

3.7. Information Technology Revolution and the Environment Project

Kazuo Matsushita

Project Leader

New Development Patterns Project

1. Project Theme

The Impact of the Digital (Information Technology) Revolution on the Environment

2. Background

The digital (information technology, IT) revolution currently underway is likely to accelerate further. It is characterized by the rapid growth in the use of computers, the Internet, cellular phones, electronic commerce, videoconferencing, geographic information systems, and remote-sensing, etc. Information technologies are expected to be among the fastest growing industries in the global economy in the twenty-first century. Further advances and the diffusion of information technologies have the potential to drastically change the economic and social systems of today by reducing the amounts of material and energy used by industries, shifting from the transportation of goods to transfer of information by telecommunications, increasing the volume of electronic commerce, and many other changes in societies and economies. The Asia-Pacific region is no exception in the growth of IT.

However, the question of how the digital revolution affects the environment—one of the greatest concerns for humanity in the twenty-first century—has received only limited attention to date .

What are the environmental implications of the further use of information technologies, and how will they change in the future? Information technologies and their applications may substantially reduce energy and resource consumption and lead to a decrease in greenhouse gas emissions. In addition, environmental monitoring and modeling using information technologies may help achieve better environmental management and policy choices. Yet, reverse effects exist—construction of an information technology infrastructure is energy- and resource-intensive and the environmental impacts of the production, use, and disposal of information technologies is certainly not trivial. Information technologies also accelerate overall economic activity through high-speed information access and exchange, resulting in greater impacts on the environment.

What policies should be implemented to utilize information technologies for sustainable development in the digital era? What implications do the experiences of “digitally advanced countries” like the United States and Japan present to countries in Asia and the Pacific? Answers to these questions are now urgently needed.

3. Objectives (Policy Relevance and Applications)

The central objectives of this research are to examine the present situation and future trends of the positive and negative impacts of information technologies on the environment, and to present desirable policies that make the best use of information technologies for sustainable development in the twenty-first century.

The research will be conducted through collaboration with researchers from Japan, the United States, Europe and several countries in Asia and the Pacific region. By performing in-depth analyses, evaluation, and future projections of the digital revolution in these areas, this research project aims to provide policymakers and the information and technology industries with valuable information and recommendations for their decision-making to support sustainable development. The research will put special emphasis on exploring lessons and implications for countries in Asia and the Pacific.

4. Target groups

Policy makers as well as people in the IT industries in Japan, the United States, Europe and the countries in the Asia-Pacific region are the direct targeted groups. In addition, environmental NGOs, scientists, researchers in the related fields will be invited to be involved in the research process. Research outputs will be disclosed periodically so that research will be conducted interactively.

5. Expected Policy Results

The following policy results are expected through this research.

- Promotion of the collection of estimates and data on environmental effects of the production, use, and disposal relating to information technologies, in order to clarify producer responsibility, and to reduce negative environmental impacts.
- Promotion of energy/resource saving by information technologies and their applications.
- Enhancement of the ability to gather environmental information and to promote better decision-making and environmental management by using remote sensing and GIS.
- Advancement of environmental information disclosure by the Internet, and furthering of environmentally sound activities by governments and industries.
- Advocacy of financial and technical aid to narrow the information gap between developed and developing countries.

Specific expected outputs are listed below.

- (1) Present state and future trends of IT
- (2) Estimation of energy and resource requirements to build IT infrastructure
- (3) Estimation of environmental loads by production, use and disposal of IT related instruments
- (4) Measures to reduce environmental loads by building IT infrastructure, and by production, use and disposal of IT related instruments

- (5) Identification of mechanisms to promote resource and energy saving by using IT and related systems, such as the substitution of transportation by telecommunications, telecommuting, videoconferencing, and e-commerce
- (6) Estimation of effects of resource and energy saving by IT and its system
- (7) Measures to enhance effects of resource and energy saving by IT and related system
- (8) Measures to promote use of remote-sensing by satellites and GIS in order to improve environmental management
- (9) Networking for sustainable development by using IT
- (10) Integration of IT and environmental policies
- (11) Proposals for countries in the Asia-Pacific to better use IT in order to build a sustainable society

6. Research Methodologies and Schedule

6.1 Review and analyze the current situation of IT (April 2001 – September 2001)

Preliminary survey and formation of the study group

- Interview of experts on IT for planning and implementing the project, e.g.
 - Electronics and Communication Industries
 - Government
 - Private research institutes

- Collect materials and data on the following:
 - The spread of IT: current situation and future projection of IT in Japan, USA, Europe and major Asian countries
 - Production, consumption and disposal of IT machinery
 - The environmental load by using IT machinery

- Case studies on the following themes (examples)
 - Reduction of environmental load by telecommuting, video-conferencing, and working at home
 - Environmental monitoring and modeling by means of IT
 - The world-wide growth in use of cellular phone and the Internet
 - Environmental campaign by NGO through the Internet

- Case studies by country
 - Japan
 - United States, Canada and Europe
 - Major Asian countries (Korea, Singapore, China, India, Thailand)

- Overseas studies
 - USA (information technology industries, government, research institutes, etc)

- Europe (information technology industries, government, research institute, etc)
- Major Asian countries (information technology industries, government, research institutes, etc)
- Questionnaire and Surveys
 - Information Technology industries
 - Experts

6.2 Examination of future projections and proposals. (September 2001-September 2002)

- Organize a workshop on the current situation and future projection of IT industries and their effect on environment (Fall 2001)
- Organize a workshop on the reduction of environmental load by means of IT (at the beginning 2002)
- Compile the results of case studies on themes (a report will be published in March 2002)
- Compile the results of case studies on countries (a report will be published in March 2002)
- Compile an interim report (July 2002)
- Interview targeted groups (policy makers and IT industries)

6.3 Presentation of research outcomes and policy proposals. (October 2002- March 2003)

- International symposium (Fall, 2002)
 - Present the results of case studies on themes
 - Present the results of case studies on countries
 - Discussion of policy proposals
- Publications
 - The spread of IT and its effect on environmental load (published in the report and on IGES homepage)
 - Measures to reduce environmental loads by means of IT (same as above)
 - Case studies on themes (same as above)
 - Case studies on countries (same as above)
 - “Sustainable development and IT” (a final report aimed to be published on commercial base in both Japanese and English)

7. Human Resources Inside and Outside of IGES

Inside: PL (Project Leader)

Project manager (1)
Research associates (2)
On loan researcher from a private company
Visiting researcher from abroad

Outside: Nikkei BP company

Overseas research and other institutes (to be confirmed)
World Business Council on Sustainable Development and other business and research institutes

*Cooperation from IGES signatory institutes will be expected as well.

An advisory group will be formed with experts and people from IT industries.

This project will be carried out with close collaboration with Capacity Building Project (eLearning) and Internet Global Environment Fund.

8. Cooperation with International Programmes

Collaboration with Wuppertal Institute, TERI, IISD as well as other international business and economic research institutes will be sought.

9. External Funding

IGES will apply for the “Intellectual exchange for promoting global partnership,” public advertising aid by the International Exchange Fund, Center for Global Partnership of Japan Foundation. Moreover, possible contracted study from the Ministry of Environment, the Ministry of Public Management, Home Affairs, Posts and Telecommunications or some other government agency as well as international programs will be sought.

The possibility of working with appropriate industrial organizations or international organizations will also be pursued.

Joint research will be conducted with the Nikkei BP company.