

**UNITED NATIONS CONFERENCE ON TRADE AND DEVELOPMENT**  
**Geneva**

**WORLD INVESTMENT  
REPORT, 2002**

**PART TWO**  
**TNCs & EXPORT COMPETITIVENESS**

**Introduction**  
**&**  
**Chapter V**  
**International Production System**



**UNITED NATIONS**  
**New York and Geneva, 2002**

## INTRODUCTION

One of the contributions TNCs can make to host economies in the developing world is to enhance their export competitiveness. Export competitiveness has many facets, the most obvious implying higher exports. But it also means diversifying the export basket, sustaining higher rates of export growth over time, upgrading the technological and skill content of export activity, and expanding the base of domestic firms able to compete globally; thus, competitiveness is sustained and it is generally accompanied by rising incomes. TNCs can help raise competitiveness in developing countries in some or all of these ways, but tapping their potential is not easy. Attracting export-oriented TNC activities is itself an intensely competitive business, and even some of the countries that have succeeded may find it difficult to sustain competitiveness as their wages rise and market conditions change. Coherent and consistent policy support is essential to ensure that attracting export-oriented TNC activities are embedded in a broader national development strategy. This is particularly important as there is a possible tension between the principal objective of Governments – which is to maximize *national* welfare – and the principal objective of TNCs – which is to maximize their *global* corporate competitiveness. Export competitiveness is important and challenging, but it should be seen not as an end in itself but as a means to an end – which is development.

The link between FDI and trade is not new but well worth revisiting, especially in the light of the growing attention to the challenge posed by competitiveness,<sup>1</sup> but also in the light of the changing nature of international production systems, the growth of supplier networks and new multilateral disciplines. In *WIR99*, as part of the examination of FDI and the challenge of development, one chapter was devoted to the link between FDI and trade. The principal conclusions were that TNCs exert a strong

influence on the patterns of world trade, that much of the international flow of goods is handled within TNCs in the form of intra-firm trade, and that inward FDI has contributed to boosting the export performance of a number of developing host countries. This year's report builds on the findings of *WIR99* by looking in greater detail at the role of TNCs in increasing export competitiveness and the corporate strategies that are driving most of the recent changes in the pattern of international trade. These have to be understood in order to achieve a better understanding of the role that policy can play to foster export competitiveness in association with TNCs.

Accordingly, Part Two of *WIR02* explores the changing nature of export competitiveness and the role that TNCs play in enhancing it in different countries and activities. Part Three then deals with the policies developing countries (and economies in transition) might consider to attract export-oriented FDI and benefit from it.

That export competitiveness<sup>2</sup> is of growing interest to countries at all levels of development is clear: the sheer volume of analysis and benchmarking testifies to the importance that Governments attach to it. Developed countries regard competitiveness as a prerequisite for maintaining high levels of income and employment.<sup>3</sup> Developing countries find it essential for development. Improved export competitiveness allows countries to earn more foreign exchange and so to import the products, services and technologies they need to raise living standards and productivity. Greater competitiveness allows developing countries to diversify away from dependence on a few primary-commodity exports and move up the skills and technology ladder, which is essential to sustain rising wages. It also permits the realization of greater economies of scale and scope by offering larger and more diverse markets.

New forms of export competitiveness, geared to international systems of production, can allow developing countries to enter technology-intensive activities that they could not otherwise undertake. In the process, it allows them to build new productive capacities. Exporting feeds back into the capacities that underlie competitiveness: exposure to world competition provides enterprises with greater access to information and technology than exposure to domestic competition alone and leads to more vigorous efforts to acquire new skills and capacities.<sup>4</sup> An export-oriented economy also tends to attract more efficient TNC activities, which reinforces the upgrading.

There is ample recent evidence that export-oriented development is not only feasible but also rewarding. However, raising export competitiveness means more than liberalizing trade and investment. The most successful countries had to make determined efforts to develop new capabilities and to attract foreign capabilities to complement domestic ones. All drew heavily on new technologies from TNCs, and many, but not all, relied on FDI or non-equity forms to spearhead the process.

This is not to argue that building export competitiveness is a complete strategy for economic development. It is only one of a number of elements needed for development. It has to be complemented by measures to ensure that the non-export sectors of an economy grow and that the benefits of growth are spread throughout the economy. If the export sector is de-linked from the rest of the economy, it is possible to improve export competitiveness without raising growth rates or living standards for the population at large. This is, however, rare; a number of exporting economies have been able to grow on the back of their export drives, including by moving up the technological ladder from labour-intensive activities towards technology and skill intensive ones (UNCTAD, 2002a).

TNCs can contribute to the export competitiveness in host countries. Their contribution is important in technology-intensive and internationally branded products, but it goes much further. They have always been significant players in primary exports and the main source of new industrial technologies for local exporters (through arm's-length licensing and original-equipment-manufacture arrangements). With the spread

of global value chains in many low- and medium-technology activities, TNCs are now involved in the whole spectrum of manufactured exports. In some low-technology segments, other international players are also active, and TNCs often take the role of coordinating local producers in addition to setting up their own affiliates. In many technologically complex activities, TNCs are particularly important because a large part of trade is internal to their international production systems.

While the growth of international production systems is well recognized, it is less well known that there is a growing tendency for firms, even large TNCs, to specialize more narrowly and to *contract out* more and more functions to independent firms, spreading them internationally, to take advantage of differences in costs and logistics. Some are even opting out of production altogether, leaving contract manufacturers to handle it while they focus on innovation and marketing. The main suppliers and contract manufacturers are themselves often large TNCs, with global "footprints" matching those of their principals and with their own subcontractors and suppliers. However, TNCs also increasingly use national suppliers and contractors in host economies. Specialization does not stop here: leading TNCs are also entering into joint innovation arrangements with other firms – competitors, suppliers or buyers – and with institutions such as research laboratories, universities and so on. Thus, the emerging global production system is becoming more multifaceted, but with tighter coordination by lead players in each international production system.

What lies behind these trends? Three forces are driving them. The first is policy liberalization, which opens up national markets and allows all kinds of FDI and non-equity arrangements. The second is rapid technological change, with its rising costs and risks, which makes it imperative for firms to tap world markets and share the costs and risks. Technological change – in particular, falling transport and communication costs, the "death" of distance – also makes it economical to integrate distant operations and ship products and components across the globe in a search for efficiency. The third, reflecting both of these, is increasing competition, which results in unexpected forms of relocation to new sites, with new

ownership and contractual arrangements, and involving new activities.

All the signs are that the export role of TNCs in host countries, through both FDI and non-equity arrangements, will grow further. It will continue to take new forms and incorporate new locations. The potential for generating exports from developing countries and economies in transition is thus high. But, as noted, tapping this potential is not easy.

Part Two of *WIR02* deals with these themes. It starts with the characteristics of international production systems, exemplifying them for a number of firms. It describes changes in global competitiveness patterns, the direct role of TNCs in exports (their indirect contribution is difficult to trace quantitatively) and the main country “winners” in export competitiveness. The *main messages* of the analysis are as follows.

Trade patterns are changing rapidly, with technology-intensive activities growing consistently faster than others. As a group, developing countries and economies in transition have done well in export competitiveness, rapidly raising their market shares and upgrading into advanced activities.

TNCs have played an important role in the exports of many countries, directly by establishing in those countries affiliates incorporated into the TNCs’ international production systems, and indirectly by entering into contractual arrangements, especially with suppliers linked to the TNCs’ production systems. However, such systems are still largely concentrated by country, region and activity. It is possible that the export dynamism seen in the leading “winners” will spread to other developing countries and economies in transition as international production gathers pace and increases in scope. But there are risks and there are opportunities. First the risks:

- The bulk of TNC-related export activity in developing economies and economies in transition is concentrated in a handful of economies, mainly in East and South-East Asia and in regions contiguous to North America and the European Union, although TNCs are also significant players in many countries that are not major global exporters.

- It is unclear whether some large production systems *can* spread further, for technological reasons. Once production has been rationalized to serve regional or world markets, first movers tend to build strong cumulative advantages, reaping economies of scale and scope and drawing upon clusters of suppliers and institutions.
- The entry-level requirements of competitive production are rising. Not only is technological progress pushing up skill requirements, TNCs also increasingly need efficient supplier networks that can operate globally and at much higher levels of technological sophistication than before.
- Even “insiders” to international production systems face uncertainty about their prospects. A number of low-technology systems such as textiles, clothing and footwear, on which many countries have relied, may have peaked in growth. The more high-technology systems are imposing more stringent demands on participants. Host countries that cannot muster new capabilities may lose their competitive edge: even first-mover advantages may not last without upgrading.
- A concentration of exports from developing countries on a few manufacturers might lead to oversupply and a subsequent deterioration of the terms of trade – often referred to as the “fallacy of composition” dilemma (UNCTAD, 2002a, ch. 4).
- Some trade arrangements that caused a spreading of international production in some low-technology industries will be phased out or else eroded by further trade liberalization. The Multifibre Arrangement is an example.

But there are also opportunities:

- International production *is* spreading and can be expected to do so as countries further liberalize trade and investment regimes and improve their infrastructure and skills, and as competition pushes firms to spread their activities more widely to strengthen their competitive advantages.
- Leading TNCs are increasingly drawing independent enterprises into their production systems: input suppliers, service providers and strategic partners. This offers considerable scope to enterprises from host economies that build the capabilities to meet TNCs’ needs.

- TNC suppliers and contract manufacturers are going transnational to retain competitiveness and to serve lead firms effectively, opening new sources of export-oriented FDI for developing countries.
- Rising costs and congestion may at some stage offset first-mover advantages, and activities then spread to cheaper and less congested areas.
- The increased tradability of services as well as of specialized service functions associated with international production systems will open entirely new areas for an international division of labour.
- Advances in transport technology may open up new possibilities for high-value agricultural and other primary products.
- New globalized activities will emerge as the economic logic of relocation and networking spreads. This is already evident in the software industry, where the “death” of distance is most evident, but it will also affect other service and manufacturing activities.

It is too early, of course, to forecast the net outcome of all these trends. The results are very likely to be industry- and context-specific. The forces driving international production systems are strong, but competition for export-oriented TNC activities is also rising. Achieving and sustaining export-competitiveness calls for higher local capabilities in all activities and all countries. If developing countries and economies in transition are to strengthen competitiveness (with or without direct TNC participation), they will have to strengthen their capabilities, attract and stimulate activities suited to their endowments, and upgrade them over time.

## Notes

- 1 For a discussion of the broader question of TNCs and competitiveness, see *WIR95*.
- 2 “Export competitiveness” is taken here in the broad sense outlined above. Thus, it does not mean raising world market shares by keeping wages low, but sustaining world market shares while raising incomes.
- 3 For instance, the OECD has this to say: “Competitiveness [should] be understood as the ability of companies, industries, regions, nations and supranational regions to generate, while being and remaining exposed to international competition, relatively high factor income and factor employment levels on a sustainable basis” (OECD, 1994, p. 23). The Government of the United Kingdom’s *Third White Paper* on competitiveness starts: “Improving competitiveness is central to raising the underlying rate of growth of the economy and enhancing living standards... The need to improve our competitiveness is not imposed by Government, but by changes in the world economy. Improving competitiveness is not about driving down living standards. It is about creating a high skills, high productivity and therefore high wage economy where enterprise can flourish and where we can find opportunities rather than threats in changes we cannot avoid” (United Kingdom, Cabinet Office, 1996, p. 10). For an analysis of the concept of competitiveness, see Lall, 2001.
- 4 There is a debate on whether exporting leads to greater enterprise productivity or *vice versa*. The relationship between the two is probably interactive (Westphal, 2002). The technology capability literature establishes that export-oriented economies enjoy healthier and more competitive capabilities than inward-looking ones, though even the former may need a period of infant-industry protection when building advanced capabilities in local enterprises (Lall, 2001b).



## CHAPTER V

# INTERNATIONAL PRODUCTION SYSTEMS

### A. Drivers and features

TNC activities affect the export performance of host countries through a range of equity and non-equity relationships. What is common to all of them is that production – and, more broadly, the operations of a firm – is organized under the common governance of TNCs. During the past 15 years, falling barriers to international transactions have not only invigorated global markets through arm's-length transactions but given rise to elaborate corporate systems of organizing the production process. As a result, *international production systems* have emerged within which TNCs locate different parts of the production processes, including various services functions, across the globe, to take advantage of fine differences in costs, resources, logistics and markets (WIR93). What is distinct about the rise of international production systems as compared to earlier organizational structures and strategies characterizing TNC operations is, first, the intensity of integration on regional or global scales and, second, the emphasis on the efficiency of the system as a whole (Kaplinsky, 2000, p. 122). In other words, global markets increasingly involve competition between entire production *systems*, orchestrated by TNCs, rather than between individual factories or firms.

The rise of such integrated international production systems reflects the response of TNCs to dramatic changes in the global economic environment, and, in particular, their search for enhanced competitive advantage through an optimal global configuration of where they produce and how they coordinate their production activities. Several forces combine to drive this process:

- The rapid decline in barriers to international trade and investment flows. The creation of a corporate international production system is made possible by the freedom

to move goods, services and knowledge among linked corporate entities with minimal impediments, even when these are situated in widely dispersed locations.

- The greater ease of the international flows of goods, services and ideas and the resulting drop in the costs of cross-border business coordination. Advances in transport and communication technologies have continued apace in recent years, and TNCs have deployed new systems to enhance their internal and external coordination. The advent of the Internet has dramatically lowered the costs of information exchange over great distances. More streamlined and standardized customs administration and port operations as well as international telecommunication gateways and satellite and fibre-optic networks further facilitate international production, including the coordination of knowledge-intensive functions such as design and R&D.
- These two forces have, together, led to stronger competition among leading TNCs. In a growing range of industries, major producers must contest all of the markets in which their competitors operate and draw on sources of competitive advantage wherever they may be located. No longer can a dynamic firm focus only on familiar markets, since its competitors may mobilize profits or resources across the globe.

All of this has led to profound changes in industrial structures. In some industries (e.g. semiconductors and automobiles), they have led to consolidation and oligopolistic competition; in others (e.g. garments), to a diffusion of market power. Corporate strategies have evolved too, as TNCs have sought to devise new forms of governance to manage their dispersed activities.

International production systems are thus evolving as corporations respond to economic and technological forces. Given their growing importance in shaping investment

and trade patterns, understanding their dynamics is essential for any developing country that seeks to enhance its export competitiveness through the activities of TNCs.

Three core elements of international production systems are critical in this context: governance, global value chains and geographic configuration.

The first element is *governance*, or the structure of control that determines the geographic and functional distribution of business activities and ensures their coordination. International production system governance occurs in forms ranging from ownership (or equity) linkages that provide direct managerial supervision, to various non-equity linkages in which formally independent intermediaries – suppliers, producers and marketers – are linked through a variety of relationships such as franchising, licensing, subcontracting, marketing contracts, common technical standards or stable, trust-based business relationships. Intel has created an international production systems in which equity – or ownership – links form the basis for common governance of the members of the system (section B.1 below), while Limited Brands has established a system based on non-equity relationship (section B.2 below). Toyota exemplifies a mixture of both approaches, by combining close links among its own fully-owned assembly subsidiaries with a multi-tiered network of formally independent subcontractors (section B.3 below). The case study of Ericsson (section B.4 below) traces the transition in control from a largely equity-based system to an almost fully non-equity-based system (although Ericsson has retained direct control over manufacturing, i.e. over product lines related to its core focus on innovation and design). The continuum of international production system governance thus reflects the degree of control over corporate activities. Equity-based governance systems internalize control and allow stronger protection of firm-specific advantages like technology, as in the case of Intel. Where these advantages lie in brand names and marketing – as in the case of Limited Brands – more externalized forms of control may suffice.

A related issue is the degree of functional hierarchy in the system. In some international production systems, each stage of production is assigned to specific corporate

affiliates and deployed globally, with each unit in the system guided by a headquarters company (sometimes referred to as an international production system “flagship” – see Rugman and D’Cruz, 2000). In Intel’s hierarchical international production system, individual affiliates specialize in particular stages of innovation or production and are closely integrated into the parent firm’s global network. At the other end of the spectrum are systems in which an integrated set of business functions is decentralized to multiple centres, often regional headquarters, that wield considerable autonomy. An example is the distribution of “global product mandates” to various affiliates. In this case, international production system governance takes on a more horizontal character. Toyota presents an intermediate case, in that affiliates in the United States and Thailand have been given “regional product mandates” for certain product lines. These two aspects of governance (equity or internalized vs. non-equity or externalized, and hierarchical vs. horizontal) are related. In general, equity-based international production systems tend to be organized hierarchically, while externalized systems operate more horizontally. Yet the distinction is important, for the two criteria are not always perfectly correlated. In the garments industry, for example, the international division of labour has, over time, become vertically specialized and hierarchically integrated under the leadership of brand-holding flagship companies like Limited Brands despite the near-absence of equity links. On the other hand, some TNCs with global networks of wholly-owned subsidiaries have moved towards more horizontal forms of coordination.

A striking recent governance trend in many manufacturing and service international production systems is a shift towards the systematic outsourcing of a greater range of activities, including back-office operations like customer service and even R&D. This reflects TNCs’ efforts to focus on their “core competencies”, i.e. those activities in which they can deploy proprietary advantages, wield market power or otherwise enjoy higher returns. The trend suggests in particular that technological advances and competitive pressures have altered the balance between two opposing firm-specific advantages sought by TNCs – internalization versus specialization – in favour of the latter. The outsourcing trend has complex implications

for global industry structures, creating entire new industries. In particular, leading TNCs in a range of industries have begun to exit from manufacturing altogether. In response, *contract manufacturers* have emerged to specialize exclusively in providing turnkey manufacturing services (see section B.5 below). Contract manufacturing differs from the earlier system of original equipment manufacturers sub-contracting in that the brand-holding TNC does not simply draw on subcontractors for extra production capacity, but rather outsources the entire manufacturing function for individual product lines or, in some cases like Cisco Systems, the entire product range.

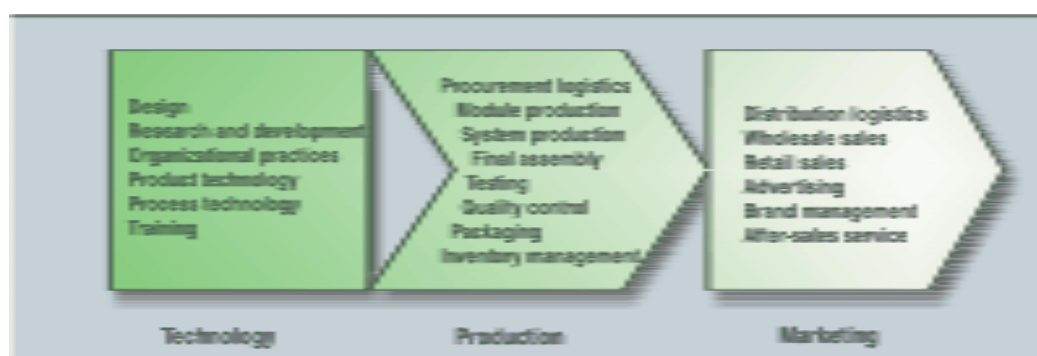
Despite the outsourcing trend, direct equity and managerial control remain key sources of competitive strength in certain industries. Even when international production systems are highly externalized, TNCs typically exert powerful authority through their control of key functions, such as brand management and product definition, as well as through the setting and enforcing of technical, quality and delivery standards throughout a network of formally independent producers.

The second element of an international production system is the organization and distribution of production activities and other functions in what is commonly known as the *global value chain*. It extends from technology sourcing and development through production to distribution and marketing (figure V.1). The core competitive advantages of TNCs can reside anywhere along the value chain, although, in practice, they tend to cluster in one component. Value chains are becoming fragmented, as business functions are differentiated into ever more specialized activities. Functional specificity allows TNCs

to distinguish activities with widely varying inputs, capacity requirements and financial returns, even within the same industry or production process. As a result, there is a general trend towards functional specialization, which contrasts with the type of vertically integrated structures that characterized many TNCs until quite recently. Intel, for example, focuses on the design and manufacture of microprocessors and a few related products (see section B.1 below), rather than combining captive in-house chip production with the production of computer systems, as was long the strategy of IBM, NEC and Samsung. In many industries, TNCs have recently tended to focus more on the knowledge-intensive, less tangible, functions of the value-chain such as product definition, R&D, managerial services, and marketing and brand management. This has long been true of the garment industry, where leading TNCs focus almost exclusively on design and marketing (see Limited Brands, 2001). Even in many “high-technology” industries, however, manufacturing as well as logistics and distribution have become standardized and more easily tradable. In consequence, contract electronics manufacturers have grown rapidly (section B.5 below).

In general, international production systems may be distinguished by the functional activity on which a TNC focuses and which gives it governance authority over the broader production system. Intel’s core strategy is to establish market dominance through the innovation and design that differentiate its products. Hence the activities that result in a finished Intel product are those of a “technology-driven” international production system. Toyota’s core competence is its ability continuously to improve quality and

**Figure V.1. The global value chain of product components**



Source: UNCTAD.



productivity in the complex automotive industry. Automotive international production systems are thus “production-driven”. Finally, in many consumer-product sectors, the ability to build brand value and capitalize on changing tastes and styles is the key to competitive strength, as exemplified by Limited Brands’ success in the garments industry. Such international production systems are “marketing-driven”.

These two elements of international production systems – governance and the value chain – can be used to analyse a variety of international production systems involved in international investment and exports. Table V.1 provides a matrix of international production system systems with illustrations taken from the case studies presented below.

The third element of international production systems, which holds particular interest for developing countries, is their *geographic configuration* in an effort to acquire a portfolio of locational assets that maximizes the competitiveness of the corporate system as a whole. The past 15 years have seen great changes in the determinants of the optimal location of TNC activities, and hence in the geographic distribution of technology, production and marketing activities within international production systems. Production has been internationally dispersed for decades, but the trend towards integration over ever larger geographic scales is relatively new. Supply chains have extended to new areas of the globe and integrated formerly distinct regional production zones. Contract manufacturing and the production of key components in electronics and other industries have witnessed a consolidation trend in the past few years. The surviving large-scale supplier firms increasingly seek a global presence, particularly by co-locating near the key facilities of their international

production system flagship customers (Sturgeon and Lester, 2002). Related to this is the recent trend towards “postponement”, in which components are made or assembled as close to the final point of sale as possible in order to reduce transport costs, which remain important for a range of products. This may pose great challenges to those “winners” in the global export trade that have previously thrived as accommodating, but distant, off-shore production platforms.

Perhaps a more striking trend has been the geographic dispersal of other global value chain functions. The internationalization of business service and support functions has progressed rapidly in recent years. Even innovation, presumably the function most firmly anchored in home countries by specialized skills and strategic motivations, is increasingly being carried out on a global stage. Developed countries continue to perform most of the research aimed at radical breakthroughs, but the developing world now carries out significant R&D.

Simplified, three sorts of drivers are acting simultaneously on the locational decisions of TNCs and their partners in international production systems. *Cost differentials* remain a fundamental factor in the location of productive activities. Changing governance models and functional differentiation (the first two elements of an international production system) have subjected a growing range of activities to the logic of cost optimization, including R&D and managerial processes like accounting, information systems development, and marketing. In locational decision-making, however, production costs are always evaluated relative to the efficiency and productivity of a location. This point is often overlooked in discussions of comparative costs, but it is particularly crucial in that a major focus of TNCs’ geographic

**Table V.1. Examples of different international production systems**

TNCs’ governance functional focus	Internalized (Equity-based control)	Mixed (Equity- and non-equity-based control)	Externalized (Non-equity-based control)
Technology-driven	Case 1: semiconductors – <i>Intel</i>		Case 4: telecom equipment – <i>Ericsson/Flextronics</i>
Production-driven		Case 3: automotive – <i>Toyota</i>	
Marketing-driven			Case 2: garments – <i>Limited Brands / Li &amp; Fung</i>

Source: UNCTAD.

allocation of value-chain activities is to achieve *systemic* efficiencies across their entire international production systems. A given location, therefore, is judged by how cost-efficiently it performs a given function in coordination with functions located elsewhere, and not merely in isolation.

*Asset-seeking* motives are also leading TNCs to tap skills and knowledge in a more systematic way on the global scale. As noted above, advances in information processing and telecommunications enhance TNCs' abilities to coordinate complex functions over great distances. This not only allows them to deploy functions in new locations, but also enhances their interest in mobilizing a wider range of skills and knowledge in a greater variety of locations.

Finally, *clustering* has become a key influence on TNCs' locational decision-making. Earlier studies have described the fortuitous emergence of geographic concentrations of related activities in production, specialized services, R&D and the like (Schmitz and Nadvi, 2000). Increasingly, however, cluster-formation is a global process reflecting recognition by a number of TNCs of the value of co-location with suppliers, competitors, service providers, and knowledge-intermediaries. Their intentional efforts to capture tacit-knowledge spillovers suggests that first-mover advantages for nodes in international production systems may be durable despite the increasing mobility of TNC assets and functions. Alternatively, it might suggest that countries seeking to enter into international production systems, or seeking to occupy more complex niches within such systems, might need to reach a critical mass of related investments before doing so.

These broad structural trends are now crucial drivers of the geographic reorganization of TNC activities. Paradoxically, TNC activities of all sorts are becoming increasingly "footloose", even as geographic clusters grow in importance. While distance might matter less for many transactions, proximity and access to tacit or partly tacit knowledge is increasingly vital for competitive advantage. Nonetheless, it must also be recognized that these trends are not the only determinants of geographic configurations of international production systems. There are also sectoral and national (or cultural) factors. For example, competitive strength in microprocessors depends on design innovation,

and the need to protect technology assets leads to an internalized, vertically integrated approach. On the other hand, success in the garments industry requires knowledge of fast-changing market trends; hence, externalizing production to a horizontal array of independent subcontractors confers cost advantages so long as these are able to meet design, quality and delivery standards. Then there are the national origins of international production systems (Borrus et al., 2000). For example, electronics TNCs headquartered in the United States typically pursue outsourcing strategies while maintaining tight equity control over their vertically specialized subsidiaries. Japanese TNCs in the same industry, by contrast, display a strong preference for integrated production, governed through a mixture of equity control and close non-equity linkages with key suppliers (although this is beginning to change). These different structural, sectoral and national characteristics are combined (as exemplified by the case studies provided below) in the context of corporate strategies of individual firms aiming at systemic *firm-specific* advantages.

The drivers and features of international production systems signal one point of particular interest to developing countries: Governments that seek export-oriented FDI need to go beyond trade and FDI policies and assess their locational advantages in the international production system context. More specifically:

"the issue is no longer whether trade leads to FDI or FDI to trade; whether FDI substitutes for trade or trade substitutes for FDI; or whether they complement each other. Rather, it is: how do firms access resources – wherever they are located – in the interest of organizing production as profitably as possible for the national, regional or global markets they wish to serve? In other words, the issue becomes: where do firms locate their value-added activities? In these circumstances, the decision where to locate is a decision where to invest and from where to trade. And it becomes a FDI decision, if a foreign location is chosen. It follows that, increasingly, what matters are the factors that make particular locations advantageous for particular activities, for both, domestic *and* foreign investors" (WIR96, p. xxiv).

Developing countries need to identify their locational strengths and weaknesses in relation to their competitors and in relation to the factors that influence the configuration of international production systems. Only then can they properly tailor policies to enhance their locational advantages. Moreover, in seeking to attract export-oriented TNC activities or induce existing affiliates (or local companies) to upgrade their niches within given international production systems, Governments need to discern where governance authority resides within various systems so that their efforts are targeted at the right decision-makers. Both these issues are taken up further in Part Three of *WIR02*.

## B. Case studies

### 1. Control through equity relations in a technology-driven international production system: Intel

Semiconductors were the most dynamic products in world trade during the period 1985-2000, when their exports grew from \$26 billion to \$235 billion. The demand for semiconductors comes mainly from the IT industries (computers, telecommunications and consumer electronics). By 2000, they represented 5 per cent of world trade, up from 1.5 per cent in 1985, and they accounted for 20 per cent of the trade in high-technology non-resource-based manufactures, the most dynamic category of world trade.

In terms of ownership advantages, competition has been fierce in the semiconductor industry, and Intel, the market leader, has set the pace (table V.2). It adapted better to the evolution of the industry in which there was a long period of fast growth (1982-1995), followed by consolidation (1995-1998), followed by a short boom and then a sharp fall.<sup>1</sup>

Intel jumped from seventh to first rank by sales in the semiconductor industry between 1983 and 2001, and is today by far the largest chipmaker in the world. Its sales increased 42 times between 1983 and 2000 before declining in 2001 as the IT market fell. It accounts for about one-quarter of global sales in semiconductors, mostly to the computer industry. It also accounts for one quarter of the R&D undertaken by the industry, and has been the biggest investor during the past decade. Intel's capital expenses in 2001 were \$7.3 billion. The company has developed significant technological and production advantages: it has been able to squeeze more transistors onto silicon wafers for computers than its competitors and it has developed larger silicon wafers, reducing fabrication costs by about one third.<sup>2</sup>

Intel exploited its manufacturing prowess by integrating its production system and establishing identical plants in numerous locations to obtain the optimal global configuration of its production facilities. This system allowed the company to locate particular activities in the sites most suited

**Table V.2. The world's leading semiconductor manufacturers, 2001**  
(Billions of dollars)

Rank 2001	Rank 1983	Company (Home country/region)	Sales 1983	Sales 2000	Sales 2001
1	7	Intel (United States)	0.7	29.7	22.7
2	5	Toshiba (Japan)	0.9	11.0	7.2
3	3	NEC (Japan)	1.3	10.9	7.0
4	2	Texas Instruments (United States)	1.6	10.3	6.7
5	..	STMicroelectronics (EU)	..	7.8	6.3
6	..	Samsung Electronics (Republic of Korea)	..	10.6	5.1
7	1	Motorola (United States)	1.6	7.9	5.0
8	4	Hitachi (Japan)	1.0	7.4	4.7
9	..	Infineon (EU)	..	6.8	4.6
10	10	Philips (EU)	0.5	6.3	4.6
Total top 10			9.4	108.6	73.6
Semiconductor industry			17.4	204.4	139.0

Source: UNCTAD, based on IC Insights, cited by Semiconductor Electronics Resource Centre, [www.dir-electronics.com](http://www.dir-electronics.com) and UNCTC, 1986.

for them. It kept the high-value elements of the semiconductor cost structure (wafer production and fabrication) predominantly in the United States and shifted the more labour-intensive assembly-and-testing activities to lower-cost sites (table V.3). Thus, Intel has kept its production process internalized. More specifically, it has 13 fabrication plants and 11 assembly-and-testing sites in 7 countries. About half of its 86,200 employees work in its Technical Manufacturing Group. It has expanded internationally with fabrication facilities in Israel (1985 and 1999) and Ireland<sup>3</sup> (1993 and 1998) and concentrated its labour-intensive operations in Malaysia (1988, 1994, 1996 and 1997),<sup>4</sup> the Philippines (1979, 1995, 1997-1998),<sup>5</sup> Barbados (1977, later closed), China (1997, 2001) and Costa Rica (1997 and 1999).<sup>6</sup> Today, about two-thirds of Intel's manufacturing workforce is in the United States, 11 per cent in Malaysia, 8 per cent in the Philippines, 4 per cent in Ireland, 3 per cent in Israel, 2 per cent in Costa Rica and 1 per cent in China. It is the leading national exporter from Ireland, the Philippines and Costa Rica, and ranks

seventeenth among foreign exporters from China.

Many of Intel's competitors have reorganized their own international production systems, following Intel's lead and on the basis of the same overall intra-firm division of labour.<sup>7</sup> In the process, a number of firms have consolidated their activities. For example, Motorola has reduced the number of its plants from 29 to 14 since 1997, and Hitachi reduced its plants from 13 to 8, shifting production from Japan to China and Malaysia.

With regard to transnationalization, Intel's operations and its international production system are designed to distance itself from competitors by protecting its technological advantages inside subsidiaries strategically located in its home country, or in Ireland and Israel. In the case of assembly and testing facilities, it has expanded internationally to incorporate a few carefully selected sites in low-cost locations but always in fully-owned operations. It is an international production system that is hierarchical,

**Table V.3. Intel's manufacturing sites, January 2002**

Country	Facility	Function	Year built	Current process technology	Employees
United States	Facility 1	Wafer fabrication	1978, 1992, 1996, 1999, 2003 <sup>a</sup>	0.13-, 0.25-, 0.35-micron	16 000
	Facility 2	Wafer fabrication	1980, 1993, 2002 <sup>a</sup>	0.13- 0.18-, 0.25-, 0.35-micron	5 500
	Facility 3	Wafer fabrication	1988	0.13-, 0.18-micron	8 500
	Facility 4	Wafer fabrication	1994	0.28-, 0.35-, 0.50-micron	2 700
	Facility 5	Wafer fabrication, assembly and testing	1996, 1999, 2001	0.13-, 0.18-micron	10 000
	Facility 6	Systems manufacturing	1996	..	1 400
	Facility 7	Wafer fabrication	2001	0.18-micron	1 845
Ireland	Facility	Wafer fabrication	1993, 1998, 2004 <sup>a</sup>	0.18-, 0.25-micron	3 400
Israel	Facility 1	Wafer fabrication	1985	0.35-, 0.50-, 0.75-, 1.0-micron	800
	Facility 2	Wafer fabrication	1999	0.18-micron	1 500
Malaysia	Facility 1	Board manufacturing, assembly and testing	1996, 1997	..	7 790
	Facility 2	Assembly and testing	1988, 1994, 1997	..	
Philippines	Facility 1	Assembly and testing	1997, 1998	..	5 984
	Facility 2	Assembly and testing	1979, 1995	..	
China	Facility	Assembly and testing	1997, 2001	..	1 227
Costa Rica	Facility	Assembly and testing	1997, 1999	..	1 845

Source: [www.intel.com](http://www.intel.com), January 2002.

<sup>a</sup> Estimated construction completion.

integrated (with associated intra-firm trade) and based on tightly controlled subsidiaries. The semiconductor industry is thus a good example of a global value chain driven by carefully protected technological advantages.

Locational advantages also play a role. As technology-intensive stages in the semiconductor production process can be separated from labour-intensive ones and the cost of transport is low relative to the value of the output, it is economical to pursue a global production strategy. In the case of Intel, the principal factors that the firm takes into account in establishing a new subsidiary for assembly and testing functions include the availability of a technical workforce, construction costs, the quality of infrastructure, logistics, business costs and supplier capabilities ([www.intel.com/pressroom/kits.htm](http://www.intel.com/pressroom/kits.htm)). Host country incentives can be important as well. The selection process for the plant that was located in

Costa Rica exemplifies the interplay of these factors.<sup>8</sup> Intel's strategy of locating labour-intensive activities in low-wage areas, mainly in Asia, and then moving to yet lower-wage locations, has also been utilized by many of its competitors. They too have moved the more labour-intensive stages of their production to developing countries, often the same ones as Intel, thereby creating a clustering effect. As semiconductors enjoy unencumbered access to most markets, market-access factors do not play a role in these locational decisions.

As a result, a handful of East and South-East Asian countries have registered high increases in their export-market shares in semiconductors, while some developed countries have experienced large declines (table V.4). During the period 1985-2000, a total of eight winners (mainly from Asia) improved their shares by almost 35 percentage points, while seven, mainly developed,

**Table V.4. Winners and losers in semiconductor exports,<sup>a</sup> 1985-2000**  
(Per cent)

Economy	1985	2000	Market share increase, 1985-2000 <sup>c</sup>	Top 10 TNCs present <sup>b</sup> in winner economies
<b>Principal winners</b>				
China	0.14	8.82	8.7	Intel, Toshiba, NEC, Texas Instruments, ST, Motorola, Hitachi, Infineon, Philips, Samsung
Taiwan Province of China	2.72	10.64	7.9	Texas Instruments, Hitachi, Infineon, Philips
Malaysia	0.36	7.81	7.5	Intel, Toshiba, NEC, Texas Instruments, ST, Motorola, Hitachi, Infineon Philips
Republic of Korea	0.76	4.01	3.2	Texas Instruments, Samsung
Philippines	0.23	3.07	2.8	Intel, Texas Instruments
Thailand	0.46	2.54	2.1	Toshiba, Philips
Costa Rica	-	1.41	1.4	Intel
Ireland	2.37	3.43	1.1	Intel, Motorola, NEC
Total	7.04	41.73	34.7	
<b>Principal losers</b>				
United States	29.97	15.40	-14.2	
Germany	8.76	3.39	-5.4	
France	6.52	1.71	-4.8	
Japan	13.83	10.27	-3.6	
Italy	3.28	1.14	-2.2	
United Kingdom	6.73	4.88	-1.8	
Hong Kong, China	3.92	2.11	-1.8	
Total	73.01	38.90	-33.7	

Source: UNCTAD, based on the United Nations' Comtrade database.

<sup>a</sup> SITC 7599: parts and accessories of data-processing equipment.

<sup>b</sup> As of January 2002. Developing economies with semiconductor affiliates not mentioned here: Singapore (NEC, Texas Instruments, ST, Hitachi, Infineon, Philips), Hong Kong, China (Motorola, Philips), Indonesia (NEC); Morocco and Malta (ST).

<sup>c</sup> The concept of "market share increase" is based in the *import* market shares as calculated by the CAN computer programme on international competitiveness of UN-ECLAC, which is based on the United Nations' Comtrade database. The data are classified at 3 or 4 digits of the Standard International Trade Classification (Rev.2). The period of analysis is 1985-2000, in which the value of individual years represents 3-year rolling averages (two-year average of the year 2000) to emphasize the structural aspects of change.



economies lost a similar percentage. In other words, a very high proportion of these trade gains and losses were accounted for by the relocation of the labour-intensive segments of semiconductor international production systems. Another factor was the arrival of newcomers in the industry from economies such as Taiwan Province of China and the Republic of Korea.

## 2. Control through non-equity relations in a marketing-driven international production system: Limited Brands

Clothing remains an important component of world trade, rising from 2.4 to 3.1 per cent of world imports (from \$41 to \$174 billion) during the period 1985-2000. It accounted for 20 per cent of low-technology non-resource-based manufactures in 2000 (up from 17 per cent). North America (\$58 billion in 2000) and Western Europe (\$72 billion) are the most important markets for garments.

Barriers to entry are low on the production side of garments, in comparison to complex technology-and-scale-intensive industries like electronics and automobiles. However, there are high entry barriers in marketing in the garment industry. Buyers therefore occupy an important place in global value chains and dominate the industry. There is an ample supply of capable garment makers, and it is relatively easy to create new ones by providing design inputs and some technical assistance. Thus, the fragmentation of the production process is very advanced.

In this situation, the key variable for the location of manufacturing plants is market access. United States rules favour clothing assembled offshore from United States inputs, and they give special market access to assemblers from Central America, the Caribbean and Africa (see chapter VII). Within NAFTA, Mexico profits from rules of origin that give it advantages over competitors, especially from Central America and the Caribbean, since its domestic inputs count as “NAFTA content” and those of its competitors do not. The European Union uses a similar mechanism (see chapter VII), also granting special access to a number of countries. Finally, the quotas of the Multifibre Arrangement have also strongly influenced locational decisions. All of these schemes and mechanisms – quotas, preferential market access and regional integration – result

in distorted trade flows. For that reason, no attempt is made here to match the corporate strategies of the leaders with trade data. This section simply presents one example of the kinds of networking relationships being established through non-equity forms, illustrating the earlier observation about the importance of such relationships for exports. Still, the trade data do capture the international and regional aspects of garments markets: China and several Asian countries compete in most major markets, while the North American and West European markets have regional suppliers, mainly as a result of trade restrictions (tables V.5 - V.7).

**Table V.5. Winners and losers in North American garment<sup>a</sup> imports, 1985, 2000**  
(Percentage)

Economy	1985	2000	Market share increase 1985-2000
<b>Principal winners</b>			
Mexico	1.6	14.0	12.4
Honduras	0.2	4.0	3.9
China	8.3	11.2	2.9
Dominican Republic	1.4	4.0	2.6
El Salvador	0.1	2.6	2.5
Total	11.6	35.8	24.2
<b>Principal losers</b>			
Hong Kong, China	22.7	8.2	-14.5
Taiwan Province of China	15.5	3.3	-12.2
Republic of Korea	13.7	3.8	-9.9
Total	51.9	15.3	-36.5

Source: UNCTAD, based on the United Nations' Comtrade database.

<sup>a</sup> SITC 842: men's outerwear non-knit; SITC 843: women's outerwear non-knit; SITC 844: undergarments non-knit; SITC 845: outer garments knit non-elastic; SITC 846: undergarments knitted.

The characteristics of demand for garments in the United States, Europe and Japan differ greatly, and these differences have been important in the choice of supplier countries (Sturgeon, 2002). United States buyers prefer standardized products at low prices. Europeans prefer high quality products of greater diversity and are willing to pay higher prices. Japanese buyers prefer high quality finishing. In practice, this means that very few suppliers can meet the needs of all three major markets, and so tend to specialize in one or two.

Take the United States market. Competition increasingly takes place not so much at the level of firms as networks.

**Table V.6. Winners and losers in West European garment<sup>a</sup> imports, 1985, 2000**  
(Percentage)

Economy	1985	2000	Market share increase 1985-2000
<b>Principal winners</b>			
China	1.7	9.4	7.7
Turkey	2.4	7.1	4.7
Bangladesh	0.1	3.2	3.1
Indonesia	0.3	2.4	2.1
Morocco	1.3	3.2	2.0
Romania	1.4	3.3	1.9
Tunisia	1.8	3.7	1.9
Poland	0.9	2.8	1.8
Total	9.9	35.0	25.1
<b>Principal losers</b>			
Italy	18.5	7.8	-10.6
Germany	10.1	5.9	-4.2
Hong Kong, China	9.7	6.3	-3.4
Republic of Korea	3.6	1.0	-2.5
Total	41.8	21.1	-20.7

Source: UNCTAD, based on the United Nations' Comtrade database.

<sup>a</sup> SITC 842: men's outerwear non-knit; SITC 843: women's outerwear non-knit; SITC 844: undergarments non-knit; SITC 845: outer garments knit non-elastic; SITC 846: undergarments knitted.

**Table V.7. Winners and losers in Japanese garment<sup>a</sup> imports, 1985, 2000**  
(Per cent)

Economy	1985	2000	Market share increase 1985-2000
<b>Principal winners</b>			
China	25.6	73.2	47.6
Viet Nam	0.0	3.1	3.0
Total	25.6	86.3	50.7
<b>Principal losers</b>			
Republic of Korea	34.2	4.9	-29.3
Taiwan Province of China	15.4	0.4	-15.1
Hong Kong, China	5.8	0.7	-5.1
Total	55.5	6.0	-49.5

Source: UNCTAD, based on the United Nations' Comtrade database.

<sup>a</sup> SITC 842: men's outerwear non-knit; SITC 843: women's outerwear non-knit; SITC 844: undergarments non-knit; SITC 845: outer garments knit non-elastic; SITC 846: undergarments knitted.

General retailers like Wal-Mart, Sears Roebuck and J.C. Penney, as well as garment specialty retailers like Liz Claiborne, The Gap and Limited Brands, both design and market clothing but do not make the products they sell. These companies are controlling a growing share of the United States market: in 1977,

the top 50 apparel and accessory retailers held 28 per cent of the market and the top 5 held 9 per cent. By 1992, the share of the top 50 had risen to 53 per cent and that of the top 5 to 18 per cent (Abernathy et al., 1999, p. 76). Continued success for buyers in the garments industry depends, to a significant degree, on identifying and contracting the best supplier networks.

An example is Limited Brands. It is a leading specialty retailer of intimate and other apparel and non-apparel (i.e. beauty and personal care) products. Founded in the United States in 1963, its net sales doubled between 1990 and 1999, from \$5 to \$10 billion. The dynamism of Limited Brands suffered a bit of a setback thereafter (sales in 2001 were \$9 billion), but it refocused on "fewer but better brands" and now seems set for a new expansionary phase (Limited Brands, 2001).

Limited Brands influences the global value chain in which it operates through marketing, which is based on its two principal advantages: retail sales outlets and brand management. In 2001 it had 4,614 stores in the United States. The company uses both in-house and external suppliers in what it calls its "global network of relationships, resources and support personnel" (<http://www.thelimited.com>). Its independent division, Mast Industries, is one of the world's largest contract manufacturers, importers and distributors of apparel (<http://www.mastindustries.com>). External suppliers include a host of firms. Li & Fung has been one of the most important ones (box V.1).

Mast Industries delivers over 200 million garments to Limited Brands per year. It also supplies other retailers. Mast is well positioned globally to supply products that enable its customers to establish and maintain their brand identity. It does so through a global network of 18 offices in 12 countries and 400 factories in 37 countries. The latter includes 53 joint ventures (42 in Asia, mainly Sri Lanka) and 600 individual associates (including 400 in Asia and 165 in North America). The key competitive advantage of Mast Industries is "to identify manufacturing partners in the right place at the right time" (<http://www.mastindustries.com>). Thus, Mast has a production migration strategy that constantly searches for production opportunities. This overarching concern to contain costs is tempered by additional factors, such as quality,

manufacturing flexibility, capacity and timely delivery. It coordinates its global network by way of the Mast Connection, which uses advanced networking technology and the Internet to create a reliable global network of Mast associates, manufacturers, customers and shippers.

There are also external “full-package providers”. The “full package” involves independent intermediaries supplying products according to the buyer’s design, assembled by the intermediaries’ production network (in which the intermediaries themselves may have no equity interest). The product carries the name of the buyer and the

#### Box V.1. Li & Fung: a full-package provider

Li & Fung Limited is an example of a worldwide trading company that manages a global logistics chain for its retailer clients and partners. It is a full-package provider that brokers high-volume garments and fashion accessories (Li & Fung Limited, 2001, p. 9). The firm is headquartered in Hong Kong, China, and is listed on its stock market. It has an annual turnover of about \$4.2 billion, employing about 5,000 people worldwide. In 2001, 72 per cent of the turnover was in the garments segment; regionally, its orders came mainly from North America (75 per cent) and Europe (21 per cent) (Li & Fung Limited, 2001, p. 6).

The firm’s specialty is supply-chain management within its global supply network. It does not own any production facilities, but manages the “full package”: product development, product sourcing and product delivery, including quality control and on-time delivery.

The evolution of Li & Fung into a full-package supplier went through several stages. In the 1960s and 1970s, Li & Fung operated as a regional sourcing agent, with offices in Taiwan Province of China, the Republic of Korea and Singapore. Activities comprised “assortment packaging”: assembling components for a product set from different locations.

In the second stage, during the late 1970s, the business became more sophisticated, functioning, in its own description, as a “manager and deliverer of manufacturing programmes” (<http://www.lifung.com>). Buyers would indicate the type of garment they were considering, and Li & Fung, as the agent, would prepare alternative designs. Once a design was agreed upon, the agent would source all components (from yarns and trims to packaging), identify a manufacturing site and arrange the logistics. “Front end” functions (design, engineering and production planning) and “back end” functions (quality control, logistics, testing) remained mostly in Hong Kong, China, while the actual manufacturing was commissioned from low-cost locations in one or more countries. During the 1970s and 1980s, manufacturing was located predominantly in China.

The third phase began in the late 1980s: Li & Fung took control of complete garments

programmes for a season for a particular buyer, including the proposing of items and batch mixes and delivery rhythms. The process has since deepened. The manufacturing part of the process has become highly complex and dispersed. Li & Fung “dissect the value chain” (Magretta, 1998). Manufacturing is farmed out to those locations that are the most cost-efficient, and the product comprises components produced in numerous locations. Out of 15 steps in the manufacturing value chain, Li & Fung claims to handle 10 (Magretta, 1998).

The firm had about 700 customers in 2000 – mainly large retailers in the United States and Europe – and operates through a network of 68 offices in 40 countries. Until the mid-1990s, buyers were mainly from the United States, such as Limited Brands. In 1995, Li & Fung bought Inchcape Buying Services, a British trader based in Hong Kong, China, broadening buyer connections into the EU market and providing itself with an established network of offices in Bangladesh, India, Pakistan and Sri Lanka. Li & Fung receives a commission from the retailer and “the higher value added lets us charge more for our services” (Magretta, 1998, p. 106). The firm has manufacturing contracts with 7,500 suppliers, of whom 2,000 are reportedly active at any given time. There are estimates that Li & Fung thus has indirect employment links with 1.5 million workers (Magretta, 1998, p. 109).

Li & Fung presides over a large network of contract suppliers in China and other Asian developing countries, notably Bangladesh, India, Pakistan and Sri Lanka, as well as in Egypt, Madagascar, Morocco and South Africa. The firm generally takes between 30 to 70 per cent of a factory’s output – less would not give it the clout to secure orders or reserve production capacity for incoming orders, and more would make it over-dependent on the supplier (Magretta, 1998, p. 106). In sum, the company’s transnationalization process is based not on the possession of domestic assets that can be exploited abroad (as was the case for many conventional TNCs), but on linkages, tapping into the resources of partners and sharing the risk with them.

*Source:* UNCTAD based on Li & Fung Limited, <http://www.lifung.com/about/index.html>; Mathews, 2001; Magretta, 1998; Gereffi, 2001.

intermediary has no influence over its distribution. East Asian firms were the first to become full-package suppliers to foreign buyers (Gereffi, 2001), drawing on their ability to coordinate complex production, trade and financial networks efficiently (box V.1).

One might say that there are two different worlds in the garments industry: an expanding world and a shrinking one. The first contains buyer-driven value chains in which brand owners (à la Limited Brands) can move the production systems of third parties based on their design and marketing competencies. Instead of establishing their own production facilities, they can contract them. This can involve the retailer overseeing some of the individual elements of the international subcontracting process such as sourcing inputs, assembly, quality control and delivery from distinct providers, as The Mast Industries division of Limited Brands does. Or it can involve the contracting of full-package providers that, on the basis of the design received, take it upon themselves to undertake the whole production process, as Li & Fung does. Both Mast and Li & Fung are skilled intermediaries that excel in organizing supplier networks. FDI is not necessarily involved in the generation of exports in this first world of garments.

The second world of the garments industry contains brand-name manufacturers that maintain FDI-based international production systems. These manufacturers have been forced offshore to low-wage sites by heightened competition, and rely on preferential market-access schemes that give them an advantage until the quota system of the Multifibre Arrangement is dismantled. The Sara Lee companies involved in garment production are typical examples. They use foreign affiliates based in three or four different production sites in one region (the Caribbean basin, for example) that produce similar products. That gives them the flexibility to adapt to the changing competitive situation of each site by adding assembly lines in the more convenient ones and dropping them in the rest, without the need to close down any site. These FDI-based production systems are, however, becoming less representative of the industry as a whole. This kind of strategy appears to rely on production as well as marketing advantages to drive the value chain, but buyer-driven chains dominate international trade in the industry.

### 3. Control through equity and non-equity relations in a production-driven international production system: Toyota

The automobile industry maintained its large share of world trade at 8.8 per cent and grew from \$149 billion to \$486 billion between 1985 and 2000. This industry accounts for about 30 per cent of medium-technology, non-resource-based manufactures. The existence of excess capacity in the order of 25 per cent in North America and 30 per cent in Western Europe<sup>9</sup> has not stopped auto TNCs from continuing to expand production capacity both at home and abroad (PricewaterhouseCoopers, 2000). Despite surface calm, a harsh industry-wide restructuring has taken place. Strong competitors have swallowed weak ones, and new plants and equipment have replaced old ones. Both factors have influenced the international expansion of the principal automobile TNCs.

Unlike electronics, automobile production systems tend to be national or regional, rather than global. The high weight-to-price ratio of motor vehicles and strict government policies to protect domestic markets and support local production slow the pace of globalization in this industry. For example, European manufacturers still produce almost three-quarters of their passenger cars in the European Union, United States manufacturers half their passenger cars in North America, and Japanese manufacturers two-thirds of their passenger cars in Japan. In the Republic of Korea – a new entrant with a strong domestic industry – national manufacturers supplied almost 90 per cent of the total until the Asian financial crisis, after which some of those companies sold their assets to foreign TNCs. In other words, home markets are still central to automobile manufacturers, even though many producers have large stakes overseas. In most developing countries with substantial automobile industries, however, TNCs are dominant.

A few firms dominate the world motor industry. In 2000, the top 10 accounted for three-quarters of global production (table V.8). Of these, only one company, Ford, had “transnationalized” a good part of its production (defined as over 40 per cent of



**Table V.8. The top 10 automobile manufacturers, ranked by vehicle production, 2000**

Rank	Company	Home country	1980 units produced (Millions)	1994 units produced (Millions)	2000 units produced (Millions)	1980 foreign production (Per cent)	2000 foreign production (Per cent)
1	General Motors	United States	6.7	8.0	8.1	29.2	48.1
2	Ford	United States	4.2	6.5	7.3	54.9	48.1
3	Toyota	Japan	3.8	5.2	6.0	..	30.3
4	Volkswagen	Germany	2.5	3.2	5.1	35.5	60.7
5	DaimlerChrysler	Germany	1.7 <sup>a</sup>	3.7 <sup>b</sup>	4.7	<20	75.5
6	PSA	France	2.0	2.0	2.9	18.4	40.3
7	Fiat	Italy	1.6	2.4	2.6	14.0	40.1
8	Nissan	Japan	3.1	2.8	2.6	..	48.6
9	Renault	France	2.1	1.9	2.5	19.8	42.4
10	Honda	Japan	1.0	1.7	2.5	..	51.1
Total top 10			28.7	37.4	44.3		
Total world			34.9	49.7	58.4		

Source: UNCTAD, based on UNCTC, 1983; OECD, 1996; Organisation Internationale des Constructeurs d'Automobiles ([www.oica.net/htdocs/main.htm](http://www.oica.net/htdocs/main.htm)).

<sup>a</sup> Sum of Chrysler (1.0 million) and Daimler Benz (0.7 million).

<sup>b</sup> Sum of Chrysler (2.8 million) and Daimler Benz (0.9 million).

production outside the home country) in 1980. By 2000, all but Toyota had passed that threshold. Yet it was Toyota that had stimulated change in the industry, including the shift of production facilities to developing countries and economies in transition.

Toyota used to supply North America and Europe mainly by way of exports from Japan. It moved abroad only when access to those markets became restricted because of voluntary export restraints and quotas. In order to establish itself successfully in the highly competitive United States market, it relied on a number of strengths intrinsic to the Toyota Production System:

- Integrated single-piece production flow with low inventories.
- Small batches made just in time.
- Defects prevented rather than rectified.
- Production “pulled” by customer demand rather than “pushed” to suit machine loading. Teamwork with flexible multi-skilled operators.
- Production line jigs with identical specifications worldwide to add/switch models easily.
- Active involvement in root-cause diagnosis to eliminate all non-value-adding steps, interruptions and variability.
- Closer integration of the value chain, from raw materials to finished product, through partnerships with suppliers and dealers.

These strengths enabled Toyota (and other Japanese manufacturers that acquired them) to make major inroads in world automobile markets, first through exports and later through FDI (Mortimore, 1997). In 1990, Toyota's production was heavily concentrated in Japan, accounting for 86 per cent of its sales. By 2000, foreign production accounted for 30 per cent. This new capacity is critical to Toyota's plan to raise its global market share by half (from 10 to 15 per cent). At the end of 2001, Toyota had 12 plants in Japan and 43 plants in 26 other countries (see annex table A.V.1 for the main ones). Its international production system combines a set of modern, efficient plants with a set of older, less efficient ones supplying domestic markets in such developing economies as Argentina, Brazil, India, Indonesia, Malaysia, the Philippines, South Africa, Taiwan Province of China, Venezuela and Viet Nam. The small production scale and export volumes of the latter mean that they do not play a significant role in the global expansion of the Toyota Production System.

Toyota's success as a major automobile TNC stems primarily from its lean production system, its quality circles, its tiered suppliers and timely procurement. Although it was a latecomer in establishing its corporate system, its superiority allowed it to establish its regional networks in the heart of the home markets of its principal competitors,



driving them to close down less efficient plants and seek out lower-cost production sites. There are, however, indications that Toyota too will be expanding operations in lower-cost sites – partly as a result of the successful copying of Toyota's production innovations by its competitors.

In the modern and most competitive part of its international production system, Toyota maintains its ownership advantage in fully-owned assembly plants, with a few exceptions. Parts are, to a large degree, externalized. Locational criteria relate mainly to market size in the case of the principal markets, and to market access in the older, less competitive parts of the Toyota international production system. Recently, Toyota has indicated that it will extend its international production system around core regional markets to lower-cost sites, like Mexico for North America, and Turkey and the Czech Republic (box III.10) for Western Europe. Production is scheduled to start in 2005.

So far, the developing country that has gained the most from developments in the industry is Mexico, which increased its market share by 12 percentage points between 1985 and 2000 (table V.9). Volkswagen is one example of how one company reoriented its production in that country (box V.2), Ford is another (box V.3).

#### 4. Control in transition in a technology-driven international production system: Ericsson

Telecom equipment was among the most dynamic exports during the period 1985-2000. By 2000, it represented 3.3 per cent of world trade (up from 1.3 per cent in 1985) and accounted for 14.3 per cent of high-technology, non-resource-based trade. In 2000, the total value of telecom equipment exports exceeded \$173 billion, with the top 10 exporting countries accounting for 73 per cent of the total.

After the boom of the late 1990s, the industry has faced a sharp downturn, partly because of excessive spending by telecom operators on licences to operate third-generation mobile telephony. This has triggered a dramatic restructuring among the leading TNCs, including massive job cuts – at least 500,000 worldwide if service providers are included (www.FT.com.2 May 2002). Over-capacity is driving manufacturers to cut costs and make better use of existing facilities. At the same time, rapid technological change – including the development of new standards for mobile telephony and closer integration of the telecom, consumer electronics and media industries – is leading to shorter product cycles and forcing companies to invest more in R&D and innovative solutions, precisely at a time when their cash flow

**Table V.9. Winners and losers in the automobile industry<sup>a</sup> exports to the North American market, 1985, 2000**  
(Per cent)

Economy	1985	2000	Market share increase, 1985-2000	Top 10 TNC present <sup>b</sup>
<b>Principal winners</b>				
Mexico	0.4	12.2	11.8	GM, Ford, DaimlerChrysler, Volkswagen, Nissan
Canada	23.7	29.0	5.3	GM, Ford, DaimlerChrysler, Toyota, Honda
Republic of Korea	0.6	3.7	3.0	
Total	24.7	44.9	20.1	
<b>Principal losers</b>				
Japan	41.3	28.1	-13.2	Toyota, Nissan, Honda
United States	12.0	7.6	-4.4	GM, Ford, DaimlerChrysler, Renault, Toyota, Nissan, Honda
Germany	15.3	12.8	-2.5	GM, Ford, DaimlerChrysler, Volkswagen, Fiat
Total	68.7	48.5	-20.2	

Source: UNCTAD, based on the United Nations' Comtrade database.

<sup>a</sup> SITC 7810: passenger motor cars.

<sup>b</sup> For developing countries with automotive affiliates not mentioned here, see annex table A.V.2.

### Box V.2. Volkswagen's strategy in Mexico

In 1967, the first Beetle left the assembly lines of Volkswagen de México in Puebla. During the following 20 years, Volkswagen de México focused its local production almost exclusively on the domestic market, achieving only small-scale exports of the classic Beetle model. In 1977, production of the first-generation Golf began, followed soon after by the Jetta. The operation was typical of the import-substituting investments made in protected markets at the time, characteristically inefficient by international standards.

In 1989, Volkswagen took a *strategic decision* to consolidate its North American operations. The two North American plants, in Puebla, Mexico, and in Pennsylvania, United States, were producing at half their capacity due to the weakness of both markets. Both plants were producing the same Golf and Jetta models. Mexico was selected as the sole production centre for Volkswagen in the region<sup>a</sup> and suitably modernized and upgraded as a result. Of the total production of 380,000 vehicles in 2001, 300,000 were exported, four-fifths of these to North America. These exports from Puebla accounted for 60 per cent of the Volkswagen sales in North America, with the remaining being imported from Germany. For the Volkswagen Group, the Puebla operation is not only the main product source for its most important growth market, which is the United States, but, also a supplier of engines and other components to most Volkswagen factories in the world. The Mexican operations of Volkswagen have been transformed into a world-class manufacturing platform.

As NAFTA was implemented in 1994, Volkswagen decided to upgrade its Mexican facilities further. It decided to start production of the prototype called Concept 1, reminiscent of the traditional Beetle silhouette, but on a modern technology platform. A production site that guaranteed both highest quality and competitive costs had to be found. After reviewing several alternatives for the production

of this car (which had meanwhile been baptized the "New Beetle"), Volkswagen finally decided in 1995 to allocate it to the plant in Puebla, Mexico.<sup>b</sup> The decision to locate the New Beetle production in Mexico meant investing several hundred million dollars, increasing capacity in the Volkswagen plant in Puebla and creating 1,500 new jobs, bringing more than 20 auto part suppliers to Mexico and building new production facilities.

The New Beetle project is the most prominent example of how globalization is determining the strategy of the automotive industry for Mexico. A new trade agreement with Europe – eventually signed in December 2000 – was already on the agenda, and the Government decided to open its borders to the import of assembled cars in advance of the actual negotiations. Strategically, this allowed Mexican automobile assemblers to reduce the production complexity of their Mexican plants to a few product lines, thus increasing scale effects for improved cost competitiveness. The low volumes of different models to supply the Mexican domestic market could now be sourced from other assembly plants all over the world, not only from the NAFTA region.

In sum, faced with a decision on how to organize its production for the North American market, Volkswagen opted to close its United States operation in favour of its Mexican one. That decision was ratified when Volkswagen assigned to its Mexican operations the worldwide production of the new Beetle model. Volkswagen has been able to improve its competitive situation in the North American market based solely on its upgraded and modernized plants in Mexico. Its subsidiary has become the third biggest manufacturing operation among foreign firms in Latin America and the sixth biggest export operation of all firms in the region. At the same time, Volkswagen's success provided another strong boost to the international competitiveness of the Mexican automobile industry.

*Source:* UNCTAD, based on material provided by the Department of Communications, Government Affairs and Corporate Strategy of Volkswagen de México, February, 2002.

<sup>a</sup> Given comparable quality levels, arguments in favour of the Mexican plant were lower production costs, a broad supplier base in Mexico and the fact that closing the Mexican plant would have meant abandoning the Mexican market, while the United States market could still be supplied from Mexico after the closing of the Pennsylvania plant.

<sup>b</sup> The main reasons for this decision were the excellent quality levels achieved in the Puebla plant after six years of export experience to the United States; the very competitive cost levels both of the plant itself and of the Mexican supplier base; and NAFTA providing a clear long-term framework with regard to both market access and the gradual elimination of performance requirements.

**Box V.3. Ford's strategy in Mexico**

Ford was one of the most globalized automobile companies in the early 1990s. It invested heavily in foreign markets and lower-cost production sites to rectify its loss of market share in the United States. In 1980, over half of Ford's production capacity was located outside the United States, mainly in Europe. It then sought to compete better in the North American market by producing in Mexico, where it made sizeable investments in assembly operations, making use of the United States production-sharing market-access mechanism and the Mexican *maquiladora* export scheme (see chapter VII). Beginning in 1994, Ford's operations there benefited from the NAFTA rules of origin.

The building of Ford's new production capacity in Mexico resulted in dramatic changes in the quality and type of models produced in Mexico. Prior to 1987, its products were sold

only in the Mexican market. There were a great many models, and production rarely exceeded 20,000 units per year. In 1987, Ford began to export two models from its new plant. By 2000, the company was producing 193,204 vehicles and exporting 181,099 of them. Ford's subsidiaries in Mexico became the third biggest manufacturing operation among foreign firms in Latin America and the eighth biggest export operation of all firms in the region.

In short, Ford's response to the loss of market share in the United States to Japanese firms was to integrate Mexico into its international production system and to focus its operations there on two compact-sized vehicles and one engine with state-of-the-art technology, both manufactured for export. It was helped in this by the United States production-sharing mechanism and the NAFTA rules of origin.

*Source:* UNCTAD, based on ECLAC, 1998; Mortimore, 1998b; Shaiken and Herzenberg, 1987; Carrillo, 1995; and Shaiken, 1995.

long-term growth of the companies is involved, the immediate threat is to survival. That means that a good part of their energy is directed at the need to improve efficiency.

The market for telecom equipment is dominated by a small number of large TNCs (table V.10) with rather similar ownership-specific advantages. (Cisco Systems, a router specialist, is the principal exception.) Eight companies in 2000 accounted for about 54 per cent of worldwide sales of telecom equipment (\$381 billion).<sup>10</sup> For the most part, they drive their value chains through technological advantages in the sense that new technologies have led to a surge in the use of mobile phones and the Internet, and this has resulted in increased demand for the installation and upgrading of modern telecom infrastructure. Of significance for the configuration of international production systems in this industry were differing standards, the timing of the shift to mobile phones, and the timing of the privatization of incumbent service providers in many countries, where national or regional priorities sometimes came to the fore.

In response to the rapid market growth of the late 1990s, most equipment vendors expanded their international production systems

and now have to adapt to the crisis in the industry. The situation of Ericsson exemplifies this in many ways.

During the past decade, Ericsson,<sup>11</sup> the world's largest supplier of telecom equipment, reduced the number of its production plants from about 70 to less than 10 worldwide and outsourcing production to contract manufacturers. Ericsson has maintained two kinds of foreign affiliates: plants needed for the development and manufacturing of new products whose production is not standardized enough to

**Table V.10. The top telecom equipment manufacturers, 2000**  
(Billions of dollars)

Rank	Company	Home country	Sales
1	Ericsson	Sweden	31.3
2	Nortel Networks	Canada	30.3
3	Nokia	Finland	27.2
4	Lucent Technologies	United States	25.8
5	Cisco Systems	United States	23.9
6	Siemens	Germany	22.8
7	Motorola	United States	22.8
8	Alcatel	France	21.6

*Source:* Gartner Dataquest, [www.cellular.co.za/stats/top\\_telecoms\\_infrastructue\\_vendors\\_2000.htm](http://www.cellular.co.za/stats/top_telecoms_infrastructue_vendors_2000.htm).

motivate a shift to low-wage countries; and the most cost-efficient plants for the more standardized products. The former produce non-standardized products and need to be close to the design and development units that can remove “bugs”. The latter engage in high-volume manufacturing concentrated in a few low-cost sites like China, Poland and Estonia. In the case of China, Ericsson expects exports to grow significantly in the coming years. Operations in other parts of Asia are likely to move there. India, Indonesia and the Russian Federation may be candidates for future production plants. For site selection, Ericsson takes into account the following host-country factors: market size, level of bureaucracy, quality of infrastructure (including customs clearance procedures, the tax system, EPZs), trade policies affecting access to international markets, level of political risk, production costs (including labour costs), and the availability of contractors and suppliers. Ericsson protects its core technological advantages through its fully-controlled subsidiaries. In choosing locations for its subsidiaries for equipment manufacture, it focuses on efficiency factors plus domestic market demand, the latter being particularly relevant to the telecom industry.

The role of outsourcing has grown dramatically. Much of the non-core production has been externalized to contract electronic manufacturers for cost-sharing reasons. The firm is disposing of many plants to contract manufacturers such as Flextronics (see below) and Solectron, which are willing to purchase them in order to strengthen their strategic relationships with Ericsson. Sourced components are aggregated at the highest possible assembly and testing levels, so that a smaller number of strategic partners or first-tier suppliers are required. In January 2001, Ericsson transferred its complete supply chain for mobile phones to the contract electronics manufacturer Flextronics to improve economies of scale and volume production flexibility, and to reduce capital exposure as well as risk. Flextronics took over all related Ericsson facilities in Brazil, Malaysia, Sweden, the United Kingdom and parts of Ericsson’s plant in Lynchburg, Virginia, in the United States. Ericsson now focuses on other parts of the telecom equipment value chain, such as design, R&D, product development, and sales and marketing.<sup>12</sup>

Ericsson’s competitors have been under similar pressures to restructure and adjust their international production systems. An example is Nokia. It is the world’s leading mobile phone maker, with a share of 35 per cent of the worldwide market of about 400 million units in 2001.<sup>13</sup> The company has production facilities in Finland (the home country) and 10 other countries. Telecom infrastructure is produced in China, Finland, Malaysia and the United Kingdom; mobile phone handsets are made in Brazil, China, Finland, Germany, Hungary, Mexico, the Republic of Korea and the United States. In the case of mobile phones, high-volume production of key inputs (engines) is concentrated in selected production units, while all factories are involved in final assembly. This type of operation requires the ability to adapt quickly to shifting tastes and a very reliable and flexible material-supply system.<sup>14</sup> Due to the need for high-volume production, Nokia only adds a new plant if it is clear that there is a market for many millions of units per year from that plant.<sup>15</sup>

An analysis of the production systems of the other main actors in the telecom equipment industry reveals many similarities with those of Ericsson and Nokia. Outside the EU and the United States, most equipment makers have set up production plants in Brazil and China. Other countries that have attracted telecom manufacturing include some in Central and Eastern Europe (e.g. Estonia, Hungary and Poland), in South-East Asia (Malaysia, Singapore and Thailand), East Asia (Republic of Korea) and Mexico. Siemens has the widest geographical spread of plants, with a presence also in India, Romania, the Russian Federation, Switzerland, Turkey and Ukraine.

Most of the key players have streamlined and outsourced considerable parts of their production in reaction to the industry crisis and the corresponding systemic efficiency requirements. Cisco Systems, for example, outsources almost all manufacturing to contract manufacturers around the globe. Nortel Networks reduced its overall workforce in 2001 from 93,000 to 48,000, mainly by divesting its non-core activities. Manufacturing and repair operations in Europe, North America and Asia were outsourced to the contract electronics manufacturer, Solectron. Motorola announced, in June 2000, a major deal under



which Flextronics was to take over a significant part of Motorola's mobile phone production. Lucent Technologies unveiled a plan in April 2000 to increase the share of manufacturing by contract partners from 20 per cent to 60 per cent over 18 to 24 months.<sup>16</sup> Lucent has transferred two manufacturing plants in the United States to Celestica.<sup>17</sup> Through these and other measures, Lucent cut its workforce by almost 45,000 in 2001. In China, on the other hand, Lucent announced, at the end of 2001, that it would expand its manufacturing base in Shandong Province.<sup>18</sup>

This analysis suggests the following:

- Most telecom companies are relocating high-volume manufacturing activities from high-cost to low-cost locations (particularly in a small number of developing countries and economies in transition).
- Throughout the industry, there is a growing focus on core competencies and a greater reliance on contract manufacturers for more standardized and less sophisticated products.
- The downsizing of high-cost production sites has not affected the design and R&D activities in these sites.

Thus, telecom equipment TNCs drive their value chains by way of their technological advantages in core products and through international production systems based on foreign affiliates for the more standardized and less technologically sophisticated items, and they rely on others, increasing in this manner their production efficiency. The ownership advantages of their advanced technologies are protected in a similar fashion as Intel's in the semiconductor industry, by internalizing them. Ericsson's principal advantages are in equipment for ground stations (i.e. for transmission and reception). In its dealings with telecom operators, the company prefers to operate through its international production systems.

Facing that competitive situation in mobile phones, Ericsson outsources much of its previous in-house production in order to reduce costs. It should be mentioned that, with regard to locational advantages (as well as the typical efficiency-seeking considerations), TNCs in telecom equipment prefer that production locations include a strong potential for domestic market growth as well as a relatively well-developed supply infrastructure.

The geographical shift in the exports of telecom equipment has been dramatic (table V.11). Over the period 1985-2000, five countries had market share gains corresponding to almost 30 percentage points in total, with the Republic of Korea, Mexico, China, Sweden and Finland reporting the largest increases. Ericsson and Nokia are behind many of these changes, either directly or via the manufacturers they contract.

**Table V.11. Winners and losers in telecommunications equipment<sup>a</sup> exports, 1985, 2000**  
(Per cent)

Economy	1985	2000	Market share increase, 1985, 2000	Top 8 TNCs present <sup>b</sup>
<b>Principal winners</b>				
Republic of Korea	3.5	11.2	7.8	Nokia
Mexico	1.0	7.4	6.4	Nortel, Nokia, Motorola
China	0.04	5.7	5.7	Ericsson, Nokia, Siemens, Motorola
Sweden	2.5	8.1	5.6	Ericsson
Finland	2.0	7.2	5.2	Nokia
Total	9.1	39.7	30.6	
<b>Principal losers</b>				
Japan	29.1	4.6	-24.5	
United States	23.5	10.9	-12.7	
Total	52.6	15.4	-37.2	

Source: UNCTAD, based on the United Nations' Comtrade database.

<sup>a</sup> SITC 7643: television, radio and related transmitters and receivers.

<sup>b</sup> As of January 2002. Developing economies with telecom equipment affiliates not mentioned here include: Brazil (Ericsson, Nortel, Nokia, Siemens, Motorola), Singapore (Motorola), Malaysia (Motorola), Thailand (Siemens), India (Siemens) and Egypt (Siemens).

The case of the technological leadership of Ericsson in the telecom equipment value chain demonstrates some of the principal features of international production systems in this industry: a technological leader facing restructuring pressures during a harsh industry-wide recession combines with a fast-growing and efficient production specialist (Flextronics – box V.4) to exploit the competitive advantages of both. Ericsson and many of its principal competitors are focused more on restructuring than on the expansion of their in-house production systems. They become, therefore, more selective about where they locate manufacturing operations, expanding only in countries like China that offer both efficiency-enhancing possibilities and strong domestic demand. Nonetheless,



the stronger expansion of international production systems within this value chain currently comes from contract manufacturers rather than the technological drivers.

### 5. Outsourcing becomes more generalized: the rise of contract manufacturers

These case studies have served to demonstrate the diversity of international production systems and suggest a trend towards less hierarchical international production systems with more non-equity elements. While non-equity forms linked to supplier networks have been around in the garment and electronics industries for a while, other new forms are rapidly appearing. Especially impressive are contract manufacturers that actually establish their own international production systems through which they serve their customers (typically other TNCs). In consequence, their presence has an immediate impact on trade.

The growth of contract manufacturing can be exemplified by the electronics segment of this market. It is expanding not only in North America and Europe, but also in Asia. Between 1998 and 2002, the global market for contract manufacturers in electronics had been expected to grow by 140 per cent, from \$58 billion to \$139 billion. Some estimates suggest that the share of the total market for electronics equipment controlled by contract manufacturers will increase from 8 per cent in 1999 to 18 per cent in 2004 ([www.solelectron.com](http://www.solelectron.com)). The largest four contract manufacturers each had revenues of over \$10 billion in 2002 (table V.12). Outside the EU and the United States, the bulk of their facilities are located in Brazil, China, Hungary,

Mexico and Malaysia, followed by Singapore and Thailand and, recently, Japan (chapter III).

Contract manufacturers offer many advantages. They achieve greater efficiency through higher capacity use because they can simultaneously assemble or manufacture products for several original equipment manufacturers using the same plant. By building in-house capabilities, they are able to develop new process technologies and sometimes even help their principals with product innovation. As they evolve, they undertake a host of manufacturing-related functions such as logistics and procurement. They go global, both to take advantage of low-cost locations and to support clients in all their major production sites around the world, introducing new products and providing aftersales repair services centres.

Important bonuses for the countries that attract leading contract manufacturers include the increased scope advantages that can accompany such an investment; clustering effects and the associated longer-term upgrading of economic activities; and, of course, exports. For example, Flextronics has become the sixth largest exporter in Hungary and one of the top 15 TNC exporters in China. The effects for host countries may become even more important if the process of outsourcing leads to a concentration of production and export activities in a small number of clusters, especially industrial parks; the greater the numbers of plants and the more numerous the local linkages with suppliers, the less likely will TNCs be to move to other locations (box V.4).

## C. Conclusions

The increasing intensity of competition in all industries, and especially export-oriented industries means that leading companies are continually challenged by competitors and newcomers. That competition in itself provokes strategic reactions. TNC responses to this competitive pressure vary according to their competitive advantages at different stages of the global value chain. In the high-technology sector, competitive advantage lies mainly in technological capacity and speed of innovation. In the medium-technology sector (characterized by mature technologies), firms tend to focus more on efficiency through economies of scale. In the low-technology sector (where

**Table V.12. The five largest contract electronics manufacturers, 1995 and 2002**  
(Billions of dollars)

Company	Headquarters	Revenue	
		1995	2002 <sup>a</sup>
Solelectron	United States	1.7	16.5
Flextronics International	Singapore	0.4	13.2
SCI Systems/Sanmina	United States	3.5	12.1
Celestica	Canada	0.6	11.3
Jabil Circuit	United States	3.6	4.9

Source: UNCTAD, based on Sturgeon, 2002, p. 14.

<sup>a</sup> Estimated.

**Box V.4. Flextronics: specializing in the manufacture of others' products**

A closer look at some aspects of the strategy of one of the fastest growing companies in electronic manufacturing services, Flextronics, provides a better understanding of what drives the transnationalization strategies of contract manufacturers. With corporate headquarters in Singapore, Flextronics grew from \$448 million in revenues in 1995 to about \$13 billion in 2002. A significant share of Flextronics' production is in low-cost economies; in eight locations in five countries (i.e. Brazil, China, Hungary, Mexico and Poland), Flextronics has developed what it calls integrated "Industrial Parks" (box table V.4.1). These help the firm to overcome infrastructure bottlenecks as they are large enough to attract suppliers to set up shop close to them. Each Flextronics' Industrial Park provides the necessary capabilities for the company to undertake high-volume production and provide cost-effective delivery of finished products within a day or two to the product owner's end-users, greatly reducing the freight costs of incoming components and outgoing products.

The most sophisticated operations, including the manufacture of routers and wireless base stations, are performed in places like Silicon Valley (United States) and Sweden, where the right mix of skilled labour is available. The most labour-intensive operations are in Doumen, China, where Flextronics makes, among other things, PC parts, mouse assemblies and mobile phones.<sup>a</sup> In Europe, the company has expanded rapidly into Central and Eastern Europe.

In addition, Flextronics also has regional manufacturing operations in multiple locations within Brazil, Europe, India, Israel, Malaysia and North America that complement its Industrial

Parks. In contrast to the latter, which were typically set up as greenfield investments, most of the regional manufacturing operations are acquisitions of existing plants previously controlled by Flextronics' key customers or competitors, and often lack the efficiency-seeking characteristics of its Industrial Parks. Flextronics cements its strategic relationships with the former owners in this manner, then endeavouring to improve efficiency in those plants.

Flextronics, like most of the more sophisticated contract electronics manufacturers, also provides such services as product introduction centres and design and engineering centres to its strategic partners and buyers. This demonstrates how the boundaries between contractee and contractor blur over time as strategic partners reassign tasks along the global value chain.

When investing in the expansion of its international production system, Flextronics expects host countries to offer an environment conducive to manufacturing for the world market. It takes into consideration factors such as the productivity of the workforce, the capabilities of domestic suppliers, the quality of public utilities and infrastructure, access to inexpensive and easily accessible land, investment incentives, labour market rules, customs clearance procedures and numerous quality-of-life aspects (Pfaffstaller, 2001).

Since Flextronics specializes in the manufacture of other firms' products, the value chain is driven by the owners of the products, *not* by the contract manufacturer. However, contract manufacturers are obliged to accompany their clients in different markets

and continually improve their process technology and production efficiency. For both reasons, contract manufacturers must establish suitable inter-national production systems of their own, and have consequently become leading investors with a critical influence on the export-competitiveness of host countries.

**Box table V.4.1. Flextronics' selected global facilities, 2002**

Location	Industrial Park	Regional manufacturing operation	Design and engineering centre
North America	..	6	9
Western Europe	..	18	14
Other developed countries	..	1	2
Latin America	2	4	..
East and South-East Asia	2	9	2
Central and Eastern Europe	4	2	2
Total	8	40	29

Source: <http://www.flextronics.com/Globalman>.

Source: UNCTAD, based on Pfaffstaller, 2001 and other materials.

<sup>a</sup> *Time*, 5 August 2001.

barriers to entry are low), cost cutting and marketing are the most critical. However, despite these general tendencies, it should be noted that firms in the same sector can react in quite different ways to similar stimuli. In the telecom industry, Nokia focuses more on in-house production of mobile phones, while Ericsson has completely outsourced it.

Most of the industry leaders reviewed above are keeping their core competitive advantages in-house in their home countries, either in R&D and design (technology development), or production processes, or sales outlets and brand management. Non-core functions, such as the labour-intensive parts of the production process, the assembly of less sophisticated products, or the logistical organization of product distribution are outsourced to low-cost sites. The contract manufacturing phenomenon epitomizes these outsourcing trends as the complete production process is outsourced. It increases the scale and importance of suppliers' operations, as global value chains are more and more finely sliced into specialized functional and geographical elements.

The splitting of the global value chain and the multiplication of supplier networks open up new opportunities for developing countries and economies in transition to participate in international production systems. Indeed, TNCs play a critical role in many manufactured exports. While retaining their core competencies, TNCs are setting up international production systems on the basis of corporate strategies that seek to obtain the optimal configuration of their production process by spreading production to locations that offer significant advantages in production costs and access to third markets. Thus, labour-intensive activities are moved to sites with cheap but efficient labour. The slicing of the value chain also means that new opportunities in the export of services open up to countries that can provide these services at low cost.

However, global suppliers must increasingly provide independent process development capabilities and the ability to perform a wide range of value-added functions associated with the manufacturing process, including help with product and component design, component sourcing, inventory management, testing, packaging and outbound

logistics. The increasing demands put on key suppliers raise the barriers to market entry for the smaller and younger suppliers from developing countries and economies in transition.

The spreading of international production systems, through either FDI or non-equity supplier forms, and – equally important – the upgrading of activities of foreign affiliates in specific locations along the value chain, depends not only on the strategies of firms but also on the policies of host countries. The latter can play a significant role in the configuration of international production systems if their governments have a clear understanding of how they “fit in” with the corporate strategies that determine the nature and location of international production systems.

The next chapter looks at global competitiveness patterns.

### Notes

- <sup>1</sup> During the first period, Japanese TNCs mounted a serious challenge to United States producers, winning significant market share (from 32.5 per cent to 51.2 per cent during 1982-1988), then falling back and reaching a low of 26.4 per cent in 1998. The main United States transnational producers (Motorola, Texas Instruments, National Semiconductor, Intel and AMD) collectively reached bottom in 1989 (at 37.3 per cent) before making a strong comeback (peaking with about 50 per cent of the global semiconductor market share in the late 1990s). While United States and Japanese leaders were fighting for market shares, new producers were making inroads, more than doubling their market shares, from 9 per cent to about 20 per cent over the period (based on data from the Semiconductor Industry Association).
- <sup>2</sup> On Intel's lead in flash memory design technology, lithography and capacity, see [http://www.intel.com/intel/finance/presentations/pdf\\_files/nichols.pdf](http://www.intel.com/intel/finance/presentations/pdf_files/nichols.pdf).
- <sup>3</sup> By end 2000, Intel's investment in Ireland surpassed \$3 billion. A new \$2 billion wafer fabrication unit was under construction ([www.intel.com/intel/community/ireland/aboutsite.htm](http://www.intel.com/intel/community/ireland/aboutsite.htm)).
- <sup>4</sup> Intel's investment in Malaysia totalled \$1.9 billion in 2000 ([www.intel.com/intel/community/malaysia/aboutsite.htm](http://www.intel.com/intel/community/malaysia/aboutsite.htm)).
- <sup>5</sup> Intel's investment in the Philippines surpassed \$1 billion by 2000 ([www.intel.com/intel/community/philippines/aboutsite.htm](http://www.intel.com/intel/community/philippines/aboutsite.htm)).
- <sup>6</sup> Intel's investment in Costa Rica was about \$450 million ([www.intel.com/costarica.htm](http://www.intel.com/costarica.htm)).
- <sup>7</sup> AMD is Intel's most direct competitor; however, it is not in the list of the top ten semiconductor makers.

- <sup>8</sup> See Spar, 1998; Rodriguez-Clare, 2001; Shiels, 2000; Eglhoff, 2001b.
- <sup>9</sup> See “Car manufacturing: incredibly shrinking plants”, *The Economist*, 11 April 2002.
- <sup>10</sup> See [http://www3.gartner.com/5\\_about/press\\_releases/2002\\_02/pr20020204b.jsp](http://www3.gartner.com/5_about/press_releases/2002_02/pr20020204b.jsp).
- <sup>11</sup> This section is based on direct interviews with Ericsson executives.
- <sup>12</sup> In 2001, partly in response to increased competition, a deal was concluded between Sony Corporation and Ericsson to merge their mobile phone businesses worldwide, relying mainly on contract manufacturers for assembly.
- <sup>13</sup> See [www3.gartner.com/5\\_about/press\\_releases/2002\\_03/pr20020311a.jsp](http://www3.gartner.com/5_about/press_releases/2002_03/pr20020311a.jsp).
- <sup>14</sup> For example, Nokia’s production of about 140 million mobile phones in 2001 implies the handling of several million components every hour, making the efficiency of the overall production network a key competitive factor.
- <sup>15</sup> For Nokia, every factory needs to be designed to serve a certain well-defined market and to be adapted accordingly, depending on whether it will produce engines or assemble mobile handsets.
- <sup>16</sup> <http://www.vnunet.com/News/602409>.
- <sup>17</sup> <http://www.lucent.com/press/0901/010904.coa.html>.
- <sup>18</sup> <http://www.lucent.com/press/1201/011225.coa.html>.