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Linkages

## *Chapter IV*



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## **PART TWO**

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# **PROMOTING LINKAGES BETWEEN FOREIGN AFFILIATES AND DOMESTIC FIRMS**

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## INTRODUCTION

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With the growing importance of FDI in economic life, host countries seek not just more such investment, but are also increasingly interested in its quality, in terms of benefits for sustainable economic development. Perhaps the most important way to tap these benefits is through production linkages between foreign affiliates and domestic firms. Such linkages can take several forms: *backward*, *forward* or *horizontal* (table IV.1). *Backward linkages* exist when foreign affiliates acquire goods or services from domestic firms, and *forward linkages* when foreign affiliates sell goods or services to domestic firms. *Horizontal linkages* involve interactions with domestic firms engaged in competing activities. Linkages, broadly defined, can also involve non-business entities like universities, training centres, research and technology institutes, export promotion agencies and other official or private institutions.

The focus of Part Two of this report is on the *backward linkages* of foreign affiliates with domestic firms in host developing countries. These are defined as transactions that go beyond arm's length, one-off relations (as in buying standardized products off the shelf) and involve longer-term relations between firms. In fact, a very large proportion of intra-industry transactions in every country involves linkages in this sense, marked by sustained exchanges of information, technology, skills and other assets. Linkages are of particular significance to developing host economies, because they provide a means of diffusing valuable knowledge throughout the economy – through direct flows to the linked firms as well as spillovers to and from the latter. The benefits provided through linkages with foreign affiliates

tend to be of greater competitive significance than those among domestic firms because of the stronger knowledge and skills base of many foreign affiliates. Linkages with foreign affiliates can therefore be of great importance to the dynamism and competitiveness of the domestic enterprise sector – the bedrock of economic development. Foreign affiliates, in turn, can benefit from backward linkages as they can reduce costs and enhance access to local tangible and intangible assets. Hence there is a substantial mutual interest between foreign affiliates and domestic firms to create and deepen backward linkages.

Foreign affiliates, of course, do not only link to domestic firms but also link, and quite frequently so, to other foreign affiliates in a host country. However, backward linkages to other foreign affiliates, while often unquestionably important, do not offer the same type of benefits for host developing countries as those between foreign affiliates and domestic (i.e. domestically owned) enterprises. The main reason is that domestic firms in developing countries are generally behind foreign affiliates as regards technology, human resources and other competitiveness-related factors, and hence would benefit more in terms of capacity-building than would other foreign affiliates. Linkages with domestic firms are therefore the primary focus of Part Two. The discussion, furthermore, ignores linkages between domestic enterprises and foreign firms that have no local direct investments (e.g. foreign buyers with supply contracts in developing countries). While these can also be channels for transfers of technology, information and skills, they involve different mechanisms and policies that are not the focus of analysis here.

Linkage promotion is not a new policy issue for developing countries (see, for example, Lall, 1980; UNCTC, 1981), but it deserves renewed attention. To begin with, FDI has become much more important in virtually all developing countries (see Part One); hence the issue of how to benefit from it has also become more important. Moreover, the economic setting is changing, and with it TNC procurement and supply chain management strategies. Intensified competition, policy liberalization and new organizational practices are leading firms to raise their reliance on external suppliers of goods and services. This opens up new possibilities for greater (and often higher quality) linkages and makes the availability of suppliers a more important factor in attracting FDI (Part One). At the same time, it imposes more stringent technological, managerial and scale demands on suppliers (and on their support institutions and infrastructure).

Confronted with this changed landscape, governments need to adapt their policies. This is all the more necessary as the ability of governments to promote efficient linkages is subject to new constraints that reduce their policy space. In particular, some frequently used measures to promote linkages, like local content requirements, are no longer permissible in the context of the WTO or other international agreements. It is still possible to promote linkages, but tools are different from those used in the past. Given the rising significance of linkages for domestic competitiveness, it is important to be aware of these tools. The objective, of course, is not just to create linkages for their own sake, but only when they are economically desirable and they enhance the efficiency of domestic enterprises. It is possible to

promote inefficient linkages, for instance, by forcing their formation under protected conditions, such that the linked supplier enterprises never become internationally competitive. This is costly for the host economy, breeding inefficiency and high-cost production structures. More generally, there are trade-offs between deeper linkages and greater dependence of suppliers on buyers.

Chapter IV provides the background to the policy discussion, outlining the significance of backward linkages for host economies and the determinants of linkage formation. It also reviews the evidence on foreign affiliate initiatives to create and deepen backward linkages in host developing countries – without claiming that this review is exhaustive or that the cases presented are representative. Still, it is clear that foreign affiliates and domestic firms, in their own self-interest, are forging linkages, and that best practices in this area can be emulated. At the same time, it is also clear that whatever the current level of backward linkages of foreign affiliates, linkages can be increased or deepened further, with a view towards augmenting the capabilities of domestic firms. This is why policies aimed at promoting linkages are important – precisely the topic of chapter V, the key chapter of this Part. The conclusions in chapter VI highlight the main policy options available to host country governments and provide the elements of a linkage promotion programme. In focusing on concrete policy measures and ways to combine them into programmes, this report seeks to identify pragmatic ways in which the contribution of FDI to the development of host countries can be enhanced.

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## CHAPTER IV.

# BACKWARD LINKAGES: IMPACT, DETERMINANTS AND TNC EXPERIENCE

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### A. Why backward linkages matter

**B**ackward linkages are important to both foreign affiliates and domestic (linked) enterprises.<sup>1</sup> Take them in turn, starting with affiliates. Most productive enterprises buy a large proportion of inputs - goods as well as services - from other firms.<sup>2</sup> The ability to source these locally can matter. If foreign affiliates can procure inputs locally, particularly in host economies in which labour costs are low, they can lower production costs (some service inputs, for example, may be very expensive to import). If they can subcontract directly to local suppliers, they can increase their specialization and flexibility, and adapt technologies and products better and faster to local conditions. Technologically advanced suppliers can provide affiliates with access to a pool of external technological and skill resources, feeding into their own innovative efforts. The trend to greater outsourcing and to concentration on core competencies raises the competitive benefits of having efficient support firms close by. This is why strong supplier clusters are of growing importance in the location decisions of firms, particularly for high value activities and functions (see Part One).

Domestic suppliers can also benefit from linkages with foreign affiliates. First, linkages raise output and employment in linked supplier enterprises. The indirect effects on supplier capabilities are probably more important. Linkages can be powerful channels for diffusing knowledge and skills between firms.<sup>3</sup> Inter-firm linkages nearly always entail an exchange of information, technical knowledge and skills. Strong linkages can promote production efficiency, productivity growth, technological and

managerial capabilities and market diversification in supplier firms. They can often promote exports by linked enterprises and, under the right conditions, domestic firms may develop to become global suppliers and/or TNCs in their own right (box IV.1). The strengthening of suppliers can in turn lead to various indirect effects and spillovers for the rest of the host economy. Spillovers can take place through demonstration effects, mobility of trained labour, enterprise spin-offs and competition effects (table IV.1).<sup>4</sup>

#### **Box IV.1. ENGTEK: from a backyard business to a global supplier**

Eng Teknologi Holdings Bhd (ENGTEK), headquartered in Penang, Malaysia, is a global supplier for the computer hard disk drive and the semiconductor industries. This holding has nine companies in four countries (China, Malaysia, the Philippines and Thailand). Some 2,000 employees generated a total revenue of about \$63 million during the fiscal year 2000, while cumulative capital investment reached more than \$34 million in that year. ENGTEK is run by a professional management team and has been quoted on the Kuala Lumpur Stock Exchange since 1993, moving to its main board in 1999.

Some 25 years ago, in 1974, the company started with a seed capital of \$200, as a tiny family-run venture that produced jigs and fixtures in a make-shift backyard facility. What are the main reasons for this exemplary growth from a no-name small and medium enterprise (SME) to a high-precision manufacturer that supplies competitive, quality value-added products and services to several global players in the electronics industry?

First of all, there is the entrepreneurial drive and the commitment of the founder family, including the vision of becoming the “best-in-class” technology corporation, the continued technological and managerial upgrading of the company to achieve this goal, as well as

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**Box IV.1. ENGTEK: from a backyard business to a global supplier (concluded)**

the uncompromising stand on product quality, price and reliability concerning on-time delivery. Secondly, ENGTEK grew up in a policy environment conducive to enterprise development. Under Malaysia's Vendor Development Programme, TNCs have been encouraged to assist local suppliers to become competitive at the global level. In addition, the Government accorded pioneer status to select local SMEs, which entitled them to generous tax rebates, thus strengthening their investment base. ENGTEK has benefited from both factors. Thirdly, ENGTEK has engaged in closely-knit partnerships with TNCs. For example, Intel provided financial as well as technical assistance needed for the company to produce semi-automated wire bonders in 1981. With partners such as Advanced Micro Devices, Bosch, Fujitsu, Hewlett Packard, Maxtor, Readrite and Seagate, ENGTEK has been involved in designing products, bringing in its specific experience in product development and gaining a competitive edge vis-à-vis potential competitors. As a first-tier supplier company, ENGTEK has been able to link up to the global production systems of its TNC clients, moving up the value chain over time. Partnerships also helped ENGTEK to internationalize and to become a TNC on its own. Finally, ENGTEK realized very early the risks related to an undiversified portfolio both of partners and products. To avoid dependence on one single customer, ENGTEK consciously put efforts into absorbing technology from a number of clients. It widened its range of products, diversifying, e.g., from precision tools into manufacturing of disk-drive components. Moreover, it developed its own technology for original equipment manufacturing and achieved original design manufacturing capabilities, which further reduced its dependency on any particular foreign affiliate.

*Source:* UNCTAD, based on ENGTEK's presentation at the workshop on Technological and Managerial Upgrading of SMEs through Linkages with TNCs, Penang, 8-9 August 2000, organized by UNCTAD and INTEL; interview with Alfred Teh Eong Liang, CEO, ENGTEK, 10 August 2000; [www.engtek.com](http://www.engtek.com); and Rasiah, 1999, pp.238-242

Knowledge diffusion through linkages with foreign affiliates can offer specific long-term (or dynamic) benefits to host developing countries. Where, as in industrial countries, both buyers and suppliers are technologically strong and capable, knowledge flows run in both directions. Their focus is then often on new technologies, products and organizational methods. Where, as in most developing countries, local suppliers are relatively weak in technological terms, the flows are likely to be more one-sided, from foreign affiliates to their domestic suppliers. They are also likely to contain more basic technological and managerial knowledge, in that the suppliers are likely to lag behind international best practice frontiers. At a time when the international competitive setting makes it imperative for developing country enterprises to upgrade technology and skills to best practice levels, this is of particular importance.

There is another advantage of linkages between foreign affiliates and domestic firms: they increase the local integration and "rooting" of TNCs and make them less footloose. Since backward linkages involve cost and effort by affiliates, stronger linkages make it more difficult for them to divest. Moreover, TNC linkages with SMEs can promote the formation and upgrading of industrial clusters in host economies, an important component of competitiveness (see Part One; Altenburg and Meyer-Stamer, 1999).

However, not all linkages are equally beneficial for a host economy; some may be harmful. For instance, firms may strike considerable linkages in protected industries in which there is inadequate incentive to invest in technological capabilities. Where such linkages lead to an uncompetitive supplier base, there is a net economic cost to the host economy.<sup>5</sup> This does not mean that there is no scope for promoting infant industries. But there is a difference between judicious, highly selective and temporary protection to foster technological learning (say, in strongly export-oriented regimes) and open-ended protection to firms – domestic or foreign – that deters learning and upgrading.

Linkages may also involve excessive costs for a host economy even under relatively open conditions. The reason lies in the size and market power of foreign affiliates. Exclusive linkages with large, monopsonistic foreign affiliates can lead to anti-competitive practices and unfair terms and conditions for suppliers (Altenburg, 2000). The distribution of benefits between buyers and sellers is subject to bargaining. Much depends on the technological content of, and value added by, the activities undertaken by suppliers. Suppliers of high value-added and sophisticated products and services are generally better placed to benefit from linkages than those selling simple products. Not only may the former receive higher shares of the revenues generated by their buyers, they may also have greater scope for enhancing their technological and organizational capabilities via linkages. The most advanced suppliers,

such as first-tier suppliers in developed countries, interact increasingly with customers in developing new technologies and products.

Foreign affiliates may be in a strong bargaining position with respect to suppliers, and so apportion to themselves a large share of the benefits of the relationship. For example, some foreign affiliates exact periodical price cuts from their suppliers (Brimble, 2001). Suppliers of simple price-sensitive inputs may, in addition, have to compete with each other by cutting costs, making it difficult for them to raise revenues and pay higher wages. Such suppliers may be forced to bear a high share of the risk of market fluctuations. Moreover, where employees in supplier firms have lower levels of job security and lower rates of unionization than employees in affiliates, there is another risk: outsourcing may be

**Table IV.1. Backward linkages and other relationships between foreign affiliates and local enterprises and organizations<sup>a</sup>**

Form	Relationship of foreign affiliate to local enterprise			Relationship of foreign affiliate to non-business institution
	Backward (sourcing)	Forward (distribution)	Horizontal (co-operation in production)	
"Pure" market transaction	• "Off-the-shelf" purchases	• "Off-the shelf" sales		
Short-term linkage	• Once-for-all or intermittent purchases (on contract)	• Once-for-all or intermittent sales (on contract)		
Longer-term linkage	• Longer-term (contractual) arrangement for the procurement of inputs for further processing • Subcontracting of the production of final or intermediate products	• Longer-term (contractual) relationship with local distributor or end-customer • Outsourcing from domestic firms to foreign affiliates	• Joint projects with competing domestic firm	• R&D contracts with local institutions such as universities and research centres • Training programmes for firms by universities • Traineeships for students in firms
Equity relationship	• Joint venture with supplier • Establishment of new supplier-affiliate (by existing foreign affiliate)	• Joint venture with distributor or end-customer • Establishment of new distribution affiliate (by existing foreign affiliate)	• Horizontal joint venture • Establishment of new affiliate (by existing foreign affiliate) for the production of same goods and services as it produces	• Joint public-private R&D centres/training centres/universities
"Spillover"	<ul style="list-style-type: none"> <li>• Demonstration effects in unrelated firms               <ul style="list-style-type: none"> <li>- Spillover on processes (incl. technology)</li> <li>- Spillover on product design</li> <li>- Spillover on formal and on tacit skills (shopfloor and managerial)</li> </ul> </li> <li>• Effects due to mobility of trained human resources</li> <li>• Enterprise spin-offs</li> <li>• Competition effects</li> </ul>			

Source: UNCTAD.

<sup>a</sup> The shaded area represents the focus of Part Two.

used as a means to reduce employment in affiliates and to transfer pressure onto employees in supplier firms where terms of employment and remuneration may be less formalized (ILO, 2001a, pp. 41-48; Blum, 2001; Harrison, 1994); this is especially the case with respect to lower-tier suppliers. However, the tendency of larger and stronger firms to try to shift the burden of adjusting to falling demand to suppliers with limited bargaining power, or to source from enterprises with no, or less formal, employment arrangements to reduce labour costs, applies regardless of ownership.

Where affiliates are “footloose” and prone to shift to lower cost locations as wages rise, local suppliers may again be forced to bear a high risk. The risk this time is of closure rather than of lower returns. Finally, there is a risk that local firms are displaced by first-tier suppliers that follow the lead firm to a new location (box IV.2). Even where TNCs stay, there is a risk to suppliers that become “locked in” to large buyers. Their fortunes become tied to those of their main customers, exposing them to potential pressure from them and to losses if the latter lose competitiveness. The same risks arise, of course, from being locked into large domestic buyers.

In sum, backward linkages of foreign affiliates matter for host developing countries because they provide opportunities for production and employment by domestic suppliers. More importantly, they constitute a direct channel for knowledge diffusion that can assist in upgrading domestic suppliers, technological and other capabilities, with spillover effects on the rest of the economy. Such knowledge diffusion is of particular importance for domestic firms that are still catching up with internationally competitive practices. The ability of foreign affiliates’ linkages to contribute to domestic supplier development cannot, however, be taken for granted. It depends on the markets in which foreign affiliates operate and therefore the incentive that they have to set up internationally competitive operations. It also depends on the capabilities of domestic firms. Where these are weak, few linkages

will occur. Moreover, linkages with large foreign affiliates, like those with all large firms, raise risks - such as the possibility for domestic suppliers of facing anticompetitive practices, unequal bargaining positions and excessive dependence.

#### **Box IV.2. Linkages to first-tier foreign suppliers**

Many foreign investments are followed by an inflow of FDI by key foreign suppliers. This phenomenon (“sequential investment”) is particularly marked in the automobile and automobile-parts industry, and in some segments of the electronics industry (UNCTAD, 2000a). In Brazil, for example, foreign component suppliers have located operations close to the final assembly plants of the leading carmakers that have invested in the country. In 2000, General Motors opened a new factory in Gravatai, Brazil. The plant was designed and developed jointly by General Motors and 16 of its global suppliers.<sup>a</sup> Given the increasing need to rely on local sourcing, associate investments by the supplier TNCs were necessary for General Motors’ investment to function. However, while all but one of General Motors’ first-tier suppliers to the Gravatai plant are foreign-owned, all use Brazilian suppliers at the second- or third-tier of the supply chain. Similar developments have been observed for other car manufacturers and in other parts of the world (Humphrey, 1998; Mortimore, 1997; Pries, 1999). Similarly, in the TV industry in Tijuana, Mexico, foreign components suppliers, notably from Asia, established operations in Mexico to follow United States and Japanese TV assembly TNCs (Carrillo, 2001, p.9).

Technological and scale factors often mean that first-tier suppliers to final assemblers in industries such as automotives are foreign-owned. In some cases, domestic supplier firms are taken over by foreign firms. However, linkages between first-tier foreign affiliate suppliers and domestic firms tend to develop at the second- and third-tier levels.

*Source:* UNCTAD, based on various sources.

<sup>a</sup> Tim Burt, “Components of an output revolution”, *Financial Times*, 10 April 2001 and company interview.

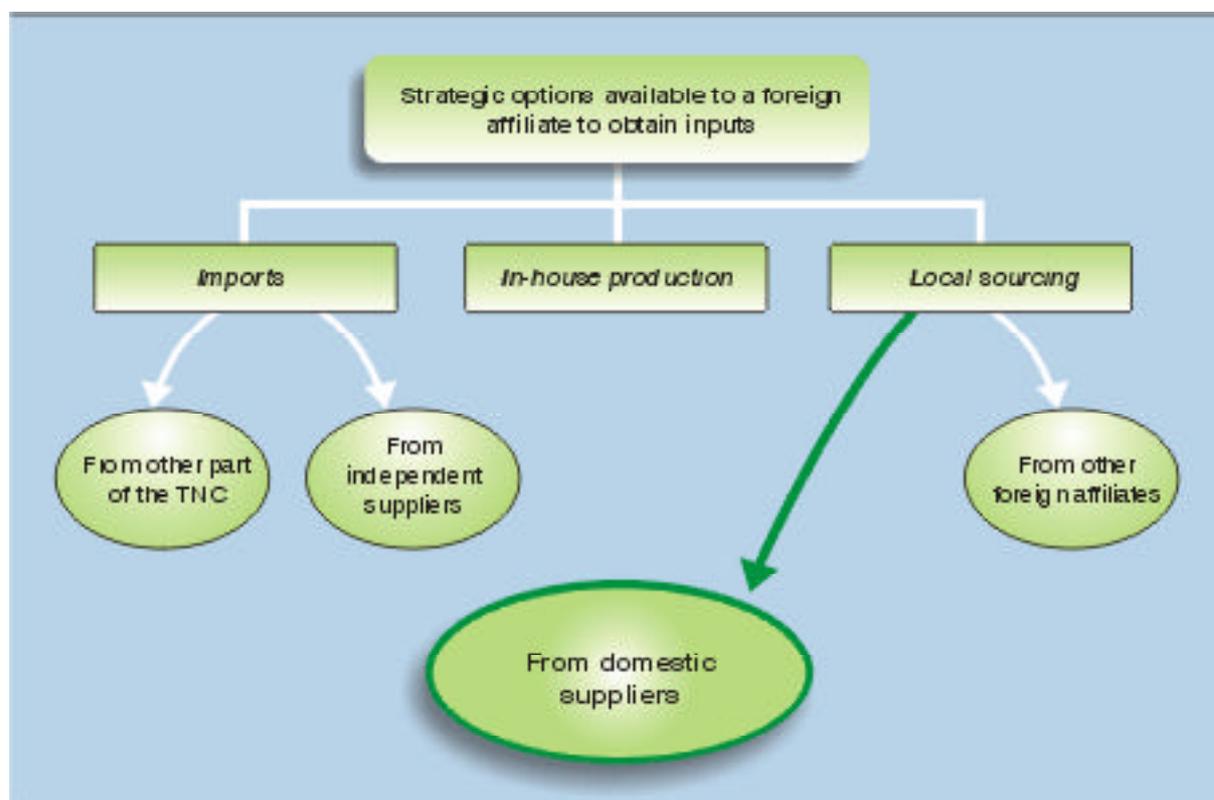
## B. Linkage determinants

A firm in any location has three options for obtaining inputs. It can import them, produce them locally in-house or procure them locally from other (foreign or domestic) suppliers (figure IV.1). The extent to which foreign affiliates actually develop linkages with domestic firms differs considerably (box IV.3). Foreign affiliates tend to be in a different position from local firms: they come with international supply chains and with established suppliers that know their technical, quality, scale and cost needs and have the capability to keep up with changing technologies. As a result, TNCs often find it economical to *import* inputs from these suppliers rather than buy locally. Where they need to procure inputs locally, they may find it more efficient to “internalize” them (produce in-house) because of their technological advantages over local firms. There may be other advantages in internalization: to avoid the costs of searching for, negotiating with,

upgrading and monitoring external suppliers. For affiliates with valuable proprietary technologies, internalization also reduces the risk of parting with valuable technological assets that can then leak out to competitors.

However, *producing inputs in-house* also involves several costs. There is the capital cost of setting up production facilities. There are further costs in managing the production process. If inputs enjoy scale economies and a firm is unable to reap them as fully as an independent supplier (that serves a number of customers), it will suffer from higher costs. If a firm has to undertake activities very different from its main area of specialization, it may face inefficiencies and overextend its organizational and technological capacity (Richardson, 1972; Penrose, 1959). Large firms – particularly foreign affiliates in developing countries – may also have to pay much higher wages than small domestic firms.

Figure IV.1. Strategic options for foreign affiliates with regard to obtaining inputs



Source: UNCTAD.

### Box IV.3. Evidence on backward linkages

The extent to which foreign affiliates establish backward linkages with domestic suppliers is usually measured by the local content of production or local sourcing by foreign affiliates. For many reasons, however, these measures may not accurately reflect the magnitude of backward linkages with domestic firms:

- Local content indicates the share of total outputs - components or intermediate products and ancillary products and services - produced locally. This includes inputs produced by local (foreign and domestic) suppliers, i.e. local sourcing, as well as those produced in-house by the foreign affiliates.
- Local sourcing indicates the share of inputs supplied by firms in a host country, but very often there is no information available on the ownership of suppliers (domestically owned or foreign-owned).
- Finally, sometimes the definition of local content, for the purpose of determining eligibility under rules of origin in the context of preferential trade arrangements, also includes inputs from other countries belonging to the same preferential trade area.

Bearing in mind these caveats, local content and local sourcing are the most commonly used proxies for backward linkages. The following examples review some evidence on local content (and local sourcing), based on relevant literature.

Several studies have noted that the propensity to source locally is often lower among foreign than domestic buyer firms. This has given rise to concerns in host countries that foreign affiliates have too limited interactions with the rest of the host economy. In Nigeria, foreign affiliates had a higher propensity to import than their local counterparts (Landi, 1986). Similar findings were made in the case of Ireland, Republic of Korea and India (McAleese and McDonald, 1978; Jo, 1980; Kumar, 1990). In Hungary, it was found in 1999 that on average the share of inputs procured from Hungarian suppliers was markedly higher in the case of domestic producers (59-62 per cent) than that of foreign affiliates (39 per cent) (Tóth, 2000). In a sample of 12 foreign-owned firms in Costa Rica “over 95 per cent of physical inputs are supplied ‘in house’ through their respective TNC networks” (UNCTAD, 2000a, p.104). Conversely, a small sample of national firms interviewed in the same survey sourced about 30 per cent of their inputs locally (UNCTAD, 2000a, p.105).

In selected *developed* host countries, affiliates source between 10 and 20 per cent of their inputs locally (i.e. supplied by domestic or foreign-owned suppliers). The average percentage of local sourcing observed in studies of various United Kingdom regions, for instance, ranges from 10 to 25 per cent (Collis and Roberts, 1992; Phelps, 1993, 1997; Crone and Roper 1999; Turok, 1993). Some evidence suggests that local procurement increases overtime. In Ireland, for example, raw materials sourced locally as a percentage of total raw material inputs in non-food manufacturing increased from 16 per cent in 1986 to 19 per cent in 1994; and in a sample of affiliates in the electronics sector, the percentage of raw materials and components procured locally increased from 8 per cent to 24 per cent in the same period (Görg and Ruane, 1998). During the 1990s, foreign affiliates of Japanese TNCs increased their local procurement in basically all host country regions, primarily by buying more from other Japanese companies in the respective host countries (Japan, METI, 2001).

In *developing* countries, the share of locally-sourced inputs by foreign affiliates varies by industry and region. Local sourcing by foreign affiliates is particularly low in the garments industry – between 5 and 10 per cent (UNCTAD, 2000a). In the Dominican Republic and Costa Rica, for example, very limited subcontracting was observed, essentially restricted to firms located in the industrial processing zone. Weak linkages were mainly attributed to the tariff regime of the main destination market, the United States. In Morocco, similarly, the share of inputs from domestic and foreign-owned suppliers of the garments industry’s principal export items was estimated at only 10 per cent in the late 1990s. As in the case of the Dominican

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**Box IV.3. Evidence on backward linkages (concluded)**

Republic and Costa Rica, the trade regime, which allows for the duty-free import of intermediate goods used in export production (UNCTAD, 2000a, p. 101), worked against local sourcing.

In the electronics industry, sourcing patterns appear to differ significantly by host country. For example, in 2001, foreign affiliates in the colour TV industry in Tijuana, Mexico, sourced about 28 per cent of their inputs locally, of which only a very small proportion (3 per cent) was supplied by Mexican-owned firms (Carillo, 2001). Meanwhile, in Malaysia, locally-procured components by foreign affiliates in the electronics and electrical industries comprised 62 per cent of exports in 1994; the corresponding figure for Thailand was 40 per cent (UNCTAD, 2000a, p. 71). However, in both countries, the most strategic parts and components were supplied mainly by foreign-owned companies rather than domestic ones (UNCTAD, 2000a, p. 71). In the hard disk drive industry, the level of local content provided by affiliates and domestic firms in Thailand was estimated at 30 to 40 per cent of total production cost in 2001 (Brimble, 2001, p. 2).

In the automobile industry, a global restructuring process has been under way for the past two decades, with all the major automobile producers, and their component suppliers, locating in developing countries. Assemblers have been moving increasingly towards “global sourcing” from preferred suppliers. Some of these locate in the production sites of the assemblers (box IV.2). This process has often been accompanied by a shake-out of domestically-owned supplier firms (UNCTAD, 2000a, pp. 148, 152, 162; Barnes and Kaplinsky, 2000). Local sourcing in the automobile industry has increased in host countries that have become global export bases for components. For instance in Mexico, local content from Mexican-owned suppliers and subcontractors stood at 30 per cent by 1995. Conversely, in Brazil, where local content in the automobile industry had been at a very high 85 per cent in 1990, local input shares fell throughout the 1990s. Imports of components rose from 8 to 24 per cent of production between 1990 and 1996, resulting in a weakening of the local supplier industry (UNCTAD, 2000a, p.152). A similar process has been observed in Argentina and Thailand (UNCTAD, 2000a, p. 155) as well as in South Africa (Barnes and Kaplinsky, 2000). In Thailand, the automobile industry’s local content is estimated at 19 per cent for passenger and heavy commercial vehicles and 25 per cent for pick-up trucks<sup>a</sup> (UNCTAD, 2000a, p. 161). Local content in the production by foreign affiliates in the Malaysian automobile industry was around 30-40 per cent in 1996 (UNCTAD, 2000a, p. 165). In China, a policy of “localization” stipulated that foreign affiliates in the automobile industry had to source 40 to 50 per cent of inputs locally. Several foreign affiliates reached this target, many by inducing their foreign suppliers to invest in China. For example, the share of Shanghai Volkswagen Company’s local sourcing from affiliates stood at 26 per cent in 2000, measured as purchases from foreign-invested suppliers in total local purchases (Xia and Lu, 2001, pp. 8-14).

In many of the *transition* economies in Eastern Europe, FDI has only been present since the early 1990s. It is therefore of interest to note some examples of high levels of local sourcing. In Poland, a sample of some 30 foreign affiliates responding to a 1997 survey reported that 75 per cent of inputs were then sourced from local firms, compared to 65 per cent at the time of their establishment in the early 1990s (Floyd, 2000). In the Czech Republic, Volkswagen-Skoda in the mid-1990s was sourcing roughly three-quarters of its inputs from suppliers based in the country. Of Skoda’s 279 registered suppliers, 174 (62 per cent) were Czech-owned, 19 were Slovak-owned and 86 were foreign affiliates and joint ventures with firms from the United States, United Kingdom, Germany, Italy and France (Skoda Auto, 2001). The degree of local sourcing – again, not necessarily from domestically owned firms – is much related to policies pursued in the preferred destination market of the European Union.

*Source:* UNCTAD, based on various sources.

<sup>a</sup> The official figure is higher: 45 – 60 per cent, depending on the car model. See UNCTAD 2000a, p. 160.

Excessive internalization can therefore lead to a loss of flexibility, higher labour costs and diversion into unrelated technologies. The global trend is to focus on core competencies and to contract out other components and services, reflecting both the cost and complexity of technological change and intensifying competitive pressures. Specialization is just as much a feature of international production systems. TNCs are combining the spread of facilities abroad under their management control with a growing web of supply relationships with independent firms at each stage of production. In fact, in some industries, firms are subcontracting out the entire manufacturing process to independent "contract manufacturers", retaining for themselves only such functions as R&D, design and marketing (Kagami and Kuchiki, 2000). Most contract manufacturers hail from industrial countries; however, some are appearing in industrializing developing countries like Singapore.

The decision to *source locally* in a host country depends on the cost, quality, reliability and flexibility of local suppliers relative to suppliers abroad. Proximity matters in many sourcing choices. Being near suppliers can make procurement more flexible and easier to negotiate and monitor. It is essential where much information and technical interchange is required for efficiency. Where the input is a constantly used service, again, it is more efficient to have the provider nearby. An efficient network of suppliers allows affiliates to reduce risk or disruptions in input supply and to adjust capacity utilization more readily to market conditions. Trust, which plays an important role in all transactions, is easier to develop with face-to-face interaction.

However, establishing linkages can be an expensive process. In any setting, efforts are needed to identify suitable suppliers and ensure that they can meet the exacting needs of buyers. Sometimes this can be facilitated by meso-institutions such as chambers of commerce, business associations or providers of business development services (Doner and Schneider, 2000). For instance, some business

associations serve as a venue for the exchange of business information, which can include specific data on subcontracting opportunities, or on opportunities for deepening linkages.<sup>6</sup>

In many developing countries the effort required may be particularly great because of the lack of efficient domestic suppliers - the main obstacle to the creation of more linkages (Halbach, 1989; Altenburg, 2000; Battat et al., 1996; UNCTAD, 2000b; Crone, 1999 and 2000).<sup>7</sup> Where the costs and risks are particularly high but proximity is important for efficiency, TNCs may encourage foreign suppliers to establish local facilities or they may decide to produce in-house. Where the costs and risks are lower, they may make efforts to identify potential domestic suppliers and assist them in reaching the efficiency and quality standards needed.<sup>8</sup> Where proximity is not important, foreign affiliates may retain sourcing links with independent suppliers abroad or with other plants in their TNC systems.<sup>9</sup> Centralized or pooled group-sourcing arrangements may encourage affiliates to use foreign sources even when local suppliers are available.<sup>10</sup>

While the extent of local linkages generally and those with domestic firms in particular reflects the balance of these benefits and costs in the short term, TNCs may display differences in their sourcing behaviour in similar situations. Apart from differences in firm-level perceptions and strategies, this may reflect the business practice and culture of their home countries. For example, Japanese TNCs, which emphasize close inter-firm collaboration, seem to find it more difficult to establish local linkages abroad than United States firms, which are more market-oriented in their procurement.<sup>11</sup> United States affiliates in Malaysia rely more on local supplies than do firms from either Japan or the European Union. On the other hand, Japanese companies, once they enter into supply relationships with local firms, seem to establish deeper and more long-term relationships than their United States counterparts (Institute of Developing Economies, 1994).

Still, local sourcing patterns change over time and as experience grows, suggesting that the nationality of TNCs should become less important in comparison with other TNC-related factors in explaining local linkages. What are these other factors? The main ones are the following:

*Investment motives and strategies.*

The propensity of foreign affiliates to forge local linkages is affected by the motive for investing in a host country. Domestic-market-oriented affiliates generally purchase more locally than do export-oriented firms.<sup>12</sup> Domestic suppliers find it easier to serve activities aimed at domestic markets, particularly where quality and technical requirements are lower (as in protected markets). They also have the advantage of knowing local consumer preferences. In some developing countries, local sourcing by affiliates may also be motivated by the desire to avoid exchange rate risks. On the other hand, cost and quality requirements are much more stringent in export-oriented activities (and host countries also tend to impose fewer controls on sourcing of inputs in export-oriented affiliates). In particular, foreign affiliates that are part of international production systems are likely to be more dependent on global corporate sourcing policies and, thus, less able to choose suppliers freely. While such affiliates (e.g. in the automotive and electronic industries) source large numbers of components, sub-assemblies and services locally, with major opportunities for firms that qualify as suppliers they tend to reduce the number of first-tier suppliers and enter into closer relationships with those that remain.<sup>13</sup>

These core suppliers are expected to have a capability to manufacture and supply – on a global basis – complex systems, to have independent design capacity and to solve problems jointly with the assembler. Such stringent requirements make it more difficult for domestic suppliers in host countries to enter the supply chain.<sup>14</sup> Hence, domestic firms in developing countries supplying to affiliates that are part of integrated production systems typically belong to a lower tier and provide relatively simple inputs – cardboard boxes, plastic and

foam rubber packaging materials, metal stamping, die-making and simple assembly (Ganiatsos, 2000, Yoon, 1994; Carrillo, 2001; UNCTAD, 2000a).<sup>15</sup> However, domestic suppliers that manage to survive in this competitive environment enjoy increased productivity, technology upgrading and export growth (box IV.1).

*Technology and market position.*

Linkages reflect the technology used and the market position of TNCs. Foreign affiliates making standardized products with mature, non-proprietary technologies tend to prefer externalized, arm's length procurement: there are many suppliers to choose from, and it is not necessary to develop special capabilities in any supplier. Where products are specialized and technologically advanced, on the other hand, affiliates tend to prefer in-house production or to retain relationships with a few selected suppliers.<sup>16</sup> TNCs in price-sensitive segments respond more to wage differences than those in markets where innovation and quality are important. The former are generally relatively footloose and less willing to invest in local skills and supplier upgrading.<sup>17</sup>

*Role assigned to affiliates.* The degree of autonomy given to affiliates affects sourcing: greater autonomy allows more development of local suppliers. In turn, affiliates with stronger local links are likely to be given more autonomy (Zanfei, 2000). In Mexico, for example, the lack of local autonomy as regards purchasing was found to be an impediment to linkage development.<sup>18</sup> Affiliates considered to be “centres of excellence”, with regional or global mandates for complete products, services or technology, tend to be more integrated with local suppliers (Frost et al., 1999; Holm and Pedersen, 2000).

*Age of foreign affiliates.* Many studies have found that local procurement by foreign affiliates tends to increase over time.<sup>19</sup> The more experience a TNC gathers in a foreign country, the more managers are recruited locally and the more knowledge it gains about local suppliers, the lower the costs of sourcing locally.<sup>20</sup>

*Mode of establishment.* For similar reasons, affiliates established through M&As are likely to have stronger links with domestic suppliers than those established through greenfield investment (*WIR00*; Scott-Kennel and Enderwick, 2001). The latter take time and effort to develop local linkages while the former have “ready-made” linkages that are likely to be retained if they are efficient. For example, a study of Japanese TNCs concluded that acquired affiliates had significantly higher local content levels than those established through greenfield investment due to their pre-acquisition embeddedness in the local economy (Belderbos et al., 2001). Similarly, affiliates of Swedish TNCs and affiliates in Central and Eastern European countries have been found to rely more on imports of inputs when established via greenfield investment; in the case of the Swedish TNCs’ affiliates, this difference persisted also in the longer-term. If, on the other hand, existing linkages are inefficient, M&As may lead to a switch to foreign suppliers (*WIR00*).

*Size of affiliate.* Large foreign affiliates have been found to source less locally than small ones: they can internalize their operations better, and local suppliers find it difficult to supply very large volumes.<sup>21</sup>

The linkage potential also varies by industry (box IV.3). It is easier to source externally when the technology is divisible into discrete stages and services than when it is a continuous process.

- In the *primary sector* the scope for linkages between foreign affiliates and local suppliers is often limited. Production processes tend to be continuous and capital intensive.<sup>22</sup> Still, possibilities exist, for example in mining (see box IV.4).
- The *manufacturing sector* has a broad range of linkage-intensive activities, but there are large variations by industry. Food processing involves high ratios of intermediate inputs to total production and extensive backward linkages between foreign affiliates and domestic suppliers of raw and packaging materials. By

#### Box IV.4. Linkages in the Peruvian mining industry

In 1998, Peru’s mining industry purchased goods and services for \$1.37 billion, of which \$800 million were acquired locally and \$570 million were imported (Peru, SNMPE, 1999, p. 13). The production capacities of domestic firms in goods and services that are inputs for the mining industry and, hence, their ability to supply, vary considerably (UNCTAD, 2000c, p. 63).<sup>a</sup> Until recently, the local supply capacities have not been fully utilized, mainly because there has been little incentive for local firms to upgrade as the markets have been virtually monopolized and protected. As a result, their costs and quality have not kept abreast with the standards required by large-scale mines that can purchase inputs from more competitive sources abroad.

For certain inputs, however (e.g. power generation and technical services), domestic firms already have strong capabilities. In Peru, relatively few users need to rely on self-generated power (Peru, SNMPE, 1999, p. 40). This is a favourable factor for mining firms as they are able to save the capital costs of setting up power generation facilities, and can benefit from the economies of scale in power generation. Significant local capabilities have developed in technical services, too. This is supported by undergraduate and post-graduate courses in geology, mine engineering, environmental engineering and metallurgy, offered at local universities. Domestic firms are able to conduct technical and feasibility studies, and have the necessary capabilities in related civil and structural engineering and construction. The Peruvian environmental engineering design and monitoring services are considered to be of particularly high standards.

*Source:* UNCTAD, based on UNCTAD, 2000c.

<sup>a</sup> The variation of local supplier capabilities is confirmed by concrete case studies in gold and copper mining. A case study on gold mining joint venture Minera Yanacocha S.A. (Kuramoto, 2000) has found that, sub-national variations set aside, local sourcing is substantial in both goods and services, but more developed in the latter. Another case study on Southern Peru Copper Corporation has found that in 1998, this firm sourced more than 60 per cent of its purchases locally (Torres Zorrilla, 2000, pp. 45-46). The most important items sourced exclusively from within Peru were diesel oil, fuel oil and ball bearings. On the other hand, rubber tyres and tubes, transportation equipment and parts, and earth-moving equipment were mostly imported (Torres Zorrilla, 2000, p. 47).

contrast, textiles and clothing show relatively low local linkages; the textile industry needs considerable sophistication and size to provide the variety and quality of fabrics needed by foreign affiliates that generally produce clothing for export.<sup>23</sup> Engineering activities offer linkage opportunities because processes are divisible. However, where technical needs are stringent, as in machinery and precision instruments, subcontracting tends to be limited.

- The *tertiary sector*, led by finance, trading, tourism and utilities, accounts for growing shares of FDI in developing countries. The scope here for dividing production into discrete stages and subcontracting out large parts to independent domestic firms is also limited. Still, some service industries such as retailing and construction offer considerable potential for linkages with physical input supplier (box IV.5). Similarly, foreign hotel operators can make significant local purchases of foodstuffs, furniture and fittings (Dunning, 1993). Increasingly, the services component of some activities is being subcontracted to reduce wage costs. (“Back office” services by airlines, banks or retailers are good examples.) Developing countries like India are making inroads into this market;<sup>24</sup> but, at this time, this subcontracting is primarily international. It may spread locally as services within developing countries are upgraded and telecommunications improve.

The above review shows that the degree of linkages is affected by a number of factors, with notable differences between industries, activities and TNCs. Basically, the extent of linkages established depends on the balance of costs and benefits involved. Still, the creation and deepening of linkages are sometimes of mutual interest to foreign affiliates and local firms. Unsurprisingly, then, there are examples of TNCs that make considerable efforts in order to foster local linkages, while others do not. Some evidence on such efforts is reviewed in the next section.

#### **Box IV.5. Sourcing in the food retailing industry: Carrefour and McDonald’s in Argentina**

Foreign affiliates in food retailing are typically oriented towards the domestic market, and hence rely to a high degree on locally procured inputs. The Argentinean retail sector provides some illustrations of typical strategies vis-à-vis local suppliers.

Carrefour’s sourcing strategy differs by product groups.<sup>a</sup> Since the merger with Promodès in 2000, Carrefour has begun centralizing its sourcing in response to growing competition with other retailers, such as Ahold, Wal-Mart Stores and Casino. For *processed* food products, one central procurement office serves all retail outlets in Argentina; in fact, in some cases, one supplier delivers a particular product to all outlets in the MERCOSUR area. Thus, suppliers need to operate a sufficient scale to meet the demand of the entire network. In the area of *fresh and staple foods*, local suppliers, producing local brands with strong market recognition for individual retail outlets, predominate; many of these were originally domestic brand-name food firms that had been acquired by TNCs since the late 1990s.

McDonald’s uses a similar sourcing strategy in most of its affiliates in different countries, with minor local adaptations.<sup>b</sup> In Argentina, about 87 per cent of McDonald’s basic food products are sourced locally. Once a supplier and McDonald’s have agreed on standards and quality guarantees along the food chain,<sup>c</sup> contracts tend to be long-term. Moreover, McDonald’s then transmits its international know-how to its supplier. As a consequence, supplying to McDonald’s is often considered an indication of quality and reliability and can lead to new contracts with other buyers. As in the case of Carrefour, supplier firms to McDonald’s are today predominantly foreign affiliates, following mergers with or full acquisitions of previously locally owned firms. Some greenfield investments have also been undertaken. For example, McCain (United States) established a large plant to produce frozen fries in the main potato-growing area of Argentina.

*Source:* UNCTAD, based on Green and Tozanli, 2001.

<sup>a</sup> Carrefour had 364 retail outlets in Argentina, with a turnover of 2.2 billion euros in 2000.

<sup>b</sup> The company had 173 outlets in Argentina at the beginning of 2001.

<sup>c</sup> This includes standards regarding employment, food processing and preservation, as well as with respect to environmental concerns such as provisions for the recycling of packaging materials.

## C. Creating and deepening linkages: what companies do

Many TNCs have specialized organizational units and procedures to deal with suppliers and subcontractors. Some even have special supplier development programmes.<sup>25</sup> A survey of TNCs in the automobile and electronics industries found that 16 out of 18 automotive TNCs had adopted a strategy for global supplier development, while the corresponding data for electronics TNCs was 8 out of 15 (Handfield and Krause, 1999). For instance, in Malaysia, four of eleven electronics affiliates surveyed had such programmes (Giroud, 2001a); a survey in Northern Ireland found 38 per cent of foreign affiliates with similar programmes (Crone and Roper, 1999).<sup>26</sup> However, what matters for the present discussion is not so much the frequency of such efforts. The point is that, whatever some TNCs have done can be emulated by other firms that seek to create and strengthen linkages with local suppliers. Some examples are given in this section and the annex to this chapter. They are not necessarily representative and are mostly based on experiences in economically more advanced developing countries. Still, they do give an insight into what companies can do.<sup>27</sup>

Whether as part of special supplier development programmes or not, efforts to create and deepen linkages involve steps for finding suppliers and ensuring efficient supply through technology transfer, providing training, sharing business information and/or giving financial support. The ultimate objective usually is to expand the number of suppliers that meet the requirements of foreign affiliates in terms of cost, quality and timely delivery, and/or to help existing suppliers improve their capabilities in one or more areas. For some TNCs, efforts to upgrade supplier activities are part of a corporate strategy taking broader economic and social considerations into account. Activities that foreign affiliates undertake to implement their programmes and achieve their objectives are reviewed briefly below; additional details and examples are contained in the annex to this chapter.

### 1. Finding new local suppliers

In host developing countries and economies in transition, where supply chains are generally not well developed, there is a particular need for efforts to identify potential suppliers. This may be especially important for affiliates that depend on inputs that cannot be imported easily or produced in-house. There are many ways for foreign affiliates to do this, of which the most common ones are as follows:

- *Making public announcements* about the need for suppliers and the requirements that firms must meet on costs and quality, ability to undertake continuous improvement, technological capabilities and delivery. Provision of such information is quite common. For example, it is an important part of Nestlé's activities related to the selection of suppliers (box IV.6).
- *Supplier visits and quality audits* are commonly used to evaluate and develop new (as well as existing) suppliers in developed and developing countries. For example, in the United Kingdom and Singapore, about 60 per cent of the affiliates conduct site visits to audit the quality of suppliers (PACEC, 1995; Tan, 1990). The corresponding figure in Northern Ireland is 47 per cent (Crone and Roper, 2001). Regular follow-ups on delivery, inventory performance, quality rating and cost improvements are relatively common.

As noted, efforts in finding new suppliers are likely to be the most frequent in foreign affiliates that are highly dependent on having access to a dynamic base of local suppliers. Factors that affect the behaviour of foreign affiliates in this respect include host country trade policies, the nature of inputs required and the competitive aspects of the supply structure of the foreign affiliates.

### 2. Transferring technology

To ensure that the inputs procured meet their stringent technical requirements, foreign affiliates often have to provide suppliers not just with specifications but sometimes also with assistance in raising

**Box IV.6. Nestlé's supplier development programme in China**

Nestlé operates 18 factories in China, producing a large variety of products including beverages, milk products, infant nutrition, ice cream, cooking aids, chocolate and confectionery. In 2000, the company's turnover in China was about CHF1 billion. High quality packaging is required to transport products and store under difficult climatic conditions, taking safety, health and environmental considerations into account. Nestlé initially had major difficulties in finding packaging of the required quality. In 1992, much of the company's supplies were imported. To expand the number of viable suppliers, Nestlé decided in 1994 to engage in active supplier development; by 1997, 98 per cent of its needs were covered by local suppliers.

As a basis for its selection of suppliers of agricultural and dairy produce, as well as packaging materials, Nestlé develops "specification sheets" that state the requirements to which every procured product or service must conform. The selection of suppliers is based on various criteria, including the acceptance of Nestlé's specifications, acceptance of audits and inspection, the existence of a well-structured quality assurance system, technical competence in their field of activity, good quality record, reliability and economic viability.

Nestlé's approach in China to develop suppliers of packaging materials was pragmatic and directed to concrete needs. When possible and economically feasible, the company worked with local suppliers to help them meet quality standards by providing information, technical assistance and sometimes also financial support.

- *Information provision.* The main contribution was to help suppliers improve their understanding of specifications required, and to improve certain commercial and quality aspects. Suppliers were given the information needed to meet the quality standards of Nestlé. Information has also been given to help suppliers contact Nestlé affiliates in other countries.
- *Technical assistance.* Nestlé staff visited the suppliers' premises before buying and again later whenever needed, and gave advice on technical aspects of production. Production assistance is given by specifying and improving quality assurance elements, helping to avoid and analyse defects in first deliveries, giving the chance to deliver in small quantities, etc. Nestlé's Quality Assurance Department gave assistance in production control and to improve the quality control system of suppliers. One supplier, for instance, was helped to overcome problems related to printing quality, bonding strength of the laminate and heat sealability.

Nestlé's efforts to establish proper quality control procedures contributed to an improvement of the competitiveness of suppliers of packaging materials, and some of them subsequently exported to Russia, the Republic of Korea and elsewhere in Asia. So far, Nestlé has dealt with 154 suppliers of packaging materials, 45 of which are foreign affiliates or joint ventures with foreign affiliates, and 109 are local. Of the ten main suppliers, six are domestic companies, three are foreign affiliates and one is a joint venture.

Nestlé's affiliates in China also assist providers of raw materials. For example, major efforts were undertaken in China to help develop local growers of coffee. During the first two years of operation of a Nescafé factory established in 1991 (of which Nestlé controlled 60 per cent and a Chinese state company the remaining 40 per cent), all green coffee was imported. To facilitate a switch to local supplies, Nestlé set up an Agricultural Technical Assistance Service (ATAS) to promote the cultivation of coffee in China. The ATAS in China began its activities in 1990 and, by 1996, employed 17 agronomists and agro-technicians and 33 farm-hands working on two Nestlé experimental, demonstration and teaching farms. The ATAS offered a number of services, such as advice on which sites are best suited for coffee plantations; how to terrace the land and select the coffee to be planted; and how to plant, use fertilizers, prune, fight pests and diseases, etc. In 1995, Nestlé created a Professional Training Department to provide technical and practical training to a number of target groups: those responsible for growing and selling coffee, agronomists and civil servants and individuals interested in entering the business. Some agronomists have been trained as trainers, in order to be able to extend the training to more people.

*Source:* UNCTAD, based on Nestlé, 2001 and company interviews.

suppliers' technological capabilities.<sup>28</sup> Such assistance tends, for obvious reasons, to be more prominent in developing countries.

A number of studies throw light on the extent or incidence of technology transfer – broadly defined to include the transfer of proprietary technology as well as technical support or assistance of various other kinds – from foreign affiliates to local supplier firms.<sup>29</sup> For example, a survey of 30 large foreign-affiliate manufacturing plants in the United Kingdom found that 67 per cent made contractual arrangements on product specification, 60 per cent provided technical assistance on quality assurance and organizational issues through visits, and 27 per cent of the foreign affiliates provided management advice to their local suppliers (PACEC, 1995). Similar results were noted in a Northern Ireland study, with 18 per cent to 76 per cent of the respondents indicating knowledge transfer activities of one kind or another (Crone and Roper, 1999, table 7.5). In both of these studies, at least half of the managers of the foreign affiliates surveyed were of the view that the knowledge transfers had had a positive impact on their suppliers' competitiveness in terms of price, quality or delivery conditions (Crone and Roper, 1999).

In developing countries, a number of studies on the electrical and electronics industries have focused on the transfer of technology by foreign affiliates to their suppliers. For example, a study carried out among eight foreign affiliates and 16 local subcontracting firms in the electronics sector in Singapore showed that significant technology transfer took place through learning opportunities provided by the exposure to foreign affiliates, e.g. through testing and diagnostic feedback (Wong 1992). Direct transfer of technology was stated to be of moderate importance and took place mainly through technical support, such as the advice or training in quality management systems and other good manufacturing practices. The types of technologies transferred were mostly related to processes, especially in quality-control techniques. In another study in the electronics industry in Singapore, focusing on original equipment manufacturing arrangements between foreign affiliates and

local supplier firms, 89 per cent of the foreign affiliates reported providing technical support as part of their efforts to develop their suppliers (Tan, 1990). In the electronics industry of Malaysia, foreign affiliates were found to have provided significant technical support to their local suppliers (Ismail, 1999; UNDP, 1993). Such support included solving specific technical problems (Capannelli, 1999) and assisting in factory layout, production planning and machinery installation (Ismail, 1999).

The extent of technology transfer appears to rise the more affiliates are committed to long-term relationships with suppliers, the greater the technical complementarity between their activities, and the more specialized or custom-made (rather than standardized) are the inputs supplied.<sup>30</sup> Transfers of knowledge are also likely to be positively influenced by the size of affiliates and their export-orientation.<sup>31</sup> Needless to say, the extent of technology transfer also depends on the host economy and the level of development of local firms. TNCs invest in building local capabilities only when the investment can be expected to yield a return in a reasonable period. Where potential suppliers lack the minimum base of skills and know-how needed to absorb technologies and management practices (and support institutions are lacking or weak), TNCs may find it too expensive or risky to try and bring them up to the standards needed. Given minimum levels of capability, moreover, affiliates differentiate their technological relations according to individual suppliers. Primary attention is typically given to a limited number of key suppliers that provide the most complex and strategically important inputs, the production of which requires close interaction between the buyer and supplier. Highly ranked suppliers receive larger and higher value-added orders, along with greater technical assistance and know-how.

Technology transfer by foreign affiliates to suppliers can be categorized according to the area of technology involved; an affiliate may engage in several simultaneously (boxes IV.7 and IV.8).

The first area of technology transfer relates to *product technology*. Forms of transfer include the following (see also the annex to this chapter):

- *Provision of proprietary product know-how.* The incidence of transfer of proprietary technology is relatively low. When it occurs, such transfers seem to concentrate on a few “preferred suppliers” (see e.g. box IV.9) (Wong, 1992; Yoon, 1994; Handfield et al. 2000).
- *Transfer of product designs and technical specifications.* Such transfers can take the form of detailed technical specifications and designs to enable local suppliers to manufacture the required inputs. Some studies have found this to be the main form of transfer of product-related technology (Wong, 1992; Ismail, 1999).
- *Technical consultations with suppliers to help them master new technologies.* Some affiliates provide advice to local suppliers on product characteristics or parameters. Such technical support activity helps local suppliers in adopting and absorbing new product-related technology.
- *Feedback on product performance to help suppliers improve performance.* Such feedback reports often include diagnostic measures. Regular feedback to suppliers has been found to be more frequent in foreign affiliates that have implemented special programmes on supplier development (Crone and Roper, 1999).
- *Collaboration in R&D.* Such buyer-supplier relationships typically require a critical minimum level of research capability of the host countries involved. In some cases, collaboration in R&D may involve local universities or research institutes (see e.g. box IV.8).
- *Provision of machinery and equipment to suppliers.* Foreign affiliates sometimes transfer machine-embodied process technology by providing machinery/equipment to local suppliers. Such equipment may be related to the manufacturing of the product to be purchased or testing equipment for quality control.
- *Technical support on production planning, quality management, inspection and testing.* Such support includes assisting supplying firms in improving their manufacturing processes, quality control methods, inspection and testing methods. Affiliates may also advise supplier firms on the selection/use of process equipment/technologies.
- *Visits to supplier facilities to advise on layout, operations and quality.* Personnel of foreign affiliates visit suppliers’ premises in order to provide advice on factory layout, installing machinery, production planning, production problems and quality control. Such visits may take place weekly or monthly or whenever the need arises. Sometimes it may also involve seconding affiliates’ engineers to the supplier’s factory for a certain number of days (Ismail, 1999).
- *Formation of “cooperation clubs” for interacting with or among suppliers on technical issues.* Such clubs are particularly common in Japanese TNCs and sometimes arrange for activities such as quality control presentations, discussions of case studies on quality improvement, value analysis and cost reduction activities; and also organize workshops on technical guidance and training (see box IV.10; also see box V.5).<sup>32</sup>
- *Assistance to employees to set up their own firms.* Employees of foreign affiliates are sometimes given support to start their own business and become suppliers. Having worked in an affiliate, the employee-turned-entrepreneur has a better understanding of the requirements of the affiliate. In addition to procurement guarantees, affiliates provide know-how, equipment and technical assistance to such start-up firms.<sup>33</sup>

The main forms of transfer of *process technology* are (see also the annex to this chapter):

- *Provision of machinery and equipment to suppliers.* Foreign affiliates sometimes transfer machine-embodied process technology by providing machinery/equipment to local suppliers. Such equipment may be related to the manufacturing of the product to be purchased or testing equipment for quality control.
- *Technical support on production planning, quality management, inspection and testing.* Such support includes assisting supplying firms in improving their manufacturing processes, quality control methods, inspection and testing methods. Affiliates may also advise supplier firms on the selection/use of process equipment/technologies.
- *Visits to supplier facilities to advise on layout, operations and quality.* Personnel of foreign affiliates visit suppliers’ premises in order to provide advice on factory layout, installing machinery, production planning, production problems and quality control. Such visits may take place weekly or monthly or whenever the need arises. Sometimes it may also involve seconding affiliates’ engineers to the supplier’s factory for a certain number of days (Ismail, 1999).
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*Organizational and managerial know-how* can be transferred in the following ways (see also the annex to this chapter):

- *Assistance with inventory management and the use of just-in-time and other systems.* Such assistance is of particular importance where the continuous supply to suit a foreign affiliate’s production schedule is vital. This applies, for example, to the automotive industry.
- *Assistance in implementing quality assurance systems* (including ISO certification). Some foreign affiliates provide support to their suppliers in

**Box IV.7. Cooperation between foreign affiliates and local suppliers: the case of LG Electronics in India**

Some foreign affiliates use advanced and systematic techniques for transferring technology and information to linked enterprises, based on their experience elsewhere. For instance, the Indian affiliate of the Korean TNC, LG Electronics, uses techniques for supplier development such as “early supplier involvement” to implement the Six Sigma system of statistical analysis for quality and productivity improvement. It helps them with process redesign and re-engineering and direct on-line supply. It provides them with global cost benchmarks, data not easily available to local counterparts. Suppliers are provided with assistance in “factory innovation” to improve quality and profits. Some are helped to set up facilities close to the buyer to improve logistics. Selected vendor employees are sent to overseas plants, invited to regular meetings and presented with awards. They can participate in LG’s training programmes and are instructed in e-commerce techniques. By being exposed to global quality and cost standards, they can meet export market demands directly; LG helps them to enter export markets.

*Source:* UNCTAD, based on Kalyankar, 2000.

designing and implementing quality assurance systems or total quality control systems. The nature of such systems are often industry-specific.

- *Introduction to new practices such as network management or financial, purchase and marketing techniques.* Foreign affiliates can offer important advice related to various other management-related areas, with important positive effects on supplier performance (see, e.g. boxes IV.9 and IV.10).

The technology transfer and upgrading process can take a long time and may, in some cases, precede actual supply activity. For example, when the French company Saint Gobain decided to set up a float glass plant in Chennai, India, it had major technical problems with potential local suppliers. Firms were disorganized and scattered. Their technological capabilities were limited and they lacked ability to reach minimum standards unaided (Saint Gobain, 2001). Saint Gobain set up specialized teams

to develop suppliers three years before even starting productive operations. The teams, with experts in several disciplines from India and abroad, provided assistance on raw material evaluation, engineering and technical services, information technology support, packaging materials development and logistics management. Each team worked with suppliers to develop cost and business models, to train a largely illiterate labour force; and to educate firms in management concepts. Moreover, the teams acted as intermediaries to help firms obtain loans, where needed, from financial institutions. Four years after the first teams were sent to India, 80 per cent of the raw material requirements were indigenized. Moreover, several suppliers began supplying other TNCs in India.

There are thus various ways in which technology linkages between foreign affiliates and domestic suppliers can be formed and strengthened. The realization of the full potential benefits derived from such linkages by the recipients also involves the transfer of capacity to understand, use and improve a given technology (Komoda, 1986). It involves adapting the acquired technology, as well as its absorption by the recipients (Baranson and Roark, 1985). Complete absorption at the firm-level involves the recipient gaining the capability to undertake innovative activity independently to improve upon products and production processes (Baranson and Roark, 1985; Narayanan, 1999). The transfer of proprietary technology usually comes with restrictions on its usage. Therefore, efforts on the part of a recipient firm to absorb acquired technologies and to improve upon them further become even more crucial.

### 3. Providing training

The human resource base of supplier firms is vital to the success and sustainability of linkages. Assistance in human resource development therefore often forms part of linkages, and expands the scope for deeper spillovers of skills and knowledge. While evidence on skill linkages is difficult to collect, what exists suggests that they can be significant. In the Malaysian electronics industry, for example, the majority (10 out of 11) of foreign affiliates

**Box IV.8. Upgrading supplier capabilities in the food processing industry in India**

The food industry is of special interest as it is one of the most linkage-intensive industries and also of great importance in many developing countries. It generates extensive and strong local linkages as a result of the use of perishable agricultural inputs, such as milk and vegetables. Difficulties in importing the required inputs, coupled with restrictions on land ownership in many countries, can make it necessary for foreign affiliates in food processing to rely on sourcing from domestic producers and to engage in efforts to develop new and upgrade existing suppliers.

Field research (conducted by UNCTAD in India in 2001) involved interviews with four leading foreign affiliates of TNCs in the food processing industry of India (Pepsi Foods Ltd., GlaxoSmithKline Beecham Ltd., Nestlé India Ltd. and Cadbury India Ltd.). It revealed that each firm on average sourced locally 93 per cent of their raw material (tomato, potato, basmati rice, groundnut, cocoa, fresh milk, sugar, wheat flour, etc.), and 74 per cent of other inputs (plastic crates, glass bottles, refrigerators, ice chests, corrugated boxes, craft paper, etc.). This high level was achieved in part as a result of comprehensive efforts by these companies to assist in the development of local suppliers.

In order to improve the sourcing of key produce in terms of reliable quantities and consistent quality, the four companies have undertaken a number of measures to strengthen their relationships with suppliers:

- *Collaboration in product development.* All four affiliates are engaged in product development with local research institutes or universities to develop hybrid varieties of crops and vegetables and new agricultural implements to alter cropping patterns and to raise productivity. For example, Pepsi Foods' R&D team has so far evaluated more than 215 varieties/hybrids of chilli, which is believed to be the largest scientific evaluation of chillies at any location. Pepsi's technology in chilli cultivation has raised its yield three times, to about 20 tons per hectare. In addition, Pepsi R&D has developed 15 new agricultural implements to facilitate planting and harvesting in India.
- *Technology transfer and training.* New hybrid varieties, implements and practices are transferred to suppliers (primarily farmers) through Farmer Training Camps. Pepsi provides its contract farmers, free of cost, with various agricultural implements and hybrid seeds/plantlets, as well as process know-how. Cadbury India has a procurement and extension services team that imparts training to potential and existing suppliers on new techniques in planting, harvesting, quality control and post-transplantation care of cocoa crop through technical bulletins, video demonstrations, slides and charts and live demonstrations on the use of various agricultural implements.
- *Introduction of contract farming.* Growers are contracted to plant the processors' crops on their lands and to deliver to the processors, at pre-agreed prices and quantities of output based upon anticipated yields and contracted acreage. Towards this end, a processor usually provides the farmers with selected inputs like seeds/seedlings, information on agricultural practices and regular inspection of the crop and advisory services on crops. Farmers have the choice to leave some part of the output free from the contract arrangement to sell it in the open market.
- *Financial assistance* is provided to growers through the involvement of agricultural development banks. For example, GlaxoSmithKline Beecham acts as a guarantor enabling its suppliers to take bank loans.

Technology transfer to local farmers has apparently had a positive impact. For example, prior to Pepsi's activities (in 1989), the tomato yield was 16 tons/hectare in Punjab; by 1999, the yield of Pepsi's suppliers in Punjab had increased to 52 tons/hectare. A report based on the impact of a number of food processing projects by foreign affiliates indicated that foreign affiliates had contributed to better farming practices (e.g. hybrid seeds, transportation innovation) that resulted in increased incomes and yields (McKinsey & Company, 1997).

*Source:* UNCTAD, based on field research.

#### Box IV.9. Unilever in Viet Nam

In Viet Nam, domestic suppliers account for 40 per cent of Unilever's production volume, 20 per cent of its raw materials and 87 per cent of its packaging materials. As local suppliers initially often lack the necessary financial resources, technology, quality control, safety standards and environmental awareness to qualify as suppliers, Unilever assists its local suppliers directly in a number of ways to develop their supply capabilities.

For its five key suppliers, Unilever provides extensive training programmes and offers financial support to upgrade their equipment. Direct technology transfers are made in the form of equipment and machinery, formulations and processing, quality assurance and analytical methods and other best practices. Unilever managers provide on-ground support to help raise efficiency, quality control and consistency of the products supplied. For example, Bico Chemicals Cosmetic Enterprise became a supplier of detergent paste to Unilever in 1996. When the company showed an interest in expanding its capabilities, Unilever assisted in the start-up and building of a liquid detergent plant in 1997. A second plant was added in 1999. In addition, Unilever provided technology for a powder bleach plant, a detergent paste plant and quality assurance equipment. Business growth and jobs created at Bico have developed favourably. According to Unilever, Bico's production volume grew from 3,000 tons in 1996 to 23,000 tons in 2000. In the same period, turnover grew from \$18,000 to \$285,000, and the number of employees from 12 to 250.

In the case of its 76 suppliers of raw materials and 54 suppliers of packaging materials in Viet Nam, Unilever defines quality standards required, establishes the technology input needed to achieve these requirements and, where appropriate, provides the financial support to ensure long-term growth. In addition, Unilever conducts training on quality standards, inspection and testing methods and warehousing specifications. In 1997, for example, Quang An 1 Company became a supplier of plastic bottles for Unilever's factory in Hanoi. Unilever established quality standards, sampling procedures and analytical test methods and provided staff training. The assurance of a steady business volume also allowed Quang An to invest in new equipment. Apart from increasing their business with Unilever sixfold in three and a half years, Quang An's improved capabilities enabled it to win new business from other TNCs and local companies.

*Source:* UNCTAD, based on Unilever, 2001.

#### Box IV.10. Fostering linkages with local suppliers: the case of Toyota Motor Thailand

Toyota Motor Thailand (TMT) has established an extensive network of linkages with supplier firms within the country. TMT's first-tier suppliers in January 2001 comprised 575 firms, of which 134 supplied core auto-parts and 441 supplied other materials and facilities (box table IV.10.1). Of the former, Japanese joint ventures and Toyota-related companies accounted for 55 per cent of firms and 79 per cent of the value of supplies. Thai firms with Japanese technical assistance and other Thai firms accounted for 27 per cent of the number of suppliers but only 8 per cent of the value of supplies. In the case of materials and facilities, wholly owned Thai firms accounted for 60 per cent of the number of suppliers, but only 14 per cent of the supplied value. It is estimated that the second- through fourth-tier suppliers of TMT's supply chain comprise around 1,500 largely Thai-owned firms, but the actual number may be lower since the economic crisis of 1997-1998 caused serious financial problems for many smaller suppliers.

During the economic downturn following the East Asian financial crisis, TMT gave significant financial support to its first-tier suppliers. In order to prevent bankruptcies among its suppliers, TMT provided some 1.6 billion baht from Toyota Motor (Japan) through a number of programmes: an advance payment revolving fund; dead stock purchase schemes at cost; and advance payments for tooling expenses.

Toyota has declared its intention to procure all parts and components locally (100 per cent local procurement – as distinguished from 100 per cent local content) at TMT by 2003, rising from its present level of around 70 per cent. In order to achieve this, TMT announced a special project in 2000 (the so-called "Thai for Excellent Project") and explained the plan to its suppliers. Toyota decided to aim for 100 per cent local procurement in the anticipation of the automotive liberalization foreseen by the ASEAN Free Trade Area in 2003, and in response to high competition with other automobile companies.

This is the first time that Toyota seeks full local procurement. Eventually this approach could also be extended to other ASEAN countries. The reason why this approach was pioneered

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**Box IV.10. Fostering linkages with local suppliers: the case of Toyota Motor Thailand (concluded)**

**Box table IV.10.1. Local procurement by Toyota Motor Thailand, 2001, by type of supplier and type of input**

Type of supplier	Purchasing of key parts and components		Purchasing of other materials and facilities	
	Number of suppliers	Distribution of purchases (Per cent)	Number of suppliers	Distribution of purchases (Per cent)
Toyota-owned firms in Thailand	4	37	-	-
Japanese joint ventures	69	42	103	78
Thai firms with Japanese technical assistance	17	7	3	2
Non-Japanese joint ventures	6	2	71	6
Pure Thai firms	19	1	264	14
Firms in ASEAN under the ASEAN BBC programme <sup>a</sup>	19	11	-	-
<b>Total</b>	<b>134</b>	<b>100</b>	<b>441</b>	<b>100</b>

*Source:* Information provided by Toyota Motor Thailand.

<sup>a</sup> Brand-to-brand complementation scheme.

in Thailand is that Toyota had already established a wide range of supporting industries there, including for key components, such as engines and major body parts. These key components are generally produced by Toyota's affiliates (not by domestic firms). The major remaining parts to be procured locally include certain precision transmission parts and electronic controls.

*Toyota Cooperation Club*

The Toyota Cooperation Club (TCC) plays an important role in TMT's efforts to strengthen its local suppliers' capabilities. TCC is an association of suppliers to TMT, with a current membership of 92 first-tier suppliers. Suppliers eligible to apply for membership must have annual sales of five million baht to TMT and at least a three-year relationship. There are currently six major types of activities at the TCC: (1) annual conferences; (2) TCC Executive Committee meetings; (3) Quality Assurance Kaizen (steady improvements) activities; (4) Cost Kaizen activities; (5) quality control circle activities; and (6) TCC lectures.

These activities are open to all members of the TCC. Activities (3) through (5) are limited to first-tier suppliers, while activity (6) is open to all suppliers. Although TMT was involved in the establishment of the suppliers' association, the major players in the activities of the Association are its key suppliers. The Executive Committee of TCC consists of representatives from its 12 key suppliers, which include not only some Japanese subcontractors in Thailand (e.g. Denso (Thailand)), but also domestic suppliers (e.g. CH. Auto Parts Co.).

The members of the Executive Committee host various activities at their companies to diffuse the Toyota Production System and quality control mechanisms to other local suppliers. For example, some members organize a series of seminars/training courses on issues related to cost-efficiency, quality assurance and delivery. There are also study groups on, e.g. plant operation with a view to proposing ways and means to utilize Kaizen. In these activities, TMT and Toyota's Operation Management Division in Japan provide technical advice and guidance. Toyota's approach is to encourage suppliers to make their own efforts to improve their competitiveness, in a voluntary learning process ("jishiuken").

The TCC has not only provided opportunities for suppliers to learn best practices from each other in management and quality control, but also fostered cooperation among suppliers. In addition, a "Supplier Centre" has been set up at TMT headquarters to provide the necessary information for its suppliers. This includes prototypes of all major parts, lists of suppliers and their performance for each month, and information on specifications of major parts and components.

Although TMT appears to be interested in extending the activities of the TCC to tier-two to tier-four suppliers, the programmes to support these suppliers are relatively weak. This is due in part to the desire of the first tier suppliers to deal with their own suppliers by themselves and to be responsible for them, and in part due to a lack of resources (both financial and personnel) on the part of TMT. With some exceptions, TMT efforts are limited to encouraging first-tier suppliers to work with their own suppliers in a similar manner to that adopted by TMT with its first-tier suppliers. Innovative ways of involving lower-tier suppliers in some of the higher-level activities of the TCC are needed to upgrade capabilities and understanding. Government support to such activities could help to reach local suppliers.

*Source:* UNCTAD, based on Brimble, 2001.

in a 1996 study provided some training to local suppliers on quality testing and process yields, product testing and problem spotting, new management techniques and production process (Giroud, 2001a). In Costa Rica, according to a survey of suppliers to Intel, 35 per cent of service providers and 17 per cent of goods providers received training from that TNC (Larraín et al., 2001). In Indonesia, where skilled labour is very scarce, a few suppliers among those interviewed for an assessment of the supply-side situation in a number of industries mentioned the training assistance they had received from their TNC clients (Battat et al., 1996). In India, three out of four large foreign affiliates covered by a case-study of the food-processing industry provided training to their suppliers' personnel (see box IV.8). In Mexico, according to the results of a questionnaire-survey, all the foreign-owned automobile-assemblers surveyed provided support to suppliers for training, mainly related to quality control (Altenburg, 2000, p. 28). Such support was, however, largely confined to first-tier suppliers, which were generally also affiliates of foreign firms.<sup>34</sup>

There is some evidence to suggest that the impact of linkages on training (and labour management) tends to be higher the longer the duration of a relationship and the smaller the size of a supplier firm relative to an affiliate (PACEC, 1995). Skill transfers seem to be higher for suppliers in manufacturing than in services. In some cases, TNCs also extend their training assistance to potential suppliers (boxes IV.11 and IV.12; Saint Gobain, 2001).

In developing host countries, local firms often face financial, skill and institutional constraints in improving human resources. Many are unaware of their skill gaps or of means to remedy them. Given their knowledge of skill needs and training methods, foreign affiliates can play a significant role in helping suppliers to audit their human resources and mount effective upgrading programmes. They can use a number of methods to do so:

- *Training courses in affiliates for suppliers' personnel.* Some foreign affiliates organize training courses for local suppliers' personnel. These can take several forms and can include broad productivity-

enhancing areas related to organizational and managerial practices. Since training courses require considerable expenditure and organizational effort, they are likely to be offered only when there is an expectation of high returns to both sides due to a sustained long-term relationship. Courses may also be offered in cooperation with meso-institutions such as industry groups or public sector agencies at the local level as, for example, the Penang Skills Development Centre (box IV.11).

- *Offering access to internal training programmes in affiliates or abroad.* Foreign affiliates that have internal training courses of their own or are part of TNC-systems with internal training courses sometimes also open them up to their suppliers' employees. (see e.g. box IV.11).
- *Sending teams of experts to suppliers to provide in-plant training.* The purpose of such visits can be to provide training on improvements in technology or process management.
- *Promotion of cooperative learning among suppliers,* through associations and clubs. Such events can promote the exchange of business information among suppliers and foreign affiliates (box IV.10).<sup>35</sup>

In addition, informal exchanges between affiliates and suppliers can be a valuable source of ideas and information on human resource development, particularly in more developed host countries in which the gap between suppliers' and affiliates' skill levels is small.

The size, range and content of foreign affiliates' training programmes in terms of the various kinds of activities mentioned vary. Several factors explained these variations. They include the characteristics of the TNCs and their affiliates as well as of the domestic suppliers: size, resource-base, capabilities and business culture. Strategies and objectives matter as does the nature of their activities. The duration and closeness of the relationship is an important determinant. Finally, the costs of providing training and the inducement provided by governments, provincial authorities and interested civil-society groups, can influence the extent and nature of training provided.

#### 4. Sharing information

A continuous flow of information from buyers is necessary for linked firms to coordinate production and investment plans, reduce transaction costs and optimize delivery. The importance of information

rises with accelerating innovation, rapid market changes and intensifying competition.<sup>36</sup> Apart from providing suppliers with information on their own business plans, foreign affiliates can assist suppliers by giving access to a broad range of technical, market and business

##### Box IV.11. The SMART model of Intel Malaysia

Intel Malaysia has developed one of the most comprehensive programmes for supporting supplier development and upgrading. Local suppliers are used by Intel in the areas of subcontracting, tooling and fabrication, equipment service support, transportation and packaging, operating supplies, construction and infrastructure support as well as information technology supplies.

Intel's so-called "SMART" approach consists of five steps. The first is to select suppliers that are willing and capable of participating in the programme. Potential candidates are sought via open houses and links with business organisations like the Small and Medium Industries Development Corporation and various Chambers of Commerce. Intel analyses a candidate from four perspectives: its management (including the vision of the CEO and the companies' financial stability); its human resources; its technical, materials and process capabilities; and its cost competitiveness.

In the second stage, Intel assists selected suppliers by initial training. The next step is to allocate business to suppliers at the level of complexity appropriate to their capabilities and the needs of Intel. Intel then helps raise supplier capabilities by continuous training and coaching. The ultimate and fifth step is to develop firms into global suppliers, with the ability to meet international standards and export directly. The goal is that Intel should not account for more than 20 per cent of any supplier's sales.

Continuous training of suppliers is provided partly by inviting them to send their staff to Intel's internal training courses and partly through courses in the Penang Skills Development Centre (PSDC). PSDC analyses gaps in the capability of the suppliers' workforce and provides courses to plug these gaps. While the PSDC assumes responsibility to package and deliver the courses, most courses are contributed by Intel and other foreign affiliates in Penang.

Coaching involves regular supplier reviews and continuous dialogue. Through the supplier reviews, Intel shares new information on technical roadmaps and expected future technical and business requirements early in the process. When appropriate, teams of engineers or relevant experts from Intel are sent to suppliers to assist.

A number of suppliers have participated in Intel's programme. According to the company's estimates, about four out of five selected companies eventually become suppliers. For "direct" suppliers, which supply large volumes of components, the success rate is almost 100 per cent. Intel Malaysia spends extra resources on coaching these suppliers. In the case of "indirect" suppliers, the success rate is about 70 per cent. Several SMEs have eventually become TNCs in their own right. In 2000, six were listed on the main board of Kuala Lumpur Stock Exchange, while another seven were listed on the second board.

According to Intel, tax incentives provided by the Government have been important in motivating it to invest in developing local SMEs as suppliers. Under the "Pioneer" scheme (see box V.8 on the Malaysian government programme), Intel has negotiated with the Government and agreed on a financial support package, from which it benefits if it meets certain agreed criteria, including one relating to supplier development. Currently, according to Intel, the tax incentives are about \$50 million per year. There are also specific government funds available, which suppliers can use to finance upgrading efforts. TNCs in Penang work closely with government institutions and PSDC.

*Source:* UNCTAD, based on Intel, 2001; Wong, 2000 and company interviews.

#### Box IV.12. Motorola's backward linkage programme in China

Since its establishment in China in 1987, Motorola has become one of the country's largest inward investors, with a direct investment stake of more than \$3.4 billion, two wholly owned affiliates, 8 joint ventures, and 18 R&D centres.

Working in full partnership with China's State Development and Planning Commission (SDPC), Motorola has established the *Centre for Enterprise Excellence*, a programme to provide high-level training to selected state-owned enterprises. The main objective of the programme is to develop Motorola's supplier base by strengthening especially quality, production and productivity through classroom and on-site instruction as well as outreach activities. Motorola and the SDPC have developed a three-step model for that purpose: training of participants for two weeks; selection of high-potential state-owned enterprises for further development (after a 6-12 months joint effort, Motorola qualifies selected enterprises as suppliers); and provision of finance, jointly with the SDPC, to selected firms. This final step has so far not been implemented as the firms selected have had access to alternative sources of funding.

Since 1998, Motorola and SDPC have developed a training curriculum in quality and productivity management for the chief executive officers, managers and technical staff of selected Chinese state-owned enterprises. They recruit and train professors from major universities in Beijing and Tianjin to provide courses in areas such as leadership development, strategic planning, marketing, quality control (Six Sigma), internal controls, finance, and human resource development. By early 2001, 449 enterprises from 23 provinces, covering 1,516 chief executive officers, middle level managers and technicians, have participated in the programme. The trainees come from a wide range of industries, including electronics, telecommunications, computer hardware, software, media, and general trading or commercial enterprises. Motorola and the SDPC plan to expand this programme to reach 1,000 enterprises over the next few years.

Recently the programme was extended beyond Beijing to the interior of Western China. In 2000, Motorola and SDPC held sessions in Xian and Chengdu. By 2001, 400 chief executive officers, middle level managers and technicians from 85 enterprises had participated in the programme there. There are plans to continue this programme in Western China through 2001. By offering to share the company's experience in quality and productivity management with Chinese companies, it contributes to the reform of state-owned enterprises, a priority objective of the Government of China. Taking this programme outside Beijing serves the Government's objective of promoting more balanced growth. The successful reform of the state-owned-enterprise sector contributes, in turn, to a more favourable business environment.

At the same time, the programme supports Motorola's efforts to expand its supplier base and achieve localization goals, which helps Motorola minimize costs, control inventory and reduce new product cycle time, all of which are critical factors for success in an industry characterized by rapid technological change. Moreover, the programme has generated goodwill and enhanced corporate access to central and provincial government leaders.

The programme has been adjusted over time. Initially, the plan was to undertake the training effort together with four or five other TNCs. However, after about a year, these plans were scrapped because each company had its own training priorities and corporate culture and it was difficult to make the programme work for multiple firms. The content of the programme is also continuously updated and new training methods are introduced, such as e-learning as a means to accelerate the dissemination of the training materials.

As of end-2000, 63 of the participating state-owned enterprises had joined the 700-plus Chinese firms currently supplying Motorola. Companies that become certified suppliers to Motorola continue to receive various types of support to ensure they remain qualified. By 2000, the average percentage of locally manufactured parts and components in a cellular phone manufactured in a Motorola plant in China had reached 65 per cent. It is expected that Motorola's local procurement will exceed \$1.5 billion, and the number of local suppliers will exceed 1,000 by the end of 2001.

Source: UNCTAD, based on Motorola, 2001.

information. For instance, they often have extensive knowledge of international and domestic market potential, market and price trends, and sources of raw materials. Information can flow from a foreign affiliate to its domestic suppliers either informally or through contractual arrangements. Foreign affiliates can use the following methods to inform local suppliers (see the annex to this chapter for examples):

- *Informal exchanges of information on business plans and future requirements.* Representatives of foreign affiliates visit their local suppliers to inform them about new market developments or future strategies. This kind of information assists domestic suppliers in making decisions on capital investments and business plans to match the needs of their buyers.
- *Provision of annual purchase orders (confirmed periodically).* Information in advance on purchasing orders is likely to be important for most suppliers. It is particularly helpful for just-in-time arrangements, where the strict delivery schedules demanded by foreign affiliates tend to entail additional costs for suppliers, who have to build up higher levels of inventories before receiving purchasing orders in order to avoid late delivery penalties (Sison, 2000).
- *Provision of market information, particularly on foreign markets.* For example, information on global market trends can help SME suppliers diversify their customers and/or markets, thus reducing their dependence on a single large buyer or market. In some cases, foreign affiliates actively assist their vendors in finding new customers in other parts of the TNCs' network (see e.g. box IV.6).
- *Encouraging suppliers to join business associations,* participate in fairs and facilitate networking (see box IV.10). These can provide a framework for foreign affiliates to communicate with a large number of suppliers, giving information on different aspects of their activities.

Sharing of information with their suppliers is a common feature of linkage programmes that some TNCs implement. This is an essential element for the matching

of capacities of suppliers with the requirements from foreign affiliates buyers. Foreign affiliates that have implemented supplier development programmes tend to be the most active in terms of providing market- and technology-related information to their suppliers (Crone and Roper, 1999).

## 5. Extending financial support

Finance is a necessary part of all linkages between affiliates and suppliers. The primary financial linkage is pricing, but it can also include financial assistance from buyers to suppliers. In developing countries, the shortage of finance is often a major constraint for local firms. Studies suggest however, that there is relatively low incidence of financial support to suppliers by foreign investors (Lall, 1980; Halbach, 1989; Battat et al., 1996, Carrillo, 2001).<sup>37</sup> In this respect, foreign affiliates may not be all that different from other buyer firms. Nevertheless, in a survey of SMEs in Europe,<sup>38</sup> TNCs were the least-often mentioned group of slow payers, when compared with local firms, both public and private. When it does occur, financial support appears to take place in the case of suppliers with whom affiliates have established close cooperation.

Foreign affiliates with relatively strong financial positions can help domestic suppliers in various ways (see the annex to this chapter for examples):

- *Providing special or favourable pricing for suppliers' products.* Under normal circumstances, buying firms have an interest in fixing prices at a level below arm's length prices, as a trade-off for long-term security and stability. Foreign affiliates are no exception. Some foreign affiliates stipulate future price reductions in line with anticipated technical progress.<sup>39</sup> At the same time, affiliates may sometimes offer preferential prices to new suppliers to help them get established (UNCTC, 1981).
- *Helping suppliers' cash flow* through advance purchases and payments, prompt settlements and provision of foreign exchange. Advance payments or purchases can help the liquidity situation of suppliers, particularly during financial crises (see e.g.

box IV.10). This could also be helpful in addressing exchange rate fluctuations which might affect suppliers, notably if they are sourcing inputs from overseas to meet the buyers' requirements.<sup>40</sup>

- *Longer-term assistance* through the provision of capital; guarantees for bank loans; the establishment of funds for working capital or other supplier needs; infrastructure financing; sharing of the costs of specific projects with suppliers; and leasing. When the procurement of new equipment necessary to produce the stipulated amount and quality of goods is too costly for a domestic supplier, a foreign affiliate can buy the equipment and lease it to its supplier.

In general, finance can be a serious bottleneck for the development of the productive capacities of suppliers, or for funding their current operational costs. The financial and cash flow situation of suppliers can be improved and strengthened if there is a commitment on the part of the financially stronger buyer-partners to provide short-term and/or long-term support through various channels. In practice, in the context of backward linkages, foreign affiliates provide finance to their suppliers relatively infrequently, suggesting that the tangible benefits for themselves that they perceive from such support are often lower than their expected costs.<sup>41</sup> However, a number of them are involved in supporting suppliers in various ways, raising the possibility that the extent of such assistance could be increased.

## D. Conclusions

The evidence, scattered as it is, suggests that a number of TNCs take various steps to develop linkages between their foreign affiliates and suppliers in host developing countries or economies in transition. Some affiliates provide assistance in a broad range of areas, whereas others may only support suppliers on an ad hoc basis, if at all. The most intense relationships are those affecting the technological status of suppliers and their ability to meet the scale, quality and cost needs of the buyer. Meanwhile, it is clear

that it has become more difficult for domestic firms in host developing countries to qualify as suppliers to foreign affiliates, in particular to affiliates that are a part of integrated international production systems. In such cases, TNCs tend to focus their supplier development efforts on key suppliers providing the most important inputs. On the other hand, when TNCs have a strong self-interest in developing their supplier base in a host country, foreign affiliates can extend considerable support to enhance the competitiveness of their domestic suppliers.

The transfer of information on technical specifications and production requirements is, of course, a necessary part of all linkages; beyond this, there are generally considerable flows of advice, information, assistance and support from buyers to suppliers. The shape linkages take varies by location, activity, firm, the state of domestic and other local firms, the nature of activities, the duration and closeness of the buyer-seller-relationship and the costs and risks involved. The general picture is however, clear: TNCs invest in linkages if and when they are expected to yield a positive (and competitive) return.<sup>42</sup> Indeed, a survey of 84 companies in Japan, the Republic of Korea, United Kingdom and United States in a wide range of industries showed that most, but not all, buying firms found that, supplier development activities did improve suppliers' cost, quality, delivery performance and cycle time (Handfield et al., 2000).<sup>43</sup>

The development, management and evaluation of supplier relations are a necessary part of supply chain management by any enterprise. TNCs transfer this function, with its range of search, evaluation, interaction and other functions, to their affiliates in most host economies. As more effective supply chain management becomes essential to their competitiveness and dynamism, TNCs seek broader, more efficient and responsive supplier networks wherever they locate. As they shift more facilities, and a larger variety of functions abroad, the range of potential linkages increases. With technical progress and its rising information intensity, the technological and skill content of many

linkages becomes higher. With the rationalization of production across regions, they also have greater scale requirements.

Forming and maintaining linkages involve costs and risks, which clearly vary according to local supply capabilities and infrastructure. This is why a TNC making the same product in different host countries may have very different local sourcing patterns. The available information does not allow the quantification of linkages by location. The broad picture, however, is that local linkages, especially with domestic firms, rise with the level of local development, particularly in complex activities. It is more likely that foreign affiliates source from domestic suppliers and engage in supplier development when the technological and managerial gaps between them and their local suppliers are not too wide.

The lack of comprehensive information makes it difficult to assess fully supplier development efforts by TNCs. Clearly, companies undertake such activities because they make sense from a business perspective. Whether supplier development programmes are effective or not depends furthermore not only on efforts made by foreign affiliates, but on the efforts made by local suppliers. It is obvious that, in order for linkages to be favoured and for assistance through linkages to contribute to an improvement of the competitiveness of domestic enterprises in a host country, strong commitment on the part of the supplier firms is required.

Finally, although companies have a self-interest in establishing and strengthening links with local suppliers, it is clear that various government policies can promote linkages between foreign affiliates and domestic firms and help to increase the willingness of foreign affiliates to assist their linked partners. While most TNC supplier development efforts are organized and implemented by parent firms and especially their foreign affiliates, some involve close collaboration with public, or semi-private, institutions. Well-designed government policies can further stimulate such efforts. Indeed, this is in a host country's economic interest, since linkages

between firms that increase the competitiveness of the firms involved can ultimately contribute to the performance of the economy as a whole. The role of governments in creating and deepening linkages between foreign affiliates and domestic firms is hence the topic of the next chapter.

## Notes

- 1 Defined as enterprises in which no single foreign equity participation is more than 10 per cent of capital. At the level of the economy or industry, the efficient use of domestic resources and capabilities may be a more important consideration than the question of the ownership composition of the suppliers with whom the linkages are established. However, countries also see backward linkages as a means to strengthen domestic enterprises and to support domestic entrepreneurship.
- 2 On average, a manufacturing firm spends more than half of its revenues on purchased inputs (Burnes and Whittle, 1995, cited in Handfield et al., 2000). A growing proportion of inputs is now knowledge- or information-intensive.
- 3 In an enclave situation, in which foreign affiliates have basically no direct links with domestic firms, the dissemination of TNC-specific knowledge to the host economy as a whole depends entirely on externalities and spillovers. Where local inputs substitute for imported ones, linkages also benefit the balance of payments.
- 4 While there is a large empirical literature on FDI and spillovers (e.g. Kokko, 1994; Katz, 1987; Gerschenberg, 1987; Aitken and Harrison, 1991; *WIR95*), there are hardly any empirical studies in the literature that analyse explicitly the link between linkages and spillovers (Blomström et al., 2000, p. 116).
- 5 See, for example, Barnes and Kaplinsky, 2000; Battat et al., 1996; UNCTAD, 2000a.
- 6 For example, the Brazil Auto Parts Association (*Sindipeças*) intermediated between suppliers and manufacturer (Doner and Schneider, 2000).
- 7 For example, 70 per cent of the foreign electronics firms in Scotland that attempted to increase local sourcing were constrained by the lack of efficient local suppliers of key inputs (Turok, 1993). Similarly, in the electrical equipment and electronics industries in Mexico and the Republic of Korea, the main constraint to local procurement by foreign affiliates was the inadequate technological level of local enterprises. Common concerns among foreign affiliates included the lack of quality control, inability to deliver on time and high prices charged by local suppliers (UNCTAD, 2000a).

- p. 66; Yoon, 1994).
- 8 In Mexico, IBM assisted the local firm Ureblock to start producing packaging materials that were not available from any supplier in the country at the time. Now Ureblock has a 200m<sup>2</sup> building in the IBM plant and its responsibilities in the production process range from cleaning the final product to labelling, packaging and final delivery to the IBM distribution department (Dussel, 1999).
- 9 In some regions of the United Kingdom, for instance, one in seven foreign affiliates obtained more than half of its material inputs from group sources (Crone, 2000).
- 10 See, for example, Phelps, 1993; Crone, 1999; Kelegama and Foley, 1999; Carrillo and Gonzalez, 1999.
- 11 Lim and Fong, 1991; Iannone, 1989; Driffield and Mohd Noor, 1999; UNCTAD, 2000a. Low linkages between Japanese affiliates and local firms may also be related to the Japanese preference for greenfield investment when expanding abroad (Belderbos et al., 2001).
- 12 Reuber et al., 1973; UNCTAD, 2000a; Altenburg, 2000; Belderbos et al., 2001.
- 13 During the 1990s, for example, the number of suppliers to Fiat's manufacturing plant in Betim, Brazil, was more than halved from 500 to around 200 (Borges Lemos et al., 2000); the number of suppliers to Fiat's Polish plant fell by 33 percent between 1992 and 1996 (Balcet and Enrietti, 1998); and to its Turkish plant by 56 percent between 1992 and 1999 (Balcet and Enrietti, 2000). Similar developments have been noted for other carmakers (also see box IV.2).
- 14 Suzuki's affiliate in Hungary, for example, only negotiates with potential suppliers that are already ISO9000 and QS9000 certified (company interview).
- 15 Even in developed economies like the United Kingdom and the United States, products sourced locally by foreign affiliates are often of a standardized or technically unsophisticated nature (Turok, 1993; Crone and Roper, 1999; Crone and Watts, 2000; Chung et al., 1994).
- 16 This may explain why technology-intensive Japanese TNCs have relatively low local content abroad, particularly in developing countries (Belderbos et al., 2001). An analysis of inward FDI in Ireland suggests that foreign manufacturing affiliates with the largest purchasing linkages tend to have a relatively low R&D intensity and therefore may have the least to offer to a local supplier in terms of technology and knowledge transfer (Breathnach and Kelly, 1999).
- 17 In the Central American apparel industry, some Asian investors relocated from higher-wage to lower-wage countries while United States brand-name companies rarely relocated despite considerable intra-regional wage differentials (Altenburg, 2000, p. 40).
- 18 Brannon et al., 1994; Lowe and Kenney, 1999. After NAFTA came into force, foreign affiliates appear to have been given a higher degree of autonomy (Carrillo et al., 1999, p. 56).
- 19 Driffield and Mohd Noor, 1999; Mair et al., 1988; Turok, 1997; Castellani and Zanfei, 1998; Halbach, 1989; Yoon, 1994; McAleese and McDonald, 1978; O'Farrell and O'Loughlin, 1981; Görg and Ruane, 1998; Scott-Kennel and Enderwick, 2001.
- 20 For example, the number of domestic suppliers to Honda of America gradually increased from about 30 in 1983 to more than 400 in 1997 (Handfield and Krause, 1999).
- 21 An Irish study shows that large and expanding foreign affiliates had relatively low levels of local procurement (Görg and Ruane, 1998). In Mexico the small size of local suppliers was found to be an obstacle to linkage creation by large foreign electronic and auto-parts firms (Carrillo et al., 2001). Other studies confirm that larger affiliates tend to have weaker local linkages (Schachmann and Fallis, 1989; Halbach, 1989; Barkley and McNamara, 1994).
- 22 Studies of the mining industry in Chile – the leader in mining-support industries in Latin America (UNCTAD, 2000c) – found that foreign-owned mining companies operate in an “enclave” with few links to local industry (UNCTAD, 2000a; Culverwell, 2000).
- 23 A survey of garments production in Costa Rica, the Dominican Republic and Morocco showed local sourcing by affiliates of between 5 and 10 per cent (UNCTAD, 2000a, chapter 4).
- 24 As *The Economist*, 3 May 2001, noted, India is becoming the “Back office to the world” by undertaking a variety of services for foreign banks, airlines, insurance companies, travel agents and so on. Most of the work is done in captive (wholly owned) facilities, saving the companies involved around 40-50 per cent of the cost. Some independent subcontractors are entering the field (e.g. in medical transcription and call centres), but almost all their work is for companies located abroad.
- 25 Examples of companies having such programmes in developing countries are Anglo-American, BASF, Cadbury, Daewoo Corporation, Fiat, GlaxoSmithKline Beecham, Hitachi, IBM, Intel, LG, Matsushita, Motorola, Nestlé, Pepsi Foods, Philips, Saint Gobain, Siemens, Toshiba, Toyota, Unilever and Volkswagen. This list is by no means exhaustive, but represents responses provided by firms to a joint UNCTAD-ICC request for case studies as well as examples referred to in the literature. These cases are part of the analysis below.
- 26 Other studies show a lower frequency of such

- efforts. For example, a survey of the South African automotive industry found that supplier development efforts by foreign carmakers and their first-tier suppliers were very modest and that they had become rarer in recent years (Barnes and Kaplinsky, 2000).
- 27 The information on companies has been compiled from responses to a survey of affiliates in developing countries and economies in transition conducted by UNCTAD and the International Chamber of Commerce in 2000/2001.
- 28 Expertise and skills can be transmitted between buyers and suppliers in both directions, and in developed host countries they probably are. But this also happens in the more advanced developing countries. For example, in Singapore, local SMEs were found to play an important role in transferring knowledge on local technical specifications, standards, management styles and local culture, as well as soft technology to their TNC customers (Chew and Yeung, 2001).
- 29 Technology transfer to suppliers generally takes the form of technical support rather than the transfer of proprietary know-how (Wong, 1992; Hobday, 1995; Ernst, 1997). Proprietary knowledge refers to product and/or process related know-how developed and owned by a TNC and usually protected through a patent or copyright or industrial design or trade secret. One reason for the limited transfer of proprietary technology may, of course, be that the foreign affiliate does not itself possess the know-how to produce a part or component it procures externally.
- 30 For example, in Thailand, technology transfer (both direct and indirect) took place in 38 per cent of the cases involving low-specificity products and 57 per cent of medium-specificity products, whereas the corresponding figure for high-specificity products was 80 per cent (Supapol, 1995). See also Chung et al., 1994.
- 31 See Giroud, 2001a; Halbach, 1989; Supapol, 1995; Gultom-Siregar, 1995; Wong, 1992.
- 32 The first "Supplier Associations" date back to 1939 when Toyota created one in Japan with its ten most important suppliers (Handfield and Krause, 1999).
- 33 Such spin-offs have become important players in the support industry in the electronics sector in Malaysia (Hobday, 1999), Singapore (Mathews, 1999) and the Republic of Korea (Bloom, 1992; Kim, 1999).
- 34 In the television-manufacturing industry of Mexico, a somewhat similar situation seems to prevail: nearly half of the foreign-owned local suppliers (to foreign-affiliate manufacturers) covered by a questionnaire survey received training (along with technical assistance) from the respective foreign affiliates for their employees, but less than a fifth of locally owned firms (generally second- or third-tier suppliers) received training for their employees from the buyers (foreign affiliates or locally owned) to whom they supplied (Carrillo, 2001).
- 35 See the section on technology transfer.
- 36 "Information is one of the most important hurdles standing in the way of the more widespread adoption of backward linkages. The whole concept of subcontracting revolves around the idea of information dissemination, since subcontracting is expected to facilitate the matching of capacities of the small-scale firms with demand emanating from the large firms. There is thus a need for effective institutional arrangements for the collection and dissemination of business information relevant to the large and small units operating in the respective industrial sectors" (ITC, 1998, pp. 11-12).
- 37 For instance, eight of 11 foreign affiliates in a survey of the Malaysian electronics industry did not provide any financial support to suppliers (Giroud, 2001a). Affiliates that provided financial support mentioned that it was limited in time and scope, and was not a part of regular company practice. In Singapore in the mid-1980s, only 19 per cent of the United States-owned affiliates and 12 per cent of the Japanese-owned ones provided financial assistance to suppliers, but the practice was more common for European affiliates, with more than 50 per cent providing such assistance (Tan, 1990).
- 38 The survey was conducted by Grant Thornton International (GTI, 1997). It should be noted that the survey report drew attention to the possibility that some respondents might have lumped foreign affiliates and large local firms together.
- 39 Suzuki in Hungary sources items from exclusive suppliers and stipulates price reductions of 2-4 per cent per year (company interview; Schweitzer, 2001) According to a survey in India in the early 1990s, 2 out of the 10 foreign affiliates mentioned professional costing and "worked out prices" with suppliers as their method to determine a mutually agreed price (Kumar, 1995).
- 40 In the Mexican *maquiladora* industry, for example, contracts are signed in Mexican pesos even if suppliers purchase raw materials in dollars. When they get paid a month or more later, payments do not take exchange rate changes into account, often at significant costs to suppliers (Carrillo et al., 2001).
- 41 Foreign affiliate-local firm financial arrangements are likely to be more prevalent

in forward linkages, especially if the relationship is governed by a franchising agreement. In the food and beverages industry, for example, companies such as Coca-Cola and Unilever often provide preferential credit lines and equipment free of charge to retailers. But these arrangements are often challenged on grounds of anti-competitive effects, as, in exchange for these contributions, retailers are required to distribute exclusively the products of the TNC of foreign affiliates supplying the product for distribution.

<sup>42</sup> For example, in the case of its so-called RC5 programme in Brazil, Fiat explicitly states that it expects to benefit through price reductions on a participating supplier's output or to share the pecuniary gains the programme helps to achieve. In fact, mainly for this reason,

a number of suppliers have chosen not to participate in the programme (Borges Lemos et al., 2000). Varsity Perkins, a producer of diesel engines, similarly expects to share the benefits a supplier enjoys as a result of supplier development efforts. However, instead of requiring an equal split on savings, Perkins requires that a supplier agrees not to raise prices the following year, unless it has to respond to increases in raw material prices (Handfield et al., 2000).

<sup>43</sup> The survey and field interviews showed that in most cases, pitfalls were related to a lack of commitment or of technical and human resources on the part of suppliers to implement the improvements required (Handfield et al., 2000).

## Annex to chapter IV. Supplier development activities by foreign affiliates

The following are additional examples of measures taken by foreign affiliates to strengthen their backward linkages with local firms:

### 1. Finding new local suppliers

- *Making public announcements* about the requirements that firms need to meet to qualify as suppliers. In Slovakia, the Development of Suppliers Department (set up by a local Volkswagen sales affiliate, Skoda Auto Slovensko) informs potential suppliers on standards they have to fulfil to become suppliers; all suppliers must first get a VDA 6.1 quality certificate (QS 9000 level) required for the supplies to the German automotive industry (Ferencikova and Koperdan, 2001). Intel Malaysia is another example (box IV.11). One part of its supplier development strategy is to search for and help domestic enterprises to reach the stipulated quality standards and upgrade their various activities in order to qualify as suppliers to Intel. The most important characteristic of a local firm is that its top management is committed to learning, to investing resources, time and effort to work with Intel Malaysia with a view to upgrading its capabilities and skills (Wong, 2000). Another kind of information support is to help potential suppliers establish themselves a presence close to the affiliate's own plant. In Hungary, for example, Suzuki's affiliate is collaborating with local authorities to inform potential suppliers on how to establish themselves in the region by, among other actions, organizing outreach events and providing material containing information on infrastructure and financing possibilities (box V.1).
- *Supplier visits and quality audits.* In Slovakia, the Development of Suppliers Department maps the potential of local suppliers through visits and analysis of technology, capacity, quality management systems and financial performance. This is followed by a special audit, classifying candidates into three groups: ready to supply, conditional supplier and rejects.

Those in the first two categories are given assistance by representatives of Skoda Auto Slovensko – to bring them to the required levels. The suppliers who finally meet the criteria start receiving order demand quotes and enter the process of competing for a contract.<sup>1</sup> In Hungary, the affiliate of Suzuki carries out a full-fledged supplier audit (on management and accounting practices, technology and working methods) of suppliers.<sup>2</sup>

### 2. Transferring technology

#### *Product-related technology*

- *Provision of proprietary product know-how.* Some foreign affiliates transfer their product-related proprietary knowledge to their local supplier firms by licensing know-how or granting supplier firms permission to use it. For instance, Astra Research Centre India (ARCI) licensed its product know-how for reagents (which are used in DNA research) to a newly formed local firm, Gene India. This firm produces these reagents and supplies to ARCI as well as to other research institutes in India and abroad. Prior to such technology transfer by ARCI, these reagents were imported (Reddy, 2000).
- *Transfer of product designs and technical specifications.* The provision of product design specifications was noted as one of the main channels for technology transfer to local suppliers in the electronics industries of Thailand, China, Indonesia, Republic of Korea and Thailand (ESCAP/UNCTAD, 1995). In a study focusing on Japanese foreign affiliates and their local suppliers in the electrical and electronics industry in Malaysia, 70 per cent of the foreign affiliates were frequently interacting with local supplier firms to provide them with product-related technical specifications, 32 per cent to provide tools and 5 per cent to provide information on plant establishment (Giroud, 2000, p. 584). In some cases, a foreign affiliate may change the design of an input specifically to suit a local supplier's production

capabilities (Giroud, 2001a). Affiliates also provide advance technical information about changes in their products. Provision of such information appears to be more prevalent in some industries, such as automobiles and electronics, than in others. For instance, Fiat's affiliate in Brazil provides the specifications for new products to local suppliers in advance (Borges Lemos et al., 2000). Although the source of such specifications may be the TNC headquarters, local suppliers need to be involved in adapting the product to local conditions, as well as adjusting customization to specific markets. This facilitates technological cooperation between foreign affiliates and local supplier firms, enabling the latter to develop components for a new product.

- *Technical consultations with suppliers to help them master new technologies.* In a survey of 33 foreign affiliates in Northern Ireland, a majority of the affiliates (76 per cent) was observed to have provided such support through monthly contacts for discussion of technical issues (Crone and Roper, 2001).
- *Feedback on product performance to help suppliers improve performance.* After the supply of a product by the supplier(s), foreign affiliates can provide feed-back on its performance, which helps suppliers in further improving the product (see Crone and Roper, 2001; box IV.6).
- *Collaboration in R&D.* Some affiliates collaborate with their local suppliers in product development through joint R&D. Collaboration in product development was observed, for example, in 44 per cent of the foreign affiliates covered by a Northern Ireland study (Crone and Roper, 2001). Such collaboration may also involve local research institutes or universities. In India, Singapore and Malaysia, foreign affiliates have been found to be involved in R&D cooperation in product-related technologies with local firms and research institutes (Reddy, 2000; Hobday, 1999, p. 95). Research institutes were involved in supplying specific R&D inputs to affiliates. The local firms involved in R&D cooperation with foreign affiliates, in addition to developing products, may also manufacture them for supply to foreign

affiliates. Through such cooperation in R&D, there is scope for transfer of application knowledge and methodologies involved in product and process development to local supplier firms and/or research institutes (Reddy, 2000).

#### *Transfer of process technology*

- *Provision of machinery and equipment to suppliers.* Magyar Suzuki, the Hungarian affiliate of Suzuki of Japan, installed production equipment in the industrial park of Esztergom, adjacent to its own site, to be shared with suppliers (Suzuki, 2001). Foreign affiliates in the food processing industry in India are another illustration of the provision of embodied and disembodied technologies to local suppliers (box IV.8).
- *Technical support for production planning, quality management, inspection and testing.* In a study of the electronics industry in Singapore, focusing on original equipment manufacturing arrangements between foreign affiliates and local supplier firms, 89 per cent of the foreign affiliates reported providing technical support as part of their efforts to develop their suppliers (Tan, 1990). In the electronics industry of Malaysia, foreign affiliates have given significant technical support to their local suppliers (Ismail, 1999; UNDP, 1993). Such support included solving specific technical problems (Capannelli, 1999) and assisting in factory layout, production planning and machinery installation (Ismail, 1999). In a Northern Ireland survey, 31 per cent of the foreign affiliates covered advised their suppliers on the selection and use of process equipment, and 34 per cent assisted suppliers in improving their manufacturing processes (Crone and Roper, 2001). In China's automobile industry, two foreign affiliates are reported to provide technical assistance through quality control to their local suppliers (Xia and Lu, 2001).
- *Visits to supplier facilities to advise on layout, operations and quality.* Some affiliates form special teams to assist suppliers in process know-how or in operating equipment. For instance, Pepsi Foods, India formed an extension team to advise its contract farmers in improved

methods of cultivation and the use of advanced agricultural implements (Pepsi Foods, 2000). Such visits are of special importance to the supplier firms, because they facilitate transfer of “tacit knowledge” related to production process and quality control (Ernst, 1997).

- *Formation of “cooperation clubs” for interacting with suppliers on technical issues.* The activities organized by such clubs have contributed to significant improvements in the quality of supplies and delivery schedules, as well as in cost reductions for the suppliers (UNCTAD, 2000a, p. 161).
- *Assistance to employees to set up their own firms.* For instance, in the Republic of Korea, recognizing the dependence of the Korean electronics industry on imported mouldings, Motorola set up a moulding production division within its factory and trained its employees at its headquarters in the United States. When some of these employees wanted to set up their own mould-making firms, Motorola encouraged them by offering to procure their product and allowed them to use Motorola’s equipment and facilities at low prices. By offering such incubation facilities, Motorola contributed to the creation of about ten spin-off firms, including Hanmi, Kookje, Micron and Crown Precision, which became leading semiconductor-moulding producers in the Republic of Korea (Kim, 1999).

#### *Organizational and managerial know-how*

- *Assistance with inventory management and the use of just-in-time and other systems.* For instance, foreign affiliates provided technical training to local automobile-parts suppliers in Mexico in just-in-time procedures, and this led to improved performance by the suppliers (Peres Nunez, 1990). Such assistance in inventory management techniques, which enable suppliers to tailor their products to order, is integrated by Japanese foreign affiliates in the Republic of Korea into their assistance in introducing the Total Productive Maintenance Approach (Kim, 1999).

- *Assistance in implementing quality assurance systems* (including ISO certification). In the United Kingdom, a survey of 30 large foreign-affiliate manufacturing plants found that 60 per cent performed visits for the provision of technical assistance on quality assurance and organizational issues (PACEC, 1995). In Northern Ireland, 48 per cent of the foreign affiliates surveyed reported that they provide such assistance (Crone and Roper, 2001). The experience of Hei Jiya Electronics Co, a local manufacturer of liquid crystal displays and modules in China, illustrates such assistance. The company entered into a supplier relationship with an affiliate of Motorola, which assisted the local company by sending teams of technical and managerial personnel to its premises to advise on improving its production management, technology and quality system. Hei Jiya was certified as a qualified Motorola supplier in 1997 for supply of components for pagers. Due to this technical assistance, Hei Jiya obtained ISO 9001 certification in 1999 and became a supplier to other electronics manufacturers (Motorola, 2001). Similarly, in the Republic of Korea, Halla Electronics, an automobile parts manufacturing joint venture of Ford, assisted nine local supplier firms in their efforts to obtain ISO 9002 certification (Kim, 1999).
- *Introduction to new practices such as network management or financial, purchase and marketing techniques.* In a Northern Ireland survey, a quarter of the affiliates are reported to be involved in introducing new managerial and organizational techniques to local supplier firms (Crone and Roper, 2001).

### 3. Providing training

- *Training courses in affiliates for suppliers’ personnel.* In Penang, Malaysia, several foreign affiliates and large domestic firms provide training courses offered at the Penang Skills Development Centre (PSDC). Subject areas for the courses include total quality management, project management, occupational safety and health (Wong,

2000, p. 74; Intel, 2001). In Viet Nam, the local affiliate of Unilever conducts training in quality standards, inspection and testing methods, and warehousing specifications for its suppliers. Training is conducted by Unilever and its key suppliers, and financed by Unilever. Supplier employees receiving training include staff involved in quality assurance and safety and hygiene, and machine tool operators (Unilever, 2001). In Slovakia, the local manufacturing affiliate of Volkswagen provides, in collaboration with the Suppliers Development Department of Skoda Auto Slovensko, training for suppliers in human resource management and quality standards (Ferencikova and Koperdan, 2001). In Brazil, the car-manufacturing affiliate of Fiat in Belo Horizonte provides training to its suppliers (now largely foreign-owned) in just-in-time methods so that disruption of deliveries is minimized (Borges Lemos et al., 2000). In India, Maruti, an affiliate of Suzuki that manufactures cars, provides training to technical personnel of its suppliers (Juneja, 2000). Most of the examples cited above involve large-scale operations in highly competitive areas in which supplier capabilities can make a big difference to costs and standards.

- *Offering access to internal training programmes in affiliates or abroad.* Fiat Poland invites its local suppliers to participate in the Fiat Group's internal training programmes. The programme covers training of the sales force, management development, support to the reengineering of the production system and to the introduction of new products, and technological training (Fiat, 2001). Some of the electronics foreign affiliates included in a study of Malaysian electronic firms provided practical training related to manufacturing processes at their own facilities (Giroud, 2001a). About 80 per cent of the training provided by Intel Costa Rica to its suppliers of services also took place at Intel's Costa Rican facilities (Larraín et al., 2001). Pepsi Foods India's Procurement and Extension Services Team organizes farmer training camps to take the farmers on a tour of the PepsiCo Research and Development Centre.

- *Sending teams of experts to suppliers to provide in-plant training.* A number of electronics foreign affiliates in Malaysia gives such assistance (Giroud, 2001a). One purpose of such visits was to provide training on improvements in technology. In a somewhat different context, the food-processing affiliate of Pepsi Foods in India has established, under the direction and management of the Punjab Agro Industries Corporation, a procurement and extension services team for providing training in world-class mechanized agro-technology to local farmers who are contracted to supply fruits and vegetables to Pepsi. Training is conducted through technical bulletins, video demonstrations, slides and charts of new techniques, and live demonstrations on the use of various agricultural implements and on operations such as crop transplanting.<sup>3</sup> Similarly, Nestlé provides training for upgrading dairy-farming methods to suppliers in Latin America and China (box IV.6).<sup>4</sup>

#### 4. Sharing information

- *Informal exchange of information on business plans and future requirements* can take place through meetings and visits. For example, in India, during the 1980s, a leading truck manufacturer, Ashok Leyland (majority-owned by British Leyland) provided each supplier with schedules of anticipated six-, three- or one-month purchasing orders (Lall, 1980).<sup>5</sup>
- *Consultation on future strategies.* Some suppliers consult regularly with their buyers about their own future strategies and requirements. In Northern Ireland, foreign affiliates give suppliers advance notice of production plans (Crone and Roper, 2001). In Poland, an affiliate of Fiat provides local suppliers with new information on future business requirements (Fiat, 2001).
- *Provision of annual purchase orders.* In Singapore, the likelihood of foreign affiliates sharing their production and purchase forecasts with local SME suppliers is high when the length of buyer-supplier relationships exceeds two years (Chew and Yeung, 2001).

- *Provision of market information.* Some foreign affiliates in the United Kingdom pass on knowledge on market trends to their local partners (PACEC, 1995). In the MERCOSUR area and in China, Nestlé actively assists selected suppliers in becoming regional suppliers to Nestlé.<sup>6</sup> Hitachi's semiconductor Malaysian affiliate exchanges information on market trends with its SME suppliers and assists them in expanding their business scope by introducing them to other Hitachi affiliates.<sup>7</sup> According to some successful suppliers in Asia, once their reliability is proven to one large foreign affiliate, reference is provided to other assemblers or manufacturers within the same business network or other foreign affiliates, generating further opportunities (Sison, 2000; ESCAP/UNCTAD, 1995; Moran, 1999).
- *Encouraging suppliers to join business associations or fairs and facilitating networking.* One example of a business association involved in information provision is the International Disk Drive Equipment and Materials Association (IDEMA) in Thailand. IDEMA has supported the development of a Thailand-based group of hard disk drive manufacturers that aims at promoting business networking, facilitating information sharing through education programmes and technical symposia/conferences, and also provides a forum for the global discussion of technical issues faced by the industry. IDEMA Thailand's activities are planned by leading international companies, such as Seagate, Fujitsu, Read-Rite, KR Precision, IBM, ENGTEK and Magnecomp, and information is shared between TNCs and their suppliers.
- *Advance and prompt payments.* Toyota Thailand raised its advance purchases and early payments when its local suppliers faced severe liquidity problems in the Asian financial crisis (Muramatsu, 2000; box IV.10). Siemens in the Republic of Korea had a policy of paying small and medium-sized suppliers promptly instead of the usual deferred payment of 30 days (Yoon, 1994). Another example is from a survey of electrical and electronics TNCs and suppliers in India, according to which some suppliers benefited from advance payments from their foreign affiliate buyers for buying raw materials, or from direct supplies of raw materials from foreign affiliates, although they were not in a liquidity crisis (Kumar, 1995).
- *Medium and long-term finance.* Unilever in Viet Nam offered financial support to five key suppliers to upgrade equipment and cover the costs of extensive training (Unilever, 2001). It also bought equipment and provided it to a supplier on leasing terms. Another example is that of Nestlé China, which financed the tooling costs of a tin can supplier for sweetened condensed milk (Nestlé, 2001). In Ecuador, Nestlé's Servicio de Fomento Agropecuario (SFA) offers preferential credit lines to milk farmers for the purchase of cows, machinery and fertilizers (for fodder production). In Malaysia, Intel offered capital to Eng Hardware in 1981 to enable it to become a supplier of precision machine tooling (box IV.1). Foreign affiliates can assist suppliers by providing guarantees to facilitate access to bank lending; one example of such assistance is that of GlaxoSmithKline Beecham in India, which has established links with a local agricultural bank to enable its milk suppliers take loans from that bank against its guarantees. Some foreign affiliates provide capital to local suppliers through public institutions. One example is Fundo Fiat (Fiat Fund), created by Fiat Brazil to finance private investments in the Brazilian automobile-parts industry and managed by a state-owned financial institution (Borges Lemos et al., 2000). Another example is co-funding by Fiat (together with the Government and UNIDO) of a programme in India to strengthen the automotive

### 5. Extending financial support

- *Pricing.* In Brazil, Fiat agrees on target prices and gives "some guarantees regarding quantities" under one type of contract which covers the duration of the lifetime of a car model, but no commitments of any kind on other types (Borges Lemos et al., 2000).

component manufacturing industry (box V.6). When the main bottleneck to the expansion and modernization of suppliers' capacities is in the underlying infrastructure, foreign affiliates participate in the financing of such infrastructure. It was reported that Nestlé's SFA in Ecuador co-financed the construction of rural roads to facilitate market access for small suppliers.<sup>8</sup> Some foreign affiliates also share the cost of improving the skills and capacities of suppliers, as with financing trainers at PSDC in Penang; trainers are seconded by foreign affiliates and paid by them. The Korean automotive company, Daewoo Corporation, has sometimes helped to finance suppliers' improvement projects in the Republic of Korea, Indonesia and Poland, e.g. by providing collateral to allow them to borrow funds at reduced rates for new equipment, or by assisting in the procurement of raw materials (Handfield and Krause, 1999).

## Notes

- 1 The Supplier Development Department has visited some 160 companies, of which, 42 companies are now supplying to the concern. Of the 42 companies, 12 companies were previously not supplying for the Skoda brand.
- 2 Information obtained through interview with Suzuki, Hungary.
- 3 Based on information obtained from Pepsi Foods Ltd. India.
- 4 Based on information obtained from Nestlé.
- 5 In addition, this truck manufacturer and its suppliers had intensive discussions to ascertain whether or not a buyer's future needs matched suppliers' capacities based on long-term business plans of both sides.
- 6 Information obtained from Nestlé.
- 7 See "Experiences in SME linkages", presentation given by Leow Teik Thye, at the International Workshop on Technological and Managerial Upgrading of SMEs through Linkages with TNCs, organized jointly by UNCTAD and Intel in Penang, Malaysia, August 2000.
- 8 Source: <http://www.nestle.com/ec/ecuador/campo/sfa.htm>.