

South Asia and East Asia Workshops, “Research Agenda for IHDP-Industrial Transformation”

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South Asian Regional Workshop on Research Agenda for IHDP-IT, held during April 4-5, 1998

About IHDP-IT

The International Human Dimensions of Global Environmental Change Programme (IHDP), initiated in 1990 by the International Social Science Council, fosters research-related activities that seek to describe and understand the human role in causing global environmental change and the consequences of these changes for society. Industrial Transformation (IT) has been identified as one of the six priority research topics within IHDP. The ultimate aim of IHDP-IT is to understand the human drives and mechanisms that could enable a transformation of the industrial system towards sustainability and, in physical terms, to decouple industrial activities from their environmental impacts. On the basis of discussions held at the international workshop on IHDP-IT organized by the Institute of Environmental Studies (IVM) of the Vrije Universiteit, Amsterdam, on 20 February 1997, a draft inventory of research for IHDP-IT was compiled in May 1997, which outlines the following major research areas.

- System-analytical perspectives such as the Environmental Kuznets Curve, international mass balance research, eco-restructuring and developed-developing country interactions.
- Industrial ecology including industrial networks, eco-efficiency, life cycle analysis, greening the industry and organizational issues.
- Consumers, including consumer choice issues and the role of consumers in decision making.

These are being further discussed in a series of regional workshops in Asia, North America, Africa, Europe, etc. More details on IHDP are available on its home page at <http://www.uni-bonn.del/IHDP>

South Asian Regional Workshop on IHDP-IT

The Tata Energy Research Institute (TERI), New Delhi hosted the South Asian Regional Workshop on IHDP-IT during April 4-5, 1998 at New Delhi, India. Participants from South and South-East Asian countries as well as other parts of the world including Austria, Bangladesh, Sri Lanka, India, Japan, Mexico, Nepal, Netherlands, Pakistan, Thailand, United States of America and Vietnam took part in the workshop. The members of the International Steering Committee of IHDP were also present. The workshop aimed at (1) discussing the existing research inventory and the overall goal of IHDP research activities, (2) developing ideas, setting priorities and make proposals for a research agenda on IHDP-IT at regional level. The workshop focussed on energy (coal based) and materials to explore the issues involved and the topics for research.

The workshop was organised in two parts: in the first part, held on the first day, the concept of industrial transformation and the existing research inventory were discussed with specific focus on South Asia. In the second part, held on the second day, three working groups were formed to identify research proposals in the following three major areas identified for research focus. These were further discussed and consolidated by all the participants together and the follow up activities needed were identified at the end of the workshop. The three major areas identified in the workshop for research focus are as follows.

- (i) Analysing energy and materials flow
- (ii) Transforming rural energy sector
- (iii) Transport sector changes for improved air quality

Energy and material flows

The use of materials and energy undoubtedly has economic origins and environmental consequences. The consumption of materials and energy is therefore an important interface between the economy and the environment and analysis of the patterns, causes and effects of materials and energy consumption have gained considerable importance in environmental economics. The changing consumption patterns will have a strong bearing on technologies. Also, the technological changes will have an increasingly higher effect on the energy consumption patterns, and material flows. Coal being the predominant source of energy in Asia, is of major attention for analysing the technological and consumption trends so as to enable the assessment of associated adverse impacts to the human community. Important topics identified for undertaking studies are:

Coal:

- Assessment of coal based combustion technologies
- Determination of demand for electricity
- Efficiency of use of electricity (demand side management - DSM)
- Institutional mechanisms for innovation and technology adoption
- Restructuring the power sector

Materials flow:

- To study the flow of materials and recycling aspects of steel, cement, plastic, and pulp & paper.

Transforming rural energy sector

Energy use and decentralised industrial production in the rural areas of South Asian countries have important implications for the environment and human welfare. In the new millennium new technologies and means of production that will enable decentralized industrial production and environment friendly rural energy generation are likely to develop. The traditional stark distinction between rural and urban areas, may get blurred. Hitherto, the synergies between decentralized rural production and dissemination of renewable energy technologies have not been explicitly studied. In particular, the human dimensions of facilitating decentralized rural production and disseminating renewable energy technologies in rural areas need to be examined carefully. The proposed studies include:

- The needs of people living in rural areas that decentralized rural production and renewable energy technology dissemination can help meet;
- Rural entrepreneurship for industries and technologies which would be a part of decentralized rural production; and
- The perceptions, practices, and skills of the implementers of programmes aiming to foster renewable energy and decentralized production programmes (their perceptions of user needs, skills, practices etc). This study should shed light on the capacity building requirements in this area, and the kinds of information that should flow from users to implementers, and from implementers to users.

Transport sector changes for improved air quality

Environmental impacts of the transport sector, especially in urban areas are causing serious concern owing to their significant (more than half) contribution to urban air pollution. The Asian cities are no exception, with the increasing demand for transportation and bad quality of fuels being coupled with poor vehicle technology/conditions and poor road conditions. The problem of urban air pollution and adverse human health impacts have already reached alarming proportions, which are essentially calling for concerted efforts to reduce urban air pollution from the transport sector. Clearly, “cleaner urban air” is the emphasis of such efforts. Therefore, studies that need to be undertaken in this direction are identified as given below.

- Technological development trends in vehicles and future scenarios to reduce urban air pollution and effect of alternative fuels
- Travel demand management strategies for cities (specific cases) – consider options of alternative modes of transport (including public transport systems), with improved fuel quality and alternative fuel usage also
- Effect of pricing and economic incentives (for transport sector) on reducing urban air pollution
- Role of improvement of roads and their conditions in improving transport services and urban environment.

At present, TERI is coordinating further elaboration of the identified research topics into pre-proposals for undertaking research studies.

Further information

For information regarding IHDP-IT activities at TERI, please visit its home page at <http://www.teriin.org>. For more details, Dr. R. K. Pachauri, Director, TERI (e-mail: pachauri@teri.res.in) may be contacted.

Report on the IHDP-IT Regional Workshop East Asia Kita-Kyushu, Japan June 24-25, 1998

Preface

This particular workshop was organized as the third one in a series of eight IHDP-IT regional workshops to develop a Science Plan on IHDP-IT. The workshop focused on the region of East Asia, primarily Japan. Aim of the meeting was to discuss IT research framework and to identify potential core projects that should be implemented at both the regional and the global level, while existing major research activities within the region concerning IT were presented and discussed as well. The results of the Workshop will serve as an input for the Open Science Meeting on IHDP-IT to be held in Amsterdam, February 25-26, 1999. The Open Science meeting is the starting point of a series of internationally co-ordinated projects aimed at better understanding of Industrial Transformation.

Since this Workshop was the first of its kind on Industrial Transformation research for Japan / East Asian Region, experts from within the three distinguished fields of IT as identified from major institutions and academia got successfully together for the first time bringing together different ideas about IT. Discussions of all five consecutive Sessions covered, therefore, a wide variety of aspects of IT research activities within the East-Asian Region and a number of topics for future IT research core projects. Out of these discussions several ideas and topics for potential core projects emerged and as a result there were some preliminary discussions on the criteria for identification of IHDP-IT core projects.

The workshop was held in Kita-Kyushu with the patronage of the City of Kita-Kyushu and the Institute for Global Environmental Strategies, Japan (IGES). The meeting took place jointly with the IGES-UE (Urbanization and Environment) Project Meeting held on June 23rd and the Joint Open Meeting held on June 24th. We would like to express our sincere thanks to the City of Kita-Kyushu, IGES, APN and START for their financial assistance.

Sukehiro Gotoh
Co-chair, Steering Committee
IHDP-IT East Asian Workshop

Report of the Meeting

About the meeting

The East-Asia Regional Workshop of IHDP-Industrial Transformation was held on June 24-25, 1998 in Kita-Kyushu, under the auspices of IGES (Institute of Global Environmental Strategies, Japan) and the City of Kita-Kyushu. The number of formally invited participants with different expertises was 38, mainly from Japan and other (South) East-Asian countries. In addition, the workshop was attended by more than 20 observers interested in IT research activities. The list of participants is attached to this report as Annex 2.

The main goal of the Workshop was, as shown in the subtitle of the program, to propose and develop a research agenda for potential IHDP-IT core projects. The Workshop was designed and organized to have 5 consecutive Sessions: an introductory Session in order to ensure a common understanding among the participants about the IT research framework, 3 central Sessions corresponding with the three distinguished IT research fields in order to present and discuss major existing research activities in Japan and East Asia, and a final Session to summarise the workshop discussions and to draw conclusions. See Annex 1 for the program of the meeting.

Introduction- Towards a Research Agenda for Core Projects

In the Introductory Session, two keynote lectures were given. Prof. Pier Vellinga, Chair of the IHDP-IT Scientific Planning Committee (SPC), provided the participants background information about the IHDP-IT research framework, the overall aim of Industrial Transformation research, and the tentative research framework for developing a research agenda. In his keynote speech, it was emphasised that the main task expected for this and other Regional Workshops is to propose and develop research ideas or topics for potential IT core projects, while discussing and considering the directions of current research activities. Prof. Robert H. Socolow, a distinguished member of the IHDP-IT SPC, was the second keynote speaker. In his speech entitled “The hard work ahead to understand materials flows and their consequences”, he presented, building on his experience, a few examples of analysing the cycles of lead, carbon and nitrogen and he demonstrated that these research examples, by using the approach incorporating the three-part analysis as distinguished within the IHDP-IT research framework, could be seen as typical research core projects.

In view of the fact that this Workshop was the third to take place in a series of eight Regional Workshops planned and organized by the IHDP-IT SPC since its first meeting in February 1998, the results of discussions of the earlier two workshops, namely, the Eastern-European one (held at IIASA, Vienna, March 1998) and the South-Asian one (held at TERI, New Delhi, April 1998) were reported. The Eastern-Europe workshop was reported in a draft written form. The New Delhi workshop organized by Prof. R. Pachauri of TERI was clearly summarised and reported by Dr. L. Srivastava of the Institute, who participated in this workshop in lieu of Prof. Pachauri. Furthermore, on behalf of the Steering Committee responsible for this particular Workshop, Prof. Imura and Dr. Gotoh introduced two research ideas, anticipating that they could serve as a starting point for potential core projects to be discussed in the following Sessions. The first idea is about a comparative study of industrialised/industrialising areas in East Asia, the second one is about implementing an Extended Producer Responsibility (EPR) regime for reducing residuals of consumer/industrial products, such as packaging, consumer electronic/electric appliances, etc.

Session II to IV of the Workshop dealt with IT's 3 distinguished research fields: Macro-Systems/Incentive Structure, Production System, and Consumption System. In each Session, major research activities or on-going projects were presented. Followed by discussions on the questions how those existing research projects could be developed into potential IT research core projects.

Macro systems and incentive structure

Session II (Macro-Systems & Incentive Structure) was chaired by Prof. Dr. Tongroj Onchan, while 4 speakers gave a presentation on their research work. First, Dr. Y.

Moriguchi, NIES, presented the results of resource flow analysis of four industrialised countries (Japan, U.S., The Netherlands and Germany) which was conducted within an international project by four research institutes of the countries involved. This is a macro material flow analysis in which in addition to the direct material input a hidden material flow (rucksack) is considered. Dr. Moriguchi expressed his wish, based on the results, to extend the same type of analysis from input to economic throughput and output the second presentation was given by Prof. Y. Washizu, Waseda University, who spoke instead of Prof. K. Yoshioka, Keio University. He introduced the work of their research group. Analysis of an extended Input/Output Table of 1990 showed that only the environmental impacts, in terms of CO₂ emissions, from production sectors with technological innovation was significantly reduced through a change in the related consumption sectors. This presentation represented the work of several research groups in Japan which are involved with the quantification and analysis of intersectoral transfer of environmental impacts, based on the Material I/O Table. The third speaker, Dr. H. S. Jeong, KEI, presented the Korean experience with the use of various economic incentives as a policy tool. To enable a transformation of the current industrial society toward a more sustainable one the OECD recommended in 1991 to enhance the use of economic instruments. Based on the Korean experience with the use of product charges, deposit-refund systems, volume-based waste collection charges, etc., Dr. Jeong clarified a set of conditions required for a successful application of economic instruments. Prof. Dr. S. Nakamura, the final speaker of this Session, paid attention to the waste flows in I/O Table analysis and demonstrated from this analysis that emissions including waste materials could be estimated through the technology matrix by the people's lifestyle. As an illustration a case study of the city of Hokkaido was presented.

After the four presentations of important research activities within this particular field, discussions were urged by Dr. Onchan in terms of IT's overall research directions and core project topics. Several questions and answers continued on the presentations, particularly on the dynamic aspect of I/O Table analysis by Dr. D. H. Cho. Another topic that was discussed concerned a proposal by Prof. M. Soerjani, Indonesia NRC to use 5R's (Refuse, Reconsider, Reuse/Repair, Recycle, and Respect) as an incentives structure for IT toward sustainability in Asian communities. He stressed that people should benefit from sustainable development in order to realise it. Prof. Dr. P. Shi, Beijing Normal University proposed a comparative study of industrial transformation of Shenzhen and Beijing as a topic for a research core project. However, during the discussion it was decided that this proposal was less suitable to develop under the umbrella of IHDP-IT because of a lack of potential international collaboration. Chairman Onchan concluded that the Session was stimulating though too short to discuss the topics for potential core projects in detail.

Production system (industrial ecology and organisational aspects)

The whole morning of the second day was devoted to Session III (Production System) which was chaired by Prof. Dr. Robert H. Socolow. In this field, 5 presentations were given on existing research projects and other activities. The first speaker, Prof. R. Yamamoto, talked about the most recent 2 to 6 times improvement of eco-efficiency measured in his eco-design vector space in product development within different sectors in Japan, based on LCA. Eco-labelling study is badly needed here and, to his opinion, the whole research on IT should be accelerated to achieve a substantial level of sustainability by 2020. Dr. E. Welch, Syracuse University, the second speaker, presented an organisational approach in IT research to materials (flow) management in the industrial society. In order to improve the overall societal eco-efficiency by closing the material loop,

for example, an organisation will undergo four kinds of solutions: birth, change, linkage, and death for its own *raison-de-etre*. He also mentioned that these solutions offer ramifications on organisations to collect, refine, and reprocess the materials, and that they will have many policy implications. The third presentation was given by Prof. Dr. T. Morioka, Osaka University. He presented the JST funded research project “Recycle-oriented Societal Complex systems”, of which he is the leader. They selected three so-called societal experimental sites including an eco-industrial park. He explained mainly the third site which was the Osaka business districts where alternative urban renewal scenarios, involving construction and other sectors, are evaluated. Prof. M. Suzuki of Tokyo University, at this moment Vice Rector at UNU, was the fourth speaker. He is the co-ordinator and leader of the famous MESSC funded “Zero Emissions Research Project”, in which more than 70 university professors of different disciplines participate. Based on the fact that Japan knows the highest density of industrial activity per unit area among industrialised nations, a number of research efforts for eco-restructuring of industries are integrated in this project. The final presentation was given by Prof. Dr. Y. Baba, Tokyo University. He introduced international comparative studies on corporate environmental strategy under competitiveness.

The above mentioned presentations were devoted to the development of research activities within the distinguished research field ‘production system’ (industrial ecology and organisational aspects). During the discussion, in addition to the questions and responses continuing on the presentations, a wide variety of views on the interaction between society and technology were exchanged. For example, Prof. Dr. I. Yasui insisted that some practitioner’s ethics should be reflected properly in LCA studies, particularly in the impact assessment step, and the criterion should be based on human fatality which is closely connected to risk assessment. Prof. K. Gonda, Tokai University, talked about a paradigm shift in scientific progress and technological development based on the nature of science and technology as it can be seen from two cross axial points: public/private and economic/non-economic. Focusing on potential IT core projects, Prof. Vellinga, proposed two research ideas. The first one refers to actual processes of industrial transformation in certain industrial sectors, for example, oil companies which transform themselves into renewable energy companies. A comparative analysis of these transformations could be an interesting core project. The second idea is to study the transformation processes within steel companies which have made environmental efforts, including Welch’s organisational point of view. Prof. Suzuki emphasised that, particularly in Japan with his highest activity density, no ‘real’ economic growth exists, in terms of sustainable development. Therefore recycling technology based on local attributes will be the most important issue with respect to eco-restructuring and should therefore be reflected in IT research. It is important in this context to set a long-range goal, i.e., where we are heading for and how we get there. In his own view, a zero emission society is the goal to be attained, and IT research will play an important role in achieving this goal.

Consumption system (consumers choice and sustainable consumption)

Consumption system was discussed in Session IV, chaired by Dir. K. Seiki, JISPRI. Ms. T. Katsuragawa presented findings on consumer’s environmental awareness and behaviours and corporate strategies based on the latest survey which were commissioned from NIES. This was a summary of a questionnaire survey held during the past 3 years among Japanese and German consumers and Japanese firms. From several comparative analyses between Japanese and German consumers it could be concluded that differences exist in the relationship between awareness and actions. Mr. H. Sakamaki, an executive officer of

large opto-electronics company, talked about the green procurement practices and the role of a firm as a consumer. Manufacturing firms do not only purchase a wide spectrum of materials, parts, products and services needed for their own production. He elaborated on his company's practices of green procurement: how it started, under what management policy and/or principles it was programmed and how it was being operated. Other topics presented in this Session include the results of a preliminary survey conducted by Peking University as commissioned from NIES on the environmental awareness of Chinese people. Dr. Jianxin Li reported that, from samples of rural, town and city (Beijing) populations, a large fraction of people rank environmental issues relatively important, consider investment by the government and enterprises, and need voluntary actions of their own. During the discussion Prof. Y. Arayama, Nagoya University, mentioned that as far as China's IT is concerned three important factors are to be considered: the organisational system called "unit", the corporate fiscal situation, and the growth rate of export industries. Furthermore, China's industrial policy included the closure of certain state corporate's factories that are heavily polluting. Prof. H. Takatsuki, Kyoto University, showed from his calorific analysis, that in the current consumption system, particularly for food consumption, a considerable amount of energy is consumed for packaging and other related processes. He also indicated that environmental awareness of the Japanese consumers is not necessarily connected to their conservation actions. In this regard, Ms. Katsuragawa responded that the information concerning the environmental impacts of goods and products should be much more effectively disseminated to the consumer. Mr. Sakamaki, as a corporate manager, shared this view with Ms. Katsuragawa, but emphasised the importance of consumer education in every possible way.

Conclusion - Workshop summary and proposals for research activities

Session V was the wrap-up session of the Workshop, chaired by Prof. Vellinga, in which summaries of the proceeding 3 Sessions were given and concluding discussions were made.

Prof. Onchan summarised his Session on Macro-systems/Incentive Structure by stating that the Korean experience on the use of economic instruments is of value to be shared by other countries. He also mentioned Prof. Nakamura's analysis in which he showed for the first time that people's life style is clearly connected to macro I/O Table analysis, of particular importance. In addition, Chair Onchan made two recommendations with respect to the criteria for potential IT core projects: first, a core project should start at a small scale and develop by involving additional elements, secondly, the size of the industry studied should be considered as a key factor for IT research, as, for example, in Thailand 90 percent of environmental problems are said to have been caused by SMEs.

Prof. Socolow, reviewing his Session on Production System as well as other Sessions said that he was impressed by all the research activities presented and the careful way in which they are planned and conducted. Particularly, Prof. Suzuki's insight into the concept of industrial activity density as an indicator is important with respect to decoupling industrial activities from their environmental impacts. Other important presentations were given by Dr. Welch and Prof. Baba on organisational aspects. He agreed with Prof. Yamamoto that IT research is of high relevance to achieve a substantial level of sustainability and stressed that we need to be bold and incremental with respect to IT research and core projects.

Prof. Socolow suggested that core projects should be multi-country, unusual, and with a good sense of solutions to the question "where is the world really stuck?". Some topics such like urban air quality, transboundary movements of industrial residuals between

North and South and food production, could be considered as core projects.

Dir. Seiki, reviewing the Session on Consumption, said that information dissemination and the role of media are the most important issues in order to raise people's environmental awareness, as was stressed by Ms. Katsuragawa, Prof. Nakahara and Prof. Takatsuki. In addition he suggested, based on his participation in the South Asia Workshop, a few criteria for developing core projects: they should be multi-national, interdisciplinary and unique.

Prof. Vellinga, Chair of this session, urged the discussions primarily on the criteria for IT core projects in order to achieve some consensus among the participants. Different views and ideas including the ones from observers were summarised into 6 preliminary criteria: (1) participation of more than two countries, (2) inter-/multi-disciplinary, (3) new, (4) addressing a global environmental issue, (5) problem-solving, and (6) communicable to lay people. From these criteria, possible projects other than the ones already mentioned include: trade and environment, rural development, decentralised energy system, efficient resource use, etc. In connection to the discussion on the criteria, Dr. Jeong and Prof. Onchan asked whether the IT research community could do anything about the Current Asian economic crisis which has much impact on environment and industrial activities. It was concluded that in principle research cannot deal with short-term economic ups and downs because of the long-time frame required for research.

Finally, Prof. Imura presented a revised research idea for a core project, taking into consideration the discussion on the criteria. However, it was asked whether this proposal should be an IHDP-IT core project, as the research is already well based on one of the IGES Projects. Another research idea for a core project, which was proposed by Dr. Gotoh, on the residuals cut through EPR's take-back programs, could be reformulated to become a global core project. With respect to the latter proposal, it was not clear yet who should be the leading institution. The Workshop was concluded by the submission of another core proposal about a new strategy for rural industrialisation.