Part 1: Editorial

Olga Memedovic

United Nations Industrial Development Organization,
Vienna International Centre,
A-1440 Vienna, Austria
E-mail: o.memedovic@unido.org

Biographical notes: Dr. Olga Memedovic is UNIDO Staff Member at Research and Statistics Branch. She holds a PhD degree in Economics from Erasmus University Rotterdam. Previously, she served as Project Leader at the Netherlands Economic Institute and as a Research Fellow at the Tinbergen Instutute of Erasmus University Rotterdam, Free University Amsterdam and University of Amsterdam. Dr. Memedovic led various research projects, among them are the *EU–LDC Trade and Capital Relations, Global Value Chains and Innovation Networks: Prospects for Industrial Upgrading in Developing Countries* and *Public Goods for Economic Development*. She is the author and main editor of several books and has produced many reports and studies on the issues of globalisation of labour markets, mutilateralism and regionalism, technical barriers to trade, competitiveness, theory and measurement of comparative advantages, GVCs and production networks, innovation systems, collective actions and industrial policy issues.

The views expressed herein are those of the author and do not necessarily reflect the views of the United Nations Industrial Development Organization.

1 Introduction

This Special Issue is conceived to contribute to our understanding of industrial upgrading in the context of Global Value Chain (GVC) and production and innovation networks by presenting the views of scholars from various disciplines, and the recent findings from empirical research and analyses of country and sector-specific cases. The purpose is also to discuss implications for policy and to identify ways forward for research and for the collection of economic data that can shed light on new and emergent trends in the global economy.

This Special Issue is organised in two parts. This first part, involving ten papers, provides more extended discussion on the theory and policy implications of GVC-engaged industrialisation and discusses methodological tools for analyses and for enhancing policy-making at various governance levels, local, national and supra-national. The upcoming Part 2, covering the remaining ten papers, will look at GVC-engaged industrialisation from a sectoral perspective. It will present papers derived from research based on field observations in specific industries like automotive, agro-food, leather and leather products, electronics (semiconductors) and white goods.

2 GVCs and structural changes in the global economy

The functional and spatial fragmentation of value chains and their reintegration in real time and space are central features of the structural changes at work in the contemporary global economy. Rapid technological advances, organisational innovations and the emergence of internationally accepted standards for product descriptions and business process protocols, in some industries and for some processes, make possible the fragmentation of value added tasks into distinct units (or modules). Steep wage differentials and liberal trade and investment regimes create economic incentives for outsourcing these fragmented tasks to specialised producers in locations around the world. Advances in Information and Communication Technologies (ICTs), Supply Chain Management (SCM) and inter-modal transport permit the functional reintegration of spatially dispersed production and consumption into new border-spanning business arrangements, variously referred to as Global Value Chains (GVCs) and Production and Innovation networks (GPNs and GINs) (Gereffi, 1994; Gereffi and Korzeniewicz, 1994; Gereffi, 1999; Sturgeon, 2000; Dicken et al., 2001; Ernst and Lüthje, 2003; Gereffi, 2004). Patterns of horizontal specialisations in final goods are being replaced by patterns of vertical specialisation in value chain tasks (Hummels et al., 1998; Hummels et al., 2001; Nordås, 2003; Yi, 2003). Complex global-scale business networks, linking nodes of innovation, production, distribution and consumption are creating international economic interdependence and are driving economic integration forward.

A great deal of academic and policy discussion is devoted to these processes. The debate concentrates on several major issues: Is globalisation a good or a bad thing? Do we properly understand the processes underlying global economic integration and the impact they are having on industrial development? Do we have the right tools to monitor the key processes and to act appropriately? How long can the GVC-led industrialisation be self-sustaining? How can national policy-makers ensure that wealth, jobs and innovative capability are generated at home as global integration proceeds? In what ways are specific locations embedded in global industries? Is investing in R&D enough to ensure that technological innovation, learning and development will take place, so that lagging economies catch up? What is the role of the state relative to the market and the public relative to the private sector in contemporary economic development?

Although the rise of GVCs raises many questions, one thing is certain: these processes are unlikely to prove ephemeral. Rather, GVCs are triggering extensive and profound long-term structural changes in the global economy.

3 The industrial upgrading challenge in the GVC context

While the changing international systems of innovation, production and trade can lead to a more efficient use of resources and to the realisation of welfare gains by fine-tuning comparative advantages (Feenstra et al., 2002; Moran, 2002; Bhagwati, 2005), they can also create various externalities, international interdependencies, and governance and policy problems (Higgott, 2005; Brown, 2008). The rise of GVC and GPNs has spurred industrialisation and upgrading but has also resulted in, or at least made more obvious, striking asymmetries between and within countries in knowledge, technology and in state capacity to understand and respond to these new realities of globalisation (UNIDO, 2003; Gereffi, 2006; Whittaker et al., 2007). There are also greater risks and uncertainty in the

global economy. Countries are more exposed to external competitive pressures and speculative swings than ever before. Intensified competition and the demands of global buyers are forcing prices down in places such as China and India, even as innovative, productive and technological capabilities rise, putting pressure on developing country producers, and pitting places against one another in ways that are immediate and direct (Kaplinsky, 2005). Even in traditional industries and in domestic markets, producers in developing countries must learn and innovate faster to sustain their competitiveness. At the same time, environmental degradation and rising energy prices are raising new questions about the sustainability of global integration.

GVCs are making the industrial upgrading process more complex and challenging. Because the system is changing rapidly, it generates structural disturbances, volatility and uncertainly that even developed countries can find difficult to deal with. The speed and extent of GVC development are challenging the old views of staged and sequential models of economic development (Rostow, 1960; Chenery et al., 1986),[1] and the classical orderly 'flying geese pattern' of the industrial development process (Akamatsu, 1961; Akamatsu, 1962; Hiratsuka, 2003, p.287).[2] The notion that foreign direct investment leads simply and directly to industrial upgrading, because of pressures to create forward and backward linkages in the host economy (Hirschman, 1958), becomes highly problematic in this new context (Kobrin, 1999; Whittaker et al., 2007; Sturgeon, this issue; Ernst, this issue).

In sum, effective responses to these challenges will have many dimensions and will involve many actors. Managing these processes calls for identifying shared concerns and responsibilities, for exploring new forms of governance, institutional innovations and collective actions at various levels: local; national and supra-national; regional and global (Sandler, 2004a, Sandler, 2004b; Sandler, 2005).

4 Overview of the papers

The first part of this special issue involves ten papers that are related to fundamental aspects and to some policy implications of GVC-engaged industrialisation. The discussion in the selected papers of Part 1 is structured around the following topics: modularity in GVCs; monitoring structural changes in global economy; governance in GVC; role of logistics in GVC; and complementing concepts of regional innovation systems and clusters.

4.1 Modularity in GVCs

GVC modularity creates a self-reinforcing, co-evolutionary cycle that is driving global integration forward. GVC modularity accelerates the division of labour, and allows for flexibility and for developing generic capabilities that can be used to meet diverse demand needs (Sturgeon, 2002; Sturgeon, 2003). Innovations in one link of the value chain can trigger pressures for developing complementary innovations and further co-developments in other value chains through network interactions, resulting in new products, new production processes and new markets.

Several papers in this volume address modularity in value chains and its implication for developing countries. Sturgeon's paper argues that GVC modularity accelerates division of labour, creating new market niches and more opportunities for developing

country suppliers, especially Small and Medium-Sized Enterprises (SMEs), to engage in the global economy and to upgrade their competencies. But there are risks too, such as the 'modularity trap' or losing product distinctiveness or in-house knowledge, because of standardisation. Similarly, Humphrey and Schmitz, estimate that the modularisation of the innovation processes will develop rapidly, but integral product architecture will still be needed in some sectors. Ernst' paper discusses that with the modularisation in innovation value chain, new challenges and opportunities are emerging for industrial upgrading in developed and developing countries.

4.2 Monitoring structural changes in global economy

Deepening of vertical specialisation and rising capabilities in developing countries are creating a self-reinforcing, co-evolutionary cycle that is driving global economic integration forward: fast and continuous changes in international division of labour drive the global engagement up; global engagement drives capabilities up; and rising capabilities tend to attract more investment and customers (Sturgeon and Lee, 2005). Comparative advantages are no longer thick and impenetrable but become volatile and complex (Bhagwati, 2005). Because the pace of change has accelerated, monitoring structural changes in the global economy and acting appropriately through policy has become more difficult.

Our understanding of these processes and their dimensions is shallow. It has become abundantly clear that we do not have the proper conceptual and methodological tools, or the appropriate data resources to penetrate the complexity of contemporary economic development. The rules of the game have changed, but economic theory and the data regimes of national and multilateral data agencies have not kept up. In this issue, Sturgeon proposes constructing new metrics to 'map' value chains by collecting establishment-level economic data on firms, establishments and workers, according to standardised generic tasks such as strategic management, new product development, operations, marketing and sales, technology and process development. These metrics, when combined with data on jobs, wages, occupations, skills and technology development, trade and e-commerce, will open new avenues for research and policy analysis.

Supporting such a view, the paper by Formentini and Iapadre discusses how the available statistical methods and tools, designed to measure more stable phenomena, may be questionable for assessing the complex and dynamic phenomena of fragmentation in production and vertical specialisation in trade.

4.3 Governance in GVC

The GVC perspective, developed by Gereffi, Humphrey and Sturgeon in 2005, has made a major contribution towards understanding industrial governance, or the non-market, inter-firm transactions and institutional mechanisms of coordination in GVC. Understanding GVC governance is important because it can limit and shape the capacity of individual producers to raise their competences in process, product, functional and inter-chain innovations (upgrading), and can also determine the dynamics of their capability building and hence their incomes over time. GVC governance thus helps to explain the income distribution along a GVC. These issues are also important in the debate on the normative aspects of globalisation, or what we should do for inequalities

arising from unequal spreading of gains from globalisation. For industrial strategy and policy formulation, understanding GVC characteristics (structure, geography, governance and institutions) is important because it raises three key issues (UNIDO, 2003; Memedovic, 2005): What type of work is allocated to developing countries and firms in the chain and will such work sustain their jobs and incomes? How much and what type of knowledge flows are in GVCs? Can knowledge flow in GVCs allow local firms' upgrading and foster a country's upgrading, and if so, what complementary flows are called for in reaching this upgrading?

Sturgeon's paper discusses how the GVC framework developed from the global commodity chain concept to an industry-neutral governance framework that combines key concepts from various academic disciplines (institutional economics, economic sociology and geography, strategic management literature, and the evolutionary economics). This industry-neutral GVC governance framework helps to answer key questions about the organisational dynamics of global industry: What are the geography and character of linkages between value added tasks in the chain? How is power distributed and exerted among firms and other actors in the value chain? What is the role of institutions (national, bilateral and multilateral rules, industry norms and standards) in structuring business relationships and in determining industry location? Addressing each of these aspects contributes to explaining how industries and places develop, how they might develop, and why some value chain tasks are firmly rooted in place and some are more easily relocated.

Humphrey and Schmitz argue that chain governance is about the setting of parameters (i.e. various standards) and their enforcement along the chain. The key issues are whether and how local enterprises manage to comply with these standards, whether and how the standards enhance or constrain the scope for local policy networks, and whether and how the standards affect local upgrading. In principle, the more conformance/compliance with parameters can be codified, generalised and credibly applied, the less will be the need for value chain governance. Humphrey and Schmitz conclude that parameter setting and enforcement by lead firms will most likely continue to be important in value chain governance.

Kaplinsky and Morris stress that in many GVCs producers from developing and Least Developed Countries (LDCs) are operating in low-rent value chain links, with low economic returns and thus weak export incentives, while rising shares of total value chain returns are appropriated by those who were able to introduce barriers to entry in other segments of the chain. The strategic challenge for developing economy producers is then the assessment of the pockets of rent, which exist and which are emerging in the chain, and to develop the capacity to upgrade their capabilities so that they too can benefit from barriers to entry, and thus get a greater share of the returns generated in the value chains into which they are inserted.

Moving in the direction of how to support global production networks as a more inclusive and participatory industrial organisation model, creating positive effects for innovation and economic growth, empirical evidence shows that electronic commerce, Business-to-Business (B2B), can offer great potential. But findings also show that the uptake was slow. Why has B2B e-commerce not been more effective? According to the paper by Dini et al., for enterprises to have an incentive to adopt e-business and e-commerce strategies and tools, the benefits must be greater than the investment and maintenance costs of the tools. The characteristics of B2B transactions call for an open infrastructure that is interoperable and allows enterprises to move freely in the market,

thereby avoiding lock-ins arising under conditions of incomplete and asymmetric information, uncertainty and high risk, when a principal hires an agent.

Assuming that the functional and spatial R&D fragmentation and reintegration in GINs will intensify, Ernst argues that countries and regions around the globe will compete to attract and expand some of the R&D tasks of the lead firms. And as they progress, they will rely on knowledge exchange through these networks, and their national and regional innovation systems will gradually integrate. The normative implications are then how best to leverage benefits from GIN integration while countervailing potentially negative effects arising from this integration. Ernst combines modularity innovation taxonomy with the sustaining and disruptive technology concepts and then uses this framework to discuss policy options for leveraging GIN participation for developing own innovative capabilities.

4.4 The role of logistics in GVC and GPNs

The role of logistics service providers in GVCs has gradually changed, in content and in complexity. They are becoming GVC coordinators and systems integrators. They also bundle some of their services with simple manufacturing tasks, like assembly and packaging. Useful insights have emerged from the SCM, freight distribution, transport geography and logistics literature for understanding current changes in the geography of production and consumption (Hesse and Rodrigue, 2004; Rodrigue, 2006).

Memedovic et al. discuss how containerisation and advanced logistics services enable and make global networks of production and physical distribution operational, and are becoming part of the value generation process. As a result, major export and import gateways emerged that became the interface between the geographies of production and the geographies of consumption, showing much of functional specialisation in the global economy. Because substantial differences in logistics capabilities exist across countries and regions that correlate with differences in transaction costs, trade performance and poverty ratings, the authors propose constructing a new Logistics Capability Index to monitor logistics capabilities by countries.

Ojala et al. show that a complex organisational structure and division of labour, similar to other global industries, has emerged in the logistic industry. The paper concludes that the demand for advanced logistics service providers is rising but response to these market demands is slow because the provision of comprehensive logistics solutions and global SCM capabilities are not easy to develop. They depend on financial resources, on capabilities in systems integration and on competitive logistics markets. Many developing countries lack competitive logistics markets, financial resources and required skills, making it difficult to get out of the vicious circle.

4.5 Role of clusters and Regional Innovations Systems (RIS)

The spread of GVCs, involving geographically dispersed firms and their clusters operating at different links in value chains or at nodes in the value network, has motivated a better understanding of local industrial upgrading challenge and of interactions across locations in the GVC context. Therefore, the research on clusters and RIS, previously mainly concerned with local linkages, needs to be extended with research on GVC linkages and how these affect local relationships, innovation and upgrading.

Clusters and RIS are interrelated concepts with several common elements. They acknowledge that tacit knowledge, the embeddedness of firms in a complex system of local network relations, the role of specific aspects of locations, local assets, capabilities, history and specific business environmental conditions remain powerful factors in explaining why geographical proximity remains so vitally important for technological learning and innovation. They also recognise that border-spanning linkages in GVC and GINs can potentially make clusters and RIS more successful open innovation systems (Chesbrough, 2003). To draw on these opportunities, clusters and RIS also need to develop strong external linkages.

Ketels and Memedovic's paper points out that strong clusters are well positioned to leverage opportunities arising from GVC. Empirical data confirm the causal link between traded clusters and economic performance, but there is still little quantitative evidence on the role and impact of cluster-based economic policy. The question is then: how can economies develop new clusters? They conclude that although this is possible, serious mistakes have created the misguided impression that cluster development is close to traditional industrial policy. One of the characteristics of a cluster-based economic development approach is its concern with the specific conditions present in a location or country. Natural-resource-rich economies are an interesting case where the need to diversify into new clusters is great but the barriers to success considerable. The paper gives some examples of the real-world policy actions that can make progress possible even in such a challenging situation.

Cooke explains the brief history of the RIS concept and its theoretical underpinnings. He points out that innovative capability depends greatly on the complementary capabilities needed to put into effect and commercialise the results of R&D, and this is best reached at the sub-national regional level (Teece, 1986; Cooke, 2005; Cooke, 2007; Cooke et al., 2007; Cooke, 2008). A well-networked entrepreneurial RIS is a self-organising, open system that translates 'exploration' knowledge from inside or outside the system, through a process of 'examination' of that knowledge to test and trial it for performance, to the point when it can be exposed to 'exploitation' knowledge or a commercial innovation on the market. This translation depends on a capable intermediary, able to understand and express the two 'languages' in question.

Value chain analysis, RIS and clusters can also be looked at as complementary strategic tools for mobilising collective action for formulating public good industrial policy, as discussed by several papers in this volume. Policy-makers, firms and representatives of intermediary organisations, and other actors in regional and national system of innovation, can be engaged in collaborate exercise to map the relevant value chain, and can use the value chain framework to assess local producers' competitive performance, GVC governance issues and their interface with local upgrading. Through this exercise they can identify the upgrading potentials, organise policies efficiently and can formulate action plans.

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Notes

1 Rostow's stages of economic development include: traditional society, the preconditions for takeoff, takeoff, drive to maturity, high mass consumption.

2 Hiratsuka (2003, p.287) argues that the 'flying geese pattern' of the forerunner followed by the latecomer, and then by the latest starter in industrial development processes does not always hold in the era of trade and capital liberalisation.