

1 GLOBAL PRODUCTION NETWORKS

DEALING WITH DIVERSITY¹

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INTRODUCTION

East Asia still is one of the most dynamic economic regions in the world. After the 1980s boom and the subsequent crises during the 1990s, however, questions arise about the future of economic development in the region and the perspectives for companies operating in East Asia. While China is unanimously – and often euphorically – regarded as the market and the production location of the future, many observers expect the decline of Japan as the economic centre of gravity. This becomes obvious in the current debates about an industrial ‘hollowing out’ of Japan and other advanced economies. The analysis of macroeconomic data on foreign trade and direct investment is often used as proof. Uncertainty also prevails about the future development of other economies in East Asia. In order to better understand the current transformations against the background of economic globalisation, it is necessary to look more closely at the structures of global production networks (GPN) – the main drivers of economic development – and their regional as well as sectoral differences.

Global production networks can be characterized by the following relevant actors: Focal firms dominating the networks (usually transnational enterprises), their business partners (for example suppliers, ex-

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ternal service providers, customers) and finally the governmental and non-governmental institutions of regions and countries within which the companies operate. The structure and development of these GPN evolves in particular from the strategies and organisational models of the focal firms, the nature of relationships with other firms and customers, and the form and intensity of influence exercised by political and societal institutions. For a long time Japan has been a prime example, and Japanese firms continue to be the largest investors in most of the East Asian countries. However, at least since the 1997 Asian financial crisis there is growing pressure to carry out restructuring in politics and business organisation in the light of globalisation, liberalisation and deregulation. Firms from Western economies meanwhile have adapted many successful elements of Japanese enterprise organisation (lean management, inter-firm collaboration and so on), while at the same time their influence in East Asia has been growing. Well known examples include the investments of German-US group Daimler-Chrysler in Mitsubishi or the holding of Nissan shares by the French car maker Renault. Hence the boundaries between previously separate production systems and strategies seem to become increasingly blurred. This poses the question of the extent to which these developments lead to a convergence of organisational models or whether particular features of different business systems remain distinctive.

In the light of the above mentioned developments two trends can be observed in economic policy which the countries in East Asia have in common, despite the differences in scope and success of their internal reforms: firstly, a considerable degree of regulation of foreign direct investment; secondly, a growing understanding of the necessity for increased political and economic co-operation. Attempts for supra-national integration like ASEAN, ASEAN+3 or AFTA and bilateral agreements, as in the case of Japan and Singapore, are the result of government actions often called for by enterprises. For instance, Japanese firms have tried to speed up the implementation of free trade zones under the AFTA using their government contacts in Southeast Asia, while Taiwanese manufacturers urge their government to reduce restrictions on setting up production facilities in mainland China. The fact that China now is the largest recipient of foreign direct investment within East Asia, however, does not mean that corporate strategies and GPN structures are aligned towards China in the same way. Important in this context are the opportunities of value-added in different economic sectors.

Globalisation rhetoric usually assumes that the origin of a transnational enterprise is irrelevant, since it operates globally and follows

universally valid – capitalist – rules. Research into the organisation of these firms, however, shows the continuing importance of home country influences. During interviews, the issue of human resource management has, of course, been raised time and again, but the forms of inter-firm co-operation also depend to a large extent on specific cultural and institutional circumstances. A clear distinction between corporate culture and ‘national’ or ‘regional’ (for example ‘Asian’) culture proves to be difficult, however, both forms are usually intricately intertwined. An interesting characteristic of many GPN is the rather strong involvement of companies from the home country of the network’s focal firm. This is true for Japanese multinationals that rely on business partners from Japan, but equally applies for European firms in East Asia. These companies often try to replicate their specific organisational models and strategies abroad, and at the same time face difficulties of integration in foreign or host country networks – due to the very same mechanism of replication. ‘[...] it can be argued that national culture continues to affect corporate strategy making and to provide differences in style and mode of implementation within MNCs. These are, of course, currently being tested in global markets’ (Loveridge and Mueller 1999, p. 82).

In the following section, we outline an analytic framework, which we believe, helps us to understand some of these processes more effectively. The framework we propose is that of the ‘global production network’ (GPN). While the GPN is not advanced as a totalizing framework capable of grasping the myriad complexities of economic globalisation, we believe that it is capable of delivering a better analytic purchase on the changing international distribution of production and consumption – and the viability of different development strategies to which they relate – than has previously been possible.

GLOBAL PRODUCTION NETWORKS – A FRAMEWORK FOR ANALYSIS

The concept of the global production network (GPN) outlined here draws on the work of Gereffi and his collaborators (Gereffi and Korzeniewicz 1994) on global commodity chains (GCC) and the existing value chain literature (Porter 1985; Sturgeon 2001). Before we elaborate on the nature of the GPN, we need to explain our preferences for the terms ‘production’ rather than ‘commodity’ and ‘network’ rather than ‘chain’. We also need to indicate our understanding of ‘global’.

In contemporary usage the term ‘commodity’ generally connotes standardized products and with that, the fixity of their production in time and

space. While this remains the reality of some forms of productive activity and products (some agriculture, some heavy industry and minerals extraction, for instance), it clearly does not capture adequately the post-fordist forms of activity that characterize many of the industries that the GCCs framework, for instance, was designed to analyse. More importantly, perhaps, our preference for a discourse of 'production' places the analytic emphasis on the *social processes* involved in producing goods and services and reproducing knowledge, capital and labour power. Notwithstanding Marx's definitive deconstruction and interrogation of the commodity (in Part I of the first volume of *Capital*), the discourse of commodities has long been captured by orthodox economics of whatever paradigm. As a consequence, it has transmuted into a reified language shorn of its social content. There is a need, therefore, to re-focus attention on the social circumstances under which commodities are produced and consumed and thus avoid the ever-present danger of slipping into a perception of commodities as de-humanized building blocks involved in the making of other commodities.

The metaphor of the chain gives the impression of an essentially linear process of activities that ultimately result in a final commodity rather than one in which the flows of materials, semi-finished products, design, production, financial, and marketing services are organized vertically, horizontally, and diagonally in complex and dynamic configurations. Additionally, the chain metaphor – consistent with a commodity discourse – seems to have difficulties incorporating due attention to the issues of the reproduction of labour power and so on. Furthermore, the chain metaphor works against conceiving of the individual firms incorporated into a production system as having room for autonomous action within that system, in spite of the fact that such autonomy is central to the possibilities for industrial upgrading and thus sustained economic development. As a consequence of these difficulties, we find a discourse of networks to be more inclusive, empirically adequate and thus more analytically fertile.

Adoption of a network discourse also delivers other potential benefits. In particular, as long as 'production' is couched broadly to include intermediate and final markets and as long as the dynamics of power and knowledge between actors and institutions are understood in a multidirectional and non-deterministic fashion, then the GPN framework allows for far greater complexity and geographical variation in producer-consumer relations than the GCC approach, for instance, has so far achieved. Specifically, it should facilitate our ability to reveal how certain key knowledge 'circulates' between producers, consumers and intermediaries, rather than moving in a uni-directional manner, a key insight of the

expanding literature on 'commodity cultures' (for example Cook and Crang 1996; Jackson 1999). Moreover, this approach should also allow more complex social geographies to be revealed, in the sense that agents in a variety of locations can be seen to combine to influence the production process.

Finally, while it is now fashionable to use the term 'global', phenomena and practices that until recently would have been more likely to be termed 'international' or 'transnational', our adoption of the former term is driven by our concerns with analytical precision. Specifically, the terms 'international' and 'transnational' derive from essentially state-centric discourses. Thus while they incorporate notions of cross-border activity of many sorts, they do not adequately express the way in which non place-specific processes penetrate and transform place-specific ones, and vice versa. They do not, therefore, help to deliver the imaginative sensibilities necessary to grasp the dialectics of global-local relations that are now a pre-condition for the analysis of economic globalisation and its asymmetric consequences.

The global production network as proposed here, is a conceptual framework that is capable of grasping the global, regional and local economic and social dimensions of the processes involved in many – though by no means all – forms of economic globalisation. It is unlikely to be of particular help, for instance, for the analysis of some forms of finance capital such as bank loans and portfolio investment. Production networks – the nexus of interconnected functions and operations through which goods and services are produced, distributed and consumed – have become both organisationally more complex and also increasingly global in their geographic extent. Such networks not only integrate firms (and parts of firms) into structures that blur traditional organisational boundaries – through the development of diverse forms of equity and non-equity relationships – but also integrate national economies (or parts of such economies) in ways that have enormous implications for their well-being. At the same time, the precise nature and articulation of firm-centred production networks are deeply influenced by the concrete socio-political contexts within which they are embedded. The process is especially complex because while the latter are essentially territorially specific (primarily, though not exclusively, at the level of the nation-state) the production networks themselves are not. They 'cut through' state boundaries in highly differentiated ways, influenced in part by regulatory and non-regulatory barriers and local socio-cultural conditions, to create structures which are 'discontinuously territorial' (see Dicken et al. 2001; Cabus and Hess 2000).

There are three principal elements on which the architecture of the GPN framework is raised. The first of these is:

Value: By 'value' we mean both Marxian notions of surplus value and more orthodox ones associated with economic rent. Thus we are interested in the following matters.

- The initial *creation* of value within each of the firms incorporated into a given GPN. The significant issues here include the conditions under which labour power is converted into actual labour through the labour process; and the possibilities for generating various forms of rent. In the former the issues of employment, skill, working conditions and production technology are important as well as the circumstances under which they are reproduced (hence connecting these issues to broader social and institutional questions). In the latter (see Kaplinsky 1998; Gereffi 1999) the issues are whether a given firm can generate rents from (a) an asymmetric access to key product and process technologies ('technological rents'); (b) from particular organisational and managerial skills such as 'just-in-time' production techniques and 'total quality control' and so on ('organisational rents'); (c) various inter-firm relationships that may involve the management of production linkages with other firms, the development of strategic alliances, or the management of relations with clusters of small and medium sized enterprises ('relational rents'); or (d) from establishing brand-name prominence in major markets ('brand rents'). In certain sectors and circumstances (e) additional rents may accrue to some firms as a consequence of the product scarcities created by protectionist trade policies ('trade-policy rents'), though this is another issue that connects questions of value creation to the institutional contexts (national and international in this case) within which firms operate.
- The circumstances under which value can be *enhanced*. The issues involved here include: (a) the nature and extent of technology transfers both from within and without the given production network; (b) the extent to which lead and other major firms within the network engage with supplier and subcontractors to improve the quality and technological sophistication of their products; (c) as a consequence, whether demands for skill in given labour processes increase over time; (d) whether local firms can begin to create organisational, relational and brand rents of their own. In all of these cases, the national institutional influences to which the firms are subject (governments agencies, trade unions, employer associations, for instance) may be decisive for the possibilities of value enhancement.

- The possibilities that exist for value to be *captured*. It is one thing for value to be created and enhanced in given locations, but it may be quite another for it to be captured for the benefit of those locations. The pertinent issues here partly involve (a) matters of government policy, but they also involve (b) questions of firm ownership and (c) the nature of corporate governance in given national contexts. In the first case, the nature of property rights and thus laws governing ownership structures and the repatriation of profits can be important, while in the second the extent to which firms are totally foreign owned, totally domestically owned, or involve shared equity as in joint-venture arrangements, continues to be decisive as a long tradition in the political economy of development has argued and recent experience in Britain, for instance, has underlined. In the third case, the extent to which corporate governance is founded on stakeholder principles, rather than on shareholder dominance (and required by legal statute) can have important consequences for whether value generated in a given location is retained there and indeed used for the benefit of the common weal. The issue of value capture, then, underlines the significance of the national form of capitalism – and thus matters of expectations, rights and obligations – for questions of economic and social development.

Power: The source of power within the GPNs and the ways in which it is exercised is decisive for value enhancement and capture and thus for the prospects for development and prosperity. Although not theorised in terms of power, Humphrey and Schmidt's (2001) discussion of the governance structures of 'value chains' is an important complement, at this point, to our work. There are three forms of power that are significant here.

- *Corporate power.* Here we have in mind the extent to which the lead firm in the GPN has the capacity to influence decisions and resource allocations – vis-à-vis other firms in the network – decisively and consistently in its own interests. Our adoption of a network discourse implies a rejection of a zero-sum conception of power in that lead firms rarely, if ever, have a monopoly on corporate power. Rather, while power is usually asymmetrically distributed in production networks, lesser firms sometimes (and for contingent reasons) have sufficient autonomy to develop and exercise their own strategies for upgrading their operations and so on. Additionally, and at least in principle, lesser firms incorporated into networks have the possibility of combining with other lesser firms to improve their collective situation within the GPN (as when SME clusters constituted as industrial dis-

tricts are incorporated into GPNs; see Castells (2000, Chapter 5) and also Carnoy and Castells (2001).

- *Institutional power.* Our reference here is to the exercise of power by (a) the national and local state (in the latter case where the national state is constituted as a federal polity); (b) international inter-state agencies ranging from the increasingly integrated European Union on the one hand through to looser confederations such as ASEAN or NAFTA on the other; (c) the 'Bretton Woods' institutions (International Monetary Fund, World Bank) and the World Trade Organisation; (d) the various UN agencies (particularly the ILO); and (e) the international credit rating agencies (Moody's, Standard and Poor and so on) which exercise a unique form of private institutional power. The capacity to exercise power to influence the investment and other decisions of lead companies and other firms integrated into GPNs is inevitably asymmetric and varies both within and between these five categories. Thus with regard to national states, some of those in East Asia (particularly South Korea and Taiwan, but more recently China) have been perceived in recent decades as being amongst the most capable of influencing private companies in the interests of industrialisation and development (among an enormous literature see Wade 1990 and Henderson 1999) while states as disparate as those of Britain and Indonesia have been far less able to do so. This is obviously not the place to explain such discrepancies except to mark that the answers seem to lie in a combination of political will (or its absence) and differing institutional capacities for economic governance. For the British and Indonesian cases see Hutton (1995) and Hill (1996) respectively. For more general and theoretical accounts of the relation between state capacities and economic development see Evans (1995) and Evans and Rauch (1999). The power of the inter-state agencies is potentially considerable – particularly in the case of the EU – though elsewhere it remains weakly developed. The power of the Bretton Woods institutions, while it can be considerable, is exercised indirectly and impacts on companies, workforces and communities via the economic and social policies that national governments are obliged to implement. The power of the UN agencies is of much less significance than any of the others in that its influence on firms is not merely indirect, but it is also only moral and advisory. The significance of the credit rating agencies is potentially considerable, both directly for many lead companies and indirectly via their credit risk assessments of national governments. However, we as yet know little of the ways in which their influence is exercised (but see Sassen 1999).

- *Collective power.* By this form of power we understand the actions of collective agents who seek to influence companies at particular locations in GPNs, their respective governments and sometimes international agencies (most recently the IMF and WTO in particular). Examples of such collective agents include trade unions, employers associations, and organisations that advance particular economic interests (for example of small businesses), NGOs concerned with human rights, environmental issues and so on. These agencies may be nationally or locally specific, or they may be internationally organized as are some trade unions (for example the International Metal Workers) or human rights organisations (for example Amnesty International). In most circumstances where such agencies are engaged, they attempt to exercise countervailing power either directly on particular firms or groups of firms within given networks or indirectly on national governments or international agencies.

Embeddedness: GPNs do not only connect firms functionally and territorially but also they connect aspects of the social and spatial arrangements in which those firms are embedded and which influence their strategies and the values, priorities and expectations of managers, workers and communities alike. The ways in which the different agents establish and perform their connections to others and the specifics of embedding and disembedding processes are to a certain extent based upon the ‘heritage’ and origin of these agents. Firms – be they TNCs or smaller local enterprises – arise from, and continue to be influenced by, the institutional fabrics and social and cultural contexts of particular forms of capitalism (or in the case of Eastern Europe, China and so on prior to the 1980s, particular forms of state socialism) in their countries of origin. While the nature of education, training and labour systems and the sources and organisation of corporate finance are important, of particular significance for firm development, priorities and strategies are the nature of state policy and the legal framework (Zysman 1983; Hutton 1995; Whitley 1999).

Local companies that have emerged from particular social and institutional contexts evolve over time on the bases of trajectories that are in part a reflection of these contexts. As many scholars have pointed out with regard to the former state socialist societies of Eastern Europe, these trajectories are ‘path dependent’ and thus to some extent historically constrained (for instance, Stark 1992; Hausner, Jessop and Nielsen 1995; Czaban and Henderson 1998). While it is important to recognize that such constraints are not immutable and that their influence may be waning – not least because of globalisation – it is also important to acknowledge

that some lead firms when investing overseas may carry the institutional 'baggage' of their home bases with them. But others might also tend to operate at or near the lowest common denominator that domestic policies and legal frameworks will allow. Japanese companies, for instance, have never offered 'permanent employment' contracts to employees in their foreign subsidiaries. Similarly German companies, though required by German and EU legislation to consult extensively with employees before instituting redundancy programmes, have never done so in countries where such laws do not apply. Recent disinvestments in Britain by Siemens and BMW are cases in point.

Amongst the different dimensions and aspects of embeddedness, there are three related forms of firm and network embeddedness that are of interest here. The first form, *societal*, considers an actor's history and social/cultural origins. The second form, *network* embeddedness, refers to the network structure, the degree of connectivity within a GPN, the stability of its agents' relations and the importance of the network for the participants. The third form, *territorial*, deals with the various GPN firms' 'anchoring' in different places (from the nation state to the local level), which affects the prospects for the development of these locations. All three forms, of course, are the result of essentially social and spatial processes of 'embedding'.

- 'Societal' embeddedness: Signifies the importance of where an actor comes from, considering the societal (that is, cultural, political and so on) background or – to use a 'biologistic' metaphor – 'genetic code', influencing and shaping the action of individuals and collective actors within their respective societies and outside it. Herein lies the foundation of most discourses about the convergence of capitalist systems and the institutional limits to it (see Gertler 2001; Harzing and Sorge 2002). This type is maybe the one most closely linked with the original idea of embeddedness as laid out in Karl Polanyi's (1944) seminal book, 'Transformation'. Although Polanyi does not write explicitly about 'cultural' embeddedness, it is safe to say that his analysis offers an excellent point of reference to emphasize the history of social networks and the cultural imprint or heritage of actors that influence their economic behaviour 'at home' as well as 'abroad'. Of course, the notion of culture is another example of a widely used, but rarely stringently elaborated concept. Without going into detail here about the nature of culture in organisation studies and economic geography (for a discussion see Gertler 1997; Alvesson 2000; Barnett 2001), culture for this purpose is broadly conceived as the 'heritage' of an actor that links it to the 'society' it emanates from. 'We propose that [...] cultural formations are significant because they both constrain and

enable historical actors, in much the same way as do network structures themselves' (Emirbayer and Goodwin 1994, p. 1440). Societal embeddedness also reflects the business systems idea of an institutional and regulatory framework that affects and in part determinates an actor's behaviour, for example on the individual level via the cognitive mechanisms detailed by Zukin and DiMaggio (1990), or on the aggregate level of the firm, as pointed out by Whitley (1999) and his colleagues.

- **Network embeddedness:** Describes the network of actors a person or organisation is involved in, that is the structure of relationships among a set of individuals and organisations regardless of their country of origin or local anchoring in particular places. It is most notably the 'architecture', durability and stability of these relations, both formal and informal, which determine the actors' individual network embeddedness (the relational aspect of network embeddedness) as well as the structure and evolution of the network as a whole (the structural aspect of network embeddedness). While the former refers to an individual's or firm's relationships with other actors, the latter consists not only of business agents involved in the production of particular goods or a particular service, but also takes the broader institutional networks including non-business agents (for example government and non-government organisations) into account. Network embeddedness can be regarded as the product of a process of trust building between network agents, which is important for successful and stable relationships. Even within intra-firm networks, where the relationships are structured by ownership integration and control, trust between the different firm units and the different stakeholders involved might be a crucial factor, such as in the case of joint ventures (Yeung 1998).
- **Territorial embeddedness:** Considers the extent to which an actor is "anchored" in particular territories or places. Economic actors do not merely locate in particular places. They may become embedded there in the sense that they absorb, and in some cases become constrained, by the economic activities and social dynamics that already exist in those places. One example here is the way in which the networks of particular firms may take advantage of clusters of small and medium enterprises (with their decisively important social networks and local labour markets) that pre-date the establishment of subcontracting or subsidiary operations by such firms. Moreover, the location or anchoring down of external firms in particular places might generate a new local or regional network of economic and social relations, involving existing firms as well as attracting new ones. Embeddedness, then,

may become a key element in regional economic growth and in capturing global opportunities (Harrison 1992; Amin and Thrift 1994). There is also a downside. The nature of local networks and socio-economic relations may under certain circumstances generate an inability to capture global opportunities and lead to regional economic downturn (Oinas 1997, p. 26). Strong embeddedness, therefore, is not necessarily a 'good' or positive quality of networks or their agent. The resulting advantages in terms of value creation and so on may result in spatial 'lock-in' for those firms with knock-on implications for other parts of that firm's network (see Grabher 1993; Scott 1998). Similarly, national and local government policies (training programmes, tax advantages and so on) may function to embed particular parts of larger actor-networks in particular cities or regions, in order to support the formation of new nodes in global networks, or what have been described as islands in an archipelago economy. But the positive effects of embeddedness in a particular place cannot be taken for granted over time. For example, once a lead firm cuts its ties within a region (for instance, by disinvestment or plant closure), a process of disembedding takes place (Pike, Lagendijk and Vale 2000; pp. 60–1), potentially undermining the previous base for economic growth and value capture. From a development point of view, then, the mode of territorial embeddedness or the degree of an actor's commitment to a particular location is an important factor for value creation, enhancement and capture.

These three dimensions of embeddedness are of course closely knitted to each other, and in combination form the space-time context of socio-economic activity. The following section will illustrate the main conceptual categories of value, power and embeddedness by looking on developments in the telecom equipment industry of East Asia and Europe.

GPN AND DIVERSITY

AN ILLUSTRATIVE EXAMPLE OF TELECOM EQUIPMENT MANUFACTURING

To date, the telecom sector has created a quite remarkable number of jobs world-wide. During the evolution of the telecoms industry, the growth of sector employment has usually been strongly connected to the overall development of national economies. Over the period 1995–2000, the number of jobs in many of the economies remained roughly constant or grew moderately; the global average annual rate was 1.7 percent, with Asia (including South Asia) finally overtaking Europe during these five years. Employment was declining especially in the transformation economies of

Eastern Europe, where privatisation and sector reforms reduced the workforce by an annual rate of 1 per cent (for example Czech Republic, Poland) to almost 10 per cent (the Baltic states of Latvia and Lithuania, for instance). In Asia, the financial crisis of 1997 and continuing reforms led to job losses in Japan and some of the South East Asian countries, while Vietnam and China saw the biggest growth rates in public telecoms services of all the Asian economies, with 17.2 per cent and 9.3 per cent respectively. This shows the strong demand for telecoms provision in order to catch up with the already more saturated markets. Within the EU, most of the northern states experienced the biggest growth rates during this period, while countries in the southern EU, especially Spain and Italy, fell back. This might be explained by the different expansion rates of mobile services.

While the above figures reflect the boom phase of information and communications technology industries world-wide, the picture has changed drastically since 2000. The telecoms sector has suffered dramatic job losses, both in the service and manufacturing activities, across the globe. Many service providers have been forced to downsize their workforce because of flattening demand, increased competition and the accumulation of huge debts related to the acquisition of 3G licenses. As a consequence, far fewer orders for new equipment have been placed, hitting the telecoms vendors and forcing them to cut costs through layoffs and relocation or outsourcing of manufacturing activities. This has transformed the economic landscape of telecom equipment manufacturing in Europe and East Asia, whereby a considerable proportion of the job losses at large OEM (original equipment manufacturer) firms like Ericsson, Siemens or Panasonic Mobile Communications has been compensated for by employment growth in contract manufacturing (CM) and electronics manufacturing services (EMS) providers like Flextronics, Elcoteq, or Celestica.

A growing share of telecommunications employment is related to the increasing globalisation of business activities carried out by the major players in the sector. Value creation in the form of direct employment and related income certainly contributes to the development prospects of countries and regions. Equally important, however, are the jobs created indirectly through the activities of telecoms companies, thereby opening up opportunities for technology and know-how transfer and thus value enhancement. One illustration of the importance of indirect employment creation is the case of a European telecoms equipment manufacturer and its operations in Malaysia. The company started its activities in Malaysia, fulfilling a major contract with Telecom Malaysia for building up their infrastructure, in 1984. Due to the size of the contract, a local manufacturing base was

required, but was closed down in 2001, after the contract expired. Since then, the company directly employs only 150 people in Malaysia, in R&D and marketing/sales, which arguably is not a major contribution to Malaysia's labour market. In terms of inter-firm linkages, however, indirect employment and technology/know-how transfer is rather remarkable. The Malaysia branch of the European firm is the source for indirect employment in the software, manufacturing and construction industries, as indicated by the local managing director during an interview.

[...] we are working together with low cost software companies to develop applications and content for new technologies such as GPRS or WAP or whatever. MIC Mobile Internet Centre, that is [our] lab where we test and verify those applications [...].

... As far as I know just about everyone of those [software companies] are local companies. Established by young entrepreneurs, small companies, maybe the biggest of the companies has 30 people and typical size is maybe 10–15. [...] They are people who have ideas and believe in mobile internet and have established companies to develop these ideas to applications. What we are doing is we are providing our software tools and platforms that they can use to develop that idea to an application. We are giving the coaching and finance in all the areas that they are concentrating on. And manage all these connections to [our parent company] and do the testing and we do it free of charge.

... In this software thing, we have about 1,000 people working in that, doing applications. In the manufacturing of these set-top boxes we have a bout 1,000 people working in that. In the subcontractor networks we have a few thousand. All in all the number of people in relation to our activities is very very big but only a small number is our own people. That is the way how we do it. (Company interview, 24.02.2002)

Another indicator for value creation is the investment in telecommunications services. In absolute terms, investment during the year 2000 has been highest in the North East Asian economies of Japan, China, Taiwan and South Korea. The only European countries that come close to these figures are Italy and the UK. The relative importance of telecoms investment, however, becomes more evident by looking at its 1999 share in total gross fixed capital formation. Again, China ranks among the countries most heavily investing in telecoms. Among the emerging economies of East Asia, Thailand and Malaysia are found to be above the world average of 3 per cent, whereas the majority of the transformation economies in Eastern Europe belongs to that category.

While the amount of investment in Asia demonstrates the importance of the region as a market, a look at the telecoms equipment trade figures for the years 1995 and 2000 indicates the dominance of European vendors over that period of time. An outstanding example is Finland, home to the equipment maker Nokia. Exports of this company alone account for about 25 per cent of all Finnish exports (Castells and Himanen 2002, p. 43) and about 70 per cent of Finnish ICT exports. Similarly, Sweden generates high export volumes partly due to its telecoms giant Ericsson, as do Germany (Siemens) and France (Alcatel). Thanks to direct investment in equipment manufacturing facilities, Ireland and the UK also expanded their telecom equipment export base, being a preferred location manufacturing base during that time. In Asia, Japan and South Korea were a major source of exports, with China catching up quickly. Hit by the financial crisis, Thailand, Malaysia and Indonesia are the only countries that have experienced a contraction of imports 1995–2000, while moderately expanding their exports. Behind this picture lie the changing strategies of equipment manufacturers towards globalisation and restructuring, which transformed the global production networks of the players involved and led to a shift in the locational structure of these GPN in Europe and Asia.

Telecoms equipment can be broadly differentiated into two categories: network and switching equipment, and terminals. This illustrative section will concentrate on the global production networks of mobile phones and the changes of value added, power and embeddedness within them under globalisation. Since the introduction of mobile telephony about 15 years ago, a small number of vendors have established themselves as market leaders in this segment. By far the largest company producing and selling mobile phones is the Finnish Manufacturer Nokia, with about 35 per cent market share world-wide and shipments of almost 140 million handsets in 2001 (Törnroos 2002, p. 10). Nokia is followed by Motorola (USA), Samsung (South Korea), Siemens (Germany) and SonyEricsson, the recently created Swedish-Japanese mobile phone joint venture. Together, these five companies cover about 75 per cent of the world market for handsets and therefore their strategies and GPN very much dominate this subsector. A common denominator of all the leading handset manufacturers is their strategy towards relocating the actual manufacturing activities to low-cost sites. Since handsets have become commoditized, the value added in the manufacturing process has fallen sharply, and hence economies of scale are crucially important. Therefore, the assembly of mobile phones has been scaled down in the United States and Western Europe, while production has been increased in Eastern Europe and East Asia. The Japanese firm Panasonic Mobile Communications, for instance,

has relocated its plant in Thatcham/UK to the Czech Republic, while Nokia has partially withdrawn from manufacturing in the US and expanded production at its Mexico and South Korea plants. What is different among the main players in this field is their strategy towards outsourcing. Every lead firm is using EMS companies now as contract manufacturers, but to different degrees. Nokia, the market leader, still produces about 80 per cent or more of its handsets in-house, at 8 locations worldwide, which is economically feasible only through the sheer volume of production. By the same token, South Korea's Samsung does the bulk of production still in house. On the other hand, SonyEricsson has given up all of its own manufacturing and co-operates with Flextronics which took over the plants previously owned by Ericsson, as EMS partner. Siemens runs a strategy of both in-house manufacturing and outsourcing, because it sees production know-how as a core competence and does not want to lose it, despite profit margins being negligible or even negative. Interestingly, whatever strategy these focal firms have chosen, in most cases the effects of societal embeddedness or home-country effects, as well as network embeddedness can be found in the GPN inter-firm relationships with their suppliers and EMS partners.

It often – though not exclusively – can be observed that the focal firms prefer partners and suppliers of their own nationality or culturally proximate countries, because of similar corporate cultures, often long standing business relationships and a resulting high level of trust. As one interviewee from a mobile phone EMS put it,

[...] well, I am a [country x citizen], a [country x citizen] trusts a [country x citizen], like that. They might not trust someone else – maybe that's the benefit. (Company interview, 25.11.2002.)

It is notable, for instance, that Nokia co-operates with a Finnish EMS firm, Motorola uses a US company, Japanese handset manufacturers like NEC – initially reluctant to follow the outsourcing model at all – started to create their own EMS spin-offs and only very lately engaged in outsourcing relationships with Western firms. Siemens and SonyEricsson, however, chose Flextronics as their EMS partner, a Singapore-based, US-managed firm with global operations. The co-evolution of suppliers and focal customers is also reflected in the business relationships between handset manufacturers and handset cover suppliers. Siemens is working with the German Balda AG, while Ericsson's lead supplier is the Sweden-based Nolato. Motorola uses the US company Nypro, while Nokia's main supplier is the Finnish firm Eimo. With the globalisation of handset manufacturing the focal firms asked their lead suppliers to follow them to new production locations, mostly in East Asia and Eastern Europe. Thus these

societally embedded inter-firm relationships were transplanted to different geographical and cultural contexts. To some extent, this is similar to developments in the car and car components industry, including the development of territorially embedded telecom clusters of producers, suppliers, and logistics companies. These clusters are developed by brand name firms and EMS firms alike, as the examples of the Nokia-led Xingwang Industrial Park in Beijing (see Liu, Dicken and Yeung 2003), the Finnish ICT cluster (see Leinbach and Brunn 2002; Castells and Himanen 2002) or the Flextronics-led Industrial Park in Hungary show. Much like the car industry, the major suppliers were 'persuaded' to follow the manufacturers to these locations. The preferred outsourcing partners usually are obliged to use suppliers chosen by the OEM or brand name holder, a fact which is not always economically viable and beneficial for the EMS manufacturer. One Asian plant of a large EMS, for example, has to use European suppliers certified by the OEM customer, even for low-value products:

... Some of the packaging moves to us from operators in [customer's home country]. [Our customer] has some interest in these suppliers, maybe they have some shares in these suppliers so they want to use them. [...] We are trying to localize, that is our plan. Once you have local suppliers, they become easy to deal with. [...] The cover is coming from [the customer's home country] and the UK. Imported. It doesn't make sense but they don't have a plant here. They should set one up. [...] That's right that could be one of the reasons why – I'm gonna be honest with you – why [our customer] has not been doing very well financially. Some of these divisions are not understandable and not financially sound. It's common sense, if you're making a component which is a couple of cents and you look at the whole cost of the product, the product cost, material cost is probably 40 per cent and 60 per cent transportation cost, not very productive (Company interview, 26.04.2002).

From this, it seems obvious that power within the mobile phone GPN lies with the brand name holders. However, as EMS firms and suppliers accumulate technical and production know-how, the balance of power between suppliers, EMS and brand manufacturers evens out, since the brand name holders have to rely more and more on the quality and capabilities of their partners. Not least, the power of customers has to be taken into consideration, with the mobile operators now being the largest purchasers, placing single orders of up to 10 million handsets or more. The downstream end of the mobile phone GPN also proves the complexity of business networks in this sector:

This is a very complex distribution model. As you have three layers, there are more but let's say three significant layers. Network operators, distributors, and retailers. Those retailers may either be fully owned by operators, Vodafone stores for example, or independent [...] A market like Poland is 100 per cent dominated by network operators. Anything you sell as a manufacturer goes to an operator and then they sell it. A market like Sweden or Greece is rather retail driven. [...] Going back to the distribution model, [...] the interesting thing is that all these channels sell to each other. Manufacturers sell to operators, manufacturers sell to distributors, and manufacturers sell to retailers. At the same time that operator may sell to the same distributor, so that distributor may get the product from two channels. For the retailer it's the same thing. The retailer may get it directly from us or he may get it together with a subscription from the operator or he may get it from a distributor. So it's a rather complex model where all these layers co-operate and work independently at the same time. (Company interview, 26.07.2002)

CONCLUSION

The way in which global production networks of firms in different regions and sectors organize their division of labour has a strong impact on economic development in East Asia and beyond. Above, we have illustrated this using the telecom equipment sector as an example. There is no single 'best practice', neither for the firms nor for the regions they are located in and which try to upgrade their economic base. Rather, a diversity of network structures and actors' strategies will continue to exist, founded not least in 'cultural' factors. The challenge for companies lies in the strategic coupling with global production networks – based on a solid knowledge of the diversity of GPN – which for many firms still poses some problems. In other words, this strategic coupling goes way beyond mere cost-oriented decisions, even though they often dominate the headlines in reports about corporate restructuring. The different regions in East Asia have to be conscious of the divergent structures of GPN as well, in order to implement successful economic policies – locally, nationally and supra-nationally.

The dread of an industrial hollowing out, for instance, not only affects Japan, but other countries in East Asia like the Republic of Korea and the Republic of China or Taiwan as well. China's economic rise seems to threaten the potential for growth in other Asian regions, by attracting more and more GPN activities and thus redirecting inter-

national investment flows. A recent study by the Japanese Bank for International Co-operation showed that for about 75 per cent of the companies reviewed it is a major issue to expand their activities outside the home country, with China having priority as a location, ahead of the ASEAN nations. The same is true for western firms who already have operations in East Asia or intend to start operations there. Despite a number of common parameters, like the pressure to reduce costs, securing or gaining market shares and so on, which led to comparable restructuring efforts in GPN, there exist different sectoral rules of competition and regulations. Hence, companies follow divergent strategies, making the scenario of a convergence of organisational patterns most unlikely and generating different regional impacts. The electronics industry including telecom equipment manufacturing, for instance, and here especially consumer electronics, is much more export-oriented than is the case in the car industry. Relocations of production activities are often easier and cheaper to carry out, for a number of reasons. A shift towards China and a retreat from some of the Southeast Asian locations in the future seems much more likely in the electronics sector than in other industries like cars or retailing, which are much more market-oriented in their locational decisions.

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