

Factors determining supply linkages between transnational corporations and local suppliers in ASEAN

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A significant potential beneficial impact of foreign direct investment arises from a foreign affiliate's propensity to purchase inputs from suppliers in the host economy. This issue is of particular interest where the host is a developing country and the linkage is likely to contribute to the development of local suppliers. We compare variations in local input linkages across four countries: Cambodia, Malaysia, Thailand and Viet Nam, all member countries of the Association of South-East Asian Nations (ASEAN). Using multiple linear regressions, our findings indicate that the degree of local input linkages is highest when foreign affiliates perform a strategic role in the transnational corporation network and are embedded in the host economy. Non-firm factors are also important determinants, especially the industry of investing firms and the existence of a supply base. Building on the findings, a series of policies to enhance supplier-foreign affiliate linkages are proposed.

Key words: transnational corporations, supply linkages, ASEAN, regionalization, electronics industry, garments industry

JEL classifications: F23, F02

1. Introduction

This article aims to analyse the sourcing patterns of transnational corporations (TNCs) in South-East Asia, with a focus on explaining *local* input linkages in the electronics and

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textile and garment industries. A supplementary aim, essentially cast by the findings, is to suggest appropriate policies that would enable governments to develop further supplier linkages with TNCs.

TNCs' linkages – and their expansion - in host economies have become a particularly important issue, especially in South-East Asia after the Asian financial crisis, as the inflows of foreign direct investment (FDI) have decreased and recent inward FDI is increasingly sustained by the reinvested earnings of existing foreign affiliates in the region. Through local supply linkages, TNCs potentially generate considerable benefits for host economies, both from value-chain multipliers and technology transfers and spillovers. Studies have shown that the linkage potential of TNCs is higher than that of domestic firms in some developing countries (Potter *et al.*, 2003; Alfaro and Rodríguez-Clare, 2004; Jensen, 2004). Given their importance, it is perhaps surprising that relatively few studies have examined the factors explaining the level of local sourcing by TNCs in host economies (McAleese and McDonald, 1978; Driffield and Noor, 1999; UNCTAD, 2001; Belderbos *et al.*, 2001; Tavares and Young, 2002). Even fewer have focused specifically on technology transfer to local suppliers (Halbach, 1989; Wong, 1991; IDE, 1994; Rasiah, 1995; Supapol, 1995; Crone and Roper, 2001; UNCTAD, 2001; Giroud, 2003) or how TNCs enhance local suppliers through the introduction of focused assistance programmes (Dries and Swinnen, 2004). This article contributes to the literature by analysing the determinants of TNCs' local supply linkages in two industries in South-East Asia: an analysis that is enhanced by comparing the issue in four countries that are geographically close and part of the same regional grouping, yet exhibiting vastly different levels of economic development (a situation partly resulting from varying degrees of maturity as FDI hosts). The implications of this regional development are further explored in the context of the development of the Association of South-East Asian Nations (ASEAN) in section 2.

Section 3 of this article then concentrates on theoretical concepts and the literature review. We first develop a theoretical

framework, borrowing concepts from transaction cost theory, various international business theories, multinational network theory, and development economics. We then review the literature to establish concrete hypotheses to be tested, focusing on the type of factors that are likely to explain the motive for local sourcing - as opposed to importing - of inputs. In section 4, we present the methodology for identifying factors explaining local supply linkages from our sample, followed by an analysis of the resulting dataset from 85 foreign affiliates located in Cambodia, Malaysia, Thailand and Viet Nam in the electrical/electronics and textiles/garment industries. Data were collected through face-to-face interviews with managing directors and other key managers at each affiliate from late 2001 through 2002. Foreign affiliates provided details about their local purchasing activities and their overall strategy. The focus on two industries allows us to compare and contrast two very different industries. It is difficult to create a perfect evaluation system for assessing local sourcing. The dependent variable in this article is the share of total inputs purchased locally by each foreign affiliate. This is essentially the concept of local sourcing as defined by the United Nations (UNCTAD, 2001, p. 134). Local sourcing indicates the share of inputs supplied by firms in a host country, with no detailed information available on the ownership of suppliers (domestically-owned or foreign-owned). One key disadvantage of this method is that local supplies may not be produced locally, as some local suppliers may merely be distributors of imported inputs. However, using the share of imported inputs would simply be the mirror image of the share of locally purchased inputs, and we therefore decided to use the former.

The results presented in section 5 are intended to help understand better an important aspect of TNCs' activities in host economies. We initially identify relationships between the local supply linkages of foreign affiliates and various company and country factors before testing these relationships within a linear regression analysis model. The findings identify three factors as being strongly linked to local supply linkages, namely the experience of activities in the host economy, the foreign

affiliate's role in the TNC network and the industry in which the firm is operating. There is some indication that the host developing economy is also important in explaining local vertical linkages. These findings are then incorporated in a broader discussion in section 6 of the implications for government policy towards supplier-foreign affiliate linkages, especially in the context of international competition and evolving TNC supply strategies (discussed in section 2). Section 7 concludes.

2. The co-evolution of investment policies in ASEAN and inward FDI

ASEAN was established in 1967 and initially consisted of five member countries, Indonesia, Malaysia, the Philippines, Singapore and Thailand; since then, it has expanded and now includes ten economies, essentially all the potential member countries in geographic South-East Asia, except Timor-Leste, which has only recently become independent. The original five member countries have prospered since the Association's establishment, especially in the cases of Singapore, Malaysia and Thailand. In 1977, ten years after ASEAN's creation, these three countries' gross national income (GNI) per capita was \$2,880, \$930 and \$420 respectively. Since then, Singapore has progressed to the status of an advanced industrial economy (GNI per capita of \$21,230 in 2003), while Malaysia and Thailand – both with much larger populations – are significant industrial powers in their own right with respective GNI per capita's of \$3,780 and \$2,190 (table 1).

The creation of ASEAN in the late 1960s was serendipitous. In the early 1970s, the world economy entered a period of prolonged crisis, which forced companies to adopt a number of "survival strategies"; among them was the transfer of production to cheap labour locations in developing countries - a process which then developed its own dynamics and became a primary motor for the "globalization" of the contemporary world economy. As table 2 shows, in the halcyon days before the Asian economic crisis of 1997, ASEAN as a region had

Table 1. ASEAN Member Countries: Comparative Data, 1977 and 2003

	Area (sq km)	Population (millions) 2003	Gross National Income Per Capita (Dollars) 1977	Gross National Income Per Capita (Dollars) 2003	FDI Stock (million of dollars) 2003	Exports (millions of dollars) 2003
Brunei	5,770	0.4	na	15,000 (est.)	7,427	4,000 (est.)
Cambodia	181,040	13.4	na	310	1,930	1,623
Indonesia	1,919,440	214.5	300	810	57,209	60,650
Laos	236,800	5.7	90	320	618	371
Malaysia	329,750	24.8	930	3,780	58,979	100,726
Myanmar	678,500	49.4	140	250 (est.)	4,376	2,802
Philippines	300,000	81.5	450	1,080	11,467	37,065
Singapore	633	4.3	2,880	21,230	147,299	144,134
Thailand	514,000	62.0	420	2,190	36,910	80,253
Viet Nam	329,560	81.3	160	480	18,574	19,660

Sources: World Bank (1979, 2004); UNCTAD World Investment Directory, www.unctad.org/wid.

accumulated up to a quarter of all FDI stock in developing countries – and this during a period when TNCs were expanding international production at a rapid rate, especially to developing countries (UNCTAD, 1999; Taketoshi and Krueger, 2000; Urata *et al.*, 2005). Singapore, Malaysia, Thailand and Indonesia were (and are) the main recipient countries in South-East Asia. The relationship between FDI, growth and development is complex, but at least in ASEAN, the relationship is, on balance, positive (Mirza and Giroud, 2004). The significant and prolonged role of FDI in local/regional economies makes South-East Asia an ideal “test case” for investigations of the impact of TNC operations on local development, including supplier-foreign affiliate linkages.

The regional dimension is also important for a number of other reasons. First, geographic proximity (and common membership of ASEAN) facilitated a strong policy-level demonstration effect by Singapore on other member countries, particularly Malaysia and Thailand. The benefits of ASEAN membership, especially gaining from the ASEAN “cachet” and learning from more successful neighbours, were among the

primary reasons behind accession by the five newer members, especially poorer countries, such as Cambodia and Viet Nam (Gates, 2000; Mirza and Giroud, 2004). One of the main reasons for our decision to investigate the four particular countries in our study was because two (Malaysia and Thailand) were the most successful of the early ASEAN member countries in attracting manufacturing FDI apart from Singapore; and the other two (Cambodia and Viet Nam) have the most manufacturing FDI among the newer member countries. They represent a viable basis for researching foreign affiliate-supplier linkages in the region.

Thirdly, and very importantly, reflecting the era, until recently the FDI policies of all ASEAN member countries were essentially framed in the context of *national* economic development strategies. Priority was given to national, individual

Table 2. Inward Foreign Direct Investment Stock in ASEAN, 1980-2003
(Millions of dollars)

Region/Country	ACCUMULATED STOCK				
	1980	1990	1995	2000	2003
South East Asia (ASEAN)	25,242	95,712	169,848	270,311	344,789
<i>Brunei</i>	19	26	62	3,856	7,427
<i>Cambodia</i>	Neg.	Neg.	307	758	1,930
<i>Indonesia</i>	10,724	38,883	50,755	60,638	57,209
<i>Laos</i>	2	14	206	550	618
<i>Malaysia</i>	6,078	14,117	38,453	54,315	58,979
<i>Myanmar</i>	5	173	937	2,408	4,376
<i>Philippines</i>	1,225	2,098	6,852	12,688	11,467
<i>Singapore</i>	6,203	32,355	55,491	89,250	147,299
<i>Thailand</i>	981	7,980	16,775	27,924	36,910
<i>Viet Nam</i>	7	66	397	17,956	18,574
Other East Asia	8,098	55,588	180,462	884,218	963,112
South Asia	2,178	4,252	10,088	33,170	44,508
Total	35,518	155,552	360,478	1,187,699	1,352,409
ASEAN's share of FDI					
in Developing Countries (%)	8	24	19	14	15
ASEAN's share of FDI					
in East and South Asia (%)	71	61	47	23	25

Source: UNCTAD World Investment Directory, www.unctad.org/wid.

country goals, rather than potential shared opportunities. In consequence, most foreign affiliates in the region had far stronger links (both in terms of inputs and outputs) with the local/national economy than other economies in the region. Initially - indeed well into the 1980s - this “silo” strategy suited TNCs because they were mainly producing for international markets. Even for the foreign affiliates in our sample, some of which have been in ASEAN for quite some time, the primary orientation for inputs and outputs is local (or with the home/international economy), not ASEAN (table 3). This explains the focus in our study on *local* supplier-foreign affiliate linkages (regional linkages are less common and patchy).

Table 3. Local and ASEAN share of Inputs and Outputs by Host Country (sample companies)
(Percentage)

	Origin			Destination		
	Local	ASEAN	Other	Local	ASEAN	Other
Malaysia	35	8	57	29	7	64
Thailand	35	1	64	26	13	61
Viet Nam	20	23	57	40	2	58
Cambodia	0	18	82	0	0	100

Source: authors’ survey.

Finally, however, there are now significant new pressures for ASEAN governments to promote *regional* FDI-related activities, including linkages. There are three main reasons for these pressures. (i) The dynamics of development in the region has meant that South-East Asia is no longer simply a supply base, but increasingly a significant market (the population is over 500 million and some 30 years of growth has created a large consumer base), which has led to the creation of the ASEAN Free Trade Agreement (AFTA) to reduce barriers to trade across the region (Wee and Mirza, 2004). (ii) Since the early 1980s, FDI stock in ASEAN, though rising in absolute terms, has slipped as a share of inward FDI stock in developing countries (table 2). (iii) Perhaps most critically from the

perspective of supplier-foreign affiliate linkages, the pressure of global competition – especially in industries such as electronics, automobiles and garments – has fostered new TNC supply strategies relying on outsourcing, global contract manufacturing and global suppliers. In this context, ASEAN suppliers increasingly have to adopt – at the very least – a regional perspective. These forms of pressure towards regional-level FDI activities/linkages underlie our discussion of future policies in ASEAN towards supplier-foreign affiliate linkages.

3. Theoretical literature and hypotheses

The theoretical concepts covered in this section are mainly related to the TNC. Some concepts related to host country economic development are also added, with a focus on developing host economies.

Theoretical concepts and vertical linkages

The core theoretical discussion behind the creation of a TNC's vertical linkage is the understanding of the complex decision-making behind the production process internal to the firm on a global, regional and local basis, and the decisions being made regarding sourcing. The debate revolves around global logistics within TNCs and the internal flow of intermediate products, parts and components between plants, as well as individual firms' external purchasing behaviour within host economies and from overseas. Depending on the extent of coordination and integration of production facilities worldwide, foreign affiliates can purchase inputs internally (that is the manufacturing of inputs is performed by the parent firm, the foreign affiliate itself, or by sister affiliates) or externally (either through import or by sourcing from locally-owned firms or foreign firms established in the host economy). This initial decision for a firm is referred to as the "make or buy" decision. The decision to make or buy rests on the production and transaction costs involved. Transaction cost theory, which originates from the work of Coase (1937), is useful in explaining institutional arrangements, and particularly why production is

not carried out entirely in the principal firm. The decision to make or buy will depend upon various transaction characteristics between economic partners (Williamson, 1991), as well as asset-specificity and potential additional investment conducted by either the buyer or the supplier depending on the requirements of the transaction (Joshi and Stump, 1999). Companies nowadays tend to concentrate on their core capabilities and therefore purchase an increasing amount of component parts and services externally (Casson, 2000; Krause *et al.*, 2000); this has led companies, national or multinational, to increased dependence on their supply system and greater vertical linkages. Concepts derived from transaction cost theory are incorporated in some TNCs theories, such as the internalization theory (Buckley and Casson, 1976) or the OLI paradigm (Dunning, 1993). These theories led to the notion of proprietary assets or ownership advantages of the TNC, whether they be at the parent level or increasingly at the foreign affiliate level (Bartlett and Ghoshal, 1998; Birkinshaw and Hagström, 2000; Andersson *et al.*, 2002). The foreign affiliate is the unit of analysis in this paper, and its specific place and role within the multinational network needs to be considered because it influences the type of activities the foreign affiliate conducts within host economies and affects the related development of local supply linkages.

Foreign affiliates and their place within the TNC

Supply patterns by foreign affiliates in host economies depend on the existing international, regional and national succession of production processes of the TNC. International business researchers have suggested that, as they internationalize, TNCs assign specific strategic roles to their foreign affiliates (see, for instance, Pralahad and Doz, 1987; Ghoshal and Bartlett, 1990; Forsgren and Pahlberg, 1992; Birkinshaw, 1997). The greater the autonomy exercised by the affiliate, the more likely it is to try and identify local suppliers and create relationships with them (UNCTAD, 2001, p. 137; Eberhardt *et al.*, 2004). Among foreign affiliates in Europe, Tavares and Young (2002) found a positive significant relationship between input's import propensity and foreign

affiliate' roles. In the case of ASEAN, where host developing economies are predominantly used for pure manufacturing purposes and many of the companies in our sample have only recently been set up, we distinguish between pure "manufacturing platforms" and foreign affiliates that have been allocated a strategic role by the parent company, such as R&D or marketing responsibilities.

Hypothesis 1: The strategic role of the foreign affiliate is positively related to the degree of local supply linkages.

Foreign affiliates gain some autonomy over time, or when assigned a specific role by the parent company. Time is thus an important factor inasmuch as foreign affiliates become more familiar with the environment in which they operate and tend to rely less on their parent firm's network of suppliers. Existing empirical analyses have focused on the age of the foreign affiliate, as a proxy for the level of embeddedness in the host economy. Studies have found that the longer the foreign affiliate has been established in the host economy, the higher the level of local supply linkages becomes (McAleese and McDonald, 1978; Driffield and Noor, 1999; Görg and Ruane, 2001). Or, measured by input import propensity, the age of the foreign affiliate is negatively associated with import propensity (Tavares and Young, 2002).

Hypothesis 2: The age of the foreign affiliate is positively related to the degree of its local supply linkages.

It has been reported that foreign ownership is related to the supply linkages of foreign affiliates (Belderbos *et al.*, 2001; UNCTAD, 2001; Smarzynska Javorcik and Spatareanu, 2003; Chen *et al.*, 2004). However, one must note that regardless of the entry mode of foreign firms, relationships and linkages created by foreign firms do not necessarily lead to an increase in the productivity of suppliers (Smarzinska Javorcik, 2004). Studies that have used firm-level data have not found any conclusive relationships. Driffield and Noor (1999) and Eberhardt *et al.* (2004) find no relationship between "joint ventures" and local supply linkages, and Tavares and Young

(2002) find no relationship between the foreign affiliate being a greenfield venture and the input's import propensity. Because we adopt a firm-level methodology, we expect no relationship between entry mode and local vertical linkages.

Hypothesis 3: The mode of entry strategy is unrelated to the level of local supply linkages.

In the South-East Asian context, many foreign affiliates have been established as manufacturing platforms to export products to the European, North American and Japanese markets. Studies have found that local market-orientation leads to variations in the level of local content and subsequent relations with host suppliers (Pangestu *et al.*, 1992; Supapol, 1995). Export-oriented firms will tend to purchase less locally in developing countries (Belderbos *et al.*, 2001; UNCTAD, 2001), even though they show a tendency to have closer relationships with existing local suppliers (Giroud, 2003), and have been shown to provide greater productivity benefits (Smarzynska Javorcik, 2004). Thus, we expect that foreign affiliate that are manufacturing for the local market will show higher propensity to purchase inputs locally.

Hypothesis 4: The share of local sales is positively related to the degree of local supply linkages.

Some studies have indicated that the size of the foreign affiliate may affect sourcing and linkages (UNCTAD, 2001, p. 138; Chen *et al.*, 2004), while others found no significant relationship (Driffield and Noor, 1999; Tavares and Young, 2002). This leads us to suggest that there is no relationship between the size of the operation and the degree of supply linkages.

Hypothesis 5: The size of the foreign affiliate is unrelated to the degree of local supply linkages.

The factors discussed above are related to the foreign affiliate itself, its role and place within the parent firm's multinational network, its level of embeddedness within the host

economy and its key characteristics, such as the mode of entry, market orientation and size. Having considered factors that are likely to influence local vertical linkages internal to the firm, we now address key factors concerning the business environment that might also impact upon linkages.

Key business environment factors

Industry characteristics

The industry in which the foreign firm is operating influences the level of vertical supply linkages. In this paper, we focus on the manufacturing sector, and more specifically on the electrical/electronics and textiles/garments industries. Within the manufacturing sector, the textiles and clothing industry shows a relatively low level of local linkages (UNCTAD, 2001, p. 139). In selected European countries, Tavares and Young (2002) also found that foreign affiliates in the textiles, clothing and footwear industry have a strong propensity to import inputs, with few local supply linkages being created. Both the textile and garment industries have a global dimension, and are geographically dispersed and highly trade dependent. The garments industry differs inasmuch as distributors have a key role in the determination of the production and the type of fabric being used. The production chain in this industry is foreign *buyer-driven* (Dicken, 2003, p. 319), which does not facilitate the generation of local supply linkages because buyers in developed markets are not inclined to select suppliers in the host developing country. Within the electrical and electronics industry, the level of local purchasing may be limited in developing countries, but there is an extensive scope for linkage creation between foreign affiliates and local suppliers (Halbach, 1989; Dobson, 1993; Rasiah, 1995; Supapol, 1995; Giroud, 2003). TNCs in the electronics industry in South-East Asia manufacture electronic components (active and passive) as well as electronic equipments and consumer electronics. The electronics industry is dominated by foreign affiliates, which creates opportunities for firms to purchase inputs from other

foreign affiliates in the host country, as well as from purely indigenous firms. Thus,

Hypothesis 6: The degree of local supply linkages differs according to the industry in which the foreign affiliate is operating.

Hypothesis 6a: Firms with activities in the electrical and electronics industry are more likely to develop local supply linkages.

Hypothesis 6b: Firms with activities in the textiles and garments industry are less likely to develop local supply linkages.

Host countries and vertical linkages

The analysis in Lall (1993) points towards some specificities of host economies in explaining the propensity of foreign firms to purchase local inputs. The level of development of the host economy plays a central part in explaining local linkages, particularly as the local supply industry depends upon and reflects the economic environment of the host. Numerous studies have analysed the relationship between TNCs' activities and their impact on host countries' development trajectories (Hood and Young, 2000; Lall and Narula, 2004). Within a region such as ASEAN, the local supplier industry, or the related and supporting industries (as described by Porter, 1990), may be strongly related to the presence of companies in other countries in the region as well as within a particular host economy. The four countries under study in this paper are all developing economies, but are at differing levels of economic development, as discussed in section 2. They also show varying degrees of experience with FDI. The experience of Malaysia and Thailand in hosting substantial amounts of FDI started well before Cambodia and Viet Nam. Cambodia and Viet Nam are also at a much lower level of economic development (Yusuf *et al.*, 2004). Finally, there is a distinction in terms of government policies, with more favourable environments in the case of Thailand and Malaysia than for Viet Nam and Cambodia. Taking these three host-country related issues into consideration, we postulate that:

Hypothesis 7: Foreign affiliates' degree of local supply linkages differs depending on the level of development of the host economy.

Hypothesis 7a: Foreign affiliates in Malaysia and Thailand will exhibit a higher degree of local supply linkages than those in Cambodia and Viet Nam.

Origin of the parent company

Previous studies have not indicated a strong country of origin effect when explaining input behaviour (Driffield and Noor, 1999; Belderbos *et al.*, 2001; Tavares and Young, 2002). Studies that find a relationship between the origin of the parent company and the degree of local supply linkages (for example, Javorcik and Spataraneu (2004) who looked at United States, European and Asian firms in Romania) are based on broad measures of “spillover”, such as productivity gains using panel data, rather than specifically analysing input linkages. Hence, we do not find sufficient support in the literature for the hypothesis that levels of local supply vary depending on the country of origin of the parent firm. However, the nature of our sample and the regional perspective of this study suggest that this hypothesis might be useful for differentiating between companies originating from the region itself as opposed to those from outside the region.

Hypothesis 8: The country of origin is unrelated to the degree of local supply linkages.

4. Methodology

This analysis is based on the results of a survey of TNCs located in four ASEAN countries, namely Cambodia, Malaysia, Thailand and Viet Nam; and in two industries, the electrical and electronics and the textiles and garments industries. These four countries were chosen to reflect differences in the level of economic development, differences in the experience of each country in hosting TNCs, and the level of embeddedness in the

local economy of foreign firms. Information was collected by means of face-to-face interviews with either managing directors and/or other key top managers at foreign affiliates in each of the four countries mentioned, using a semi-structured questionnaire. A preliminary list of companies was compiled by the researchers, taking into account the origins of firms. Researchers were careful to select companies that reflected the population of foreign firms in each host country, which is a mix of firms from East Asia, Europe, Japan and the United States, as well as investors from neighbouring countries (particularly in the case of Cambodia). As such, the sample is representative of foreign investment in the host countries and the profile of companies interviewed reflects the structure and origin of foreign investors. Initial contacts with firms were organized in collaboration with the respective Board of Investments in host economies. In the case of Cambodia, additional support was received from the Garment Manufacturers' Association of Cambodia (GMAC) for contacting targeted companies. Local collaborators were key to organizing the interviews. A total of 85 firms reflecting the foreign investors' population were interviewed during the fourth quarter of 2001 and throughout 2002. Given the nature of the data collection method through in-depth interviews, the sample size of 85 firms is large and comparable to or larger than similar studies (see, for example, Crone and Roper, 2001; Driffield and Noor, 1999).

Table 4 presents descriptive statistics related to the variables under study. The average age of foreign affiliates is just over 13 years, although clearly, this varies considerably depending on various factors. The length of operation of the foreign affiliates indicates that these firms are well-established in their host economies and have invested long term. Considering the fact that firms have been in operation, on average, for over a decade, the low average share of local suppliers is somewhat surprising: only a little over a quarter of total supplies are purchased from the host economy. Details on local supply linkages are provided in appendix 1. The average levels of local supply are the highest in Malaysia and Thailand and non-existent in Cambodia, where firms in the garment industry import all

materials used in the manufacturing process. The average degree of local supply linkage is similar in the electrical and electronics industry, as well as the textiles industry. There is, however, a marked difference in the case of the share of local supply linkages in the garment industry as a whole, primarily owing to the fact that most firms in this industry (in our sample) are located in Cambodia, where purchase of material locally is nil. Firms originating from neighbouring ASEAN countries show the lowest degree of local supply linkages. This is partly because

Table 4. Descriptive statistics

	Mean	Standard deviation	Number of positive
Dependent variable			
Share of supplies bought on the local market	26.79%	25.57%	
Independent variables			
Subsidiary characteristics			
Strategic role			39 (45.9%)
Age	12.92	9.44	
Entry mode			
<i>Greenfield venture</i>			57 (67.9%)
<i>Joint venture</i>			31 (36.5%)
Share of local sales	27.25%	36.81%	
Size (Number of employees)	1696	2720.11	
Industry			
<i>Consumer Electronics</i>			20 (23.5%)
<i>Electronics</i>			37 (43.5%)
<i>Textiles</i>			5 (5.9%)
<i>Garments</i>			23 (27.1%)
Host country			
<i>Cambodia</i>			11 (12.9%)
<i>Malaysia</i>			27 (31.8%)
<i>Thailand</i>			25 (29.4%)
<i>Viet Nam</i>			22 (25.9%)
Home country			
<i>Japan</i>			26 (30.6%)
<i>United States</i>			11 (12.9%)
<i>Europe</i>			10 (11.8%)
<i>3 NIEs</i>			25 (29.4%)
<i>ASEAN</i>			7 (8.2%)
<i>Other</i>			6 (7.1%)

Source: authors' calculations.

half of the ASEAN-originated firms in our sample are located in Cambodia and because a third of them import more than 80 percent of their supply from their parent company (which is located nearby). Firms in the sample have a very large average size, with 1,600 employees on average, which reflects both the labour-intensive nature of the activities and the scale of investments (especially in Malaysia and Thailand).

Operationalization of variables

A key strength of this study is the level of details related to individual firms' characteristics and local supply linkages. The dependent variable is the share of inputs purchased locally in the host economy and is expressed in percentage terms.

Table 5 describes the key variables to be tested and the expected sign of their relationship with local supply linkages (the results are also summarized in this table); relationships are then tested using linear multiple regression models. A correlation analysis showed no evidence of multicollinearity between independent variables. Independent variables are divided into four groups. First, we consider the foreign affiliates' characteristics. Managers discussed with the researchers the roles assigned to the affiliate by parent companies, and the significance and breadth of their functional activities. Sample firms are separated into two categories; one comprises affiliates for which the sole function is manufacturing, and the other comprises affiliates performing other strategic roles also (such as engaging in marketing or R&D activities). The second independent variable is represented by the age of the affiliate, indicating the length of operation, which is adopted as a proxy for the likely level of **embeddedness** in the local economy. The **entry strategy** is assessed with two dummy variables; one of them takes the value "1" if the affiliate is a joint venture, and the other if it is a greenfield operation. The **market-orientation** of the affiliate is evaluated by the share of the output sold in the local market, as opposed to being exported to other markets. The **size** of the foreign affiliate is represented by the number of employees of the affiliate in the host country. In the second

Table 5. Description of variables and Summary of Findings

Variables under study	Type	Description	Expected Sign of Relationship	Findings (Hypothesis Confirmed)
Dependent variable:	C	share of overall supply purchased in the host economy		
Subsidiary Characteristics				
Strategic role (H1)	D	1 = subsidiary is not solely a production plant; has some strategic roles in one or more functional areas	+	Confirmed
Age (H2)	C	number of years the subsidiary has been in operation in the host economy	+	Confirmed
Entry mode (H3)				
Greenfield venture	D	1 = investment is greenfield; 0 = otherwise	(none expected)	Confirmed
Joint venture	D	1 = subsidiary is a joint venture; 0 = otherwise	(none expected)	Confirmed
Local sales (H4)	C	share of total output sold on the local market	+	Not Confirmed
Size (Number of employees) (H5)	C	total number of employees at the subsidiary	(none expected)	Confirmed
Industry (H6)				
Consumer Electronics	D	1 = subsidiary is part of the consumer electronics industry; 0 = otherwise	+	Confirmed
Other Electronics	D	1 = subsidiary is part of the other electronics industry; 0 = otherwise	+	Not Confirmed
Textiles	D	1 = subsidiary is part of the textiles industry; 0 = otherwise	-	Not Confirmed
Garments	D	1 = subsidiary is part of the garments industry; 0 = otherwise	-	Confirmed
Host country (H6)				Inconclusive
Cambodia	D	1 = host economy; 0 = otherwise	-	
Malaysia	D	1 = host economy; 0 = otherwise	+	
Thailand	D	1 = host economy; 0 = otherwise	+	
Viet Nam	D	1 = host economy; 0 = otherwise	-	
Home country (H7)				
Japan	D	1 = parent from Japan; 0 = otherwise	(none expected)	Confirmed
United States	D	1 = parent from the United States; 0 = otherwise	(none expected)	Confirmed
Europe	D	1 = parent from Europe; 0 = otherwise	(none expected)	Confirmed
ASEAN	D	1 = parent from ASEAN; 0 = otherwise	(none expected)	Relationship
Other	D	1 = parent from 'other'; 0 = otherwise	(none expected)	Confirmed

Source: authors' calculations

Notes: D = Discrete. Dummy variables represent a single category of a non-metric variable. C = Continuous

group, that is business environment factors, we consider the **industry** in which the foreign firm is operating. This is indicated by a series of dummy variables, depending on whether the firm is part of a particular industry or not. The four categories include *Consumer Electronics*, *Other Electronics*, *Textiles* and *Garments*. Similarly, four dummy variables are used for each **host country** under study. Finally, the **home country** aspect is included by using dummy variables for each major country or region.

5. Results, findings and discussion

The results of the five models explaining the levels of local supply linkages are presented in table 6. We focus on parsimonious models, using stepwise selection. The regression models provide statistical evidence for the relationships between the local supply linkages and the series of factors presented in the framework developed earlier. All regression models are significant. There is a strong theoretical justification behind the order in which variables were entered into the model, with firm characteristics identified as the major explanatory factors explaining the degree of local supply linkages. Regression 1 tests the hypothesis linking the role of the foreign affiliate and its age to local supply linkages. Both independent variables have statistically significant coefficients with the expected signs. In a second step, the remaining independent variables related to the affiliates' characteristics were entered in the regression, but were not found to be significant and are left out of the model. In regression 2, the *Consumer Electronics* variable is added to the model. It is significant and positively related to local supply linkages. The categories *Other Electronics* and *Textiles* were not identified as significantly related to the dependent variable. However, regression 3 shows the significance of *Garment* with a negative sign (as expected). In regression 4, the host country variables were tested. This parsimonious model highlights *Cambodia* as the sole host country significantly and negatively related to local supply linkages. Finally, regression 5 tests the relationship between the TNC's home country and the dependent variable. Only firms originating from *ASEAN* are significantly

Table 6. Linear Regression Models

	Reg. 1	Reg. 2	Reg. 3	Reg. 4	Reg. 5
Subsidiary characteristics					
Strategic role	.295*** (15.072)	.288*** (14.724)	.254** (12.987)	.270*** (13.800)	.309*** (15.779)
Experience in host economy	.349*** (.943)	.367*** (.994)	.275*** (.744)	.279*** (.755)	.299*** (.807)
Mode of entry					
Sales on the local market					
Size of the subsidiary					
Industry					
Consumer electronics		198*** (11.754)			
Other electronics					
Textiles					
Garments			-.242** (-13.958)		
Host economy					
Cambodia				-.256*** (-20.012)	
Malaysia					
Thailand					
Viet Nam					
Home economy					
United States					
Japan					
Europe					
ASEAN					-.195*** (-17.872)
Others					
Model statistics					
Adj. R-sq.	.255	.286	.298	.307	.283
F-value	15.059***	11.959***	12.581***	13.125***	11.799***

Source: authors' calculations

Notes: Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$, all two-tailed tests. Values for the independent variables are standardized beta coefficients. The intercept was insignificant in all models. All models were re-run without the intercept, the results in terms of significance levels remained similar to those presented in the models above.

related to the degree of local supply linkages, and negatively so, as expected. In the parsimonious models presented, only the significant variables were added to the equation, leaving out unnecessary dummy variables. We found some evidence of heteroscedasticity, which is to be expected with small sample sizes. This does not negate the core relationships highlighted. Given the nature of our study, our models are valid and point to existing relationships that were not previously shown in the literature. While we cannot correct for the number of cases, we acknowledge the need for caution in the discussion of results.

The series of regression models presented in table 6 enable us to test the hypotheses linking various explanatory factors to local supply linkages.

With hypothesis 1, we investigated the link between local supply linkages and the type of foreign affiliate and its integration within the TNC. All regression models indicate a strongly significant and positive relationship between the role played by foreign affiliates and local supply linkages. These results are particularly noteworthy, because they enhance the knowledge and understanding of local supply linkages, as previous studies have not paid sufficient attention to the strategic role played by the foreign affiliates and local supply linkages. The length of time a foreign affiliate has been established in the host economy, and hence the degree of embeddedness of the firm, is strongly and positively related to the degree of local input linkages. Hypothesis 2 is confirmed: the older the foreign affiliate, the larger the share of local input sourced within the host economy. Our results are consistent with previous studies (McAleese and McDonald, 1978; Driffield and Noor, 1999; Tavares and Young, 2002). *Age* is a key factor explaining local supply linkages and may also reflect the natural development of supply capabilities as industrial development takes place in host countries.

Confirming results obtained in earlier studies, we find no significant relationship between the entry strategy and local supply linkages. Hypothesis 3 is confirmed, supporting the results obtained by Driffield and Noor (1999) and Tavares and Young (2002).

We find no relationship between the local market-orientation and the level of supply linkages; thus hypothesis 4 is not confirmed. Having said this, our sample consists of a set of companies that are predominantly engaged in manufacturing for export markets, with 40% of firms having no local sales at all in host economies, and only 40% of the firms exporting less than 90% of their production. There is therefore a great bias towards export-orientated firms in our sample, which may, therefore, not be appropriate for testing this relationship.

Hypothesis 5 is confirmed, in line with results from previous studies, and we find no relationship between the size of the firm and the degree of local supply linkages.

Hypothesis 6 is partly supported. The findings were significant for two industry categories. *Consumer Electronics* exhibited a positive relationship: companies in this industry tended to display higher levels of local supply linkages. Contrariwise, there was a negative relationship between the relevant variables for companies in the garments industry; companies in this industry tended towards lower degrees of local supply linkages. This is in line with the literature. The consumer electronics industry is dominated by assembly plants, which are in a position to purchase inputs from other electronics manufacturers established in ASEAN. On the other hand, the garments industry in our sample is essentially composed of companies originating from East and South-East Asian home countries with foreign affiliates located in Cambodia (and, to a lesser extent, in Viet Nam), where the textiles industry necessary for the production of inputs is non-existent (though there are some textile plants in Viet Nam). Thus, the low levels of local supply linkages can be explained by the specificity of the industry in this part of the world. There is some evidence that local supply linkages differ according to the host economy, especially because of the existence of more autonomous foreign affiliates in Malaysia, Thailand and Viet Nam and of a more established supply base (especially in Malaysia and Thailand). Overall, this results in a strongly negative relationship in the case of Cambodia in regression 4, because all foreign affiliates are in the garments industry and there are no purchases of inputs from local suppliers. However, given the specific nature of the local environment in Cambodia, and the fact that no other significant difference has been found between Malaysia, Thailand and Viet Nam, it is impossible to confirm fully this hypothesis. While there is some indication that local supply linkages vary depending on the host economy, statistical support for this hypothesis is insufficient to fully confirm this among the four countries under study, with the exception of Cambodia.

Finally, we find little evidence that the degree of local supply linkages differ depending on the home country of the

foreign affiliate. Hypothesis 8 is confirmed. We do, however, find that companies originating from ASEAN have a negative relationship with the level of local supply linkages. These companies are strongly reliant on intra-firm imports of materials. On the one hand, this can be explained by the specific nature of the industry, as many of them are garment manufacturers that have relocated to Cambodia to take advantage of the availability of cheap labour, but still rely on existing suppliers, including their own factories in some cases. On the other hand, since companies from ASEAN are new international investors, they might well be expected to show high levels of reliance on their parent company. A similar tendency is identifiable, in a less pronounced manner, with companies originating from the three newly industrializing economies in the survey (Hong Kong (China), the Republic of Korea and Taiwan Province of China).

6. Policy implications: some global and regional dimensions

Overall, three key groups of variables were confirmed in our findings above to explain the degree of local supply linkages in the ASEAN countries analysed in this study. We acknowledge the small sample size and the tentative nature of this policy discussion. The argumentation points to key areas that need to be addressed and studied further by policy makers and researchers.

The first set of confirmed explanatory variables were two particular characteristics of the affiliates themselves: first, the existence of a specific strategic role played by the foreign affiliate, indicating a level of independence or autonomy from the parent company in terms of decision-making power; and secondly, the age of the foreign affiliate, which represents the level of embeddedness of the foreign firm in the local economy, and the consequent level of relationships established with local actors in the economy such as customers and, especially, suppliers. The second group of variables found to be significant were the industries in which companies operate; these are critical to the levels of local supply linkages (in the case of this study, electronics firms display a much higher propensity to utilize local suppliers than those in the garment industry). Finally, albeit with strong support for only one country (Cambodia), the

analysis finds that some differences in supply linkages occur depending on the level of development of the host economy and the local supporting industry. Our results for the third explanatory factor are case specific, but still underline the necessity for the host economy to develop a solid support industry if it wishes to benefit fully from the presence of foreign affiliates.

A number of policy implications for governments can be drawn from the above findings, especially because the local sourcing of inputs is still at a quite low level in the surveyed host countries.

Policy Implications of the Findings on Firm Age and Strategic Orientation

Inasmuch as the *age of foreign affiliates* (consequently experience, embeddedness etc.) is important in determining the degree of supply chain linkages between foreign affiliates and local firms, section 2 indicated that ASEAN countries – including some of those in this study – are fortunate to have hosted considerable numbers of TNCs for some time (indeed very few major TNCs are *not* represented in the region as a whole). This is especially important for older ASEAN member countries (e.g. Malaysia and Thailand) that have witnessed an increase in reinvested earnings rather than new capital inflows. We suggest that:

1. Malaysia and Thailand can improve existing policies aimed at encouraging supply linkages. Governments ought to do more in terms of providing support to the development of existing SMEs, particularly in the electronics industry, and in providing additional financial incentives for *existing* TNCs to source a greater proportion of their input locally.
2. This policy advice should also apply at the regional level, with ASEAN governments acting in concert to promote cross-ASEAN supplier-foreign affiliate linkages (within the framework of the ASEAN Investment Area).

Within a wider Asian context, despite the relative ascendancy of China, ASEAN countries remain an integral part

of a globally orientated production system that stretches across East Asia; their role in this system may well increase in the near future because of TNCs' changing *strategic orientation*. There are two reasons for this: (a) TNCs, having initially shifted operations to or consolidated in China, are now reassessing their over-dependence on that economy and are moving some production back to ASEAN (JBIC, 2004); and (b) the pursuit of the ASEAN plus 3 concept (i.e. ASEAN is currently negotiating free trade agreements with China, the Republic of Korea and Japan) (ASEAN Secretariat, 2004) will affect the strategic stance of TNCs towards ASEAN *vis-à-vis* other parts of East Asia. Hence:

3. ASEAN governments can consider the benefits of facilitating supply not only within ASEAN but within the East Asian production system as a whole.

This would not only favour the economic integration of regional economies, but would also have the advantage of further strengthening the competitiveness of TNCs established in ASEAN countries (including ASEAN TNCs). Given the results of our model (e.g. firms that have operated in these countries for some time generate higher linkages) and considering the current trends in FDI inflows especially in Malaysia and Thailand:

4. Both countries should pay more attention to retaining and expanding the activities of existing investors, as opposed to focusing (as is the current orientation of many ASEAN governments) almost exclusively on promoting inflows of new capital and investors.

Our results indicate that foreign affiliates benefiting from some level of autonomy in their activities show higher levels of linkages. Therefore:

5. Governments increasingly need to develop flexible policies encouraging TNCs with significant strategic roles in their economies, rather than only adopting policies applicable to all TNCs.

Policy Implications of the Findings on Industry and Host Country

If ASEAN governments are to build on the strategic orientation of foreign affiliates in order to expand the degree of supply linkages, they need to assess the influence of particular attributes or characteristics these foreign affiliates might possess. For example, our findings suggest that foreign affiliates producing consumer electronics are more likely to develop a high degree of linkages with local suppliers.

6. Industry characteristics are important and the existence of such types of foreign affiliates should be recognized. Furthermore, certain types of electronics firms with crucial regional-global strategic orientations have a significant presence in the region.

Within the electronics industry, governments can enhance or develop policies that maintain or increase the presence of major global contract manufacturers because such companies offer indigenous suppliers considerable opportunities to develop or enhance the skills and competencies needed to participate in the global economy, directly or indirectly. The textiles industry might also be essential (to supply the garments industry), but few supply linkages are generated by this industry because of its high capital intensity; again, any policies supporting the retention of this industry have to be made on grounds other than the generation of *local* supply linkages.

Finally, the confirmatory result on Cambodia strongly underscores the fact that linkages with suppliers depend heavily on economic development (hence education, infrastructure etc.) and the development of supporting industries. This has implications for Malaysia and Thailand as well as Cambodia and Viet Nam, because in the highly competitive global environment, an ongoing upgrading of a country's assets is essential. In the wider ASEAN setting, the development of "sub-regions", such as the poorer "CLMV" (Cambodia, Laos, Myanmar and Viet Nam) region of Indochina, is important for countries such as Malaysia and Thailand because this supports

the development of the ASEAN division of labour (e.g. firms in Viet Nam supplying foreign affiliates in Thailand).

7. Conclusions

The sourcing patterns of TNCs are receiving increasing attention in the academic literature. This aspect is currently under-studied and there is a considerable need to understand fully the sourcing behaviour of foreign firms in host economies, particularly host developing economies where spillovers to locally-owned suppliers can be an important means for these countries to gain competitive advantage. This paper further builds on findings on firm characteristics by advocating a series of policies designed to enhance supplier-foreign affiliate linkages.

One of the strengths of our analysis is the uniqueness of the data collected and the level of detail of the information presented. Other studies on supply linkages usually address the issue from a macro-economic perspective, but are not in a position to fully assess crucial firm-level factors in the understanding of local supply linkages. This is the first cross-country analysis in ASEAN of supply linkages, and the results presented in this paper are a useful basis for the development of government strategies towards foreign affiliate-local supplier linkages. The critical issues to be addressed by governments in the region when formulating and implementing policies towards TNCs and linkages generation are the level of local embeddedness of foreign affiliates, the strategic roles played by these affiliates, and the industry concerned. Governments also need to refine their policies to distinguish between new and existing investors, as well as the extent and breadth of supply linkages established by TNCs.

In future research, scholars will need to consider the competitive pressures and changes in the international institutional architecture. This article has pointed to the role of firms' strategies and foreign affiliates' roles in the determination of linkages in host economies. This will need to be further studied at the firm level and ought to include more precise

accounts of foreign affiliates, and their place within the broader TNC's global network. In addition, as TNCs develop new global supply strategies predicated on "deverticalization", with the increase in *outsourcing* of some manufacturing and distribution operations, concepts of global contract manufacturing and global suppliers must also be considered carefully in host government policies aimed at increasing the degree of linkages between foreign companies and local suppliers, especially indigenous ones.

Finally, there is some truth in the assertion that, until recently, ASEAN developed as a region, but without significant *cross-regional development*. The future of *local* supplier-foreign affiliate linkages will increasingly depend on pursuing *regional* options across both ASEAN and the broader East Asian region. From an ASEAN government perspective, these issues can be partly addressed by a significant move from policies promoting national export-orientated manufacturing to those encouraging the establishment of regional-global production-supply platforms. The existence of a diverse regional division of labour in South-East Asia, as well as a burgeoning ASEAN policy framework, bodes well for the creation of a potential, full-scale, regionally orientated production system. ■

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Appendix 1

Table A1. Number of subsidiaries by host and home countries
(Frequency)

Host economy	Malaysia	Thailand	Viet Nam	Cambodia	Total	Share (%)
Home country						
Japan	10	9	7	0	26	30.5
United States	7	2	1	1	11	12.9
Europe	5	2	3	0	10	11.7
3 NIEs	4	8	8	5	25	29.4
ASEAN	0	0	3	4	7	8.2
Others	1	4	0	1	6	7.0
Industry						
Consumer Electronics	7	5	8	0	20	23.5
Other Electronics	18	16	3	0	37	43.5
Textiles	1	1	3	0	5	5.8
Garments	1	3	8	11	23	27.0
Total	27	25	22	11	85	100

Source: authors' calculations.

Table A2. Average share of inputs purchased locally: host country by home countries and industry
(Percentages)

Host country	Malaysia	Thailand	Viet Nam	Cambodia	Total
Home country					
Japan	37.1	49.8	12.0	0	34.1
United States	38.5	20.0	60.0	0	37.0
Europe	15.0	25.0	15.0	0	17.0
3 NIEs	40.0	21.8	28.7	0	22.6
ASEAN	0	0	10.0	0	4.2
Others	60	43.7	0	0	39.1
Industry					
Consumer Electronics	34.4	39.6	31.1	N/A	34.4
Other Electronics	32.5	36.7	8.3	N/A	32.3
Textiles	90.0	50.0	8.3	N/A	33.0
Garments	20.0	13.3	18.8	0.0	9.5
Total	34.7	35.0	20.4	0.0	26.8

Source: authors' calculations

Note: The three NIEs (newly industrializing economies) are Hong Kong (China), the Republic of Korea and Taiwan Province of China.