The Research on the Experience and Perspective of ODA on Infrastructure Development in the Developing Countries

Final Report

March 2004

Japan International Cooperation Agency
ALMEC Corporation

Infrastructure …
Realizing People's Potentials

Infrastructure provides the basis of human life and contributes to the sustained improvement of livelihoods by supporting regional and national economic growth. Many people live under a variety of threats in the large part of the world, such as Afghanistan, Iraq and Africa. The role of infrastructure is reaffirmed for eradication of threats against human security.

In postwar Afghanistan, Japan has been undertaking the rehabilitation and improvement of war-torn roads that are indispensable for transporting urgent supplies needed for the reconstruction of the country and restoration of people's livelihoods. Japanese ODA has long been assisting in many parts of Sub-Saharan Africa including the provision of safe water for the survival of local people. Such efforts must be strengthened and expanded so as to create a safer living environment as quickly as possible and thereby help local people improve their life prospects and realize their aspirations. To understand the importance of infrastructure in ODA, it is crucial more than ever to focus on the human dimension of its development. Infrastructure must be provided in such as way that it will stimulate and activate the potential capacity of local people.

JICA will identify grassroots needs and aspirations accurately through direct contact with local people and will carry out the projects to meet their needs. In the light of manifestations of people's latent abilities, JICA will go further and beyond the traditional framework of infrastructure, and will cooperate with recipient countries in institutional and organizational development, along with taking comprehensive approach by crossing bureaucratic barriers of government agencies, countries and regions, and sectors. We hope that our support in infrastructure development will remove people's threats and will provide a firm foundation on which people can achieve their aspirations.

March 2004

OGATA Sadako
President
Japan International Cooperation Agency

PREFACE

Not for economic growth alone, infrastructure is essential for people's daily life. Lack of necessary infrastructure is often found in developing countries, therefore the needs of infrastructure development remain of great magnitude. The environment surrounding infrastructure development is changing significantly. The goal is not limited to the development of physical infrastructure but it is important to bring the new issues such as poverty reduction, human security and peace building into the scope. It is necessary to reflect the original intention of development while considering the primary role of infrastructure all the way along.

With this awareness in mind, Japan International Cooperation Agency (JICA) decided to conduct the research on the experience and perspective of ODA on infrastructure development in developing countries with particular focus on Asia. The study was conducted from October 2003 to March 2004.

Issues on development assistance in infrastructure development and its strategies were discussed in the four advisory committee meetings, having Mr. ARAKI Mitsuya, president of International Development Journal Co., Ltd, as chairperson, and among the working group consisted of staff from the Social Development Study Department and Agriculture, Forestry and Fishery Development Study Department of JICA. In addition, study team headed by Mr. SHOYAMA Takashi, ALMEC Corporation conducted a study including three field surveys.

During the course of study, views and opinions were exchanged with donor agencies including Japan Bank for International Cooperation (JBIC), World Bank (WB) and Asian Development Bank (ADB), and questionnaire surveys and interviews on financial and technical ODA on infrastructure development projects were conducted in three countries namely Thailand, Malaysia and Philippines. On the basis of the results of field surveys, literature research in Japan and results of hearings, issues on infrastructure development and strategies were summarized, and a public symposium was held. At the last, the report summarizing the study results is completed here.

The report reviewed the past performance of Japanese ODA towards developing countries and important views in providing infrastructure services hereafter from the viewpoint focusing on the human dimension in developing countries were elaborated on the basis of the findings.

Japanese technical and economic cooperation in infrastructure has been heavily directed to Asian countries. Therefore, the discussion mainly focused on major issues found in these countries. The needs for external assistance would be different in other parts of the developing world, reflecting the variations of natural environment, historical and cultural backgrounds, and different manifestations of poverty. An entirely different approach is required to provide economic and technical cooperation to war-torn nations.

In order to provide effective ODA on infrastructure development depending on the regions and local situations, it is necessary to start from the accurate understanding of local needs and to provide consistent cooperation through the line of process from planning phase to the stage of confirming the outcomes. In addition, it is important to keep asking what is the role expected of infrastructure. Only such ceaseless effort enables to fulfill the original function of infrastructure development; development that reaches to the people's hopes, and to make infrastructure as an imperative tool to tackle new issues, such as poverty reduction, human security and peace building.

I hope this report will contribute to the improvement and enhancement of development assistance in infrastructure field. In closing, I would like to express my sincere gratitude for all those concerned for their cooperation and assistance extended to this study.

March 2004

MATSUOKA Kazuhisa
Vice President
Japan International Cooperation Agency

The Research on the Experience and Perspectives of ODA on Infrastructure Development in the Developing Countries

EXECUTIVE SUMMARY

This report contains the results of the 2003 study on infrastructure-related projects which the Japan International Cooperation Agency (JICA) conducted for the past 30 years. It clarifies the past disappointing performances regarding Japan's cooperation with developing countries in the field of infrastructure. It presents problems, and then examines what mode of cooperation Japan, and/or JICA, should proffer in the future. The examination and prognosis were carried out through analyses of reports written by JICA and other donors, conduct of individual interviews with experts and persons involved and questionnaire surveys as well as discussion with Advisory Committee led by five academic experts.

Why Infrastructure Now?

1. Infrastructure for People

Infrastructure is a requisite for human survival, livelihood, and social development, and helps in securing the right of people to live safely, as well as lead harmonious and stable lives. Roads are necessary to access health care and medical facilities, irrigation is vital in gaining food stability and security, to name just a few. A cross-country analysis conducted in the study showed that there is a high correlation between infrastructure and levels of social development.

Infrastructure likewise supports both national and regional economic growths, improves the quality of people's lives by redistributing wealth, and helps in securing the continuous improvement of that quality. Again, the cross-country analysis showed that there is a strong correlation between GDP per capita and infrastructure stocks and that infrastructure stocks and economic levels are closely related to each other as well, although this does not indicate a causal association between the two.

2. Infrastructure Bottlenecks: Obstacles to Development

There are now approximately 1.1 billion people in the world who live in absolute poverty, earning an income of only about one dollar or less per day. What exacerbates the situation is that the level of economic infrastructure deemed indispensable to growth is low in poor countries, which makes independence and sustainable development difficult to pursue. In the developing countries, infrastructure stocks remain at around a tenth of that in advanced countries. Aid is definitely required in this situation. However, the level of aid has been declining since its peak in the latter half of the 1990s. The total amount of aid for developing countries has decreased drastically, partly because of the increase in emergency loans following the 1997 financial crisis. Investment from the private sector has also severely dropped, with the total amount of investment in infrastructure seeing a decline in recent years.

3. Lessons from Past Experiences

Analysis of past development assistance in infrastructure showed the following: first, effective actions to address the infrastructural gap could not be taken – the fund supply was insufficient and the expected infusion of private sector money did not materialize. Second, services did not get to the intended beneficiaries. This meant that what the beneficiaries needed was not actually provided successfully. In addition, offering infrastructure services brought about negative effects. Specific instances include the deterioration of residential environment due to relocation of residents, destruction of the natural environment, excessive demand estimates, and increased traffic accidents.

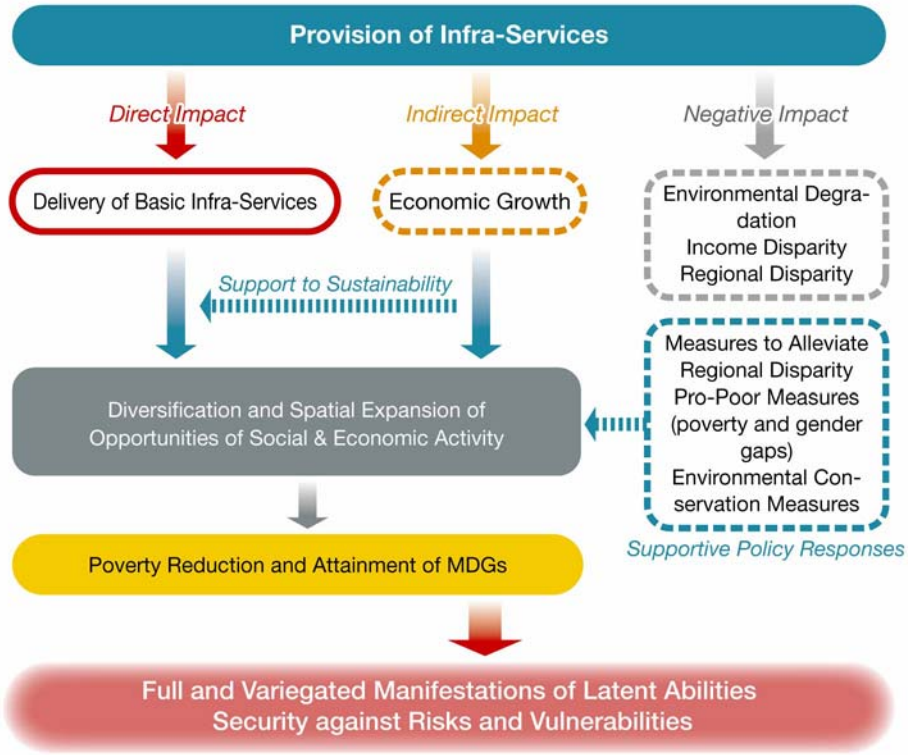
Based on these findings, aid agencies have continued various efforts, which, however, are not yet sufficient and still have much room for improvement.

Five Focal Views on People's Infrastructure

1. Infrastructure Redefined

The examination of infrastructure's role has shown that attention should not be focused only on facilities, such as roads, bridges, and electric power stations, but also on the services these facilities offer to the people. The basic aim of these services, which is to "improve the conditions where people exist," must be followed through. The purpose of "redefining infrastructures" is to change old ideas and perspectives on what infrastructure is.

Mechanism for Infrastructure to Contribute to Development Goals



There are two major paths wherein infrastructure can realize human potentials and security. One is infrastructure improvement that brings about a direct effect on a specific target such as the

improvement of social infrastructure like waterworks and sanitation. The other is economic activation that includes large-scale core infrastructure and the reallocation of benefits that contribute to development goals. Whether or not this path will actually lead to human satisfaction partly depends on the manner of governance in a developing country. Without economic growth, the sustainability of social infrastructures that bring about direct benefits cannot be ensured. This path, therefore, has an important meaning. Where any negative effect is supposable, it is necessary to make an effort to pursue a path that will lead infrastructure to the realization of human potentials by minimizing its impact through complementary measures and policies.

In this study, infrastructure is defined as "a common foundation necessary to achieve development goals such as poverty reduction, the Millennium Development Goals (MDGs), which will ultimately allow the people to realize their capabilities." The word "redefinition" is boldly used to posit the view that realizing people's potentials is an important role of infrastructure.

2. Field-level Initiative in Goal Setting

Along with the redefinition of infrastructures, it is necessary to make infrastructure goals that reflect real people's needs with various characteristic features. Beneficiaries of infrastructures are diverse and their needs are also varied, so it is considerably difficult to exactly grasp them. Although poverty reduction and MDGs are internationally agreed goals, these are ambiguous from a field-level perspective and are not necessarily recognized by the aid recipient country.

Infrastructure should have a long term and provide a regional structure for long periods of time. The Champs Elysees in Paris and Rome's ancient aqueducts are good examples of this. In order to set long-term goals, it is necessary to heed not only current conditions (e.g. urbanization, decentralization, and globalization), but also long-term trends and long-range movements (e.g. energy problems and greenhouse effects).

3. Integrated Approach

A program approach is important because of the view that it is necessary to take a more comprehensive and more effective method, based on a redefined infrastructure and an upgraded method of goal setting.

So far, both development and assistance to rural areas tended to lack uniformity in approaches regarding infrastructure. The reasons for this were poor governance and discontinued plans due to political power shifts, in the case of developing countries; and overlapping assistance and complicated procedures, in the case of assisting countries. Without any unified approach, consistency of assistance cannot be expected, and the realization of usual effects will be halved at best. To secure uniformity, it is necessary to clarify the respective priorities of a series of projects (including the field of management such as institutions, organizations, and personnel capacity development) for development goals and then to take a programmatic approach.

A programmatic approach is defined as "a method to implement various projects (operations), policies and/or systems necessary for the achievement of a goal set by a recipient country, after the determination of time, method, and executing agencies, while considering them as a successive organic stream."

To achieve greater impact, it is necessary to substantially increase the programs' contents. It is also

necessary to expand their components from single projects to interrelated policies and personnel development, as well as to expand the membership of the main stakeholders to include not only the governments of developing countries and donors, but also residents, nongovernment organizations, and private companies. This way the range of funding sources, sectors, and related issues also becomes wider.

To take this programmatic approach, comprehensive efforts at the policy level are important. However, since it is considerably difficult for a developing country to use this tack as a main actor, intellectual assistance to various fields, including systems, organizations, and personnel development, is a requisite.

It is important to prioritize projects in the programmatic approach, and how to deal with criteria is one focal point. Some criteria in the social aspect are, however, not quantitative, and weighing them becomes difficult as their number increases. Although there is much room to study future directional movements, two movements seem to prevail: (1) to secure transparency of decision making by presenting project information through the use of easily understandable outcome indicators; and (2) to clarify the decision-making process as shown in JICA's guidelines for environmental and social consideration.

Although poverty reduction is one development goal that has international consensus, the road to it through infrastructure development is paved with vagueness. Therefore, it is necessary to explicitly work on poverty reduction upon program formulation.

Decision making is an important element that influences all parts of a program. Accordingly, it is important to provide assistance to developing countries on various levels so that decision making can be rational.

4. Pro-poor Project Design

This is a task that needs to be done at the stage of project elaboration, after a program is formulated.

Although many projects that directly contribute to poverty reduction are those under social infrastructure, their cause-effect relationship has yet to be clarified. Here, the importance of comprehensive efforts after determining the needs of the poor and of promoting further case studies is emphasized.

Basic economic infrastructure is important for economic growth; however, its influence upon poverty reduction is indirect. It is necessary to think up complementary policies to cover for poor governance.

5. Reducing the Infra Gap

The difference in infrastructure stocks between developed and developing countries is overwhelmingly large and unlikely to be easily closed. For example, social infrastructure is at a relatively high level even in some low-income countries partly because they were part of the old Communist block where such infrastructure was comparatively high. The level of economic infrastructure is, however, still very low in developing countries.

Securing a source of funds is necessary to close the infrastructure gap. While the demand for infrastructure improvement in developing countries, is 200 - 250 billion dollars per year, donor assistance is only about 10% of the total amount. Infusions from private investment have been down by half since the latter half of the 1990s. There is a trial calculation of funds needed for operation and

maintenance, which is a similar amount.

This basically requires developing countries to grow economically and then to secure public funds. Measures to recover private investment are also important. Regarding aid, it is important to give assistance in policies for securing sources of funds and in personnel development related to them.

To close the infrastructure gap, strategies at each stage of development in the developing countries are important. Generally, the efficiency of investment in infrastructure tends to be higher in middle-income countries. This is because, in low-income countries, the investment environment has yet to improve and problems still remain with governance and sustainability along with the fact that marginal utility of investment goes down in high-income countries. Can low-income countries invest in infrastructure? Yes, they can. Even small investments have considerable effects in reducing the poverty rate when incomes are low. In low-income countries, the major emphasis is on poverty reduction, sustainable development, improvement of the investment environment and improvement of governance. In middle-income countries, it is the improvement of private investment environment and the formulation of business models.

In the need for infrastructure at each stage of development, emphasis for low-income countries is placed on social infrastructure and infrastructure related to primary industry. In lower-middle income countries, it is on infrastructure suitable for urbanization, infrastructure related to industrialization. For upper-middle income countries, emphasis is on an advanced type of infrastructure, and infrastructure that enhance safety and amenities as well as maintenance. Emphasis regarding technological needs is placed on the construction of basic systems in low-income countries; on the integration and efficiency improvement of systems in the lower-middle income countries; and on the introduction of techniques on a high order and thoughtful consideration for external diseconomy in upper-middle income countries. What is important in the systems, organizations, and personnel development by development stage, is a basic framework for an investment environment and the improvement of systems in low-income countries; in lower-middle income countries it is financial system, business techniques, and incentives for private investment; and in upper-middle income countries, it is management and operation as well as methods of evaluation.

Considering the needs for infrastructural assistance at each development stage, there is an issue regarding what direction future assistance should take concerning countries at the relatively high stage of development. In East Asia, it can be said that, generally, even in middle-income countries, such as Thailand, Malaysia, the Philippines and China, the difference between advanced countries is still large and the need for infrastructure, as it were, is also strong. As characteristics of the need for infrastructure, first of all, "cross-border infrastructure" is highlighted. The necessity of cross-border infrastructure arises from the movement toward regional economic integration such as globalization and free trade agreements (FTA). The importance of investment in environmental preservation becomes greater. In middle-income countries, as industrialization and motorization expands and elements of environmental destruction become stronger, assistance related to the environment is important. It seems that special attention must be given to China, because of its direct threat to Japan. As for regional disparities, there is a difference of six to seven times in the average income among provinces even in Thailand and Malaysia. As governments of developing countries give priority to areas with good efficiency of investment, donors must study measures to correct these regional disparities. In middle-income countries, the request for new or advanced technology is strong. This has been endorsed by results of interviews in Thailand, Malaysia, and the Philippines. It seems that technical cooperation and intellectual assistance related to new and/or advanced technology will be important in the future.

6. Actions by JICA

1) Toward a “People’s Infrastructure”: Infrastructure Redefined

JICA is making preparations to initiate a number of case studies that will clarify how dormant abilities can find paths to self-empowerment in a new milieu provided by project implementation. Study findings will be analyzed and pooled as a common stock of knowledge for subsequent project planning and implementation.

2) Field-level Initiative in Goal Setting

JICA has been strengthening its field-level initiatives throughout the process of project preparation, namely culling relevant goals from accurately collected local needs; presenting tradeoffs between goals to stakeholders in the proposed project; fine-tuning forecast methods regarding long-term social and economic prospects and technological changes, thereby deciding on project goals and components by envisioning long-term, pro-people outcomes, and presenting an image as vividly as possible of the expected “outcome” of project implementation so that potential clients would be able to judge wisely and rationally. In addition, technical cooperation efforts are being improved toward capacity development among the counterpart personnel to enable them to adapt to project goals and components.

3) Fully Rewarding Service Delivery: An Integrated Approach

JICA has been strengthening its issue- and region-specific capabilities, as well as upgrading the functions of its overseas offices, with clear commitment to the promotion of the integrated approach in infrastructure development in its technical cooperation agenda. Primary focus will be on the development needed for the integrated approach. In view of the growing trend of globalization, JICA recognizes the mounting importance of infrastructure development across borders and will support the formation of cross-border transport development strategies in Africa, the Middle East, and Eastern Europe. Regarding the urban sector, where the complex problems of land use, transportation, water supply and sewerage, housing, and so on are closely interlocked, it is considered necessary to pursue an integrated approach.

It also has gained support for integrating rural development projects in many parts of the developing world and plans to fine-tune its technical contribution by devising methods to improve the sustainability of rural projects have been supported. Concomitantly, intellectual support will be expanded and strengthened for building decision-making capabilities of key actors in rural development.

4) Concepts for Designing Empowerment: Pro-Poor Project Designs

Pro-poor projects are not very many in the infrastructure sector. They are mostly small projects. Because nothing much is known and recorded about the possible poverty reduction impacts of large-scale economic infrastructure projects, JICA has begun to collect relevant information to understand the mechanisms of poverty reduction. It is also making joint preparations with other organizations to study design details of large infrastructure projects implemented through concessionary loans.

5) For People in Asia, Africa, etc.: Reducing the Infrastructure Gap

JICA has been increasing its technical cooperation for countries trapped in an especially large infra gap and capacity development for better operation and maintenance. For developing countries that have reached a higher stage of economic development, technical cooperation will be provided on the issue of environmental conservation that involves the application of

advanced technology. By noting the different stages of development among recipient countries, JICA provides technical cooperation for institutional development which is necessary to attract private investors in infrastructure, thus contributing toward the increase in infrastructure stock. A variety of training programs are available for capacity development related to infrastructure development and management, including public-private partnerships. In addition, technical cooperation will be offered on fiscal system development to increase public sector financing for infrastructure development.

The Research on the Experience and Perspective of ODA on Infrastructure Development in the Developing Countries

FINAL REPORT

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ACRONYM

ADB	Asian Development Bank
BHN	Basic Human Needs
BOO	Build-Own-Operate
BOT	Build-Operate-Transfer
CDF	Comprehensive Development Framework
D/D	Detailed Design
DAC	Development Assistance Committee
DfID	Department for International Development
EIA	Environmental Impact Assessment
F/S	Feasibility Study
FTA	Free Trade Agreement
GDI	Gender Development Index
GDP	Gross Domestic Product
GNP	Gross National Product
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit
HDI	Human Development Index
HIC	High Income Country
IEA	International Energy Agency
ILO	International Labor Organization
ITS	Intelligent Transport System
JBIC	Japan Bank for International Cooperation
JICA	Japan International Cooperation Agency
LIC	Low-income Country
LMIC	Lower-middle-income Country
M/P	Master Plan
MDGs	Millennium Development Goals
MIC	Middle-income Country
NEPAD	New Partnership for Africa's Development
NGO	Nongovernment Organization
O&M	Operation and Maintenance
ODA	Official Development Assistance
OECD	Organization for Economic Co-operation and Development
OECF	Overseas Economic Cooperation Fund
PFI	Private Financing Initiative
PHRD	Policy and Human Resources Development Fund
PKO	Peacekeeping Operations
POVNET	Network on Poverty Reduction
PPIAF	Public-Private Infrastructure Facility
PPP	Public-Private Partnership
PRSP	Poverty Reduction Strategy Paper
SWAps	Sector Wide Approaches
UMIC	Upper-middle-income Country
WB	World Bank

Introduction

1) Background and purpose of the study

(1) Background

Poverty is widespread in many developing countries, including those in Asia. These countries are characterized by deteriorating urban environments caused by urban population explosions, and impoverished rural communities. They endure loss of human lives and suffer from physical damages due to the frequent occurrence of natural disasters such as flooding and earthquakes. Yet, some countries, while facing similar problems, manage to accomplish dramatic economic development. The “East Asian miracle” countries such as Malaysia, Singapore, and South Korea continue to grow economically and socially to become semi-advanced or advanced countries. In no small part, infrastructure improvement through development assistance (from international organizations and advanced countries including Japan) plays a key role in every aspect of development in the developing countries: in society, economy and environment. It therefore enhances the quality of life of the public at large. Japan’s post-war reconstruction provided vast experience in infrastructure improvement and economic development techniques. This experience was gained even before Japan became an advanced country, and is extensively applied in the design of Japan’s development assistance to other countries.

Today, there still exists a wide gap in the level of infrastructure stock between advanced and developing countries. The value of infrastructure stock per capita exceeds US$ 9,000 in advanced countries. In the middle-income countries, it is only $1,125 per capita (or 1/8 of the value in advanced countries), and in low-income countries, it is merely about $700 per capita (or 1/13 of that of the advanced countries). The gap tends to widen if one looks at the average values across countries. The disparity in level of infrastructure development is more pronounced in economic infrastructure than in social infrastructure. And poor social infrastructure hampers economic development and the improvement of the quality of life and the environment.

Japan, for quite a long time now, has been providing development assistance, including for infrastructure development. The thrusts, form, modality and practices of Japanese aid are recently being given serious re-thinking given the experience so far and to respond to changing development situations (between nations or regions) and to shifts in aid paradigms (for example allowing greater citizen participation in aid programs, leveraging with private funds, bigger role for NGOs, etc.). As the main aid agencies have diversified to respond to such changes, it even more becomes necessary to work beyond conventional frameworks in development assistance. For instance, infrastructure development is being reconsidered as a major component of development programs by other donors such as the World Bank (WB), the Asian Development Bank (ADB), the Japan Bank for International Cooperation (JBIC), the Organization for Economic Co-operation and Development (OECD), and the United Nations Development Programme (UNDP).

Because the environment and culture of assistance for developing countries have varied since the 1970s when it went into full swing, it is also necessary for Japan to consider these paradigmatic changes, conduct frequent dialogue, and reflect them in the core philosophies and activities of its aid policies. As Japanese assistance is large in size and diversified in form, it has a significant effect not only on Japan’s economy, but also on the programs of the

donor community and developing countries. Therefore, it is important to clarify the principles and policies of Japanese assistance and to make them known widely at home and to the international audience.

This study intends to obtain a general view of the achievements of and lessons from infrastructure development projects supported by Japan in developing countries. At the same time, it aims to assess the role of Japan in future world development in general, and, in particular, in developing infrastructure in developing countries, including those in Asia. It also aims to recommend the ideal form of cooperation the Japan International Cooperation Agency (JICA) should extend to improve infrastructure in developing countries.

(2) Purpose and Objectives

The main purpose of this study is to assist in improving the efficiency of and enhance the benefits from infrastructure projects supported by Japan's official development assistance (ODA). These projects include mainly the development of transportation, urban development, and agricultural and rural development. The study also seeks to evaluate the JICA portfolio with the view of making suggestions concerning its future role. More specifically, the concrete tasks under the study are as follows:

A. Review JICA's experiences in development assistance in infrastructure development, highlighting, from the social, economic and environmental viewpoints, the outcomes and impacts of infrastructure in developing countries, and draw lessons from them.

B. Suggest an ideal model for infrastructure development , particularly for developing Asian countries and for ODA projects related to infrastructure development, especially technical cooperation; and to suggest future directions for JICA.

2) Subject and scope of the study

(1) Infrastructure covered by the study

Developing infrastructure requires relatively large amount of investments. The level of infrastructure development also defines to a large extent a country's competitiveness. In turn, the competitiveness of a country determines whether it is an attractive location for investments that will generate jobs and livelihood opportunities. Social infrastructure improvements therefore affects the lives of the poor.

However, investing in isolated and highly-localized infrastructure does not stimulate development. The benefits can only be realized if such investments are complemented by other physical and managerial enhancements. Infrastructures impact differently on people's lives and productivity; the natural, social, and economic condition of the locality, determine how infrastructures affect the way and quality of life and productivity of the workforce. The role of infrastructure evolved over the years. But in whatever form, infrastructure services and facilities are exposed to disasters or wars and the ability and capacity to immediately replace damaged or lost infrastructure facilities is important to build over time.

This study focuses on economic infrastructure among the types of infrastructure. Although aid from advanced countries and international aid agencies for social infrastructure has increased in the last 30 years, aid for economic infrastructure has decreased by more than 20% in the five-year period since 1996.

In the World Bank report, "Infrastructure for Development" (1994), "infrastructure" is a term that covers all activities related to social capital and includes structures, equipment, and facilities (which are long-lived assets), and the services derived from them. These infrastructure services are at the heart of people's lives and economic activities. In other words, inadequate infrastructure services directly bring about falling standards of living and waning productivity.

The World Bank report mentions that economic infrastructure includes the following sectors:

- **Public utilities:** Electric power, communication, waterworks, sewage systems, waste treatment, gas.
- **Public work projects:** Roads, large dams, canals, and drainage ditches for irrigation.
- **Other traffic sectors:** Urban and inter-urban railways, urban transport, ports and harbors, transportation by water, airports.

This study deals only with three key subjects: transportation, urban development, and agricultural and rural development. These were chosen because Japan has technical superiority and extensive experience on cooperation in these areas. The other infrastructure sectors such as electric power and communication are also referred to in this report but only when it is necessary to situate the three subject infrastructure sectors in the context of the macro infrastructure picture.

(2) Scope of investigation

The scope of this investigation study is as follows:

A. As a study area, Asia is generally the focus, although the entire world was covered in a macro analysis on the effects of infrastructure and in reviews of experiences. Conclusive suggestions were made for Asia. Field studies were carried out in three Asian countries, namely Thailand, Malaysia, and the Philippines.

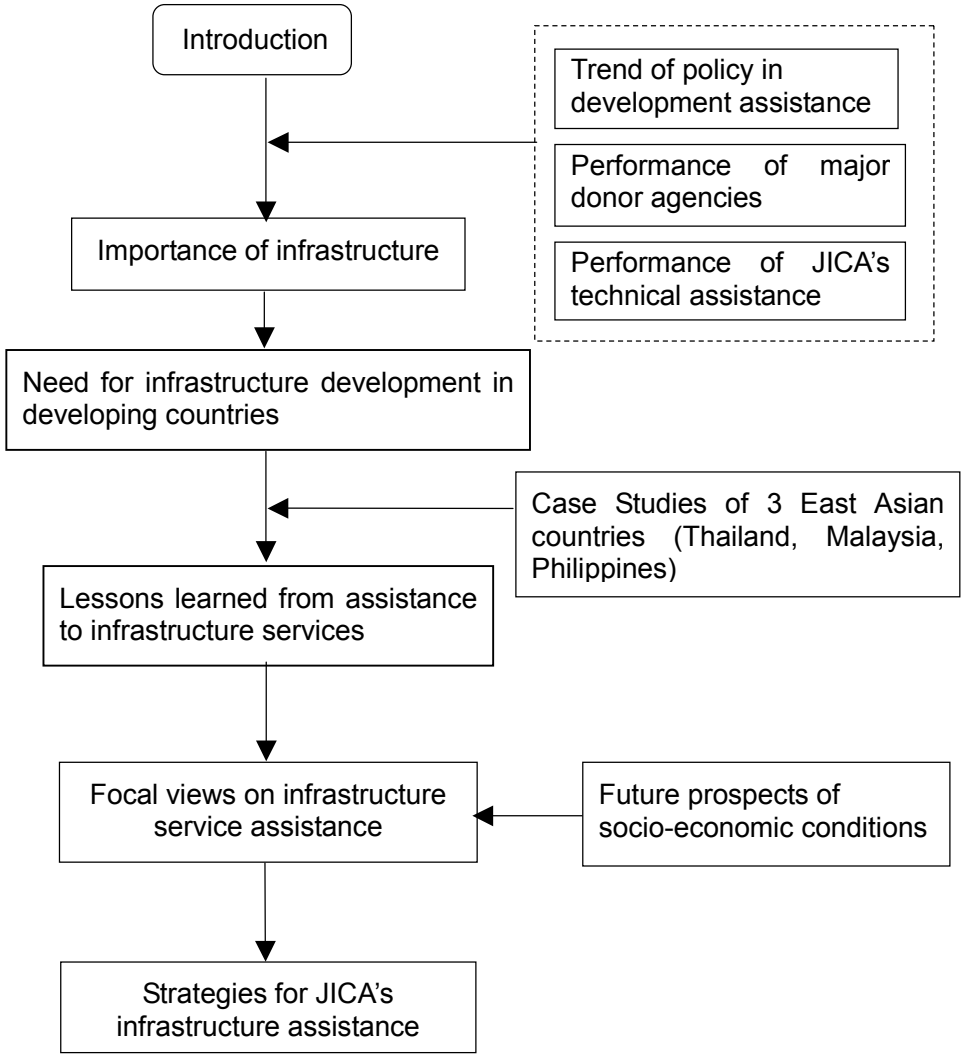
B. As fields of study, transportation, urban development, and agricultural and rural development among those related to infrastructure improvement were given particular focus.

C. The review covered projects dating from about 30 years ago.

3) Overall framework of the study

The organization of this report and the overall framework of the study are shown in Figure A.

Figure A Overall Framework of the Study



4) Methodology and organization of the study

The methodology includes an analysis of existing literature and data examination based on the results of questionnaire surveys conducted by the study team in the three Asian countries. In addition, various occasions for discussions were arranged. First, a working group (WG) for each of the three fields of study was established in the executive office. It identified success and failure cases from samples of completed assistance projects, and extracted problems and strategies in the fields of the study. Furthermore, in addition to individual discussions, regular plenary sessions of the working group were held to discuss infrastructure in general. To take concrete lessons from experiences in actual projects, discussions were conducted with well-informed independent personalities, such as consultants, and with aid agencies.

Table A

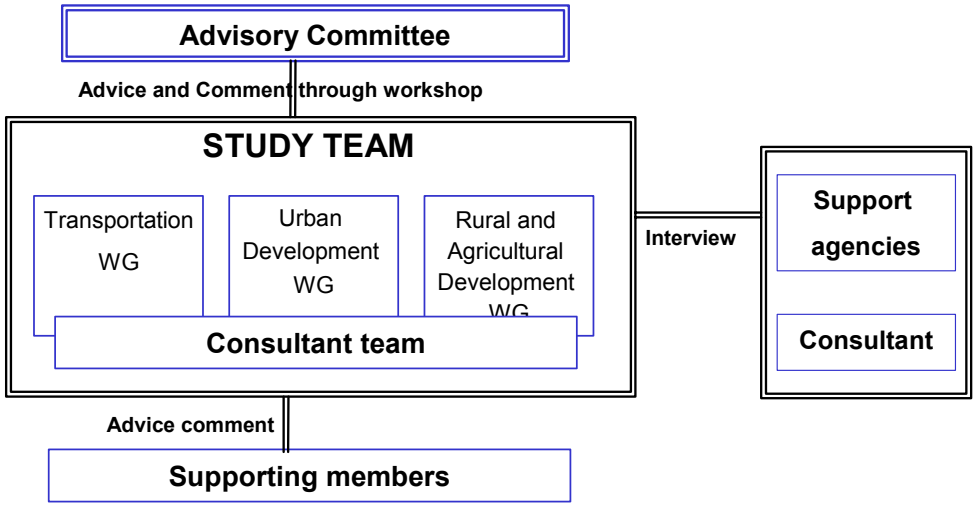
Details of Study Meetings and Seminars

	Date	Place	Number of participants	Brief
1st Study Meeting	Oct. 30	11 CDEF Conference Room, JICA	46 people	・Organized the framework and discussion points for the whole investigation.
2nd Study Meeting	Nov. 19	11ABCD Conference Room, JICA	55 people	・Regarding necessity, effect and needs of infrastructure
3rd Study Meeting	Dec. 25	International Conference Room, 2/F, JICA General Training Institute for International Cooperation	67 people	・The ideal model of infrastructure services and assistance ・JICA's infrastructure strategies
4th Study Meeting	Feb. 2	11 ABCD Conference Room at JICA	36 people	・To prepare conclusive suggestions of this study ・To prepare JICA's basic strategies
Public Symposium	March 15	Japan Federation of Economic Organizations Hall Sponsored by: JBIC, Japan Federation of Economic Organizations	342 people	・Entering a new age of ODA for infrastructure ・Experience and perspective of development assistance in the field of social infrastructure
			Lecturer Mr. MATSUOKA Kazuhisa（JICA, Board member） Mr. TANGO Keiichi（JBIC, Board member） Mr. OKAZAKI Yuji（JICA, Managing Director of Social Development Study Department） Mr. SHOYAMA Takashi（ALMEC Corporation） **Panellist** Mr. ARAKI Mitsuya（President, The International Development Journal Co., Ltd.） Mr. ASANUMA Shinji（Prof. Univ. of Hitotsubashi） Mr. OHNO Kenichi（Prof. National Gratitude Institute for Policy Studies） Dr. YOSHIDA Tsuneaki (Prof. of Takushoku Univ.) Mr. KOHNO Akira（Ministry of Foreign Affairs） Mr. ARAKAWA Hiroto（JBIC, Director of Development Assistance Department） Mr. TOMIMOTO Ikufumi (JICA, Deputy Managing Director of Planning and Evaluation Department)	

In addition to these discussions, a workshop led by five academic experts was held. They also organized four meetings with supporting agencies and consultants to discuss a broad range of problems and issues. At a public symposium held on March 15, a research presentation was conducted before an audience of about 400 attendees. Along with the results of this study, the symposium theme "Economic Growth, Poverty Reduction and the Infrastructure Gap" was tackled with a panel composed of representatives of key agencies involved in Japan's development assistance, such as the Ministry of Foreign Affairs and the JBIC. Details of the study meetings, the symposium, and panelists are shown in the following table.

The organization for conducting this study and the persons involved are shown below.

Figure B Study Organization



Persons and Agencies involved in the Study

Name	
Advisory Committee	
ARAKI Mitsuya	President, The International Development Journal Co.,Ltd
OHNO Izumi	Professor. GRIPS (National Graduate Institute for Policy Studies)
TAKAHASHI Satoru (Dr.)	Professor, Tokyo University of Agriculture
TSUNOKAWA Koji (Dr.)	Professor, Saitama University
YOSHIDA Tsuneaki	Professor, Takushoku University
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OKAZAKI Yuji (Director)	Managing Director
HOSHIYAMA Yoshiyuki	Deputy Managing Director
KUROYANAGI Toshiyuki	Director of Planning Division
NAKAMURA Akira	Director of First Development Study Division
KONYA Kenichi	First Development Study Division
Transportation Working Group	
KAKUZEN Yodo (leader)	Deputy Director of First Development Study Division
NAKAZONO Tomoyuki	First Development Study Division
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Infrastructure Development Institute (IDI), Japan
Japan Transport Cooperation Association (JTCA)
Agricultural Development Consultants Association (ADCA), Japan

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World Bank Group
Asian Development Bank (ADB)
United Nations Development Programme (UNDP)
United States Agency for International Development (USAID)
Japan Bank for International Cooperation (JBIC)

5) Organization of this report

This report is organized into four chapters, summarized as follows:

Chapter 1: Importance of Infrastructure

Infrastructure is an indispensable part of human existence and is a necessity for the security, social stability, and economic development of nations. In this chapter, the roles of infrastructures are classified according to the effects on users - *directly* from the services infrastructure provided, or *indirectly* through economic growth resulting from infrastructure development. This section confirms from the analyses and from other existing literature that such effects certainly exist. It also elaborates on how the direct or indirect effects of infrastructure are derived by the people.

Chapter 2: Need for Developing Countries to Catch up in Infrastructure Development

The levels of infrastructure in developing countries are studied and the need for infrastructure services is discussed in this section. This chapter concludes that the need for infrastructure is extremely high; that there is a wide gap in the level of infrastructure development between both low- and middle- income countries, and high-income countries; and that infrastructure needs vary depending on the stage of development of a country, and differ from region to region. At the same time, this chapter stresses the importance of motivating developing countries to intensify efforts in improving their infrastructure and to encourage private investment in infrastructure development. This is particularly relevant because development assistance traditionally assumed a big role in addressing infrastructure needs of developing countries. Yet, the financial resources available for infrastructure development are running low.

Chapter 3: Development Assistance in Infrastructure Services: Main Lessons

The main lessons presented in this chapter are derived from reports and surveys of aid agencies, from the meetings with well-informed independent personalities, and from the interviews and questionnaire surveys conducted in the three sample Asian countries, namely Thailand, Malaysia, and the Philippines. The disappointing past performance of Japan's

development assistance to infrastructure generated widespread criticisms leveled at Japanese aid in general. Clearly, it is important the Japan's development assistance should pursue a consistent and unified approach to effectively bridge the infrastructure gap. Transparency in project implementation will provide beneficiaries with effective infrastructure services.

Chapter 4: Focal Views on Infrastructure Service Assistance: The Way Forward

Flowing from the analyses in Chapters 1 to 3, an ideal model for future assistance in infrastructure is developed and suggested in this chapter. The model has five dimensions: i) infrastructure redefined, ii) field-level initiative in goal setting, iii) integrated approach, iv) pro-poor project designs, and v) reducing the infra gap. In addition, this section explains in an easily understandable manner the proposed direction of JICA's infrastructure strategies.

VOLUME I:

PAST EXPERIENCES OF

INFRASTRUCTURE DEVELOPMENT

1. Importance of Infrastructure

Infrastructure is essential for people to lead safe and healthy lives. It also plays an important role in a country's growth. In this chapter, various infrastructures are categorized based on how they impact on the people: (1) directly, if its effects are felt directly by users who derive benefits from the services provided by infrastructure, and (2) indirectly, if the benefits result from the economic growth sustained by infrastructure development. The effectiveness of infrastructure is analyzed using various data and from existing literature. How the benefits of infrastructures are delivered to the people is also illustrated in this section.

1.1 Role of Infrastructure

The word "infrastructure" comes from the Latin language of the Romans who were considered "fathers of infrastructure." Nanami Shiono's "*Roma-jin no monogatari*, Res Gestae Populi Romani," states that the Romans considered infrastructure as an essential development tool for a civilized way of living. For the Romans, infrastructure includes security, public order, taxation, health care, education, postal, currency, and poverty relief systems. It is manifested in physical assets like roads, bridges, ports, water supply, public bath houses, temples, agoras, etc. This historical background confirms that infrastructure is a timeless and fundamental tool of humankind. If one looks at modern world needs, infrastructure could likewise be defined as follows:

"Infrastructure is the basic systems and structures guaranteeing all peoples the right to live actively in safety and good health, contributing directly or indirectly to manifestations of people's latent abilities and enhancement of the quality of their lives through diversification, expansiveness, and sophistication of people's lives by improving productivity and information access, increasing exchanges opportunities, and so forth".

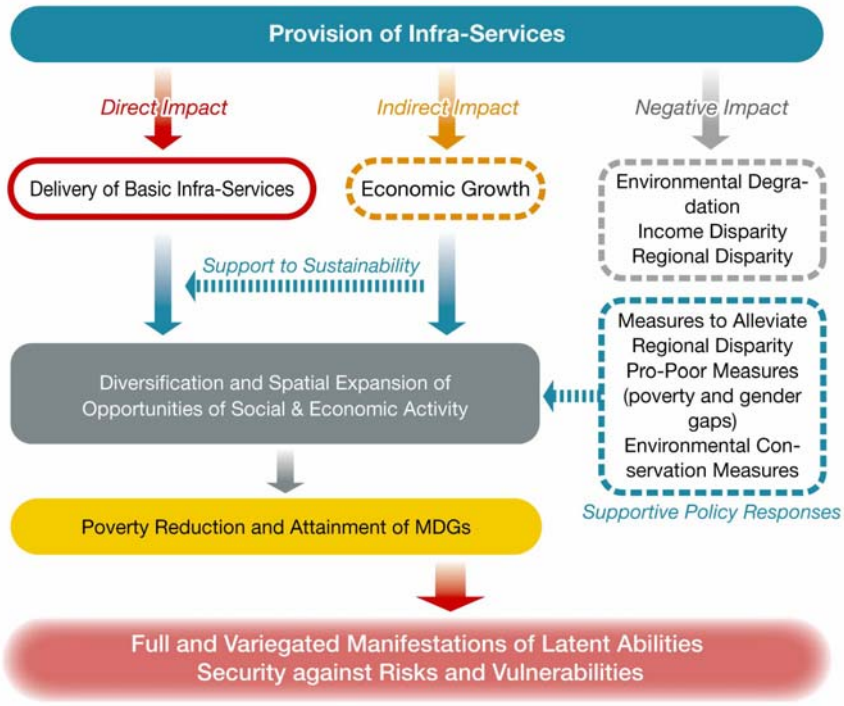
As infrastructure is vital for safe and healthy life and, more generally, the semi-economic development of a country. Infrastructure development is a crucial measure in attaining the security of human beings, sustainable development, and protection of human rights. The World Bank's poverty reduction agenda (as indicated in the World Development Report) revolve around three themes: i) economic opportunities (assistance toward achieving economic growth that, in turn, translates into providing fair market access, job creation, and better social services to the poor), ii) empowerment (inclusion of the poor in the development process, ensuring greater government's accountability and transparency), and iii) security (alleviation of the risks the poor faces, such economic crises, illnesses, natural disasters, violence, etc.). Infrastructure plays a critical role in all three themes.

As earlier mentioned, infrastructures can have either direct or indirect effects on people.

(1) Direct effect – it has direct impact on users who utilize or consume infrastructure facilities.

(2) Indirect effect – when the infrastructure development results in improved productivity, reduced transport costs, improved access, and economic growth.

Figure 1.1.1 Role of Infrastructure, Its Effects and Channels



1.2 Direct Effect of Infrastructure

1) Securing basic infrastructure access

Infrastructure has a direct effect on the improvement of the living environment. The direct impact of infrastructure services on the quality of people's lives can be felt by using or consuming such infrastructure to meet basic human needs[1)].

Although they vary depending on the kind of infrastructures or users, the direct impacts of infrastructure include the following:

- Improved people's health and well-being and decreased mortality rates due to access to clean water and sanitary. In addition, better access to clean water through piped systems frees people from the burden of transporting water, and allow them to spend more time on economic activities.
- Higher farmers' incomes as a result of agricultural productivity enhanced by the development of irrigation systems (which also alleviate agricultural damage from natural disasters like droughts).
- Improved access to markets, educational, and medical facilities as well as better mobility due to the development of community roads.
- Better access to educational medical facilities due to the construction of schools, hospitals clinics, etc.

These impacts are verified by the case study on individual projects and cross-country

[1)] In 1977, according to the International Labor Organization (ILO), BHN includes (1) essentials to satisfy a certain amount of minimum individual consumption by households including food, clothing, and shelter, and a certain amount of furniture and household goods, and (2) public services, which should be provided by the community, like potable water, sanitation facilities, public transportation, and educational facilities. Satisfying BHN is inseparable from the people's participation (employment and self-employment). Furthermore, (1) and (2) interact with one another.

comparisons on the effects of infrastructure.

(1) Effect on human development

● Infrastructure development improves human development index.

This positive correlation was found between infrastructure stocks and the human development index (HDI), a composite index that reflects people's well-being and education. The specific measure for improving general well-being is indicated in the Millennium Development Goals (MDGs). Thus, this correlation reinforces the conclusion that infrastructure development positively affects people's well-being and education. Significant advancements were found when infrastructure stocks were in the range of 1,000 dollars to 3,000 dollars. It also implies that infrastructure development have an even more significant effect when the level of infrastructure is low.

The HDI includes income index. This has to be adjusted by excluding income to make a meaningful analysis of the relationship between the HDI values and infrastructure stocks. The analysis shows that HDI values increase when infrastructure stocks exceed $1,000. However, the impact tapers off once the value of the infrastructure stocks exceed $2,000. This implies that infrastructure development increases the HDI more in low-income countries.

Figure 1.2.1 Infrastructure Stocks and Human Development Index, 2000

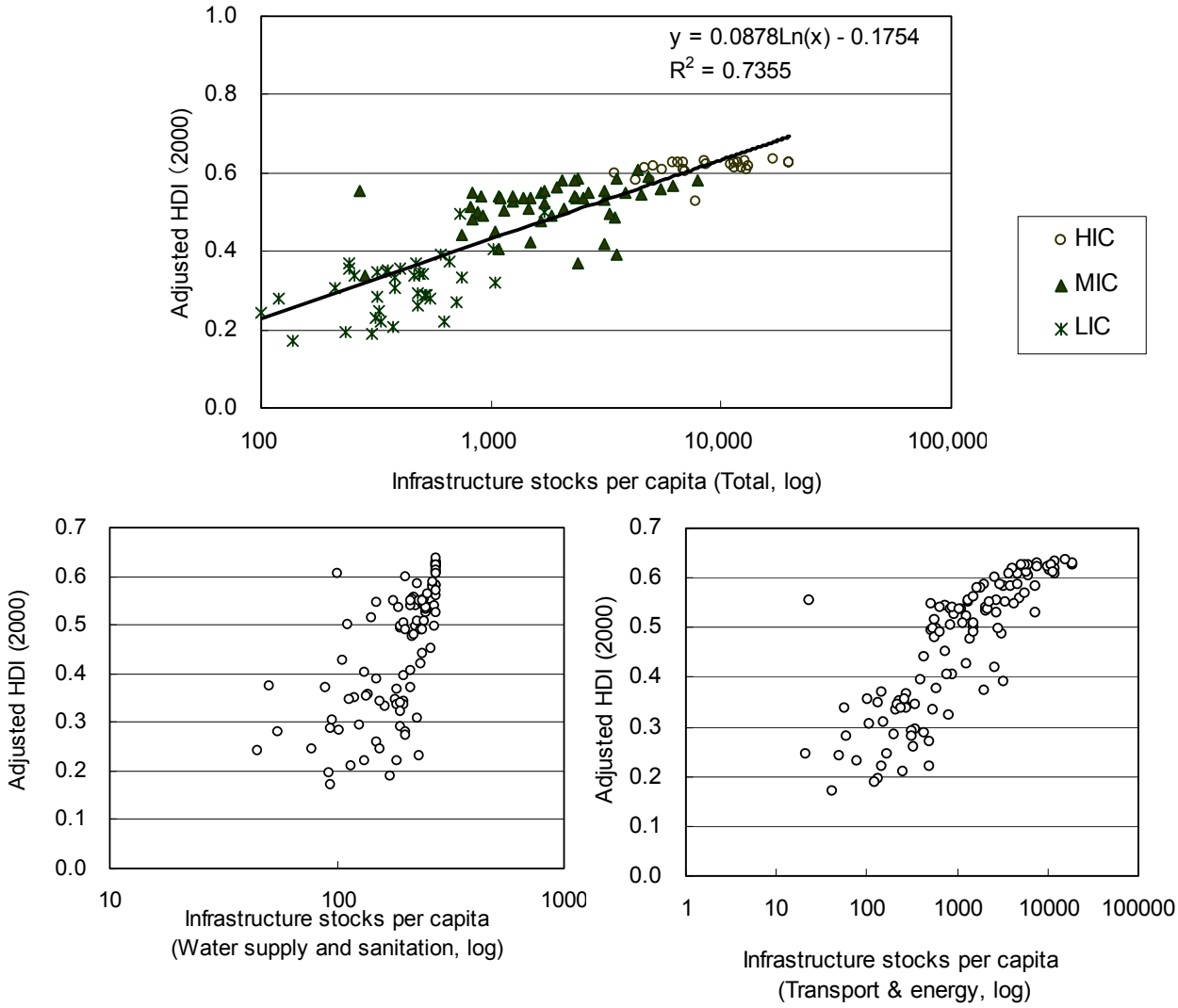
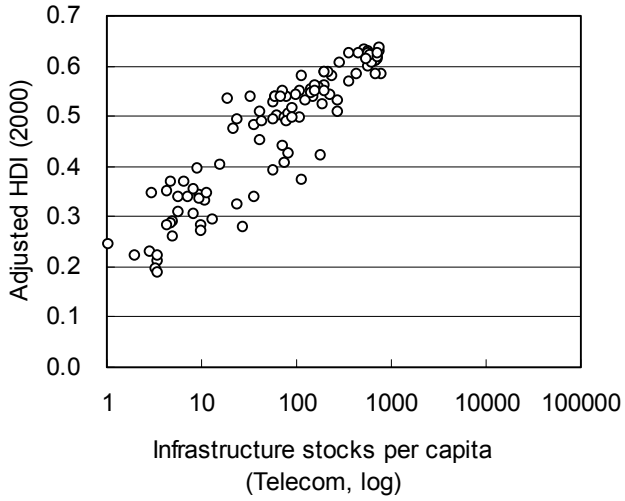


Figure 1.2.1 Infrastructure Stock and Human Development Index, 2000（continuation）



Source: “Adjusted HDI” was calculated using UNDP HDI database. Infrastructure stocks were formulated using World Development Indicators (2003), M. Fay & T. Yepes, 2003: “Investing in Infrastructure: What is Needed from 2000 to 2010”, World Bank Policy Research Paper 3102, July 2003.

Notes:

1. Adjusted HDI is a composite index aggregating the following three dimensions: life expectancy (years), adult literacy rate (15 years old or older, %), and school attendance rate at primary, secondary and tertiary levels (%). Its maximum value is 1.0. Higher values are better. Adjusted HDI is HDI excluding income.
2. Infrastructure stocks per capita was obtained by aggregating the stocks for energy, roads, railway, water and sewage, fixed telephone lines, mobile phones for each country as of 2000, multiplying each item by their respective average unit prices, and then dividing the aggregated sum by population.

Infrastructure Sector	Unit Price ($)	Unit
Energy	$ 1,900	per kilowatt of generating capacity, including associated network costs
Roads	$ 410,000	per kilometer of two-lane paved road
Railway	$ 900,000	per kilometer of rail, including associated rolling stock
Sanitation	$ 700	per connected household
Water	$ 400	per connected household
Mainlines	$ 400	per line
Mobile	$ 700	per subscriber

There is, however, no correlation between the Gini index and infrastructure stocks. Thus, separate soft measures that aim for a reallocation of income is needed to enhance the effectiveness of poverty reduction through infrastructure development.

(2) Effect on health improvement

● Development of water and sewage systems lowers mortality rates, while the development of roads and other physical infrastructures enhances accessibility to medical facilities.

Good living conditions and good access to medical services, when needed, are important to people’s well-being.. To reduce infant and child mortality rates. For example, the development of medical services alone is not sufficient; improvement in children’s and mother’s literacy rates, income levels, and access to water are likewise insignificant factors to ensure low infant and child morbidity.

To illustrate, an evaluation of a bridge project in Bangladesh was undertaken. The review showed that the bridge construction contributed to enhanced medical care standards, better

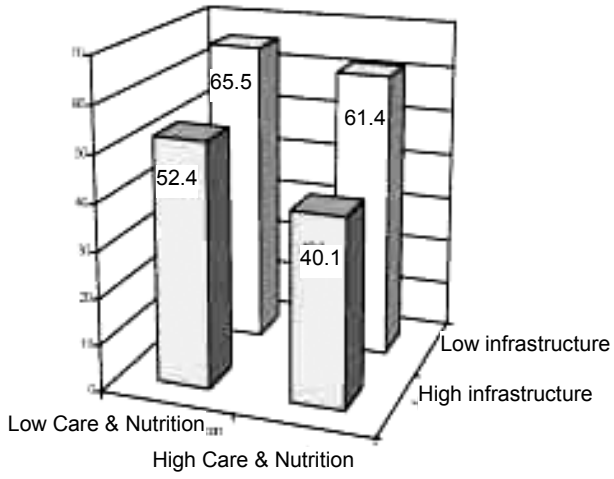
access to medical facilities and the availability of more medical and pharmaceutical supplies (Infrastructure Development Institute-Japan, Ministry of Land, Infrastructure and Transport. 2001. *"Infra-project no kokabunsekichousa*" [Analysis of infrastructure project effects]).

- **Meghna Bridge and Meghna-Gumti Bridge**: Nearly 70% of the people wanted to change their hospitals or clinics in search of a better medical service. These bridges provided people easier access to higher level of medical services and better facilities that are only available in Dhaka. As a result, the share of people who answered "good" on the local medical facility environment after using these bridges jumped significantly to 56.6% from the previous 0%. Doctors who answered "no problem" in obtaining medical products dramatically increased to 70% from the previous 5%.
- **Jamuna Bridge**: Because of the bridge construction, over 60% of the people reported to have changed their hospital or clinic to those they consider of better quality compared to those where they normally went for treatment before the bridge was constructed.

The above observations are shared by a World Bank report authored by Danny Leipziger, Marianne Fay, Quentin Wodon and Tito Yepes (2003) who elaborated on **infrastructure vis-a-vis infant mortality rates and children's well-being**. GDP per capita and women's literacy rates have a significant impact on infant and child well-being and mortality rates. Medical and healthcare measures alone are not sufficient, and implementation of comprehensive efforts including infrastructure is required. Access to clean water is important to reduce infant and child mortality rates, while hygiene and the availability of a floor in poor dwellings are effective measure against malnutrition. Electricity also positively affects people's well-being. Before the advent of electricity, people used firewood for lighting, energy sources that are not only inconvenient to use and of poor lighting quality; its widespread use also has environmental impact.

Figure 1.2.2 Infrastructure, Health Care and Infant Mortality: Stylized Relationships, 2000

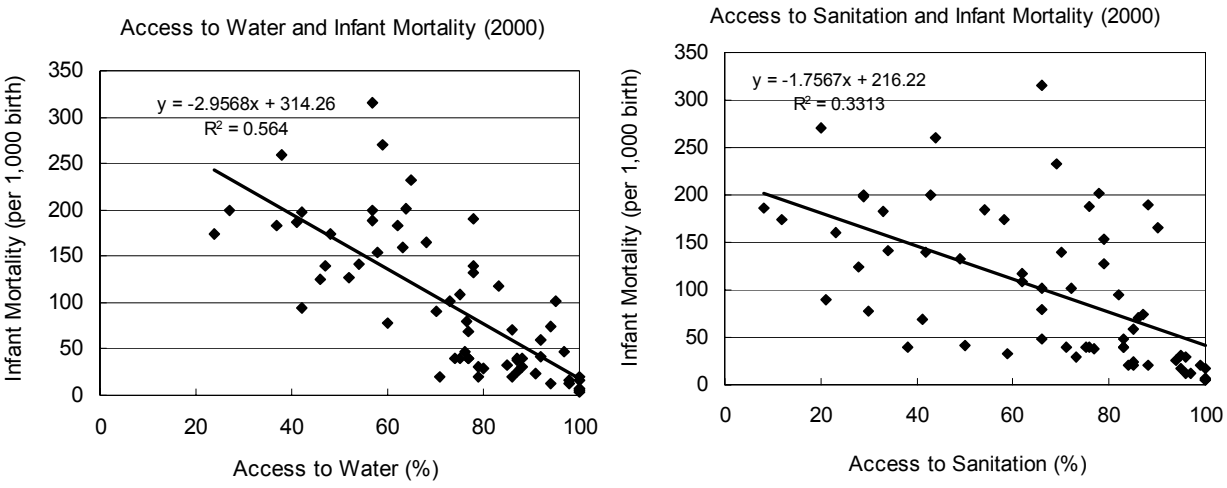
Infant Mortality Rate (Corrected by income effect)



Source: Danny Leipziger, Marianne Fay, Quentin Wodon and Tito Yepes. 2003. "Achieving the Millennium Development Goals: The Role of Infrastructure" (World Bank Policy Research Working Paper 3163)

The cross-country analysis on the relationship between infant mortality rates and infrastructure showed that access to potable water and sanitation reduces infant mortality rates.

Figure 1.2.3 Infant Mortality Rates and Access to Water and Sanitation, 2000



Source: Human Development Report, 2003

The development of roads and transportation broadens people's exchanges. However, it also makes people more vulnerable to epidemics even if it improves access to medical facilities (because roads facilitate movement of people with contagious diseases). In addition, hygiene and sanitation improvement are effective means to combat epidemics. However, in the case of HIV/AIDS, there is no evidence that sanitary conditions infrastructure stocks have any bearing in the fight against this disease.

(3) Education and gender

● Infrastructure has a positive effect on women's advancement and access to educational institutions.

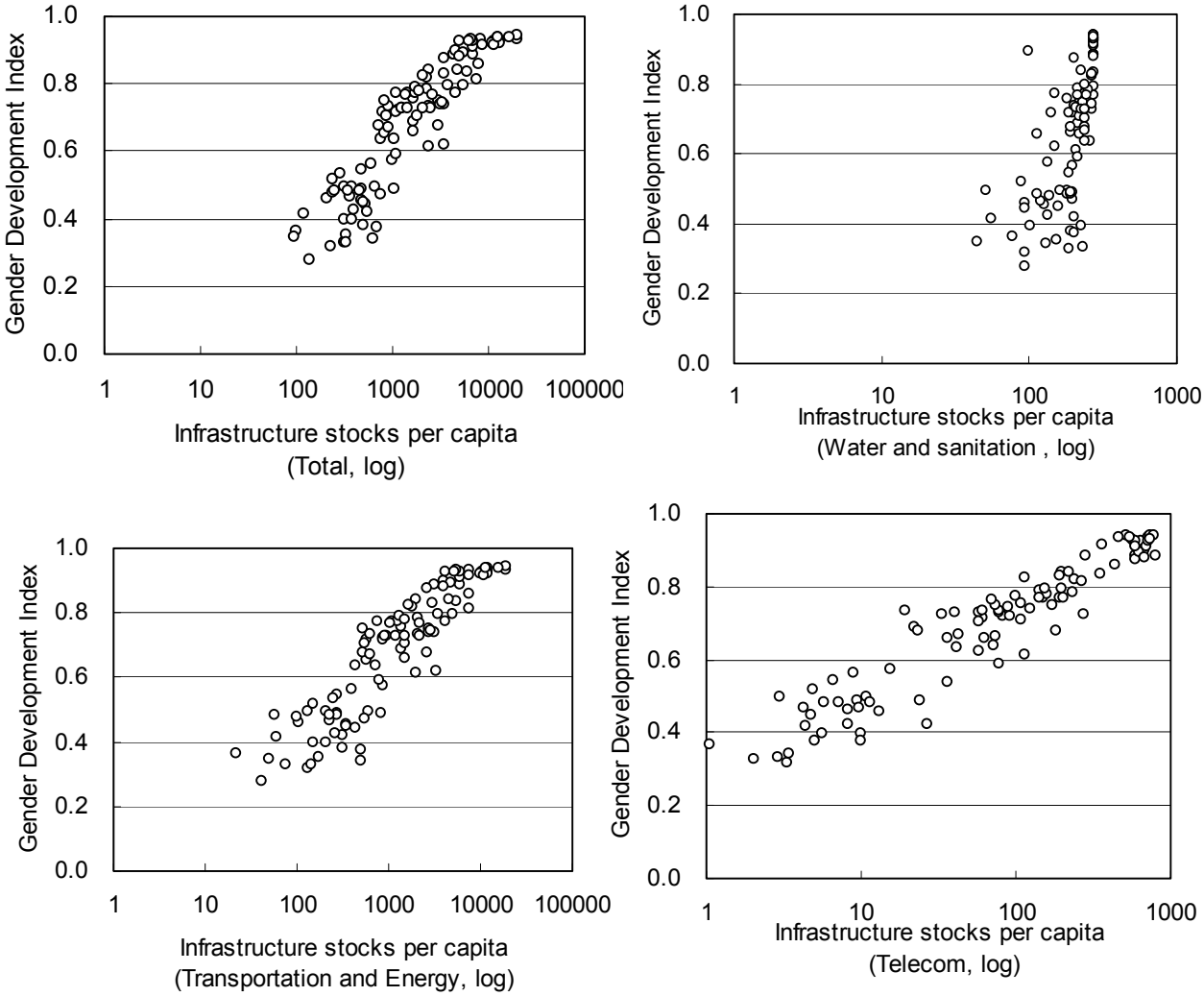
In a number of cases, the improvement of roads and transportation provides better access to educational institutions, allowing children who, otherwise, would not have enough time to now go to school. Likewise, the provision of clean water supply and electricity reduced women's domestic labor, and as a result, improves women's school attendance rate.

- In South Africa alone, women walk daily to draw water from a distance equivalent to circling the earth 319 times (The World Bank. "Infrastructure Services – The Building Blocks of Development"). Provision of safe water provided immediate benefits for women and children.
- In education, transportation brought about positive effects including shorter commuting time and better traffic safety. Improved access to water facilitated women's school attendance, and electricity promoted studying as well (Danny Leipziger et al. 2003. "Achieving the Millennium Development Goals – The Role of Infrastructure").
- Following a bridge construction, improvement was made on existing educational institutions and new schools were built (Infrastructure Development Institute-Japan, Ministry of Land, Infrastructure and Transport. 2001. *"Infra-project no kokabunsekichosa"* [Analysis of infrastructure project effects]).

As a macro validation of these effects, the cross-country analysis showed a clear correlation between gender development index (similar to the HDI index) and infrastructure stocks. Economic infrastructures, particularly transportation and energy, have significant positive impact on gender issues. The reduction of domestic labor (brought about by easier access to, say, water) allows more time for other productive tasks and positive incomes and, therefore,

ultimately create positive effects on women's general welfare.

Figure 1.2.4 Gender Development Index and Infrastructure Stocks, 2000



Source: Gender development index; UNDP, "Human Development 2003," Infrastructure stocks; M. Fay & Tito Yepes, 2003.

Note: Gender Development Index（GDI）is a composite index aggregating gender disparity in life expectancy, literacy, educational attendance, and income. A GDI of 1.0 indicates no disparity between the sexes.

(4) Safety

● Development of infrastructure is necessary to prevent and mitigate damage by natural disasters, traffic accidents, etc.

Infrastructure is indispensable for protection against natural disasters like earthquakes, volcanic eruptions, floods, and landslides, as well as in evacuation and reconstruction work. For instance, embankments have been built since ancient times to prevent flooding. During the Kansai Awaji Earthquake, roads prevented fire from spreading. Without airports, ports and harbors, relief operations would be very difficult.

Current estimates are that the cost of traffic accidents amounts to 1-3% of the GDP in the developing countries where there is undeveloped transportation infrastructure to handle the burgeoning number of automobiles.[2)] The development of roads and related facilities is,

[2)] Cost of traffic accidents: "Road Safety Guidelines of the Asian and Pacific Region", ADB. Following the

therefore, a major issue for traffic safety.

The impacts from disasters are greater on poor and on low-income countries. The poor is more vulnerable to traffic accidents as they tend to reside in high-risk areas. Infrastructure development that enhances safety especially of the poor is therefore important. In times and places of conflict, infrastructure that supports, for example, transport of safe water and daily commodities becomes an integral element of human survival.

2) Impact of infrastructure on poverty reduction

The UNDP homepage in the internet declares that: “Poverty is a situation where there is a lack of access to essential goods and services including education, job, foods health care, safe water, shelter, energy, etc. Extreme or absolute poverty is a situation where there is lack of minimum food to sustain life and there is a state of difficulty to carry out a harmonious life with dignity (UNDP home page)”.

Following this definition, a great number of people in developing countries live in poverty because a large section of the developing worlds’ population has no access to safe water and to transportation services, and they lack basic infrastructures to meet basic human needs.

The direct effect of infrastructure development on poverty is yet to be established empirically. However, there is evidence that infrastructure plays a substantial role in reducing poverty. For example, the development, improvement and rehabilitation of infrastructure itself generate employment. And employment creation effectively contributes to poverty reduction. Public works create jobs for the poor and their income increases as a result of the job creation. Community capacity is also developed by involving them in the operation and maintenance of infrastructure facilities.

3) The MDGs and infrastructure development

As stated above, infrastructure brings about various social development effects including poverty reduction, sustenance of human beings, women’s social participation, and the accessibility of education, whether indirectly or directly through economic growth. Currently, the Millennium Development Goals (the MDGs[3)]) are shared among the international development community as achievement goals for poverty reduction, wherein the role of infrastructure to achieve the MDGs are studied.

Infrastructure is deeply linked to the MDGs. The contributions of infrastructure to the achievement of the MDGs are as follows:

(1) Economic effects such as economic growth, which, in turn, translates into job creation that is essential in reducing poverty.

(2) Improved access to the necessities and conveniences in daily life.

(3) Provision of water, sanitary facilities, etc.

The hypothetical correlation with infrastructure development against each goal is as follows:

development of the Jumna Bridge (Bangladesh), accidents in the neighboring area dropped by 45%.

[3)] International development goals adopted by 189 member countries at the UN Millennium Summit in September 2002. MDGs set up the concrete goals and directions that the entire international community, including donors, beneficiary countries, etc., should follow to sustainably reduce poverty and improve living standards.

(1) Eradicate extreme poverty and hunger

- Economic growth facilitated by infrastructure development may contribute to poverty reduction.
- Enhanced food security through infrastructure development (e.g. irrigation, transport and logistics) may contribute to hunger reduction.

(2) Achieve universal primary education

- Economic growth spurred by infrastructure development improves incomes, thereby, provides more opportunities to send children to school.
- With an improved access to educational institutions provided by transport infrastructure, commutes to school are made easy, improving school participation rate.

(3) Promote gender equity and empower women

- With an improved access to educational institutions, there is greater likelihood of girls going and staying in school.
- The enhancement of convenience in daily life, like improved access to water and goods brought about by new water and transport systems, saves a lot of women time and labor that can be put to more productive and recreational activities.
- Growth in employment opportunities and increase in exchanges may facilitate women's social transformation.

(4) Reduce child mortality

- Provision of safe water, enhancement of sanitary conditions, etc. helps lower mortality rates.
- Enhancement of access to medical facilities and accessibility of drugs made possible by transport infrastructure contribute to reducing mortality rates.

(5) Improve maternal health

- How infrastructures can help reduce child mortality also applies to improving the health of pregnant women and mothers.
- Reduction of women's labor due to enhanced convenience in daily life may improve their well-being.

(6) Combat HIV/AIDS, malaria, and other diseases

- Enhancement of sanitary conditions and access to medical facilities facilitated by infrastructure development can help in the campaign against these diseases.
- Strengthening of public communication systems and an increase in educational opportunities enable the people to receive timely and useful information on how to prevent these illnesses.

(7) Ensure environmental sustainability

- Infrastructure helps secure potable water and water for other uses.
- Infrastructure improvements in the slums reduce flooding in communities and help improve urban environment.
- Strengthening of transport and production efficiency may result in more efficient use of natural resources.

Japan's philosophy on international cooperation is to place "human security" at the heart of Japan's programs. Though its development cooperation program, Japan has vigorously pursued actions to help improve people's lives, generate livelihood opportunities, and uphold

human dignity. It strived to prevent terrorism and minimize conflicts and provide assistance to victims of conflicts, and support recovery and reconstruction efforts. Japan is actively involved in addressing the major issues in the post-Cold War era: Apart from efforts to alleviate the victims of violence brought about by terrorism and conflicts, another important element to addressing human security is through reduction of poverty. Impoverishment is also a cause for human beings to be violent. Poverty reduction therefore is a more long-lasting means of attaining human security. Japan, with its war history and steady and painstaking reconstruction experience, can offer much to the developing countries through its ODA. And Japan's focus on human security is aligned with the MDGs.

Table 1.2.1 Assumed Correlation Between Infrastructure and Millennium Development Goals

		Road		Port	Air-port	Rail-way	River	Tele-com	Water	Sewe rage	Sani-tation	Irriga-tion
		Trunk	Local									
Indirect effect through economic effect		◎	△	○	△	○	△	△	△			○
Direct impact of Infra development	Poverty reduction	○		△								○
	Spread of primary education	△	△									
	Gender equality	○	△						○	△	△	△
	Reduction of child mortality	△					△	△	◎	○	○	
	Improvement of maternal health	△	△					△	◎	○	○	
	Prevention of epidemics	x		x	x	x	△	△	○	◎	◎	
	Environment (incl. securing water)	x	△			○	△		◎	△	○	
	Security (disasters, crimes)	○	○				◎	△				

Note: (1) ◎: strongly relevant, ○: relevant, △: somewhat relevant, x: negative effect

(2) One MDG, the "development of a global partnership for development," was excluded as it is directly released to . Alternatively, "safety" was included from the viewpoint of human security.

4) Infrastructure in human security[4)]

"Human security" is a state wherein individuals are free from threats to their existence both on life and dignity. Such threats are wide-ranging including lack of BHNs, absolute poverty, political oppression, terrorism and violence, crimes, disasters, environmental degradation, etc.

Infrastructure is critical during relief work in times of conflict and during natural disasters. Because lives are at risk during these occasions, the swift provision of infrastructure is extremely necessary. In the post-Cold War era, regional conflicts have occurred and continue to occur in many parts of the world. These are in addition to frequent occurrence in the developing countries of natural disasters, like volcanic eruptions and earthquakes.

[4)]The concept of "human security" was developed by the UNDP as the most important global issue in the future (Human Development Report, 1994). Through Japan's initiative which has won international understanding and support, the campaign for human security is sustained through the activities of the Commission on Human Security.

Assistance to victims in dire circumstances has become a major responsibility of the international community such that relief and reconstruction assistance is an important diplomatic issue for Japan. Up to now, Japan supports a series of reconstruction projects in Cambodia, East Timor, Turkey, Afghanistan, among others. Reconstruction and development of infrastructure are critical because damaged infrastructure hinders employment generation and makes earning a living more difficult. Furthermore, infrastructure directly affects invariably a large number of people and provides a basis for reconstruction.

Long-term assistance is necessary for reconstruction work in conflict or disaster areas. But in instances where assets are lost or ruined, survival is determined by the speedy replacement of these assets. In Japan, it takes generally just about two weeks to plan for such reconstruction work and implementation follows quite immediately even in the worst of conditions. This is because different models of infrastructure development are readily available, there is good management of information, trained manpower is ample, and the systems for allocating resources (finance and equipment) are well established.

1.3 Indirect Effect by Infrastructure: Economic Growth

1) Effect on economic growth

Infrastructure development is essential for economic growth, and economic infrastructure, particularly roads and energy, is closely correlated with economic growth. Development of electricity, communication, and waterworks enhances productivity of various sectors. Development of transport infrastructure contributes to the reduction of travel time and cost of goods, while adequate infrastructure, electricity, communication, as well as water and sewage systems, encourages private sector investment, which redounds to a revitalized local economy.

According to the World Bank, “Infrastructure represents, if not the engine, then the ’wheels‘ of economic activity. Input-output tables show that in the economies of Japan and the United States, for example, telecommunications, electricity, and water are used in the production process of nearly every sector, and transport is an input for every commodity (World Development Report 1994).

The following points out how economic growth is facilitated by infrastructure development:

a. Streamlining of production and transportation planning
   Development of distribution facilities reduces on transport costs and transit time, which enables the streamlining of the production plan and transport plan for producers and transport agencies, respectively. As a result, organized inventory makes the economization of capital interest possible by reducing inventory investments. These costs and economization lead to an increase in output by furthering production and transport outlays.

b. Decentralization due to location of industries
   Provision of transport facilities, electricity, and water satisfies the requirement for the location of industries. The availability of infrastructure also in may areas means there is greater availability of appropriate sites for enterprises expand. Enhancing industrial development by collectively developing infrastructure is the characteristic of industrial complexes and parks.

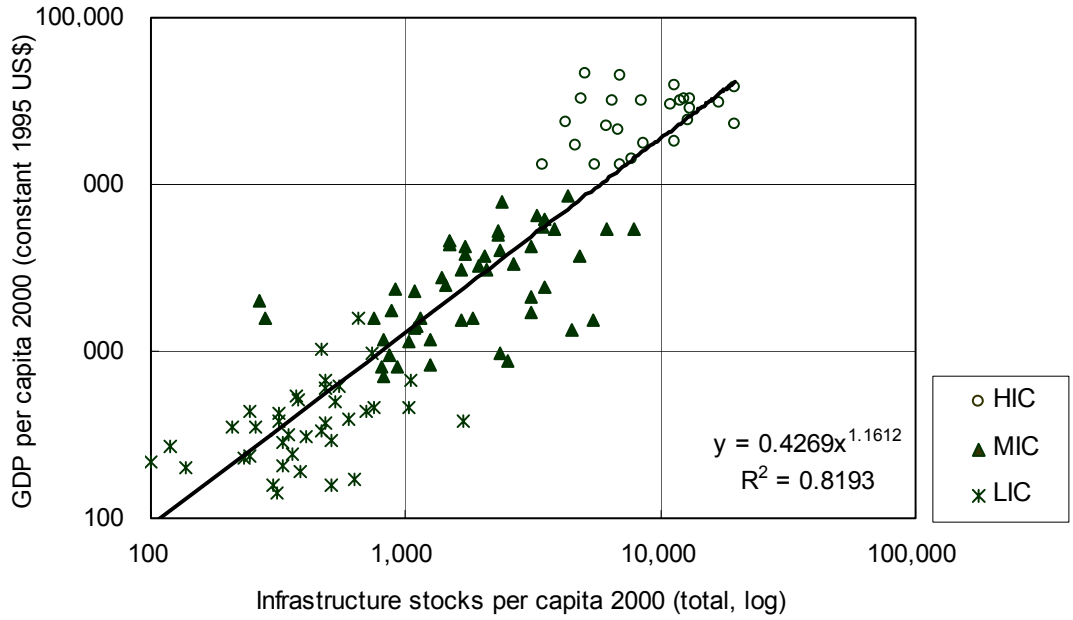
c. Streamlining of distribution systems
Construction and rehabilitation of transportation facilities make system transformation possible by connecting the facilities using information technology, from a conventional distribution process to a simpler one by omitting middlemen, thereby increasing production rate and engendering new demands. Changes in raw and in-process materials suppliers will also occur, making possible the transformation to a more rational distribution system.

d. Increase in trade
Reduction in transportation cost and transit time through the development of transportation facilities expands the potential demand area.

e. Exploitative effect
Development of transportation facilities enables the use of unutilized resources (e.g. low-use land, idle manpower, unutilized tourist resources, etc.) within the influence area. The value of such resources will increase.

No empirical study yet clearly proves the correlation between infrastructure and economic growth or whether economic growth facilitates investments in infrastructure. However, it is clear that a strong correlation between these two exists (see Figure 1.3.1). The World Bank in its 1994 World Development Report reports that a 1% increase in infrastructure stocks raises the GDP by 1%.

Figure 1.3.1 Correlation Between GDP Per Capita and Infrastructure Stocks, 2000

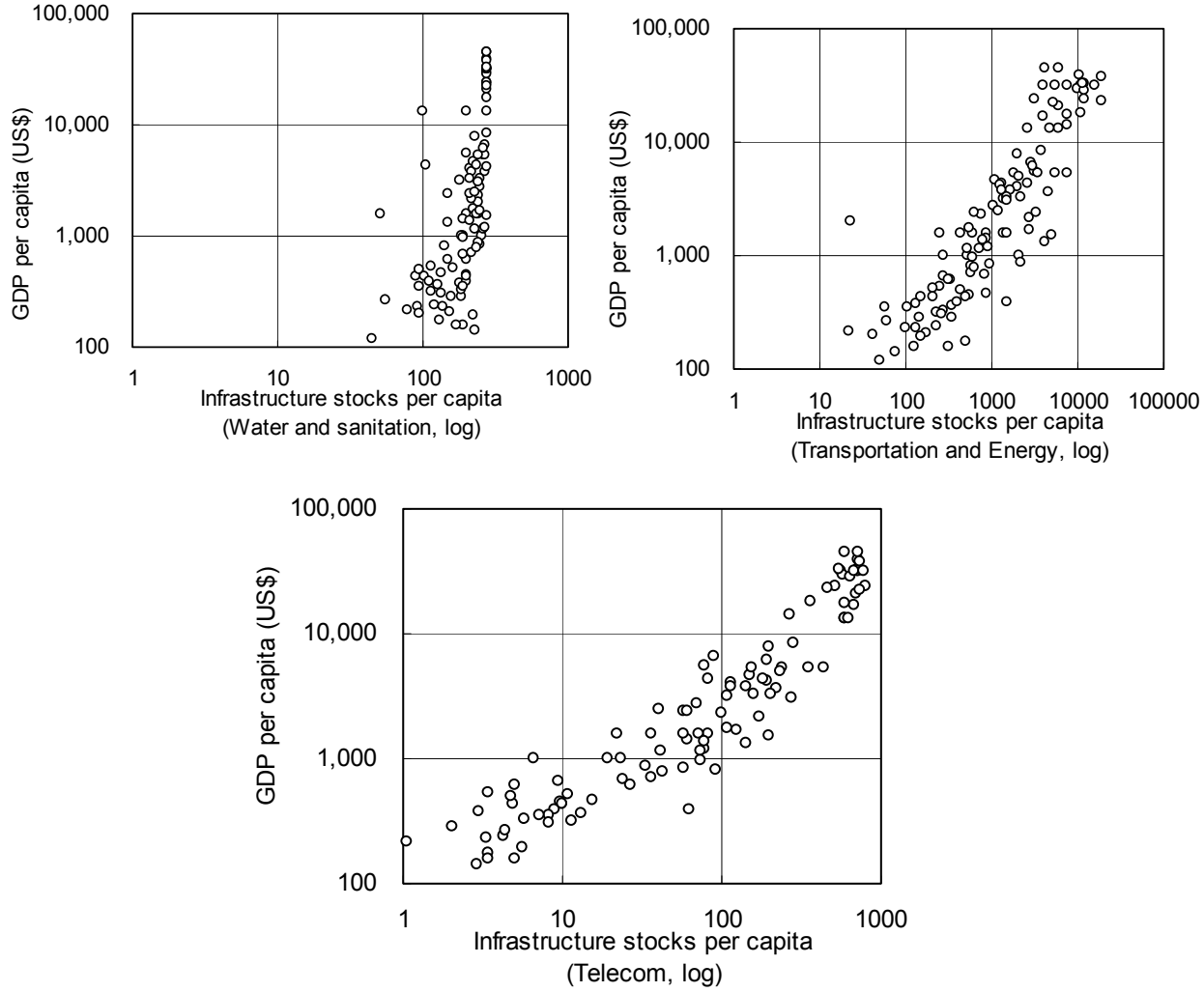


Source: GDP per capita; the World Bank. World Development Indicator, Infrastructure stocks; M. Fay & T. Yepes, 2003

Moreover, according to the analyses of each infrastructure sector, there is a strong correlation between economic infrastructures, like electricity, communication, and transportation, and income levels. However, there is not that much correlation regarding access to water and sanitation facilities. Since social infrastructures, like water and sewage system, are normally installed at the early stage of development and once it reaches a certain level (100% access rate), no investment is made regardless of economic growth. On

the other hand, a trend shows that investments in economic infrastructure are proportional to economic growth.

Figure 1.3.2 Infrastructure Stocks by Sector and Income Level, 2000



Source: GDP per capita; the World Bank. World Development Indicator,
Infrastructure stocks; M. Fay & T. Yepes, 2003

2) Impact on poverty reduction through economic growth

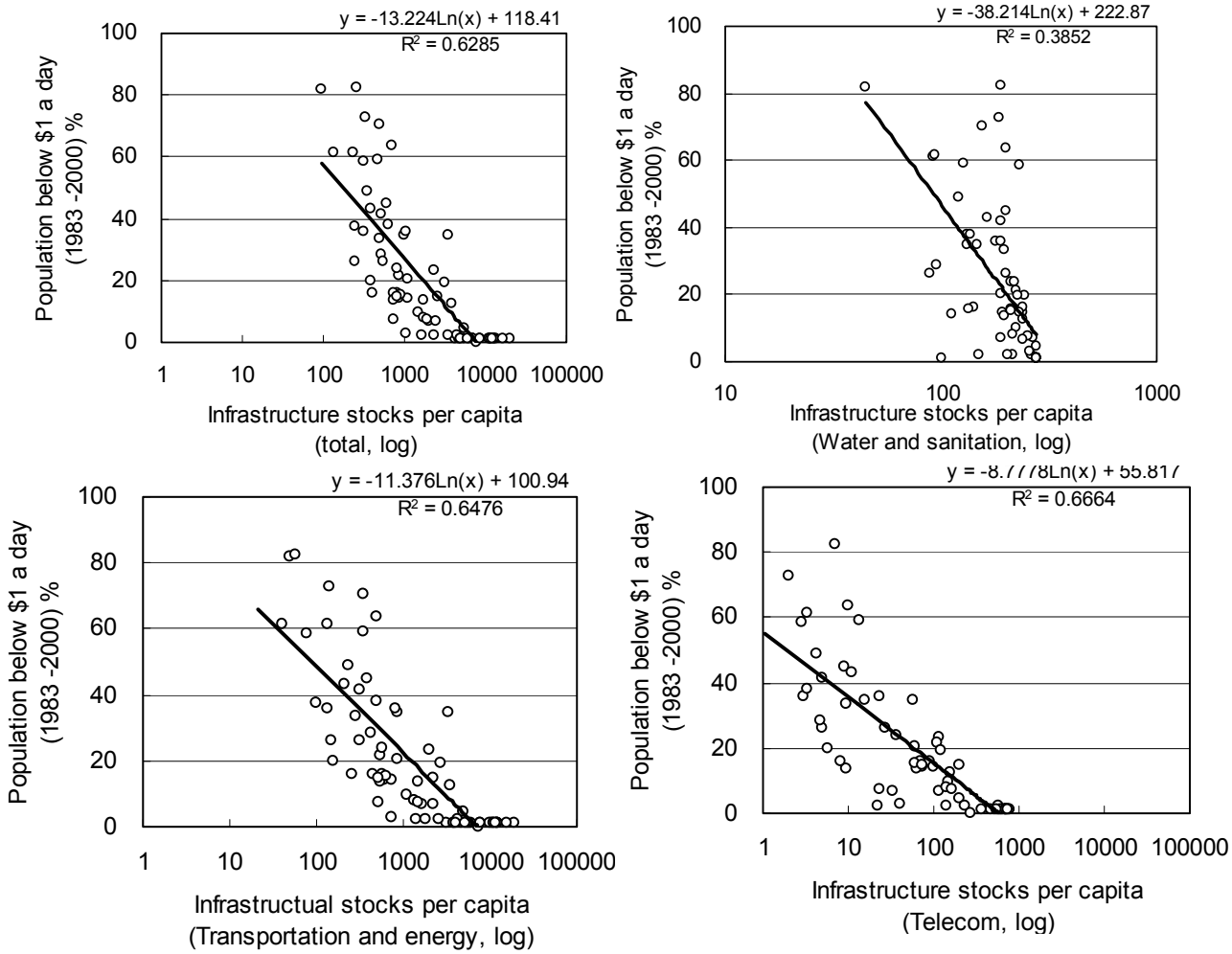
A correlation between infrastructure development and economic impacts is generally recognized. However, a quantitative analysis to measure infrastructure's effectiveness has not been established yet.[5)]

According to the cross-country analysis, from the macro viewpoint, a certain degree of negative correlation was found between infrastructure stocks and poverty rate. In particular, in low-income countries where infrastructure stocks are scarce, the difference in infrastructure stocks comes out as a significant difference in poverty rates. Thus, there is a possibility that infrastructure development has a profound effect on poverty reduction (see Figure 1.3.3). Moreover, a certain degree of negative correlation between economic growth

[5)] The interim report of the ADB's "Assessing the impact of transport and energy infrastructure on poverty reduction (2001)" reviewed the existing research and thesis on poverty and on transport and energy sector infrastructure. It concluded that its correlation was not adequately proven. It also pointed out that there were only limited case examples and thesis about the impact on the urban poor, in particular.

and poverty rate appeared, indicating that an increase in income levels due to economic growth contributes to the reduction of the poverty rate (see Figure 1.3.4).[6] However, in the rapid economic growth of some Asian nations, income disparity rather expands even as the number of poor decreases. The increase in income disparity needs to be noted (Tsuneaki Yoshida. 2000. *"21seki no kaihatsu-senryaku-kenkyu-iinkai hokokusho" [*Report of Development Strategy Research Committee for the 21st Century]).

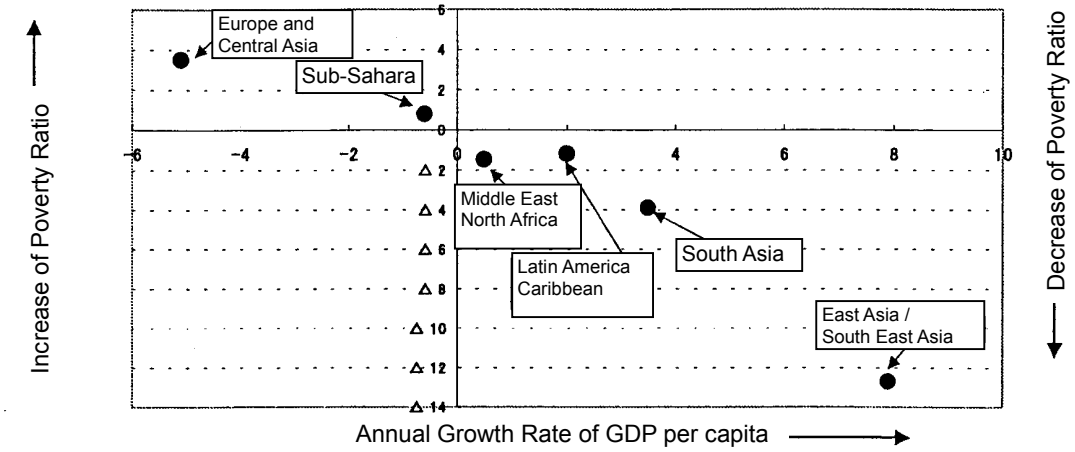
Figure 1.3.3 Correlation Between Poverty Rate and Infrastructure Stocks, 2000



Source: Poverty rate; Human Development Report, 2003 Infrastructure stocks; M. Fay & Tito Yepes, 2003.
Note: Poverty rate: Proportion of people who live on less than US$1 per day (1990-2001) (%).

[6] A similar analysis was using in-country regional units rather than countries. The correlation between poverty reduction and economic growth was found in various regions in the Philippines. (World Development Report 2000/2001, the World Bank)

Figure 1.3.4 Variation Between Economic Growth Rate and Poverty Rate in Developing Countries (1990-1996)



Source: Yoshida. 2000. *"21seiki no kaihatsu-senryaku-kenkyui-innkai hokokusho" (in Japanese)*,(Report of the Development Strategy Research Committee for the 21st century).

Indeed, the post evaluation conducted on ODA-funded project by the respective donors showed the positive effects on poverty reduction of the development of large-scale infrastructures.[7)] However, how infrastructure development brings about poverty reduction and what kind of infrastructure services is effective are not sufficiently verified and remain to be issues at present. Case studies on rural and agricultural development are more advanced given that the poor accounts for a large part of the target population, and also the mechanism of how it impacts the poor is more understood. However, economic infrastructure that is anticipated to impact on the poor is not well recognized, and a clarification on the causal relationship is an issue.[8)]

3) Importance of complementary policy: correction of income disparity

As stated above, it is assumed that infrastructure development brings about economic growth and reduces poverty to a certain degree. However, this depends upon the contents of infrastructure development – it may benefit the wealthy or it may improve the living environment of the poor. The main beneficiaries of infrastructure development tend to be the segments of population groups that have access to such infrastructure or those that are capable of using them. Large-scale infrastructures, such as roads and ports in particular, tend to distribute its benefits to high-income groups who utilize such infrastructure, thereby further expanding income disparities. Moreover, there is a possibility that infrastructure development may bring about negative impacts to the poor by dividing communities with the construction of a high-standard road or by the decline in regional traffic safety levels.

In order to prevent the widening of such income disparities, a thorough consideration is needed to ensure a more equitable distribution of benefits. In other words, securing access to infrastructure for the poor and the weak is necessary while understanding their needs and

7) According to the *"Infra-project no koka bunseki chousa (in Japanese)*" "Analysis study on infrastructure project effects", Infrastructure Development Institute-Japan, Ministry of Land, Infrastructure and Transport, 2001 and 2000, post evaluation of Meghna Bridge, Meghna Gumti Bridge and Jamuna Bridge in Bangladesh verified the direct and indirect effects on the poor group produced by the large-scale bridge.

8) "Linking Economic Growth and Poverty Reduction, Large-Scale Infrastructure in the Context of Vietnam's CPRGS" conducted by GRIPS in 2003 set following three channels for the achievement of poverty reduction by economic growth; (1) direct channel, (2) market channel, and (3) policy channel.

providing them the benefits. It is therefore necessary to have a balanced policy – one that allows the market to determine which infrastructure to develop but also safeguards the poor from their unintended adverse effects. The policies can be a mix of: providing subsidies in the level of tariffs for use of the infrastructure facilities, taxation that pursues income redistribution, and appropriate configurations of trade, investment and financial measures, etc.

4) Infrastructure effect on regional stability and correction of disparity

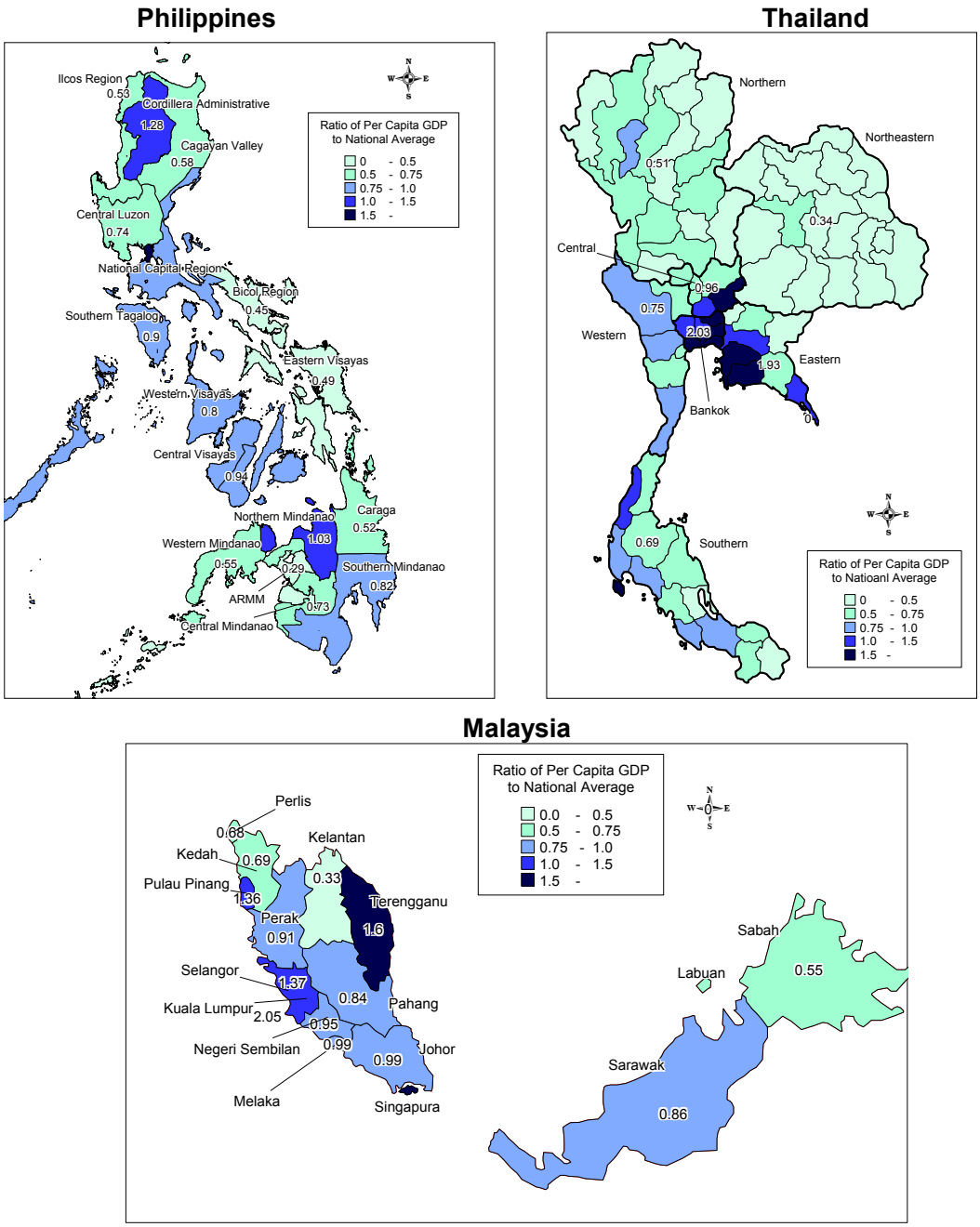
There are historical facts (such as Russia's east and south invasion policy in its search for ice-free ports, or Bolivia's fight against Chile to acquire its Pacific route) that show that development of roads, rail, and ports forming trade routes is so critical that governments are putting their economies at stake to pursue them.

The role of traffic and communication networks is significant for domestic security. They do not just perform the intended function (like, say, roads for deployment of military force). They also play a role in stabilizing the region through external actions like facilitating the circulation of information and correction of economic and cultural disparities

Roads and railways convey people, goods, and information. When the Japanese *Shinkansen* (bullet train) service started, its function as a communication tool and cultural diffusor was also highlighted. Recently, fiber optics are set up along expressways, literally establishing an information network. When drought and rice shortage occurred in Indonesia in the 1970s to the 80s, despite a sufficient water and rice supply for the whole nation, it caused turmoil due to the lack of information on the geographical distribution of surpluses and shortages. This showed how transportation and communication networks, if both are developed, could preempt disturbances.

Many internal disputes are often largely rooted in economic disparities, aside from tribal, religious, and cultural differences. Internal regional disparities are remarkable. The actual state of regional disparity in three Southeast Asian countries is shown in the Figure 1.3.5. National average GDP per capita is set at 1.0. Numeric values in the figure indicate the ratio of regional per capita to the national average. In the Philippines, the Autonomous Region in Muslim Mindanao had the lowest at 0.29, while the National Capital Region recorded the highest at 1.3 (or 4.5 times that of the ARMM). Likewise, a considerable difference among regions was found in Malaysia (6.2 times) and Thailand (6.0 times).

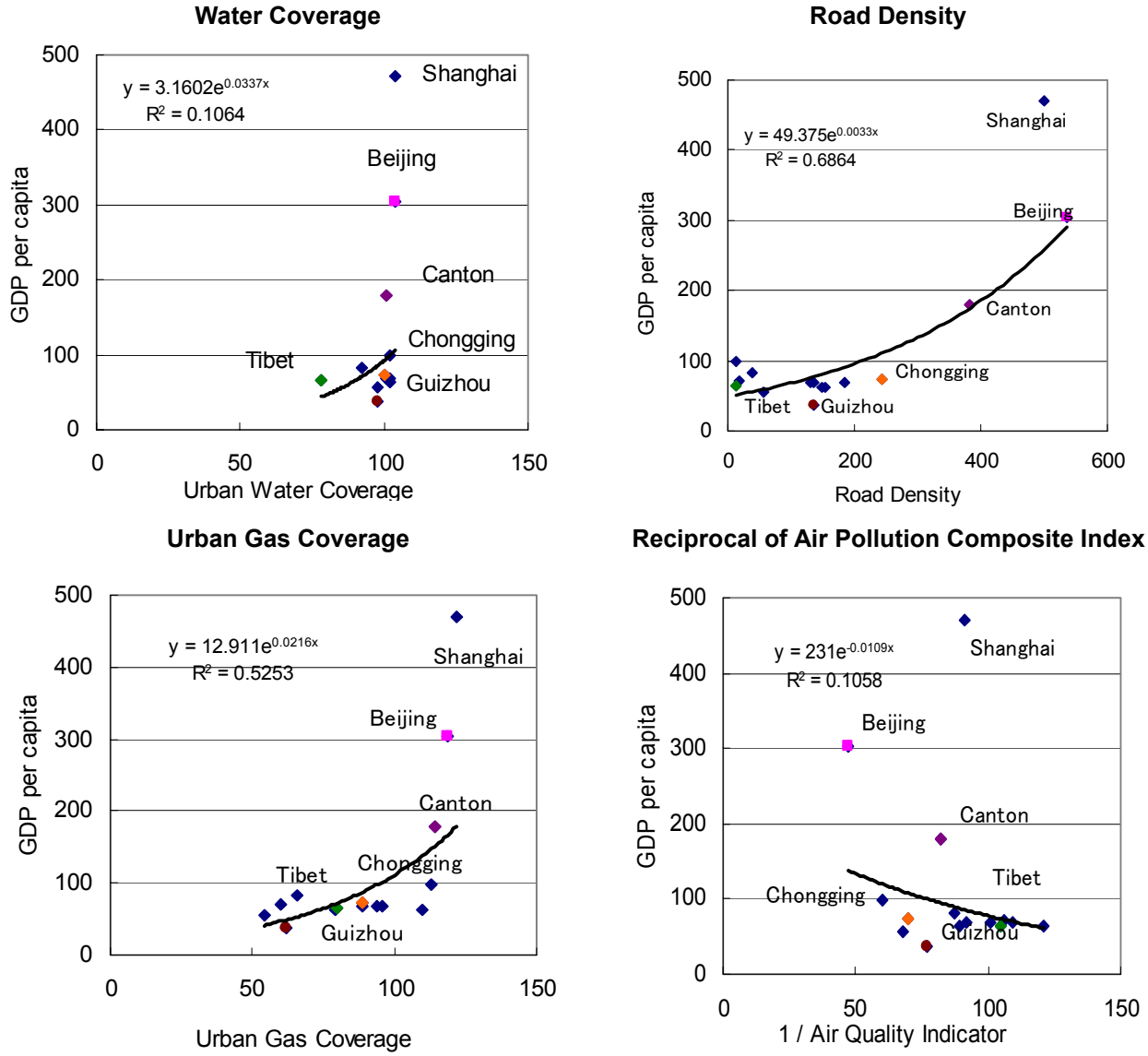
Figure 1.3.5 Regional Disparities in Three Southeast Asian Countries



Source: Data was based on information from the statistical yearbook of each country, Philippines in 2002, Thailand and Malaysia in 2001.

Internal regional disparity is correlated with the development of economic infrastructure. The trend is notable in economic infrastructure. In contrast, the correlation with social infrastructure is not significant (see Figure 1.3.6).

Figure 1.3.6 GDP by Region and Infrastructure Development Level in China



Source: Data based on information from the Embassy of Japan in China
http://www.cn.emb-japan.go.jp/jp/1st%20tier/indexj.htm)

Note: Indexing of national average to 100.

In Japan, infrastructure investment was made to correct regional disparities, including the dispersal of industrial sites in local regions (e.g. new industrial towns and special areas for industrial consolidation) and the development of roads, ports, airports, etc. It is considered that these efforts contributed in narrowing regional disparities.

According to an analysis of the Japanese post-war regional disparities in income, road development, and sewage system development levels, each was applicable to the Kuznets' inverted U hypothesis. Moreover, it was found that the largest gap in road development level was in 1958, while the most significant disparity in income level came three years later in 1961. In contrast, the peak disparity in sewage system development came out five years later than the income level peak (Kouji Kadokawa, 2002). In other words, economic infrastructure facilitated economic growth which in turn contributed in reducing regional income and economic disparities, as well as developed the social infrastructure. Thus, the

development of economic infrastructure is required to correct regional disparities in undeveloped areas. Economic disparities were caused by the differences in the development levels of industrial and service sectors. Thus, the development and promotion of local cities that support such industries are imperative.

2. Need for Developing Countries to Catch up in Infrastructure Development

This chapter clarifies the social and economic movements in developing countries as a background that creates the need for infrastructure. After taking a general view of the level of infrastructure stocks, the need for it was examined at each stage of development. Also, consideration was given to the volume of investment required to satisfy this need.

Here, it is clarified that the need for infrastructure is extremely high and that there is a large disparity between low- and middle-income countries, and high-income countries; and that the need varies according to the development stage and region. As the role of assistance is large because of a shortage of funds for infrastructure development, this chapter points out that the direction of future assistance in infrastructure development should be toward promoting self-help efforts and private investment in developing countries.

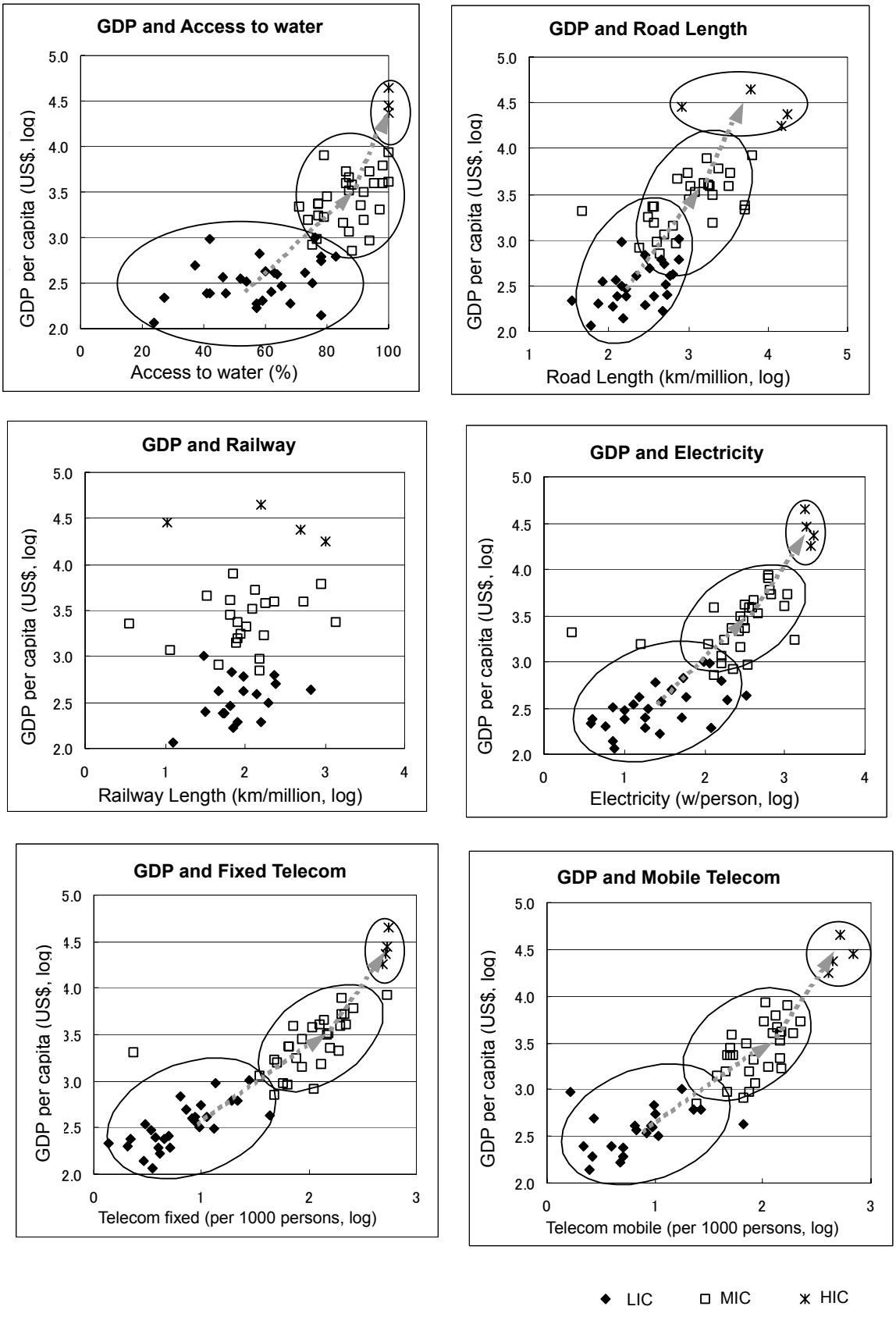
2.1 Infrastructure Services Necessary for Developing Countries

1) Considerations of the need for infrastructure development:
Infrastructure need accompanying economic growth

Industrial activities intensify and their level is raised along with economic growth. As a result, demand for infrastructure development rises; for example, a quicker distribution network becomes necessary. If an attempt is made to improve living standards, various kinds of infrastructure will also be necessary. In the experience of Japan, enormous infrastructure development was carried out along with high economic growth. Infrastructure development then gave rise to further economic growth.

It was shown in the previous chapter that there is a wide disparity in the condition of infrastructure stocks depending on income class. Fact is, the conditions of infrastructure development and the income level of a country have a high correlation. The indicators other than the income level, for example, the Gini coefficient showing income distribution has no correlation with infrastructure. Therefore, from the macro viewpoint, the level of infrastructure development can mainly be illustrated by the income level. For instance, results of the cross-country analysis of the correlation between income level and the level of infrastructure development showed the following (see Figure 2.1.1):

Figure 2.1.1 GDP and Infrastructure Development (by development stage), 2000



Source: World Development Indicators, M. Fay & T. Yepes, 2003

2) Social-economic background, which generates need for infrastructure development

A great factor in the rise in income levels is the progress of industrialization, which in turn drives urbanization. The rise in income levels also popularizes automobile use. Each of these phenomena generates need for new infrastructure. In order to fully understand this need, the relation between these changes and infrastructure stocks was examined. This section covers the increase in urban population, population density, industrialization, and motorization, as the factors generating the need for infrastructure development.

(1) Increase in urban population

The advance of urbanization demands infrastructure necessary for urban living and housing. Because population density is high and high-density industrial activities are also carried out, urban functions and a hygienic environment cannot be maintained without specially designed. Because of this, urban roads, water supply and sewage systems, and electricity are necessary and indispensable infrastructures. The greater the size of an urban population, the more advanced infrastructure is needed, such as public transportation facilities, waste disposal and treatment facilities, and multilevel roads. According to the cross-country analysis, the correlation between urbanization and infrastructure is as follows (correlation coefficient in 2000):

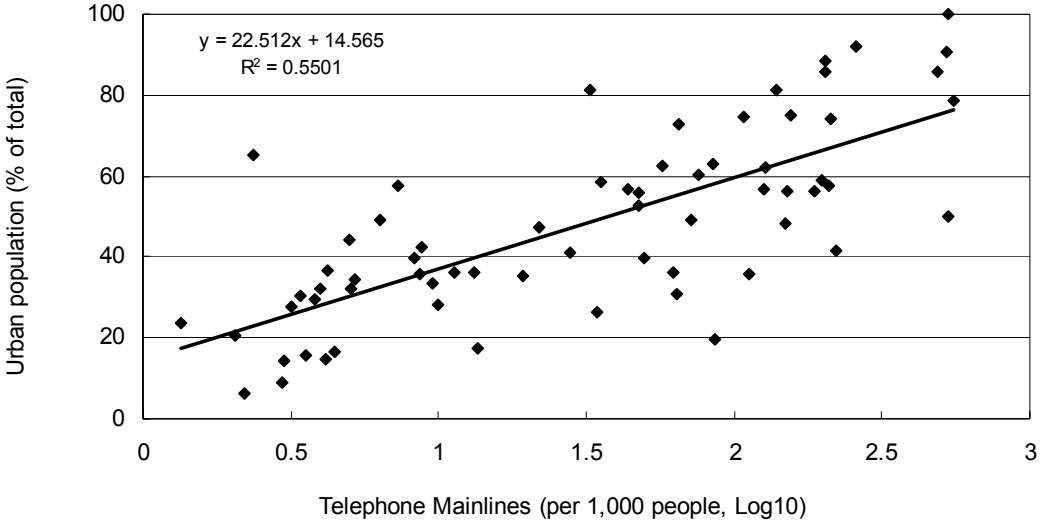
Table 2.1.1 Coefficient of Correlation (R_2) to Urbanization, 2000

Sector of Infrastructure	Coefficient of Correlation (R_2)
Telecom fixed（lines per 1000 persons ）	0.5501
Electricity（kw per capita）	0.4971
Paved Road Length（km / 1 million ）	0.33246
Access to Water (%)	0.3446
Access to Sanitation (%)	0.1993

Source: World Development Indicator, M. Fay & T. Yepes, 2003

Although telephones and electricity correlate with urbanization, roads and water supply and sewage systems have a weak correlation with urbanization. That is, it is considered that while these kinds of infrastructure tend to improve on a national scale, telephones and electricity are more likely to be widespread in cities.

Figure 2.1.2 Urbanization and Number of Telephone Lines, 2000



Source: World Development Indicators, M. Fay & T. Yepes, 2003

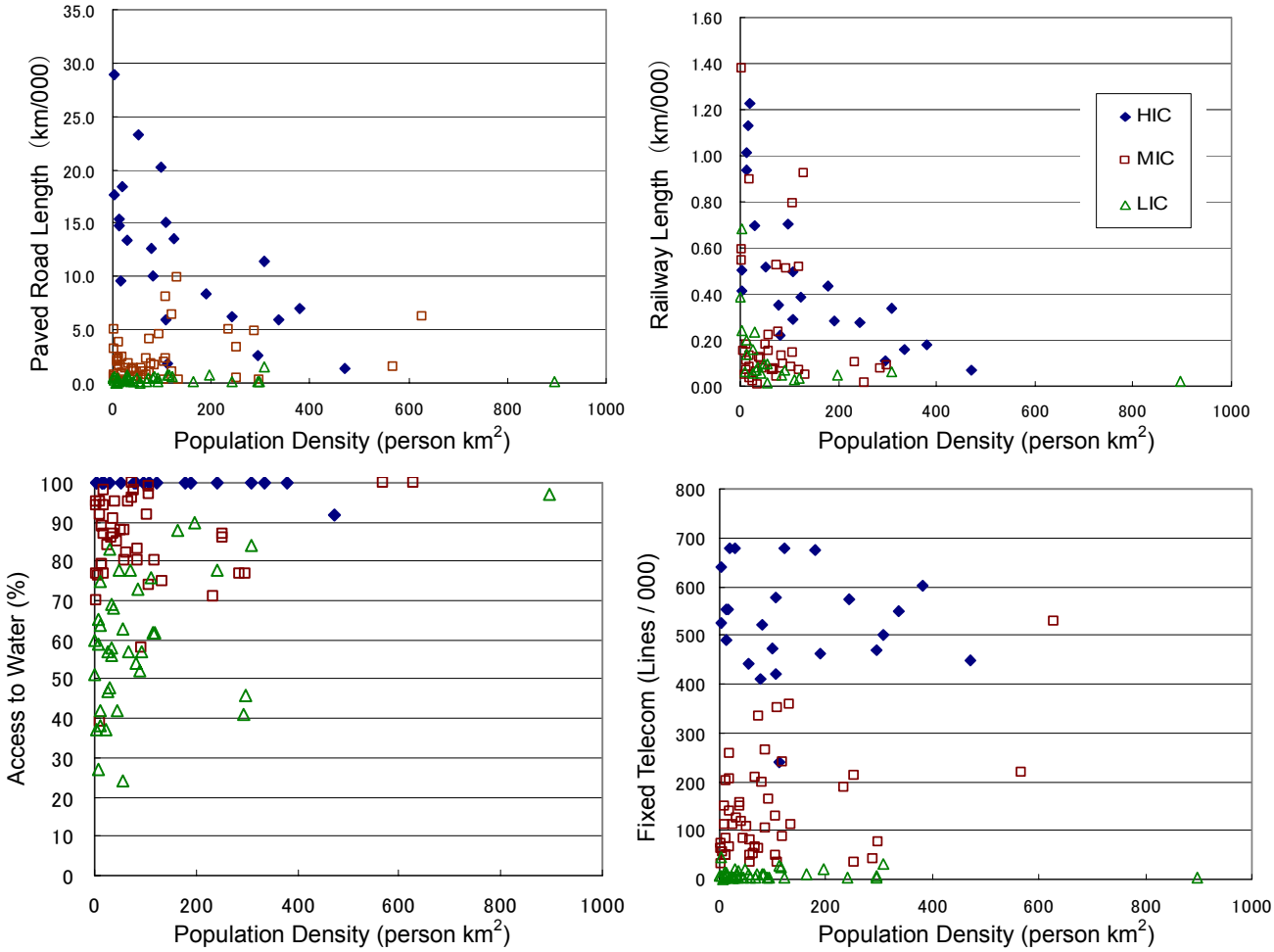
(2) **Population density**

If population density is different even though the ratio of infrastructure stocks per person is on the same level, the level of infrastructure services will also be different. Because infrastructure is public, and because of economies of scale, the higher the population density is, the more the level of infrastructure services is improved. For example, between Bangladesh, whose population density is extremely high, and Africa and rural areas in China, whose population density is low, the volume of social infrastructure that is necessary for the beneficiaries to get the same services vastly differs. From this point of view, there is an opinion that the advance of urbanization is an opportunity to enable the provision of efficient infrastructure services. (World Development Report by the World Bank, in 2003)

The correlation between infrastructure and population density differs according to infrastructure sector. As shown in Figure 2.1.3, in the case of strongly public infrastructure, such as roads and railways, the higher the population density, the lower the volume of stocks per person. Here, it is considered that the efficient offering of services is carried out. On the other hand, in the case of infrastructure which is generally private in nature, such as telecommunications and water works, the correlation between population density and infrastructure stocks per person is not seen because the services are offered to a household unit.

At the same time, there are cases wherein an increase in population density aggravates problems in infrastructure services due to traffic congestion, deterioration of the environment, and inadequate public services, making infrastructure development difficult.

Figure 2.1.3 Population Density and Infrastructure Stocks, 2000



Source: World Development Indicators, M. Fay & T. Yepes, 2003

(3) Industrialization

Energy, communication, industrial water, and transportation such as roads, ports and harbors, and airports, which support efficient distribution systems are vital to industries. Without these infrastructures, the operation of factories immediately meets difficulties. In some cases, the incentives for relocating factories are based on improved and efficient infrastructure in industrial parks and complexes which include ports and harbors.

Industrialization is, however, weak as a determinant of the level of infrastructure development of an entire country. There is no correlation between the level of industrialization and the national level of infrastructure stocks, according to the cross-country analysis.

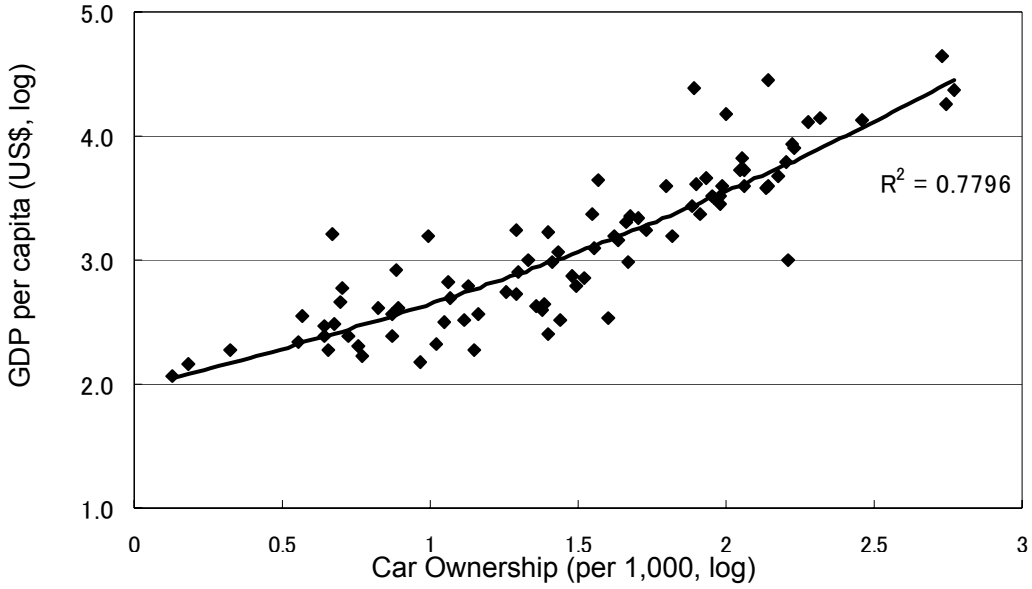
As the ratio of industry in the economy is large at the stage where industrialization (value of manufacturing in the GDP) exceeds 30% (Generally, the income level is around 1,000 dollars.), the infrastructure necessary to support it is important. The fact that there are more development projects on ports and harbors in Japan's assistance to middle-income countries where industrialization has advanced to a certain degree supports this observation.

(4) Motorization

As automobiles come into wide use through the rise in income levels, they gain a high correlation as shown in Figure 2.1.4. In countries where the yearly income level exceeds 3,000 dollars, car ownership is about one car per ten persons and about half of the households have cars.

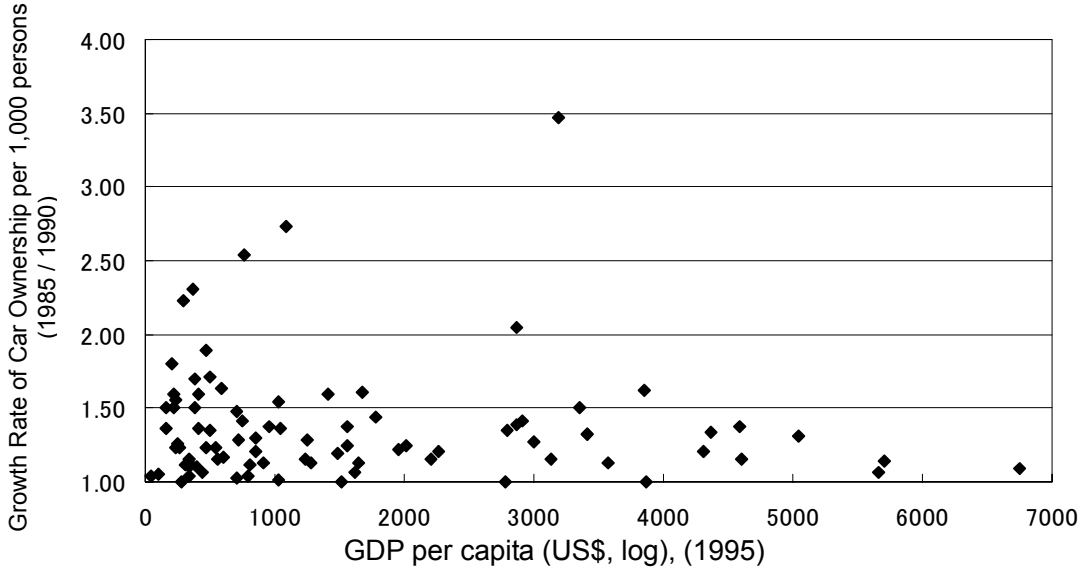
The increase in the number of cars starts to progress from the stage where there is lower income. That is, the number of cars increases dramatically even at the stage where the income level is 1,000 dollars or less. The increase becomes mild at the stage when income is more than 5,000 dollars (Figure 2.1.5).

Figure 2.1.4 Car Ownership and GDP per Capita, 2000



Source: World Development Indicators (East Asia & Pacific Region, Sub-Saharan Africa, Latin America & Caribbean)

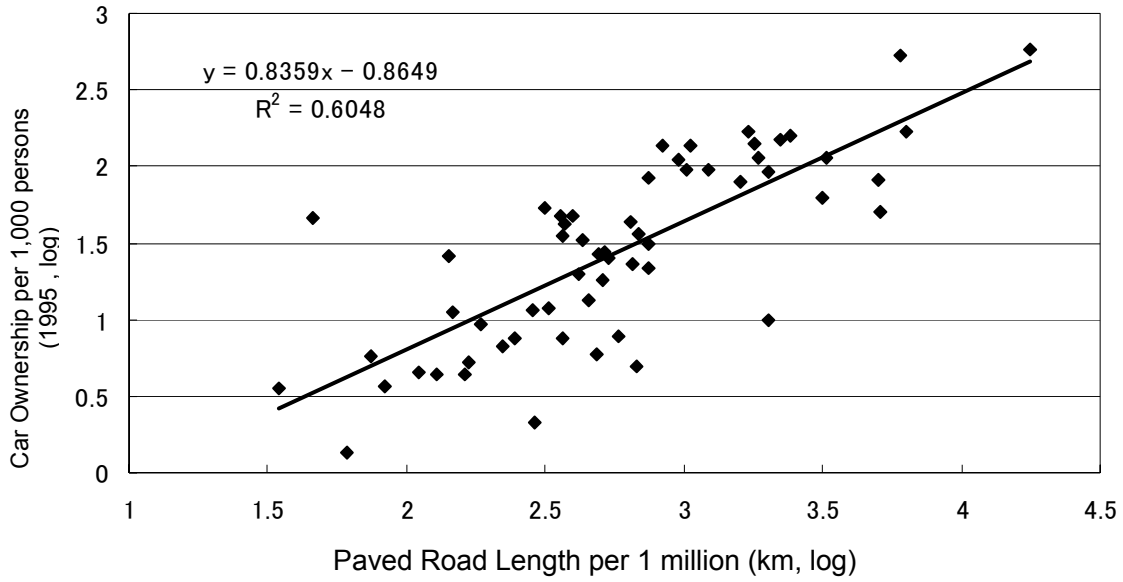
Figure 2.1.5 Growth Rate of Car Ownership and GDP per Capita, 2000



Source: World Development Indicators

That is, a sharp increase in the number of cars is one phenomenon in countries where the number of owned cars is still small and urbanization has not yet advanced (such as Cambodia, Rwanda, Uganda, and Zambia. Many exist in Africa.). What is assumed in these regions is a demand for arterial roads for regional connectivity and a demand for access roads to farm villages and arterial roads. As paved roads are said to increase in demand corresponding to the widespread use of automobiles, a problem will either be the excess or deficiency of roads compared with the number of owned cars. In Figure 2.1.6, the number of owned cars is around 100 cars per thousand people and the tendency of relatively shorter paved road lengths per car is seen. This falls in with the low investment in paved roads in middle-income countries.

Figure 2.1.6 Car Ownership (1995) and Paved Road Length, 2000



Source: World Development Indicators

On the other hand, in places where urbanization is advancing to some degree and the widespread use of automobiles has not progressed yet (China, Thailand, Benin, Chad, etc.), there is concern that a sharp increase in cars will bring about heavy urban traffic. Because the widespread use of automobiles is actually progressing in capitals and big cities, such as Bangkok, severe traffic jams will hit such areas. The problems of motorization that come with urbanization will require enhancement of roads and public transportation. As there are cases where increase in cars continues while urbanization advances, it is important to improve urban traffic infrastructure in such countries.

Table 2.1.2 Car Ownership and Urbanization in Countries facing Rapid Motorization

		Urbanization Rate			
		less than 30 %	30-50%	50-70%	more than 70%
Car Ownership (per 1000 persons , 1995)	less than 10	Cambodia, Burkina Faso, Eritrea, Rwanda, Uganda, India	China, Benin, Chad,		
	10-50	Zambia, Lesotho, Guinea-Bissau、	Thailand, Albania	Philippines, Nicaragua	
	50-100		Botswana	El Salvador, Iraq	
	more than 100			Romania	Estonia

Source: World Development Indicators

Note: Countries of which growth rate of car ownership (1995/1990) is more than 1.5 are categorized.

2.2 Infrastructure Stocks in Developing Countries

1) Level of infrastructure stocks in developing countries

The demand for infrastructure development is summarized in the previous section, and the present level of infrastructure stocks is generalized here according to region and income class. Regarding the level of infrastructure stocks, data from international organizations and a World Bank policy research paper, entitled *"Investing in Infrastructure: What is needed from 2000 to 2010"* written by M. Fay & T. Yapes (2003), were used.

In comparing the levels of infrastructure stocks among countries according to income group (Table 2.2.1), it could be seen that there is a small difference in social infrastructures between low- and high-income countries and a larger gap among economic infrastructures such as roads, communication, and energy. On the other hand, on the part of agricultural infrastructure and irrigation, there is basically almost no gap in the size of cultivated area among the three income groups. The ratio of irrigated area to cultivated area decreased as the income level rose. More detailed research is necessary to confirm whether or not the ratio of agriculture decreases along with the increase in income and the reason behind it.

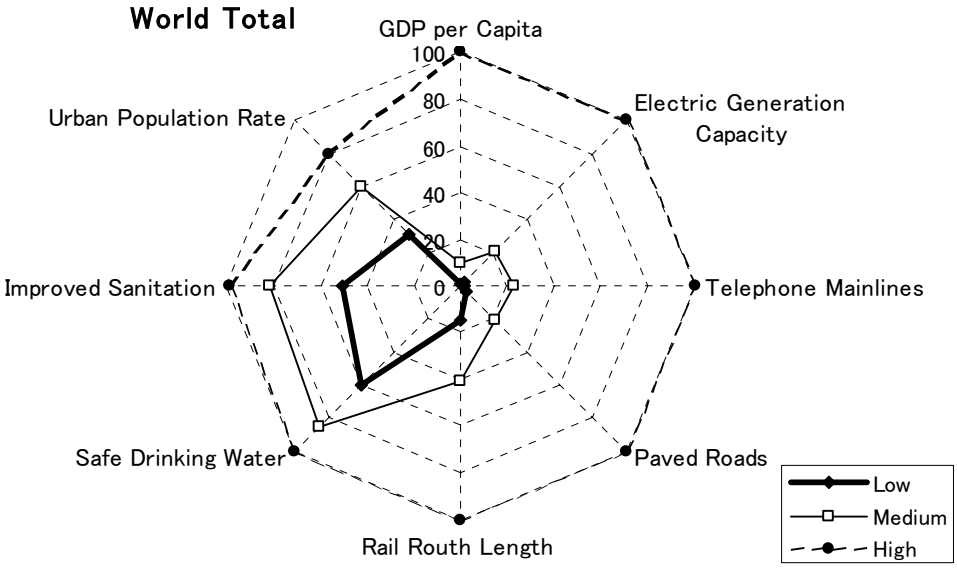
Table 2.2.1 Infrastructure Stock Levels by Income Group, 2000

	GDP Per capita (US$)	Urban Population rate (%)	Electricity KW/person	Telecom fixed Lines / 000	Telecom mobile No. / 000	
LIC	475	31	0.11	28	5.8	
MIC	1,919	47	0.40	127	83.7	
HIC	29,808	78	2.03	582	526.0	
HIC/LIC	63.0	2.5	18.0	21.0	91.0	
	Paved Road km/000	Railway km/000	Access to water (%)	Access to Sanitation (%)	Irrigation rate (%)	Cultivated area (ha/000)
LIC	1.1	0.07	76.3	45.58	22.8	44.6
MIC	1.1	0.13	81.8	61.87	18.8	45.7
HIC	10.5	0.44	99.6	98.07	11.5	47.3
HIC/LIC	10.0	6.0	1.3	2.2	0.5	1.1

Source: Calculated using World Development Indicators and M. Fay & T. Yepes, 2003

Note: Including 59 LICs, 70 MICs, and 27 HICs.
Irrigation rate indicates ratio of irrigated area to whole irr land area

Figure 2.2.1 Infrastructure Stock Levels by Income Group, 2000



Source: World Development Indicators, M. Fay & T. Yepes, 2003

Note: Average value of stock level of each income group, indexing average of HIC to 100 as follows (39 LICs, 50 MICs, 25 HICs):

GDP per capita（at US$ in 1995, 28,874=100）
Electricity generation（kw / capita, 2.11kw=100）
Telephone mainlines（lines / 1000 persons, 554=100）
Paved road length（km / square kilometers, 1.33km=100）
Rail length (km / per 1000 persons, 0.44km=100）
Access to water（household, %）
Access to sanitation (household, %）
Urban population rate (%)

Changes over time in these levels of infrastructure stocks are shown in Table 2.2.2. Social infrastructures, such as water supply and sewage systems, have a higher increase in stocks in low-income countries than middle-income countries, while economic infrastructures, such as energy, communication and roads, have a higher rate of increase in stocks in middle-income countries. It is supposed from this trend that priority is given to the completion of basic infrastructure in low-income countries and that middle-income countries still have a high demand for economic infrastructure because, although their basic infrastructure has been improved, its level is still lower than that in high-income countries.

A comparison between the 1980s and 1990s revealed that the annual rate of increase in the level of stocks of electricity, roads, and railways in the 1990s was lower than that of the 1980s. Because the increasing rate of population did not differ greatly between the two periods,[1)] it is possible to say the investment in economic infrastructure was relatively sluggish in the 1990s.

1) Population growth rates in the 1980s and 1990s were 2.4% and 2.0% in low-income countries and 1.8% and 1.3% in middle-income countries, respectively.

Table 2.2.2 Change of Infrastructure Stock Levels by Income Group, 1980-2000[1)]

	Year		Electricity Kw /person	Telecom fixed lines/000	Paved roads km/000	Access to water (%)[2)]	Access to sanitation (%) [2)]
LIC	1980		0.04	2.8	0.64	40	23
	1990		0.07	5.2	0.79	62	42
	2000		0.08	22.6	0.97	-	-
	Annual growth rate	**80-90**	**5.6%**	**6.4%**	**2.1%**	**3.0%**	**4.1%**
		90-00	**1.2%**	**15.8%**	**2.1%**		
MIC	1980		0.16	15.6	0.58	54	44
	1990		0.23	29.7	0.75	74	68
	2000		0.33	119.4	0.87		
	Annual growth rate	**80-90**	**4.2%**	**6.7%**	**2.5%**	**2.1%**	**2.9%**
		90-00	**3.5%**	**14.9%**	**1.6%**	**-**	**-**
HIC	1980		1.61	320.1	8.74	-	-
	1990		1.93	453.7	9.71		
	2000		2.10	580.0	11.1	95	95
	Annual growth rate	**80-90**	**1.8%**	**3.5%**	**1.1%**	**-**	**-**
		90-00	**0.9%**	**2.5%**	**1.3%**	**-**	**-**

Source: Calculated using M.Fay & T.Yepes and World Development Report 1994.

Note: 1) Values in this table were calculated by the Study Team from data attached to the above report, and are different from those indicated in Table 2.2.1.

2) Access to water and Access to sanitation: using data in 1975 and 1990 from World Development Report 1994 due to lack of data in the above source.

2) Levels of infrastructure stocks by region

A broad view of conditions of infrastructure stocks is taken by region. The total was computed covering 39 low-income countries and 50 middle-income countries, and excluding high-income countries. As a result, it could be seen that even as economic and social infrastructure development progressed in European and Central Asian countries, other regions were still far from the level of stocks in high-income countries (Table 2.2.3).

Table 2.2.3 Infrastructure Stock Levels by Region, 2000

	GDP Per capita (US$)	Urban Population rate (%)	Electricity KW/person	Telecom fixed Lines/000	Paved Roads Km/000	Railway Km/000	Access to water (%)	Access to sanitation %
HIC	29,808	78	2.03	582	10.5	0.44	99.6	98.1
East Asia & Pacific	1,576	34	0.22	97.9	0.4	0.04	75.6	46.0
Europe & Central Asia	3,058	69	0.72	254.8	4.3	0.39	81.1	84.7
Latin America & Caribbean	3,174	76	0.41	125.4	0.9	0.13	85.8	77.4
Middle East & N. Africa	2,246	56	0.33	79.3	1.3	0.09	89.3	82.6
South Asia	483	29	0.10	28.1	1.3	0.06	85.9	34.8
Sub-Saharan Africa	935	35	0.11	16.5	0.5	0.08	56.2	54.9

Source: Calculated using M.Fay & T.Yepes, 2003

These comparisons of infrastructure stocks by region and by income class are described below. Although a simple comparison was difficult because the definition of each indicator is different in each country and because the number of sample countries is small, the information that could be obtained from these charts are as follows:

- In East Asia and the Pacific, the percentage of urban population was 40% in both low-income countries (four countries) and middle-income countries (four), Intraregional disparities in the level of infrastructure stocks were also small. In middle-income countries, the level of economic infrastructure stocks was low and it is expected that demand for investment in economic infrastructure will increase in the future. Access to safe drinking water in low-income countries was on a considerably lower level compared with other regions.
- In Europe and Central Asia, social infrastructure already improved to a substantially high level in middle-income countries (eight). The rate of urban population was as high as 64% and the future increase in demand for economic infrastructure is expected. (Low-income countries were not included.)
- In Central and South America, the level of social and economic infrastructure stock was quite high compared with other middle-income countries (22). But one low-income country besides having a low level of social and economic infrastructure, also had intraregional disparities.
- In the Middle East and North Africa, while the rate of urban population in one low-income country was as low as 20%, middle-income countries showed quite a high value at 60%. Although the development of social infrastructure was advancing, that of economic infrastructure is considered to be relatively backward. The difference in stocks of economic infrastructure was large between middle- and low-income countries.
- In South Asia, the rate of urban population is about 30% in both low- (four) and middle-income countries, which is a low value. This is because the role of agriculture is large. Based on the data, it was assumed that the demand for economic infrastructure would increase in the future partly because the level of its development was backward. The level of roads in middle-income countries was prominently high, because the data source was limited to one country (Sri Lanka).
- In Sub-Saharan Africa, while the rate of urban population of low-income countries was about 50%, that of middle-income countries (seven) was about 30%. In middle-income countries, although economic infrastructure including railways relatively improved, social infrastructure development stagnated. Low-income countries lagged behind in the development of both social and economic infrastructure and are considered to have a large intraregional gap.

Figure 2.2.2 Average Infrastructure Stock Levels by Region and by Income Group (1/2)

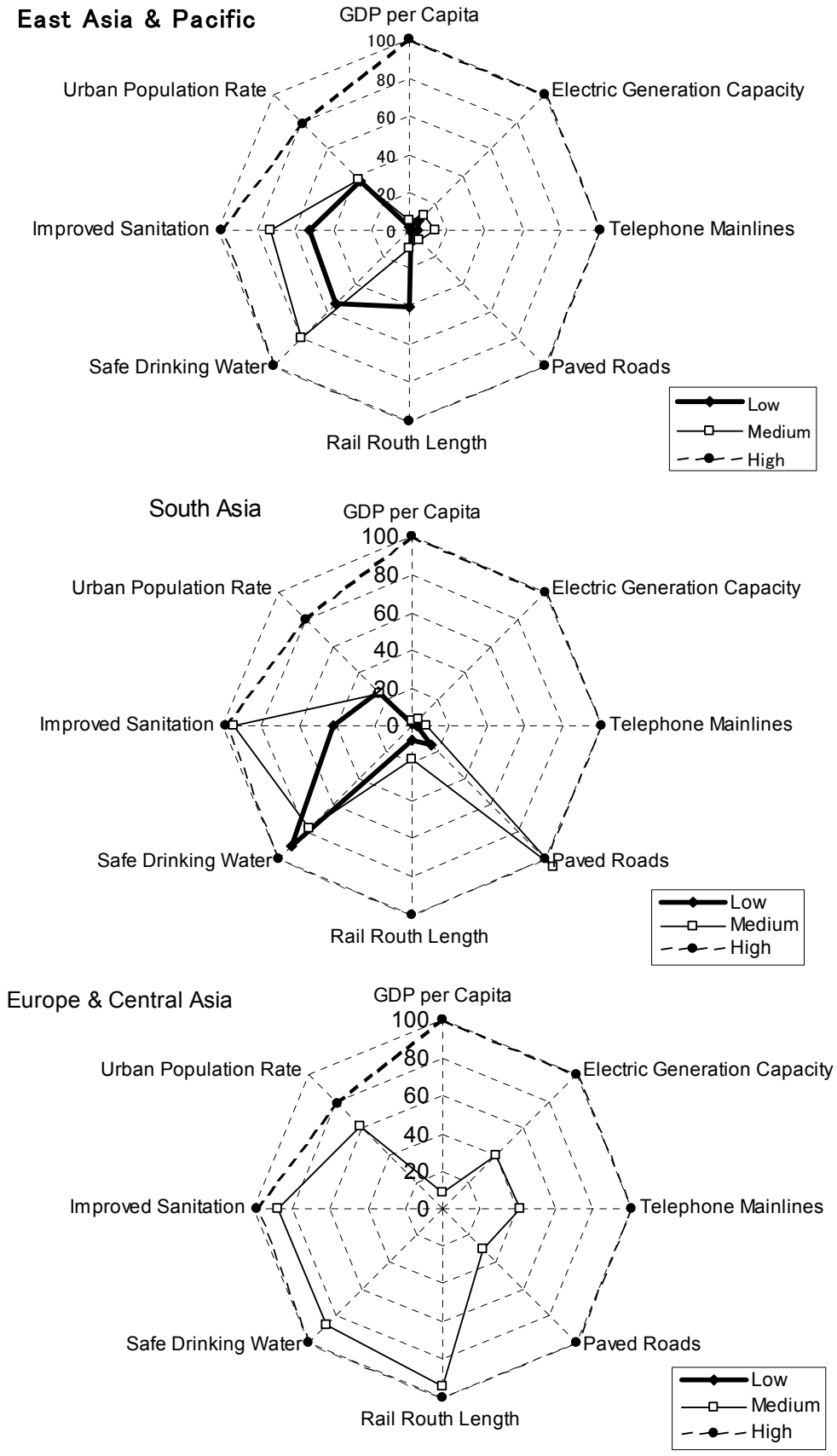
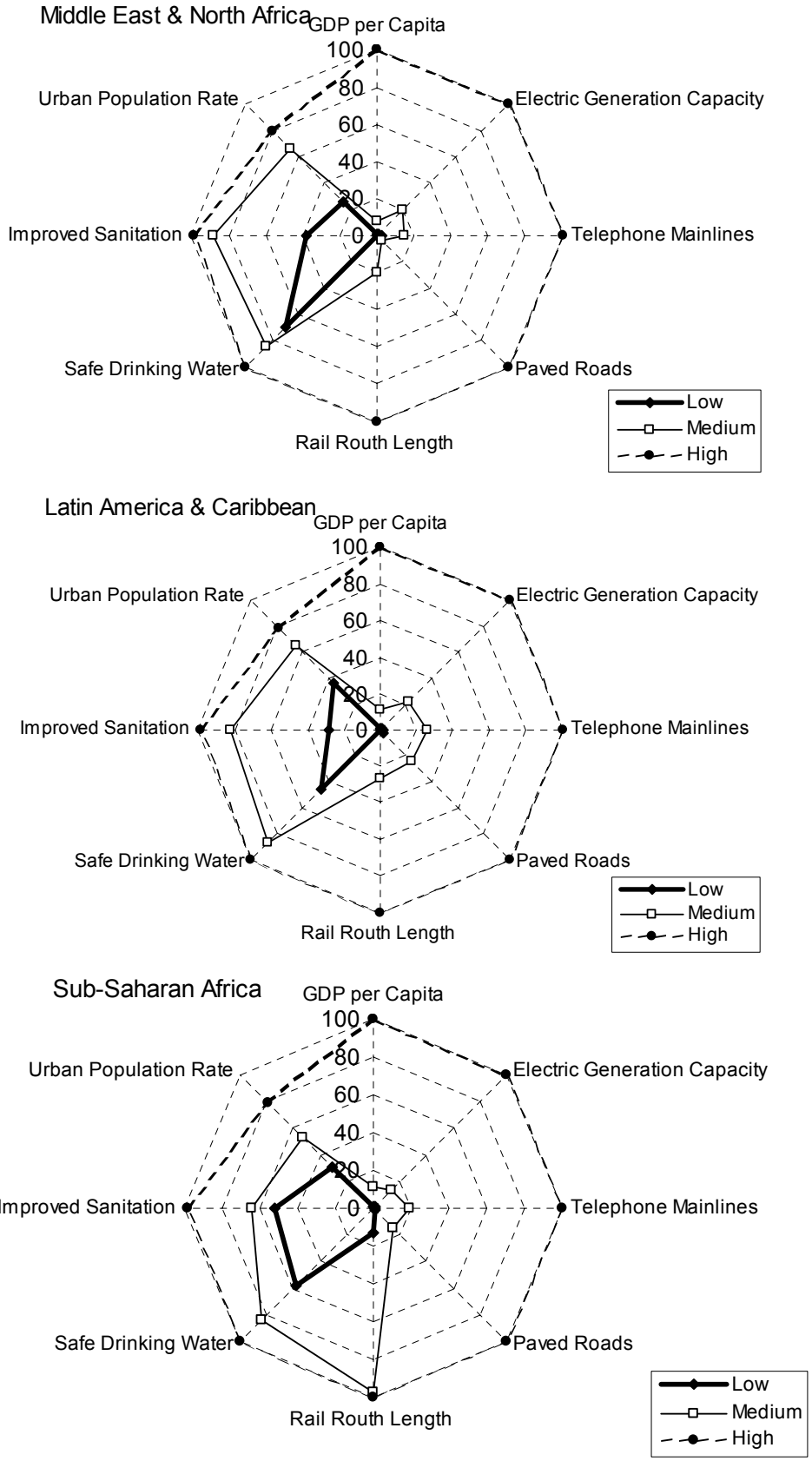


Figure 2.2.2 Average Infrastructure Stock Levels by Region and by Income Group (2/2)



Source: Calculated using M. Fay & T. Yepes

3) Infrastructure stocks from the viewpoint of monetary value

Furthermore, infrastructure development has the following characteristics concerning monetary values (The method of calculation is described in a note of Figure 1.3.1).

(1) Infrastructure stocks (monetary value) by stage of development

Infrastructure stock per person was about 730 dollars in low-income countries, about 1,250 dollars in middle-income countries, and about 9,300 dollars in high-income countries, showing a wide gap among them (see Table 2.2.4). Though roads and electric power accounted for much of stocks at every economic stage, their characteristics depended on the countries' level of infrastructure development. While much importance was given to roads, water, and hygiene in low-income countries, the weight on electric power increased to half of the total but that of roads decreased by a large amount in middle-income countries.

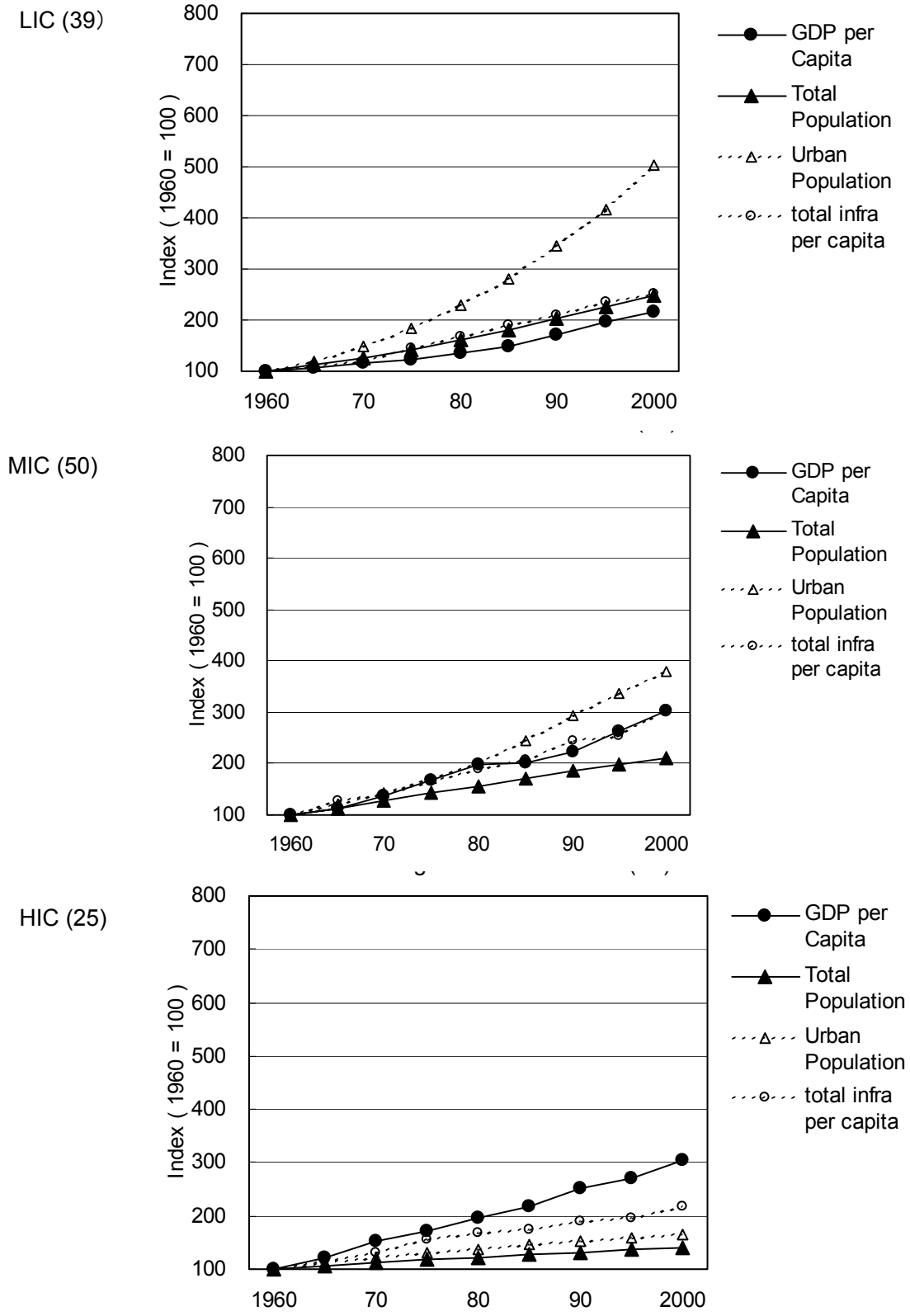
Table 2.2.4 Composition of Infrastructure Stocks by Income Group (%), 2000

	LIC	MIC	HIC
Electricity Generation	22	50	43
Telephone Mainlines	1	4	2
Paved Roads	54	28	48
Railway	7	6	4
Access to Water	8	5	1
Access to sanitation	8	7	1
Total Infrastructure Stock (US$)	730	1,245	9,342

Source: Calculated using M.Fay & T.Yepes, 2003

The results of comparing the trends of these infrastructure stocks with those on the increase in population and income levels showed the following: A clear increase in population was remarkable in poorer countries, while economic growth and increase in infrastructure stocks were mild. In high-income countries, population increase in income levels was high. In comparing the trends in urban population as well, it was found that urban populations notably increased in low-income countries. Accordingly, it is fear that urban environments will deteriorate due to the increase in the number of the urban poor and the shortage in infrastructure.

Figure 2.2.3 Historical Changes in Population, Income levels, and Infrastructure Stocks by Income Group (1/2)



Source: Compiled from World Development Indicators and M.Fay & T.Yepes, 2003

(2) Infrastructure stocks by Human Development Index

The classification and comparison of countries through the use of the Human Development Index (HDI) showed that the infrastructure stock per person was 400-plus dollars in low-index countries, 1,200-minus dollars in middle-index countries, and about 9,400 dollars in high-index countries. These figures show a wide gap again. Contents of infrastructure stocks in low- and middle-index countries were almost similar to the values by income group. The proportion of water and hygiene in low-index countries was higher and the total amount of infrastructure stocks was as low as about 60% of that of low-income countries. That is, it showed that the proportion of basic infrastructures, such as water and sanitation, was relatively high at the stage where infrastructure stocks were still low.

Table 2.2.5 Composition of Infrastructure Stocks by Human Development Index, 2000

(%)

	Low-index countries	Middle- index countries	High-index countries
Electricity Generation	23	42	42
Telephone Mainlines	1	3	2
Paved Roads	36	36	48
Railway	11	6	4
Access to Water	15	6	1
Access to sanitation	14	7	1
Total Infrastructure Stock per capita	417 US$	1162 US$	9414 US$

Source: Calculated using Human Development indicators and M. Fay & T. Yepes, 2003

Note :Countries were categorized using the following criteria using HDI in 2001
Low-index countries: HDI<0.4, Middle-index countries: 0.4≦HDI<0.6, High-index countries 0.6≦HDI.

(3) Infrastructure stocks by region

Compared by region, those with the most infrastructure stocks were Europe and Central Asia (about 3780 dollars), followed by Central and South America (about 1440 dollars), the Middle East and North Africa (about 1420 dollars), South Asia (about 900 dollars), East Asia and the Pacific (about 770 dollars), and Sub-Saharan Africa (about 600 dollars).

Table 2.2.6 Infrastructure Stock by Region, 2000

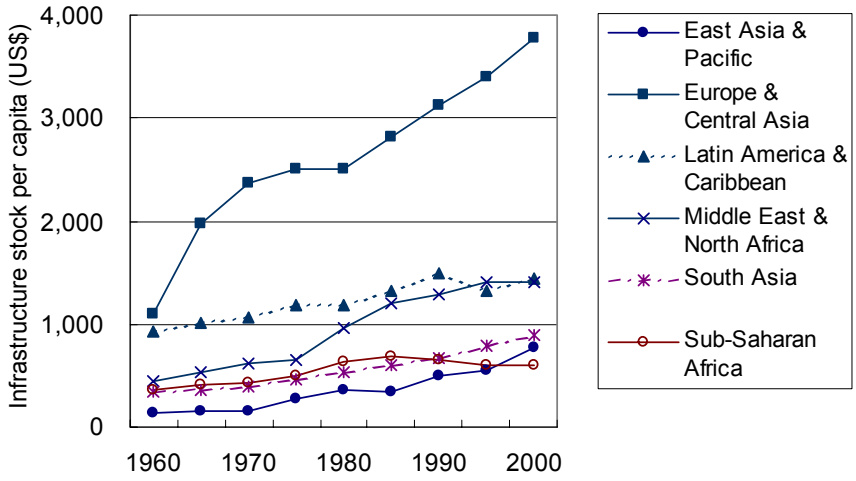
(%)

	East Asia & Pacific (8)	Europe & Central Asia (7)	Latin America & Caribb. (23)	Middle East & N. Africa(10)	South Asia(5)	Sub-Saharan Africa(36)
Electricity Generation	53.5	36.2	54.5	43.7	20.7	36.5
Telephone Mainlines	5.1	2.7	3.5	2.2	1.3	1.1
Paved Roads	20.0	46.7	24.5	35.3	59.4	31.3
Railway	5.2	9.3	5.2	5.5	5.6	10.2
Access to Water	7.9	1.9	4.8	5.0	7.7	7.9
Access to sanitation	8.4	3.1	7.5	8.2	5.4	13.0
Total Infrastructure Stock per capita (US$)	770	3.780	1,440	1,420	900	600

Source: Calculated using M.Fay & T.Yepes, 2003

From examining the changes in infrastructure stocks over time, it was found that the stocks steadily increased in East and South Asia, as well as in Europe and Central Asia. But the stocks almost stagnated in Central and South America and seemed to have run out of steam in the Middle East and North Africa since the 1990s. In Sub-Saharan Africa, among others, infrastructure stocks demonstrated a tendency to decrease since 1985. For example, although infrastructure stocks in Sub-Saharan Africa around 1970 were twice that of East Asia, their levels became almost the same in 1995 and then their positions were reversed in 2000.

Figure 2.2.4 Historical Changes in Infrastructure Stocks per Capita by Region



Source: Compiled from World Development Indicators and M. Fay & T. Yepes, 2003

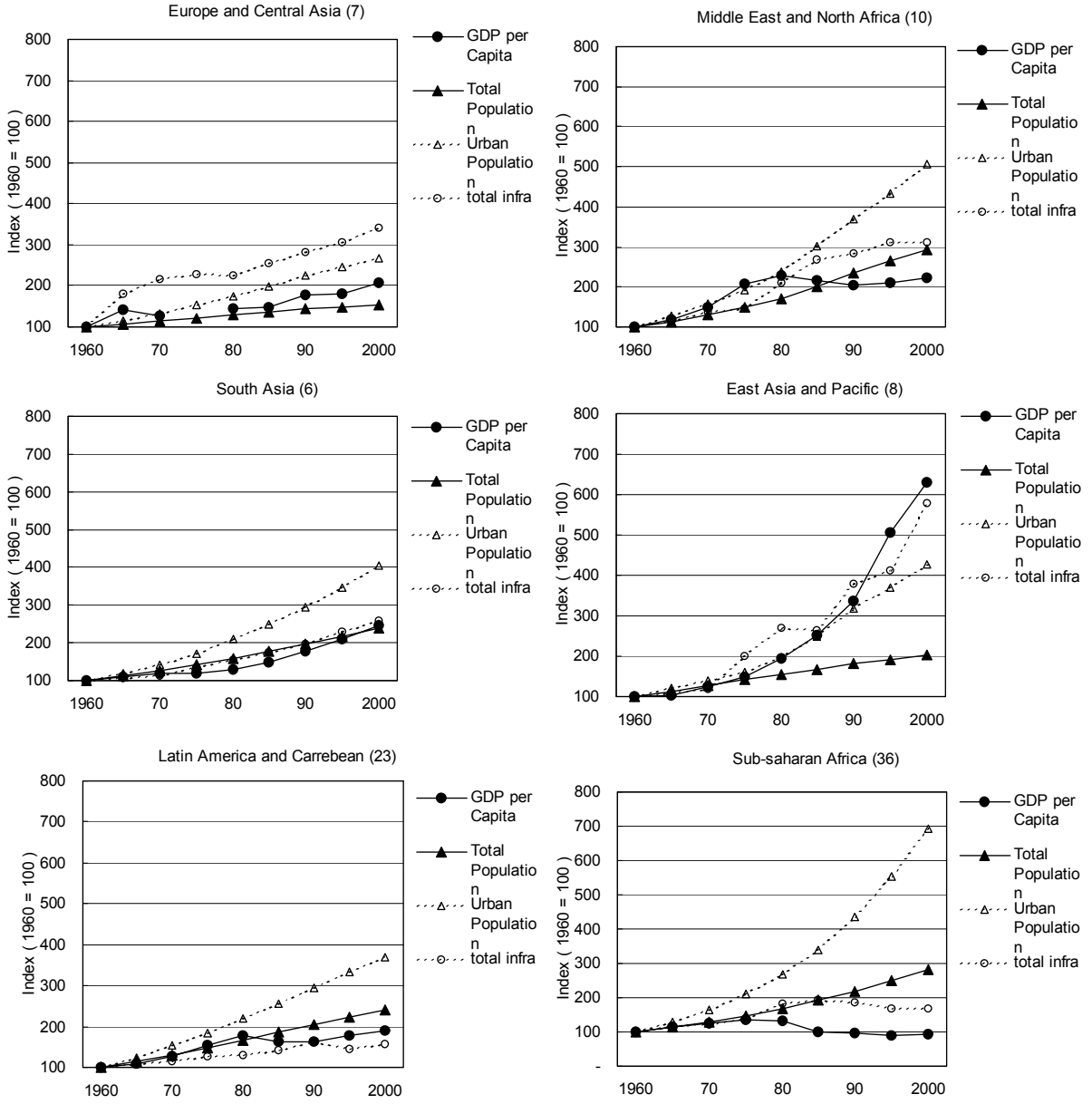
In 2000, the share of railways in the infrastructure stocks in Sub-Saharan Africa, which once occupied a high proportion, decreasing, while the stocks for electric power and roads did not increase at all. Those for water and sanitation increased. Economic infrastructure development lagged far behind. On the other hand, electric power stocks increased sharply in East Asia as well as communications, which experienced a huge increase in its stocks. This showed an economic-infrastructure-driven development. The rapid decrease in railway was similar in Central and South America and stagnated in terms of total amount, although infrastructures, such as electric power, increased. The reduction in railway stocks was common for each region. There is a possibility that the stocks decreased more in regions with inadequate maintenance capacities. By comparing the trends in these infrastructure stocks with those in population and income levels, the following characteristics were obtained.

- East Asia and the Pacific achieved explosive growth since 1990, and infrastructure stocks likewise grew, indicating that economic growth and infrastructure development are strongly linked. Although its urban population growth was as high as that of South Asia, it surpassed South Asia in economic growth and infrastructure.
- In Europe and Central Asia, although population and economic growth were at low levels, an increase in infrastructure stocks was marked.
- In the Middle East and North Africa, population and growth of urban population were swiftly increased. The economy, however, has slowed down since the 1980s, even

though an increase in infrastructure stocks was seen in the 1980s. The same could be said for Europe and Central Asia where changes in economic growth and infrastructure stocks did not correlate with each other so much.

- Sub-Saharan Africa was in an extremely difficult situation due to a decrease in economy and infrastructure stocks and a swift growth of population and rapid urbanization.
- In Central and South America as well as South Asia, urban population increased but other indicators only had modest changes.

Figure 2.2.5 Historical Changes in Population, Income Levels, and infrastructure Stocks per Capita by Region



Source: Compiled from the World Development Indicators and M.Fay & T.Yepes, 2003

(4) Infrastructure gap

The volume of development and the amount of investments required were estimated on the assumption that the infrastructure gap between low- and middle-income countries on one hand, and high-income countries on the other is considered to be the infrastructure investment need. To be more precise, the necessary amount of investments was determined by multiplying the difference in the stock per person per infrastructure sector between each income group and the high-income countries by the population of the subject income country.[2)]

As a result, a total infrastructure investment that is equivalent to about 40 trillion dollars is necessary all over the world in order to raise the level of current low- and middle-income countries to that of high-income countries. It was found from the examination by sector that the proportion of roads and electricity, for which the unit price of development is high, was high in all regions. The estimated amount needed in middle-income countries in East Asia is 11.6 trillion dollars and approximately 90% of this represents China's needs. On the other hand, about 75% of the 11.6 trillion dollars required in South Asian low-income countries corresponds to needs in India.

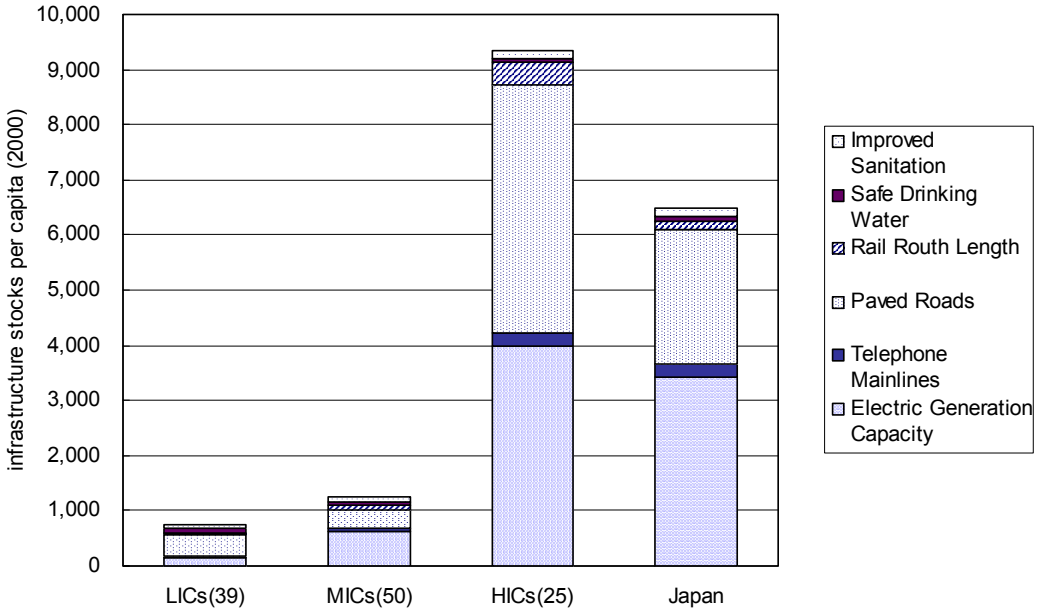
Table 2.2.7 Estimated Infrastructure Investment Needs by Region and Income Group

	East Asia & Pacific	Europe & Central Asia	Latin America & Caribbean	Middle East & North Africa	South Asia	Sub-Saharan Africa	Total
LIC	3,303	464	113	152	11,583	5,272	20,887
MIC	11,618	3,444	4,064	2,258	153	411	21,947
Total	14,921	3,907	4,177	2,410	11,736	5,683	42,834

Source: Calculated from M. Fay & T. Yepes, 2003 and World Development Indicators

[2)] As this estimate does not include maintenance costs, the amount of required investment should exceed this estimated figure. In the original research paper, maintenance cost is at least 2% of the alternative cost of capital stock for electricity, railways, and roads; 3% for water supply and sewage systems; and around 8% for fixed telephones.

Figure 2.2.6 Infrastructure Gap per Capita by Income Group



Source: calculated using M. Fay & T. Yepes, 2003 and World Development Indicators

2.3 Infrastructure Needs in Developing Countries

1) Level of achievement in infrastructure development

The above is a broad overview of the volumes and levels of infrastructure development in the developing countries. The need for infrastructure development should be found essentially from a difference between the current level and the target level of development. The target level, however, is not universal and standardized but differs according to region or country, and between urban and rural areas. Even if the volume of stocks per person or household is used as the required level of infrastructure, comparison by region cannot simply be made because infrastructure use differs.

The point here is not merely improving infrastructure facilities; what is more important is to set a target value for the level of services required of them. Performance indicators of public facilities are classified into: (1) recognition of services and users, (2) safety and satisfaction, (3) physical conditions, and (4) structural strength and loading capacity. To analyze the need for infrastructure development, it is necessary to establish a comprehensive indicator of performance including the performance of individual elements. (Infrastructure Management, W. Ronald Hudson, Ralph Haas, Walled Uddin, Morikita Shuppan Co., Ltd.)

Because the above-mentioned infrastructure performance indicators should be set by each country and city, it is difficult to describe detailed indicators from a macro viewpoint. In this subsection, present levels of infrastructure development are analyzed to explore the need for infrastructure in the developing countries.

2) Infrastructure needs by stage of economic development

Although the need for infrastructure by a developing country naturally varies according to its natural conditions, industrial structure, conditions of urbanization, and historical background,

from the macro viewpoint, it could be seen that the need has a high correlation to the economic level. Infrastructure needs should thus be organized according to economic level. In succeeding paragraphs, the "$" mark shown with the amount of income refers to US$ at 1995 levels.

Table 2.3.1 Pattern of Infrastructure Needs and Economic Growth by Development Stage

Income Group		LIC	LMIC	UMIC	HIC
Population/ Society	Annual growth rate of total pop. (%)	2.0	1.3		0.7
	Pop. Density (persons/km^2)	74.0	55.1		26.4
	Urban population rate (%)	30	49		78
	Poverty rate (%)	35	17		0
	Car ownership (no./100)	1	5		56
Industry	Agriculture value added/GDP (%)	23	11		2
	Industry value added/GDP (%)	29	36		28
Infrastructure stock per Capita (US$)		730	1,245		9,342
Expected Infrastructure Needs		Social and economic infrastructure for primary industry: ・water resources, irrigation, water supply & sewerage, health care, and education ・ roads & bridges, and energy	Urban and industrial infrastructure: ・water and sewerage ・roads, airports, ports, energy, and communication	High-tech, safety- and amenity-related infrastructure development and renewal: ・flood and landslide control, sewerage, solid waste management ・traffic control, distribution facilities, asset management	

Source: Annual growth rate of total population: 1990-2000, World Development Indicators.
Urban population rate: (2000), World Development Indicators.
Poverty rate: share of population below 1 US$ per day: Human Development indicators (countries with available data (1991-2000).
Car ownership: World Development Indicators (number of vehicles in 1995 divided by population in 2000.
Infrastructure stock: calculated from M.Fay & T.Yepes, 2003.
Note: Infrastructure needs were estimated from demand analysis and ODA project records.

《Low-income countries - below $755》

(1) Present condition

Infrastructure development in low-income countries has centered on basic infrastructures such as roads and water supply systems. In water supply and sanitation, particularly, more investment has been provided than in high-income countries. In 2002, the distribution rate of waterworks was approximately 76% while that of sewage systems was about 46%. Investment in economic infrastructures, such as electric power and communication, was, however, small. In Japanese ODA, the number of projects on roads and bridges (particularly many grant-in-aids), water resources development, and irrigation has been increasing.

(2) Needs for infrastructure

a Maps and surveying: These are indispensable in providing basic information for infrastructure development and require assistance because they have not been developed in low-income countries. Actually, in previous development studies, much

weight was given to assistance in surveying and mapping in countries with incomes of $400 or less.

b. **Irrigation:** There are many countries where the share of agriculture is high and the rate of urbanization is low. Increase in agricultural productivity and improvement in living environments in farm villages are important for poverty reduction and economic stabilization. From such point of view, irrigation is an important infrastructure. Although assistance for irrigation has so far been given, there are cases where sufficient maintenance was not carried out. Therefore, it is necessary to examine needs, recoupment of past investments, as well as operation and management.

c. **Water supply and sewage systems:** Securing drinking water is indispensable to the existence of humankind. Therefore, the development of adequate water supply and sewage systems impacts on the improvement of hygiene, the reduction in diseases and deaths, and the alleviation of women's and children's labor. Although their development has advanced considerably in low-income countries, the development pace in rural areas has lagged behind that in urban areas and the rate of operation has been low due to insufficient maintenance (World Development Report 1994). There are many low-income countries where the urban population is remarkably increasing. In urban areas, the hygienic condition is apt to be worse because the population density is high. The development of water supply and sewage systems suitable for each farm village and city is therefore required. Maintenance and repair of infrastructures that were improved in the past is also important.

d. **Roads:** The level of road maintenance and amount of investment in low-income countries is almost the same as that in middle-income countries. Roads are also indispensable infrastructures for convenient living and industrial activities such as transportation of farm commodities. Since car usage is relatively low compared with that in middle-income countries, it is believed that the economic spinoffs of road development are more restricted. Therefore, it is deemed important to invest in maintenance and the development of small, quality roads in farm villages and similar areas as well as national trunk lines to enhance national connectivity. The high share of bridge projects in grant aid is considered reflective of these needs.

e. **Transportation:** Among development survey items, airports, as well as ports and harbors occupy a comparably high proportion. This is probably due to the fact that international or extensive flows of people and products starts to increase in tandem with economic development. Probably, this also serves as a stepping stone in achieving the next economic development stage. On the other hand, there is airport development aimed at tourism promotion. This is necessary to make prospective policies and master plans for urban traffic because urbanization and motorization are also advancing rapidly in low-income countries. There is, however, a possibility that actual development needs will remain restricted.

f. **Electricity and communication:** Electricity and communication facilities are infrastructures in which low-income countries lag far behind middle- and high-income countries. But they are important for economic stimulation and also improve

agricultural productivity. Electricity is also important in enhancing living standards because it brings about improvement in the hygienic condition and alleviates burden on women. Therefore, in the future, it is desirable to increase the investments in electricity and communication in low-income countries. At the same time, it is necessary to consider the aid recipient country's ability to operate and administer the projects as well as the investment.

《Lower-middle-income countries - below - $755～$2,995》

(1) Present state

Infrastructure stocks are twice those in low-income countries and basic infrastructures has been improved to some degree. Infrastructure investment is mainly focused on economic infrastructure for economic growth such as electric and communication facilities. Investments in roads are, however, low. In Central and South America, infrastructure has been considerably improved. In some countries, important issues are not only new investments but restoration and repairs, as well.

(2) Infrastructure needs

a. **Urban development:** Along with issues of urbanization and rapid increase in population in the capital, large cities also get to account for high proportions of productive or economic activities. The trend is that urban problems, such as increases in the urban poor, traffic jams, power shortages, deterioration of water, and air pollution, are becoming severe. Congruently, it is also necessary to prepare for natural disasters like the flooding from rivers. It is assumed that there will be more need for infrastructure development that supports urban populations and functions including roads, water supply and sewage systems, electricity and communication facilities, and river improvements. Furthermore, development surveys have a tendency to increase city and road plans.

b. **Water supply and sewage systems:** These require development suitable for rapid increases in urban populations. In other cases, development in the rural areas is also necessary because of the gap between agricultural villages and cities.

c. **Roads:** Although a definitive cause has not been pinpointed, a possible reason why road maintenance and development in middle-income countries is getting lesser is because of constraints due to the increases in investments in electric power and other components. The supposition is that the need for road maintenance and development becomes higher than under normal conditions as the widespread use of cars increases and economic activities grow. Particularly, needs will increase in metropolitan areas where automobiles are heavily concentrated.

d. **Transportation:** Because the advance of industrialization increases international exchanges, the need for ports, harbors and airports of larger sizes will also grow.

e. **Electricity and communication:** Electricity and communication facilities are infrastructure investments which increase rapidly in middle-income countries and the demand for them actually increases along with economic growth. However, since electricity and communication are components that are commonly suited for private investments and because their investment environments in middle-income countries are better than in low-income countries, the demand for them is not

directly reflected on the ODA. In fact, the weight on aid projects on electricity in yen loans has decreased in middle- or higher-income countries.

《Higher-middle-income countries - $2,955～$9,265》

(1) Present state

In the amount of investments in infrastructure and of infrastructure stocks, countries of this group have a GDP per person of $2,995. Advanced countries are included in this category. Other than the advanced countries, other countries, such as Korea and Malaysia in Asia and those in Europe, the Middle East, and Central and South America, belong to this group. These countries already have considerable significant infrastructure stocks, and self-development is substantially possible. Maintenance of infrastructure is, however, insufficient in Europe, and in Central and South America, and investments for them are necessary in some cases. It is a characteristic feature that investments in roads occupy a large part of overall investments.

(2) Infrastructure needs

a. **Correction of regional disparities:** In case of economic growth, there may be problems such as differences between the rural areas and large cities as well as urban concentration. If so, the development of regional cities is important. For this purpose, it is necessary to raise the level of the whole infrastructure in regional cities and improve high-speed transport networks that connect regions.

b. **Accident prevention:** Needs for forest and river conservancy, flood control and urban disaster prevention should be assumed because damage from natural disasters, such as earthquakes, floods, and landslides, can expand widely due to urban concentration. It is the high-income countries that have given much weight to river and sand control in the development surveys.

c. **Roads:** Investments in roads in high-income countries are increasing, contrary to that in the middle-income countries. It is supposed that investments in construction of full-fledged road networks are being made due to progressive car use. It seems that roads of higher categories, such as expressways, are required.

d. **Transportation:** What should be assumed are needs for transport infrastructure that includes the upgrading of airports, ports and harbors, as well as operational and administrative techniques.

3) Infrastructure needs by region

The previous subsection clarified the needs for infrastructure. This necessitates the organization, by region and country, of the fields where future demand is assumed. In Japan, key regions are selected in a broad ODA outline, formulating what assistance per region should be and what assistance plans per country are moving forward. In this subsection, the socioeconomic circumstances in each region and the present levels of infrastructure development are summarized. The needs for infrastructure by region are also surveyed. Table 2.3.2 shows the main social and economic indicators in each region.

Table 2.3.2 Socioeconomic Conditions by Region

		East Asia & Pacific	Europe and Central Asia	Latin America & Caribbean	Middle East & N. Africa	South Asia	Sub-Saharan Africa
Socio-economic indicator	Population growth rate	1.2	0.6	1.7	2.3	1.9	2.5
	Population density (persons/km^2)	111.7	96.7	24.8	307	302.2	24.2
	Urbanization rate (%)	34.4	68.6	75.5	56.4	28.7	34.5
	Poverty rate (%)	27.1	22.1	31.4	20.3	29.7	45.0
	Car ownership (no./1000)	15.3	154.3	91.9	49.6	6.4	11.1
Industry	Agriculture value added GDP (%)	16.0	9.6	7.4	16.5	22.8	16.1
	Industry value added /GDP (%)	48.3	31.5	29.2	31.5	24.5	29.6
Infrastructure Stocks (US$)		800	3,750	1,450	1,400	900	600

Source: Population growth rate: World Development Indicators (average annual growth rate of 1990-2000).
Urbanization rate: World Development Indicators (Urban population / total population, 2000).
Poverty rate: Human Development Indicators (population living below one dollar per day divided by total population) using countries with available data 1991-2000 and excluding China in East Asia.
Car ownership: World Development Indicators (1995).
infrastructure stocks: calculated using M.Fay & T.Yepes, 2003.

《East Asian Region》

In East Asian and Pacific countries, although infrastructure stocks in monetary value have steadily increased, the level of infrastructure stocks is still low. As the level of urbanization is comparatively low in both low- and middle- income countries, it is supposed that demand for economic infrastructure will increase along with the expected development of urbanization in the future. In low-income countries, investments in basic social infrastructure will continue to be required in order to reduce poverty. It will also be necessary to make investments in the shift to market economies and for continuous aggregate growth. In East Asia, the importance of cross-border infrastructure as a means of broad-based development and regional development (development of ASEAN, APEC, and the basin of the Mekong River) is rising.

《Pacific Region》

In the Pacific, infrastructure development that is peculiar to island countries is required. These countries are commonly small in size, depend on primary industry heavily, and are vulnerable to external factors such as natural disasters and movements in the international market. They have development difficulties including their small domestic markets and great geographic distance from international markets. There are large needs for economic and social infrastructures to overcome remoteness and geographical isolation such as offering appropriate health-care services to residents and environmental preservation to reduce the impacts of natural disasters. To achieve economic independence, it is required that they pursue economic reforms through the fishing industry, the exploitation of seabed mineral resources, the development of their private sectors. (From "Methods for Regional

Assistance," ODA Broad Outline)

《Europe and Central Asia》

In Europe and Central Asia, the level of infrastructure development is high, partly because of their historical and cultural background, and because their social infrastructure have attained a level almost equal to that in high-income countries. These countries are still in a transition phase either to democratization or market economies. They require the development of social and economic infrastructures, which are the foundations of independent economic development. What is required in regions that are in the period of post-conflict recovery and reconstruction is the development of infrastructure to aid relief work for refugees and the poor, as well as the restoration and development of infrastructure.

《Central and South America 》

In middle-income countries in Central and South America, social infrastructures have been improved to high levels, and economic infrastructure is at a relatively high level compared with middle-income countries in other regions. Also, infrastructure development through private investment is active. Although urbanization is already high in these countries, there is still a large need for basic infrastructure to narrow income gaps and regional disparities. This is because there still exist regions that lag behind in the development of economic and social infrastructures and because the gap between the rich and the poor is still wide. An examination of the low-income countries in this region revealed that the level of both social and economic infrastructure is low and that it is required to improve economic and social infrastructures for environmental improvement, which contributes to the activation of private activities and the promotion of investments from foreign countries. Besides the evolution of the Pacific-rim cooperation and the South American common market, broad-based alignment is carried out in Caribbean states and Central America, as well.

《The Middle East and North Africa》

Countries in the Middle East and North Africa range from the oil producers to the least developed countries (LDCs). The conditions of each group also vary. The development of social infrastructure is comparatively advancing. Particularly, middle-income countries are on the same level as in the middle-income countries in Europe, Central Asia, and Central and South America. Economic infrastructure is, however, at a low level. In low-income countries, while the level of social infrastructure stocks is advancing in comparison with other regions, that of economic infrastructure stocks are still low and the need for them is still considered to be large.

These countries are principally crude-oil-producing countries and can exercise some form of influence on peace and stability in areas of the world such as in the Middle East and Iraq. It is supposed that high-income countries will require infrastructure development to promote investments from foreign countries for economic diversification (i.e. to grow out of their dependence on oil), as well as measures for environmental preservation. What is necessary in low-income countries is the development of basic economic and social infrastructures such as the development of agriculture and water resources.

《South Asia》

In South Asia, infrastructure stocks in monetary value are steadily increasing, which is similar to East Asia. However, the level of infrastructure development is still low. The level of

urbanization is low in both middle- and low- income countries and it is supposed that the need for infrastructure development along with urbanization will increase in the future. Since poverty groups are still substantially great in this region, requirements include development of basic infrastructure as measures against poverty, development of economic and social infrastructures, environmental development for intraregional economic deregulation and regional cooperation, as well as measures for environmental preservation suitable for environmental overloads accompanying increases in population.

《Sub-Saharan Africa》

Sub-Saharan Africa has many problems that block development. These include concerns of being left in the dust heap of economic globalization, military conflicts, and the growing problem of AIDS. In addition, railway stocks are vanishing and growth of other economic infrastructure stocks has also reached a plateau; a decrease in infrastructure stocks is seen overall. In middle-income countries, as both economic and social infrastructures show relatively high levels, it is supposed that operation and maintenance will be important in the future in addition to new investments. However, over half of the countries in Africa are considered least developed and/or heavily indebted poor countries. They, therefore, require the development of basic infrastructures such as measures against poverty and social development. Also supposed are the increase of needs for development such as that of the private sector, industries and agriculture, and for infrastructure development to promote intraregional cooperation, which will bring about economic independence and political stability in Africa.

2.4 Investments in Infrastructure in Developing Countries

1) Estimates of performance of investments in infrastructure

In this section, past movements of investments in infrastructure in developing countries are estimated in association with income classes. Because there is no organized data on the amount of investments in infrastructure, estimates were made from the increase in infrastructure stocks (on the assumption that variation in infrastructure is investment). Obtained knowledge is as follows:

a. A difference of 8.3 times in investments in infrastructure between high- and low- income countries in the 1980s, and 9.6 times in the 1990s was obtained. It also showed that there is a tendency for the difference to further widen. A similar tendency was seen between high- and middle- income countries. The absolute amount of investments in low- and middle- income countries was also smaller than that in the 1980s. Namely, it can be said that the 1990s was a period wherein investment in infrastructure in the developing countries was relatively neglected.
b. There was little difference in investment in water and sanitation among income classes, and most of these investments were made in developing countries. The difference in investments, therefore, existed in economic infrastructure. Particularly, investments in electricity and communication were remarkably small in the low-income countries. In the 1990s, however, investments in communication grew rapidly just as in middle-income countries.
c. Middle-income countries have a distinct characteristic wherein the proportion for investments in economic infrastructure was high. On the other hand, investments in

paved roads were smaller than in the low-income countries. As these countries are of an income class where rapid increase of cars is assumed, it is supposed that problems, such as traffic jams and the like, will arise. Such a tendency is increasing.

Table 2.4.1 Estimated Annual infrastructure Investment by Income Group

(US$ per capita)

	LIC		MIC		HIC	
	80s	90s	80s	90s	80s	90s
Electricity Generation	5.7	2.4	14.8	18.1	59.5	33.7
Telephone Mainlines	0.1	0.7	0.6	3.6	5.3	5.1
Paved Roads	5.8	7.6	7.7	6.1	50.7	89.3
Railway	-	-	-	-	-	-
Access to Water	0.9	1.0	0.6	0.6	0.4	0.4
Access to sanitation	1.3	1.4	1.2	1.2	1.4	1.4
Total	12.2	11.7	33.0	24.5	100.8	112.8

Source: calculated using M.Fay & T.Yepes, 2003

Note: Railway was excluded since infrastructure stocks of railway are decreasing. Total value is not aggregated by sector but estimated as total infrastructure including railway.

2) Estimated required amount of future infrastructure investments

To satisfy future demands for investments in infrastructure, 5.47% of GDP in total is considered as the necessary figure for 2005 to 2010, 2.74% for new construction, and 2.73% for operation and maintenance.

This estimates show the possibility that poorer countries will have a bigger financial burden. Among regions, demand for infrastructure development will be remarkably high in Asia. The burden on operation and maintenance costs will be bigger than that of new investments in high-income countries, such as in South Asia, Europe, and Central Asia.

Table 2.4.2 Estimated Annual Investment Needs, 2005-2010

	New		Maintenance		Total	
	US$ million	%GDP	US$ million	%GDP	US$ million	%GDP
LIC	49,998	3.18	58,619	3.73	108,607	6.92
MIC	183,151	2.64	173,035	2.50	356,187	5.14
HIC	135,956	0.42	247,970	0.76	383,926	1.18
East Asia & Pacific	99,906	3.67	78,986	2.90	178,892	6.57
South Asia	28,069	3.06	35,033	3.82	63,101	6.87
Europe & Central Asia	39,069	2.76	58,849	4.16	97,918	6.92
Middle East & N. Africa	14,884	2.37	13,264	2.11	28,148	4.48
Sub-Saharan Africa	13,268	2.84	12,644	2.71	25,912	5.55
Latin America & Caribbean	37,944	1.62	32,878	1.40	70,822	3.02
All developing countries	233,139	2.74	231,654	2.73	464,793	5.47

Source: M.Fay & T.Yepes, 2003

The necessary amount of investments by sector was examined next. The amount of investments in electric power is the largest in the low-income countries, followed by roads and mobile telephones, respectively. What is more characteristic, compared with middle-income countries, is that the percentage of investment in drinking water and hygiene is about three times, and it shows that the percentage of roads is about twice.

Middle-income countries also have the distinct characteristic wherein investments in mobile

telephones are the largest. The number of phone lines is also large. This indicates that investments in information and communication will become substantial. Operation and maintenance costs, comparable to the amount of investments in new construction, will also become necessary. Operation and maintenance cost is higher, particularly in low-income countries. This comes from large investments in mobile telephones, for which operation and maintenance costs are relatively low, in the middle-income countries. Operation and maintenance cost of paved roads, the amount of investment for which is large, is more efficient in middle-income countries. In any case, it is shown that efficient operation and maintenance are extremely important.

Table 2.4.3 Estimated Annual Investment Needs by Infrastructure Sector, 2005-2010

(million US$)

		Electricity Generation	Telephone Mainlines	Paved Roads	Railway	Mobile	Water	Sanitation	Total
New Construction	LIC	17,990	4,835	13,598	491	6,393	2,974	3,706	49,988
		6.0%	9.7%	27.2%	1.0%	12.8%	5.9%	7.4%	100.0%
	MIC	56,396	25,690	25,104	733	68,068	2,707	4,454	183,151
		0.8%	14.0%	13.7%	0.4%	37.2%	1.5%	2.4%	100.0%
Maintenance	LIC	13,293	5,321	22,858	2,918	3,730	5,036	5,462	58,619
		2.7%	9.1%	39.0%	5.0%	6.4%	8.6%	9.3%	100.0%
	MIC	50,558	27,995	28,998	5,970	44,994	6,111	8,410	173,035
		9.2%	16.2%	16.8%	3.5%	26.0%	3.5%	4.9%	100.0%
Maintenance/ New Construction[1)]	LIC	0.74	1.10	1.68	5.94	0.58	1.69	1.47	1.17
	MIC	0.90	1.09	1.15	8.14	0.66	2.26	1.89	0.94

Source: calculated using M.Fay & T.Yepes, 2003

1) Maintenance needs is divided by new construction needs

3) Possibility of fund procurement for investments in infrastructure

(1) Outlook of infrastructure investment

It is estimated that investments in infrastructure are about 200 billion dollars per annum, which is 1/5 of the total amount of investment, or about 4% of GDP on average. In countries where communication or electric power networks are expanding rapidly, especially those with notable progresses in urbanization, investments considerably exceeding these figures are made (World Development Report 1994). As seen in Table 2.4.4, among Asian countries, there are those where investments in construction reaches more than 15%. It is supposed that infrastructure investments are also significantly large.

The proportion of public investments in construction investment varies according to country. It is, however, supposed that public investments have an important role in infrastructure investment regardless of the stage of national development. This is because the proportion is more than 50% in Indonesia, Iran, and China; a similar tendency is seen in Singapore and Korea, both of which are high-income countries.

Table 2.4.4 Comparison of Construction Investment Share

Country	Share of Construction Investment in GDP	Share of Public Investment in total Construction	Share of Employees in Construction	Year
Nepal	10.70%	N.A	0.50%	
Kenya	2.50%	N.A	4.85%	1997
India	8.30%	40.90%	4.50%	1996-1997
Indonesia	6.70%	67.00%	5.00%	1994-1999
Philippines	5.60%	41.55%	5.00%	1995
Thailand	20.75%	33.20%	1.00%	1994
China	6.20%	59.00%	5.20%	1994
Iran	11.50%	54.80%	N.A	1997
Turkey	12.50%	23.00%	16.00%	1995
Colombia	3.49%	N.A	N.A	1990
Peru	8.70%	N.A	N.A	
Ecuador	2.40%	25.00%	6.70%	1996
Malaysia	14.40%	25.20%	9.40%	1993
Korea	16.50%	57.00%	7.30%	1999
Chili	9.80%	38.70%	7.50%	1995
Singapore	10.80%	69.00%	7.00%	1998
Japan	16.40%	42.40%	10.20%	1996

Source: Website of Ministry of Land, Infrastructure and Transport, Japan

In Japan, the percentage of investments in construction to GDP rose to approximately 25% in 1973, when the first oil crisis occurred. But it has been declining gradually since then and is about 15% now. Infrastructure investments, as part of construction investments, are mainly attributed to governmental investments in construction, which account for around 7%.

(2) Private investments

Private investments in infrastructure development in the developing countries were 128.4 billion dollars at its peak in 1997. This, however, dropped sharply to 57.5 billion dollars in 2001 (Table 2.4.5), which was due to impact of the Asian economic crisis. Private capital, which mainly seeks profit, is sensitive to such business fluctuations.

As private investments expanded rapidly in the 1990s, a tendency arose wherein desirable private investments would be ranked positively and whereby public investments were turned to governance, capacity building, poverty reduction, etc. Recently, however, a trend that re-examines the importance of public funds has also been observed because of cooling private investments.

It is difficult to finance investments in infrastructure from public funds only. Facilities for transportation, energy, water, and communication can be improved by user fees in many cases. For roads as well, there is a method of realizing users' payments through a fee-charging system. Regarding facilities beneficial to the wealthy, such as expressways, there may be a way of thinking that impartiality shall be enhanced by users' payments wherever practicable.

For this purpose, it is important to improve the environment for the entry of the private sector and it is also necessary to make such inductions that investments will be made

properly. Private investments are disproportionately made in areas and fields where economic growth is high, and wherein securing markets and profits can be expected. In addition, there is a question of whether or not sufficient consideration will be given to poverty reduction and environmental protection. Therefore, both enhancement of public ability of involvement and technical assistance for this enhancement will probably be required.

Note: the DfID (British Department for International Development) considers that as a breakdown of investments in infrastructure in developing countries, about 70% are made by the government, about 3% are by ODA, and about 27% are by the private sector. It is their policy to attach importance to governance and maintenance control as a role of ODA in infrastructure development.

Table 2.4.5 Investment in Infrastructure Projects in Developing Countries with Private Participation, (billion US$, 2001）

	1995	1996	1997	1998	1999	2000	2001	Total	Share
Energy	25.0	33.6	52.0	31.1	18.1	28.7	11.2	199.7	33%
Water and Sanitation	1.8	1.9	9.3	2.4	6.9	4.8	2.2	29.3	5%
Transportation	12.0	17.4	21.7	18.4	8.9	11.6	12.4	102.4	17%
Telecommunication	20.1	29.7	45.4	57.3	43.3	45.3	31.7	272.8	45%
Total	58.9	82.6	128.4	109.2	77.2	90.4	57.5	604.2	100%
Rate of change to previous year		40.2%	55.4%	-15.0%	-29.3%	17.1%	-36.4%		

Source: Ada Karina Izaguirre , A Review of Projects with Private Participation, 1990-2001 (2002, World Bank)

Table 2.4.6 Percentage of Developing Countries with Infrastructure Projects involving Private Participation

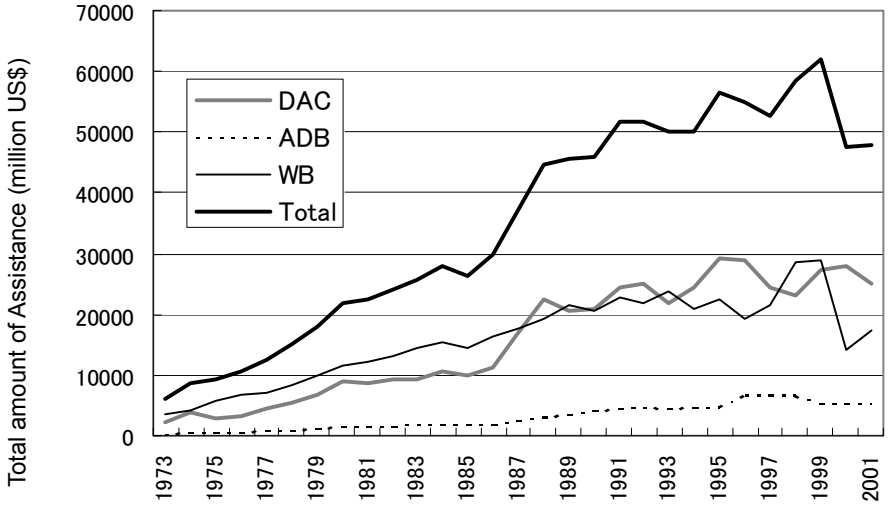
	LIC	LMIC	UMIC
Share	81%	77%	76%

Source: Are the Trends in Low-Income Countries Different? (2000, World Bank)

(3) Infrastructure investments through ODA

In all bilateral aids by the DAC countries and loans from international aid agencies (the World Bank group and the Asian Development Bank), aid volume almost increased linearly from the beginning of the 1970s, racking up a total of 61.9 billion dollars in the runup to 1999. This figure was equivalent to the GNP of one country such as Chile, Peru, Pakistan, the Philippines, or Malaysia, in the same year. But the World Bank, which realized aid almost equaling the total amount of aid by the DAC countries, decreased loans by 15 billion dollars in a single swoop in 2000. As a result, the total amount of aid in that year dropped to 47.4 billion dollars, the level 10 years ago, and was the same level in 2001. This decrease was partly influenced by a fund shortage due to rapid increases in urgent loans from 1998 to 1999, as reactions to the 1997 financial crisis.

Figure 2.4.1 Aid Flows from DAC Members, ADB and World Bank



Source: aggregated from the annual reports of the DAC, ADB, and Word Bank

Table 2.4.7 Infrastructure Aids of DAC Members, ADB, and World Bank

	Period	1973-75	1976-80	1981-85	1986-90	1991-95	1996-01
Annual Average Aid (million US$)	DAC	3,031	5,765	9,573	18,474	24,924	26,099
	ADB	544	1,110	1,856	3,066	4,750	6,123
	WB	4,539	8,720	13,938	19,056	22,289	21,609
	Total	8,115	15,595	25,368	40,596	51,962	53,831
Economic Infrastructure (million US$)	DAC	1,044	2,483	3,885	7,231	10,226	8,250
	ADB	226	412	712	1,241	2,563	2,101
	WB	1,699	3,290	5,507	6,966	7,558	5,370
	Total	2,969	6,184	10,104	15,438	20,346	15,720
Share to total	DAC	34.4	43.1	40.6	39.1	41.0	31.6
	ADB	41.5	37.1	38.4	40.5	54.0	34.3
	WB	37.4	37.7	39.5	36.6	33.9	24.8
	Total	36.6	39.7	39.8	38.0	39.2	29.2
Social Infrastructure (million US$)	DAC	807	934	2,089	4,348	7,667	11,385
	ADB	61	177	321	440	724	1,127
	WB	443	989	1,448	2,136	4,578	5,048
	Total	1,311	2,100	3,859	6,923	12,969	17,560
Share to total	DAC	26.6	16.2	21.8	23.5	30.8	43.6
	ADB	11.2	16.0	17.3	14.3	15.2	18.4
	WB	9.8	11.3	10.4	11.2	20.5	23.4
	Total	16.2	13.5	15.2	17.1	25.0	32.6

Source: aggregated from the annual reports of the DAC, ADB, and Word Bank

Table 2.4.7 shows, in average annual amounts, the transition of shares of economic infrastructure (transportation, communications, and energy) and social infrastructure (education, health care, water and sewage, and multi-sector) in the total amount of aid. Economic infrastructure consistently kept its share of 37-40%, but this decreased to 29% in the latter half of the 1990s. In particular, the decrease in the share of the World Bank was marked; its share, which had been nearly 40% for a time, went down to 34% in the first half of 1990s and to 25% in the second half. Consequently, not only the share, but the actual amount of assistance for economic infrastructure, dropped from 20.3 billion in 1991-1995, to 15.7 billion dollars in 1996-2001, on annual averages.

The expansion of the shares of social infrastructure is notable. The share was hovering around 15% until the end of the 1980s. It rose to 23% in the first half of the 1990s and to

33% in the second half, resulting in a reversal of positions of the economic and social infrastructures. In 1998, the amount of assistance for social infrastructure exceeded the amount for economic infrastructure for the first time. Both the DAC countries and the World Bank doubled the share of assistance for social infrastructure in the past ten years. From this, influence of policy switch from economic to social infrastructure is clearly reflected in the amount of assistance.

On the assumption that new investments in infrastructure are about 230 billion dollars, and the share of private investments is about 60 billion dollars (which is about half of the amount before the economic crisis), approximately 170 billion dollars (about 74%) mainly represents public investments. This amount is about 12% of public investments on the assumption that public development funds are about 20 billion dollars. Accordingly, it is considered that ODA for infrastructure development is extremely important now when private investments are lacking.

For securing financial resources for infrastructure development, income from user fees and special revenue sources are issues. There are already some cases where funds for road developments are raised by taxing fuel. As benefits of infrastructure development are apt to tilt in the favor of the wealthy, this supports the introduction of a fuel tax, from the perspective that impartiality should be acquired through users fees. On the other hand, excessive tax imposition has problems such as raising transportation costs which brings about price increases.

4) Recent movements of aid agencies regarding infrastructure

At a seminar entitled "Infrastructure and Poverty" held at the DAC headquarters in March, 2003, the importance of infrastructure in development was emphasized. In response to this, and as sketched out below, the need to reevaluate assistance in social infrastructure development is rising among donors. In carrying out this study, attention should be paid to such movements.

World Bank

With 1997 as a peak year, private investments in infrastructure decreased and are unlikely to rise soon. The necessity of supplying infrastructure services aimed at poverty reduction and economic growth has been underscored during global discussions on development at international meetings such as the UN Millennium Summit, the New Partnership for Africa's Development (NEPAD), the World Summit on Sustainable Development (WSSD), and the Camdessus Panel. In response to these circumstances, the World Bank started to review assistance in the field of infrastructure. In July of 2003, the WB Board of Administration approved an action plan giving shape to new policies pertaining to the World Bank's new efforts in the field of infrastructure. The main policies in the action plan are as follows:

a. To aim at improvement of efficiency and performance of infrastructure suppliers and continue to nurture the private sector.

b. To finance public projects, performance of which is good, from the perspective that advice on policies in sector reforms shall be given in response to decreases in private investments in infrastructure.

c. In assistance for private investments as well, with attention focused on organizational

make-up for private entry and on capacity building, to render assistance to both private service suppliers and regulatory bodies.

d. To give assistance while heeding the characteristics of subsectors. In the fields wherein the private sector enters easily among infrastructure fields, such as the sectors of information and communication techniques, weight shall be attached to the promotion of private entry; while in sectors where the percentage of private entry is below 10%, such as water supply and sewage, expansion and increase of grant money to the private sector shall be enhanced.

e. To give assistance while heeding the state of regional development. For low-income countries where private entry is limited, financial assistance shall be given to governments. For middle-income countries, partnerships between governments and the private sector shall be supported. For high-income countries, assistance for promotion of private investments shall be persistently rendered regardless of the fact that private investments decrease.

Based on the above, aiming at realization of the said action plan, the World Bank has worked out a concrete plan for the schedule of implementation and which it expects to complete in the next two or three years. The plan is publicly presented on the home page of the World Bank.[3)]

Asian Development Bank

The Asian Development Bank recognizes the important link between supply of infrastructure and poverty reduction, and has announced their policy to expand infrastructure projects related to hardware and society in the long-term plan (2001 - 2015) [4)]. Specifically, it is their policy to increase finance, placing weight on education, health care, water supply, sewage and residential facilities in poor countries. The ADB expects loans of five billion dollars in continuing projects, and loans of eight billion dollars in new projects from 2002 to 2004. These are planned to include aid for improving governance in the field of infrastructure. The ADB has set a "supply of infrastructure which will enhance long-term independent development as well as empowerment of the poverty groups" as a future goal, and takes a line to work on the issue of how to improve the poor group's access to infrastructure in light of this goal. Furthermore, they consider that partnership between governments and the private sector and a proper regulatory environment, with the principle of competition adopted in the field of infrastructure, will be important in the supply of infrastructure.

Department for International Development in the United Kingdom（DfID）

Since 1997, when a new strategy against poverty was hammered out, the DfID has continued studies on the effects of poverty reduction that infrastructure development brings about. Results of these studies are organized best in a report titled "Making Connections - Infrastructure for Poverty Reduction[5)]." The contents of this report were also made public at a seminar called "Infrastructure of Poverty," held at the headquarters of the DAC in March, 2003. The gathering received high acclaim from attending donors because, with importance of infrastructure development centered anew on the discussion on poverty reduction,

[3)] http://www.worldbank.org/infrastructure/files/InfrastructureActionPlan.pdf.
[4)] "Moving the poverty reduction agenda forward in Asia and the Pacific-the long-term strategic framework of the Asian Development Bank (2001-2005)," ADB, March 2001.
[5)] "Making Connections: Infrastructure for Poverty Reduction," January, 2002, DfID.

infrastructure was not grasped as a mere conventional "box" but was reevaluated in terms of its relation with development of the system and of the effects it brings about. The report consists of five chapters: "New Issues of Infrastructure," "Impacts on Poverty Reduction," "Issues of Investments in Infrastructure," "Possibility of New Partnership," and "Future Efforts." The main points at issue in this report are as follows:

a. Despite much need for assistance for infrastructure in the developing countries, donors, so far, have taken a negative view of infrastructure. A change of this view is required.

b. It is necessary to properly place infrastructure services (including not only physical development, but systems and benefits of people) in the agenda for eliminating poverty.

c. Achievement of the MDGs is impossible unless a method is taken which integrates large infrastructure and local infrastructure with the poverty groups as a target.

d. In the present situation, 70% of funds for infrastructure are procured from developing countries' own public funds and procurement through ODA is less than 5%. Now, that investments in infrastructure are mainly made by governments, donors should support them.

e. A role of donors is to assist in forming bridges among domestic companies, private companies, and end users in cooperation with the government of a developing country.

f. Development of the public sector is the most realistic and politically acceptable option.

g. The state of current investments in infrastructure is far below demand and donors must halt the downward trend of assistance for infrastructure.

h. To overcome the negative impression of large infrastructure projects, transparency (in bidding procedures, infrastructure plans etc.) must be secured, as well as development of abilities (ability to examine investments in infrastructure made by governments of developing countries, ability to carry out transparent procurement and bidding, etc.) and analysis of environmental impacts (health risk to the poor, risk of disasters in areas where impoverished people live, etc.).

Based on the above-mentioned discussions, the DfID has laid down a policy for its future efforts in development of infrastructure. On the level of bilateral assistance, focus will be placed on four fields: "development of abilities," "performance of accountability," "construction of partnership between the government and the private sector," and "appropriate use of governmental subsidies." On the level of multilateral assistance, the DfID has determined to play a central role by establishing the Public-Private Infrastructure Facility (PPIAF, for multilateral donors' technical assistance to contribute to qualitative improvement by the use of private resources) to promote the effective use of private investments, and to work on the promotion of fair investments in infrastructure through the Commonwealth development cooperation and on assistance for private investors goals, which is a promotion and development of infrastructure.

Joint Study by the World Bank, the Asian Development Bank and the JBIC

With assistance from the Government of Japan (PHRD Fund) for the common goal of economic growth and poverty reduction in East Asia, the Japan Bank for International Cooperation, the Asian Development Bank, and the World Bank started a joint study on infrastructure development in the region (tentatively called "Infrastructure in East Asia: the

Way Forward ") in September of 2003.

In this joint study, the ideal type of new international partnership between the public and private sectors is to be sought for reorganization of the role and effects of infrastructure development in East Asia, particularly the role for and importance in poverty reduction. In addition, an examination will be made on the recipes, such as fund-raising toward promotion of more efficient infrastructure development.

Countries to be surveyed are East Asian and Pacific countries. The survey will be conducted on so-called economic infrastructures (urban and regional), particularly facilities of electric power, gas, transportation (roads, railways, airports, ports and harbors) and communications, water supply and sewage systems, and of irrigation facilities. The summary of concrete survey contents is as follows:

a. Importance of infrastructure in economic growth and poverty reduction.
b. Historical overview of recent infrastructure development in East Asia.
c. Experience in infrastructure for mobilization of private resources in the said region.
d. Impacts made on demand for infrastructure by decentralization and urbanization.
e. Contribution of infrastructure to enhancement of international competitive power in the said region and promotion of regional integration.
f. Considerations for environment and health care.
g. Forecast of demand for infrastructure development.
h. Delineation of roles between public and private sectors in planning infrastructure development, procuring funds, administering and supplying services.
i. Issues related to regulation of infrastructure suppliers (public and private).
j. Sources and methods of fund procurement for infrastructure development.
k. The poor's ability to bear infrastructure cost and social considerations.

It is planned to make a report of this survey with the completion expected in December 2004 and to publish it in various locations after that.

DAC Poverty Reduction Network (PovNet)

The DAC committee consists of eight subordinate organizations.[6)] Among them, an organization called "Poverty Reduction Network (going by the name of PovNet)" started task teams in three fields, i.e. development of the private sector, agriculture and infrastructure, and perform activities to realize a pro-poor growth. The infrastructure task team is chaired by Japan. The PovNet discusses not only poverty reduction but growth and focuses on the importance of infrastructure in light of growth.

[6)] Subordinate organizations approved by the DAC committee in March, 2003, are the following eight:1) Working Party on Statistics, 2) Working Party on Aid Effectiveness and Donor Practices, 3) Network on Development Evaluation, 4) Network on Gender Equality, 5) Network on Environment and Development Co-operation, 6) Network on Poverty Reduction, 7) Network on Governance,8) Network on Conflict, Peace and Development Cooperation.

3. Development Assistance in Infrastructure Services: Main Lessons

Lessons from past infrastructure assistance were gleaned from every stage of project cycle. It included aid agencies' post study reports, interviews with experts, questionnaire surveys in three Asian countries and various other sources and data, which were gathered in order to put them in proper perspective with respect to recent assessments and criticisms leveled at Japan's ODA. The outcome underscores the primacy of a consistent and integrated approach to guarantee transparency in project implementation to realistically narrow the widening infrastructure gap even while avoiding negative impacts, and providing more effective services to recipient countries and individual beneficiaries.

3.1 Lessons from Past Experiences

A discussion and clarification of development criticisms of past assistance is necessary in keeping with the objectives of the study, as well as to sort out lessons from previous assistance in infrastructure services. This facilitates the extraction of lessons from past concrete aid cases and defines issues and future orientation obtainable from these lessons. This chapter sorts out such lessons by project phase for future use. The following three basic assessments were gleaned from the past experiences:

a. Lack of actions against the infrastructure gap.

b. Limited and biased reach of infrastructure services.

c. Negative impacts of infrastructure development.

The description of each of these assessments is found below:

1) Lack of actions against the infrastructure gap

Various problems abound in the developing countries. Infrastructure development vital for livelihood generation and economic growth is significantly lacking, shackling economic growth, perpetuating low living standards, and other socio-economic malaise in many countries. Approximately 1.1 billion people are living in absolute poverty all over the world (earnings of less than US$1.08 per day), about 1.2 billion people did not have access to water as of 1997, while a mere 10% of the population in Sub-Saharan Africa has access to electricity (the World Bank). The absence of infrastructure hinders access to social services, increases and expands the poverty groups, increases social instability, and endangers various peoples and populations throughout the world. Developing the necessarily proper infrastructures is indispensable to address these malaise and issues. However, in many developing countries and regions, there is a severe dearth of economic infrastructure, including energy, transportation, etc., which are essential for the promotion of industry and many forms of development, placing the economic independence of nations or regions in trouble. Infrastructure levels in developing countries, in terms of infrastructure stocks, is a mere tenth of the average in high-income countries. The necessity of development is thus vast.

On infrastructure services, one of the factors for the inability to deliver services is the quantitative lack of infrastructure. The rational for this ironically includes the lack of recognition of such needs and insufficient amounts of investments due to investors' shying away from risks since it involves gargantuan amounts. Anticipated private investment in economic infrastructures did not materialize due to high financial risks caused by the lack of

institutions and other factors. Moreover, in some regions, the developed stocks are either already decrepit or are declining. Effective actions for addressing these forms of infrastructure gaps have yet to be carried out.

Based on the preceding observations culled from an examination of past assisted projects, the following are the primary lessons (Their concrete details are described in the next section.):

- A clear master plan, especially one that promotes high ownership among stakeholders, contributes to the consistent implementation of projects. Lack of a master plan, or a deficient one, causes negative impacts on the implementation of projects. Espousing a vision among concerned parties is important.
- Strengthening investment incentives among private entities promotes project efficiency.
- Diversification of financial resources for projects should be promoted. This is based on the premise of imposing fair and appropriate burdens on beneficiaries.
- Plans should be altered flexibly in the event of unforeseen situations like natural disasters, abrupt changes in socio-economic conditions, etc.
- Inadequate maintenance and management (e.g. financial shortage, lack of local ownership, etc.) often hinder the functions of developed infrastructures.
- At the planning stage, providing projects with mechanisms for providing feedbacks, or evaluating results after project implementation while strengthening monitoring systems will enhance project effectiveness.
- For a consistent aid implementation, the coordination of schemes and simplification of procedures among donor countries are necessary, while strengthening ownership and improving governance and capacities of recipient countries.

2) Limited and biased reach of infrastructure services

Infrastructure can deliver major benefits in economic growth, poverty alleviation, and environmental sustainability – but only when it provides services that respond to effective demands and does them efficiently. (The World Bank. 1994. World Development Report)

Infrastructure development has brought substantial effects on economies, societies, and environments. However, the development of infrastructure facilities alone is insufficient to bring about such impacts. What is important is whether services that are required by users and residents are being delivered and have proper impacts.

A considerable amount of assumptions, assessments, conditions, and complementary factors are required to bring about the required effects of an infrastructure development project, and have them function consistently, so as to achieve their maximum goals and benefits. Initially, the process involves the placement of an infrastructure task with the state, or upper planning level. This is followed by the preparation of a master plan for each sector, implementation of a feasibility study on relevant issues, planning of the detailed design, construction, then the infrastructure or facility completion. For infrastructure to function as a facility, continuous and appropriate maintenance is required. Without proper ownership by the managing body, sufficient maintenance will not be conducted. Additionally,

complementary policies are indispensable in facilitating investments from the private sector or for raising funds. On all fronts, the development of infrastructure cannot be achieved without the element of human capacity, which involves the capacities of the responsible agencies not only to balance conflicting interests with other agencies but also to coordinate with other donor agencies, which is essential in prioritizing the necessary infrastructure projects. Furthermore, the establishment of a complementary system is needed for the operation of infrastructure facilities.

There are many cases wherein infrastructures were developed but their services did not properly redound down to their beneficiaries. Often, this was caused by a lack of comprehension of exact people's needs. However, even when needs were recognized, the infrastructure's location, component, scale, or specification did not complement with those needs. Other cases also obtain wherein built facilities were able to meet people's needs but came up short in the areas of sufficient operation, maintenance, and management.

Although these issues have been common knowledge they don't mean that they have been entirely resolved. For instance, with respect to facility maintenance, although consideration for operation and maintenance are a matter of course, taking steps toward effective maintenance measures may still not be made. The obstruction lies in obtaining proper maintenance budgets especially with the thought that many are lacking in political mileage that some new infrastructure construction have.

These observations further confirm that a number of lessons can be had from the outcomes of past aid projects. Successful and unsuccessful cases are often stated in simple assessments such as: "Such conditions led to success," or "Lack of such conditions ended in failure." However, it should be noted that many lessons are also obtainable from neither successful nor unsuccessful cases. This will show in statements like: "It could have been more effective if such conditions existed," or "This kind of condition has a decisive influence on the consequence." The chief lessons found are as follows: (Details will be given in the next section.)

- Accurately reflecting user's needs is important. To that end, participation of local concerned parties, including the governments, communities, and residents, during the master plan stage is necessary.
- Setting suitable technologies and scales based on appropriate demand forecasts is important for project planning and designing. Promotion of community participation is required to draw accurate needs and enhance ownership.
- A broad outlook is required to maximize the effects of infrastructure services including coordination with other sectors and formulation of complementary policies, etc.
- Many cases were found wherein infrastructure services have deteriorated due to lack of financial resources for maintenance, lack of ownership, and lack of community participation, among others.
- Providing feedback on the planning stage, whether or not services meets needs, or whether any disadvantage or inconvenience occurred during the post evaluation stage, is necessary for the next project.
- Strengthening of stakeholders' ownership and capacities, and improvement of the

recipient countries' governance are necessary for the sustainability of infrastructure services.

3) Negative impacts of infrastructure development

In some cases, negative impacts resulted from infrastructure development. These include the degradation of living conditions by involuntary residential resettlements, deterioration of the natural environment, influence-peddling among officials on project appointment, bidding anomalies, wasteful investments caused by overly estimated demands, large amounts of financial burdens, an increase in accidents, and so forth. Many of these became media fodder in discourses and criticisms against the ODA, from NGOs and other quarters.

The 10 issues pointed out by the Liaison Council for ODA Reform by Citizens and NGOs (ODA Liaison Council) in 1999 in their *"ODA kaikaku nimuketeno NGO karano-teigen"* (Recommendations for the ODA Reform by NGOs) are: (1) administrative procedures for ODA implementation, (2) community participation, (3) gender equality, (4) information disclosure, (5) environmental destruction, (6) eviction, (7) indigenous peoples, (8) coordination with civil society, (9) development assistance of local autonomous bodies, and (10) promotion of development education and regional learning. Among the ODA problems, eviction and environmental destruction got the most criticisms from the NGOs.

To address these issues, certain measures, like setting guidelines for environmental and social considerations to enhance the validity and transparency of project implementation, etc., have been taken by international aid agencies, including JICA and JBIC. Nevertheless, some lessons could still be gleaned from past aid projects. The primary lessons are (Concrete details will be described in the next section.):

- In a sense, involuntary residential resettlement is an unavoidable issue attached to infrastructure development. Attentive consideration to minimize resettlement is a matter of course. However, various measures are required to strengthen the implementing agencies' governance, secure the living environment for the relocated residents, as well as ensure fairness and transparency of project implementation.
- With regard to environmental protection, conducting fair environmental assessment, avoiding unrecoverable damage, and implementing preventive and alleviation measures against anticipated adverse impacts are necessary.
- Appropriate technologies and scales should be recommended by conducting a demand forecast assessment at the planning stage.

3.2 Lessons Learned by Project Stage

1) Lessons from the master plan stage

Technical assistance is the chief subject in this aspect. Although a number of technical assistance were provided to conduct various master plan and feasibility studies for certain projects, issues which were often left to the recipient countries included: fund raising, ideal state of organizations or institutions, and financial resources for management and maintenance. There is a growing awareness that these issues have decisive influences on the consequences of infrastructure projects.

Poverty reduction is a typical objective of aid projects, and one that especially has international consensus. Thus, the facilitation of trickle-down effects and attention to socially

vulnerable groups are important even in economic infrastructure projects aimed at promoting economic growth. There is a growing importance on dealing with contemporary issues including the possibilities of project sustainability, securing ownership by recipient countries, and participation of concerned parties.

Objectives and scientific methods must be applied in the determination of infrastructure needs and in the assessment of infrastructure demands. Cautious demand assessments are critical especially when they involve demand stimulation in model projects, or if demands are subject to the results of other projects. Additionally, if projects are swayed by political considerations in the donor country, there is a high risk that projects will balloon to unnecessary scales.

(1) Goal setting

Goal setting is an important agendum in the master plan stage. In order to have a common vision, goal setting is necessary in any level of master plan, whether it is for a state plan, a regional development plan, or a master plan for each sector. In addition, a master plan has a significant role in sharing visions.

"Setting a target in clearly understandable terms strengthens the ownership by local governments and residents, and the possibility of implementation for a master plan is enhanced."

Central Luzon Development Project Study (Philippines, JICA, 1993-1995):
A master plan for a comprehensive regional development covering agricultural and industrial sectors, socio-economy, and infrastructure facilities for six provinces in Region III of the Philippines' Luzon island was formulated. The term "glocalization" was used as a focal vision to deliver both globalization, for the promotion of regional economy, and localization, for taking in the needs of local residents. It enhanced the participation and ownership by local governments and ensured a successful participation of local residents. The formulated regional plan is still being utilized after 8 years since it was implemented. The 28 social development proposals, of which 18 have been engaged as of 1997, and the North Luzon Expressway, proposed as a backbone infrastructure, was also built. (Based on information from an interview with experts in Japan).

"Presenting clear logic and alternative proposals strengthens local ownership toward the goals formulated in the master plan."

Transportation Master Plan and Feasibility Study of Urban Transport Projects in Greater Cairo Region (in the Arab Republic of Egypt, JICA, 2001-2002):
A comprehensive urban transport plan in the Greater Cairo Region was formulated. In this study, a comprehensive approach was taken rather than applying a single measure to present its clear logic: vision – transport plan goals – central strategies – planning tasks, against traffic problems, like traffic congestion and insufficient public transportation, and urban problems. In addition, each strategy showed "what should be achieved," "how to achieve," and "recommendations for implementation", in clearly understandable terms. By presenting multiple improvement scenarios, it allowed for objective decision making. It recommended the formation of an organization that allows investing limited financial resources effectively by eliminating the negative effects of vertical administrative system, as well as managing both roads and public transportation in a cross-sectional manner. In line

with this recommendation, a presidential order on the establishment of the Cairo Synthesis City Transportation Authority is pushing forward. (Based on information from the "Urban Development Working Group Assessment Report")

"Without a master plan, which serves as a vision, project feasibility cannot be sustained."

A master plan is indispensable for consistent operation. The feasibility of the project cannot be maintained if the road network is suddenly altered. (Asian Development Bank. 1996. "County Synthesis of Postevaluation Findings in the Philippines")

(2) Setting priorities

Master plans play a role in prioritizing projects. So, criteria must be clearly illustrated. Although the criteria differ by nation or region, there should be consensus about them among concerned agencies in conformity with the interested state's upper plans in order to secure the implementation of the master plan.

In the master plans prepared in the 1970s, projects were not prioritized based on a quantitative evaluation. Evaluations in the feasibility studies were limited to economic and financial analyses. Environmental assessment began in the mid-80s. With due consideration of the social aspect and related sectors, the expansion of evaluation items was requested, from the traditional "economy," "finance," and "environment" to "analysis of beneficiary groups", "contribution to the MDGs", "sustainability", etc. In JICA's "National Transport Development Strategy Study in Vietnam (VITRANSS)" in 2000, the following items were evaluated during the process of prioritization in addition to the economic internal rate of return (EIRR): (1) contribution to network formulation, (2) linkage between nations, (3) cost recovery, (4) contribution to social equity/poverty reduction, (5) environmental consciousness, and (6) resettlement of residents.

(3) Ownership and coordination by concerned agencies

Ownership by concerned agencies is important in the master plan stage. Policy consultations and the participation of concerned agencies are the key matters in order to strengthen their ownership. Thus, the use of easily comprehensible terminology is desired.

Moreover, consensus building through partnership among concerned agencies is essential in strengthening the possibility of implementing the master plan. This also enables a clarification of responsibilities and roles. Aside from central governments, also included are local governments and residents' representative bodies, etc.

"Strengthening local ownership by various measures enhances sustainability of the master plan."

National Transport Strategy Study in Vietnam (Vietnam, JICA, 1999-2000):

To efficiently develop a transportation system that would provide a platform for the Vietnamese economic growth, the short- and medium-term transport strategies were formulated along with the 2000-2020 long-term strategies covering the whole nation and all transportation modes. During the planning process, ownership by the counterpart was enhanced through conferences conducted at various stages and with various officers including, those in charge of policy formulations, planning, project implementations, counterparts, and others. As a result, the study has been authorized as a project for the

transportation sector in Vietnam. (Based on information extracted from good practices by the Transportation Working Group)

"Honoring the ownership by the developing countries facilitates implementation of the master plan."

Eastern Seaboard Development project (Thailand, JICA, JBIC, 1982～):

This project developed a new industrial complex on the eastern seaboard, southeast of Bangkok, around the newly built international container port, aiming at avoiding the centralization of industries in the Bangkok metropolitan area. The complex houses heavy and chemical industries using natural gas extracted from the Gulf of Siam and export-oriented industries (e.g. machinery and apparatus, etc.). Through JICA and JBIC, 16 projects, a total of 27 cases, of cooperation and loan projects were conducted. Regarding project implementation, the Thai government repeatedly discussed with the aid agencies, including the World Bank and Japan, the appropriate scale and timing of investment. With respect to the review of project contents and the scale and timing of investment, ownership by the government of a developing country is important. In the end, this project was implemented based on the independent judgment of the Thai government. (JICA and JBIC. 1999. "The Joint Ex-Post Evaluation of JICA and OECF")

"Linkage between donors has a beneficial effect on policy dialogues."

In the transport sector in Vietnam, an unofficial coordination system among donors exists and JICA plays a key role here for initiating it. Such a system is especially important for policy dialogues. (Asian Development Bank. 2001. "Technical Assistance Performance Audit Report on Advisory Technical Assistance for Institutional Strengthening in Transport Planning and Administration in Cambodia and Vietnam")

(4) Development of planning for a public-private cooperation system

Participation of the private sector and privatization can be promoted for efficient construction of infrastructures, which makes up for scarce government funds. However, problems often occur due to insufficient development of institutions and conditions regarding privatization and corporatization. Development of appropriate environments and institutions by the central planning agency is needed. In addition, the formulation of long-term strategic planning and coordination, as well as the confirmation of long-term investment planning, is necessary to implement consistent infrastructure development[1)]. In the meantime, at least in principle, the private sector embarks on projects where it can turn a profit, and privatization is only limited to manageable infrastructures. Presenting sufficient incentives to the private sector is thus essential to facilitate their participation. In the Eastern Seaboard Development in Thailand, private sector participation as a main executing body brought project efficiency and commercial success. It is considered that in addition to the Thai government's investment policy, investment incentives for the private sector, including site location, timing of construction, peripheral development resources, etc. all functioned well.

"Incorporating comprehensibility and transparency is necessary in the procedures such as bidding procedures for selecting a concessionaire in a PFI project."

Privatization of Inter-urban Highway Development (Argentina, 1990-):

[1)] Based on the presentation at the Infrastructure Development in East Asia Planning Workshop, 2004, by Shinji Asanuma.

As for road sector improvement to maintain and rehabilitate existing roads, and reduce costs, privatizing the inter-urban highway, covering the access roads between major cities and access roads toward principal cities, was conducted in 1990. It applied a 12-year build-operate-transfer (BOT) scheme with costs imposed on users. The increase in toll by 50% due to rising inflation rates, collection of tolls without sufficient investment from the private sector, and the unfair toll collection method caused users' protest. As a result, the contract was discharged in 1991 followed by a renegotiation. On the occasion of privatization, building sufficient organization for concession management and institutions for road regulations, as well as the introduction of a bidding system using simple standards and transparent methods are necessary. (Toru Aoki. 2000. "Reconstruction of the infrastructure privatization methodology in developing countries and creation of intellectual assets")

2) Lessons from the planning and design stage

(1) Selection of implementing agency and their ownership

The capacity and ownership by the implementing agency is a major factor that contributes to project results. In development assistance in particular, defining and determining roles and responsibilities of each agency based on the judgment on their capacities and aptitudes for the implementation of a project are necessary.

"Infrastructure should be drawn out as a network, and the participation of concerned parties should result in the enhancement of project ownership."

The Urban Development and Housing Sector (Asian Countries, ADB, 1976-):
In urban development projects, there are some cases where each component is developed in different regions without any linkage between them. Infrastructure should be designed as a network to create a synergetic effect. The active participation of all concerned parties is important; this leads to the enhancement of the local governments' ownership in particular. This is especially true when local governments are responsible for the repayment of loans (Asian Development Bank. 1997. "Impact Study on the Bank Assistance to the Urban Development and Housing Sector"[2])

"Neglecting the local governments' ownership creates little success in local projects."

Urban Development Project in Secondary Cities (Indonesia, ADB, 1990-1996):
Aimed at developing urban living environments and the strengthening of urban maintenance technologies, such as the development of water system, wastewater, sanitation system, waste products, rural development, market infrastructure, urban street and planned land reform, were conducted in 51 cities in 9 states in the island of Sumatra and Jawa Barat. The Directorate General for Human Settlement (DGHS) of the Ministry of Public Works frequently altered project components with changes made at the provincial level. Budget per city was limited and were conducted with minimum involvement by local governments and their ownership was practically nil. Judging from the poor project quality, lack of "sustainability," and no positive impact on institutions, it was determined that the project ended in failure. (Asian Development Bank. 2000. "Project Performance Audit Report on Three Integrated Urban Infrastructure Development Projects: Secondary Cities Urban

[2] Post project evaluation was conducted on the seven city development cases, three regional development cases, and two residential development cases chosen from the urban sector projects.

Development (Sector) Project, BOTABEK Urban Development Project and Bandar Lampung Urban Development Project in Indonesia")

"In terms of the urban development in local cities, residents' participation is important in the aspects of local ownership and maintenance."

The Bandar Lampung Urban Development Project (Indonesia, ADB, 1991-1996):
Aimed at developing urban living environments and the strengthening of urban maintenance technologies, the development of water system, wastewater, sanitation system, waste products, rural development, market infrastructure, urban streets, and planned land reform were conducted in Bandar Lampung City. This project was planned and administered at the central level and the local government played a responsible role through the assistance of the consultants. The scale of the project was the same as the above- mentioned secondary city urban development project, and the consequence of this comprehensive urban infrastructure development approach was dependent on the degree of the residents' participation as viewed from the point of ownership and maintenance, which was a suitable approach for a city with a population of 100 to 150 thousand. (Asian Development Bank. 2000. "Project Performance Audit Report on Three Integrated Urban Infrastructure Development Projects: Secondary Cities Urban Development (Sector) Project, BOTABEK Urban Development Project and Bandar Lampung Urban Development Project in Indonesia")

(2) Procurement of financial resources for infrastructure maintenance

Total infrastructure investment estimate for all developing countries is approximately 200 billion dollars a year. The international aid agencies and developed countries, mainly the World Bank, Japan, and the Asian Development Bank, have provided 10% to 12% of such investment. In the late 1990s, however, during the period when "aid fatigue" was felt, total ODA amount dramatically decreased to 15 billion dollars, which is equivalent to the late 1980s level. This was partly caused by a change in aid orientation – from the infrastructure sector to poverty reduction – made by a number of donors including the World Bank. However, aid's gross amounts decreased as well. The private sector's pie, which took a major role in the infrastructure development in 1990s, also dropped to 57.5 billion dollars in 2002, following a peak of 128.4 billion dollars in 1997.

The issues and strategies for the procurement of financial resources for infrastructure maintenance are as follows:

a. **Expansion of fund sources:** including imposing "user's pay principle' on concerned parties and beneficiaries, review of infrastructural utility rates, etc.

b. **Utilization of private funds:** including formulation of institutions that attract private investments and private funds, PPP schemes and coordination among the private sector and ODA, the development of an exchange risk hedge system (from "marginal profit" to "loss from the difference of quotations"), etc.

c. **Search for a low-cost development plan:** including review of economic measures including the utilization of maintenance funds, low-cost technologies, and local materials.

Moreover, with respect to technical assistance for master plans and feasibility studies for projects, the exploration of possibilities for fund procurement for infrastructure development

is necessary while considering the points below.

Enhancement of better government culture and governance and eradication of corruption among politicians and government officials, in particular, are important for the effective use of limited funds. According to a World Bank report, in the Indonesian government's infrastructure development, equipment and material procurement cost piles up due to corruption and 700 million to 2.1 billion dollars disappear per annum from the funds.[3)]

With regard to quantity survey of project costs, it is common knowledge that costs of ODA projects are much higher than similar scales of projects that use local funds. An increase in transparency of ODA operations and accountability of aid recipient countries, in particular, will contribute to cost reductions.

(3) Appropriate needs analysis and adoption of appropriate scale

With respect to project planning and design, consideration of appropriate technologies and scales is important through the conduct of demand forecasts. Failure in needs analysis may lead to either overinvestment or underinvestment, and make the efficient implementation of infrastructure services difficult.

"Underestimating regional electricity demands causes accidents, which makes the impact of assistance ineffective."

The Barge-Mounted Power Rehabilitation Project (Bangladesh, JBIC, 1995-1999):
Repair works of Khulna's electric generator No. 1 and No. 2 and Chittagong's electric generator No. 1 and No. 2 were conducted on the supposition that electricity was being generated for 5 to 7 hours during peak period in the evenings. Planned annual electricity production was estimated at 47,450MWh and 51,100MWH per generator, respectively. However, electric supply and demand became tight in the Khulna region and both generators were forced to operate for far in excess of their estimated time, which caused fuel leakage and the following fire. Repair work was conducted and electricity production was restarted afterward. However, production volume became much lesser than originally planed and they were not able to run fully, resulting in poor effectiveness of aid. The rehabilitation plan presented by an outside expert was expected to be carried out using the implementation agency's own fund. (Ministry of Foreign Affairs of Japan. "Economic cooperation evaluation report, 2002" and "General Accounting Office report 2000")

"Optimistic demand forecasts coupled with delayed regional development cause excessive investment."

State Railway Project of Thailand (Thailand, JBIC, 1991-1996):
Anticipated freight volumes for the year 2000 was estimated at 514.8 thousand tons at the project planning stage in 1988. However, actual freight volumes were much lower than the expected amount and an increase in freight volume at an early date was not anticipated, bringing out effectiveness of aid poorly. It was caused by the delay of the potassium-mining project in the northeastern part of Thailand. In addition, the implementation of the railway project was delayed for four years. Meanwhile, cargo owners were using automobile transportation even after the completion of the railway project. (Ministry of Foreign Affairs of Japan. "Economic cooperation evaluation report, 2002", and "General Accounting Office

[3)] "The biggest threat in Indonesia is not a terrorist, but infrastructure", Vietnam News, December 3, 2003.

report 1999")

"Even at the planning stage, cost reduction should be made within appropriate technologies"

Road Development Project in the North Eastern Region (Thailand, JICA, 1989-1990):
In response to development and poverty problems in northern Thailand, local roads were rehabilitated and a bridge was rebuilt with the aim of improving regional communication. The bridge has provided safe and all-weather access and improved the convenience of local residents. In addition, significant regional development effects were achieved including impact on actual traffic volume, exceeded over 50% of the forecast at most points. However, all the steel used were imported and the cost nearly reached 10 times more than concrete bridge (although durability, life-cycle maintenance cost differs). Had the costs been reduced, more bridges could have been built. Thus, sufficient technical study at the planning stage is necessary. (Japan Society for International Development. 2002. "Report on the regional disparity correction between Thailand metropolitan area and local region: External institution evaluation")

"Maintenance will be difficult unless appropriate and low-cost technologies are used"

Computerized Area Traffic Control System in Penang (Malaysia, JICA, 1986-1988):
The adoption of a computerized area traffic control (ATC) system and a traffic management plan up to the year 2000 was recommended for this project. Among the recommended plans, the initial ATC system plan was carried out by adopting a computer system, developing traffic intersection, etc. However, the upgrading of traffic management system was not realized due to financial issues. The system was not easily reformable since accessories of the JICA's ATC system are costly and are twice the amount of the local control system. (Based on information from the Field Interview Survey)

(4) Participation of local residents

The necessity of local residents' participation in infrastructure development planning is beginning to be recognized. To avert protests against projects, project transparency and participation of local residents and stakeholders in the planning stage are important. This is especially true if a project benefits only a certain group, or groups, of people, like infrastructure development at the community level, etc. Conversely, the establishment of a community and the increased understanding of democracy are facilitated through an appreciation of infrastructure development by local residents and through the achievement of such infrastructure development. (Based on information from the field interview survey)

"Participation of local governments, NGOs, and local residents starting from the planning stage enhances the quality of the infrastructure services."

Kampung Improvement Project (KIP) (Indonesia, WB, 1970-1988):
To respond to the increased need for basic infrastructures caused by the rapid inflow of people from the rural areas, housing conditions in Kampung, which had a dense population of low-income households, were improved and basic infrastructures were developed to help reduce poverty. Project cost was approximately 18 dollars per person in Jakarta and 23 dollars in the small cities. Its main components included the rehabilitation of roadways and paved community roads, the improvement and new construction of drainage systems, the provision of garbage bins and refuse collecting trucks, the provision of safe water, the

construction of public lavatories, the provision of medical clinics and primary education facilities, etc. The project improved the living environment of the poor, and a ripple effect was found in the other kampung. Cooperation of local governments and the community as well as partnerships between community groups and NGOs facilitated the maintenance of basic infrastructure facilities, as seen in the kampung. The degree of residents' participation varied by project; however, consultations at the early stages of master plan formulation and design were important. Furthermore, consultations with residents enhanced their participation, which contributed in increasing their satisfaction with the project. On the other hand, coordination between community infrastructure and citywide infrastructure, as well as illegal waste-disposal management and so forth, was beyond the control of the community, thus management by local governments was required. (World Bank. 1995. "Enhancing the Quality of Life in Urban Indonesia: Legacy of Kampung Improvement Program")

(5) Consideration of other sectors and formulation of complementary policies

In order to effectively and efficiently provide infrastructure, coordination with other sectors and complementary policies are necessary with consideration of existing organizations and institutions. Such examples include the creation of organizations for the maintenance and development of systems, etc. found in the cases below.

"Enhancement of residents and development of maintenance system are effective in improving waterworks services."

Greater Colombo Water Supply System Extension Project (Sri Lanka, JBIC, 1999-):
In order to secure stable water services, a non-revenue-water (NRW) reduction project[4)] was carried out in a poor residential district aimed at lowering NRW rates, along with the development and rehabilitation of the decrepit waterworks system. Not limited to the improvement of facilities, it included the development of a system that would provide efficient and sustainable service through various NRW reduction action plans, including water leakage repair, enhancement of residents' consciousness, development of water charge, and collection system. Furthermore, the implementation of NRW pilot projects in poor residential districts resulted in the people's willingness to pay for the installation cost of individual faucets and water bills. This confirmed the principle that enhancement of residents' consciousness is important, as in this aspect for: water meter repair, collection of water-use fees, development and promotion of a collection system for water use. (Based on information from the analysis of good practice by the Transportation Working Group)

(6) Consideration for the social and environmental aspects

With respect to the influence of infrastructure, particularly large-scale infrastructure, its channels in distributing benefits are often unclear. As a result, there is a risk wherein the poor who has minimum access is left behind and benefits are distributed unfairly to the wealthy, thereby further widening income disparities. Development of complementary policies, which allow the poor to receive benefits, is necessary to assure the effectiveness of poverty reduction efforts through infrastructure. The case examples, one is that no consideration for the poor was included in the policy, which resulted in them not fairly benefiting from infrastructure, and the other is that consideration for the poor was included in

4) Non-revenue water rate in greater Colombo is 47% and Colombo city is significantly high recording at 57%. System leakage (28%), leakage, wasted water in the poverty group residential district (19%), illegal connection (5%), etc. are the presumable causes (based on information from JBIC press release, 1999).

the policy, are as follows:

"The number of beneficiaries for waterworks services decreases due to a lack in liability relief for the poor."

The Metropolitan Cebu Water Supply Project in the Philippines (Philippines, ADB, 1990-1997): *Development of waterworks system providing 33,000 m^3 of water per day to metropolitan Cebu was planned. The original plan aimed to reduce NRW from 38% (1990) to 30% (1993) and increase the number of beneficiaries to 100,000 people, including 30,000 who lived under the poverty line, by the year 1993. Although the number of beneficiaries exceeded the target, the NRW was far below target, recording only 34% as of 2003. Share of poverty in the number of beneficiaries was only 70 percent of the targeted level. The reason for this was the unaffordable cost of initial investment (water pipe and meter - 3,500 pesos) to the poor. Liability relief, like the common use of water facilities, etc. in the poor communities should have been included in the scope during the initial phases. (Asian Development Bank. 2002. "Project Performance Audit Report on the Metropolitan Cebu Water Supply Project in the Philippines")*

"Urban development designed for the urban poor did not function well due to lack of consideration on job opportunities and financing scheme for them."

Dhaka Urban Infrastructure Improvement Project (Bangladesh, ADB, 1988-1996):
Aimed at improving urban environments and living conditions, 520ha of low-cost land for housing, commerce, and industry in Mirpur district was allocated for the poor in Dhaka city. Strengthening of institutions and the organizational capacity of the responsible government agencies that were in charge of maintaining infrastructures was performed at the same time. However, the project's sustainability was extremely low due to a lack of management in the institutions and financial aspects, in addition to insufficient maintenance. Some cases involved the selling of lots by the recipients instead of building their own dwellings using their own funds. After selling their lots, they returned to squatting. If (1) job opportunities for the poor, and (2) small-scale financing for them were taken into account, the project could have been successful. (Asian Development Bank. 2001. "Project Performance Audit Report on Dhaka Urban Infrastructure Improvement Project in the People's Republic of Bangladesh")

Furthermore, infrastructure development carries environmental risks; thus, taking measures to minimize such risks is necessary. Conducting an environmental impact assessment (EIA) at the planning stage can gauge potential adverse impacts.

"Insufficient policy on natural environment preservation reduced the effectiveness of the project."

The Second Trengganu Tengah Development Project (Malaysia, ADB, 1974-):
When a post project evaluation was conducted on this project in 1995, soil erosion caused by the project was a concern. Although countermeasures were taken they resulted in other problems like clogged drainage, etc. Additionally, the ecosystem was damaged, putting at risk animals like elephants, tigers, etc. Most of them were relocated to preserves. However, the remaining elephants caused damages to agricultural products. (Asian Development Bank. 1996. "Project Performance Audit Report on the Second Trengganu Tengah Development Project in Malaysia")

3) Lessons from the construction stage

(1) Consideration on the social and environmental aspects: resettlement of residents

Infrastructure project often requires site procurement and thus resettlement of residents. In principle, for ODA infrastructure projects, aid recipient countries are responsible for relocating residents and providing compensation. However, due to the government's lack of capacity, the project was delayed and the relocatees not only lost their livelihoods but were not given ample compensation. There were cases wherein donor countries were accused of human rights violation.[5)] Resettlement of residents is unavoidable if infrastructure projects are to succeed. Results obtained from interviews showed a number of projects that suffered from delays due to resettlement problems.

"Budget deficit of the local government impedes land expropriation."

Kuala Lumpur Outer Ring Road (Malaysia, JICA, 1995-1996):
Following a feasibility study of the outer road (No. 6) in Kuala Lumpur, this project took place under the 8th Malaysia 5-Year Plan. Some delay occurred in certain sections due to land expropriation issues. Chief of this was the lack of resources, and the project was implemented using private resources. (Based on information from the field interview survey)

"Political intervention could make land expropriation difficult."

Cagayan Integrated Agricultural Development Project (Philippines, JBIC, 1977-1991):
Irrigation facilities were developed in a 14,100 ha agricultural land along the Cagayan River. During the negotiation stage for site procurement, farmers were in favor of donating land considering that they would receive benefits from this project. However, the intervention of Communist rebels made the site procurement difficult. Compensation should have been paid in order to avoid conflicts with the Communist Party guerillas. Due to this interference, the central government decided to cancel the project, however, a continuation permit was authorized from the central government after a large majority of farmers and beneficiaries approved the project as shown through an opinion survey. (Based on information from the field interview survey)

"Persevering negotiation and measures to support people's livelihoods facilitate land expropriation."

Integrated Agricultural Development Project in Marinduque (Philippines, JBIC, 1992-1993): *Enhancement of agricultural production, improvement of the living environment of residents, and job creation were the aims of this project through the development of dam and irrigation facilities, the rehabilitation of roads, the development of waterworks facilities and the development of agricultural lands. Payment of land expropriation cost was delayed due to issues on land ownership and bottlenecks on the required paperwork. Although some residents refused to vacate their land, persevering negotiations, the provision of job opportunities relative to the implementation of the project, along with other efforts proved persuasive in the project's continuance. (Based on information from field interview survey)*

"When land expropriation falls into great difficulties, altering project sites according to situations is effective."

[5)] There were some cases wherein Japan's ODA for construction projects for dams, ports and roads, among others caused serious problems particularly on relocation of residents.

Pan-Philippine Highway Improvement Project (Mindanao Section) (Philippines, JBIC, 1986-1987): *This project involved repair works on some highway sections. As expected, negotiations for land acquisition ran into opposition. Some residents demanded compensation even without holding official papers. The problem was addressed by altering the alignments as drawn in the master plan. The alternative routes minimized the scale of land acquisition. (Based on information from the field interview survey)*

There are some cases wherein large-scale residential resettlement was implemented smoothly. Such cases are often found in countries that have solid governance and wherein meticulous resettlement plans are set in place. The Jinjing River Rehabilitation Project in Chengdu, China, by the World Bank, completed the relocation of 42,000 people in just 1.5 years by coming up with options of either eviction with compensation or resettlement to alternative sites.

In Asia, dam construction projects bring about resettlement issues. In future, such projects will be fewer . On the other hand, in a large number of developing countries, migration from the rural to the urban areas continues, making the development of infrastructure still lags behind. Thus, it is expected that residential resettlement issues of infrastructure projects in urban areas will be more serious, and infrastructure projects will not be successfully carried forward without radical solutions.

With regard to loan projects, the World Bank laid down its operation manual on the involuntary resettlement of residents for its staff in 1980. It has since been followed by four revisions made in 1986, 1988, 1990, and 2001. The orientation of the manual was enforced progressively from “operation memorandum,” ”operation order,” to “operation policy.” The OECD formulated its “Guidelines for Aid Agencies on Involuntary Displacement and Resettlement in Development Projects” in 1991, which included a clause stating that “In every case, the alternative to refrain from carrying out the project (the "non-action" alternative) should seriously be considered.”

In April 2002, the Japan Bank for International Cooperation also formulated the “JBIC Guidelines for Confirmation of Environment and Social Considerations”, and in 2004, the JICA released its “JICA Guidelines for Environmental and Social Considerations.” The JBIC guidelines state:

a. Best efforts must be made to avoid involuntary residents’ resettlement and loss of livelihoods by reviewing all options.

b. The project implementing body, or others, must provide sufficient compensation and assistance at an appropriate timing to those who will be relocated and whose livelihoods will suffer.

c. Appropriate participation must be encouraged from the affected people and the community at the planning and implementation stages of the measures on resettlement, as well during monitoring.

The following considerations are strongly suggested to promote Japan’s ODA proposals.

a. Activities in line with the environmental and social considerations.

b. Assistance to deepen counterpart understanding of resettlement issues from the initial stage of study and planning.

c. Technical assistance for the formulation of resettlement action plan.

d. Efforts in making the most of past cases and lessons learned.

e. Development of infrastructure in the resettlement area.

Up to now, aid recipient countries have been responsible for the cost of residential resettlement and project sites, as they are non-ODA items. However, considering that these issues tend to become the biggest problems in the promotion of infrastructure projects, not to mention its social importance, the inclusion of residential land and asset compensation for ODA funding, aside from the development costs, should be considered.

(2) Securing flexibility

During the infrastructure construction stage, unforeseen situations at the planning stage often occurs, such as changes in the external conditions, like natural disasters, economic crisis, etc. Taking a flexible position, including in changing of plans to address such unforeseen and uncontrollable circumstances, is important.

"Planning is a continuous process and a master plan needs continual reassessment according to changes in the external conditions."

The Second Trengganu Tengah Development Project in Malaysia (Malaysia, ADB, 1974): *The expansion of the existing five urban districts and the development of a new town were carried out in order to increase job opportunities for, and prevent population drain among, the urban youth. It included the creation of new sections, the expansion of water supply system, the construction of low-cost housing and commercial buildings, and the provision of training for local government staff. At the post project evaluation conducted in 1995, the number of population was much lesser than the estimate. A large number of people were sucked into the neighboring newly industrialized area and other provinces. There were very few empty lots as the plan was modified to correspond to the changes through reducing land volumes, altering policies, and allowing in-migration. Although a master plan is the overall guideline, planning is a continuous process. The hypotheses and descriptions in the master plan should be reviewed constantly. Thus, strengthening the capacities of implementing agencies is necessary. (Asian Development Bank. 1996. "Project Performance Audit Report on the Second Trengganu Tengah Development Project in Malaysia")*

4) Lessons from the maintenance stage

Strengthening the sustainability of infrastructure services is a required condition to enhance infrastructure effectiveness. This can be achieved only through appropriate operation and maintenance (O&M) of infrastructure. In the developing countries, life span of infrastructure services is often shortened by inadequate maintenance. As a result, the economic efficiency of infrastructure investment is diminished. Main causes are: (1) incomprehension of general rules of maintenance and economic principles, (2) lack of financial budget management capacities (local governments, in particular), (3) common practice of prioritizing new construction over maintenance, (4) insufficient imposition of cost on users. (*Asian Development Bank. 1998. "Special Evaluation Study on the Operation and Maintenance of Road Facilities and Their Impact on Project Sustainability")*

Additionally, in developing countries, the so-called "after-the-fact maintenance," or repairs

after the damage, is a main practice. However, adopting policies that enhance efficiency of maintenance is important by introducing the concept of preventive maintenance. The following points should be taken into account in the technical assistance on maintenance:

a. Emphasizing planning and organizational system for O&M in the master plan and feasibility study.

b. Assisting in building consensus on the promotion of beneficiaries-pay-principle through disclosing the study on the benefits allocation of infrastructures and its results.

c. Enhancing training programs on infrastructure O&M.

(1) Securing financial resources

Large numbers of aid projects evaluated as failures in exercising their effects are due to insufficient infrastructure maintenance caused by the difficulties in securing financial resources for maintenance. In some cases, however, financial resources cannot be secured due to increases in maintenance costs caused by the adoption of new and expensive technologies introduced by the aid agencies. As infrastructure stocks grow, the maintenance cost of infrastructure also increases. As stated in Chapter 2, according to a World Bank economist, the amount of investment for infrastructure construction and that for infrastructure maintenance needed by the developing countries for the period 2005-2019 are in the same scale – 230 billion dollars annually (according to the estimate, maintenance cost is 1.8 times more than the amount of new investment in the developed countries). However, the actual amount used for maintenance is scant, and generating funds for maintenance, which is comparable to new investments, is challenging. For infrastructure assistance, the axis of policies with overriding priorities, must be shifted from new investment to maintenance. Issues on securing financial resources are as follows:

a. Promoting the “user’s pay principle” with the concerned parties and beneficiaries: review of gasoline tax/vehicle tax, utility rate (electricity, water and sewage, industrial water, agricultural water).

b. Commissioning operation to the private sector: expressway/arterial road, port/airport.

“Lack of maintenance by local governments reduces effectiveness of aid.”

Sewage System Network Development Project (Bangladesh, JBIC, 1988-1992):
Aimed at restoring the function of intermediary pump stations, 12 idle pumps located in four different stations were exchanged or repaired while expanding the capacity of sewage disposal at the sewage treatment facility from 50,000m^3 to 120,000m^3 per day. However, the maintenance scheduled by the local implementing agency, including repair work of damaged drain ditches and cleanup of drain ditches, were not sufficiently carried out due to difficulties in budget allocation under the tight fiscal condition. Consequently, sewage throughput was much lower than the capacity, thereby reducing the effectiveness of aid. (Ministry of Foreign Affairs of Japan. “Economic cooperation evaluation report, 2002” and “General Accounting Office report 2000”)

“Budget deficit causes insufficient maintenance.”

The Study on Flood Control and Drainage Project in Metro Manila (Philippines, JICA, 2000)： *Database for maintenance and repairs was developed following the identification of conditions of the existing drainage system and the issues. The issue on maintenance*

involved budget constraints. Restoration was not performed due to insufficient budget, when expensive parts for repairs were involved. (Based on information from the field interview survey)

"A serious problem in the road sector is the shortage of maintenance caused by budget constraints."

Road Sector Review (JBIC, 1970-):
Among the target projects for the review[6)], over 20% had some concerns and a little less than 20% had obvious problems. Many problems were found in the operation and maintenance budgets of local roads and construction machines. The weakest area in overall road sector was operation and maintenance and the most common cause was budget deficit. What are needed are sufficient budgets, means to assess the necessary budget for each road section, and construction machineries, and the development of an efficient organizational system to allocate necessary budget in a timely manner. (JBIC. 2002. "Ex-post evaluation report on yen credit projects")

"Lack of maintenance is an issue in the road sector. Augmentation of financial resources by cost sharing among users, or by other means is important."

This study aimed at researching on the operation and maintenance of the road sector, particularly national road assisted substantially by the ADB. Although they differed in degree, adequate operation and maintenance was not conducted sufficiently in many road projects assisted by the ADB. Budget shortfall is the main blame. However, inadequate regulations, conducting halfhearted oversight, and defective cost-recovery measures also contributed to the problem. Some roads were not regarded as public goods; thus, participation of the private sector and increase in the financial share of users should be considered. In particular, the implementation of policy that makes road development a special financial resource by increasing the financial shares of the users is important. (ADB. 1998. "Special Evaluation Study on the Operation and Maintenance of Road Facilities and Their Impact on Project Sustainability")

"New construction is more likely to be prioritized in the road sector in the Philippines, even though the local government lacks maintenance budget."

Since 1970, the ADB has continuously assisted the Philippines' road sector, and six cases out of the 11 road projects were targeted in this study. The conditions of roads were: 39% was "good to fair," while those with "fair" and "poor" conditions both comprised 30%. Main cause of road deterioration was lack of maintenance by the local governments. The Philippines has a paltry culture on maintenance and there is a tendency for prioritizing investment in new construction and for considering maintenance as less serious. (ADB. 1997. "Impact Evaluation Study of Bank Operations in the Road Sector in the Philippines")

(2) Participation of concerned parties

Development of participatory maintenance systems for infrastructure is indispensable for infrastructure's sustainability. This is particularly true if beneficiaries are specific like communal pumps, irrigation facilities, etc. In addition, with regard to basic urban infrastructure, like water supply system, when construction and O&M are dealt with by the central and local governments, respectively, problems occur with the handover after

[6)] Almost entire road sector projects evaluated by 2001; in total of 62 Yen loans projects were targeted.

construction completion, such as lack of ownership among local governments and lack of efficient maintenance which result from revenue shortages.

"Giving major support to low-end agricultural organizations narrows the income disparity between rural and urban areas."

Small-scale Irrigation Project IV-VI (Thailand, JBIC, 1983-1990):
This project was not merely an "irrigation project" aimed at providing agricultural water, but a "multi-purpose water resource project" for farmers that would provide them with a broad array of benefits including the efficient use of land through irrigation, crop cultivation during the dry season, income increase from the sale of fish catch and marine products, increase in agricultural production, income increase from rice-related businesses, etc. Although construction cost of facilities, including reservoir, barrage, etc. was contributed by the government, in principle, the cost and labor associated with end-water channel construction and maintenance of facilities were left to the beneficiary farmers. Much discretion as possible was given to low-end agricultural organizations, from project site selection, through construction, management, operation and maintenance. It was highly valued as a successful case of ODA "grass-roots model" project. (JBIC. 2000. "Ex-post evaluation report on ODA loan projects", and JBIC. 1993. "Sectoral and special theme evaluation: development and poverty [Thailand])

"Involvement of local governments is important in infrastructure maintenance."

The Infrastructure Restoration Project in the Philippines (Philippines, ADB, 1989-1993): *An emergency assistance rehabilitation project in the Philippines aimed at rehabilitating infrastructures damaged by a series of severe typhoons. Assistance targets were schools, flood control facilities, ports and roads, and provides their planning, designing and implementation (limited to small-scale rehabilitation). Roads, bridges, ports, flood control facilities, and schools were restored, and some of them were in better condition than before to strengthen them against the onslaught of future typhoons. However, infrastructures covered by this project were limited, and recent disasters and the lack of maintenance have caused infrastructures in other areas to deteriorate faster. In the Philippines, the importance of infrastructure maintenance is beginning to be recognized; however, it considerably lags behind at the provincial and local authority levels. Local governments' understanding of the importance of maintenance should be deepened. (ADB. 1996. "Project Performance Audit Report on the Infrastructure Restoration Project in the Philippines")*

5) Lessons from post project evaluations and monitoring

Obtaining lessons by evaluating a project's progress and results through monitoring is beneficial and necessary. This is not only for the targeted project's interest, but also to provide inputs to subsequent similar projects as well as for revising master plans.

It is also stated in the "ODA mid-term policies (August 10, 1999)" of Japan that "strengthening the monitoring of project processes, which exploit each aid feature and resolve issues that occur during implementation, achieves the anticipated results while balancing those actions." Strengthening a monitoring system is important for aid recipient countries and necessary to enhance their accountability. For the monitoring of aid recipient countries, officers from the aid implementing agency and a project supervisor should be in

charge.

Aid implementing agency should conduct the post project evaluation, approximately 3 to 5 years after an infrastructure service was started. Information prior to project implementation is required in order to grasp the effects and problems of the project. Thus, it is important to conduct a field survey at the planning stage to obtain the necessary data based on the description of post project evaluation. Whether the project is a grant aid or a loan, with respect to the infrastructure projects, it is desirable to have the post project evaluation performed on all the projects. However, if this proves difficult, it should be applied to those that the project cost exceeds a certain limit.

Post project evaluation is conducted to clarify the differences between anticipated conditions and actual conditions in all aspects including demand, economy, society, environment, operation, etc. It is important to understand the extent of negative impacts as well as any impact on users and residents' livelihoods. Often, useful lessons can be found from failures and negative results, thus everything should be disclosed avoiding any form of concealment.

It is important that adequately assessed monitoring results be utilized as lessons learned for maintenance systems or for future projects. Monitoring systems, evaluation methods and financial resources and others should be considered at the planning stage.

"Conducting evaluation and monitoring both during and after implementation is important to any project, whose effects are various and require some time to manifest themselves."

The Pahang Barat Integrated Agriculture Development Project (Malaysia, ADB, 1982-1991) *: Aiming at providing economic infrastructure to peasant farmers to enable them to farm continuously, improve the job opportunities for the next generation of farmers, secure sustainability, this project developed farmlands for peasant farmers and croplands with cocoa and fruit trees. It also developed pilot development schemes and improved agricultural services and land-use planning. The physical goals of the project were achieved, and its development schemes and assistance services were implemented. However, the monitoring and evaluation systems did not function effectively, and data collection was managed in an ad hoc basis. In this kind of small-scale agricultural development project, effects are various and require some time to be felt and seen. Thus, conducting evaluation and monitoring both during the implementation and after is important. When the capacities of implementing government offices are limited, technical assistance on this aspect should be provided. (ADB. 1996. "Project Performance Audit Report on the Pahang Barat Integrated Agriculture Development Project in Malaysia")*

"Evaluation of project effectiveness is important to make the transport sector efficient. As for the evaluation mark, outcomes are more important than outputs, as they have more needs for technical assistance."

Transport Sector Adjustment / Investment Program (Burkina Faso, WB, 1992-2000):
This project assisted in coming up with projects for the transport sector on repair and maintenance, improvement of efficiency, strengthening of existing agencies, introduction of policies and regulatory measures, and reform of state transportation systems. The project was extremely complicated as many components and stakeholders were involved. Although

some delays occurred during the institutional reform, transportation agencies and public services were successfully privatized. As a result, the project came out well resulting in the abolition of subsidies, improved services, and enhanced efficiency. Following privatization, the role of the government shifted to supervising enterprises. Thus, government agencies should be reformed at the same time. However, developing countries often lack human resources. This should be dealt with through technical assistance. With regard to road project evaluation techniques, while it is easy to evaluate the development volumes (e.g. the number of kilometers of road paved, etc.) evaluation by the results (e.g. status of the roads as a network, condition of roads, etc.) is important. Selection of technologies and standards from available resources is required to conduct such evaluation. (World Bank. 2003. "Project Performance Assessment Report, Transport Sector Adjustment /Investment Program in Burkina Faso")

"Monitoring is important for post project evaluation in order to apply the project as a model case to other areas."

Development of Agrarian Reform Communities in Marginal Areas (Philippines, JICA, 1996-2001) *: Aimed at improving the quality of life in the rural areas, a training program targeting farmers, fisherfolks, women, youth, and local governments was formulated. Although there were some delays in the handling of local costs, a manual was made and trainings were provided to representative officers from each center during the project implementation period. Promotion of the training program on the improvement of rural living will be conducted at all centers after the completion of this project. Monitoring needs were carried out during the post project evaluation while receiving progress report on a regular basis. The applicability and possibilities of dissemination of the project model needs to be verified, and will involve the reshaping of such model into something that can be used by the recipient country upon completion of the cooperation period. This is in order to strengthen self-sustaining development effects through the replication of techniques and means established by the experiences from the pilot areas and model agencies in other areas. (JICA. 2002. "Annual Evaluation Report")*

"For a project that requires a long gestation period, a stepwise approach should be considered in order to move forward while monitoring results."

Integrated Valuation for Project on Irrigation and Agricultural Development (Philippines, ADB) *: The study's objective was to recommend future guidelines for the ADB by reviewing past performances of ADB loan projects in the Philippines. The evaluation was conducted based on post project evaluation reports. In the irrigation and rural development projects, an average of 3 to 5 years of delay was found due to: (1) financing deficit in the counterpart government, (2) problem with land acquisition, (3) deteriorating security, (4) bad weather, (5) delays in procurement and delivery, (6) contract with inexperienced workers, etc. Technical aspects should be reviewed rigorously at the project design stage. For a project that requires a long gestation period, in particular, a stepwise approach should be considered to enable the project to move forward while monitoring results. Moreover, moderate goals should be set in planning. (ADB. 1996. "Country Synthesis of Postevaluation Findings in the Philippines")*

3.3 Lessons Applicable to the Entire Infrastructure Development Technical Assistance

1) Lessons for assistance project system

One of the issues on technical assistance has to do with the existing institutions and organizations of both aid agencies and recipient countries. For Japanese government assistance, in particular, numerous procedures, including documents, conference minutes, etc. (based on information from the interview survey with recipient countries), and categorization of grant-aid cooperation, loan assistance, or technical cooperation (pointed out in the interview with experts in Japan), were considered as negative factors in the implementation of a consistent aid program. Coordination among various programs and aid agencies are effective, like the provision of complementary aid (including the implementation of pilot projects by grant-aid cooperation, implementation of project-type technical cooperation scheme, or dispatching experts, etc.), on projects carried out by loan assistance. Consistent assistant on projects, from the beginning to the end, is needed while performing such coordination.

"Aid effects are enhanced by combining an assistance scheme with other schemes."

Promotion of Rural Village and Forest Conservation Project (Nepal, JICA, 1994-1998):
This project aimed at improving the natural environment through the development of rural village resources in the mountain region. It established the conservation model for the rural village resources including forest, etc. though the rural village promotional activities with initiatives of residents in Kaski and Parbat counties. Based on the outcome, rural village resources conservation methods that were applicable to other intermediate and mountain regions were established and technical transfers were made to both counties' soil conservation office staffs. In cooperation with the Japan Overseas Cooperation Volunteers, more accurate needs were grasped in an efficient manner. Effective technical transfer could be achieved by long-term experts providing technical assistance for such findings. (JICA. 2000. "Annual Evaluation Report")

"According to the nature of project, both aid-recipient country and aid agency should take a flexible approach, including altering the procedures for implementation."

The Infrastructure Restoration Project (Philippines, ADB, 1989-1993):
Too much time were spent prior to its implementation since the Department of Public Works and Highways (DPWH) conducted ordinary implementation procedures on an emergency project. Although the same applies to the ADB, its needs to tackle this problem and help improve the Philippines government's systems and internal procedures. (ADB. 1996. "Project Performance Audit Report on the Infrastructure Restoration Project in the Philippines").

2) Counterpart Ownership

Counterpart ownership becomes an extremely important factor in implementing technical assistance in an efficient manner. Efforts are necessary to enhance the involvement of counterparts for ownership. Such efforts are often subject to consultant as individuals. (Based on information from the interview with experts in Japan)

"Training counterparts is a continuous effort. The strategy of "train the trainer" is effective."

Technical Assistance for Institutional Strengthening in Transport Planning and Administration *(**Cambodia, ADB, 1993-1995**): Assistance to reconstruct the torn economic society through the rehabilitation of emergency transport facilities was performed in the fist phase. Transport Planning Unit (TPU) was made in the Ministry of Public Works and Transport (MPWT) and trainings were provided to the TPU staff in the second phase. The rehabilitation project in the first phase was mostly implemented and could be regarded as successful. The World Bank and JBIC recognized it as a model project. However, cost of the trainings provided in the second phase was extremely expensive and lack of follow-up measures resulted in the loss of most acquired skills. Training method should be a sustainable and high cost performance system, and should be provided using existing research organization, etc., through the application of the "train the trainer" strategy. Additionally, final outcomes were prepared in only English, resulting in a lack of impact among high-ranking government officers. (ADB. 2001. "Technical Assistance Performance Audit Report on Advisory Technical Assistance for Institutional Strengthening in Transport Planning and Administration in Cambodia and Vietnam".)*

"Technical cooperation approach should shift from the short-term "advice presenting approach" to long-term "institutional and capacity enhancement approach."

Integrated Post Project Evaluation (Philippines, ADB):
Objective of the study was to obtain future guidelines for the ADB in reviewing the performance of past ADB loans projects in the Philippines using post project evaluation reports. Technical cooperation proposals are best effective when the receptiveness of aid recipient countries are good. Short-term technical cooperation aimed at complementing the project, particularly its advice on approach should shift to the long-term approach taken for institutional and capacity building. (ADB. 1996. "Country Synthesis of Postevaluation Findings in the Philippines")

"On the occasion of technical transfer, counterparts should work closely with consultants and be informed of the complete contents."

Visayas and Mindanao Islands Strategies Road Network Development Project *(**Philippines, JICA, 1997-1999**): Following the formulation of the road network development projects in the Visayas and Mindanao Islands, the 6-year implementation program targeted for 2004, 2010 and 2016 were formulated. Technical transfer to the counterpart was conducted in this study, including data collection and research. However, there was no counterpart involvement in data analysis which was done in Japan, with the counterpart merely received the report. Although the counterpart could get all the analyzed data and formula, it was difficult to update the data, as details like invariables and variables, etc. were often unclear in the report. Thus, transferring data, analytical methodology, and necessary software to the counterpart should be done by the study team by working closely with the counterpart during the study process. (Based on information from the field interview survey[7])*

"Close collaboration and linkage with counterparts enhances the latter's ownership

[7] Aside from this project, similar comment was found in the results of other interview and surveys.

of the project and its outcome."

MMUTIS: The Study on Metro Manila Urban Transport Integration (Philippines, JICA, 1996-1999): *Database to aid transportation planning, policy making and education was created. The integrated transport master plan for the Manila Metropolitan area (2015) was formulated, based on which a medium-term plan (1999-2004) was developed. Linkage with counterpart was enhanced through weekly regular meetings held during the implementation period, which contributed in strengthening ownership. Since project completed, the counterpart has updated the traffic demand forecasts using the planning techniques (database), which were transferred to them by the study team. However, a concern on the composition of the study team was raised. Japanese consultants held key positions, while Filipino counterparts were relegated to conducting field surveys and doing minor assignments. As in loan projects, local consultants should occupy key positions such as assistant team leader. (Based on information from the field interview survey).*

3) Governance

Governance is an ambiguous concept. It can be broadly interpreted into two dimensions: (1) "state of the nation", whether the country has a pro-democracy orientation, and (2) "state or act of governing", whether the government exercises authority (judiciary and legislative) effectively and efficiently. The World Bank has a policy of non-involvement with political problems. Accordingly, it defines governance as limited to "a nation's act of exercising authority over the utilization of its economic and social resources for its development"[8)].

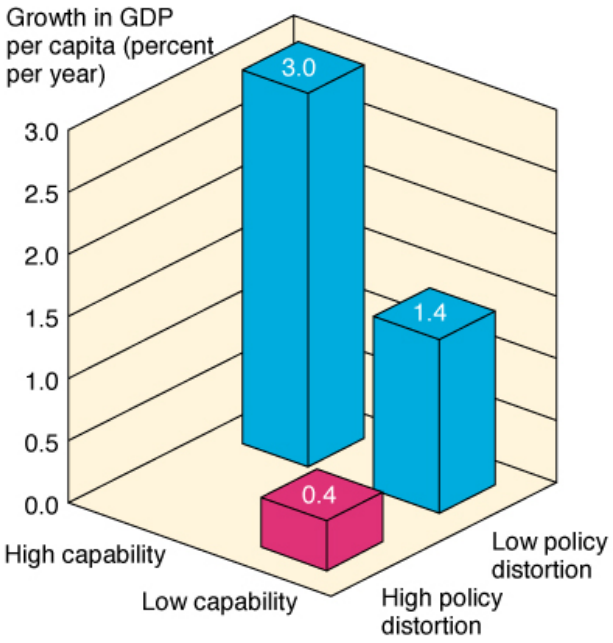
The emphasis on governance adds one more axis in the traditional paradigm of government and market in relation to the effectiveness and efficiency of aid.[9)]

Governance has a significant impact on economic growth. In other words, the trends are: economic growth is fast in a country with high capability and low policy distortions, and economic growth is slow in a country with low capability and high policy distortions (see Figure 3.3.1). However, effects of governance are unclear since its concept is complex and vast, and its functions differ per country. Some concrete projects, which resulted in failure due to weak governance, were reported.

8) Izumi Ohno. 2000. "World Bank Assistance Development Strategies. *Sekai-ginko kaihatsuenjyo- senryaku- no-henkaku (in Japanese)*"

9) In this study, the following eight indices were used in the analyses: (a) Political score (-10 to 10), (b) Voice and accountability (-2.5 to 2.5), (c) Political stability and lack of violence (-2.5 to 2.5), (d) Rule of law (-2.5 to 2.5), (e) Government effectiveness (-2.5 to 2.5), (f) Corruption perception index (0 to 10), (g) Graft and corruption (-2.5 to 2.5), (h) Economic Management Index (EMI) (1970-1993), 1.28+6.85x budgetary balance -1.4x inflation +2.16x openness. (a) to (g) were based on information from the Human Development Report 2002, UNDP, while (h) was from "Aid, Policies, and Growth," C. Burnside and D. Dollar, *The American Economic Review*, September 2000.

Figure 3.3.1 Correlation Between Economic Growth and Government's Capability and Policy



Source: World Bank. World Development Report 1997

"A project was postponed due to the carelessness of the aid recipient government resulting in procedural delays."

Mt. Pinatubo Volcano Victims Water Provision Project (Philippines, JICA, 1993-1995) *:Equipment and materials, like well-drilling machines were provided, and 66 hand-pumped wells and three water supply plants, using spring water, were constructed in this project. Although the rural village's water supply project was transferred from the Department of Public Works and Highways (DPWH, central government agency) to the local government in 1997, the provided equipment, including the well-drilling machines, were left with DPWH . From 1998 onward, there were no hand pumps and others were merely made. Total number of facilities made was approximately half of that scheduled in the basic design study report. (Ministry of Foreign Affairs of Japan. 2002. "Annual Evaluation Report on Japan's Economic Cooperation")*

Improvement of governance should be pursued. As stated previously, the strength of governance is closely correlated with economic growth, and it tends to accelerate the effects of infrastructure and economic growth. Considering these points, the presumable orientations to enhance governance through infrastructure assistance are as follows:

(1) **Placing weight on countries with good governance:** When most donors are experiencing aid fatigue, this is the most direct course of action to ensure the effective use of assistance funds. However, countries that have poor governance often have high poverty rates. Thus, the drastic application of this policy could expand the disparity between nations and it could make poor countries all the poorer.

(2) **Placing weight on enhancing institutional capacities:** This scheme is suitable for technical assistance. By treating the implementation of infrastructure development itself as a means to enhance governance and by providing constant technical assistance from planning to implementation and maintenance stages, it is possible to

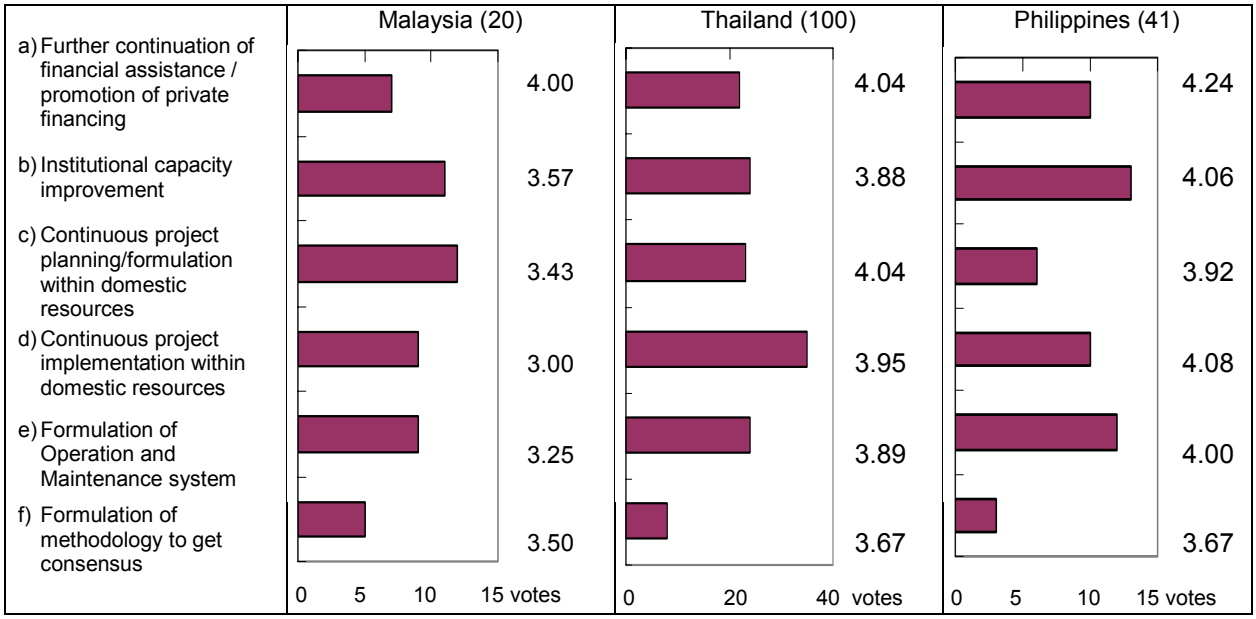
enhance governance in the aspects of securing transparency, strengthening accountability, involving residents, etc. However, since governance is closely connected to local culture and customs, prudent actions are required. A sweeping application of this policy could turn back the assistance approach, which is currently under review. In particular, it may function as a conditionality for providing assistance on infrastructure services.

4) Capacity development

Like the term governance, capacity development can be broadly interpreted. It is not limited to capacity enhancement of governments and civilians, but also performance improvement of legislation, regulations, organizations, etc. However, at this point, semantically, it overlaps with governance enhancement. Thus, capacity development here refers to technical capacity. As such, technical transfer will be reviewed with respect to its relationship with infrastructure assistance.

Technical transfer is important at every project stage. In order for aid recipient countries to establish autonomy, all the stages of project implementation, namely planning, construction, maintenance, and monitoring and evaluation, must be accomplished without external assistance. In doing so, it is vital for aid recipient countries to possess all necessary technical capacities. This is the objective of technical transfer and it can be said that the effectiveness of the provided technical transfer in the past were substantial.

Figure 3.3.2 Effectiveness of Technical Transfer Made Through Japanese Infrastructure Projects（by Questionnaire Survey）



Note: Figures right of the column refer to the evaluation score on Japanese technical transfer.

However, like Malaysia and Thailand, a number of people are of the view that technical assistance is no longer necessary except for highly sophisticated infrastructure technologies (based on information from the field interview and questionnaire survey). At the same time, many other countries seem to require technical transfer. In fact, numerous donors are engaging in technical transfers. However, this does not mean that all the technical assistance came out well, because a number of problems were found. Common issues

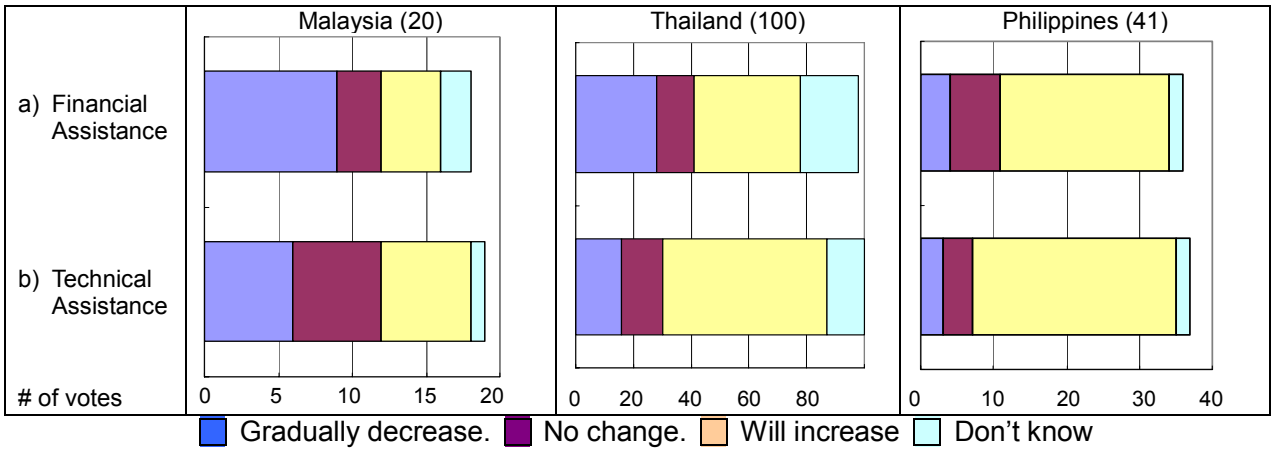
raised in the donor's post project evaluation reports are as follows:

- Specific goal of technical transfer was unclear during the initial phases.
- On-the-job training could not be provided because the counterpart was not involved on a full-time basis.
- The person who benefited from the technical transfer either changed jobs, transferring to a private company on the strength of his acquired skills, or was reassigned to another department to the disadvantage of the originating department.
- Necessary information could not be obtained, or learned skills could not be applied due to the organization's budget deficit.

In principle, these issues are considered as matters of governance. However, certain factors come from different aspects and there is a room for improvement through ingenious ways, like incorporating efforts to enhance ownership by concerned parties at the planning stage, etc.

With regard to the necessity of technical transfers, it is recognized that countries that have developed to a certain degree, like Malaysia and Thailand, will gradually place less reliance on donor countries. Strong demand of technical transfers remains among low-income countries and low- to medium-income countries, and it is expected to increase.

Figure 3.3.3 Necessity of Japanese Technical Transfers (by Questionnaire Survey)



Recognizing the aforementioned issues, the following points should be noted for effective and efficient technical transfer.

(1) Clarify the target of technical transfer at the planning stage of the technical transfer, and set a concrete and realistic goal at each achievement level. Since aid recipient countries tend to set impractical goals, practical goal need to be agreed upon through discussions.

(2) When technical transfers are conducted to target counterparts, there are always risks involved, including employment status (full-time or part- time), sustainability of the transferred skills (shift in work designation within organization, staff turnover whether they will stay with the organization, etc.), capacity of counterpart[10], etc.

[10] Understanding the contents of transferred techniques is relatively easy. However, applying such techniques to

When there are doubts about these considerations, the possibility of focusing on the local consultants should be considered. Relatively steady outcomes from them are expected as they are bound by the project's terms and conditions. Moreover, there are incentives for them. On the other hand, from the donor's point of view, it does not matter whether the target beneficiaries of technology transfers from the aid recipient country work for the government or not.

(3) In technical transfers, stimulating the target person's interests (economic or societal) is believed to be effective. The JICA study on small-scale irrigation development in Malawi is a good example of a successful technical transfer, resulting in high project ownership and sustainability. This was achieved by providing the farmers' with strong incentives to ensure that the project succeeds.

new set up is a totally different issue. In general, when the former is achieved, technical transfers tend to be considered successful, however, when the aid-recipient country makes a complaint about absence of such transfers, it often involves with the latter problem and such resolution is not easy. This is especially true for the planning technologies.

VOLUME II:

RECOMMENDATIONS OF THE STUDY

4. Focal Views on Infrastructure Service Assistance: The Way Forward

Based on the analysis of the roles, effects, and needs of infrastructure and the lessons gleaned from past infrastructure service experiences, this chapter discusses the following five main views and how these will have a bearing on the manner future infrastructure development assistance should be carried out:

1. Infrastructure Redefined

   Infrastructure is redefined as a foundation of basic services that helps in guaranteeing the right of communities or peoples to live safe, secure, healthy, and stable lives, and ultimately help them realize their potentials through self-empowerment.

2. Field-level Initiative in Goal Setting

   To respond to the redefinition of infrastructure, the issues of when, to whom, and what sort of infrastructure services should be provided is discussed, and suggestions are made on the importance of setting project goals selectively from diverse local needs, the need of seeing through long-term prospects, and the need to be flexible in adjusting project goals in response to changes in external circumstances.

3. Integrated Approach

   For the attainment of set goals, the discussion focuses on how to maximize and sustain the positive contribution of infrastructure development, while minimizing its negative impacts. As we redefine infrastructure and set goals on the ground, it is also necessary to be more comprehensive in the approach to infrastructure assistance. In doing so, the provision of various intellectual supports for different levels of decision makers is important.

4. Pro-Poor Project Designs

   Empowerment of the poor is an objective and pro-poor project design should be as an issue at the project design stage and approached in an integrated manner. Suggestions are made to facilitate pro-poor design of programs, those that consider the importance of having basic infrastructure services reach the poor at affordable cost and suitable to their cultural and living conditions.

5. Reducing the Infra Gap

   In parallel with the methodologies, including program formulation for infrastructure maintenance, planning and implementation process, etc., this section also discusses how to deal with the absolute shortage of infrastructure stocks. The discussion covers the roles of the private and public sectors in infrastructure development, and the various needs for infrastructure according to the different stages of economic development, and suggests the appropriate focuses for future technical cooperation.

4.1 A Redefined Role for Infrastructure

Infrastructure's vital role in sustainable growth is clear: it reduces poverty reduction and helps in achieving development goals like the MDGs. The conventional measure for infrastructure development however focuses rather on the outputs (e.g. quantitative increases of stocks for, say, new roads or additional water connections), their specific effects (e.g. reduced transport costs, expanded access to water), and the outcome of service delivery. The impacts on achieving overall social development goals, such as poverty reduction and human security are not the focus of such assessments. The need to make efficient investments in infrastructure, especially in light of the limited resources for development assistance, requires a redefinition of how infrastructure contributes in realizing such development goals.

1) Effects of infrastructure

Infrastructure development directly brings about an increase in opportunities for people and the improvement of living standards. For instance, the provision of access to water and the development of sanitary facilities contribute in elevating community health levels; the development of roads improves access to education, market, and health care; and the development of irrigation systems enhances agricultural productivity, which leads to an increase in incomes.

As discussed in Chapter 1, a close correlation exists between infrastructure stocks, particularly economic infrastructure, and income. Thus, infrastructure development is vital for economic growth. As shown by Eastern Asian countries that have experienced remarkable economic growth, the boost in their economies coincided with an increased investment in infrastructure stocks.[1)] It is also a fact that infrastructure development substantially contributes in reducing regional disparities through the attraction of private investment and the promotion of industries, in the process, therefore, promoting local economic development.[2)]

While cases showing clear and direct benefits of infrastructure abound, it is difficult to come by examples that would clearly show how infrastructure development contribute to the attainment of development goals, like poverty reduction, MDGs, and human security. There are also subtle nuances in assessing the effects of infrastructure services provision - its development benefits have the potential of favoring the wealthy to the detriment of the living environment of the poor.

To comprehensively grasp how infrastructure services bring about economic growth, contribute to reducing poverty, and help in achieving human security, infrastructure development goals need to be reoriented. The channels through which impacts to the people are delivered also need to be clarified.

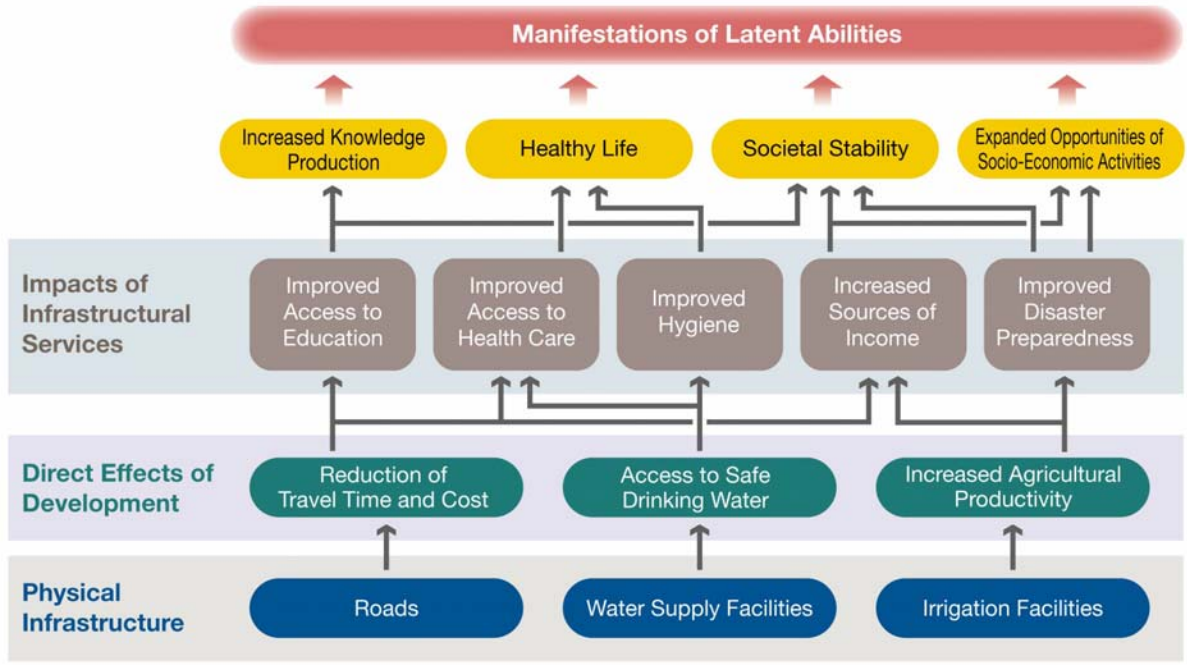
[1)] For instance, public investment in Thailand from 1987 to 1991 accounted for approximately 43% of its GNP. As a result of intensive investment, private investment also increased and the country enjoyed high economic growth (recorded 10.6% annual average of GDP growth rate). During this period, 62% of aid volume invested by DAC member countries was spent on economic infrastructures. The same intensive assistance for economic infrastructures also applied to Malaysia.

[2)] Thailand Eastern Seashore Development, closely associated with Japanese assistance, successfully brought in private investment by intensively developing economic infrastructure, and has contributed to correcting regional disparity. An established national vision, a conducive environment for private investments, and basic conditions that attract international demands are the prerequisites for this kind of intensive investment.

2) Exploiting latent abilities through infrastructure development

Aid agencies have recently begun to conduct detailed studies to better grasp the correlation between infrastructure development and poverty reduction. For instance, the "Impact of Rural Roads on Poverty Reduction: Case Study," by the Asian Development Bank in 2002, examined the outcome of rural roads projects. The study found that as a result of the projects, the activities of local transporters and retailers immediately expanded, which encouraged local farmers to venture into transportation and commercial businesses. This illustrates that infrastructure development can encourage the use of other abilities (in the case of the farmers, entrepreneurship) which would otherwise be untapped if not for the infrastructure intervention. The mechanism of igniting latent abilities through infrastructure development is illustrated in Figure 4.1.1.

Figure 4.1.1 Manifestations of Latent Abilities through Infrastructure Development



There is growing interest in the analysis of how macro-level infrastructure exactly impacts on human development. For instance, the 2003 paper "Achieving the Millennium Development Goals: The Role of Infrastructure" prepared by the World Bank, pointed a reduction of infant mortality rates (among others) following progress in the provision of infrastructure (see Chapter 1).

Notwithstanding emergent and promising new approaches, more effort is needed to find answers to such basic questions as: What types of latent abilities should and could be made tapped on a long-term basis through the efforts on poverty reduction? How to calibrate ultimate effects? And, what kinds of infrastructures are necessary to activate people's potentials and how best to design and implement such projects?

3) Mechanism for achieving poverty reduction

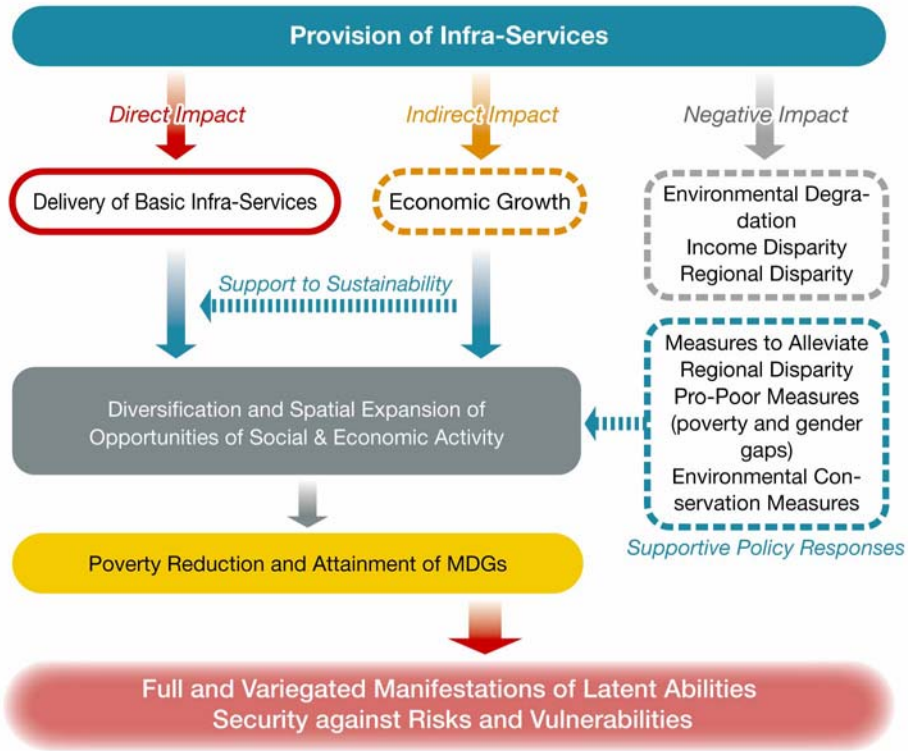
There are two major channels through which infrastructure services can have an impact on poverty reduction. One channel is to deliver basic infrastructure services directly to the people and thereby expand and diversify the breadth and depth of opportunities from which

they can choose. This will culminate in the reduction of poverty and the attainment of other MDGs. The other channel is to provide physical assets that support regional and national economic growth. Such socio-economic growth will raise the level of per-capita income and improve the standards of living, contributing thus to the attainment of the goal of poverty reduction and other development objectives. The former channel consists of infrastructure projects that have clear, pro-poor impacts. However, it has been pointed out that the long-term sustainability of such projects is hard to guarantee. Continued investment in physical facilities and recurrent expenditures on basic services are possible only when economic growth generates additional revenues for spending. The latter channel, on the other hand, has a potential to bring with it widening income disparities among social classes and between regions and a negative impact on natural environments. This emphasizes the need to adopt supportive policy instruments that offer affordable services for the poor and ensures adequate environmental conservation.

4) Redefinition of infrastructure

Up till now, the assumption is that infrastructure should be redefined to refer to “a foundation of basic services that will help attain poverty reduction and other development goals, including the MDGs, economic growth, etc., to ultimately help people realize their dormant potentials through self-empowerment.” The term “redefine” aims to emphasize a reexamination of the exact developmental roles that infrastructure plays.

Figure 4.1.2 Redefinition of Infrastructure



4.2 Issues on Goal Setting and Strategies

The delivery of infrastructure services is relatively important than the infrastructure facilities themselves, and their sustainable delivery is a key issue. In other sectors, this concept is often regarded as a matter of course. For instance, in education, building schools alone is the not the main issue; rather, it is in the attendance of children and keeping them to stay in school until they finish school that are more essential. Further, roads are a means of providing access for people or communities whether for going to work, to school, to deliver goods and services, or various other purposes. In more basic terms, the service of transporting something between two points must be provided. The concept of service is now more being rigorously discussed, and this kind of analytical approach is essential to ensure that the planning and design of future projects take into account the necessary functions of infrastructure facilities. However, an activity-based approach is necessary to accurately understand the diverse needs of beneficiaries, and what kind of infrastructure services, facilities, and institutions are necessary to meet the desired activities of the people. Furthermore, helping people realize their potentials is also important. For instance, the ability to transform citizens into intelligent, productive, and responsible individuals is a manifestation of the latent power of education.

Against this backdrop, poverty reduction, the MDGs, human security, and others are put forward as consolidated goals. And infrastructure service delivery should place greater emphasis on achieving such goals. Infrastructure value will thus be assessed on how the infrastructure relates to these goals.

In planning and implementing infrastructure, the physical and spatial aspects should also be fully taken into account. Taking all these aforementioned assessments into consideration, the goals can then be set and the strategies to achieve them are drawn up.

1) Clarification of goal setting

So far, the effects and services generated by infrastructure development have been considered as higher goals and not as direct or intermediate goals; emphasis has been largely on quantifying the outputs of infrastructure development, e.g. kilometers of roads built, number of households connected to a water system, etc.

The reasons for this approach in analyzing infrastructure are: (1) the existence of infrastructure alone has already achieved various goals; (2) infrastructure development in itself is a difficult task; therefore, construction has become the objective itself; and (3) due to the sheer lack of infrastructure, its development has been the main orientation. Even today, the absolute volume of infrastructure stocks is still considerably low. Completing an infrastructure development does not mean the infrastructure is effectively assuming its function because of various obstacles, such as inappropriate fares, institutional barriers on customs and tariffs, and a deteriorating capacity resulting from lack of maintenance. This means that in some cases, originally available capacities for services, such as production volumes and transportation are declining.

However, it is also hard to say that changes in assistance methodology, from structural adjustment, to PRSP, etc. or changes in goal orientations have brought sufficient outcomes. Although the worldwide absolute poverty level has decreased by approximately 11%, from 1.24 billion in 1990 to 1.1 billion in 2000, it was mostly through the effect of China's effort

alone. The poverty rate is still increasing in Eastern Europe/Central Asia, Central and South America, Middle East/North Africa, and sub-Saharan Africa.[3)] Future prospects expect the number of the absolutely poor to reach a total of 810 million in 2015, approximately 300 million people less than the number in 2000. Poverty rates in Eastern Asia are expected to lower to approximately 3.9%, while those in sub-Saharan Africa are expected to increase. There will be almost no improvement in the Middle East and North Africa.

Table 4.2.1 Outlook on Absolute Poverty, 2015

	Poverty Rate (%)	Population of the Poor (million)
East Asia & Pacific	3.9	80
Europe & Central Asia	1.4	7
Latin America & Caribbean	7.5	47
Middle East & North Africa	2.1	8
South Asia	15.7	264
Sub-Saharan Africa	46.0	404
Total	13.3	809

Source: The World Bank. Global Economic Prospects 2003

Should this trend continues, the GDP per capita in these regions would not increase from the current levels. Under this condition, it would be utterly irresponsible to pump resources in these regions if growth is not the objective. Unfortunately, some surveys reveal that poverty reduction is not necessarily a primary goal of potential recipients of aid. For example, following Japan's on-request aid policy, there were more applications for aid that are not directly related to poverty reduction. The inference is that many of goals were set on something else rather than on poverty reduction. Furthermore, the requests for assistance come from the national level, and often disregard the inputs of poverty groups, resulting in other issues tended to be given more priority.

There is debate over the poverty reduction approach, whether the orientation should be direct assistance for the poor or indirect assistance by way of improving the poor people's living conditions through raising the national economic level. The latter (structural) approach was a core aid ideology in the 1950s to 1970s, while the former was practiced mainly from the 1990s up to the present. However, the newer approach is also being reviewed as results are not forthcoming. The review seems to be directed at the pro-poor growth strategy, i.e. pursuing economic growth aimed at poverty reduction, and pursuing economic growth while incorporating complementary pro-poor policies. The necessity of reexamining the role of infrastructure has come out from these assessments.

However, there is yet to be an absolute consensus on what the ultimate goals of infrastructure should be. In general, achieving economic growth and the MDGs, which include poverty reduction and human security, have traditionally been the ultimate goal of infrastructure. Again, correlations between this goal and discernible impacts of infrastructure services are not yet necessarily clear. It is, therefore, necessary for individual projects to take a flexible approach in considering the beneficiaries' needs.

2) Accuracy

Beneficiaries of infrastructure development vary widely; they can be individuals, various

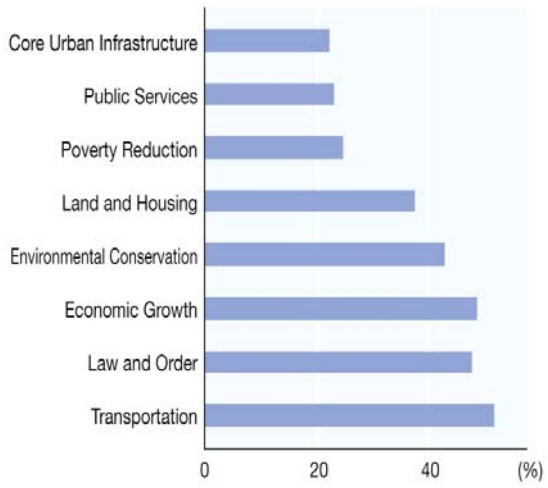
[3)] The World Bank. "Global Poverty Monitoring Database"

organizations, villages, local governments, states, or corporations. The desired infrastructure services, visions, and goals likewise differ according to the level of economic and social development in various regions within a country, different ethnic and cultural backgrounds, and so forth. Moreover, diversity tends to increase with the influences of globalization, decentralization, and such development phenomena. Because this diversity is not yet fully understood and a lot of uncertainty remains, efforts are still underway to consolidate goals (like the MDGs), establish common funds, and harmonize programs and processes.

However, such goal sharing is not always an appropriate response to diverse goals. Goals should be fully understood at the field level, particularly by the beneficiaries. While the aid community may have a common understanding of the goals of development assistance like poverty reduction and MDGs, this however may not be the case at the grassroots level. Therefore, the use of technical terms may not be appropriate in the dialogue in the developing countries. The results of the questionnaire survey conducted in this study and the submitted applications for assistance clearly show that there are various sets of goals that exist other than poverty reduction and MDGs (see box below). It is also important to have a good grasp of these individual goals and to review them periodically.

Urban Problems Pointed Out by Ho Chi Minh City Residents

The Questionnaire Survey conducted by JICA's Urban Transport Master Plan and Feasibility Study in HCM Metropolitan Area asked 26,765 respondents to choose from a list of problems three urban problems they consider as most serious. Transportation, law and order, economic growth, and environmental conservation are on top of the list, while poverty reduction and public services come out as lesser concerns. This illustrates that issues and concerns also vary from country to country and from region to region. (JICA. 2004. The Study on Urban Transport Master Plan and Feasibility Study in HCM Metropolitan Area)



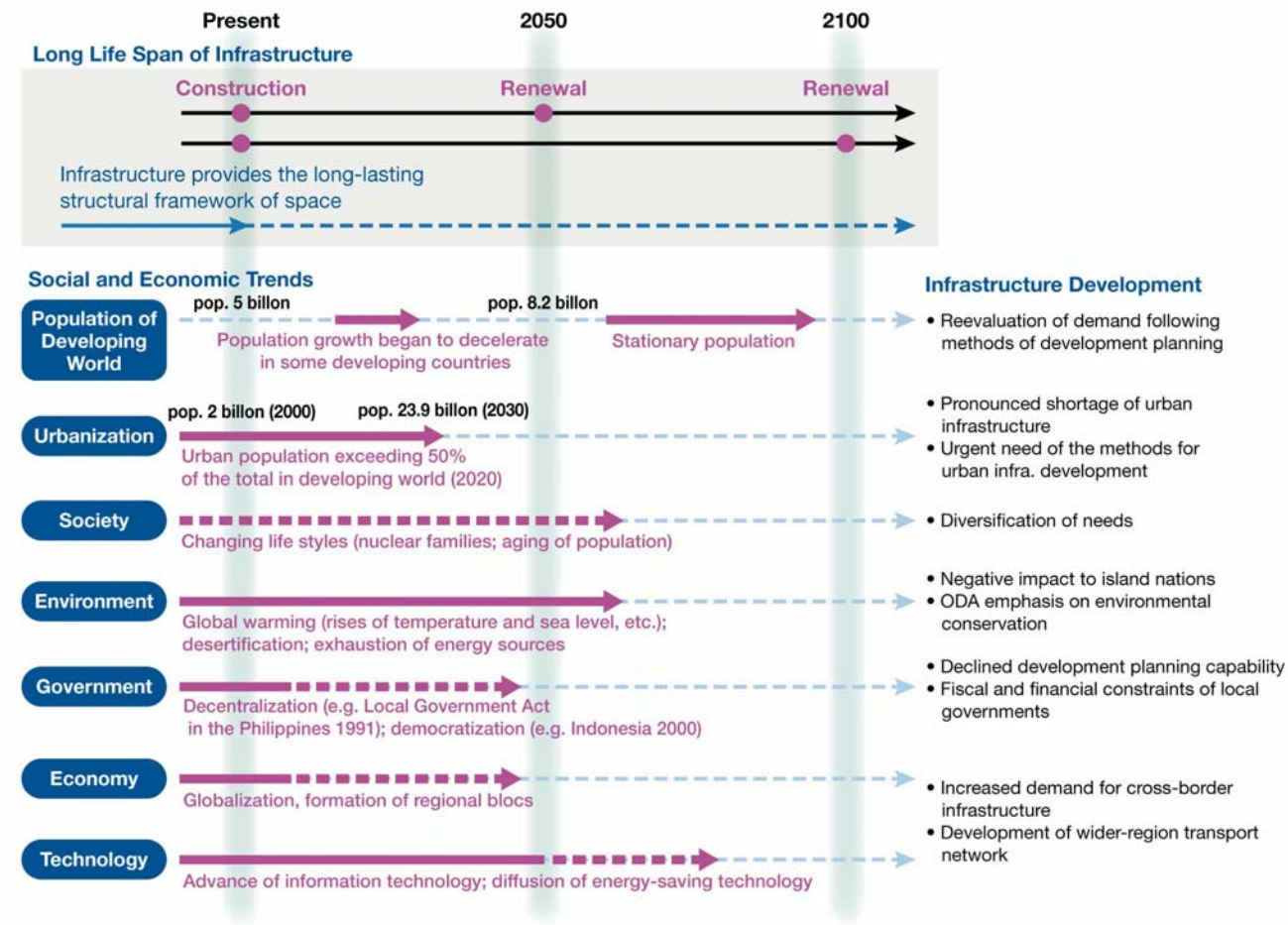
3) Goal setting from long-term perspective

Most physical structures have long life spans and their usefulness generations. Good examples include the Champs-Elysees in Paris and the ancient aqueducts in Rome. Once constructed, infrastructure facilities occupy space permanently, underpinning the rigid structural framework of urban or rural spaces. Thus, it is necessary to set infrastructure goals by forecasting long-term prospects of demography, social and economic development, as well as environmental impacts.

In developing countries, however, detailed analyses are difficult to conduct due to scarce information. Because of the absolutely low level of infrastructure development, i.e., it is far below current demands, future infrastructure demands are not as big a concern as in Japan. The developing countries are more preoccupied with meeting current needs rather than

planning for future needs. However, a long-term perspective is very important so that there is flexibility for future infrastructure development to adapt to anticipated changes in their environments. Here, the orientation of infrastructure based on a long-term perspective is discussed considering the possible future socio-economic conditions in developing countries.

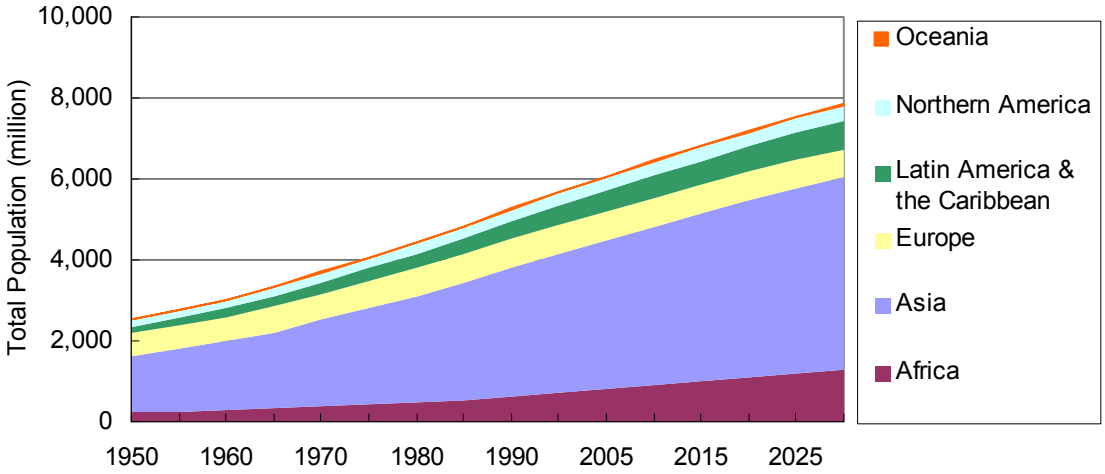
Figure 4.2.1 Infrastructure under Social and Economic Changes



Demographic changes

The population of developing countries is expected to increase steadily from 4.8 billion in 2000 to 8.2 billion by 2050 (the UN estimates and projections, medium variant). In this estimate, the birth rate is seen to continue to decelerate. However, if the deceleration rate is slower than the estimate, population may increase to 11.9 billion people by 2050. Rapid growth is expected in the 49 least developed countries although it is anticipated that the birth rate in these countries will begin to decelerate significantly between 2000 and 2050. However, their total population is expected to grow approximately 3 times by 2050 (from 658 million people now to 1.8 billion).

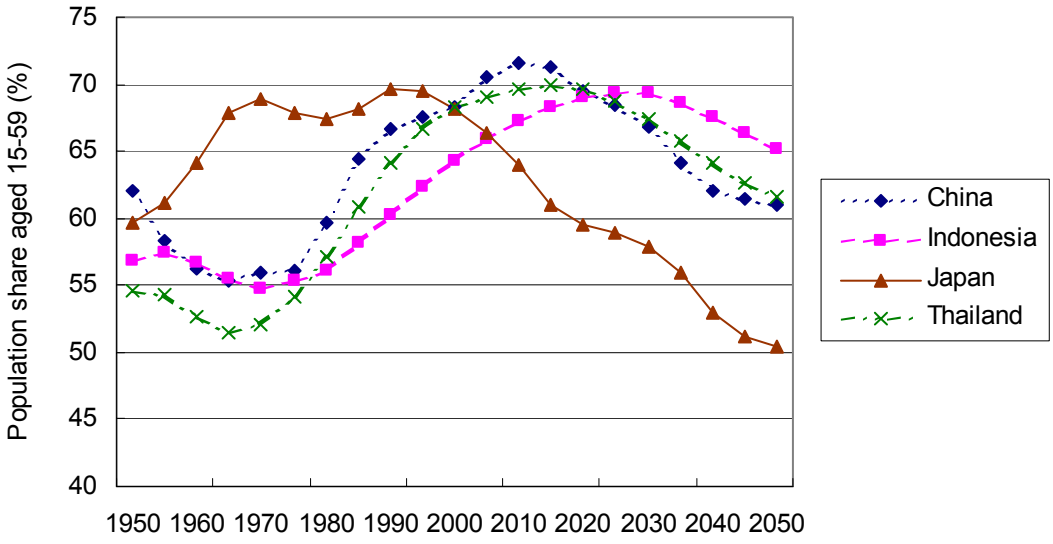
Figure 4.2.2 Demographic Change by Region



Source: United Nations. Urban Population Prospects The 2002 Revision

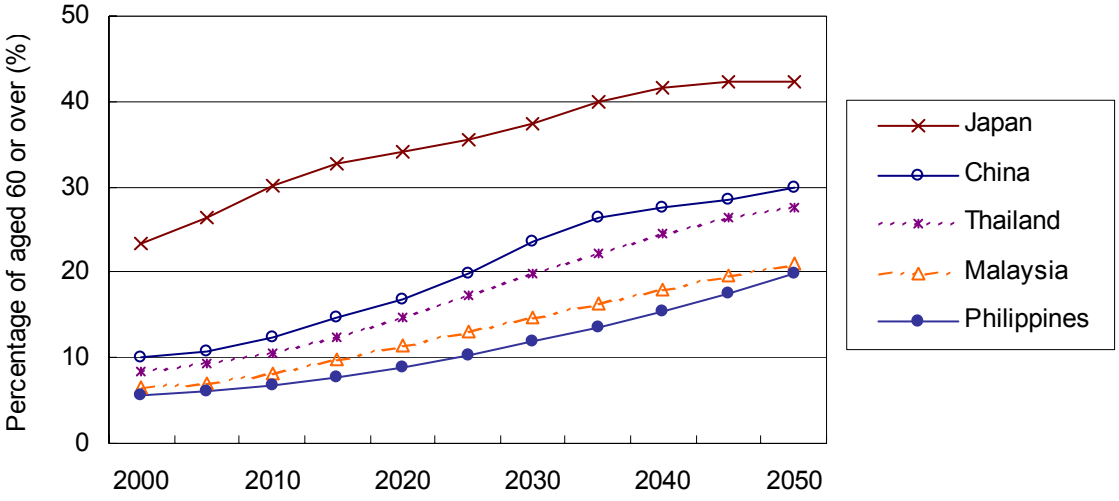
At the same time, similar to the trend in Japan, it is expected that population growth will begin to decelerate in some Asian countries in the near future. The productive-age population ratio of China and Thailand is expected to reach its peak sometime between 2010 and 2015, while Indonesia's will be between 2020 and 2025.

Figure 4.2.3 Productive-age Population Ratio (15-64 years old)



Source: United Nations, Urban Population Prospects The 2002 Revision

Figure 4.2.4 Senior Population Ratio (above 60 years old)



Source: United Nations, Urban Population Prospects, the 2002 Revision

Based on this forecast, some Asian countries will face declining birth rates as well as the problem of an aging population. It is expected that China, in particular, will need to deal with these peculiar population problems very soon as a consequence of its one-child policy.

The current infrastructure needs in many developing countries will not be greatly affected by the population growth because the increase in population is still relatively low. However, the need for basic social infrastructures (including water, sanitation, and education), which are relatively developed at an early stage, may diminish quickly even in low-income countries. What these trends mean would be that, in infrastructure planning in the developing countries, it is necessary to initially set the standard at a reasonable level while taking account of demographic trends. The developing countries have adopted a demand-driven approach to infrastructure development; but now can be the best opportunity to think about an ideal situation where infrastructure provision is defined not only based on current needs but also considering the probable requirements of a future that is projected based on current demographic events. Whether or not such attempts at rational infrastructure planning will succeed is heavily dependent upon improvements in governance, strengthening of capacities, etc. in the developing countries.

Urbanization

Urban population in developing countries stood at approximately 1.69 billion in 1995. This is expected to increase to about 3.23 billion by 2020, or about 1.34 billion more people by then. On the other hand, only around 120 million people more is expected to be added in advanced countries. Rapid urban population growth is expected during the same period in the 49 least developed countries where the population will be close to 3 times more than the size in 1995. As a result, urban populations will exceed 50% of the total population in developing countries by 2020. As of 2000, the estimated population of the absolutely poor (those living with less than $1.00 per day) was 1.1 billion people (500 million urban poor and 600 million rural poor.[4)] There is a great chance that the number of the urban poor will

[4)] Absolute figures were obtained from “Global Poverty Monitoring Database” (the World Bank), while the estimate of urban poverty was obtained from ”Rural and Urban Poverty: Understanding the Difference,” David Satterhwaite. 2001. The World Bank.

exceed that of the rural poor in the near future, as is now the case in South America.

Table 4.2.2 Urban Population and Urbanization Ratio

	1995	2000	2005	2020	2020/1995
More Developed Regions	875,539	900,179	922,219	989,207	1.13
	74.6%	75.4%	76.3%	79.9%	
Less Developed Regions	1,694,576	1,970,190	2,262,664	3,233,356	1.91
	37.7%	40.4%	43.1%	51.3%	
Least Developed Countries	136,792	170,946	214,265	392,152	2.87
	23.1%	25.6%	28.4%	37.6%	

Source: United Nations, Urban Population Prospects, the 2002 Revision

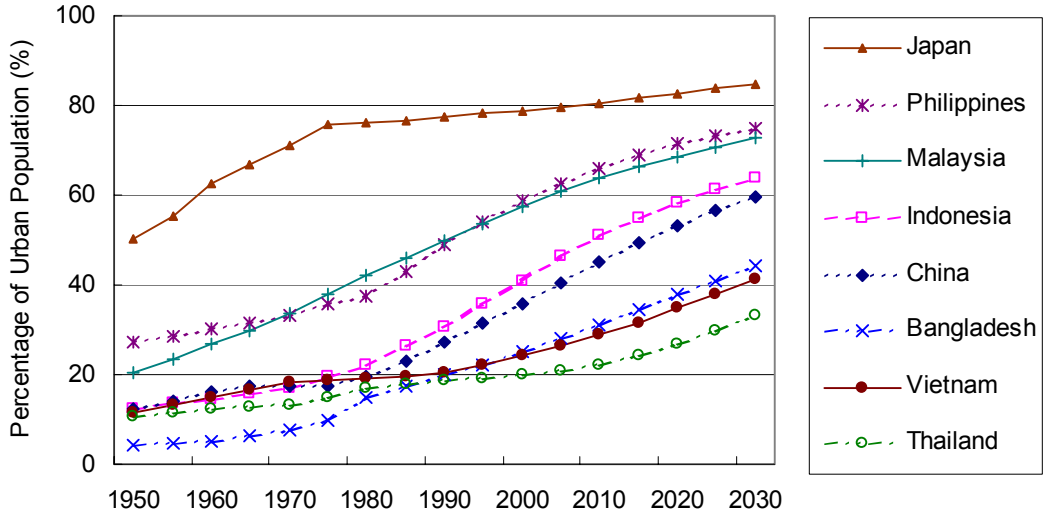
Note: Upper stand: Urban population (thousands); Lower stand: Urbanization Ratio (as percentage of urban population)

More developed regions comprise Europe, North America, Australia/New Zealand and Japan.

Less developed regions comprise all regions except countries defined as more developed regions.

The least developed countries, as defined by the UN General Assembly in 2001, include 49 countries.

Figure 4.2.5 Changes in Urban Population Ratio in Asia (1950-2030)



Source: United Nations, Urban Population Prospects. The 2002 Revision

Urbanization brings about economic growth, creation of job opportunities, social changes, and the transformation from primary, secondary to tertiary industries. In urban areas, infrastructure development can be difficult due to high population densities and the complex uses of lands. The advanced countries have developed various methods and technologies for infrastructure development that takes full account of these constraints. These techniques invariably offer consolidated packages that includes various elements to address urban issues comprehensively.

In principle, comprehensive approaches, including an institutional inductive approach, like city planning laws, taxation systems, welfare policies, etc., are adopted in combination with other measures, such as coordination between public and private investment, allowing markets to dictate cost recovery, imposition of tariffs that shifts the financial burden on beneficiaries, and welfare policy for the low-income group (i.e. to reduce tariffs from these

groups and government providing subsidies), etc. Securing financial resources and promoting private investment are the key issues that need to be addressed in order to handle massive infrastructure demands caused by enormous increases in urban population.[5)]

Developing countries also face humanitarian issues resulting from migration into urban areas. These include the growing number of street children, proliferation of slum communities, urban blight, poor waste disposal, air pollution and crime. Attending to these problems put great pressure in terms of infrastructure planning and resource allocation as it becomes more costly and difficult to undertake infrastructure development under such conditions.[6)]

Countries with high urban population growth rates predominate in Africa. Income level is low in these countries where primary industries dominate, resulting in the rapid expansion of slums and the escalating number of unemployed urban poor. In these low-income countries, it is essential to plunk in investment in the urban areas simultaneously with infrastructure investment being made in the rural areas.

Table 4.2.3 Countries with High Urban Population Growth Rate by Urban Population Ratio (2000)

Urban population ratio	less than 40%	40% to 70%	more than 70%
Africa	Angola, Burkina Faso, Chad, Ethiopia, Guinea, Kenya, Madagascar, Malawi, Mozambique, Niger, Sierra Leone, Somalia, Sudan, Swaziland, Tanzania, Togo, Uganda, Zimbabwe 18 countries	Benin, Cameroon, Congo, Cote D'Ivoire, Libya, Mauritania, Nigeria 7 countries	Gabon, Mali 2 countries
Middle East	Yemen 1 country	Iraq, Syria 2 countries	Jordan, Kuwait, Oman, Saudi Arabia, United Arab Emirates 5 countries
Asia	Afghanistan, Laos, Nepal 3 countries	Indonesia 1 country	
Central & South America		Honduras, Paraguay, St. Vincent and the Grenadines 3 countries	

Source: the World Bank. 2003. World Development Indicators

Note: Countries included have more than a million urban population and growth rates of above 4% recorded in 1980, 1990, and 2000.

[5)] Various methods are created to ensure a return of the development profit such as excess acquisition scheme for right-of-way, land reallocation, complete land acquisition by public (e.g. new town project), minimum tax (e.g. ZAC of France), issue of a claim (e.g. TIF of the USA), etc. Additionally, various experiences on land reallocation, procedures for residents' participation, and incentives for private investment have been accumulated (e.g. land reallocation in Turkey; rate of site reduction is fixed at 30% by law – it becomes public if it were less, indemnity is given if it were more).

[6)] In Bogotá, Columbia, the development of sewage in squatters' areas is expected to cost three times more than that in the new urban area (the World Bank. 2003. Development Report).

Except for some countries, the urban population growth rate in Asia, which has a large population, is slowing down. However, giant cities, with sizes of approximately 10 million people, continue to grow. Large infrastructure investments are, therefore, necessary in these places. Additionally, these cities enjoy high productivity, contributing a large share in national production, which further means that investments aimed at making these cities more efficient and environmentally favorable are needed.

City planning based on population forecasts, projected development patterns, coupled with and infrastructure development design needs to be drawn out. In some cases, population inflows and urbanization controls may be necessary. However, the importance of city planning is often not recognized in urban cities in many developing countries. If it is recognized, implementation cannot be carried out because of institutional and budgetary problems, issues of governance, etc. Meanwhile, urban slums have already expanded while city plans are yet to be developed.

City planning and infrastructure design require sophisticated techniques and analytical capacities that can be obtained through learning from other countries' experiences. This is particularly relevant because comprehensive visions, planning, development regulations, etc. are important in the cities where various infrastructures are interrelated and interdependent. Technology transfer in city planning in general and urban infrastructure design in particular is therefore extremely important.

Decentralization

In some countries, decentralization is progressing along with the tide of democratization. Recent public expenditure statistics of Asian countries show that the ratio of local government disbursement is becoming larger, accounting for 70% in China, 40% in Philippines, and 25 to 35% in Indonesia.[7)]

It is believed that decentralization is neutral to the total volume of infrastructure demand. However, it could bring major changes in the way infrastructure facilities are developed and implemented as local governments gain ground. Decentralization enhances the potential of reflecting local needs thoroughly in infrastructure planning. On the other hand, it may also complicate the development of infrastructure that covers a wide area (crossing jurisdictional boundaries), as well as the coordination between regional infrastructures, etc. In transportation for example, some areas revert back to centralization of authority due to concerns that individual policies over core transportation infrastructures in each region are proving to be inefficient.[8)] The lack of engineers and the deterioration of financial and planning capacities at the local government level also pose critical constraints to effective infrastructure provision under a decentralized regime.

For aid agencies, what this means is that it is important to evaluate the capacity and governance of each recipient country as they vary considerably. Capacity development for local governments also becomes very important while a review of assistance schemes directed towards local governments may also be worthwhile to be enable the aid agencies to

[7)] In Indonesia, two laws – local autonomy law, as well as central and local budget balancing law – were stipulated in 1999.
[8)] Jakarta, Cairo, etc.

be more responsive to them.[9)]

Advancement and diversification of economies and industries

All nations, including developing countries, aspire for economic and industrial advancements, as well as for the enhancement of their international competitiveness. However, various factors hinder the developing countries in reaching an advanced economic status. It has been said that the global economy is not a zero-sum game, and this holds true even for countries that tend to strengthen themselves in those areas where they are most competitive. In reality, there is heated competition and the zero-sum game unfolds as a result. Even East Asia, which has been enjoying steady economic growth, was affected by the 1990s Asian financial crisis.

Following the Japanese trend, sluggish economic growth is becoming evident in Korea, Singapore, and others. Only those countries that attract foreign investments due to their cheap labor, like China and Vietnam, are enjoying rapid growth. The question therefore is sustainability of growth for Asia: how long it will last, or if it has already peaked. Although an in-depth analysis is still needed, it would appear that East Asian development is (consciously or subconsciously) following the Japanese development model. It could also be that Japan and the newly-industrializing economies (NIEs) that follow Japan's footsteps have fallen into a sluggish economic growth because of their interaction with other countries that pursue similar industrial policies and strategies. This hypothesis needs to be carefully verified considering these countries' expansive relations with Europe and North America. However, given population declines in advanced East Asia nations, and the lack of new groundbreaking products using new inventions, this hypothesis of Eastern Asia nearing the end of its growth curve does not seem too unrealistic.

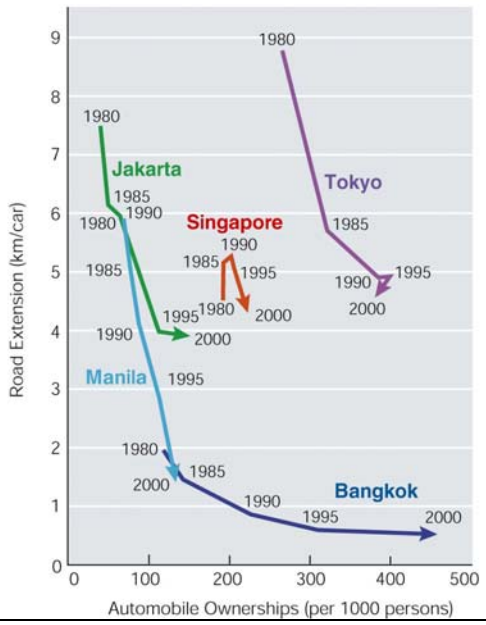
With respect to assistance for infrastructure, several approaches can be considered given the above-cited situations. One approach is to assume that the current economic structure in developing countries will be maintained but there is orientation toward progressive structural reform. That is, these countries are aiming at streamlining distribution and improving access to markets and resources by abolishing trade barriers. Indeed, negotiations for the FTA, development of infrastructures across barriers, and simplification of procedures are progressing, while several projects like the Asian Highway and development of the Mekong River basin are being pursued. Japan has already proposed the modernization of ports, airports, etc. to respond to such projects.

Although it includes longer-term and more challenging aspects, the other approach is the diversification of the developing countries' economic structures while giving local characteristics full play. Should countries produce similar products for similar markets, they would fall into a zero-sum game situation before long and will be pushed to the edge. Therefore, providing assistance to encourage industrial diversification as well as improving productivity is important.

9) The ratio of local government projects among the World Bank's urban planning projects are as follows: all portfolios for China, 27% for the Philippines, 89% in Indonesia. The importance of capacity development for local governments is increasing.

Automobile Ownership and Total Road Length

Among large Asian cities, it appears that Jakarta and Metro Manila are following the Bangkok experience over the past 20 years. Metro Manila was warned several years ago that it will facing severe traffic congestions, like those seen Bangkok. The warning has become a reality. On the other hand, Singapore has developed roads according to accurately estimated urbanization and motorization forecasts, with almost no vertical variance. This case illustrates the importance of long-term planning. (JICA. 2004. The Study on Integrated Transportation Master Plan for Jabodetabek)



Energy problems and global warming

Environmental problems, particularly global warming, cannot be tackled by a country alone. A global solution is needed. In reality, low-income and lower-middle-income countries cannot afford to focus on environmental issues. Rationalization of infrastructure development and national land use should be pursued taking into consideration such factors as population growth, increased motorization and industrialization, and greater energy consumption that come with increasing incomes. However, low-income countries and lower-middle-income countries lack the resources and technologies to undertake this. Here, the upper-middle-income and high-income countries, including Japan, can ensure that this can happen with aid as the driving force.

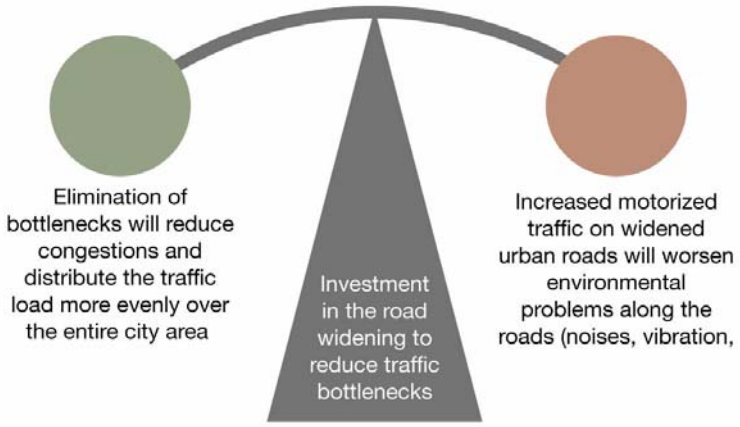
Once a developing country reaches the middle-income level (lower- and upper-middle-income countries) environmental destruction intensifies. For instance, motorization progresses rapidly when the GDP per capita reaches the $3,000 to $4,000 range. From the viewpoint of development assistance, middle-income countries have reached a stage of development that they can already make independent investment in infrastructures. However, developing countries tend to prioritize production and economic growth over environmental conservation. Therefore, it is necessary for advanced countries to continue providing and reinforcing assistance for environmental conservation. China offers a good example in this regard. Yellow sand rising out of progressing desertification and air pollution caused by intense industrial and household use of fuels, vehicle emissions from the fast-growing number of cars, etc. already have direct impacts on Japan. Should China, with a population 10 times bigger than Japan, rapidly increases its energy consumption in pace with its economic growth, global warming could intensify. Currently, Japanese ODA for China is being debated in Japan because of China's economic stature. However, assistance to China to address the growing environmental concerns is critical as it directly relates with Japan's national interests.

Although the long-term effects of global warming are not clear yet, several forecasts and estimates have already been made. Since the force of inertia applies to global warming as well, there is now a common recognition that "it is too late to take action when the effect shows up, and necessary action must be taken immediately." Island countries are particularly vulnerable even to a slight sea level elevation,[10]. Therefore, urgent actions are needed.

4) Program Fit and Acceptability

It is important to prioritize goals identified by each concerned party. Donors should not impose such priorities; prioritization is best left to the judgment of the aid recipient in order to secure ownership and ensure the success of a proposed project. Ownership ensures sustainable cost sharing, and provision of resources and attention for operations and maintenance. But relevant information is needed to make such judgments. At present, needed information is often not provided to beneficiaries and other stakeholders. Transparency and disclosure of all relevant information are important in engendering rational and timely decision making by beneficiaries (and those financially responsible parties). It is also useful to explain the tradeoff between the expected disadvantages and the advantages to be gained from a project (see Figure 4.2.6).

Figure 4.2.6 Example of Tradeoffs in Infrastructure Development



Infrastructure brings benefits to certain groups but it may also create negative impacts on others. Thus, balancing the conflicting interests of various stakeholders and agreeing on a common goal are indispensable.

Consensus-building methodologies (such as participatory approach, etc.) for small-sale projects are relatively well-established. However, they are not necessarily followed or are difficult to apply in large-scale projects.

Following the above-mentioned principles, it is possible to limit the range of activities that can be pursued in order to manage the use of limited resources. Such activities can include transport demand management, energy consumption, etc.

[10] In 2001, Tuvalu Island in the South Pacific (population: approximately 11,000) was washed over by sea water caused by the La Nina phenomenon. Damage from spring tide is anticipated this year and its vulnerability against natural disasters caused by abnormal weather is increasing along with the rising sea level (*Asahi Shinbun* Newspaper, February 17, 2004).

5) Flexibility in adjusting project goals

Infrastructure projects are often vulnerable to externalities and changing circumstances. During infrastructure implementation, the economic conditions may change and industrial and other key policies altered, factors which not anticipated during project planning. And the extent of uncertainty is greater in the developing countries. To cope with such eventualities, it is necessary to have built-in procedures in the project implementation processes, wherein goals are reassessed regularly vis-à-vis the monitored changes in external environments and that allows constant modification and revision of implementation design. In cases of transport projects for example, closely associated investments (e.g. a new industrial estate, new housing development, mining development, etc.) that create demand for transport infrastructure and services must be regularly monitored. These associated investments will require appropriate adjustments during the implementation of these transport projects, changes that may involve additional scope, changes in alignment, etc. that in turn will also require budget modifications.

4.3 Promotion of Integrated Approach

It is often pointed out that individual infrastructure projects are appraised and designed independently from others. There is lack of uniform approaches, and the delivery of infrastructure services do not benefit from effective coordination, rendering inefficient and unsustainable. Both aid recipient countries and donor countries are responsible for this fragmentation in assistance. In developing countries, the causes are poor governance, political intervention, short project life spans caused by frequent administration changes, growth strategy biases against poverty reduction and environmental conservation, etc. The donor countries and agencies also partly to blame for the multiplicity of ODA strategies and overlapping project proposals. Other reasons for the highly diffused ODA programs are the complex of project identification, appraisal and implementation procedures that are too tedious and often time consuming, and donor responses are a per-project basis.

Under these circumstances, the donors should be made more accountable in the allocation and use of limited ODA resources. Therefore, it is important to formulate master plans that include programs promoting an integrated approach, and that comprehensively address infrastructure problems and issues.

There are a number of master plans that have been formulated, which also prioritized projects. But most failed in implementation. One reason is the inadequate institutional arrangement for coordination among government departments and ministries in developing countries. Another is the weak coordination among donors as well. It is important to also extend assistance to developing countries that will better support coordination of aid efforts and more rational policy making.

1) Proposals on integrated approach

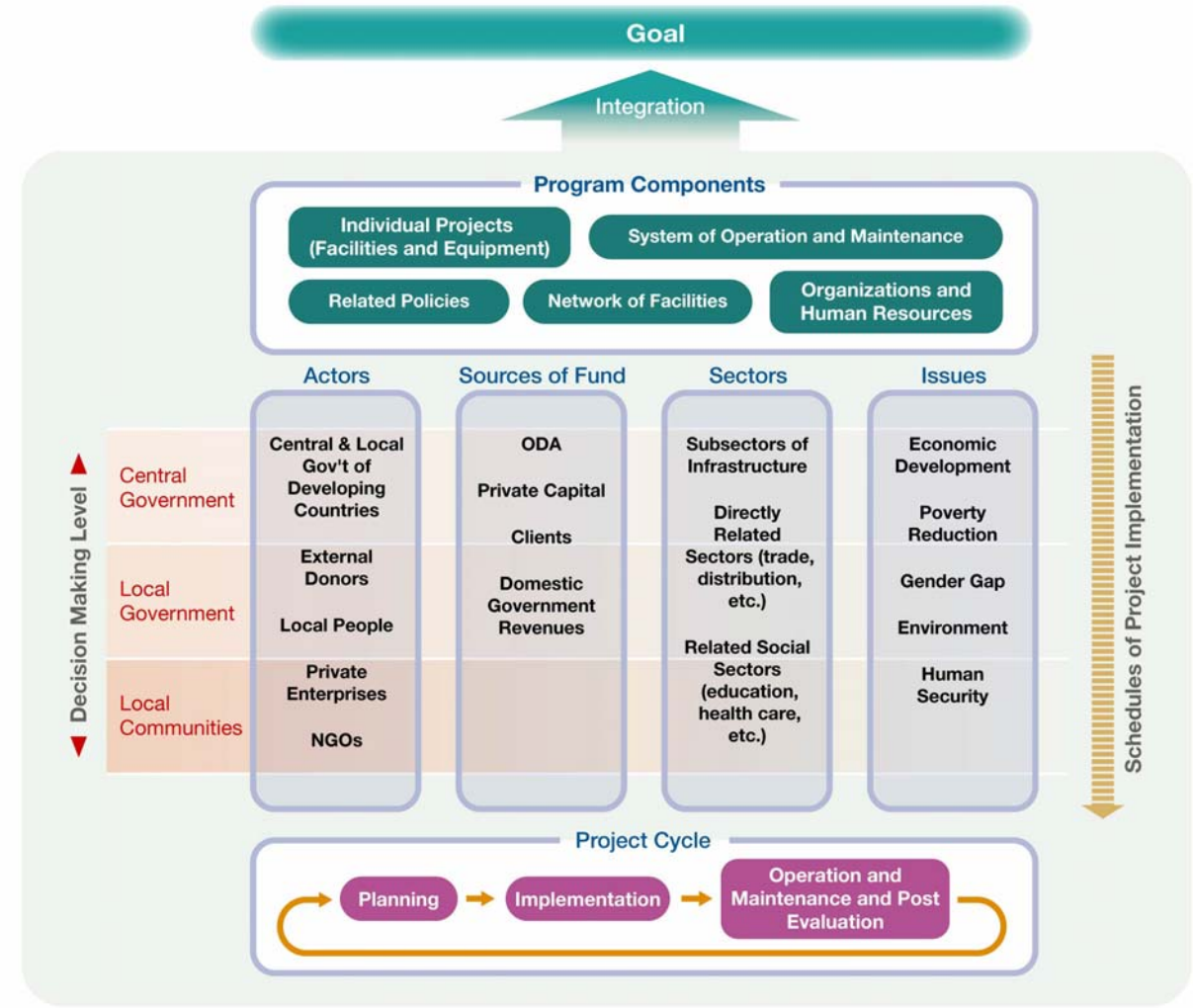
Interest in the integrated approach is gaining ground in recent years. But the proposed approaches vary widely. The World Bank promotes the Comprehensive Development Framework (CDF) which emphasizes wider ownership of and participation of each recipient country in the development process. For sectoral development, there is a growing interest in the so-called sector-wide approach (SWAps). With a SWAp, donors and the policy makers of a recipient country select a single sector and formulate a coherent program of projects and policy instruments for subsequent implementation (Ministry of Foreign Affairs of Japan, Q&A

on Economic Cooperation, pamphlet). For these concepts, integrated approach is defined as follows:

"Integrated approach is a statement of commitment where the development goals proposed by the government of a given developing country are translated into a consistently prioritized bundle of relevant project proposals, related institutional supports, and policy instruments, with clearly stipulated agenda of project implementation schedules by the designated executing agencies or organizations."

This integrated approach needs to be formulated together with a sense of ownership by the aid recipient country. Based on this definition, an integrated approach enables policy decision-making at the upper level, in each sector, state, local government level, or local community level to formulate a master plan that integrates the respective needs of each level. Program components and issues differ by decision-making level. The framework for an integrated approach for infrastructure development is shown in the figure below.

Figure 4.3.1 Framework of Integrated Approach



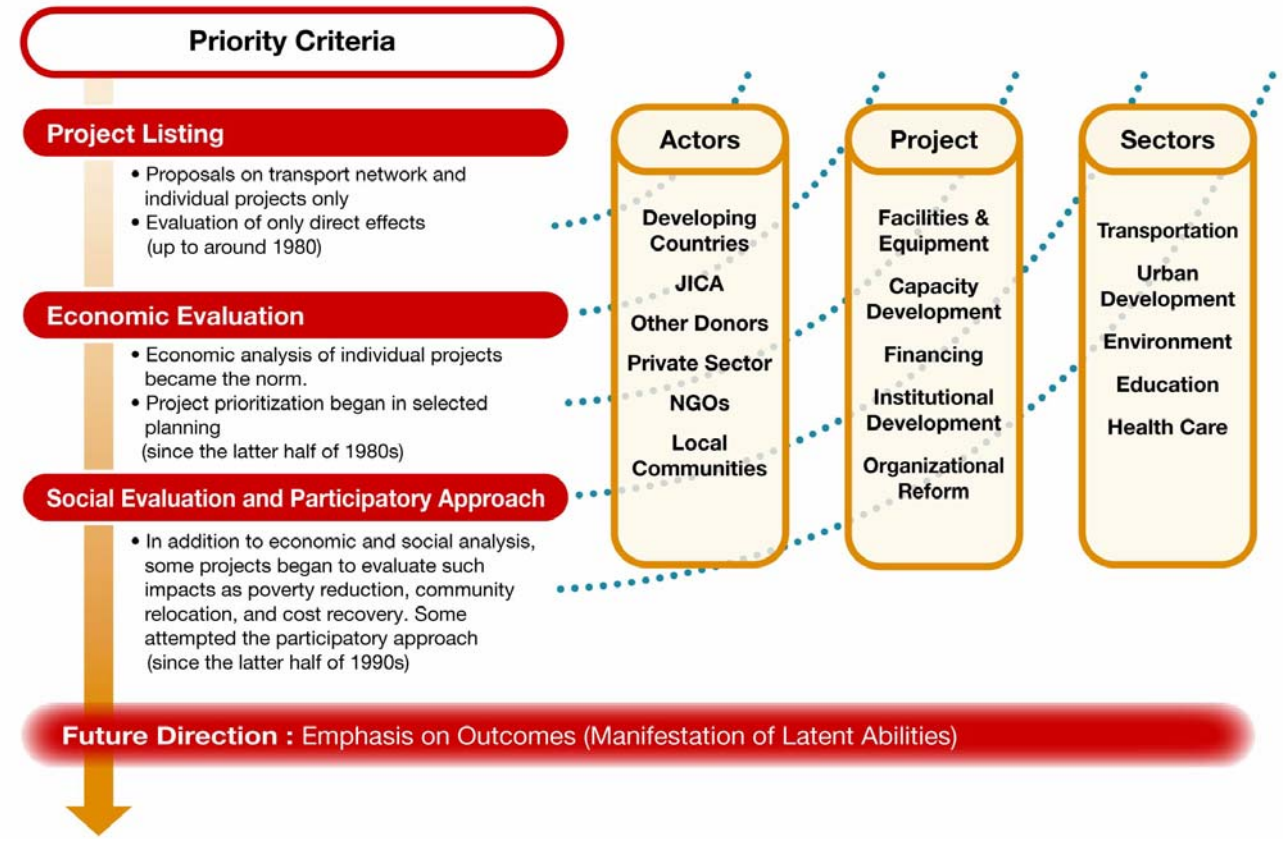
2) Criteria for evaluating priorities

Efficiency in reaching a given goal can be assured by assigning the order of priority among necessary actions. For efficient infrastructure development, it is necessary to define a set of criteria to determine priorities among projects with the further diversification and extensiveness of the integrated approach. The expanse and evolution of such evaluation criteria is illustrated in the case of the transportation master planning exercises (see Figure 4.3.2). Up to 1980, neither project evaluation nor prioritization was made, but simply proposals on transport networks and individual projects. In the 1990s, the criteria was expanded to include economic and social impacts. The participatory approach was also introduced.

The criteria for assessing economic and environmental impacts are relatively more objectively and scientifically quantifiable. However, the social impacts are rather difficult to measure and often not quantifiable. The increase in the number of criteria has resulted in the almost intractable difficulty of assigning weights for each of them.

Soon, the evaluation of an infrastructure project will include assessing the outcome of infrastructure services delivery. This outcome index is defined from the viewpoint of the impact on people's lives. However, currently no uniformly established methodology or technique is available to categorize and evaluate "outcomes." In addition, it is difficult to attribute outcomes directly with actual projects. It is necessary to find suitable ways to measure and show the components of "outcomes" at the field level.

Figure 4.3.2 Criteria for Project Priority and Scope for Project Evaluation (JICA Transport Master Plans)



Source: Based on information from past JICA transportation master plans (30 urban transportation cases and 20 nationwide/regional transportation cases).

As in the JICA Guidelines for Environmental and Social Considerations formulated in 2004, the introduction of a participatory approach is recommended to ensure transparency in decision making and to clarify the decision-making processes. Often, it is unlikely to achieve economic impacts, poverty reduction, and environmental improvements at the same time; tradeoffs among these goals need to be made and should be shown clearly through the participatory process. It is likewise important to show through the participatory approach that upon project completion, the beneficiaries and the recipient country need to think about the maintenance system and the attendant cost and financial resources required. Donor countries and institutions are expected to extend technical assistance to strengthen aid recipient countries' policy-making processes.

3) Programs for poverty reduction

As discussed in the previous section, infrastructure brings about economic growth, which lead to improved people's living standards and expanded opportunities. However, large-scale infrastructure, in particular, may also widen income and regional disparities, as well as promote gender inequality. It is important to adopt supplementary and pro-poor measures to alleviate such negative impacts, aid in redistributing benefits of economic growth, and contribute toward rural development. All these measures must be packaged in a integrated approach.

In the low-income countries, the national and regional programs should specifically target poverty areas. Intensive investment in underprivileged regions can, albeit slowly, bring about less regional disparities. To illustrate, the postwar infrastructure investment in Japan was described "as a means to reduce regional income disparities, which was a policy objective, allocating infrastructure investment intensively to the least developed areas, which made a contribution to a certain degree" (Tsuneaki Yoshida. 2000. *"Nihon no infra-seibi-no-keiken-to-kaihatsukyoryoku"* [Experience from Infrastructure Development in Japan and Development Cooperation]). Cross-sectoral programs are effective in reducing poverty. It is also appropriate to assign program execution to implementing agencies that fully understand local conditions, those that can assume ownership of the programs and those that can pursue good governance in the field. The programs should promote participation and cost sharing by beneficiaries to ensure sustainability. As a direct pro-poor approach, the provision of subsidies, and institutional assistance, such as microfinancing, should be implemented.

Poverty reduction is a multifaceted issue that narrow, sector-focused approaches would not effectively address. It requires an integrated approach with a strong pro-poor commitment. In the sphere of agricultural and rural development, for example, direct investment in irrigation facilities needs to be combined with the promotion of non-agricultural production activities to increase rural poor household incomes. These can be further complemented by investments in rural roads and water supply facilities to improve living standards. Investment to improve disaster preparedness is also necessary to reduce the vulnerability of the rural poor.

It is extremely difficult to collect sufficient user charges to pay for operating costs, let alone the recover investment costs, since investment in infrastructure is normally very expensive. It is in fact often unrealistic to expect all potential users pay high service charges, particularly among poverty groups. Subsidies are therefore justified to allow such groups to access the

infrastructure services. Certain types of infrastructure services lend themselves to operation and maintenance by local communities themselves. Local participation in operation and maintenance can potentially reduce costs and, consequently, a decrease in user charges. In this respect, it is necessary to provide appropriate training programs for community leaders and members.

4) Supportive policy instruments to improve the efficiency of infrastructure services

Under resource constraints, it is essential to improve the efficiency of infrastructure services. Efficient infrastructure services should be the outcome of projects. How infrastructure services can be made efficient is often largely subject to the 'soft' measures associated with infrastructure development. In other words, the level of services delivered is dependent on the characteristics of infrastructure operation. Some examples are as follows:

- Fairness and efficiency of the customs operations provided at international terminals.
- Participatory operation and maintenance of irrigation systems, organization of water users' cooperatives.
- Drinking water supply with appropriate charge scales and collection systems.
- Intra-urban road development with traffic demand management systems.
- Industrial estates with institutionalized incentives for the private investors.

These soft measures are indispensable in improving the efficiency of infrastructure services and should be incorporated into the program. This is the area wherein intellectual support through technical cooperation is necessary.

5) Tailoring technical cooperation for decision makers in different levels

Decision making is a crucial element that affects every part of poverty reduction programs. Setting priority criteria and identifying major issues are the key functions of decision making. Intellectual support for building such decision-making capacities plays an important part in future technical cooperation programs.

Such intellectual support is, basically, meant for decision makers in important official positions. The form and substance must be determined in relation to the multiple tiers in government which are responsible for different ranges of decisions, and also in relation to the nature of a given development issue: for national and sectoral development planning and strategies, it is the central government should be the target level; for regional or urban development planning, the regional or municipal government; and for the participatory approach, the community. All these tiers require technical cooperation to build decision-making capabilities of actors participating in the process.

Table 4.3.1 Example of Integrated Approach and Technical Cooperation by Decision-making Level

Decision-making Level	Major Issue	Area for Intellectual Support
Central Government	・Conservation of national land area ・Improvement in international relations ・Reduction in regional disparity, poverty reduction, environmental conservation ・Economic growth ・Sectoral strategies, etc.	▢ Program preparation: formulation of national development plans, supportive legal enactments or revisions, fiscal and public finance reforms, critical appraisal of development assistance offers. ▢ Major program components: legal enactments or revisions, capacity building, effective negotiations with donors, revision of standards for project design, etc. ▢ Priority decisions: among sectors, regions and major development issues. ▢ Pro-poor consideration: policy for income redistribution, designation of priority regions, formulation of guidelines on subsidies, etc.
Regional & Municipal Government	・Social welfare (education, health care) ・Poverty reduction ・Disability assistance ・Environmental protection ・Coordination with peripheral local governments	▢ Program preparation: formulation of urban or regional development plans, supportive enactments or revisions of municipal ordinances, decision on municipal tax, etc. ▢ Major program components: supportive enactments or revisions of municipal ordinances, capacity building, effective coordination with other municipalities, cost sharing with service users to ensure sustainability, and formulation of means, etc. ▢ Priority decisions: priorities among sectors and classes of potential beneficiaries. ▢ Pro-poor consideration: formulation and execution of major policy tools, appropriate subsidy, formulation of guidelines on community-based participatory operation and maintenance, etc.
Local Communities	・Preservation of culture, traditions, etc. ・Poverty reduction, etc.	▢ Program preparation: participation in municipal policy-making process. ▢ Major problem components: operation and maintenance of community-level infrastructure, participation in policy-making process, capability development of community leaders, etc. ▢ Priority decisions: participation in decision making on timing of project implementation ▢ Pro-poor consideration: collection of minimum charges, profit redistribution, etc.

4.4 Pro-poor Project Designs

As far as engineering aspects of projects are concerned, there are no issues even if the specific project are selected and prioritized in the integrated approach. However, the pro-poor aspect of project decision is a new challenge because of the very limited experience and this requires special consideration.

The pro-poor infrastructure project design can be practiced at two levels: One level is to

design an entire project by directly targeting the poor. The other level is to design a supplementary project in such a way that the poor can access the core economic infrastructure.

Projects of the former type require an integrated approach and are based on the understanding of needs and social characteristics of the local poor beneficiaries. There is much to be studied in terms of how to evaluate the situation "before" and "after" project implementation situations because there is no systematic knowledge of how the delivery of infrastructure services evolves to generate a favorable outcome that helps in reducing poverty.[11)]

For projects of the latter type, it is necessary to identify the exact mechanism wherein investment in core economic infrastructure contributes to poverty reduction and social development through individual projects. However, in the developing world, due to poor governance and inappropriate have hindered efforts of countries to channel economic growth generated from infrastructure development to poverty reduction. Thus, it is important to incorporate supplementary measures on poverty reduction into the project design.

Four A's for a Pro-poor Design

Availability: Presence or absence of basic infrastructure services.

- Provision of access roads to connect poor, disenfranchised communities to the urban road networks (complementary pro-poor projects)
- Construction of communal facilities (e.g. water pumps) in poor localities (direct pro-poor projects).
- Development of primary schools and medical facilities by section (direct pro-poor projects).

Accessibility: Removal of physical and social barriers.

- Construction of feeder roads to connect to arterial roads; various measures to offset the negative impact of new arterial roads, which cut across local lanes and alleys (complementary pro-poor projects).
- Construction of rural roads to connect to arterial roads; improvement of farm-to-market roads (direct pro-poor projects).
- Provision of a pier for small boats at a major port (complementary pro-poor projects).

Affordability: Pro-poor pricing of basic infrastructure services.

- Preferential measures for public transportation vis-à-vis private cars (complementary pro-poor projects).
- Low-cost housing connected with water, electricity and gas for the poor (direct pro-poor projects).
- Subsidized service delivery for the poor (direct pro-poor projects).

Acceptability: Tailoring of services to suit local culture and customs.

[11)] To enhance the delivery of infrastructure services, the following four A's should be improved: (1) availability, (2) accessibility, (3) affordability, and (4) acceptability (JBIC/UNFPA. 2004. "*Hoken sector ni-taisuru infra-no-hyokashuho-kaihatsu"* [Development of infrastructure evaluation method for the health sector]).

- Organization of water users' cooperatives (complementary pro-poor projects).
- Participatory development of tertiary irrigation channels and farm roads, as exemplified by the Food for Work programs (direct pro-poor projects).
- Provision of public transportation services acceptable to women (complementary pro-poor projects).

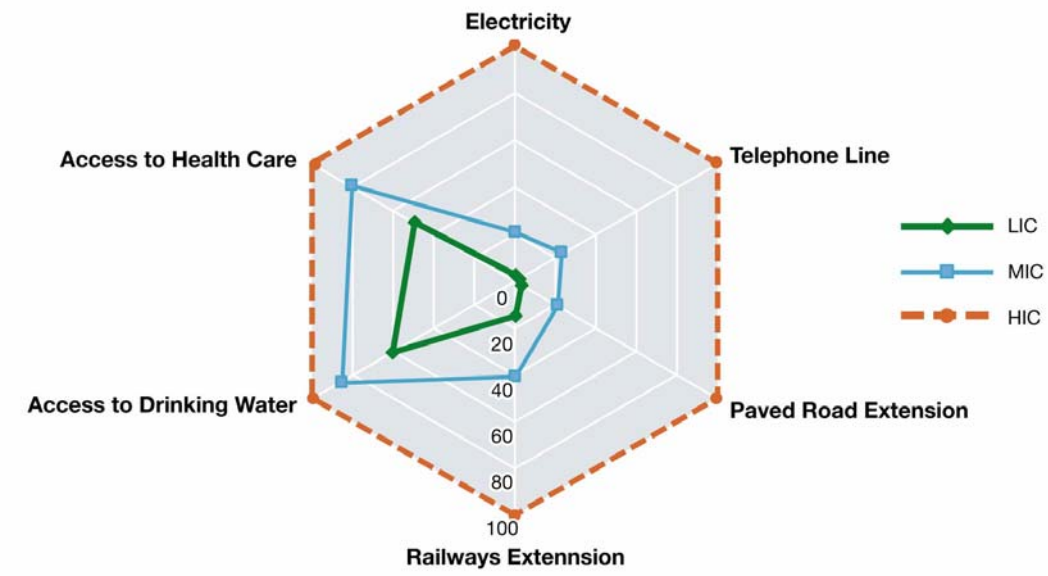
4.5 Reducing the Infrastructure Gap

1) Lack of infrastructure

The level of infrastructure stocks is extremely low in the developing world, and a glaring gap exists between the developing and the developed countries. It is not exactly easy to quantitatively compare the countries given their wide differences in population densities and distributions. However, the difference in the level of infrastructure stock between developing and advanced countries is more pronounced in economic infrastructures (such as electricity and transport) than in social infrastructures (like water and sewage systems).

The average total stock in dollars among the low- and middle-income groups is one-thirteenth and one-tenth, respectively of the average among high-income groups. In a hypothetical estimate, the low-income and middle-income countries would need to make new investments worth approximately 40 trillion dollars in order to reach the level of infrastructure of high-income countries.

Figure 4.5.1 Comparison of Average Stock Levels by Income Group, 2000



Source: M.Fay & T.Yepes. 2003. And World Development Indicators.

Note: With 100 as the average value of each infrastructure subsector in high-income countries, indices were calculated for the respective averages among three groups of developing countries (39 low-income, 50 middle-income, and 25 high-income countries).

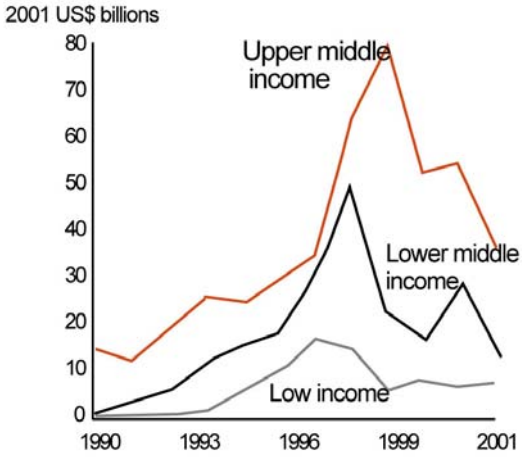
2) Securing the financing for infrastructure development

Securing the required financial resources is a necessary condition to reduce the above-mentioned gaps. According to a World Bank estimate, the annual demand for infrastructure investment in the developing world amounts to $233 billion, while annual operation and maintenance requires a further $232 billion (the World Bank Policy Research

Paper 3102). Total development and recurrent expenditure requirements amount to as much as 5.5% of the aggregated GNPs of the developing world. ODA can finance only 10% of this huge requirement. The World Bank further says that the annual private investment in infrastructure is around $60 billion, which is only about half the amount the private sector can potentially raise. In other words, the available finance is far too small to reduce the infrastructure gap between the developing and the developed worlds.

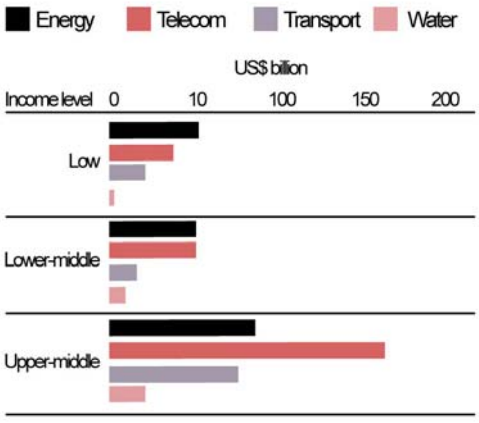
Figure 4.5.2 Projects with Private Sector Participation by Income Group

Dimension of infrastructure project with private sector participation by income group in developing countries
1990-2001



Source: Ada Karina Izaguirre. A Review of Projects with Private Participation, 1990-2001 (2002. the World Bank)

Accumulated infrastructure investment amount with private sector participation in developing countries
1990-1999

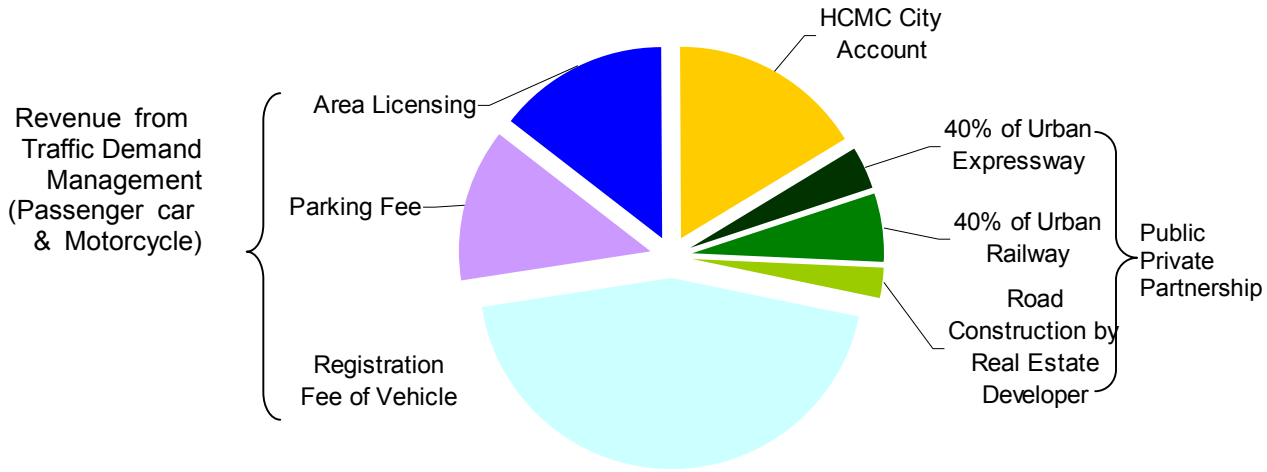


Melissa Houskamp and Nicola Tynan. Are the Trends in Low-Income Countries Different? (2000. the World Bank)

Therefore, developing countries can secure the financing in fundamentally three ways: a) through public funding which can be made possible by sustained economic growth; b) collection of minimum fees or user charges (based on the principle of imposing cost sharing from beneficiaries. Here, it is important to build capacity and improve governance to effectively impose user charges); and c) attract private sector investment, which can be in direct project finance or through public-private-partnership (PPP) schemes.

Technical assistance support is now being sought as part of ODA to help put in place measures that will assist developing countries raise the financing for infrastructure development. These measures should provide catalytic effects, redistribute development benefits, facilitate cost sharing, introduce proper tariff setting (e.g. road pricing), and build local capacity. JICA's Study on Urban Transport Master Plan and Feasibility Study in Ho Chi Minh Metropolitan Area (JICA. 2004) showed that in order to support the city's small general account, the city can generate funding by applying the PPP scheme in transport demand management. It proved that there are various ways to generate funds through ingenious planning (see Figure 4.5.3).

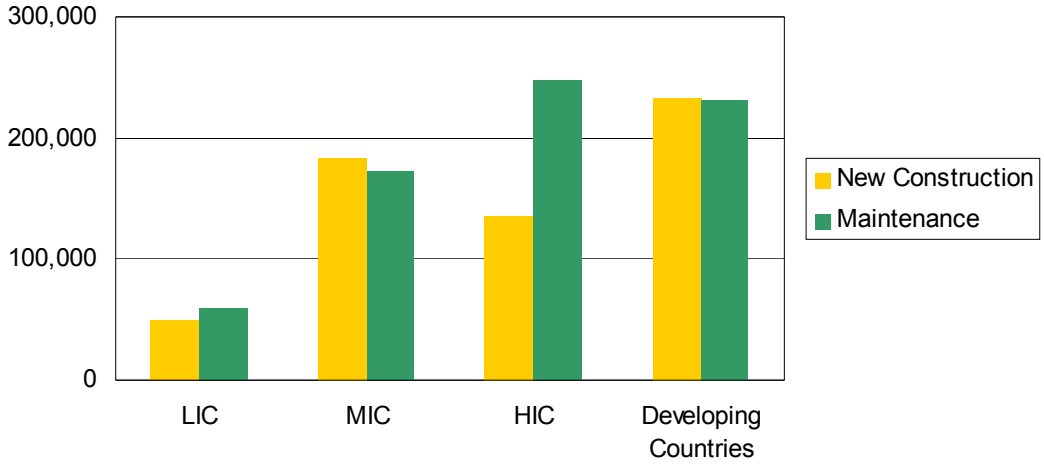
Figure 4.5.3 Fund-raising Plan for the Ho Chi Minh City Transport Master Plan（2004-2020）



Source: JICA, The Study on Urban Transport Master Plan and Feasibility Study in HCM Metropolitan Area.

Proper operation and maintenance are also important to prevent the further widening of the infrastructure gap. Neglecting the upkeep of infrastructure will render the facilities in disrepair or worse, useless, and will then lessen the accumulated infrastructure stocks. In fact, infrastructure stocks have already decreased in some countries in Central and South America. According to World Bank estimates, the capital requirement for operation and maintenance is almost equivalent to the amount of new construction investments. It is necessary to balance investments for new construction and for operation and maintenance.

Figure 4.5.4 Expected Annual Infrastructure Investment Needs（2005-2010）,(unit: $ 1 million)



Source: M.Fay & T. Yepes. 2003

3) Different infrastructure development needs

Undeniably, there is a huge and growing demand for infrastructure development in the developing world. Infrastructure requirements vary widely from one country to another, and from one region to another in a given country. The nature of infrastructure needs changes with economic growth, urbanization, motorization, and transformation of economic structure. It is necessary to understand the different needs, various social and economic trends, and the circumstances that will affect the demand for infrastructure, before launching an economic and technical cooperation with a given country.

Table 4.5.1 Infrastructure and Related Needs by Development Stage

Development Stage		Low Income	Lower-middle Income	Higher-middle Income	High Income
Population & Social Aspects	Population Growth Rate (%)	2.0	1.3		0.7
	Population Density (people/km^2)	74.0	55.1		26.4
	Urbanization (%)	30	49		78
	Poverty Ratio (%)	35	17		0
	Vehicle Ownership (per 100 persons)	1	5		56
Industry	Value-added Agriculture/GDP(%)	23	11		2
	Value-added Industry/GDP(%)	29	36		28
Infrastructure Stock ($)		730	1,245		9,342
Expected Infrastructure Needs (Strategic areas)		Social and economic infrastructure for primary industry: ・ Water resources development, irrigation, drinking water, sewerage, health care, and education ・ Roads & bridges, and energy	Urban and industrial infrastructure: ・ Water & sewerage ・ Roads, airports, ports, communication, and energy ・Environmental conservation	High-tech, safety- and amenity-related infrastructure and facility renewal: ・ Flood and landslide control, sewerage, waste matter treatment ・ Traffic control, distribution facilities, asset management ・ Environmental conservation, recycling	-
Expected Technical Needs		(Establishment of basic system)	(System integration, efficiency improvement)	(Absorption of advanced technology, reduction of external diseconomies)	
Institutions/Organizations		・Development of basic frame to make investment possible: formulation of infra related laws, etc. ・Development of systems for sustainable growth: pro-poor taxation system, etc.	・Institutional development for financing infra development and for project preparation and implementation Institutional measures to attract private investment in infrastructure, creation of favorable climate for industrial investment	・Management of project cycle, and system of operation and maintenance ・Methods for evaluating infrastructure investment	
Infrastructure-related Technology	Production/ Industry	・Preparation of basic information needed for infrastructure development (e.g. maps)	・Building levels & standards for infrastructure	・Methods of Impact assessment and Regulation, etc.	
	Institutions	・Development of basic technical capacity for the sectors mentioned above	・Participatory approach, etc.	・Consensus building among others	
	Others	・Development of basic technical capacity for the sectors mentioned above	・Techniques of operation and maintenance	・R&D on construction technology	

Source: WB. 2003. World Development Indictors, UN. 2003. Human Development Report,
Used information in Fay, M. and Yepes, T., 2003 & T. Yepes, 2003

Low-income countries have large rural populations and are under-equipped in terms of basic social infrastructures like water, energy, and sanitation. Thus, these countries have been investing considerably in social infrastructures, and their investments in such infrastructures are equal those made in the middle-income or high-income countries. Low-income countries have also invested in irrigation facilities to improve agricultural productivity of their large rural populations. Despite these past efforts, their demand for new infrastructure remains very large. One of the reasons is that they had to begin from the lowest level of infrastructure stock. Another equally important reason is that the available infrastructure is failing to function properly. The effective influence area of an irrigation system shrinks because years of poor operation and maintenance have reduced the volume of water intake and the efficiency of water distribution. The failure to collect water charges has led to shortfalls in budgets for water supply pipeline maintenance, resulting in inefficient operation. Similarly in transportation, the transport capacity of constructed roads have continued to drop because no attempt is been made to repave it. These examples point to the lack of attention given to operation maintenance in the low-income countries.

The operation and maintenance capacity of the developing countries needs to be incorporated into infrastructure development. However, the budget allocation on operation and maintenance always falls far short of the requirement. It is more important and realistic to assume the limitations of operation and maintenance capacity as a given, before planning new investments in infrastructure. Because an increased investment in social infrastructure alone does not have positive impacts on economic growth and cannot ensure even the sustainability of the invested facility itself, it is essential to keep a favorable balance between the social and the economic infrastructure investment.

Low-income countries are usually less urbanized and contain large land areas with low population densities. The cost of providing people with equal access to infrastructure services is much greater in sparsely populated areas than in heavily populated urban areas. Thus, it is necessary to find suitable ways to finance the development of infrastructure as well as their operation and maintenance.

Middle-income countries have a rapidly growing demand for large-scale infrastructure to keep pace with ongoing urbanization, motorization, and industrialization. At the takeoff stage of development, the returns on economic infrastructure investment are high. This makes it more realistic for these countries to expect private investment in infrastructure. From the viewpoint of donors, it will be necessary to provide technical cooperation on various institutional measures and to develop business models that will serve as catalysts in creating a favorable investment climate for private investors (see box below).

Middle-income countries generally need building technical and technological capacities more than obtaining financial assistance for infrastructure development, while low-income countries lack both technology and financing and require an integrated approach in technical cooperation. Middle-income countries require more finely tuned, sophisticated technical cooperation, especially on environmental impact assessments and on incentives and policy tools for attracting private sector participation in infrastructure development.

4) Infrastructure requirements in counties with relatively higher stages of development

The specific needs in some Asian countries that have reached a higher stage of development is discussed below.

Cooperation for cross-border infrastructure development

With accelerating globalization, cross-border infrastructure is assuming an important role, such as those in the FTA and other regional blocs. ASEAN countries have renewed their interest in the development of the ASEAN Highway and other cross-border infrastructures. By strengthening the economic and social ties in their region, they are aiming to raise their collective international competitiveness and boost their respective economies. The hope is that the proposed cross-border transport network will provide a decisive impetus to the growth of lower-income member countries (e.g. Myanmar, Cambodia, Laos, and Vietnam). External donors are expected to support the collective undertaking of infrastructure development. Given the expected complexity in programming project proposals to satisfy several countries, it will be necessary for donors to provide appropriate technical cooperation to ensure effective cross-border coordination.

Conceptual Pattern of Infrastructure Development and Economic Growth

To give a schematic summary, the impact of infrastructure investment on economic growth follows a logistical curve. Namely, the impact is low in the initial stage of economic development, and gradually rises with the progress of economic development. After the threshold of takeoff, the economic impact picks up and continues to grow rapidly throughout the period of high economic growth. After a certain level of infrastructure stock is reached, as in a developed country, the marginal utility of infrastructure investment begins to decline gradually. In developing countries, because of their low income levels, it is believed that a small amount of investment has a significant impact on poverty reduction.

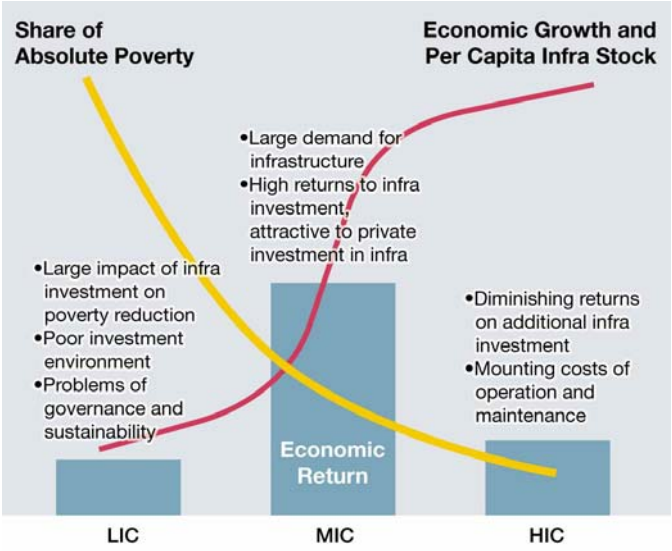
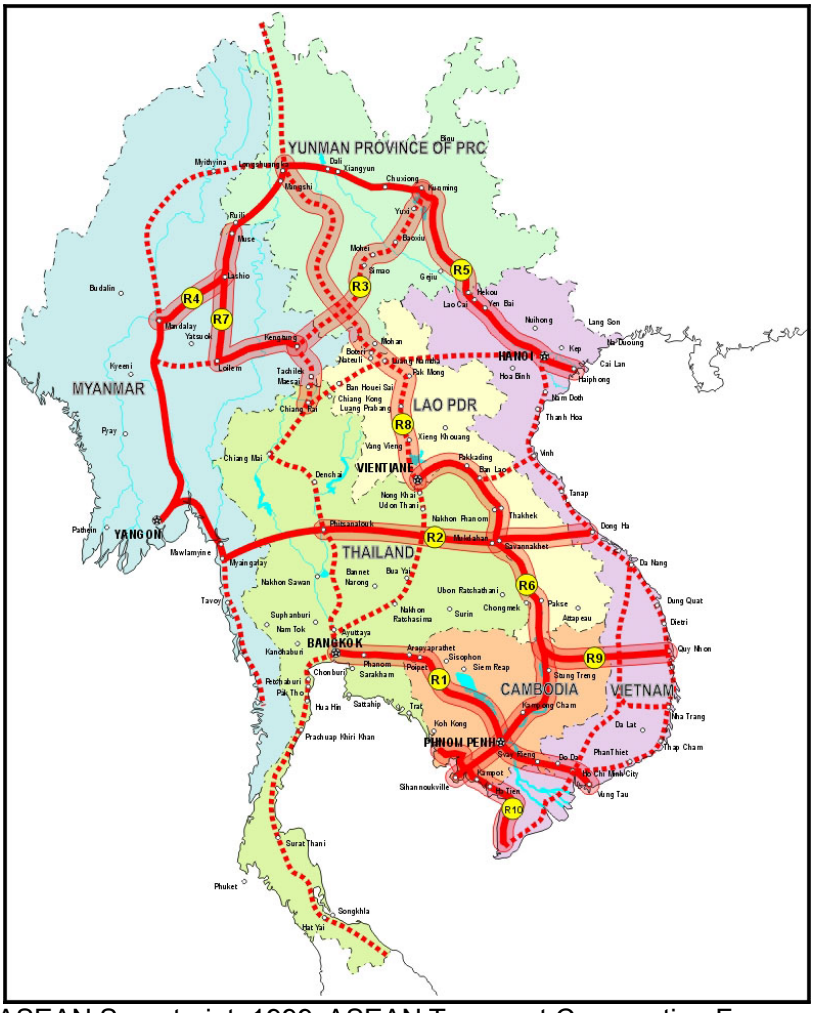


Figure 4.5.5 ASEAN Highway Network Plan



Source: ASEAN Secretariat. 1999. ASEAN Transport Cooperation Framework Plan

Reduction in regional disparities and environmental conservation

Middle-income countries tend to choose a pro-growth development path. As a result of the vigorous pursuit of high economic growth, they have a propensity to neglect issues associated with high growth rates - worsening regional disparities and environmental deterioration. It is increasingly necessary therefore to provide assistance to these countries on these issues they seemed to have neglected. Donors can also exert pressure to make these countries fully aware of the urgency and gravity of these problems in order for them to act swiftly. These countries would also high-quality analytical support (that can be provided through technical cooperation) on how they can effectively attract private investment. A case in point is related to the carbon dioxide emission barter arrangement which illustrates how to enlist effective high-level intellectual cooperation.

Establishment of Carbon Fund

The Kyoto Protocol was adopted in December, 1997, in an attempt to reduce the emission of carbon dioxide and other greenhouse gases. An article in the Protocol allows the trading of emission credits between developed and developing countries to facilitate their efforts in fighting global warming. In accordance with the article, a Prototype Carbon Fund was established by the World Bank in 2000 in an attempt to create a market in project-based emission reductions. This fund supports energy-saving projects in developing countries by providing financial resources and technology through the fund. In return for the support, developed countries will receive greenhouse gas emission credits as dividends to use for achieving their respective targets set in the Kyoto Protocol. In April, 2001, the UK established a trade market for emission credits. JBIC and the Development Bank of Japan will also establish Japan's first carbon fund in 2004. It was reported that Sumitomo Corporation and Nippon Steel Corporation have purchased the emission rights on their Western Siberia gas pipeline repair project (*Nikkei Shinbun* newspaper. January 30, 2004).

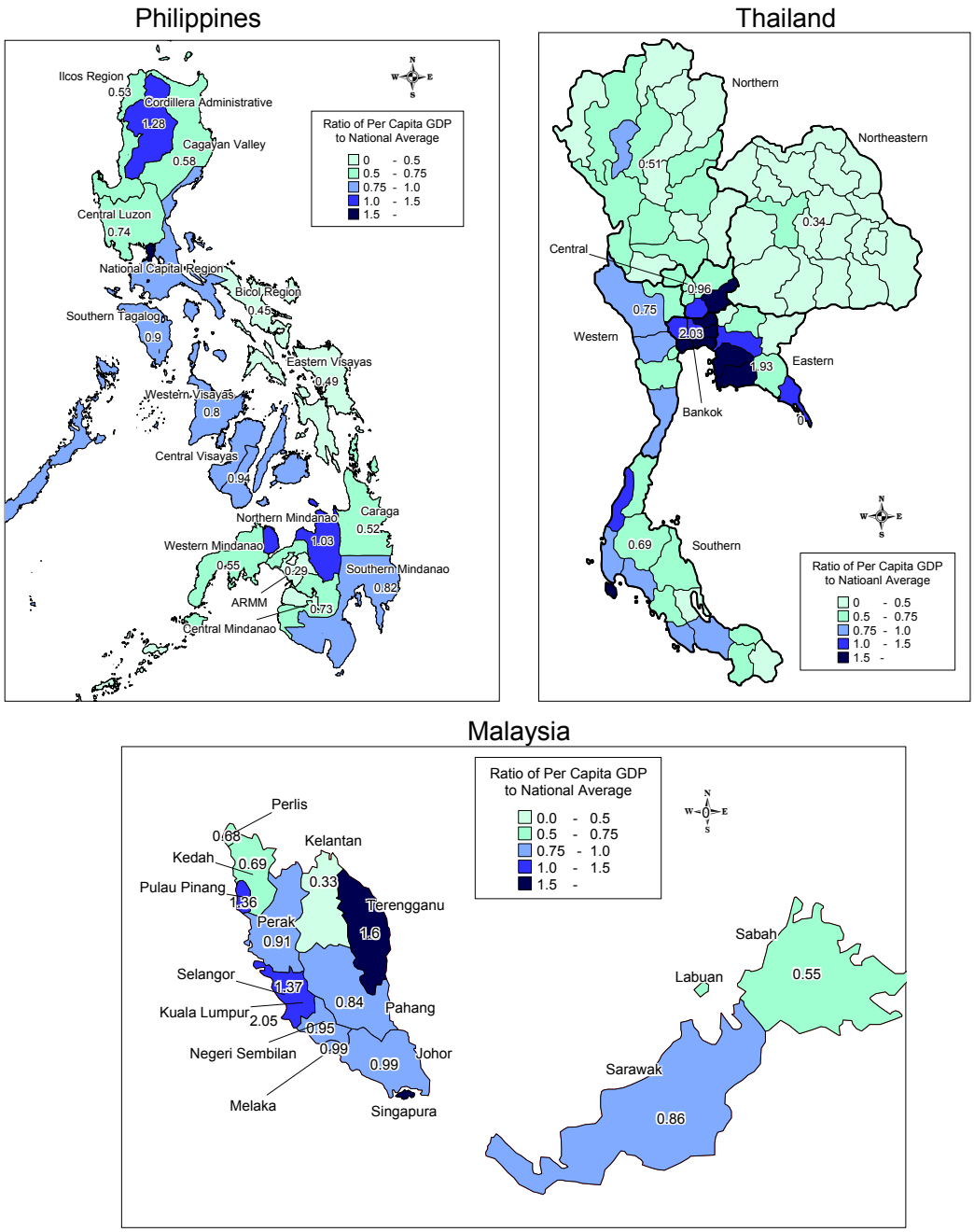
Through this scheme, pollution-creating infrastructure in developing countries will be improved. It also demonstrates that high-efficiency infrastructure also attracts private investment. This will play a significant role in introducing a business model that includes incentives for private participation. Japan has excelled at environmental conservation technologies; thus, further technical assistance from Japan in this field is expected to be sought in the future.

Middle-income countries also face regional income disparities. Economic disparities in the poorer regions are wide and the difference between provinces in GDP per capita are; 9.6 times, 3.4 times, 7.0 times and 6.4 times, for China, the Philippines, Thailand, and Malaysia, respectively (see Figure 4.5.6). Poor regions are increasingly left behind because their poorly developed infrastructure drive away private investors to more advanced regions. Moreover, pro-growth economies tend to concentrate infrastructure investments in the urban areas. External financing of infrastructure investment in the poorest regions will enable these areas to lead themselves above the poverty line. Coupled with appropriate fiscal incentives, the combination of better infrastructure and lower wages are likely to tip the balance and attract private investors in these disadvantaged regions.

High-level technical cooperation

Countries that have reached a higher stage of development face many issues in addition to the need to bridge the infrastructure gap. Some of these issues involve the application of advanced technologies to solve problems, as previously mentioned, regarding environmental issues. More advanced analytical work is likewise needed to look at a range of issues such as the accumulated infrastructure stock; resource recycling systems; infrastructure subsectors that require the application of ITS technology; project management; fiscal, financial, and other institutional or organizational reforms; and so on. In some areas, technical partnerships or collaborations are the more suitable as a form of cooperation (see Table 4.5.2).

Figure 4.5.6 Regional Disparities among 3 Countries in Southeast Asia



Source: Data was obtained from the each country's statistical yearbook; Philippines 2002, Thailand and Malaysia 2001

Table 4.5.2 Answers to the Questionnaire

Response	Country
・Technical assistance needs to be changed to technical collaboration.	Thailand
・We request a follow-up on the operation and maintenance system developed by assistance.	Malaysia
・We need technical assistance on the integration of different railway systems and new technologies (e.g. ITS, EIA).	Malaysia
・We need technical assistance because of the difficulty in obtaining the budget for development study.	Thailand
・We need technical assistance on new technologies (e.g. ATC, etc.) and securing financial resources.	Thailand
・We need technical assistance on safety standards for infrastructure development and management.	Philippines

Source: Based on the results of the Field Interview Survey.

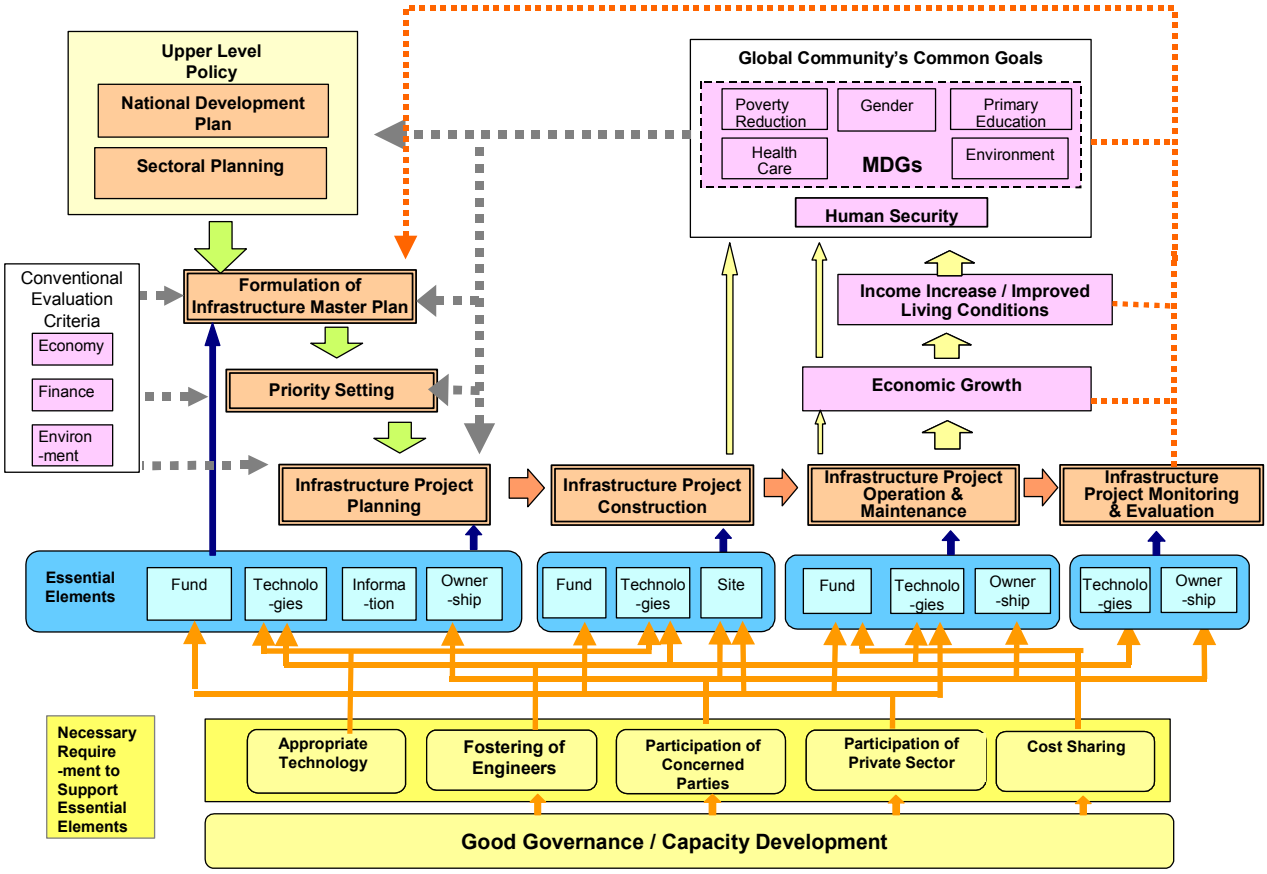
4.6 Actions by JICA

The five focal views on assistance for infrastructure development discussed in this report apply to any form of development assistance. And, in principle, JICA's actions should be based on these viewpoints. JICA should emphasize infrastructure development and its long-term perspective should be incorporated into the implementation of concrete projects. However, as widely discussed, the magnitude of the given tasks is huge. JICA's direction should be discussed in line with the orientations on infrastructure development explained earlier.

The basic framework of infrastructure is set forth in Figure 4.6.1. In order to efficiently provide infrastructure services, it is necessary to undergo through a series activities of the project cycle: upper planning (or investment programming), individual project planning, construction, operation and maintenance, monitoring and evaluation. It is necessary to develop a smooth project cycle and at the same time studying how the outcomes of infrastructure services contribute to economic growth, income increases, and improvement of people's living conditions.

Collaboration and coordination with other aid agencies are indispensable for JICA. Furthermore, it is important for JICA to pursue an integrated approach in delivering infrastructure services in order to maximize the otherwise untapped abilities in recipient countries. The approach to infrastructure assistance should benefit from the analysis of JICA's characteristics and strengths, its vast and varied human resources, knowledge of cooperation planning, formulation and design, past results and data, on-site administration and development experiences. The necessary actions for JICA based on each of the five focal views are as follows:

Figure 4.6.1 Framework for Study on Infrastructure Assistance



1) Toward "People's Infrastructure": Infrastructure Redefined

JICA is preparing to initiate a number of case studies to clarify how dormant abilities find paths to self-empowerment in a new milieu provided by project implementation. Study findings should be analyzed and pooled as common stock of knowledge for subsequent project planning and implementation.

For more effective cooperation toward infrastructure development, it is necessary to recognize that infrastructure is the foundation of activities that improve access to social services, information, etc., and that it supports the vital activities of people such as working, studying, trade, getting medical treatment, etc.

Rather than dwelling on the question whether or not to develop infrastructure, the argument should be how infrastructure can help realize goals and maximize possibilities. JICA as an agency deals with concrete projects. Therefore, it should not only study concepts but also clarify how such concepts can be applied in practical situations, and disseminate them in a proactive manner.

For instance, in Chapter 1, the role of infrastructure was discussed. Based on this discussion, it is necessary to examine more deeply how people's latent abilities were manifested and demonstrated through infrastructure development. At the same time, a cross-sectional study on the aspect of capacity development by reviewing past JICA's projects is needed.

2) Helping People Realize their Hopes: Field-level Initiative in Goal Setting

JICA has been strengthening field-level initiatives throughout the project preparation process by: picking relevant goals from accurately collected local needs; presenting to stakeholders tradeoffs between goals of the proposed project; fine-tuning forecasting methods regarding long-term social and economic prospects and technological changes (thereby allowing better decision-making on project goals and components by envisioning the long-term, pro-people outcome); and presenting an image as vividly as possible of the expected “outcomes” of project implementation so that potential clients would be able to judge wisely and rationally. In addition, technical cooperation efforts are being directed towards capacity development of counterpart personnel so that they will be more capable of and equipped to pursue agreed project goals and components.

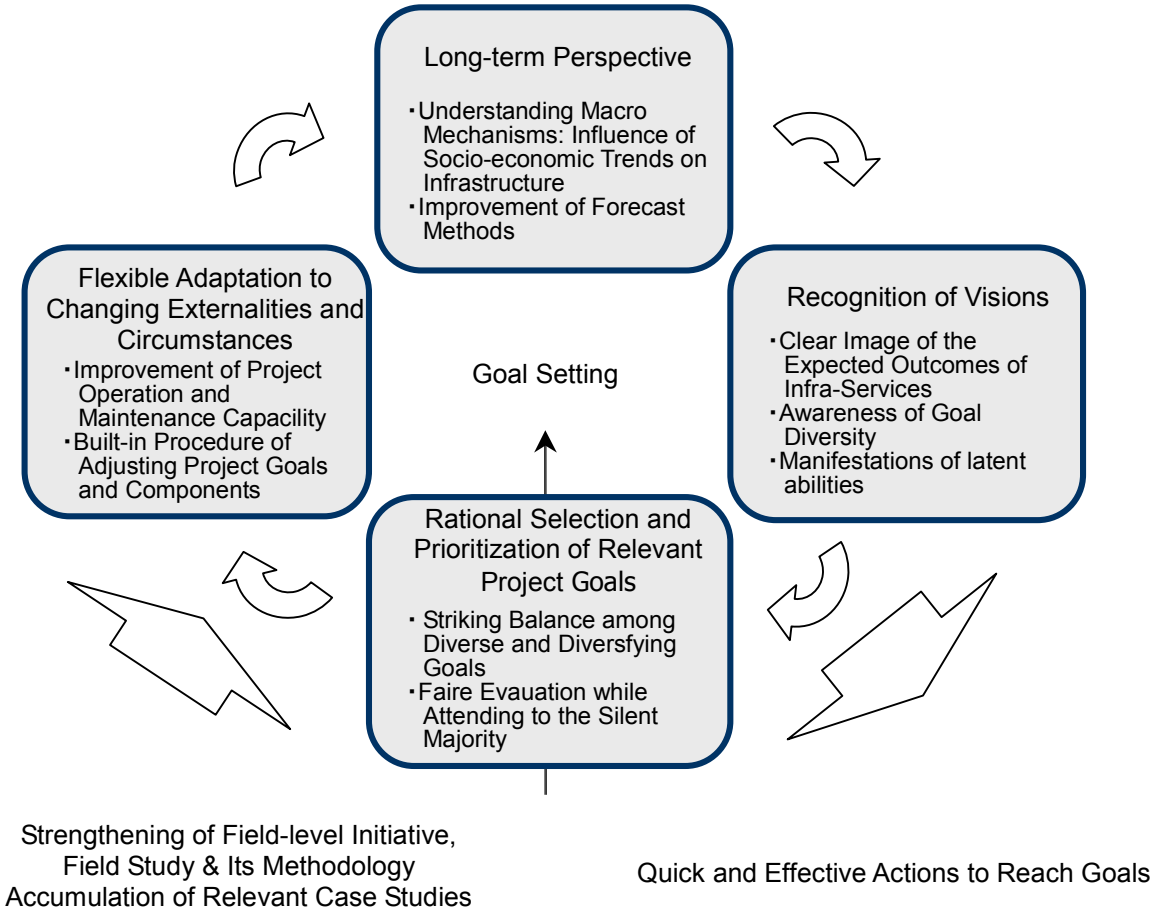
Appropriate goal setting based on the redefinition of infrastructure is vital. In order to build effective infrastructure, it is important to think how the infrastructure development and services can bring out the best in people.

Based on the redefinition of infrastructure, it is important to take prompt and accurate actions toward achieving goals while comprehensively and precisely grasping diverse local needs. This could be achieved by engendering ownership of goals the field level, by strengthening capacity, having a long-term perspective, recognizing visions, setting rational goals and adjusting project goals as needed (see Figure 4.6.2). Emphasis should be made on accuracy, appropriateness of goals, long-term perspective, and flexibility during the goal-setting process.

JICA should assist in setting appropriate goals of the infrastructure projects from the field-level point of view while enhancing the capacities accumulated from past experiences. The tradeoffs should be reviewed qualitatively and quantitatively and from various aspects such as environment and development, central and local governments, cost and benefits, etc.

To enable stakeholders to make appropriate and rational judgments, they should be presented with complete information on project scope, methodology, sites, and other specifications. The information should be offered in more quantitative fashion, using accumulated analytical methods and resources, statistics, and even raw data.

Figure 4.6.2 Goal Setting for Pro-People Infrastructure Development



Accuracy: Who is looking for what kind of conditions?

- Visualize the accomplished conditions (in a state that possibilities were manifested) and lay out the expected outcome.

Suitability and appropriateness: Select goals based on the understood needs

- Prioritize the diversified goals.
  It is necessary to have stakeholders make judgment based on the available resources for making rational judgment (e.g. within the tradeoffs, within the restriction of resources).
- Put stakeholders' opinions together (including that of the silent majority).

Long-term perspective: Take the long life of physical structures into consideration

- Pay attention to the influence of socio-economic trends on infrastructures.

Flexible adjustment: adjust project goals in a timely manner when needed

- Understand the changing external conditions and circumstances and reflect on the project goals through continuous assessment.

Long-term, prospective issues such as economic climates, energy allocation movements, debt service to international financial institutions, etc are widely discussed. However, a comprehensive analysis of infrastructure climates has yet to be conducted. The understanding of these climates through the application of the discussed integrated

approaches is needed. Additionally, as in the redefinition of infrastructure, the understanding of its mechanism from the aspect of manifestations of people's latent abilities is also required.

JICA should also strengthen governance and capacity development through technical cooperation. Like infrastructure development, human resources development also requires long-term engagement.

Also required is a systematic approach in clarifying the roles expected of infrastructure from a long-term perspective. From the expectation, one needs to think of the required human resource development to be carried to be able to respond to such long-term role defined for infrastructure.

3) Fully Rewarding Service Delivery: Integrated Approach

JICA has been strengthening its capabilities to address a variety of issues and region-specific needs. It has upgraded as well the functions of its overseas offices, with clear commitment to the promotion of the integrated approach in infrastructure development in its technical cooperation agenda. Primary focus should continue to be on developing the integrated approach. With advancing globalization, JICA recognizes the mounting importance of infrastructure development across borders and should support the formation of cross-border transport development strategies in Africa, the Middle East, and Eastern Europe. Pursuing the integrated approach is even more relevant in the urban sector where the complex problems of land use, transportation, water supply and sewerage, housing, and so on are closely interlocked

JICA has also been supporting integrated rural development projects in many parts of the developing world, and it plans to fine-tune its technical contribution by devising methods that will improve the sustainability of rural projects. Concomitantly, intellectual support should be expanded and strengthened to build decision-making capabilities of key actors in rural development.

The integrated approach, as discussed in various sections, needs to have a comprehensive coverage to respond to the redefined role of infrastructure. Programs with comprehensive coverage normally requires key decisions to be made at at the policy level for eventual implementation. In order to do so, it is important to understand the capacity of decision makers and the major issues at every decision-making level. It is also necessary to provide intellectual support in developing the capacities at higher policy-making levels (see Table 4.3.1.).

JICA currently implements various technical cooperation schemes. While strengthening the linkage with other relevant agencies, JICA should promote the integrated approach that connects each scheme to each other but applies them collectively as an input to effectively address issues. The same applies to infrastructure development. As it has been reiterated, the consideration of beneficiaries' viewpoints and taking an integrated approach are necessary in maximizing the effectiveness of infrastructure services. With respect to sectoral objectives and approaches of development assistance, it is necessary to reflect them in overall assistance strategies of a particular country, similar to master plans for each country, which define the needs of the recipient countries, anticipate potential issues and specify target areas.

Regional engagements beyond the country level have already taken place such as in the Mekong region project, the ASEAN Highway project, etc. As was seen in the Middle East and the former Soviet Union, decision making may be segmented by ethnicity. Moreover, as seen in the Free Trade Agreement, cross-border initiatives become more important as globalization progresses. JICA has been formulating a number of national level infrastructure development strategies for transport, water resources, etc. It is necessary to strengthen the capacities to respond to cross-border infrastructure by applying accumulated knowledge from past experiences. Currently, integrated infrastructure development projects for metropolitan cities (e.g. urban planning, transportation, water and sewage, solid waste management, etc.), are yet to be sufficiently implemented because they require huge amounts of resources for study, planning, and implementation, and also because such projects require long-term commitment. JICA is one of the few institutions that can address such metropolitan projects and therefore should continue and intensify its assistance to urban environmental development programs.

Importance will be placed on infrastructure assistance at the community level where direct impact on social and human development like poverty reduction can be made. To attract investment in infrastructure, it is important to review and improve on the current studies on infrastructure development, and to enhance planning capacities. It is also necessary to clarify to communities the importance of infrastructure but that the communities need to share in the cost of the construction and maintenance of infrastructure facilities

The future will increasingly bring more challenging conditions. This highlights the importance of good decision-making process where drastic measures are made rather than addressing them through symptomatic approaches. Decision-making requires enormous amounts of inputs (analysis, consensus-building) at each decision-making level, which can be compounded if it were to be pursued in an integrated approach. JICA's assistance in this regard will be crucial. JICA's technical assistance is expected to be quite substantive in elaborating and analyzing tradeoffs for various infrastructure option, in the development of alternative plans, in strengthening of management capacities, etc.

4) Concepts for Designing Empowerment: Pro-poor Project Designs

Pro-poor projects are scarce in the infrastructure sector and they are mostly small projects. Because nothing much is known and recorded about the possible poverty reduction impacts of large-scale economic infrastructure projects, JICA has begun to collect relevant information to better comprehend the interplay among factors that contribute to poverty reduction. It is also making joint preparations with other organizations to study design details of large infrastructure projects implemented by concessional loans.

The concept of pro-poor development has been discussed extensively with respect to infrastructure development. However, the discussion has been limited to attempts that bring direct impacts on the poor. As stated previously, it is important to re-recognize the wide and diversified roles of infrastructure and to clarify what kind of designs are required to contribute to poverty reduction.

As discussed in section 4.4, it is important to incorporate the four A's, i.e. availability, accessibility, affordability, and acceptability, into pro-poor project designs. A baseline study on poverty areas is also needed. The flow of monitoring, evaluation and feedback based on

the results of baseline studies need to be systematized in the event that projects are implemented. While increasing this type of effort, it is necessary to promote pro-poor project designs.

Although the above-mentioned approaches have already been partially adopted, the lack of baseline data prevents the comparison of the conditions before and after project implementation. JICA has accumulated records of studies and designs on large-scale infrastructures and these include more useful information that can be used as baseline data. Furthermore, the vast and extensive experience would be useful for a comprehensive analysis at the project design stage, which will contribute to better pro-poor designs.

5) For People in Asia, Africa, etc.: Reducing the Infra Gap

JICA has been increasing its technical cooperation with countries trapped in an especially large infrastructure gap, and in capacity development for better operation and maintenance of infrastructure facilities. For developing countries that have reached a higher stage of economic development, technical cooperation will focus on environmental conservation involving the application of advanced technologies. Bearing in mind the different levels of development among recipient countries, JICA will provide technical cooperation for institutional development necessary to improve capacities at attracting private investments in infrastructure, thus contributing toward the increase in infrastructure stocks. A variety of training programs are available for capacity development in infrastructure development and management, including arranging for public private partnerships. In addition, technical cooperation will be offered on the fiscal system development to increase public sector financing for infrastructure development.

JICA will assist in narrowing the significant infrastructure gaps found in Africa and some countries in Asia.

In the developing world, some 200 to 250 billion dollars is required annually for infrastructure investment (new construction). Since ODA can finance only 10% of this significant amount, and the annual private investment in infrastructure has dramatically dropped to approximately 60 billion dollars, it is necessary to break the vicious cycle of under-investment in infrastructure.

In principle, developing countries need to secure public funding through economic growth. They also need to pursue the collection of minimum fees based on the principle of imposing cost sharing on beneficiaries, or on responsible parties, capacity building as well as improvement of governance. Also important is the adoption of business models with new incentives to attract private sector participation, in addition to the introduction and promotion of PPP schemes to increase the available funding. As part of the intellectual support to secure funding, assistance to measures that will provide catalytic effects and redistribute development benefits, as well as on cost sharing, road pricing, and capacity building, are ideal for future ODA.

It is necessary for JICA to formulate cooperation strategies that meet the need for infrastructure and related technical assistance per development stage (see Table 4.5.1). Development of economic infrastructure is one of the indispensable conditions for sustainable development. This requires development studies that formulate master plans which include institutional development to attract investment, methods to recover investment

costs, and projects utilizing the private sector. Further assistance on poverty reduction and sustainable development, regional development, distribution of benefits through cross-border infrastructure development, and coordination between grant and loan assistances should also be emphasized in future cooperation programs.

Operation and maintenance should be given adequate attention to prevent the widening of the infrastructure gap. There is growing concern because operation and maintenance is being neglected not only in countries that have large infrastructure gaps, but also in countries with relatively developed infrastructures. Efficient operation and maintenance of existing infrastructure are important for the countries and sectors that have a certain amount of economic infrastructure stocks. Such efficiency may be relied on to promote private investment. Therefore, institutional development to increase efficiency, fund procurement methods, risk management, etc., should be recommended while assisting human resource development.

Technical assistance should be provided to address issues related to the use of advanced technology, which are issues in countries that have reached a higher stage of development. Many of these countries are found in Asia, Japan's priority assistance area. Japan and JICA are expected to play big roles. Japan has accumulated technologies on natural resources and environmental management and protection because the scarcity of natural resources in the country. Its knowledge on the environment, experience with the provision of incentives, efficient infrastructure services, and so on will be useful for purposes of assisting this set of countries.

Infrastructure investments, the implementation of cost recovery measures, PPP, as well as projects by the private sector are expected in the countries that have relatively developed investment environments. Better identification of the beneficiaries of infrastructure services, clear assignment of roles, effective sharing of risks are necessary to create better investment environments. Technical cooperation should be provided to formulate better infrastructure assistance strategies, develop realistic cost recovery measures, and promote and enhance good governance.

With respect to the funding to reduce the overall infrastructure gap, the extensive use of private funds is recommended, along with measures to raise public funds particularly for lumpy investments or if financing by the private sector is not forthcoming. Nonetheless, private investments should be encouraged to complement the government resources.

On mobilizing finance for infrastructure, technical assistance will be key in building institutional development in infrastructure finance and, on human resources development, as well as on securing financial resources through other methods like public funding, taxation, etc.

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