Editorial

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Biographical notes: Dr. Jouni Korhonen is an Academy Fellow, Docent (Adjunct Professor) Research Director at Åbo Akademi University (Turku, Finland). He is the Editor-in-Chief of *Progress in Industrial Ecology* (Inderscience Publishers). Dr. Korhonen has served as the Subject Editor (Associate Editor) of the *Journal of Cleaner Production* (Elsevier Science) for six years now (2002–2008). He has published over 40 articles on industrial ecology, ecological economics, ecological modernisation and social ecology in international scientific journals that apply the referee practice. His PhD was published in 2000. Dr. Korhonen has worked as a Visiting Researcher at Harvard University. He is the President (together with Professor Richard Welford) of the International Sustainable Development Research Society.

The articles in this issue of *Progress in Industrial Ecology* propose that it is important to look beyond the immediate boundaries of one's organisation in sustainability and environmental analysis and in management approaches utilising such analysis. Environmental systems analysis including materials flow analysis has been important for sustainable development work. Scientists, decision-makers and business actors have become aware of the fact that materials and energy flows have natural, instead of administrative or man-made, boundaries and borders. Industrial metabolism has developed into a diverse and widely used body of analysis approaches, tools and methods to trace, monitor and account for the physical flows in industrial production-consumption systems. The metabolism of human systems is analogous to the metabolism of natural ecosystems, which also depend on the source and sink functions of their environment.

Industrial ecology has emerged as the scientific discipline incorporating industrial metabolism into its realm. But as industrial ecologists, we have also promised to do more than the important comprehensive analysis in industrial metabolism. Industrial ecology wants to include prescriptive suggestions to public policy and business management for changing and directing human actors and organisations towards more sustainable ways of operation.

It is on this second point that industrial ecologists have the most work to do. Engineering and natural science approaches are well-equipped to map and calculate the flows of materials in and between the system components of complex systems. The sustainable development of complex systems and boundary-crossing in these systems,

however, imply that the flows need not only to be monitored and analysed, but also coordinated and organised. Material flows are inevitably interorganisational. Humans cannot prescribe borders to these flows in a similar manner as administrative borders for geographical entities, for example.

Interorganisational management models contrast with the traditional model of business management. Traditional business management mainly focuses on a single company, or 'intraorganisational management'. The most common environmental management tools now applied in companies include the ISO 14001 standard and the EU Eco-Management and Auditing Scheme (EMAS). Both of these tools are mainly developed for a single firm or organisation. No management, organisational or administrative framework, model or platform exists for an interorganisational collection of private firms, public authorities and NGOs of, for example, a certain region, and its material and energy flows.

The risks of difficulties and misunderstandings in applying interorganisational structures and management models to an intraorganisational context and culture are many. Yet industrial ecologists seem to perceive these as minor barriers. As long as the engineering, the natural science and the physical materials and energy flow calculations are comprehensive and detailed enough, industrial ecology will succeed in its contributions to public policy and business management.

The issue of interorganisational sustainability or environmental management invites our research community to consider at least the following three broad questions and research challenges:

1 Data and materials gathering and modelling of the data. When moving from intraorganisational to interorganisational cases, the boundary of the system under investigation obviously becomes larger. Still, in all materials and energy flow studies, the system boundary needs to be defined. The physical flows of materials and energy cross substance, process, product, organisation, local, regional, national and continental boundaries and borders. For example, in the networks of many different firms, all have their own products with the product life cycles often extending local and regional borders. It can be close to impossible to map and quantify all of the individual product life cycles of an interorganisational firm network. I doubt whether a completely self-reliant locally sourcing and consuming industrial symbiosis or eco-industrial park exists in the modern society.

2 What should we optimise and why? The environmental and social concerns require us to optimise the global economic system as a whole in relation to the global ecosystem (or planet Earth with its atmosphere). In the competitive market economy, individual firms naturally optimise their own actions in terms of costs and profits. When moving from this single firm level to the level of a firm network or the interorganisational industrial ecology level, the goal of optimisation becomes more complicated. What if suboptimisation at the level of an individual actor enhances the optimisation of the system as a whole, *e.g.*, a local network of organisations, of which this one actor is part? What if the local optimum is in conflict with the regional and, most important, with the global optimum? How to balance optimisation and suboptimisation between different levels of analysis, policy and management in the global market economy within the biosphere?

3 What is the management system or the organisational form of a firm network? The management system models developed in business studies have been designed for an individual organisation, which has its own budget, its own decision-making platform and its own specific assignments of responsibilities and tasks. The challenge to develop the same for a network of firms encompassing many different organisations (each of which has its own management structure and management system) is huge.

The above research questions need international cooperation, the exchange of ideas and the sharing of practical experiences. Materials and energy flows extend business boundaries, but increasingly also national and continental borders. Firms are increasingly multinational with supply and value chains connecting different continents. This argument is supported by the fact that the 14th Annual International Sustainable Development Research Conference of the International Sustainable Development Research Society (ISDRS), New Delhi, India, 21–23 September 2008, has several important special tracks/sessions addressing themes of interorganisational sustainability governance and management. The conference has received many interesting contributions from all around the world addressing interorganisational questions both on the local level, such as eco-industrial parks, and on the global level, such as international supply chains.

The Delhi research conference has special tracks on regional sustainable development, global supply chains and industrial ecology for climate change mitigation. It is important that interorganisational sustainability management issues and themes have received this platform within the 14th annual conference. Below, I will shortly outline the main objectives and contents of these three tracks/special sessions within the programme of the 14th annual ISDRS conference in India.

The Industrial Ecology for Climate Change Mitigation track/session of the annual conference argues that the concepts, tools and methods of industrial ecology can offer insight into climate change mitigation and in this way contribute to global sustainable development. Cleaner production processes that are more eco-efficient, for example, are considered. Waste management is integrated with energy generation by utilising waste-derived fuels and by using the waste heat from electricity generation in the fuelling of societal production and consumption processes. Eco-efficiency approaches assessed both on the level of production processes and on the level that covers the entire supply and value chain, including consumption activities, need to be studied.

The track on global supply chains concentrates on global product certification schemes, global trade and sustainability questions, and on the difference between the developed and developing countries in terms of product standards. It has finally been accepted that modern products have international and global life cycles, supply chains and value chains. The conference in India now attempts to learn from and build upon the experience of international, global and integrated value chains when setting future research hypotheses and arguments in this rapidly emerging field of business studies: global sustainable supply chain management.

Sustainability is a global challenge. This journal and this annual conference are acknowledging the reality. However, at times, for more accessible approaches and for practical implementation programmes, it can be important to adopt geographical system boundaries. The special session in India, which deals with the role of local/regional authorities, with public-private partnerships and with the leadership of key private firms

in regional sustainable development, has attracted more contributions than any of the other 25 international scientific special tracks/sessions.[1] It is important to note that the call for papers was not one of explicitly focusing on industrial ecology. Rather, as always with ISDRS, the call was openly calling for research contributions to all the diverse fields of sustainable development research and from all over the world. This interest shows that the spatially orientated geographical boundary helps the global sustainable development research community to appreciate and value the accessibility and transparency that the local context provides.

Note

1 www.isdrs.org