

# **Asian Transitions and Globalisation:**

## **Towards an Analytical Framework**

Workshop report

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## **Introduction**

Industrial Transformation (IT) is a core project of the International Human Dimensions Programme on Global Environmental Change (IHDP). It was launched in 1999 together with publication of the IT Science Plan (Vellinga and Herb, 1999) with the challenging goal of improving the understanding of the ways in which society could combine economic and social development with the reduction of pressure on the environment. The scientific agenda of the IHDP IT has been built around a number of research questions in the fields of: energy and material flows; food; cities with focus of water and transportation; information and communication; governance and transformation processes.

Industrial Transformation research starts with the notion that changes in technologies — put differently, changes in the ways in which humans use environmental resources and services — are embedded in the socio-economic realm and modify the natural environment. This embraces processes and products, production and consumption chains and distribution and disposal activities. IT research is also interested in the institutions and incentives that shape these systems (i.e. property, liability, regulations), and how these situate and influence social actors (government, producers, and consumers). In thinking about how these systems might change, IT is concerned with the interaction of innovation by economic and social actors with processes of change at a higher level in socio-technical systems of provision (energy systems, mobility systems, food and nutrition systems and so on). IT is interested not only in identifying alternatives, but also in seeking to understand how broad-scale change in systems that are relevant for global environment may occur and be steered over the longer-term future (Olsthoorn and Wieczorek, 2006).

There have been several reasons why it was timely to consider a workshop on the relationships between sustainability transitions and globalisation. First, transitions have become a major theme in scientific and policy debates about sustainable development in Europe, emphasising the role of socio-technical innovation across production and consumption systems. This debate has focused on long-term changes across different scales from local to global, including changes in technology, institutions and behaviour. Major scientific contribution in this field came from the research work of the Dutch Knowledge Network on System Innovation (KSI [www.ksinetwork.nl](http://www.ksinetwork.nl)) that has co-sponsored the meeting. Second, there is a need to connect these ‘western’ debates about transitions and sustainability with current understandings of processes of social, political and economic development in other parts of the world. Given the transformative changes are most manifested in the rapidly urbanising and developing Asia, this part of the world appeared particularly challenging: A characteristic feature of much of the current Asian policies and research linked to technology, industry and sustainability - relates to product-process innovation and to the question of how to achieve near-term improvements in energy-, resource- and pollution-intensities through the adoption of best available technologies. The achievement of higher-level environmental and sustainability targets - including low-carbon or less resource-intensive development pathways – has attracted less attention, partly because these economies are still relatively less resource-intensive per capita than most industrialised economies. Nevertheless, policymakers and a community of scholars in Asia have become increasingly interested in alternative development pathways that integrate sustainability objectives.

This workshop, responding to the need of developing appropriate research and policy frameworks for the region brought two scientific communities together: one concerned with system innovation and the other concerned with economics of technological development in Asia. The workshop, next to stimulating the dialog and supporting the creation of a network of researchers and practitioners interested in an Industrial Transformation of Asia, provided a platform for development of a meta-

study. This document reports on the discussions that took place during this meeting in Chiang Mai on 6-7 July 2006.

## **Acknowledgements**

We would like to use this opportunity and acknowledge support and work of people and institutions that helped organise the process. First of all we would like to thank the KSI for their financial and scientific contributions to the meeting and its preparations. Secondly, a sincere thank to the host and local organiser: USER Unit of the Chiang Mai University, particularly Louis Lebel and his staff who made sure that the workshop participants had luxurious conditions for scientific exchange. Last but not least – thank you to all participants who accepted our invitation and took active part in the debate over the two days.

## **Opening**

Louis Lebel, director of USER, Chiang Mai University, welcomed all participants of the workshop to Chiang Mai. He mentioned that so far IT and USER have never cooperated formally. The workshop is an opportunity to make a link and it brings together a number of interesting and respected people.

In his introduction, Louis touched upon the theme of what he called uncomfortable transitions. Uncomfortable for a number of reasons, which he put down in a set of questions:

- How change in this region can be different?
- How much longer will the globalisation and urban industrial growth nexus last? Answer to this question makes a difference on how we think of transitions, namely forces might “close down” the window of opportunity.
- What are the big uncertainties – the analytical framework we are about to develop needs to get account of them?
- Does connectedness help transition or does it hinder it? (And who will remain unconnected?)
- When we speak of Asia as a region – does it limit the transitions that are possible (intellectual limit, or practical/political one)? Shouldn't we rather talk about separate countries: currently 3 groups of countries are distinguished in Asia: East, South East and South Asia.
- For whom are transitions pursued? Who is the transitioner? Who has to change? Who are the actors?
- Knowledge and action: Can social innovation be fostered? What can practice teach? Who should be teaching whom (i.e. European countries who have their green technologies right)? (“sufficiency” principles of economy?)
- Are (should) ecosystem changes (be) coupled to social and technical change in transitions? (Is there really ecosystem co-evolution?)
- Will sustainability transitions be: fair, fun and comfortable?

## **Tour de table**

The workshop brought about 30 participants coming from two scientific communities: one based largely in Europe and North America with expertise on technological change, systems of innovation, “transitions”, and the other, a group of experts working on industrial change, globalization and sustainability across Asia. See the appended list of participants for details.

## **Industrial Transformation research**

Frans Berkhout, chair of the IT Scientific Steering Committee (SSC) presented the Industrial Transformation research framework and the origins of this workshop. He started by distinguishing two periods in the history of IT: for the first five years IT was defining the field and creating research community; second period is marked by a coordination of research on emerging issues, transitions and globalisation in Asia being the first. He also stressed that this initiative should be seen as a support to two processes: (i) the renewal of the research agenda for IT and the research community working on the issues as well as to (ii) the effort of the IT office to test the research findings of the KSI network in international contexts.

He mentioned that IT SSC planned this workshop as issue-based and trying to answer a question of whether we can link two areas of interest: technology and socio-technical change with the development studies. He proposed the objective of the workshop to be threefold:

- To bring these two communities together;
- To conduct a metastudy - a significant output in the form of a book or a set of papers in a peer reviewed international journal around general question of socio-technical transitions and globalisation in the Asian context;
- To give ground for defining a research agenda in this field.

Frans reminded that input to this workshop has been a short document on “Transitions and Globalisation” presenting current developments in the two fields but without making suggestions on possible links and implications for the Asian research framework. Participants have been asked to use this background information to identify 3 most relevant to their opinion issues that need to be discussed at a workshop. The reactions helped to create the agenda of the meeting and served as starting point for discussion.

The workshop and the whole process had an open structure; the metastudy – scientific output of the process is also open to a wide participation of those who were interested. The workshop has been planned as a ‘working session’ to generate good ideas around next generation research – rather than to present the results of work done to date. The implication for its set up was that there were no paper presentations scheduled.

## **Why developing Asia?**

David Angel, member of the IT SSC, in his introductory lecture explained why we are interested in this region. He said that we focus on sustainability transitions. He referred to the background paper, which gave some general thoughts and initial issues to think of transitions in Asia. David repeated that if we talk about transitions we mean long-term, large scale changes in the human environment interactions. Furthermore, transitions have a system aspect: socio-cultural, institutional dimensions as well as technological change are involved in meeting human needs such as housing, mobility, food, etc. Metrics include energy and materials intensity of economic activity (extending beyond manufacturing of goods). An interesting question is whether it is possible to influence the change as it happens and not like in the US to reconstruct and reconfigure the industrial infrastructure. What is missing in the Asian context is a framework and an empirical research programme that allows studying transitions and longer term changes esp. in the Asian context.

Why developing Asia as an empirical context for studying sustainability transitions?

- It is because of the scale and rate of urban development and industrial growth and their profound implications for environmental quality and resources locally, regionally and globally, which make Asia central to sustainable development on a global scale.
- It is because developing Asia is in the midst of a massive urban-industrial transition that in absolute terms of urban population growth and scale of economic activity is historically unprecedented. There is an unpredicted prospect of energy use growth in the emerging Asia as a result of growing GDP while we would rather like to see the decoupling of GDP growth from the energy use.
- It is because this transition in Asia is occurring within a distinctive period of economic globalization, which constitutes, along with rapid urban-industrial growth, a profound force for system change within the region.

A basic research question is about the significance of these transformational forces of industrial-urban growth and economic globalization for global transitions to more sustainable production and consumption systems. How might the current period of industrial transformation in Asia be harnessed towards more sustainable development pathways? We intended in this workshop to bring together current conceptual ideas about transitions – drawing upon other historical experience – with an understanding of the specific development dynamics of industrializing Asian economies.

What is useful in theorising transitions towards sustainability is to think of a number of other transitions taking place in Asia in the context of globalisation such as e.g.: democracy development or governance changes, changing roles of actors (states, NGOs) and new relations between these segments (different for various countries). It is now widely asserted that ‘institutions’ have been key to the success achieved in East Asia in promoting poverty reducing economic growth and building technological capability within firms, industries and regional economies. The relevant institutional conditions range from fundamental starting conditions for industrial-environmental capabilities building (such as political stability, rule of law, and control of corruption), effectiveness of government institutions in carrying out policies, availability of information around technology choices, policy availability and the like, to the degree to which development options are structured by international agreements. To these institutional concerns related directly to economic development, we must also add government and public understanding of environmental concerns and commitment to addressing them (from energy supply, to water availability and climate change). Therefore, an interesting question is for example whether are we looking into harnessing of the role of the state in sustainability transitions or are we looking for other forms of economies?

Some other questions that David Angel put forward as relevant for studying transitions in Asia:

- What is appropriate scale for studying transitions in Asia? – Region, country, sector?
- What scope of environmental improvement are we talking about in sustainability transition? Is 30% enough or do we need more?
- China - because of the size of its economy we need to think about its role and the change that is taking place in China.
- Is the sustainability transition required at all? Does it make sense to develop a research programme on sustainability transition that needs to take place in Asia?
- A key marker of globalization in East Asia is the emergence of a dynamic process of technological capabilities building within selected developing economies. One question before us is whether these processes of technological capabilities building can be harnessed to transitions in human-environment relations.

- What role might global production networks of transnational firms and associated knowledge and capacity building play (positively and negatively) in transition?
- What would research project under the framework of Industrial Transformation look like? And how would this project differ from the work that we do now about environmental efficiency improvement.

Possible points of entry for the analysis:

- Innovation and technological change;
- Markets and industrial structure;
- Governance and institutions;
- Consumption and behaviour.

### **Why is socio-technical framing of transitions interesting?**

Fred Steward, member of the IT SSC, in his speech argued why for him as a researcher the socio-technical phrasing of transitions is of interest. He started by saying that the prevailing socio-technical system of modern economies needs radical change for sustainability. One-sided strategies to ‘revolutionise’ ‘consumption’ (social) or ‘production’ (technology) appear politically or economically unfeasible. At the same time ‘realistic’ incremental strategies deliver too little. Is there an alternative and could system innovation approach be one? At least part of its claim is to provide an alternative to embrace both consumption and production; social and technical change. Its promise of satisfaction and sustainability appears attractive for policy and business arenas. Parallel themes confront regions/nations pursuing paths of economic and technological modernisation.

To illustrate long-term radical changes, Fred called upon a number of historical examples of how we dramatically changed our ways of doing things. Those included changes such as from: sail based –to steam based intercontinental transport, horse to automobile domestic mobility; home base to city grid sanitation; note-pad to PC information. He argued that now when we are faced with a lock-in of specific technologies – we can look at these examples and can get hold of some patterns such as e.g. the dynamics of transformative innovation and search guidance as to possible point of intervention. We see that radical change is systemic in nature, takes time, embraces technological AND social innovation, involves diversity of actors – on both the production AND consumption side and disrupts social arrangements.

Some interesting visualisations include:

- The way we think of the prevailing regimes: the multifactor network involved in the socio-technical regime.
- The way in which the change can take place by disrupting and reconfiguring socio-technical regimes: a dynamic multilevel perspective on IT.

The merits of the transition approach is that it conceptualises innovation in relation to a prevailing domain of socio-technical practice in contrast to technologies or sectors – far too narrow a vision; it embraces the complexity of systems and a diversity of actors; focuses on radical reconfigurations over periods of several decades and recognises a variety of transition paths not only the substitution model. This approach by introducing a meso level focus (that reveals situated socio-technical paths and choices) avoids the micro focus on firms and new products and a macro focus on a new principle of the economic system such as for example mechanisation or information, etc.

Applying the approach to innovation and sustainability has a number of implications and it may also open a new window of opportunity on some current dilemmas. It also helps to realise that we have to do with prospective and not retrospective change, which is a difficult task as it is always easier to say who the winner was than to predict one. We talk about purposive and not emergent change. We want to induce it and the approach allows for framing of the ‘present’ in relation to the alternative futures. It can be seen as a sort of radical incrementalism – setting short-term goals in the long-term perspective, which offers opportunities to narrowness of most management approaches and breadth of economics. It should not be seen as an alternative to broader politics or more specific entrepreneurship but it could enrich their context. It also allows for reframing the issues – it reallocates fragmented and apparently unrelated issues in a different context while still giving space to the niche actor and the wider landscape.

### **Sustainability transitions in Asia – what’s relevant?**

Part of the plenary discussion has been devoted to brainstorming for the purpose of structuring the workshop and framing of a research agenda on transitions and globalisation in Asia. Ted Parson facilitated this discussion. He started by reminding the relevant building blocks that should be kept in mind during the debate:

1. **Transitions**: socio-technical change of large scale;
2. **Sustainability** transition;
  - a. We have seen other transitions but not this one yet;
  - b. It is prospective, partially normative;
  - c. We have some partial ideas about directions – e.g. metrics (energy and materials intensity, demographic transitions).
3. **Globalisation**: examining the link between transitions and globalisation;
  - a. Economic but not just ... also technological, institutional, socio-cultural;
  - b. Questions about casual linkages in both direction;
4. Focus on **Developing Asia**:
  - a. Rapid development, transformation(s) underway: importance, opportunity;
  - b. Questions for research focus: Distinct? Homogeneous enough?

Proposed workshop agenda envisaged breaking into four thematic working groups (WG): technology; markets (industrial structure); institutions (governance, politics); social/cultural change (consumption and behaviour) with a set of common questions for each of the WG:

1. Observed patterns of change: historical and effects of globalization.
2. Conceptual frameworks: Patterns of regularity? And theory - Do we have general causal knowledge?
3. Separability and coherence of this area: (What) can we understand about this field separately? And what is the nature and intensity of causal linkages with other areas?
4. Justification for a focus on (developing) Asia? Is this the historical accident, namely rapid development that opens up intervention opportunity? “Asia” – isn’t it too high a level of abstraction? Uniqueness? (vs. more general causal understanding). Homogeneity (vs. infinite diversity, historical uniqueness).

5. Steps to a research agenda: What would you actually do to understand this better and to identify feasible points of intervention, influence (by whom ..)?

This agenda has been put forward for discussion and amendments during the first brainstorming session. The debate however started with clarification of terms such as e.g. regime/niche/landscape vs micro/macro/meso notion; the level of detail of the entire analysis; what exactly is meant by sustainability transition (the term transition in the Asian context has been used in connotation with industrialisation and greening of manufacturing industries while this workshop brings in some new notions of long-term, wide societal change). It has been argued that given the Asian background it may be more useful to break into groups that look into major sectors: energy, food, mobility, water, etc.), current patterns and impacts and possible drivers for change and actors necessary for transforming the systems towards more sustainable ones. Also taking a wide Asian perspective might not be the most productive approach as there are quite significant discrepancies between the countries. Most commonly used division of this region refers to South, Southeast and East Asia. This division very broadly grasps commonalities of the countries in terms of economic development and socio-cultural patterns.

Given however that we are interested in theorising transitions as broad socio-technical changes - the decision was to follow the original agenda with this remark that during the WG discussions we should be mindful about actors (esp. role of state in transition processes), sectors as well as drivers and impacts of change. We may also use various entry points for analysis of the different areas.

### **Technology is there, markets are global and institutions in flux**

One of the most interesting outcomes of the WG discussions and the following plenary was that conventional theories of economic development (cf. Rostow, Lewis, 'balanced growth' theories), which argue that national economies move through stages involving capability-accumulation and structural change, are not necessarily applicable in the Asian context. According to these theories development implies growing resource-intensity of economies early in the process of development, with major environmental impacts. Asian development is already influencing the global demand for resources, and is having major impacts on local, regional and global environmental quality, including the global climate. Globalisation however provides with new contexts: new actors (consumers, civil society), different interrelations between them, at different levels. It also provides with main pressure on environmental quality through global value chain, regulation, international institutions and this way opens up opportunities for various development pathways which do not necessarily have to follow the stages model. Because of this different demographics, inequalities and various sources of drivers the original EKC does not apply to Asia. The question is whether productivity is off the path in the developing countries and does this mean it has to be put on track towards sustainability. In that respect clarification of the link between productivity and environmental productivity seems important. Furthermore, the Asian industrial structure is different from that of e.g. Europe where liberalisation and deregulation allowed for existence of many alternatives.

#### *Technology and markets*

In Asia currently there is no specific pattern of technological change nor technology is perceived as lacking. Technology is there (and in many countries renewable, alternative technologies are operationalised at smaller scale – e.g. decentralised off-grid renewable energy systems in India). Innovation receives attention but at firm level and this is also where environmental considerations are taken more seriously into account. The real problem is with scaling up of good practices and experiments and their implementation at a larger scale. That is often linked with the institutional and socio-cultural barriers such as lack of governmental commitment, lack of continuation of policies,

corruption, and bureaucracy. Many technologies are said to need more economic and institutional power such as it was a case of Toyota Prius or Danish windmill turbines. The existing national renewable policies, however, are not that much environmentally grounded as much as they are an issue of national energy security. That may not be enough to support the sufficient level of ongoing experimentation and to get these small projects breaking into and shaping the existing socio-technical regimes. Electricity supply may be an excellent example to look at because of the strong lock-in's and because it would demonstrate how difficult it is to break existing regimes.

### *Institutions*

It has been concluded that governance in Asia is in flux and undergoing grand transformation but there is no clear pattern of change. Mode of governance, processes of democratisation, democracy and their connection to sustainable development have emerged as critical for sustainability transitions, but nothing casual can be said about the link at this stage. It may therefore be useful to analyse the (i) conditions under which the trends may lead to sustainability via transformation; (ii) the extent to which state and it shape (good confident government, corrupted weak government, etc) impacts the process and the pathways and (iii) the degree to which globalisation could provide incentives for sustainability transitions (this is since international institutions and regulations came forward a number of times as main drivers for change).

What makes things additionally complicated is that Asia faces multitude of problems simultaneously and is in the midst of an ongoing grand urbanisation and industrialisation processes. Other trends such as increasing population and consumption, role of media and ICT, growing inequalities should also be looked into when researching ST. The concept of globalisation should be clearly defined and characterised in terms of which exact trends/processes/indicators are relevant in the given context. And secondly should globalization be viewed as a locking-in or providing new opportunities factor?

### *Socio-cultural issues*

Socio-cultural issues and changes therein have been decided to be strongly influenced by the process of globalisation. Culture, plainly defined as set of social norms and practices is a dynamic but difficult to change area, globalisation is thought to be able to speed up potential changes through development of mass-media, ICT, e-commerce etc. For analysis of changing consumption patterns the food system is particularly relevant in the Asian context i.e. how and what we eat. Participants of the group on consumption emphasised that it is important to look at history of food practices in the Asian context esp. at rice consumption as a very dominating practice. In Asia most of people originate from the 'rice kingdom'. Comparative analysis of historical cases in various contexts is probably an interesting way to identify the so far patterns of change. Rice is also a nice example of how human-environment relations evolved over the years and how land use practices transformed. Adding energy would provide with an extra context.

### *Summarising*

A key research and policy question is whether industrial, economic and social transformations now underway in Asian countries will follow conventional trajectories, or - given that the conditions under which change happens now involves different set of actors and is taking place in different conditions<sup>1</sup> to those of OECD countries - whether more environmentally efficient development pathways may be possible. Environmental policies and the diffusion of more environmentally efficient technologies and practices would play an important role in the opening of these pathways. Systems view as proposed by the system innovation studies is useful as it encompasses technology

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<sup>1</sup> Structure of industry has a lot to do with lock in situation; processes of liberalisation and deregulation in Europe were the main reasons why new alternatives could begin to exist.

coupled with socio-cultural and institutional processes. Long term perspective is desirable to set short-term goals in a bigger perspective (most of Asian countries already have 5 year national environmental plans but they are hardly implemented. Common is lack of continuation, lack of governmental commitment, enormous distrust of state with corruption as the most urgent issue that should be addressed.

All Asian participants emphasised the need to differentiate between states of Asia or at least take into account the division into the three regions: S, E and SE Asia. It is since there are huge discrepancies in e.g. the form of governance, history, industrial structure, even standardisation (e.g. ISO has different standards in China than in the rest of Asia). Secondly, there is relatively great number of success stories and sustainability experiments all over Asia that make the socio-technical systems of Asia qualitatively different from those of the OECD, developed countries. The experiments are seen as a light in a tunnel and they need up-scaling. There is also a good political will, which need to be down-scaled. What mechanism would be efficient in linking the two so that they impact existing regimes and push them towards sustainability?

## **Developing a research agenda**

### *Choosing focus*

The second day of the workshop was devoted to the development of research agenda and to practical issues of the set up of the metastudy. Frans Berkhout summarised the discussions from day one in the set of following points:

- Systems view is useful in the chosen context: technology is strongly coupled with socio-cultural processes and institutions.
- Long term perspective - useful, possibility to influence regimes.
- Conditions for change and for developing transitions towards sustainability in various countries are different: different forms of governance and social construct, endemic markets and technological capabilities. Different because of ongoing massive urbanisation and ongoing agrarian to industrial transformations.
- The process of change in the Asian context does not have to follow the expected path of development. This is since globalisation is changing the current situation in Asia and changes the way in which it is going to develop. It brings about new kinds of consumer awareness, technology development and stimulates overall connectivity.
- For the metastudy practically – it is important to focus on domains of socio-technical practices and systems that the involved people know about.

The aim of the metastudy is to analyse other literatures and summarise what we already know about transitions towards sustainability in Asia. This is no original data gathering exercise but analysis of existing material in the field. Based on the so far discussions - the following is the list of issues that participants submitted as important for the analysis of sustainability transformations (ST) in Asia:

- Issue of geographical focus and the number of levels that can be used to analyse Asia: - ASIA as a whole or regional differentiation such as e.g. ASEAN (Association of Southeast Asian Nations) or country specific?
- Identification of ongoing transitions and the coping mechanisms. There are things happening despite of the transition conditions. What is the role of large external events, crises?
- Sustainability of the ongoing transitions: are the changes linked to sustainability in any way. Are they sustainability transitions?

- Impact of globalisation – does it provide new opportunities or is this a hindering element?

Decision of the workshop participants was to look into two questions in more details:

- Do existing trends and changes tend to move towards or away from sustainability?
- Does globalisation provide any prospects for change towards sustainability or locks all in?

#### *Outcomes*

David Angel summarised the outcomes of the discussions about the two questions. In both cases the discussions started with clarification of the terms. In case of sustainability transitions in the Asian context – the suggestive attributes have been summarised in the following way:

- Improved resource efficiency but in balance with commitments to environment, poverty reduction, access to resources, social issues (such as e.g. labour).
- Enhanced adaptive capacity.
- Higher cross-scale integration of processes.
- Increased resilience of ecological and social systems.

There are a number of transformative, major changes undergoing in Asia but there are no sustainability movements of significant impact. Most of the current socio-technical regimes are at the stage of relative disability/flux. That refers mainly to the institutional dimension (democracy, political capacity, technocratic capacities), which is said to be in ferment. There is also quite a degree of experimentation for sustainability taking place but at the local level. The overall changes cannot be classified as sustainability transitions. At this stage of development it is even difficult to evaluate whether they are heading a sustainable direction and what their impact on environment could be. It is believed that the change may go in all variety of directions. Potential path to ST might not be linear: it can get worse before it gets better or better on some attributes, worse on others. Because of considering very broad trends, important are proximate drivers of progress – e.g., institutional capability; societal agreement on direction; availability of information to track progress (monitoring, assessment, evaluation, etc.); technocratic/bureaucratic capability which is strengthening some countries, weakening others; role of civil society: increasing in some places, decreasing in others. Other important and potentially relevant trends include: population, consumption, urbanization: but we can't say anything useful (causal) at that level of aggregation regarding effects of these on ST. There is a need to distinguish near-term and long-term effects: e.g., technology: in near term is not a constraint – technologies are in principle available, constraint is the will to deploy it. If one adopts a transitions lens, vs. near-term gaze (e.g., how to get 10% gain in energy efficiency in the pulp and paper plant) – areas of potential causal clusters for ST over this longer term would include:

- Governance: adoption by political elites of national strategies consistent with ST – elite consensus; critical trend;
- Also need for trans-national consensus on importance of ST;
- Geopolitics: need for political stability. If security is on the table, it pre-empts all other concerns.
- Crisis, external shocks: more important than when studying near-term incremental issues but note: manner of response to crisis even more important than crisis itself.
- Information and assessment capabilities: ability to manage up-scaling innovations and successes – lots of local good news, but limits to up scaling.

Using the transition language - the disability of regimes, the number of experiments at the niche level as well as existence of favourable landscape conditions (most countries have national environmental plans) make the Asian socio-technical systems compliant with the necessary requirements for a sustainability transitions but the transitions as shown above – do not take place. Where to look for the reasons of this situation – is it due to lack of mechanism linking the three levels or are there other processes such as e.g. globalisation that play a role? Definitely the systems are qualitatively different from those of the industrialised countries from before the industrialisation period, which might suggest that they do not necessarily have to follow the stages model of development.

Globalization has been defined at this workshop as growth in connectedness along multiple dimensions: capital, knowledge, communication, civil society, consumption patterns, etc. Two models of globalisation are important in that respect: (i). core-periphery model with flows from core to periphery (also in terms of emerging commitments towards environment and sustainability); (ii) greater distribution of capabilities. With regards to the relation of sustainability to these models: the core-periphery model says new commitments to SD in advanced economies are transferred to developing economies: e.g., stronger regulatory frameworks, corporate commitments to sustainability, change in consumer or civil society expectations. Second model presents story less good for sustainability. Newly emerging local sources of capital are likely less committed to sustainability. Three aspects of emerging capacity that could offer opportunities include: (i) Desire to meet consumer demands—interest in de-materialized ways to meet them; (ii) Changed demands among knowledgeable young; (iii) Global market might offer new opportunities. But in general, a few powerful players are likely to develop stronger capital and innovation capabilities.

## **Metastudy**

If there is a significant change in the region then the analysis should also be future-oriented, less empirical. There is need for a scenario-type of analysis, rather than reliance on existing studies of past trends, patterns. Measurement and metrics regarding possible transitions: Need to measure decoupling of growth from environmental detriments, measure socio-technical change – both possible but at very high level of aggregation e.g. patterns of R&D so need to be disaggregated into regimes (food, shelter etc). Set agenda for patterns and ways that we might measure.

Building blocks of the metastudy based on the so far discussions:

- Introduction/background motivation chapter (system motivation lens, Asia focus).
- Trends – what are the trends underway in the region, patterns of change, etc incl. description as well as empirically based review of trends – use current literature on e.g. governance change and changing role of institutional capacities within states, industrialisation, demography etc and apply the system innovation lens.
- Sustainability transition – definition, evaluation of current transitions with regards to their sustainability dimension -do current trends promote or hinder ST?
- Impact of globalisation;
- Role of experiments in ST. The big transitions are linked to experiments in very different places (e.g. mobility etc) Experiments may lead to various definition of sustainability. How far are they linked to ST? Are they likely to sustain ST?
- Propositions and questions – opening up the agenda.

*Structure and potential contributions*

1. Introduction (Frans, Fred, David, Anna):
  - a. Systems innovation lens
  - b. Asia – why Asia is good to look at?
  - c. Globalisation as important contextual feature of dynamics in Asia.
2. Trends (contributions from: David – leading, Jean Christophe – industrialisation from the perspective of production, foreign capital, etc, Singapore, South East Asia. Main relevant trends in energy policies/supply; Shun Managi – trends in free trade
3. Experiments relevant to sustainability transitions? How do they define sustainability? (Contributions from: Xuemei on policy related experiments; Antonio-policy experiments in Philippines; Shobhakar on urban transport and mobility issues; successful policy experiments in Indonesia, China by Mike and David).
4. What might sustainability transitions look like? Do current trends promote or inhibit transitions?
5. Will/Does globalisation help? (Contributions from: Jim, Mike and Rajah: Jim – value chain, on degree to which multinationals can force change – is there not much hope there? Impact through value chain, etc.; Rajah – related to Mike – Malaysia, Indonesia, global governance and environmental productivity; Paul – glob from below – conceptual piece, NGO's etc..)
6. Propositions and questions. With the aim of opening the agenda.

*Organisational issues*

- Potentially special issue, or a book but more interest in a peer reviewed international journal. Metastudy is a study of the other studies.
- No sequence of work but more simultaneous with chapter 1 to be done and distributed early to set the stage for the remaining ones.
- Balance between theories and empirical work – bottom up – use the material and put it in a shape that reflects the conceptual framework.
- Tie to own work and own research agenda
- IT office looks at the workshop results and proposes lead authors who set their own teams depending on the scope of papers.
- Drafting exercise – issue of the group coming together again – only if it is necessary.
- IT office will circulate three critical papers for acquaintance with system innovation field.

## Appendix 1 - Agenda

The workshop should be seen as a ‘working session’ to generate good ideas around next generation research rather than to present the results of work done to date. The implication for its set up is that there are no paper presentations scheduled.

**Thursday, 6 July 2006**

9:15	<b>Welcome with coffee/drinks</b>
9:30 – 9:45	<b>Opening address</b> <i>Louis Lebel</i>
9:45 – 10:00	<b>INDUSTRIAL TRANSFORMATION RESEARCH</b>  From Science Plan to the ‘transitions & globalisation’ project <i>Frans Berkhout</i>
10:00 – 10:30	<b>ASIAN DEVELOPMENT CONTEXT</b>  What makes this such an interesting part of the world to study human-environment transitions. Setting the stage and research questions <i>David Angel</i>
10:30 – 11:00	<b>ANALYZING TRANSITIONS</b>  Developments in systems innovation studies <i>Fred Steward</i>
11:00 – 12:30	<b>SUMMARY AND INSTRUCTIONS FOR WGs</b> <p style="color: red;">The above 3 presentations are meant to set a stage for identification of issues that we want to have discussed at this workshop. In the result of this plenary discussion the focus/ perspective of each of the WGs (1-4) may change. In case however when we all consider this a proper structure - to ensue comparability of the results of each group - we suggest a list of some generic questions which each of the groups could address (see below). Also subject to change/verification – see below.</p> <p><i>Chair: Ted Parson; Rapporteur: Michael Rock</i></p>
12:30 – 13:30	<b>Lunch</b>
13:30 – 15:30	<b>ESTABLISHING COMMON THEMES - Working Groups (WG)</b>  WG1 Technological change WG2 Change in markets and industrial structure WG3 Institutional change WG4 Changing consumption patterns and behaviour
15:30 – 15:45	<b>Break</b>
15:45 – 17:00	<b>ESTABLISHING COMMON THEMES - Working Groups (WG) contd</b>  WG1 Technological change WG2 Change in markets and industrial structure WG3 Institutional change WG4 Changing consumption patterns and behaviour
17:00 - 18:00	<b>FRAMEWORK AND PLAN FOR THE SECOND DAY</b> WG1-4 report-back and plenary discussion  <i>Chair: David Angel, Rapporteur: Jim Murphy</i>
19:30	<b>DINNER</b>  <i>Location tba</i>

**Friday, 7 July 2006**

8:30 – 8:45	<b>INSTRUCTIONS FOR WGs</b>
8:45 – 10:45	<b>DEVELOPING A RESEARCH AGENDA - Working Groups (WG)</b>  WG5 – Models of transformation and transition WG6 – Metrics of transformation and transition WG7 – Empirical studies of transformation and transition
10:45 – 11:00	<b>Break</b>
11:00 – 12:30	<b>DEVELOPING A RESEARCH AGENDA- Working Groups (WG)</b>  WG5 – Models of transformation and transition WG6 – Metrics of transformation and transition WG7 – Empirical studies of transformation and transition
12:30 – 13:30	<b>Lunch</b>
13:30 – 15:00	<b>REPORTING BACK AND DRAWING CONCLUSIONS</b> Plenary discussion:  WG5-7 presentations and discussion  <i>Chair: Fred Steward; Rapporteur: Ted Parson</i>
15:00 – 15:15	<b>Coffee break</b>
15:15 – 16:30	<b>META-STUDY WRITING TEAM</b>  Meeting in subgroups, making plans and appointments.
16:30 – 17:00	Summary and synthesis  <i>Chair: Frans Berkhout</i>
17:00	Adjourn

**Proposed common/generic questions to assign to each thematic workgroup:**

1. Observed patterns of change:
  - a. Patterns of historical change;
  - b. Observed (presumably recent) effects of globalization in this thematic area; (Collect workgroup views and experiences, and also identification of important prior research and scholarship);
2. Applicable conceptual frameworks: How do we think about patterns of change and the effects of globalization in this area? (Collect workgroup views and important prior research and scholarship)
3. How and to what extent can we understand the specific thematic area (e.g., technology, institutions, etc.) separately? vs. Nature and intensity of linkages with other thematic areas that are essential for understanding patterns and dynamics of change?
4. Justification for a specifically Asian-focused research program - with reference to both the uniqueness and the homogeneity of the Asian experience.
5. Steps to a research agenda.

## **Appendix 2 – List of Participants**

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### **Appendix 3 – Participants’ reactions**

#### **Antonio P. Contreras**

I am particularly interested in linking political transitions and transformation to a) economic and environmental transitions within countries; and b) to globalization. The paper, citing Booth (1999), identified several factors that are important for growth (seen in the North-East Asian model) as:

- Investment in human and physical capital
- Egalitarian distribution of income and assets prior to growth
- Rapid export-led growth
- Insulated bureaucracy free from pressure from rent-seekers and playing an active role in the economy, such as creating and fixing market institutions, promoting exports and encouraging savings.

Furthermore, the paper has pointed out that South East Asian countries tend to be constrained by their dependence on natural resources, the relative inequities in education and income distribution, and their dependence on external investments vis-à-vis government leadership in the economy.

Unfortunately, the paper does not adequately discuss the role of political transitions and transformation in economic development and globalization.

It has been pointed out by many authors (and political actors) that a strong (but “clean”) state could propel growth. Indeed, the growth in North-East Asia, and in Singapore, was enabled by strong state presence. Waves of democratization happening in South East Asia, producing systems of governance that are promoting transparency, accountability and participation, while at the same time creating a situation that are seen as threatening economic growth. In the Philippines, for example, the re-emergence of authoritarian structures is now being officiated by the current administration not only to buttress its doubted legitimacy, but also to provide a favourable climate for growth. This is anchored on the argument that leftists groups, social movements, and political noise coming from the pluralism resulting from “people power” are preventing the flow of investments (both external and from local investors) and are undermining growth in the economy. Similar arguments have been raised in Thailand by Thaksin.

The positioning of political “noise” as a problematic construct vis-à-vis growth occurs amidst an environmentalism that subsists on a discourse that privileges local communities, participatory development, and decentralization/devolution. Thus, the tension between economic growth and political democratization becomes even more defined. The Philippines has been considered the economic laggard of South East Asia, possessing enormous promise during the early years of an authoritarian political system, but later was compromised by its excesses. The opening of democratic space has propelled the Philippines as having the freest media, the highest number of NGOs, and the healthiest civil society community engaged in social and environmental development, yet it is also performing poorly on the economic front. The current spate of extra-judicial killings of journalists and left-wing activists has been suspected to be carried out by paramilitary forces with silent approval from the state as a way of “cleaning” the system for economic investments to grow.

Political democratization has also provided a stage for global transformations, either as enablers or as constraints. Again, this is something that is not fully discussed in the paper.

There is a need to engage this dynamic linkage between political freedom and democratic spaces on one hand, and economic development on the other. There is also enormous promise to link this to

environmental quality. To be silent on this matter would mean a tacit approval of, if not, agreement to, the proposition that strong states necessarily bring about development. This is something that needs to be addressed not only by the paper presented in this workshop, but by any effort that seeks to understand industrial transformation in the context of a highly diverse set of societies and countries.

The following are some of the key questions that need to be asked:

- Under what conditions would strong states become enablers or constraints of economic development? What are the prospects for these conditions to be altered, and if possible, through what processes?
- What are the connections between democratic transitions and resource quality?
- Is the current configuration of urban societies constrained by or compatible with democratic systems of governance?
- Is political democratization enabling or constraining the attainment of economic development goals?
- Has participatory approaches undermined the development of “bitter pill” solutions to economic and environmental problems? If so, would global and national economic and environmental agenda be better served by top-down decision making based on the advice of scientists

### **Fred Steward**

Three issues of concern to me are:

1. More focus on a selection of 'meso' level systems, which are of particular interest regarding current transition in Asia - in addition to the broad economic trends.
2. Some discussion of the specific significance of Chinese development in terms of global sustainability and whether its pattern & scale merit its special emphasis in current sustainability discussions.
3. An assessment of the scope for a specific regional/national context for radical innovation or whether global path dependence prevails.

### **Jean-Christophe Simon**

We had several meetings at LEPII-Grenoble to discuss papers sent by workshop organisers and we collected comments and suggestions from participants: Dr. Patrick Criqui, Prof. C. Figuière, Dr. C Locatelli, Dr. J-C Simon

*Some elements of thinking:*

We are very motivated to work upon a new programme, considering our current focus at LEPII (Public research lab of applied economics on Production and International Integration, approved by French National Research Center and University of Grenoble) and our past experience on development issues and emerging economies with particular reference to East Asia. Some of our scientists have an experience working over the past two decades on transformation of industrial organisation and overall growth pattern.

Since the beginning of the current decade we have emphasized work on regional economic integration, intra regional specialisation of emerging economies, particularly among ASEAN members. Needless to say, the pivotal position of Japan in Asia offers food for thought: Japan is the

epitome of rapid industrialisation, regional production network building, with rapidly growing needs for energy, raw materials. Over the past decades issues of pollution and resource management have lead to new needs for innovative technologies, offering tracks of diversification to many companies (from energy to transport sector). Is this a way to a new leadership through sustainable industrial technologies?

*Suggested areas for future research*

For Asia as a whole, recent issues of growth dynamics, resource conflict and competitiveness prove to be a particular challenge to Asian economies, questioning the very pattern of international integration, and the long-term sustainability of industrialisation through globalisation. We feel that four areas can offer fertile ground for further research:

1. **Industrial/manufacturing specialisation.** Is there a growing drive towards sustainable technologies and production systems in emerging Asia? Which activities or sectors seem more active or promising?
2. **Industrial organisation.** How to characterize recent trends in industrial organisation reflecting new ways to design products, or awareness of major emerging constraints such as resource, energy and skills management?
3. **Regional system:** can we put forward a new hypothesis on the “flying geese paradigm”? Once again Japan could be a regional leader, initiating new technologies and activities, pioneering products that are truly geared towards sustainable development.
4. **Lest but not least – China as a mega issue.** The sub-continent has experienced strong growth, restructuring and international integration over the past decades, based on a production pattern that is extensive, energy hungry, archeo-fordist and truly unsustainable. Can it leap forward, and establish a co-hegemon with Japan, or will it experience very painful adjustment of its economic and social system?

**Jim Murphy**

My comments are fairly general as I am a new participant in the IT community and am thus not very familiar with the particular discussions and debates the group has had historically. As such, my apologies if the comments below seem a bit dated or arcane in relation to some of the consensus objectives and goals that have prompted the Chiang Mai workshop. That being said, I approached this document from the perspective of an economic geographer whose research has focused on the socio-spatial dynamics of innovation, technological change, and regional/industrial/sustainable development processes in the Global South (particularly Africa and Latin America). At the present, I am beginning a study of the Bolivian manufacturing industry with an emphasis on understanding how Bolivia’s significant urban/regional differences and divides shape the innovative activities of firms and influence the prospects for, and challenges associated with, linking to or upgrading within global value chains for manufactured goods. Although my scholarly research has not been conducted in Asia, my theoretical interests overlap significantly with some of the concerns laid out in the work-in-progress. Moreover, I have personal experience (in the late 1980s and early 1990s) working on the “front-lines” of the sustainability transition in Asian industry – as an American engineer working for a UK-based corporation in the design, development, and start-up of pollution abatement systems for a steel rolling factory (Guangzhou, China) and a video-tape manufacturing plant (Kumi, South Korea). My experiences with technology transfer have significantly influenced my theoretical approach to innovation and sustainable development, particularly with regard to the role of personal agency and the challenges of inter-cultural communication in the technology transfer and diffusion process.

In terms of the document, I found it to be quite thorough and helpful in laying out the key issues facing Asian industries, economies, and environments today and in providing a broad theoretical context for starting discussions in Thailand. I particularly appreciated the notion that the “easy” part of becoming more productive in industry has already been achieved by Asian firms and that the region is at a critical juncture from a sustainability perspective. Thus a key question in my mind is whether or not Asian industries can compete on the high road of sustainability or will they become mired in a race-to-the-bottom as global competition and increasing consolidation and control over value chains forces firms to emphasize short-term cost reductions over all other priorities. The document also effectively raises concerns about the need to better theorize the actual dynamics or processes of transition – particularly as these relate to issues of scale and embeddedness, core concepts in contemporary economic geography. Finally, the point about linking the technical to the socio-cultural is an essential one and my particular research interests are grounded in such relationships.

Three specific questions or concerns of mine relate to: 1) the ways in which the innovation-inducement process is theorized; 2) how we define and identify the innovations worth theorizing, studying, or promoting; and 3) the ways in which scale or levels are conceptualized in systems research. First, theories on the process of inducing innovation tend to emphasize transaction costs and the need to get prices right in order to facilitate adoption/absorption (i.e., the anticipated benefits outweigh the short-term cost of change with an emphasis on getting the technology to the optimal price point). These ideas, while crucial and extremely useful from a planning and policy perspective, do not adequately deal with issues of agency and process in relation to technological change; concerns that I believe can lead us to more holistic theorizations of systemic transitions. Second, as the document rightly notes, what is an innovation worth exploring, explaining, or promoting through research into industrial transformation? Is it innovation at the grand – Schumpeterian – scale or should we be more concerned with the day-to-day dynamics of innovation and productivity? Moreover, I believe it is important to question if, and the degree to which, radical innovations are ever really radical – or are the capabilities necessary for their adoption/absorption well established prior to the (seemingly?) rapid transformation of a society. Third, the multi-level perspective on systemic change (presented on page 12), while helpful in an heuristic sense, raised concerns for me about the degree to which a (seemingly) linear perspective on systemic change limits the kinds of analytical frameworks we develop. Specifically, I am concerned that, by framing the process of change as starting first with a technological niche and then proceeding forward to the landscape scale, that there may be a tendency to seek a singular path for sustainable development (not unlike a Rostovian trajectory) and that this may reduce our abilities to understand and account for the ways in which technological niches are, for example, in any given place and at any given time, co-constituted in part by particular socio-technical regimes and landscapes. In order to fully understand systemic transition I believe that we need to find ways to reframe scale such that we situate the levels of systemic innovation within and in direct relation to the activities of firms and policymakers. The broader point being that when innovation-diffusion is conceptualized as an asymptotic linear process – as I would argue the S-curve seems to demonstrate – there is a tendency among policy makers to focus primarily on the push-pull factors that will move the innovation from the niche to the regime to the landscape at the expense, arguably, of understanding and accounting for the contingent and embedded nature of learning, technological change, and capability developing processes.

In sum, my three key issues are as follows:

1. How we conceptualize the embeddedness of systems and the processes through which new norms, values, and technologies become situated in them through dynamic interactions between agents and structures.
2. Questions regarding the kinds of technological changes or innovations most worthy of study and theorization. In other words, do our innovations have to be radical in the Schumpeterian sense or is it more useful and significant (in the long run) to understand the incremental dynamics of industries and systems in Asian economies?
3. The question of scale and its conceptualization in relation to systems research.

### **Jose R. Moreira**

My first concern is really understand if we need a 'transition' in order to obtain sustainable development. In this paper sustainable development is characterized by mitigation of climate change, by better pattern of living in cities through reduction on traffic jams, by fair provision of food, energy and water.

As far I can see climate change mitigation, mobility preservation and energy provision could be addressed through technologies already available. Regarding water supply I am not an expert on that but my feeling is that there is no water shortage but essentially lack of clean water. If this is the case, technologies applied at local level are effective provided a minimum income is available at the site.

Climate change mitigation, as pointed out by the IPCC assessments isn't limited in the short term by technologies but by policies able to stimulate society to use alternatives to fossil fuels. Several studies are available showing that a combination of alternative renewable energy sources can supply most of the energy required by the year 2100. Also, IPCC baseline scenarios demonstrate that society future can follow different paths depending of the population awareness and care with the environment. Baseline scenarios do not require special environment policies for their occurrence and will be dictated by the kind of human behaviour expected. The possible future behaviours don't require 'transitions' as defined in this text or in the book 'Understanding Industrial Transformation: Views from Different Disciplines'. The scenarios expect small and continuous adjustment of society behaviour. IPCC shows that within some of these scenarios the amount of effort and the cost to mitigate climate change will be modest. Other scenarios where intensive use of energy and material and poor trade activities at international level can be also mitigated using available technologies but will require much more effort and cost. Effort means essentially policies at international level; as well as local policies to control better use of materials, water and energy resources. Costs will not be prohibitive. Some studies conclude that 1% of Global GNP would be enough; the cost will be lower if cooperation between countries will continue (like the CDM, JI, Emissions Trading, etc) and if the baseline will not be extremely energy prodigal. To implement the necessary policies I don't think we will need a 'transition', since some of these necessary policies are already being implemented by international or national authorities. Modest results observed may be due the slow rate of implementation of some of the policies and the necessary time required for the already existent technologies be optimized through 'learning-by-doing'

In order to show that alternative renewable sources of energy can make a significant contribution without deep change in our mobility habits it is worthwhile to discuss a few examples.

Alcohol from sugar cane has demonstrated technical and commercial feasibility to replace gasoline. Assuming the car fleet will increase to 3.5 billion cars by 2030 (e.g. Toyota scenario) and that more fuel efficient cars will be normal rule (as good as the Prius from today) it will be necessary to produce 45 million barrels equivalent of gasoline per day as ethanol (67 EJ/yr). Assuming present

ethanol yield is 8,000 l/ha (good plantations in Brazil) and that an annual increase of 2% will continue (the increase has been higher than that in Brazil since 1975) it will be necessary to plant sugar cane over 200 million ha. Just to give a metric it is useful to know that world wheat planted area is over 250 million ha, while corn and rice planted areas is near 200 million ha each at world level. According with UN-FAO data there is plenty of soil to plant such extension of sugar cane and many authors believe that it is possible to produce more than 500 EJ per yr from planted biomass sources.

It is worthwhile to remember that alcohol production from sugar cane is associated with electricity cogeneration and that when producing 67EJ of fuels per yr it is possible, with available technology, to produce 55 EJ of electricity to be sold to the grid. For better feeling of the magnitude of these figures it is worthwhile to know that present final energy is around 200 EJ/yr.

More important is to remember that sugar cane is one of the sources of biomass for energy, probably the most productive, but others are already being used for ethanol and biodiesel. Furthermore, regarding electricity generation it is possible to rely in other energy sources, which are already commercially feasible like wind, large and small hydro. Regarding heat production, solar energy is performing quite nicely. Thus, shortage of clean energy doesn't represent a serious constraint for sustainable development but, obviously, some effort in energy efficiency is required as society chosen its development path. Just to quote one figure the most energy intensive baseline scenario described in IPCC Third Assessment Report requires 2500 EJ/yr of primary energy by 2100 (when today we use 440EJ). Assuming final energy forms (e.g. ethanol and electricity) have a conversion efficiency of 40% this means that final energy would add to 1000 EJ, imposing some concern about the capacity of all this energy be produced by renewables.

Another last but not least important aspect with biomass is that when used as a source of energy combined with Carbon Capture and Storage (CCS) it is possible to obtain net negative CO<sub>2</sub> emissions. This means that through the use of biomass (and only biomass) plus CCS, CO<sub>2</sub> concentration in the atmosphere may be reduced as more energy is produced, and guarantying real climate mitigation.

According with several studies the rate of increase in the use of some of these renewable energy sources is very high (wind, photovoltaics, solar heaters) and in the last few years others (e.g. ethanol, biodiesel) are experiencing the same trend. For these last ones it is clear they are following the classical S-shape curve. This is occurring because a series of governments are setting appropriate policies able to open opportunities for such energy sources to compete with the traditional fossil fuel based ones. Until now, it is very visible the relevance of policies, of awareness build-up, of information flows and the prestige create through marketing campaign promoting respect with the environment. But, it is also very clear that economic and energy safety issues are motivating the migration away of oil and natural gas. It is difficult to identify that all that is part of a 'transition'.

Based in the above examples looks like it will be possible to mitigate climate change and to address the issue of sustainable energy availability without any deep changes in society behaviour that should be anticipated as a 'transition'

Regarding mobility, the text claims that not only CO<sub>2</sub> pollution is a constraint but heavy traffic jams in cities decrease life quality. This is a problem that could be avoided. In the city of Los Angeles, where most of the people's transport is base in cars, 70% of the city area is used for streets and roads. Typical density of population in cities is around 1 person each 80 m<sup>2</sup>. In order to allow enough area for streets and roads it would be necessary to decrease population density to a level around 200 m<sup>2</sup> per person. Such extension of area is still quite small compared with the available

global area (1%) and could be implemented in new cities, which are being populated at this moment mainly in Asia.

Regarding unfair food distribution the major problem is the level of poverty from a significant share of the global population, preventing them to acquire the products. Food supply isn't an issue since there is overproduction of most basic foodstuff. Thus, any 'transition' required for more fair access for food must try to minimize poverty. This is a very complex issue and it is clear that under a capitalist society the way to mitigate poverty is through economic development of the poor regions of the world. Ways to promote such development can be through short term measures in regions where education has achieved some minimum level, as shown in this paper for some countries in Asia or through medium-term measures in regions where it will be possible to create job opportunities for low level educated people. For this latter case biomass-based energy sources, in particular sugar cane, could be an excellent opportunity to improve life conditions of rural people. It is very important to understand that biomass energy sources aren't energy for the poor, but energy by the poor. As discussed above food isn't produced in larger amount because there is not enough demand. Rural population that has depend of the production and sales of food to people living in cities, which have acquisition power high enough to permit such commerce, may observe a second opportunity by production and commercialization of biomass for energy. The global market value for energy is as big as the market for food, which means that it would be possible to double the income of rural population once this new market is established. With twice more revenue, more rural people will be able to attend schools gaining education and will be able to buy more food for them increasing the demand for food, which feedbacks on better revenue to the share of rural population that are food producers. Thus, more than a double in the rural population revenue should be expected.

Just as an example it is worthwhile to say that alcohol production in Brazil requires 500,000 direct jobs, most in rural areas. For an ethanol production of 45 million bbl per day, the total number of jobs would be 90 million if a simple extrapolation from the situation in Brazil is assumed. Adding indirect jobs it would be possible to create a demand for 200 million jobs. This could mitigate poverty in around 500 million inhabitants. The results are impressive, mainly considering the almost commercial feasibility of such fuel. Unfortunately, this example shows that the energy market is huge but unable to solve poverty of most of the 2 billion people living in miserable circumstances.

With this example it was possible to demonstrate that, at least for a share of the poor people food scarcity could be solved simultaneously by solving the clean energy issue. For the remaining poor we could either guess that a 'transition' would be the solution or argue that it may be possible to create other new market suitable for low education rural population. I don't have any suggestion on what could be created, at this moment,

Finally, I would like to conclude that it was possible to address totally or at least partially the major issues related with climate change, energy, mobility and food. Regarding water, it would be search for an expert but I suspect that it would be possible to identify mitigation opportunities without relying in 'transition'

More interesting, is that the proposed solutions, probably will become a reality in another one or two decades and I have been unable to identify that a 'transition' is under way.

### **Weidong LIU**

It is crucial to IT research to understand the relationship between development pathways and environmental profiles via international comparative studies. Since Asia (East Asia and Southeast Asia, in particular) is experiencing rapid economic growth and urbanization, countries in this region

can be good cases for such comparative studies. Therefore, I look forward to a meta-study that can initiate an international comparative analysis of development pathways and related environmental parameters.

Personally, I would like to argue that local industrial transformation generally result from two main reasons: (1) intra-sectoral upgrading by using new technologies; and (2) inter-sectoral structural upgrading. While the former is closely related to technological innovations in product and production process, the latter is by and large a result of local comparative advantages and consequently of global shift of production activities. Although there is a sort of “general” trajectory of local industrial upgrading (e.g. from labor-intensive to capital-intensive and then knowledge-intensive), such a trend may be reinforced or affected by economic globalization. For example, China increasingly acts as a “world factory” under economic globalization, which means heavy industries that are energy-, resources- and pollution-intensive may continue to be the linchpin of industrial development for sometime. Against such background, I propose the following themes for further discussions:

- What are the major driving forces of local industrial upgrading? In particular, is industrial transformation a “natural” process that can go smoothly with time without interventions or a process that demands strong governmental interventions?
- What are the interrelationships between economic globalization, local industrial transformation and environmental profiles and what ethical issues are involved in such interrelationships? In particular, how is economic globalization affecting local industrial development and upgrading?
- Trajectory of industrial transformation of the industrialized economies in the last forty years (some cases) and its coupling relationship with changes in energy-, resources- and pollution-intensity in these economies. Which factor, global shift or technological advance, has played a major role in their industrial transformation? It may include:
  - A comparison of resources and environmental profiles of the same industrial sectors between countries. Parameters to be compared may include those of water and energy intensity per unit of industrial output (UIO), land occupancy per UIO, and emission of major water and air pollutants per UIO.
  - A comparison of industrial upgrading trajectory between countries. Emphasis can be put on changes in regional aggregated parameters of energy-, resource- and pollution-intensity (i.e. per unit of GDP or per capita) along with the trajectory of industrial transformation.

### **Louis Lebel**

I have read through the background paper. It is rich in ideas. Five related areas of questioning I would like to explore more in the context of transitions in theory and "practice" are:

1. **Asia constructs:** Why do people think of "Asia" as a region? What are the impacts of that on how transitions are imagined?
2. **Aggregation and denominators:** When is a nation or a region an appropriate level of aggregation (denominator in stats) and when is per capita or other groupings more informative ?
3. **Governance:** What role do deliberation and negotiation have in transitions? Who decides? For whom are transitions pursued? Who is left behind? How much plurality is possible?

4. **Lessons from:** What have states, communities and firms done well in Asia? Are there lessons to be learnt for further transitions in mature / post-industrial economies?
5. **Resilience:** What are the implications of transitions for resilience of social-ecological systems? The capacity to manage resilience?

### **Michael Rock**

1. I'd urge more consideration of the paper's focus—is it on Asia, East Asia, or the rapidly developing market economies of Asia (East Asia). One could see at least a three tiered structure. Those countries that have largely completed their industrial transformations—this includes Japan, South Korea, Taiwan Province of China and Singapore. Those that are in the midst of their industrial transformations—this includes Indonesia, Malaysia, Thailand, the Philippines, China, India, Bangladesh, Pakistan, Vietnam, and Sri Lanka. Those that are just beginning their industrial transformations—this includes Cambodia, Laos, and perhaps Nepal.
2. I'd urge consideration of another transformation — a democratic one. Democracy is relatively new in South Korea, Taiwan Province of China and even newer in Thailand and Indonesia. Democracy exists in a semi-democratic state in Singapore and Malaysia. It does not exist at all in China and Vietnam. In the 'countries' that have recently experienced democratization, democratization has tended to privilege business at the expense of popular groups in civil society. (By the way economic liberalization in India also privileged business at the expense of popular groups.) It has also contributed to an increase in corruption via 'money politics', a breakdown of centralized corruption networks that were growth enhancing, and a politicization of key macroeconomic agencies (ministries of finance, central banks, planning agencies). One might ask, what are the implications of this for transitions?
3. Finally, I'd urge consideration of how one embeds 'system innovation' in the domestic and regional political economies of Asia. I say this because, as long as the world remains organized along national lines, governments, polities and societies in each Asian 'country' will be responsible for inducing innovations. This might lead one to ask, for example, is one or more country better positioned than others to induce sustainability innovations?

### **Naohiro Goto,**

My research field:

- 1) Material Flow Analysis

I am interested in regional MFA. My current research topic is how much local region consumes resource and it deposits waste. By understanding the local MFA, we can let the local government know useful information for their politics (especially environmental politics).

- 2) Agro-industry in Indonesia

Our research group is investigating material balance and cost in Indonesian agro-industry, palm, casaba and sugar cane. Japan imports much the merchandise crop as processed goods. We want to know relation between the import and suitability in Indonesia. How much does the import generate environmental load in Indonesia?. Do people in Indonesia can get enough money to live by agro-industry?

Key Issues should be discussed in Chiang Mai:

1. Indicators for transition and globalization

Several indicators should be investigated. From view point of engineer, quantitative indicator is easy to understand such as MFA (resource consumption, energy use, waste generation and so on), land use area, GDP and so on. So in the meeting we should give some indicators, which we should share.

2. Application of research results

I think final objective of this project is to establish sustainable society. Our research should be applied to establish the sustainability. However I have no idea relation between results of this project and sustainability. In order to understand the relation, we should deal with actual topics to overcome in terms of transition and globalisation. The topics depend on researcher. We accumulate the topics and then we introduce general principal.

3. Working sheet

I think we will compare industrial transition in several countries and analyze characteristic of the countries. we should unify items to compare. For example a researcher investigates the transition in Japan, and another investigates that in China If they investigate different topics and different item, it is difficult to compare. Before they begin to research, they should make a common working sheet to fill.

### **Ooi Giok Ling**

- 1) Scaling the issues of transitions for the Asian region that is characterized by great fragmentation – economic and political – because of globalization.
- 2) Norms that have shaped transitions – legislative and policy frameworks as well as their implementation – that can be identified at different territorial scales of nation, province and city as well as local community.
- 3) Political contexts for shaping these norms – in Asia there is great differentiation in the power of governments and businesses as well as NGOs concerned with environmental issues from climate change to degradation of river basins and water catchment areas as well unfair trade practices.
- 4) Examining the meanings of the continuum in transitions from agricultural-rural to urban industrial and the post-industrial in Asia.

### **Paul van Seters**

1. In his new book, entitled *The World is Flat: A Brief History of the Globalized World in the Twenty-first Century* (2005), Thomas Friedman distinguishes three eras of globalization: G 1.0, 1492–1800; G 2.0, 1800–2000; and G 3.0, 2000–... . In G 1.0, with countries as the key actors leading the process of globalization, the world is shrinking from size large to size medium; in G 2.0, with multinational companies as leading actors, the world is shrinking from size medium to size small; in G 3.0, in which individuals replace countries and corporations as the dynamic forces, the world is shrinking further from size small to size tiny. As China and India figure so prominently in Friedman’s analysis, are we indeed now witnessing a new transition of globalization in Asia (and the rest of the world)?
2. While Friedman is very good on the creative forces at work in contemporary globalization, particularly as seen from Asia (India, China), his book has at least two major flaws. One, Friedman does not seriously address the problematic aspects of globalization. Two, he is completely wrong on the role of the so-called antiglobalization movement.

3. One of the last chapters of the book is entitled “The Unflat World.” Here Friedman discusses the plight of those who are not, or not yet, touched by the flattening forces of globalization (he distinguishes ten such forces). He refers to “hundreds of millions of people on this planet who have been left behind by the flattening process or feel overwhelmed by it,” and mentions that these hundreds of millions live in Africa, in rural India, China, and Latin America, as well as in “plenty dark corners of the developed world.” Friedman’s numbers to me seem way off target, however. In fact, it would be more realistic to say that today *billions* of people are missing out on the blessings of globalization. (There is a strange inconsistency in the numbers Friedman gives, though. Further on in the same chapter, he quotes Bill Gates who is worried about the “3 billion” people who live in the unflat world, and he ends that particular section by referring to “the 50 percent of the world that is still not flat.”) Clearly, Friedman is aware that not everyone today is enjoying the fruits of globalization, but this fact he treats as an aside rather than as an issue of major importance. Particularly from an Asian point of view, this seems indefensible.

More importantly, Friedman seems unaware that many of the ills of the unflat world are directly related to the process of globalization itself. As a “technological determinist,” he assumes that globalization in time will take care of these problems all by itself. That claim I think is untenable too. How do our Asian colleagues see this?

4. Friedman distinguishes five disparate forces within the global populist or antiglobalization movement: guilt-ridden upper-middle-class American liberals; factions of Old Left protectionism; those protesting the speed at which the old world was disappearing and becoming flat; anti-Americans; and a motley coalition of non-governmental organizations (NGOs). The first four are engaged mainly in the discussion *whether we globalize*, the fifth in the discussion *how we globalize*. Friedman is rather dismissive of the role of the first group, claims that he has “a lot of respect and sympathy” for the latter group, but adds that these NGOs have been taken for a ride by the hardcore antis. In fact, I think it is the other way around. The NGOs have played a central role in the antiglobalization movement from its very inception, while the anarchist and other fringe groups only played (and play) a minor role in it. For empirical evidence supporting this thesis, look at the history of the World Social Forum, one of the most important manifestations of the emerging global civil society. Hence the phrase “antiglobalization” is misleading, and it would be more appropriate to refer to this phenomenon as the new social movement for global justice. So what is the relevance of this movement in Asia? (Think of Walden Bello! And of Vandana Shiva!)
5. If Friedman’s notion of globalization suffers from too much “technological determinism,” it might be more fruitful to follow the lead of the Australian sociologist Malcolm Waters. Waters defines globalization as a “social process in which the constraints of geography on economic, political, social and cultural arrangements recede, in which people become increasingly aware that they are receding and in which people act accordingly” (*Globalization*, 2001, p. 5). Notice that globalization here is not restricted to economics, but includes political, social, and cultural aspects as well. But notice also the three different layers in this definition: globalization is not just (1) a social process, but also (2) people’s awareness of this process and (3) the actions undertaken by people, given their awareness, to respond to this process. Obviously this awareness and these actions are often focused on the problems inherent in or resulting from globalization processes. Hence the issue of the unflat world should be treated not as peripheral to but rather as an integral part

of globalization itself. Does this broader and more critical conception of globalization reflect the reality of globalization in Asia today?

6. Multistakeholder initiatives, such as tri-sector partnerships for sustainable development, have become increasingly visible and prominent recently, particularly since the UN World Summit on Sustainable Development in Johannesburg in 2002. These partnerships in my view perfectly illustrate the action perspective on globalization and transitions (the topic of our workshop) outlined in the previous sections. They embody the same logic as “global issue networks” (Jean-François Rischard, *High Noon: Twenty Global Problems, Twenty Years to Solve Them*, 2002). What experience has there been in Asia with such partnerships? And what is their merit from an Asian perspective?

### **Rajah Rasiah**

This is a very interesting piece that seeks to continue the work on industrial transformation (IT) – which is an integral pillar of IHDP. It is rich in ideas, addressing some of the most salient aspects or issues and concepts that are relevant to an understanding of industrial change. In fact I like very much the position taken by the authors. I have only finished reading up to page 10 and that might mean that some of the points I raise should be dropped. I have the following questions, which may be a reflection of my own conceptual biases or my misunderstanding of the issues rather than a scientific assessment of what the authors may have sought to do:

#### **Main issues:**

1. The piece should be very explicit in what it seeks to do. Having read the whole piece it is still unclear if the proposal seeks to simply address the critical issues involved in industrial transformation, or it is seeking to orientate the critical elements of IH in relation to sustainable development or it is simply seeking a framework containing the critical elements to link IT to sustainable development.
2. It may be useful to revisit the development economics works of Lewis (1956), Kaldor (1957) and Myrdal (1957) on the inter-relationships between agriculture and manufacturing, and in more specific terms Schumpeter (1934) and Hirschman (1958) on technology development. Korea and Taiwan enjoyed the historical initial conditions such as an egalitarian distribution of land resources (it was much easier for the American-led governments in these economies who distributed land confiscated from the Japanese colonial government). Marshall aid in these economies clearly emphasized poverty alleviation to stem support for the communists. Clientelist interests were not dominant in these economies so that governments enjoyed relative autonomy to engender development. The opposite was the case in Philippines where Marcos failed to convince his powerful landlord supporters to likewise.
3. The systems of innovation framework if it is to be used strongly in the framework should be defined appropriately. It should be seen as a system of connected economic agents (individuals, firms and institutions) that are engaged in learning, innovation and competition. The emphasis on interdependent and interactive interface between these economic agents helps the evolution of a more egalitarian system that addresses social, cultural and political interests.

#### **Minor issues:**

1. Pg. 3, 1<sup>st</sup> para – It might well be necessary to add that in Asia there are countries that have experienced both rapid (Korea, Taiwan, China, Singapore and Malaysia) and low (e.g. Nepal, Uzbekistan, Afghanistan, Turkmenistan and Bhutan) rates of industrialization, the

various different drivers - local capital in Japan, Korea and Taiwan, and foreign capital in Singapore and Malaysia), and varying sizes involved – large (China and India), and small (city-country such as Singapore and HongKong, and small economies such as Taiwan and Malaysia). Asia perhaps has the myriad necessary to provide an approximation of a global laboratory.

2. Pg. 3, last two paras – may be useful to separate urbanization with and without industrialization.
3. Pg. 4, full paras 2 and 3 below “Causes of..” – Should examine the robustness of these studies reported. I have serious reservations on the use of TFP – see the critique by Romer (1986, 2001), Nelson (1996) and others.
4. Pg. 4, lines 9-11 from below – rent seeking should address the issue of productive (e.g. the Schumpeterian rent) and unproductive rents. An input-output framework of this providing a cogent critique of the work of Bhagwati and Krueger was advanced by Mustaq Khan and Chang Ha Joon.
5. Pg. 4, last 2 lines – useful to replace MNCs with FDI as the Northeast Asian economies also relied extensively on MNCs but through licensing and other channels to access technology at least in the initial stages.
6. Pg. 5, 1<sup>st</sup> para with the figure – useful to examine energy use by per capita.
7. Pgs 6-8 – useful to discuss more the issue of portfolio equity investment – which after the Asian financial crisis of 1997-98 has emerged as a far more footloose source of capital than FDI.
8. Pg. 7, 1<sup>st</sup> para – Useful to examine the late Lall’s work on capabilities. He distinguishes economies that developed capabilities while exporting to compete effectively from those that did not. The earlier group managed to upgrade and enjoy higher per capita incomes compared to the latter. He also noted that many Sub-Saharan economies simply do not have the capacity to even work on their capabilities. On FDI seeking to upgrade – see literature on “sticky spaces on slippery slopes”.
9. Pg. 7, last full para – the globalization of production should led to more scrutiny of the work of the global value chain GVC guys (e.g. Gereffi, Sturgeon, Morris, Kaplinsky and Humphrey). On the upside GVCs offer an understanding of how value chains are driven, changes within them (including modularization) and how particular host-sites are experiencing benefits-debenefits from these developments (though they provide little explanation of how host-sites are responding to these developments). On the flipside, GVCs have created a lot of interest on the outsourcing of low value added tasks including those related to the trafficking of illegal informal labour. Also, global governance mechanisms such as the TRIMS and TRIPs agreements, and the preferential agreements such as the one by LDEs under bilateral trading agreement with the US and under the “everything but arms” agreement with the EU have had an influence on these developments.
10. Pg. 9, 2<sup>nd</sup> para – a clearer and examinable definition of systems of innovation is necessary to locate learning and innovation.
11. Pg. 8, 2<sup>nd</sup> para – there should be more discussion on portfolio equity investment.
12. Pg. 9, last para – issues of ontological and epistemological explications may also be addressed here.

## **Shinji Kaneko**

From a long-term perspective on industrial transformation processes in Asia, among others, I have particular interests in the following three drivers:

### 1. Industrial transformation in an era of soaring oil price

Two major oil shocks in history provide ample evidences that changes in the international price of oil constitute an important driving force in the transformation of energy demand and supply and the resulting industrial transformation. It is also evident from our experiences in 1990s that cheap oil price prevented fostering large improvement in energy efficiency. In the event of soaring oil prices in the medium to long term, a matter which has been discussed intensely in recent years, the Asian region—which is emerging as a growing consumer rather than a producer of oil—may face enormous cost burdens, whether the price increase is abrupt or happening over a longer period. In a certain stage of economic development and industrial structure change, the demand for oil products increases rapidly due to motorization, intensive use of naphtha and others. Hence, oil price has significant implications to the direction and speed of industrial transformation particularly for the emerging Asian economy. From the perspective of risk management, we know that the cost burden will be larger if responses to risks are either too early or too late. In this respect, the timing of energy transformation, which includes increases in energy efficiency, is an important factor. But any energy transformation normally requires a longer period of time. This is because a longer time is required to replace the old devices with new energy-consuming equipment and related infrastructures. This goes not only for the application and spread of future technologies, but also for existing technologies that are already commercially viable. It is therefore, important to assess the impacts of scenarios of soaring oil prices in the medium to long term on industrial transformation—from the perspective of corporate and societal risk management of enormous costs.

### 2. Emerging eco-market and corporate environmental management

Traditionally, corporate environmental management aimed at reducing discharges of various environmental pollutants or saving energy and resource consumption in a reactive manner to government regulations. In this stage, corporate environmental management can only expect marginal returns and benefits. However, with the development of eco-market where consumer and business clients put more value on environmental performances of both product and firm, proactive corporate environmental management might gain larger scale of returns in such ways as developing and expanding new market of eco-products, both for final products and intermediate products, putting more values on eco-products and brand image of corporations and lowering the cost of fund procurement. Therefore, in the developed world, changes in consumers' behavior towards expanding eco-market are crucial to facilitate this trend. On the other hand, the developing world cannot be free from this trend due to globalization. Currently, proactive multinational corporations develop procurement guidelines encompassing overseas subsidiaries. They have also started to monitor environmental performance in overseas subsidiaries and factories and report corporate environmental performance indicators in consolidated-based corporate environmental reports. Proactive environmental behavior of firms might be spreading in the developing world through local subcontracting firms of environmentally proactive multinational corporations, which also have spillover effects on other domestic firms in developing countries.

### 3. New demographic transition

It has long been argued that population expansion in the developing world has implications to food, energy and resources security. Long-term population projection of United Nations has kept revising downwards for the last several updates. This, first of all, implies that we need to improve our

understanding of up-to-date demographic phenomena more precisely. To have a better understanding of scale effects of the demographic transition to industrial transformation and environmental changes, we also need to know structural aspects of demographic changes. In some nations like Japan, Korea and Russia, population has started to decline or will soon start to decline and the society is rapidly aging. In addition, due to its strong birth control policy, China, sooner or later will also face a serious aging society. Measures and policies directed to an aging society are important but new challenges to human history. On the other hand, family size is getting smaller while the number of family is increasing in all countries. This trend has impacts on housing (buildings), household expenditure and residential energy and resource demands. With my limited knowledge in this field, I guess the direct and indirect impacts arising from these new demographic changes are not sufficiently reflected in the arguments of future issues. This new demographic transition might be one of the issues to be addressed in industrial transformation project.

### **Shobhakar Dhakal**

The briefing paper tries to lay out the foundation of the globalization by providing an outlook of its few markers as well as the review of the debate on sustainability transition that is taking place in Europe in a bid to see how these two are linked in Asia and to get an perspective on how to induce such transitions in Asian context. Flexing the analytical framework is the key purpose.

The paper is very interesting, it provides a cursory look into Asian development, I would not call it a serious look rather it is yet simple overview that does not take non-experts of either “globalization” or “transitions” by any surprise. The descriptions are very obvious that are know to us (first 8 pages at least). However the paper does not do justice by not adequately explaining why European debate needs to be connected to Asia while it is well known that Asia is clearly different from Europe in terms of policy needs, policy development, economic reality, cultural background and societal characteristics. It is quite obvious that Asian countries have different priorities issues at hand (however huge diversities persist in Asia amongst different group of countries). Europe is in a post-industrial phase while Asia is in pre-industrial phase despite that some of the issues could look similar I would believe that they are quite different. Even between Japan and Europe, both are at post-industrial phase, the whole philosophy of policies for material-cycle-management is quite different although it may look same from the surface. In this context, some discussions may be needed to show whether or how the definitions/approach /framework of “sustainability transition” in Asian context could or would be different or similar to Europe or is it a universal approach applicable everywhere despite the huge difference as mentioned earlier. The paper rightly points out that much of the current policy and research linked to technology, industry and sustainability in Asia relates to product-process innovation. However, it portrays that achievement of higher-level environmental and sustainability targets are has attracted less attention in Asia due to mainly it is in the stage of less resource-intensive per capita. In my view this is because of local physical priorities as well as political priorities at the current context; if it is to be true how we explain North America where higher-level environmental and sustainability targets, as we believe, are has attracted less attention too – may be political priorities has much to do than anything else. The bottom line of these comments is that stronger discussion is needed for this fancy European mantra’s relevance to Asian context else it cannot attract interests of scholars in Asia.

Asia is indeed in the huge urban-industrial transition. We need to look a bit into deeper whether this transition is stimulated significantly by the economic globalization itself. If this is true, we need to look these two separately before then trying to connect them together else deal separately. What is the role of economic globalization on India’s urban-industrial transition? I presume very less than China or at least very different.

Is globalization is all about economic globalization? The marker of globalization is too narrow in this paper. Such marker has to include many more other attributes, in particular emerging common culture (I would say emergence of common but bad culture of consumerism and nature-unfriendly activities), expanding global media outlets and their reach, NGO activism, great progress in wire and wireless communication including internet that is bringing world closer, and fast yet relatively affordable transportation that is bringing world closer. Media and communication is more powerful than economic globalization for sustainability transitions, both from “cause” as well as “response” point of view.

Rural-urban migration is unavoidable in Asia. Is size and scale of urbanization bad or good? What it signifies. Does it help in sustainability transition or make it worse?

How globalization is affecting sustainability parameters negatively and positively? This needs to be evaluated. Globalization is affecting the over utilization of natural resources in the host country for the sake of making money by MNCs who export goods to outside the host country. In the long run, the natural capital of the host country is depleted (could be irreversible) and they might invite costly problems than short-term gains. Similarly, there is evidence that, in some countries, cities are competing to attract FDI by significantly compromising the environmental consequences which has serious implications (Vietnam, China, India etc). However, in other hand, such globalization may helps to create job and develop industrial and technology base and may actually contribute to sustainability transitions. However, “develop first” and “clean-up later” approach actually might work for local pollution and few issues but clearly does not work for natural resources-depletion and carbon emission issues.

The only way to reconcile between Asian priority and transition need is to mainstreaming some of the transition elements into the immediate public policy, and education system and societal awareness programs over the time. Radical change may work in some of the technological elements; leap- frogging may be possible in some niche area of technology but in essence the culprit is the way how humans behave - the scale and intensity of their activity.

This paper is too much focused to technology and economics, which pay important role but they are not only ones. They are only part of the game. The paper has introduced systems innovations approach for nailing down elements of the transition needs which encompasses industrial transformation, regime shift, technological transition and socio-economic paradigm. These elements are quite comprehensive. It should be well understood that technology has definitely an important role to play but depending too much on technology is not a wise idea. Industrialization-led environmental adversities in terms of local and regional pollution are contained purely due to end-of-pipe technologies, process technology and clear fuel. However when it comes to the carbon emission, such essentially does not work – hydrogen? Where we get it? The crux of the sustainability transition calls for wise use of energy and materials, reduce the scale and intensity of the consumption activities, and improved process efficiency.

Are we going to deal only with East Asian Economies in this analysis? If not we need a much broader perspectives

There are other elements that are to be considered for understanding the potential pathways of transition. Human being by nature are adaptive animals, they tend to talk too much but when it is necessary they adapt. The key is to know what makes them adapt to new pathways and what should be he role public policy.

The last point I like to bring is that “design” does not work. Nobody can design nor will anybody follow the design. The transition should “evolve”.

## **Shunsuke Managi**

I have read the Workshop Agenda of this workshop. My particular interests are session of “ANALYSING TRANSITIONS: Developments in systems innovation studies”, and “ESTABLISHING COMMON THEMES - Working Groups (WG), WG1 Technological change”.

Large parts of my research focus on measuring and finding incentives of technological change and productivity, especially analyzing issues in China and several other countries.

For example, before the reform, China was a poor, over-populated, short of human capital and natural resources, and centrally planned economy. After more than two decades of market transition, China became a lower middle-income, emerging market economy. During the period, China's per capita Gross Domestic Product (GDP) has more than quadrupled and total GDP growing at an average annual rate of more than nine percent. In the early 1980s, few economists would have expected the outcome in China today. China is not likely to stop this growth any time soon.

The economics profession suggests a recipe for transition from planning economy to market economy. This requires for stabilization, liberalization, and privatization following political democratization. To guarantee a good reform, this recipe may not sufficient, but theoretically surely these essential ingredients are necessary for a reform to work. Although many of the policies such as being open to trade and foreign investment and sensitive to macroeconomic stability are adopted by the government in China, violations of these standard prescriptions are conspicuous. For the most part of the past two decades, China's reform succeeded without complete liberalization, privatization, and democratization. Therefore, the Chinese path of reform and its associated rapid growth is puzzling because it seems to defy the necessity part of this conventional wisdom. Blanchard and Fischer (1993) asked why China has grown so fast when conditions thought to be necessary for growth were absent.

In the literature, several plausible explanations are provided. The important reason for the growth is suggested to be the work of alternative financing and governance mechanisms. One of the most important mechanisms is reputation and relationships. The second most important mechanism is competition in product and input market. Third mechanism is the local government's fiscal incentives.

Empirical literature of economic growth in China suggests that total factor productivity (TFP) growth has played an import role to increase GDP during the reform periods. Out estimates of TFP growth on average found to be 1.84 percent, supporting the finding by Young (2003) that has questioned the Chinese growth performance. Source of TFP increase mainly come from technological change, instead of efficiency change. This reflects that relatively large potential of efficiency improvement is not absorbed in the economy yet. Our result of TFP does not shows the major change after the initiation of this reform. This might be because the "Decision" of November 1993 does not consider private ownership as important player in the economy. State ownership was still regarded as a "principal component of the economy" while private ownership was a "supplementary component of the economy."

Then we identified the source of changes in TFP and suggested possible solution for China to construct sustainable society considering energy and environmental problems.

I believe my experiences have some potential to contribute to WG1 of Technological change. I should also note that I am also interested in any other session considering the importance of these issues.

**Xuemei Bai**

I think the paper has laid down a very good foundation for further discussion and work. Reading the paper, several questions occurred to me, which are listed below:

1. It perhaps worthwhile to explore a little more on whether we know exactly what the long-term transition towards sustainability looks like today, or in a short term. It perhaps is easier to identify if we focus on historical trends, but if we are going to talk about inducing transition, then perhaps we need some more discussion on the long-term trend and short-term perturbation. Is there a possibility that some of the trends that might look positive today eventually turn out to be a negative one? Can we recognize which particular change or transitions that are taking place today is part of the long-term transition towards sustainability?
2. The scale issue might need further emphasis. In terms of analytical scale, do we want to take Asia as whole and talk about overall transition, or talk about the transition at several different scales, e.g. cities, national level, and Asia as a region? To me it seems there are more to explore in terms of interlinkages between scales, e.g. how measures taken at a particular scale (in addition to places that is addressed in the paper) interact with the trends at other scale.
3. The above question is also linked to the question of how do we identify the mechanism of transition. I know this is a huge question, and it is not likely to be fully answered unless we define our boundaries very carefully, but perhaps this need to be emphasized if we are going to talk about inducing transition. Empirical examples of several factors, either positive or negative, can serve as a starting point of exploring this question.

I concur with Louis - I think it should be interesting to ask the question of how the overall transition is related to resilience at a particular level.

## Appendix 4 - Reference list

### Transitions to sustainability and system innovation approach

\*) – marks the four most relevant pieces for a quick acquaintance with the field

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