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Transnational Corporations

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Contents

Foreign direct investment, competitiveness and technology
Editor's introduction

When we were compiling the articles and the research note of this issue of *Transnational Corporations*, we realized that the materials dealt with the same topic: the interaction of foreign direct investment (FDI) with competitiveness and technology. Hence we can offer our readers a panorama of key issues, analyzed by eminent scholars.

The convergence of topics in the three articles and the Overview of the *World Investment Report 2002* is not an accident. Leading scholars are closely following the most important emerging patterns of the world economy and the challenges they raise. And there is no doubt that under a scenario of heightened international competition among firms and intensifying competition among locations for investment projects, the question of how success can be attained and maintained is of crucial importance.

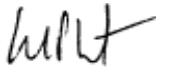
The first article, written by John H. Dunning and Alison McKaig-Berliner, analyzes the competitiveness question from a firm perspective, and in one services industry (professional business services). Given the growing importance of services in economic activities and their increasing tradability, it is timely to carry out an empirical enquiry on how these developments affect the sources of competitiveness. The authors carried out an original field study into the sources of competitiveness of 96 professional business service firms. Among its most significant findings, the article shows that the propensity of firms to access competitive advantages from foreign locations is positively related to the degree of transnationality, and varies according to the country of origin and form of FDI.

In the second article, Sanjaya Lall investigates the sources of competitiveness for developing locations and the role Governments can play in enhancing such competitiveness. The article addresses the competitiveness question from the point of view of the role of FDI in technology transfer and learning. It highlights the important role that FDI can play in the transfer of technology, but emphasizes that technology transfer should be maximized and complemented by appropriate country policies. It presents the success achieved by South-East Asian economies as a benchmark for economic and policy analysis. Lall concludes that there is no single path to competitive success; there are rather diverse paths followed by different countries.

The third article, by Rajah Rasiah, provides further details on how government policies can (or can not) enhance competitiveness. The relevance of his analysis comes from the fact that he contrasts the cases of two locations within the same country (Malaysia): that of Penang (a success story) with Klang Valley (a less successful case). This underlines the importance of sub-national entities in providing the right type of assistance to competitiveness. The author focuses on the development of human capital through formal education and learning by doing in both locations. Different systemic coordination at the local level has produced different levels of network synergies in Penang and Klang Valley. Stronger systemic coordination and network cohesion stimulated greater differentiation and division of labour in Penang, while weak systemic coordination and network cohesion confined transnational corporations to largely truncated operations without significant levels of differentiation and division of labour in Klang Valley.

The Overview of the *World Investment Report 2002* provides a wide range of background information for the reader, in order to contribute to a full picture of the current dynamics of the world economy. It examines the downturn of FDI in 2001 – the first in ten years – mainly due to a slowdown of world economic growth and a decrease in cross-border mergers and acquisitions, as well as its implications for both firms and host economies. Furthermore, it focuses on FDI and export competitiveness, both from the point of view of evolving corporate strategies and the changing global landscape of production. Based on an analysis of recent trends in international trade, it identifies the countries and products in which TNCs have driven export performance and describes the most relevant corporate strategies behind these patterns. It also presents policy options available for developing countries to attract and upgrade export-oriented FDI.

As for the standard features of *Transnational Corporations*, this issue contains not just six book reviews on volumes that all deal with related firm-level or host-location related competitiveness issues, the traditional list of UNCTAD publications, information on UNCTAD's recent press materials and books received, but also the consolidated indices of all materials published in *Transnational Corporations* so far. We hope those indices will help the reader in finding relevant reading in the wealth of materials we have produced over the past 11 years.



Karl P. Sauvant
Editor

The geographical sources of competitiveness: the professional business service industry

John H. Dunning and Alison McKaig-Berliner *

This article presents the results of an original field study into the geographical sources of competitiveness of some 96 professional business service firms. Among its more significant findings, it shows that the propensity of firms to access competitive advantages from a foreign location is positively related to their degree of transnationality, and varies according to their country of origin and form of overseas involvement.

Key words: business strategy, competitiveness, knowledge capital, policy, professional business services, transnationality

Introduction

In the December 1996 issue of *Transnational Corporations*, one of the authors of this article summarized the results of a field survey into the geographical sources of competitiveness of the world's largest industrial firms (Dunning, 1996). Based upon the opinions of the senior executives of some 144 such firms, that article found that a not insignificant part of their competitive advantages was obtained as a direct result of their foreign based activities; that an "overwhelming majority" of these executives – from all industries and countries[1] – believed that the importance of the foreign sourcing of these advantages had increased in the first half of the 1990s (Dunning, 1996, p. 27); and that foreign direct investment (FDI), followed by cross-border inter-firm cooperative agreement, was the favoured modality for acquiring those advantages.

* The authors are Emeritus Esmee Fairbairn Professor of International Investment and Business Studies, University of Reading, United Kingdom and Emeritus State of New Jersey Professor of International Business, Rutgers University, United States and Ph.D. graduate, Rutgers University, United States, respectively. The authors wish to thank three anonymous referees.

[1] As listed in the *Fortune* magazine, 25 July 1994.

The purpose of the present article is to set out the findings of a follow-up survey into the geographical sources of competitiveness of some 96 professional-business-service firms. The survey was conducted between November 1999 and May 2000. Some ten professional business service industries were chosen for examination.[2] These industries are identified in table 1, which also sets out the response rate to the questionnaires sent out to 448 professional-business-service firms.[3] As revealed by the table, the response rate (weighted by the size of the firms) varied between 8 per cent and 44 per cent around an average of 21 per cent. Apart from that obtained from two industries *viz.* information technology, investment and financial services, this is an acceptable response rate.

The characteristics of the sample

Further details of the sample firms are presented in tables 2-4. Particular note should be taken of the transnationality index (TI) set out in the final columns of the three tables. In table 2, an industry classification is offered, based upon the knowledge-capital intensity (KCI)[4] of the participating firms. The KCI ratio[5] was derived from information provided by the respondents; it is based on an average of (a) the percentage of skilled labour (up to first university degree or its equivalent) to the total labour force, (b) the extent of linkages between a firm and university and research institutions, and (c) the perception of the executives of the importance of knowledge related assets (relative to other assets) as a competitive advantage. The data suggest that 83.3 per cent of the sample firms, which accounted for 74.0 per cent of the global sales, classified themselves as of above

[2] Banking activities were deliberately excluded as these have been subject to extensive study by other researchers.

[3] The names of firms were obtained from professional trade associations and various directories. In each case, the largest professional-business-service firms were approached by way of mass mailings, e-mail, fax and personal contact. The exact number of firms contacted varied by industry between 25 and 83. For further details see table 1.

[4] The equivalent of the technology intensity measure identified in the manufacturing study.

[5] Full details of these and other calculations made in this article are contained in Alison McKaig-Berliner's Ph.D. thesis (McCaig-Berliner, 2001).

Table 1. The sample firms, 1999-2000

Industry	"Population": number of questionnaires sent (A)	"Sample": number of questionnaires returned (B)	Return rate (%) (B/A)	"Population": turnover ($ million) (C)	"Sample": turnover ($ million) (D)	Weighted return rate (%) (D/C)	Number of firms contacted
Accounting/auditing	40	8	20	76 227	22 865	30	Top 40, in terms of 1998 total revenues.
Advertising	50	8	16	26 760	6 330	24	Top 50, in terms of 1997 total revenues.
Architecture a	25	5	20	2 052	895	44	Top 25, in terms of 1997 international billings. [a]
Engineering a	83	27	33	11 670	3 670	31	Top 83, in terms of 1997 international billings. [a]
Information technology	45	2	4	202 769	29 648	15	Top 45, in terms of 1998 total revenues.
Investment & financial services	47	5	11	11 486 055	953 534	8	Top 47, in terms of 1998 "full credit to book, running manager only."
Law/legal firms [c]	50	17	34	37 317	14 324	38	Top 50, in terms of total number of lawyers employed for 1998.
Management consulting	50	8	16	44 400	9 666	22	Top 50, in terms of 1997 global consulting revenues.
Market research b	33	8	24	6 666	1 359	20	Top 30, in terms of 1997 total research revenues.
Reinsurance	25	8	32	69 054	12 878	19	Top 25, in terms of 1997 reinsurance premiums written.
Total	448	96	21			25	

Source: Authors' estimates, based on the results of the survey.

[a] Figures have been recalculated as total billings in 1997, for the purposes of industry analysis.

[b] The Market Research list of the world's top 25, in terms of 1997 total revenues. Two firms are tied for rank 26. Also, three of the top firms are listed as the sum of their affiliates. (Two are broken down into two firms each, and one is broken down into three firms.) This brings the total number of firms represented to 30. For mailing purposes, a survey was sent to each affiliate, as well as the three associated parent firms. Thus, the total number of surveys mailed is 33.)

[c] The weighted return rate for law firms is measured in terms of total number of lawyers employed.

average, or average, KCI.[6] They also show that, around an arithmetic mean of 35.4 per cent of global employment, the transnationality index – at 56.6 per cent – was highest for low KCI firms.[7] In most instances, the transnationality indeces were also similar for each of the three measures used.

Table 2. The industry composition of the sample, by the transnationality index, 1999-2000

Industry ranked by knowledge-capital intensity (KCI)	Number of sample firms	Sales ($ billion)	Sales (%)	Transnationality index (TI) (Percentage)		
				Foreign billings	Foreign labour force	Foreign skill-intensive employees
High KCI	23	53.83	21.34	31.42	31.35	39.48
Architecture	5	0.99	0.39	10.80	8.80	6.50
Information technology	2	33.80	13.40	5.10	4.05	5.20
Management consulting	8	16.91	6.71	54.14	49.43	59.57
Market research	8	2.12	0.84	31.01	36.44	43.75
Average KCI	57	132.71	52.62	31.97	31.40	36.13
Engineering design	27	4.16	1.65	36.30	34.29	35.77
Investment and finance	5	31.15	12.35	33.60	35.00	56.33
Legal services	17	6.49	2.57	18.18	20.48	30.13
Reinsurance	8	90.91	36.05	43.93	45.00	47.00
Low KCI	16	65.67	26.04	51.55	56.64	55.40
Accounting and auditing	8	26.72	10.60	68.71	75.00	65.33
Advertising	8	38.94	15.44	36.54	42.88	51.14
Total	96	252.21	100.00	35.00	35.36	39.60

Source: Authors' estimates, based on the results of the survey.

In table 3, some details about the regional and national origins of the sample firms are presented. As might be expected, the largest number (57.3 per cent of the total), originated from the United States and the United Kingdom. However, this was a considerably higher proportion than that in the case of the manufacturing survey (37.5 per cent), the main reason being the less significant participation of

[6] The corresponding figures for manufacturing firms were 60.4 per cent and 82.5 per cent, respectively.

[7] The corresponding figures for manufacturing firms were 41.8 per cent and 45.5 per cent, respectively.

both Japanese and smaller European firms in the professional business service industries. As in the previous survey, the transnationality index for two of the three measures identified was lowest in the case of the firms from the United States, Japan and developing countries; although one unexpected result was the considerably higher transnationality index in respect of (knowledge-intensive) employees recorded by professional-business-service firms from the United States and Japan.

Table 3. The composition of the sample, by the region or country of origin and the transnationality index, 1999-2000

Region/country	Number of sample firms	Sales ($ billion)	Sales (%)	Transnationality index (TI) (Percentage)		
				Foreign billings	Foreign labour force	Foreign skill-intensive employees
Large European countries of which:	29	125.8	49.9	46.5	48.2	40.6
Germany	6	7.4	2.9	28.1	36.6	22.5
United Kingdom	19	53.3	21.1	48.7	49.5	47.0
France	3	65.0	25.8	70.0	65.0	32.5
Spain	1	0.1	0.04	..	..	..
Small European countries of which:	8	23.4	9.3	50.2	49.5	42.5
Denmark	2	0.4	0.2	28.0	30.5	10.0
Switzerland	3	21.8	8.6	56.3	63.3	55.0
Other countries [a]	3	1.2	0.5	58.8	48.3	50.0
United States	36	73.0	28.5	28.5	28.2	41.3
Japan	8	21.6	8.6	9.6	14.3	42.8
Developing countries [b]	2	5.2	2.1	0.2	3.3	5.2
Other countries [c]	13	3.2	1.3	36.6	34.5	33.8
Total	96	252.2	100.0	35.0	35.4	39.6

Source: Authors' estimates, based on the results of the survey.

[a] This group includes one firm from Finland, the Netherlands and Sweden each.

[b] This group includes one firm from India and Singapore each.

[c] This group includes six firms from Australia and Canada each, and one firm from Bermuda.

In table 4, the transnationality index is related to the size of the sample firms – size being measured in terms of their sales. As in the case of the manufacturing study, the transnationality index values

are seen to increase markedly between the "small" or "medium" sized firms, but (somewhat unexpectedly) much less in the case of firms classified as 'large' or "very large".

Table 4. The composition of the sample, by firm size and transnationality index, 1999-2000

Size of the firm (FS)	Number of sample firms	Sales ($ billion)	Sales (%)	Transnationality index (TI) (Percentage)		
				Foreign billings	Foreign labour force	Foreign skill-intensive employees
Small (< 0.3 billion dollars)	43	6.1	2.4	27.9	26.7	32.0
Medium (0.3 - 2.9 billion dollars)	37	32.2	12.8	40.7	42.5	45.2
Large (3.0 - 19.9 billion dollars)	13	106.8	42.4	38.4	43.4	54.1
Very large (> 20 billion dollars)	3	107.0	42.4	48.3	34.9	..
Total	96	252.2	100.0	35.0	35.4	39.6

Source: Authors' estimates, based on the results of the survey.

The conceptual framework

In identifying and evaluating the ways in which the foreign activities of professional-business-service firms may affect their global competitiveness, three strands of scholarly research are drawn upon. The first is that arising from the work of Michael Porter (1990, 1997) on the competitiveness of nations, and the extensions suggested by Alan Rugman (1993) and one of the authors of this present article (Dunning, 1993) to embrace an extra-national dimension. In this article, the Rugman/Dunning version of Porter's diamond of competitive advantage is adapted to identify the kind of foreign located assets to which firms might seek to gain access in order to protect or enhance their global competitive positions.

The second strand is that of innovation theory which suggests that, in their search for new knowledge, firms are being increasingly

compelled to decentralize at least some of their research and activities to their foreign affiliates; draw on those of their partners in cross border contractual alliances; and tap into clusters of foreign based innovatory activities, and/or the innovatory systems of foreign governments. Here the work of scholars such as Paul Almeida (1996), Daniel Archibugi, Jeremy Howells and Jonathan Michie (1999), René A. Belderbos (2001), Julian Birkinshaw, Neil Hood and Stefan Jonsson (1998), Birkinshaw and Hood (2000), John Cantwell (1993, 1999), Cantwell and Odile Janne (2000), Donald Dalton and Manuel G. Serapio (1999), Tony S. Frost (2001), Lars Hakanson and Udo Zander (1996), Gary K. Jones and Herbert J. Davies (2000), Bruce Kogut and Zander (1993), Walter Kuemmerle (1999), Eleanor Westney (1990) and Ivo Zander (1999) is especially relevant.

The third strand is that of FDI theory. Until the emergence of the contemporary knowledge intensive and alliance based globalizing economy, most explanations of FDI were centred on "why", "how" and "when" firms best exploited their existing competitive (or ownership specific) advantages, or added to them by capturing the economies of specialization, scale or scope arising from a widening geography of value-added activities. To meet these goals, firms invested overseas to protect existing, or gain access to new, markets (*market seeking* FDI); to ensure or seek out new sources of national resources (*resource seeking* FDI); or to deploy better their global resources and capabilities by taking advantage of the differential comparative resources, endowments of cross-border countries and practicing an integrated production and marketing strategy (*efficiency seeking* FDI).

More recently, and especially over the past two decades, an increasing amount of FDI has been undertaken to augment the *existing* competitive advantages of firms by acquiring or accessing *new* competitive advantages. Much of such *strategic-asset-seeking* FDI has taken place by way of mergers and acquisitions (M&As) and/or the conclusion of cross-border strategic alliances. As demonstrated *inter alia* by UNCTAD (2000), the majority – probably around two thirds – of intra-Triad FDI in the 1990s took this form, although in some industries (e.g. autos and consumer

electronics) firms from developing countries have increasingly sought to add to their home based assets by investing in the more advanced industrial countries (Makino, Lau and Yeh, 2002).

The growth of asset-seeking FDI may be explained by several features as identified, for example, by Dunning (1997), Robert Pearce (1989, 1999a, 1999b), Kuemmerle (1999), Tom Wesson (2002) and S. Makino, C. Lau and R. Yeh (2002). Essentially they reduce to the growing geographical dispersion of knowledge-based and other created assets – particularly among industrialized countries; the growing specialization of value added activities by firms, prompted *inter alia* by their need to exploit cross border economies of scale and scope; and the growing need of firms to either acquire or access assets possessed by foreign-based firms, or to access or tap into complementary resources, capabilities and markets which would enable them to better utilize their existing competitive advantages (Dunning, 2000).

Each of the above strands of theory is complementary to each other. Although their explanations for the widening geographical loci of competitiveness-enhancing assets differ slightly, empirical research based on these explanations point to a similar conclusion: *to a greater or lesser extent, firms from all countries and all industries are diversifying the geography of their strategic-asset-seeking activities.* This, indeed, was strongly confirmed by the earlier study already referred to (Dunning, 1996).

But what of the geography of the creation or accessing of competitive advantages by professional-business-service firms? To the best of the knowledge, this question has not been systematically researched by scholars.[8] Yet the professional business service

[8] One exception is the work of Lilach Nachum (1999a and b) who found that, between 1980 and 1995, outward United States FDI by professional services firms helped strengthen their global competitive positions. This it did, not directly, but via its impact on the locational advantages of the United States, and on the ownership advantages of United States firms. Nachum also argued that the changing ownership advantages of United States firms, which FDI itself helped to upgrade, were a more important determinant of the competitive prowess of United States professional-business-service firms than the locational advantages of the countries in which they operated.

industries is not only one of the most knowledge intensive of all service industries, it is also one in which FDI is growing the fastest.[9]

The following sections of this article seek to do three things. First to establish the extent to which professional-business-service firms – or more specifically the chief executives (or directors of foreign operations of such firms) – perceive they derive different kinds of competitive advantages from their foreign operations. Second to identify – and where possible evaluate – the relationship between this propensity and a series of contextual and/or explanatory firm and country specific variables. In doing so, first, a series of bilateral relationships between three firm-specific variables (*viz.* the degree of knowledge-intensity, size and transnationality), one country-specific variable (*viz.*, size of country and the sourcing of competitive advantages) are set out. Second, the statistical significance of each of these and one other country specific variable (*viz.* stage of development in a multiple regression equation) is examined. Then, in relation to the association between the propensity of firms to source their competitive assets from a foreign location, three other variables (*i.e.* their mode of foreign involvement, the emergence of the Internet and the organizational strategy they pursue towards their global activities) are briefly considered. The third issue addressed in this article is the extent to which the sample firms perceived the different actions and policies of their home governments to aid or inhibit both their global competitiveness and their willingness and ability to engage in asset-seeking foreign activities.

The geographical sources of competitiveness

In seeking to identify the extent to which the executives of the sample professional-business-service firms perceived they derived a particular competitive advantage or group of advantages from their foreign relative to their domestic activities, respondents were asked to rank their answers on a seven point Likert scale of 0-6. They were told that a figure of 0 would indicate that they perceived that

[9] According to the United States Department of Commerce (1991 and 2002), the sales of United States affiliates in the professional business service industry rose by 421.1 per cent in the years 1990-1999, as compared with 383.3 per cent for all service firms and 198.3 per cent for all United States TNCs.

all of their firm's competitive enhancing assets derived from their activities in their home countries. A figure of 3 would indicate that the origin of a firm's competitiveness was believed to stem equally from their home and a foreign country (or several foreign countries). A figure of 6 would indicate the perception that all of the global competitive advantages of the respondent firm were the result of its foreign activities.

Industry specificity

Table 5 sets out four groups of competitive advantages identified by Michael Porter. These were further broken down into a number of components, which, after perusing academic and professional studies, and discussion with some of the respondents

Table 5. The sourcing of competitive advantages, by knowledge-capital-intensity of the sample firms, 1999-2000
(Mean value / *Standard deviation*)

Item	All	High KCI	Average KCI	Low KCI
Access to resources and Capabilities	**2.39**	**2.48**	**2.27**	**2.70**
	1.19	***1.04***	***1.20***	***1.35***
Labour	2.78	2.47	2.74	3.43
	1.41	*1.27*	*1.35*	*1.71*
Unskilled labour	3.21	3.20	3.00	4.20
	1.97	*1.58*	*2.02*	*2.30*
Skilled labour	2.57	2.13	2.56	3.36
	1.53	*1.36*	*1.46*	*1.86*
Professional labour	2.65	2.22	2.67	3.29
	1.62	*1.38*	*1.57*	*2.02*
Knowledge-related	2.29	2.47	2.17	2.47
	1.37	*1.17*	*1.44*	*1.41*
End services	2.43	2.52	2.32	2.73
	1.67	*1.50*	*1.70*	*1.79*
Process technology	2.27	2.43	2.11	2.60
	1.55	*1.56*	*1.57*	*1.45*
Patents and copyrights	1.94	2.35	1.81	1.77
	1.66	*1.60*	*1.68*	*1.69*
Brands, trademarks, logos	1.66	1.91	1.49	1.86
	1.43	*1.44*	*1.39*	*1.56*
Customer needs	2.86	3.04	2.72	3.13
	1.65	*1.40*	*1.60*	*2.20*
Information databases	2.29	2.57	2.02	2.87
	1.62	*1.34*	*1.58*	*2.00*

/...

Table 5 (concluded)

Item	All	High KCI	Average KCI	Low KCI
Managerial and organizational	2.24	2.39	2.07	2.62
	1.45	*1.33*	*1.39*	*1.79*
Managerial expertise	2.09	2.35	1.93	2.33
	1.59	*1.43*	*1.51*	*2.09*
Organizational capabilities	2.01	2.26	1.84	2.27
	1.61	*1.60*	*1.52*	*1.94*
Relational skills	2.60	2.57	2.44	3.27
	1.53	*1.31*	*1.48*	*1.91*
Infrastructure-related	2.40	2.55	2.28	2.64
	1.28	*1.15*	*1.27*	*1.52*
Legal infrastructure	2.09	2.59	1.84	2.27
	1.62	*1.44*	*1.53*	*2.05*
Institutional infrastructure	2.21	2.18	2.05	2.87
	1.64	*1.50*	*1.55*	*2.07*
Local industrial strength abroad	3.12	2.95	3.16	3.20
	1.68	*1.36*	*1.75*	*1.93*
Internet-related infrastructure	2.22	2.57	2.07	2.21
	1.71	*1.78*	*1.66*	*1.85*
Consumer demand	**2.49**	**2.46**	**2.46**	**2.65**
	1.37	***1.35***	***1.33***	***1.64***
Cost efficient production	2.49	2.86	2.39	2.38
	1.77	*1.42*	*1.91*	*1.75*
Upgrading of product quality	2.40	2.36	2.35	2.63
	1.61	*1.84*	*1.47*	*1.86*
Making for more product innovation	2.58	2.22	2.63	2.94
	1.57	*1.57*	*1.47*	*1.91*
Inter-firm rivalry	**2.51**	**2.87**	**2.44**	**2.20**
	1.80	***1.71***	***1.73***	***2.18***
Linkages with foreign or domestic firms and institutions	**2.52**	**2.71**	**2.33**	**2.90**
	1.11	***0.93***	***1.09***	***1.35***
Competitors	2.59	2.64	2.48	2.93
	1.60	*1.29*	*1.66*	*1.79*
Clients and customers	2.76	2.61	2.91	2.44
	1.37	*1.12*	*1.48*	*1.26*
Suppliers	2.57	2.91	2.34	3.09
	1.48	*1.51*	*1.28*	*2.17*
Universities and other research institutions	2.11	2.57	1.79	2.71
	1.56	*1.21*	*1.34*	*2.40*
Public/semi-public bodies	2.69	3.00	2.45	3.14
	1.60	*1.41*	*1.45*	*2.25*
Professional associations	2.28	2.43	1.98	3.13
	1.49	*1.08*	*1.41*	*2.00*

Source: Authors' estimates, based on the results of the survey.
Note: Figures in italics represent the standard deviation of the respective mean.
Note: The 7-point Likert scale is from 0-6. (Zero indicates that the advantages are sourced mainly from home, and six indicates that the advantages are sourced mainly from abroad.)

to the questionnaire, were identified as being the most important competitive enhancing assets of professional-business-service firms.[10]

The table reveals that for *all* firms the average (unweighted) ranking of the geographical sourcing of competitive enhancing assets varied between 2.39 and 2.52. This suggests that the firms in the sample reckoned they derived rather fewer than one half of these advantages from their foreign activities (be these by way of exports, cross-border contractual ventures or FDI), and that the rankings varied little across these four groups. However, *within* each of the groups, the competitive enhancing assets accessed from foreign sources (*viz.* access to unskilled labour, customer needs, local industrial capabilities and linkages with customers and clients) stood out the strongest. Generally speaking, such assets were more highly valued by firms with an average or below average knowledge-capital intensity. The major exceptions were access to patents and copyrights, managerial skills and well-developed and reliable legal and Internet-related infrastructure and cost conscious consumers.

Region or country specificity

Table 6 sets out the data on the extent to which the geographical sourcing of competitive advantages varies according to region or country of origin of the respondent firms. Here it is clear that firms from small European countries and Japan perceived they gained more competitive enhancing advantages from their foreign activities than did the larger European and United States investors. This was particularly marked in the case of access to unskilled labour, all kinds of knowledge, managerial expertise, relational skills, the quality of consumer demand (especially in the Japanese case), and linkages with competitors, suppliers and – except, again, in the case of Japanese firms – with clients and customers. The two sample professional-business-service firms from developing countries both thought that their foreign activities enabled them to access more than one half their knowledge based competitive advantages. Such activities were also perceived to afford them particularly valuable access to linkages with competitors, clients and customers, and to an additional average competitive spur from foreign so-called rival firms.

[10] Several of these were similar to those identified in the manufacturing study, but some were unique, e.g. customer needs, information data banks, relational skills, and Internet-related infrastructure.

Table 6. The sourcing of competitive advantages, by region or country of origin, 1999-2000
(Mean value / Standard deviation)

Item	All	"Large" European countries	"Small" European Countries	United States	Japan	Developing countries	Other countries
Access to resources and capabilities	2.33	2.54	3.07	2.09	2.87	2.19	2.21
	1.17	***1.30***	***0.72***	***1.16***	***1.24***	***0.00***	***1.14***
Labour	2.71	2.87	3.21	2.62	3.29	1.17	2.67
	1.38	***1.52***	***0.59***	***1.41***	***1.96***	***1.18***	***1.05***
Unskilled labour	3.21	3.13	4.00	2.82	3.88	2.50	3.50
	1.97	***1.91***	***2.00***	***2.00***	***2.23***	***2.12***	***1.90***
Skilled labour	2.57	2.68	2.50	2.51	3.00	0.50	2.62
	1.53	***1.68***	***1.20***	***1.48***	***2.14***	***0.71***	***1.12***
Professional labour	2.65	2.93	3.13	2.57	3.00	0.50	2.08
	1.62	***1.65***	***1.55***	***1.60***	***2.14***	***0.71***	***1.12***
Knowledge-related	2.25	2.44	3.35	1.85	2.79	3.33	2.08
	1.33	***1.53***	***0.88***	***1.23***	***1.37***	***1.18***	***1.66***
End services	2.43	2.68	3.63	1.86	3.25	3.50	2.08
	1.66	***1.81***	***1.30***	***1.40***	***1.98***	***0.71***	***1.55***
Process technology	2.27	2.26	3.00	1.86	3.25	4.00	2.08
	1.55	***1.51***	***1.77***	***1.29***	***1.58***	***2.83***	***1.66***
Patents and copyrights	1.94	2.00	3.33	1.65	2.00	3.50	1.38
	1.66	***1.68***	***1.37***	***1.60***	***1.69***	***2.12***	***1.51***
Brands, trademarks, logos	1.66	1.59	3.00	1.51	1.88	2.50	1.00
	1.43	***1.31***	***1.63***	***1.46***	***1.55***	***0.71***	***1.00***
Customer needs	2.86	2.82	4.13	2.44	3.63	3.50	2.77
	1.65	***1.85***	***0.99***	***1.46***	***2.13***	***0.71***	***1.48***
Information databases	2.29	2.74	2.88	1.81	2.75	3.00	1.92
	1.62	***1.93***	***1.36***	***1.41***	***1.39***	***0.00***	***1.55***
Managerial and organizational	2.20	2.48	2.92	2.00	2.50	1.00	1.97
	1.39	***1.54***	***1.07***	***1.34***	***1.76***	***0.94***	***1.52***
Managerial expertise	2.09	2.29	2.75	1.92	2.25	1.00	1.85
	1.59	***1.65***	***1.67***	***1.54***	***1.91***	***0.00***	***1.52***
Organizational capabilities	2.01	2.32	2.50	1.78	2.25	0.50	1.77
	1.61	***1.70***	***1.60***	***1.53***	***1.75***	***0.71***	***1.59***
Relational skills	2.60	2.82	3.50	2.31	3.00	1.50	2.31
	1.53	***1.54***	***0.76***	***1.39***	***2.07***	***2.12***	***1.65***
Infrastructure-related	2.35	2.59	2.69	2.15	2.94	2.13	2.25
	1.25	***1.49***	***0.94***	***1.23***	***1.30***	***0.18***	***1.15***
Legal infrastructure	2.09	2.11	2.38	1.97	2.75	2.50	1.69
	1.62	***1.83***	***1.30***	***1.69***	***1.28***	***0.71***	***1.44***
Institutional infrastructure	2.21	2.43	2.50	2.00	2.63	1.00	2.08
	1.64	***1.93***	***1.31***	***1.50***	***1.69***	***1.41***	***1.61***

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Table 6 (concluded)

Item	All	"Large" European countries	"Small" European Countries	United States	Japan	Developing countries	Other countries
Local industrial strength	3.12	3.25	2.75	3.09	3.50	2.00	3.08
abroad	***1.68***	***1.96***	***1.75***	***1.65***	***1.85***	***1.41***	***1.12***
Internet-related infrastructure	2.22	2.57	3.13	1.53	2.88	3.00	2.15
	1.71	***1.89***	***1.73***	***1.35***	***1.89***	***1.41***	***1.68***
Consumer demand	2.45	2.55	2.88	2.09	3.71	2.33	2.49
	1.34	***1.49***	***1.87***	***1.03***	***1.65***	***1.89***	***1.09***
Cost efficient production	2.49	2.41	3.38	2.26	3.25	2.00	2.38
	1.77	***1.57***	***2.13***	***1.70***	***2.60***	***1.41***	***1.66***
Upgrading of product quality	2.40	2.41	2.75	1.89	4.00	3.00	2.46
	1.61	***1.57***	***2.05***	***1.41***	***1.51***	***2.83***	***1.39***
Making for more product	2.58	2.83	2.50	2.14	3.88	2.00	2.58
innovation	***1.57***	***1.63***	***1.77***	***1.42***	***1.36***	***1.41***	***1.62***
Inter-firm rivalry	2.48	2.93	2.63	1.86	3.00	4.50	2.62
	1.72	***1.87***	***1.92***	***1.59***	***2.07***	***0.71***	***1.66***
Linkages with foreign							
or domestic firms	2.46	2.64	2.88	2.33	2.90	3.17	2.20
and institutions	***1.10***	***0.92***	***0.81***	***1.20***	***1.68***	***0.71***	***1.02***
Competitors	2.59	2.85	3.13	2.23	3.38	4.00	2.00
	1.60	***1.66***	***1.46***	***1.44***	***1.92***	***1.41***	***1.53***
Clients and customers	2.76	2.90	2.88	2.61	1.75	3.50	3.31
	1.37	***1.45***	***1.46***	***1.27***	***1.16***	***0.71***	***1.38***
Suppliers	2.57	2.60	3.38	2.45	3.13	3.00	1.92
	1.48	***1.04***	***1.06***	***1.68***	***2.17***	***1.41***	***1.32***
Universities and other	2.11	2.52	2.00	1.82	2.63	2.50	1.69
research institutions	***1.56***	***1.50***	***1.20***	***1.51***	***2.26***	***0.71***	***1.55***
Public/semi-public bodies	2.69	2.52	3.13	2.74	3.13	3.00	2.33
	1.60	***1.50***	***0.83***	***1.83***	***2.10***	***0.00***	***1.30***
Professional associations	2.28	2.30	2.75	1.94	3.38	3.00	2.08
	1.49	***1.49***	***0.71***	***1.43***	***2.20***	***0.00***	***1.38***

Source: Authors' estimates, based on the results of the survey.
Note: Figures in italics represent the standard deviation of the respective mean.
Note: The 7-point Likert scale is from 0-6. (Zero indicates that the advantages are sourced mainly from home, and six indicates that the advantages are sourced mainly from abroad.)

Regarding firms from the larger home countries, those from the United States perceived that their foreign activities were likely to protect or enhance their domestic-based competitive advantages by providing them better access to labour inputs, customer needs,

local industrial capacity and linkages with clients' suppliers and public or semi-public bodies. The rankings for the larger European transnational corporations (TNCs) were above average for such assets as access to unskilled and professional labour, relational skills and local industrial capacity; for knowledge about customer needs and linkages with competitors, suppliers and customers; and for the additional spur provided by global competitors.

As perhaps might be expected, the respondents from the regions and countries with a comparative advantage in the production of professional business service services (notably the United States) discerned they derived the larger part of their knowledge related managerial and organizational activities from their home countries, although a better appreciation of local customer needs and relational skills was ranked higher than average for these two sub-groups of assets.

Size of firm

Table 7 indicates a marked positive relationship between size of firm and the perceived foreign sourcing of competitive advantages in the case of access to resources and capabilities and consumer demand pressures; but it did not so in the case of inter-firm rivalry and external linkages – except in the case of linkages with suppliers. The difference in the ranking between the 43 smallest firms and the rest (as identified in table 4) is shown to be most significant in the knowledge-related, managerial and organizational expertise categories. By contrast, the former group of firms believed they benefited relatively more than did their larger counterparts from the exposure to competition from foreign firms, and from linkages with foreign clients and customers – but not with suppliers or research institutions.

Degree of transnationality

As might be expected, the findings set out in table 8 correspond fairly closely with those presented in table 7. This is simply because the larger professional-business-service firms also tend to be the most transnational.

Table 7. The sourcing of competitive advantages, by the size of sample firms, 1999-2000
(Mean value / *Standard deviation*)

Item	All	Small (<$0.3 billion)	Medium ($0.3-2.9 billion)	Large ($3.0-19.9 billion)	Very large (>$20.0 billion)
Access to resources and capabilities	2.39	2.1	2.5	2.8	3.7
	1.19	*1.3*	*1.1*	*0.9*	*1.3*
Labour	2.6	2.3	2.7	3.4	3.7
	1.6	*1.6*	*1.5*	*1.8*	*2.1*
Unskilled labour	3.2	3.14	2.75	4.18	4.67
	2.0	*2.29*	*1.38*	*1.89*	*1.53*
Skilled labour	2.57	2.37	2.58	3.08	3.33
	1.53	*1.41*	*1.50*	*1.83*	*2.52*
Professional labour	2.65	2.33	2.69	3.42	3.67
	1.62	*1.55*	*1.53*	*1.83*	*2.08*
Knowledge-related	2.29	1.92	2.53	2.54	3.67
	1.37	*1.49*	*1.26*	*1.04*	*0.44*
End services	2.43	1.98	2.67	2.85	4.33
	1.66	*1.74*	*1.47*	*1.52*	*1.53*
Process technology	2.27	1.79	2.64	2.62	3.00
	1.55	*1.68*	*1.40*	*1.26*	*1.00*
Patents and copyrights	1.94	1.34	2.56	1.92	4.00
	1.66	*1.51*	*1.65*	*1.31*	*1.73*
Brands, trademarks, logos	1.66	1.31	1.94	1.92	2.00
	1.43	*1.52*	*1.37*	*1.24*	*1.00*
Customer needs	2.86	2.58	2.92	3.31	4.33
	1.65	*1.82*	*1.44*	*1.65*	*0.58*
Information databases	2.29	1.83	2.50	2.69	4.33
	1.62	*1.68*	*1.52*	*1.32*	*0.58*
Managerial and organizational	2.24	1.88	2.44	2.54	3.67
	1.45	*1.47*	*1.43*	*1.08*	*1.76*
Managerial expertise	2.09	1.72	2.42	2.23	3.00
	1.59	*1.62*	*1.54*	*1.42*	*2.00*
Organizational capabilities	2.01	1.70	2.22	2.15	3.33
	1.61	*1.61*	*1.53*	*1.52*	*2.52*
Relational skills	2.60	2.21	2.67	3.23	4.67
	1.53	*1.47*	*1.47*	*1.36*	*1.53*
Infrastructure-related	2.40	2.10	2.50	2.90	3.50
	1.28	*1.33*	*1.20*	*0.91*	*2.05*
Legal infrastructure	2.09	1.70	2.23	2.54	4.00
	1.62	*1.55*	*1.55*	*1.66*	*1.73*
Institutional infrastructure	2.21	1.88	2.06	3.38	3.67
	1.64	*1.65*	*1.51*	*1.26*	*2.08*
Local industrial strength abroad	3.12	2.86	3.31	3.46	3.00
	1.68	*1.65*	*1.72*	*1.45*	*3.00*
Internet-related infrastructure	2.22	2.00	2.39	2.17	3.33
	1.71	*1.75*	*1.76*	*1.47*	*1.53*

/…

Table 7 (concluded)

Item	All	Small (<$0.3 billion)	Medium ($0.3-2.9 billion)	Large ($3.0-19.9 billion)	Very large (>$20.0 billion)
Consumer demand	2.49	2.24	2.70	2.59	3.00
	1.37	*1.34*	*1.33*	*1.57*	*1.67*
Cost efficient production	2.49	2.44	2.56	2.31	3.33
	1.77	*1.86*	*1.63*	*1.89*	*2.52*
Upgrading of product quality	2.40	1.95	2.75	2.77	3.00
	1.61	*1.63*	*1.48*	*1.64*	*2.00*
Making for more product innovation	2.58	2.33	2.83	2.69	2.67
	1.57	*1.66*	*1.44*	*1.80*	*0.58*
Inter-firm rivalry	2.51	2.38	2.78	2.23	2.00
	1.80	*1.78*	*1.78*	*1.83*	*2.65*
Linkages with foreign or domestic firms and institutions	2.53	2.23	2.69	3.13	2.14
	1.12	*1.05*	*1.14*	*1.02*	*1.03*
Competitors	2.59	2.26	3.03	2.77	1.67
	1.60	*1.71*	*1.53*	*1.24*	*1.15*
Clients and customers	2.76	2.72	2.92	2.69	1.67
	1.37	*1.40*	*1.42*	*1.11*	*1.15*
Suppliers	2.57	2.31	2.45	3.73	3.33
	1.48	*1.55*	*1.25*	*1.56*	*0.58*
Universities and other research institutions	2.11	1.56	2.30	3.58	2.00
	1.56	*1.16*	*1.63*	*1.78*	*1.00*
Public/semi-public bodies	2.69	2.43	2.71	3.75	2.00
	1.60	*1.47*	*1.57*	*1.82*	*1.73*
Professional associations	2.28	1.91	2.26	3.54	2.33
	1.49	*1.39*	*1.40*	*1.56*	*1.15*

Source: Authors' estimates, based on the results of the survey.
Note: Figures in italics represent the standard deviation of the respective mean.
Note: The 7-point Likert scale is from 0-6. (Zero indicates that the advantages are sourced mainly from home, and six indicates that the advantages are sourced mainly from abroad.)

The bivariate relationships set out in table 8 are much more clear-cut than those identified by the previous three tables.[11] In the case of no less than 18 of the 26 individual competitive advantages identified, the attribution of these advantages to foreign-based activities consistently increases with the transnationality index of the respondent firms; and in the other eight, there are only minor

[11] This was also the case in the manufacturing study.

deviations from this pattern. The transnationality-index factor seemed to be least significant in the case of the demand related advantages, and linkages with public or semi-public bodies and professional organizations.

Table 8. The sourcing of competitive advantages, by the transnationality index of the sample firms, 1999-2000
(Mean value / *Standard deviation*)

Item	All	Low	Medium low TI	Medium high TI	High TI	TI Undefined
Access to resources and capabilities	2.39	1.68	2.18	2.71	2.83	2.93
	1.19	*1.25*	*1.01*	*1.20*	*0.90*	*0.82*
Labour	2.78	1.93	2.76	3.37	3.07	1.78
	1.41	*1.34*	*1.55*	*1.14*	*1.29*	*1.35*
Unskilled labour	3.21	2.48	3.00	3.77	3.87	0.50
	1.97	*2.04*	*2.34*	*1.58*	*1.73*	*0.71*
Skilled labour	2.57	1.75	2.65	3.20	2.75	1.33
	1.53	*1.33*	*1.66*	*1.37*	*1.48*	*1.53*
Professional labour	2.65	1.58	2.94	3.20	2.85	2.67
	1.62	*1.14*	*1.92*	*1.52*	*1.39*	*2.52*
Knowledge-related	2.29	1.55	2.04	2.57	2.76	3.56
	1.37	*1.35*	*1.23*	*1.46*	*1.03*	*0.79*
End services	2.43	1.46	2.12	2.93	2.90	3.67
	1.66	*1.59*	*1.36*	*1.74*	*1.45*	*0.58*
Process technology	2.27	1.33	2.29	2.24	3.00	4.67
	1.55	*1.40*	*1.49*	*1.38*	*1.30*	*1.53*
Patents and copyrights	1.94	1.26	1.69	2.04	2.71	3.00
	1.66	*1.36*	*1.93*	*1.55*	*1.69*	*1.73*
Brands, trademarks, logos	1.66	1.04	1.81	1.78	2.00	2.33
	1.43	*1.15*	*1.87*	*1.45*	*1.25*	0.58
Customer needs	2.86	2.21	2.35	3.33	3.24	3.67
	1.65	*1.72*	*1.46*	*1.84*	*1.22*	*0.58*
Information databases	2.29	1.79	1.94	2.41	2.71	4.00
	1.62	*1.72*	*1.43*	*1.64*	*1.42*	*1.73*
Managerial and organizational	2.24	1.61	2.12	2.42	2.75	2.44
	1.45	*1.55*	*1.44*	*1.45*	*1.09*	*1.90*
Managerial expertise	2.09	1.50	1.94	2.37	2.43	2.67
	1.59	*1.72*	*1.71*	*1.52*	*1.36*	*1.53*
Organizational capabilities	2.01	1.38	2.06	2.20	2.38	2.33
	1.61	*1.64*	*1.78*	*1.54*	*1.40*	*2.08*
Relational skills	2.60	1.96	2.35	2.70	3.43	2.33
	1.53	*1.57*	*1.27*	*1.60*	*1.16*	*2.08*

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Table 8 (concluded)

Item	All	Low	Medium low TI	Medium high TI	High TI	TI Undefined
Infrastructure-related	2.40	1.77	2.05	2.70	2.87	3.25
	1.28	*1.27*	*0.93*	*1.40*	*1.00*	*1.56*
Legal infrastructure	2.09	1.58	1.65	2.38	2.48	3.00
	1.62	*1.44*	*1.41*	*1.78*	*1.69*	*0.00*
Institutional infrastructure	2.21	1.42	1.56	2.77	2.76	2.67
	1.64	*1.35*	*1.03*	*1.76*	*1.61*	*2.52*
Local industrial strength abroad	3.12	2.52	3.00	3.47	3.33	3.33
	1.68	*1.62*	*1.58*	*1.83*	*1.46*	*2.52*
Internet-related infrastructure	2.22	1.58	2.00	2.20	2.90	4.00
	1.71	*1.64*	*1.75*	*1.67*	*1.52*	*2.00*
Consumer demand	2.49	2.14	2.22	2.58	2.80	3.67
	1.37	*1.58*	*1.25*	*1.37*	*1.21*	*0.67*
Cost efficient production	2.49	2.25	2.18	2.73	2.71	2.33
	1.77	*2.09*	*1.67*	*1.82*	*1.52*	*1.15*
Upgrading of product quality	2.40	1.92	2.12	2.47	2.81	4.33
	1.61	*1.72*	*1.50*	*1.61*	*1.44*	*1.15*
Making for more product innovation	2.58	2.25	2.31	2.53	2.95	4.33
	1.57	*1.70*	*1.49*	*1.66*	*1.29*	*1.15*
Inter-firm rivalry	2.51	1.75	2.35	2.90	2.77	4.00
	1.80	*1.75*	*1.50*	*1.83*	*1.88*	*1.41*
Linkages with foreign or domestic firms and institutions	2.52	1.93	2.40	2.82	2.76	3.11
	1.11	*1.26*	*1.07*	*1.18*	*0.65*	*0.51*
Competitors	2.59	1.92	2.50	3.07	2.52	4.33
	1.60	*1.69*	*1.46*	*1.65*	*1.25*	*1.15*
Clients and customers	2.76	2.17	2.29	3.53	2.64	3.33
	1.37	*1.34*	*0.92*	*1.48*	*1.14*	*0.58*
Suppliers	2.82	1.96	2.63	2.79	2.89	3.33
	1.32	*1.78*	*1.36*	*1.40*	*1.18*	*1.15*
Universities and other research institutions	2.11	1.50	1.67	2.34	2.85	2.00
	1.56	*1.44*	*1.45*	*1.67*	*1.39*	*1.00*
Public/semi-public bodies	2.69	2.25	2.81	2.79	2.95	3.00
	1.60	*1.89*	*1.52*	*1.57*	*1.39*	*1.00*
Professional associations	2.28	1.79	2.31	2.33	2.67	2.67
	1.49	*1.59*	*1.66*	*1.58*	*1.11*	*0.58*

Source: Authors' estimates, based on the results of the survey

Note: Figures in italics represent the standard deviation of the respective mean.

Note: The 7-point Likert scale is from 0-6. (Zero indicates that the advantages are sourced mainly from home, and six indicates that the advantages are sourced mainly from abroad.)

Some econometric evidence

Having reviewed the content and significance of the bivariate relationships between four firm-specific characteristics and the propensity of firms to derive competitive advantages from foreign sources, the statistical significance of each of these is estimated; this is done by constructing a series of linear multiple regression equations in which each of the four groups of competitive advantage identified by Michael Porter are related to the four contextual variables dealt with in the previous section. In addition, two other explanatory variables, *viz.* the level of development of the home country (HCLD) and the professional licensing and accreditation procedures of the sample firms (PLAR), are considered. *A propos* the former, it might be hypothesized that, as development proceeds, home country firms would have *less* need to tap into foreign sources of competitive assets. On the other hand, where, for reasons stated earlier, firms from advanced industrial countries find it beneficial to cooperate with those of other countries to exploit better or capture the benefits of their own competitive advantages, the relationship might be expected to move in the opposite direction. The second additional variable supplements the intellectual capital intensity measure[12] as a proxy for knowledge-capital intensity.

Table 9 sets out the results of this exercise. These are briefly discussed in respect of each of the four groups of competitive advantage.

Access to resources and capabilities

The first equations show that the propensity of the sample firms to source these assets from outside their home countries is a positive and significant function of the transnationality index, size (FS), and the intellectual capital intensity (ICI). It is, however, a negative and significant function of home country size (HCS). These relationships are as expected. However, there is no indication of a statistically significant relationship between a firm's licensing/

[12] This is the equivalent of the knowledge-intensity variable (see earlier tables) but evaluated at the *firm* level.

accreditation intensity procedure (PLAR), or its home country's level of development (HCLD).

Table 9. Multiple regression equations relating the competitive advantages to firm-, sector- and country-specific characteristics

Item		Model sig. level	R^2 – adj.
(1)	**ATR =** 0.21287 + 0.0145 **TI**** + 0.1753 **FS**** + 0.0135 **ICI*** - 0.0055 *PLAR* - 0.00009 **HCS*** + 0.00005 *HCLD*	0.0036	0.20099
(2)	**CDI =** - 0.16935 + 0.0026 *TI* + 0.0923 *FS* + 0.0314 **ICI***** - 0.0117 **PLAR**** - 0.00014 **HCS**** + 0.00007 **HCLD****	0.0006	0.25437
(3)	**IFR** = - 1.04582 + 0.0322 **TI***** - 0.01688 *FS* + 0.0039 *ICI* – 0.00086 *PLAR* - 0.00017 **HCS**** + 0.00012 **HCLD****	0.001	0.24164
(4)	**ELS** = 0.7771 + 0.0143 **TI**** + 0.0803 *FS* + 0.0023 *ICI* + 0.0058 *PLAR* – 0.00005 *HCS* + 0.000032 *HCLD*	0.0454	0.1095

Source: Authors' estimates, based on the results of the survey.

Notes: * Level of significance is 0.10.
** Level of significance is 0.05.
***Level of significance is 0.01.

Key:
TI (X1): *Transnationality index*
FS (X2): *Firm size*
ICI (X3): *Intellectual capital intensity*
PLAR (X4): *Professional licensing and accreditation requirements*
HCS (X5): *Home country size*
HCLD (X6): *Home country level of development*
ATR (Y1): Access to resources
CDI (Y2): Consumer demand influences
IRF (Y3): *Inter-firm rivalry*
ELS (Y4): *External linkages*

Consumer-demand influences

The propensity to source consumer-demand-related advantages from abroad is shown to be a positive and significant function of the industry's intellectual capital intensity (ICI), as in the home country's level of development (HCLD). It is a negative and significant function of licensing and accreditation requirements (PLAR), as well as home country size (HCS). Rather surprisingly, neither a firm's degree of transnationality (transnationality index) nor its size (FS) are seen to be significant determinants of Y2. Perhaps this is a by-product of the contemporary information age and the

advent of the Internet. Customers are becoming increasingly linked to firms. This puts the former in a position to make their demands better heard. Professional-business-service firms can therefore gain competitive advantages as a result of understanding and heeding their customers' needs, and working with them to meet these needs.

Inter-firm rivalry

Equation (3) reveals that the exposure of a firm to regional or global competitive pressures is a positive and significant function of its transnationality index, as well as its home country's level of development (HCLD). Inter-firm rivalry (IFR) is also a negative and significant function of home country size (HCS). Results do not indicate the existence of a significant relationship between IRF and FS, ICI, and PLAR. This, again, could be a reflection of today's world economic scenario. More specifically, advances in electronic communications – as mentioned above – allow for a greater degree of firm-to-firm or rival-to-rival contact.

External linkages

Equation (4) shows that the competitiveness-enhancing qualities of foreign-based linkages are a positive and significant function of a firm's transnationality index. None of the other explanatory variables reveal a significant relationship with external linkages (ELS). This could again reflect the advent of E-commerce – where linkages are increasingly forged electronically.

In summary, the statistical analysis shows that, apart from equation (2), the transnationality index is consistently the most significant contextual variable influencing the extent to which competitive advantages are likely to be sourced from outside the home country of professional-business-service firms. The HCS variable is also positively significant in all but equation (4). The FS variable is positively significant and the PLAR variables negatively significant in only one of the four equations; and the ICI and HCLD variables positively significant in two of the four equations.

Some additional explanatory variables

In addition to the contextual variables set out in the previous sections, professional-business-service firms were asked to give their opinions on how far they perceived their propensity to access competitive enhancing assets from outside their home countries was linked to (a) the mode of their foreign operations, (b) the advent and maturation of E-commerce and the Internet, and (c) the extent to which they pursued an integrated regional or global business strategy. Each of these will be briefly discussed in turn.

Mode of entry

In the manufacturing survey, it was found that the foreign sourcing of competitive advantages was more likely to be associated with FDI of the respondent firms, than with either cross-border cooperative arrangements (e.g. strategic alliances, management contracts, licensing agreements) or arm's-length transactions (Dunning, 1996, pp. 19-21). This was because FDI represented a more embedded commitment by the investing firms, and because such firms were more likely to delegate asset creating (e.g. innovatory activities) to their affiliates when they were part of a centrally controlled network of activities (Birkinshaw, Hood and Janson, 1998).

Tables 10a and b present the results for the professional-business-service firms. However, unlike in the manufacturing survey, the FDI modality was divided into M&As and greenfield investments. Three particular conclusions are identified hereby.

- Most firms perceived that they were likely best to augment their domestic competitive advantages from foreign sources by engaging in M&As rather than by any other route – including greenfield FDI. Interestingly, non-equity arrangements (and, particularly, it is suspected, strategic alliances) came a fairly close second, while even arm's-length transactions were thought to bring about some modest competitive advantages.

Table 10(a). Perceptions by the sample firms of the importance of the mode of foreign involvement, by knowledge-capital intensity, 1999-2000
(Mean value / Standard deviation)

Knowledge-capital intensity (KCI)	Number of firms	FDI				Non-equity arrangements		Arm's-length transactions	
		Greenfield		M&As					
All firms	96	2.27	*1.75*	4.05	*1.55*	3.53	*1.71*	2.51	*1.66*
High KCI	23	2.86	*1.75*	3.78	*1.59*	3.36	*1.87*	2.57	*1.65*
Average KCI	57	1.93	*1.56*	4.14	*1.60*	3.52	*1.65*	2.61	*1.64*
Low KCI	16	2.63	*2.16*	4.13	*1.36*	3.81	*1.76*	2.00	*1.78*

Source: Authors' estimates, based on the results of the survey.
Note: Figures in italics represent the standard deviation of the respective means.
Note: The 7-point Likert scale is from 0-6. (Zero indicates that the mode is unimportant, and six indicates that the mode is critically important for sourcing competitive assets abroad.)

Table 10(b). Perceptions by the sample firms of the importance of the mode of foreign involvement, by transnationality index, 1999-2000
(Mean value / *Standard deviation*)

Transnationality index (TI)	Number of firms	FDI				Non-equity arrangements		Arm's-length transactions	
		Greenfield		M&As					
All Firms	96	2.27	*1.75*	4.05	*1.55*	3.53	*1.71*	2.51	*1.66*
Low TI	24	2.21	*1.86*	3.83	*1.83*	4.26	*1.32*	2.46	*1.47*
Medium-low TI	17	1.93	*2.02*	3.69	*1.78*	3.44	*1.79*	2.93	*1.58*
Medium TI	30	2.73	*1.62*	4.37	*1.10*	3.27	*1.74*	2.62	*1.57*
High TI	22	2.09	*1.57*	4.27	*1.42*	2.95	*1.76*	1.90	*1.89*
Undefined TI	3	1.00	*1.73*	3.00	*2.65*	5.33	*0.58*	4.50	*2.12*

Source: Authors' estimates, based on the results of the survey.
Note: Figures in italics represent the standard deviation of the respective means.
Note: The 7-point Likert scale is from 0-6. (Zero indicates that the mode is unimportant, and six indicates that the mode is critically important for sourcing competitive assets abroad.)

- There is some suggestion that firms with a below average or average KCI were more likely to access foreign sourced competitive advantages via the M&A and non-equity route rather than the greenfield mode than were high-KCI firms.

- Non equity arrangements appear to be the preferred means by which firms with a low transnationality index access their foreign based competitive advantages, while the M&A route was more likely to be elected by the regionally and globally integrated TNCs. Again this is what one might have predicted. It would seem that, as the relative importance of their foreign value added activities grows, firms rely less on greenfield FDI and arm's-length transactions to augment their competitive advantages.

One further finding of this survey – not set out in tabulated form – was that there were few (home) regional or country-specific differences in the attribution of competitive advantage to particular modalities. The only exception was that Japanese and developing countries firms believed that non-equity arrangements were more likely to be a source of such advantages than M&As.

The impact of the Internet

In the professional-business-service survey, two other questions were asked from respondents. The first concerned the extent to which they perceived that the Internet helped them to create or acquire competitive advantages, independently of the location of their activities. The second asked firms to give their opinion as to how far, by lowering cross-border transaction costs, did the Internet make it easier (and more desirable) for them to augment competitive enhancing assets from outside their home countries.

Tables 11a and b set out the results of this exercise, classified by the contextual variable most influential in determining the sourcing of competitive advantages, *viz.* the transnationality-index variable. These show that:

- The Internet *is* generally regarded as a relatively important competitive enhancing asset at both an industry and a firm level; it is marginally more seen so by firms with low transnationality indeces.

- The Internet is perceived to have fairly neutral effects on the modality of accessing foreign-based competitive advantages, and only a modest effect on the relative significance of these latter advantages.

- The Internet is perceived to exercise a major encouraging influence on professional-business-service firms to pursue a global or regionally integrated strategy towards their production and marketing operations.

Table 11a shows that there is some suggestion – but little more than that – that the competitiveness of professional-business-service firms with a low transnationality index are more likely to be upgraded and sourced from foreign countries as a result of the Internet, than those with a medium-high to high transnationality index. On the other hand, table 11b shows that there is a much stronger suggestion that the Internet is likely to have a greater impact on each of the competitive related variables of large or very large firms.

Table 11(a). The effect of Internet factors, by transnationality index, 1999-2000

Transnationality Index (TI)	Number of firms	Sales ($ billions)	Industry competitive-ness [a]	Inter-firm competitive-ness [a]	Foreign value adding activity [a]	Relative FDI to non-equity [a]	Foreign competitive Advantage [a]	Effect on global structure [b]
Low TI	24	40.00	4.58	4.58	3.75	2.92	2.63	2.38
Medium-low TI	17	22.39	4.00	3.94	3.18	1.64	2.94	1.94
Medium TI	30	57.86	3.77	3.79	3.30	2.21	2.10	2.00
High TI	22	131.19	4.27	4.14	3.05	2.24	2.68	2.18
Undefined TI	3	0.77	5.33	5.33	5.33	2.00	3.67	2.00
Total	96	252.21	4.18	4.15	3.40	2.31	2.56	2.13

Source: Authors' estimates, based on the results of the survey.

[a] The 7-point Likert scale is 0 to 6. (Zero indicates that the Internet is insignificant, and six indicates that the Internet is extremely significant.)

[b] The 7-point Likert scale is -3 to +3. (Negative three indicates that the Internet will lead to less structural integration, and positive three indicates that the Internet will lead to much more structural integration, over the next five years.)

Table 11(b). The effect of Internet factors, by size of the sample firms, 1999-2000

Transnationality Index (TI)	Number of firms	Sales ($ billions)	Industry competitive-ness [a]	Inter-firm competitive-ness [a]	Foreign value adding activity [a]	Relative FDI to non-equity [a]	Foreign competitive Advantage [a]	Effect on global structure [b]
Small (<$ 0.3 billion)	43	6.11	3.98	3.98	3.33	2.16	2.74	2.07
Medium ($0.3-2.9 billion)	37	32.24	4.03	3.92	3.16	2.26	2.24	2.03
Large ($3.0-19.9 billion)	13	106.85	5.08	5.08	4.15	2.73	3.08	2.46
Very large (≥$20 billion)	3	107.00	5.00	5.33	4.00	3.33	1.67	2.67
Total	96	252.21	4.18	4.15	3.40	2.31	2.56	2.13

Source: Authors' estimates, based on the results of the survey.

[a] The 7-point Likert scale is 0 to 6. (Zero indicates that the Internet is insignificant, and six indicates that the internet is extremely significant.)

[b] The 7-point Likert scale is -3 to +3. (Negative three indicates that the Internet will lead to less structural integration, and positive three indicates that the Internet will lead to much more structural integration, over the next five years.)

Integration or stand-alone production systems?

It may be reasonably hypothesized that, the more a firm practices a regionally or globally integrated business strategy, the more likely it would derive competitive advantages from foreign sources. Certainly as the data set out in table 12 show, the majority of professional business service respondents believe their foreign operations are part of such a strategy – rather than that of a stand-alone strategy.

On the other hand, when the rankings for each firm with each of the four main groups of competitive advantage were correlated, only relatively weak positive relationships were found in three of these: access to resources and capabilities, inter-firm rivalry and external linkages and a small negative correlation[13] for the consumer demand variable. This latter result is particularly interesting – and

[13] The respective coefficients of correlation were +0.1376, + 0.1336, +0.1295 and – 0.0333.

understandable – as it suggests that there are fewer opportunities for consumer demand related advantages to be obtained in cases where firms practice a globalized strategy, e.g. with respect to product mandates.

Table 12. Perceptions of business strategies as to the extent of foreign operations being part of a regionally/globally integrated business strategy, 1999-2000
(Mean value / Standard deviation)

Classification	Mean value	*Standard deviation*	Classification	Mean Value	*Standard deviation*
By industry			**By TI**		
Accounting/auditing	3.71	*2.29*	Low	4.14	*1.67*
Advertising	4.00	*2.20*	Medium - low	4.24	*1.39*
Architecture	5.00	*0.00*	Medium - high	4.66	*1.72*
Engineering	4.15	*1.78*	High	4.36	*1.53*
Information technology	3.50	*0.71*	Undefined	5.33	*0.58*
Investment and financial services	5.80	*0.45*			
Law/legal firms	4.94	*0.83*	**By KCI**		
Management consulting	5.25	*0.89*	High	4.64	*1.00*
Market research	4.13	*0.99*	Average	4.46	*1.57*
Reinsurance	3.63	*1.85*	Low	3.87	*2.17*
By country/region			**By size**		
"Large" European countries	4.41	*1.64*	Small	4.22	*1.62*
"Small" European countries	4.50	*1.31*	Medium	4.73	*1.50*
United States	4.52	*1.50*	Large	4.42	*1.62*
Japan	3.50	*2.07*	Very large	3.00	*1.00*
Developing countries	4.50	*0.71*			
Other countries	4.62	*1.61*			
All	4.41	*1.58*	All	4.41	*1.58*

Source: Authors' estimates, based on the results of the survey.
Note: The Likert scale is from 0 to 6. (Zero indicates no integration, and six indicates full integration.)

The role of home governments

Along the lines of the manufacturing study, the professional-business-service firms were asked to give their evaluation of the role which (they perceived) their home governments have played, and are playing, in influencing their own ability and willingness to be globally competitive. In the questionnaire, 14 possible ways in which national governments might exert such an influence were identified. For each of these, the respondents were asked to assign a figure on

a Likert scale of –3 to +3, according to whether they thought their home governments had negatively or positively influenced their global competitiveness. (A figure of 0 would indicate a zero or balanced influence.)

Table 13 presents the findings classified by the three groups of industries used in previous tasks. Table 14 does the same for firms classified by their country or region of origin, and table 15 for firms classified by their degree of transnationality.

Table 13 shows that, on average, the respondents to the questionnaire thought that the actions by their home governments had a marginally beneficial effect on their global competitiveness, with the least knowledge intensive firms assigning the highest values in most categories, apart from the provision of infrastructure. The respondents of each of the groups valued the support of their governments most in the provision of telecommunications infrastructure and competition enhancing trade policies, and in the case of the low KCI groups innovation encouraging policies. Overall, it was also perceived that their own governments gave about the same support to their competitiveness-enhancing activities, as did other governments.

More interesting differences are revealed in table 14. European firms generally thought their own governments pursued more competitive enhancing policies than did their United States and Japanese counterparts. The differences were most marked in the case of education, trade, FDI, exchange rate, and innovation policies, and in rule and standard setting. Indeed in five of the policies identified, Japanese professional-business-service firms thought that those pursued by their home government were (marginally) disadvantageous to their global competitiveness. These same TNCs also ranked the support of their own governments relative to those of other governments considerably lower than did those of other nationalities. More generally, it would appear that respondents from all regions and countries thought that the quality of infrastructure provided by their home governments was a more important competitive enhancing vehicle than any of the specific policies they might pursue.

Table 13. Perceptions of the influence of home-government policies on the competitiveness of sample firms, by knowledge-capital intensity, 1999-2000

(Mean value / Standard deviation)

Effects of home-government policies [a]	All firms	High KCI	Average KCI	Low KCI
1. Provision of infrastructure	0.87	0.87	0.92	0.69
	1.02	*0.75*	*0.89*	*1.67*
a) transportation facilities	0.54	0.39	0.65	0.38
	1.20	*0.78*	*1.20*	*1.67*
b) telecommunications	1.30	1.43	1.30	1.13
	1.21	*1.08*	*1.10*	*1.71*
c) legal and institutional	0.76	0.78	0.81	0.56
	1.43	*1.09*	*1.37*	*2.06*
2. Fiscal policies	0.32	0.26	0.23	0.69
	1.46	*1.05*	*1.57*	*1.58*
3. Education policies	0.41	0.26	0.39	0.69
	1.17	*0.86*	*1.06*	*1.78*
4. Trade policies	0.85	1.04	0.79	0.81
	1.20	*1.19*	*1.11*	*1.52*
5. FDI policies	*0.59*	*0.52*	*0.65*	*0.44*
	1.24	*1.04*	*1.31*	*1.31*
6. Labour-market policies	0.25	0.17	0.23	0.44
	1.20	*1.47*	*1.10*	*1.21*
7. Regulatory measures	0.06	0.04	0.07	0.06
	1.41	*1.43*	*1.27*	*1.91*
8. Rule/standard-setting	0.39	0.23	0.50	0.25
	1.08	*0.75*	*0.91*	*1.81*
9. Exchange-rate policies	0.23	0.09	0.16	0.73
	1.04	*0.85*	*1.01*	*1.33*
10. Market-facilitating policies	0.35	0.23	0.29	0.75
	0.99	0.69	0.81	1.65
11. Innovation policies	*0.42*	*0.41*	*0.30*	*0.88*
	1.12	*1.10*	*0.91*	*1.67*
12. Policies affecting culture of consumption	0.19	0.35	0.05	0.44
	0.99	*0.78*	*0.82*	*1.63*
All categories average	0.48	0.45	0.46	0.59
	1.24	*1.09*	*1.17*	*1.62*
Home-government support to competitiveness, relative to other governments [b]	2.73	3.26	2.54	2.63
	1.40	*1.21*	*1.33*	*1.75*

Source: Authors' estimates, based on the results of the survey.

Note: Figures in italics represent the standard deviation of the respective means.

[a] The 7-point Likert scale is from -3 to +3. (Negative three indicates that the home government policy has an extremely negative influence on competitiveness, and positive three indicates that the home government policy has an extremely positive influence on competitiveness.)

[b] The 7-point Likert scale is from 0 to 6. (Zero indicates that home governments are not supportive relative to compe-titor governments, and six indicates that home governments are extremely supportive relative to competitor governments, With regard to the facilitation of competitiveness.)

Table 14. Perceptions of the influence of home-government policies on the competitive advantages of sample firms, by region or country of origin, 1999-2000

(Mean value / *Standard deviation*)

Effects of home-government policies [a]	All	"Large" European countries	"Small" European countries	United States	Japan	Developing countries	Other countries
1. Provision of infrastructure	0.87	0.79	1.21	0.74	1.00	1.67	0.97
	1.02	*0.85*	*0.75*	*1.06*	*1.55*	*0.47*	*1.12*
a) transportation facilities	0.54	0.59	1.25	0.17	1.13	1.00	0.62
	1.20	*1.15*	*0.89*	*1.13*	*1.55*	*1.41*	*1.26*
b) telecommunications	1.30	0.97	1.50	1.42	1.38	2.50	1.38
	1.21	*1.02*	*0.76*	*1.34*	*1.51*	*0.71*	*1.26*
c) legal and institutional	0.76	0.83	0.88	0.64	0.50	1.50	0.92
	1.43	*1.14*	*1.36*	*1.66*	*1.93*	*0.71*	*1.32*
2. Fiscal policies	0.32	0.32	0.50	0.22	-0.38	2.00	0.62
	1.46	*1.36*	*1.69*	*1.38*	*1.19*	*0.00*	*1.89*
3. Education policies	0.41	0.55	0.63	0.25	0.25	2.00	0.23
	1.17	*1.18*	*1.41*	*1.27*	*0.71*	*0.00*	*0.83*
4. Trade policies	0.85	1.21	0.88	0.58	0.25	2.00	1.00
	1.20	*1.11*	*1.13*	*1.27*	*1.16*	*0.00*	*1.08*
5. FDI policies	0.59	0.71	1.00	0.37	0.38	1.00	0.69
	1.24	*1.01*	*1.51*	*1.24*	*1.77*	*1.41*	*1.25*
6. Labour-market policies	0.25	0.48	0.00	0.14	-0.13	1.00	0.31
	1.20	*1.38*	*0.76*	*1.26*	*0.64*	*1.41*	*1.11*
7. Regulatory measures	0.06	0.10	0.75	-0.22	-0.50	1.00	0.54
	1.41	*1.47*	*1.16*	*1.53*	*1.07*	*1.41*	*1.05*
8. Rule/standard-setting	0.39	0.48	0.50	0.12	0.13	1.00	0.92
	1.08	*0.95*	*0.76*	*1.25*	*0.99*	*1.41*	*0.95*
9. Exchange-rate policies	0.23	0.38	0.50	-0.03	0.29	1.50	0.23
	1.04	*1.37*	*0.93*	*0.57*	*1.38*	*0.71*	*1.01*
10. Market-facilitating policies	0.35	0.64	0.38	0.18	0.13	0.50	0.31
	0.99	*1.03*	*0.52*	*0.76*	*1.25*	*2.12*	*1.32*
11. Innovation policies	0.42	0.69	0.63	0.37	-0.25	0.50	0.23
	1.12	*1.04*	*0.92*	*1.17*	*1.39*	*2.12*	*0.93*
12. Policies affecting culture of consumption	0.19	0.17	-0.13	0.42	-0.13	0.50	-0.08
	0.99	*1.00*	*0.83*	*1.00*	*1.64*	*0.71*	*0.29*
All categories average	0.48	0.58	0.66	0.33	0.22	1.29	0.57
	1.24	*1.19*	*1.11*	*1.27*	*1.36*	*1.08*	*1.18*
Home-government support to competitiveness, relative to other governments [b]	2.73	2.79	3.25	2.86	1.63	4.50	2.31
	1.40	*1.26*	*1.16*	*1.59*	*1.30*	*0.71*	*0.95*

Source: Authors' estimates, based on the results of the survey.

Note: Figures in italics represent the standard deviation of the respective means.

[a] The 7-point Likert scale is from -3 to +3. (Negative three indicates that the home government policy has an extremely negative influence on competitiveness, and positive three indicates that the home government policy has an extremely positive influence on competitiveness.)

[b] The 7-point Likert scale is from 0 to 6. (Zero indicates that home governments are not supportive relative to competitor governments, and six indicates that home governments are extremely supportive relative to competitor governments, with regard to the facilitation of competitiveness.)

Table 15. Perceptions of the influence of home-government policies on the competitiveness of sample firms, by transnationality index, 1999-2000
(Mean value / Standard deviation)

Effects of home-government policies [a]	All	Low	Medium-low	Medium-high	High	Undefined
1. Provision of infrastructure	0.87	1.14	0.80	0.94	0.53	0.78
	1.02	*0.91*	*1.05*	*1.00*	*1.15*	*0.69*
a) transportation facilities	0.54	0.63	0.65	0.67	0.27	0.00
	1.20	*0.97*	*1.41*	*1.40*	*1.08*	*0.00*
b) telecommunications	1.30	1.67	1.29	1.30	0.91	1.33
	1.21	*1.24*	*1.10*	*1.12*	*1.31*	*1.53*
c) legal and institutional	0.76	1.13	0.47	0.87	0.41	1.00
	1.43	*1.12*	*1.70*	*1.46*	*1.53*	*1.00*
2. Fiscal policies	0.32	0.04	-0.13	0.80	0.18	1.00
	1.46	*1.23*	*1.26*	*1.49*	*1.71*	*1.00*
3. Education policies	0.41	0.54	-0.18	0.47	0.50	1.33
	1.17	*0.88*	*1.07*	*1.20*	*1.37*	*1.15*
4. Trade policies	0.85	0.71	0.59	1.17	0.68	1.67
	1.20	*1.30*	*0.80*	*1.21*	*1.25*	*1.53*
5. FDI policies	0.59	0.67	0.00	0.96	0.45	0.67
	1.24	*1.31*	*1.00*	*1.23*	*1.26*	*1.15*
6. Labour-market policies	0.25	0.21	-0.06	0.45	0.23	0.67
	1.20	*1.22*	*0.83*	*1.35*	*1.27*	*1.15*
7. Regulatory measures	0.06	-0.21	-0.12	0.07	0.55	-0.33
	1.41	*1.38*	*1.22*	*1.53*	*1.47*	*0.58*
8. Rule/standard-setting	0.39	0.50	0.38	0.31	0.45	0.00
	1.08	*0.98*	*0.81*	*1.28*	*1.18*	*0.00*
9. Exchange-rate policies	0.23	0.17	0.00	0.25	0.41	0.67
	1.04	*1.13*	*0.94*	*1.08*	*1.05*	*0.58*
10. Market-facilitating policies	0.35	0.58	0.06	0.25	0.55	-0.33
	0.99	*0.88*	*0.57*	*0.89*	*1.37*	*0.58*
11. Innovation policies	0.42	0.29	-0.06	0.77	0.57	-0.33
	1.12	*0.95*	*0.90*	*1.07*	*1.40*	*0.58*
12. Policies affecting culture of consumption	0.19	0.21	0.00	0.28	0.18	0.33
	0.99	*0.88*	*0.94*	*1.03*	*1.18*	*0.58*
All categories average	0.48	0.51	0.21	0.62	0.45	0.55
	1.24	*1.19*	*1.12*	*1.29*	*1.31*	*1.02*
Home-government support to competitiveness, relative to other governments [b]	2.73	2.50	2.12	2.83	3.10	4.33
	1.40	*1.38*	*1.36*	*1.32*	*1.41*	*1.15*

Source: Authors' estimates, based on the results of the survey.

Note: Figures in italics represent the standard deviation of the respective means.

[a] The 7-point Likert scale is from -3 to +3. (Negative three indicates that the home government policy has an extremely negative influence on competitiveness, and positive three indicates that the home government policy has an extremely positive influence on competitiveness.)

[b] The 7-point Likert scale is from 0 to 6. (Zero indicates that home governments are not supportive relative to competitor governments, and six indicates that home governments are extremely supportive relative to competitor governments, with regard to the facilitation of competitiveness.)

Lastly, the data set out in table 15 reveal no consistent relationship between the degree of transnationality of the respondent firms and their perception of the competitive influencing policies pursued by their home governments. There is a slight suggestion that the provision of infrastructure by such governments was thought to be more beneficial by firms with a low transnationality index. On the other hand, for most kinds of policies – and particularly fiscal, labour market, exchange rate and innovatory policies – and regulatory measures, government intervention was more favourably viewed by firms with medium-high or high transnationality indexes. It was also these latter firms that most highly regarded the support provided by their home governments relative to that provided by other governments.

Summary and conclusions

Like its earlier counterpart, which investigated the sources of competitiveness of the leading industrial firms, the results of this survey show that a not insignificant part of the competitive enhancing advantages identified by the world's leading professional-business-service firms are derived from their foreign-based activities. They also show that most of these advantages are positively correlated with the degree of transnationality of the sample firms and are most likely to be derived from M&As and non-equity alliances than any other form of cross border economic involvement. For the most part, firms with a relatively low knowledge intensity perceived their foreign operations were likely to yield the highest technological *et al.* feedback, while, at the time of the survey, such a reverse flow of competitive enhancing assets was most marked in the case of firms from smaller European countries and Japan than in that of other countries or regions.

Of the various categories of competitive advantages identified, access to all kinds of labour, relational skills and local industrial capacity, a better understanding of customer needs, and linkages with clients, customers and public or semi-public bodies were the most likely to be sourced from a foreign location. It was these advantages, together with access to suppliers and a better appreciation of customer demands that the advent of the Internet,

and the pursuance of regionally or globally oriented business strategies, have helped to enhance.

The role of home-country governments in influencing the global competitive advantages of the professional-business-service firms was perceived to be marginally beneficial. The fact, however, that executives from Japan and the smaller European countries took a somewhat different view on the role of governments than those from the United States and the large European countries reflect some very distinctive country specific perspectives of the respective role of governments, hierarchies and markets in contemporary capitalism.

Finally, professional-business-service respondents were asked to give their views on the likely change in the relative importance of the competitive advantages acquired as a direct result of their foreign operations over the period 2000-2004. On a seven-point Likert scale from –3 to +3 (negative 3 indicating substantially less, +3 substantially more), the average (unweighted) score of the 96 professional-business-service firms was 1.81 (SD 1.07). Of the industries identified, the law and architectural firms with scores of 2.33 and 2.00, respectively, had the highest expectancies of their future foreign operations; the reinsurance, and information technology firms had the least. The score for smaller European countries and Japan (at 2.25 and 2.00, respectively) were higher than those for the United States (1.75) and European countries (1.86). There was, however, no discernible pattern of expectations among firms when classified by knowledge capital intensity, size or degree of transnationality. *Perhaps most significantly of all, only two of the 94 respondents giving information on this point thought that the foreign sourcing of their competitive assets would become relatively less important over the first four years of the present century*.[14]

[14] Further results of the survey on which the data in this article are based are contained in McKaig Berliner (2001).

A policy footnote

As with the previous study (Dunning, 1996), the policy implications of the current findings are straightforward. National governments need to recognize that firms are now engaging in FDI and other foreign activities to protect or augment their existing competitive advantages, as well as to exploit such advantages. The current survey has shown that this no less applies to firms engaged in professional business services as in those in industrial activities. The data presented strongly suggest that, as the foreign operations of professional business services firms become a more significant component of their global operations, there is an increasing feedback to their home countries of knowledge, supply capabilities, the needs of foreign consumers, and the benefits of external clusters and linkages.

This being so, it is all the more imperative for national governments to liberalize further regulatory measures towards FDI in the professional business service industries. At the same time, they should do their best to ensure that their macro-organizational policies do nothing to impede their TNCs in these industries from both exploiting and augmenting their competitive advantages in the global market place. Finally, the findings of this article have underlined the need for supranational entities – such as the WTO – to work towards an open and fair trading regime for professional business services and, in due course, set the regulatory framework for a free and fair flow of FDI in this industry. ■

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Linking FDI and technology development for capacity building and strategic competitiveness

Sanjaya Lall *

This article addresses the role of FDI in technology transfer and learning, particularly by transnational corporations. It highlights the important role that such corporations can play in the transfer of technology, but emphasizes that technology transfer should be maximized and complemented by appropriate country policies. It identifies key trends in the global economy to demonstrate that technology-intensive products have the fastest-increasing share of growing world trade, so developing countries should develop capabilities in technology-intensive products. It further identifies the notable success achieved by South-East Asian economies. The article also discusses the role of FDI, research and development, licensing, information and communication technology infrastructure and human capital as key structural determinants of industrial competitiveness, which technology policy should focus on. The article considers foreign direct investment-targeting strategies, and argues that there is a prominent role for policy intervention. On the basis of its evaluation of the country case studies, the article considers the strategies used successfully to build domestic capabilities, providing a broad set of policy options from which to choose from. However, there is no single path to competitive success. The article emphasizes the variety of diverse paths followed by different countries.

Key words: foreign direct investment, technology, development, competitiveness, transnational corporations, policies, developing countries, South-East Asia.

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Introduction

Rapid technical change and accelerating globalization are changing radically the context for economic development. These changes offer developing countries both enormous promise – of massive productivity increase and more access to new resources and markets – as well as considerable risk – of economic dislocation, stagnation and marginalization. This article discusses the central role of technological capabilities in building competitiveness, focusing on the interaction between foreign direct investment (FDI) and domestic technological effort.

International competitiveness is more than ever before at the core of industrial success, and it is taking new forms. Trade liberalization is forcing enterprises to face unprecedented global competition in domestic as well as foreign markets. The falling costs of distance make this competition more immediate and intense than in the past. Rapid technical change forces producers to constantly upgrade their process technologies and introduce new products. It also changes patterns of trade, with product segments based on research and development (R&D) growing faster than less technology-intensive segments. Innovation itself is more costly and often more risky than before, with continuing high concentration of advanced R&D spending by country and enterprise. There is now greater inter-firm and cross-national collaboration and networking in innovative effort.

One important consequence of liberalization and technical change is that technology and capital are far more mobile than before, with FDI playing a key role in resource mobility. However, the role of major foreign investors (transnational corporations [TNCs]) goes much further than transferring productive resources: it includes the organization of economic activity across national boundaries in new ways, with production and services linked across far-flung sites to take advantage of fine cost, capability, logistic and market differences. The linkages involve not only TNCs but also a whole array of linked but separate enterprises, both foreign affiliates and locally owned firms.

The changing organization of international production, with tightening links to exploit location advantage in a context of constant

technological ferment, has crucial implications for capability building in the developing world. Does it mean, for instance, that developing countries can benefit from the "global shift" in production (Dicken, 1998) by simply opening their economies to world markets and resource flows? Or is there still a role of economic policy? The changing organization of international production, with tightening links to exploit location advantage in a context of constant technological ferment, has crucial implications for capability building interventions by Governments. If there is a role for policy, how should countries treat FDI (the import of technologies in an internalized form) as compared to other forms of technology import (in externalized forms) to support the development of capabilities in national enterprises? Are FDI and local technology development complementary or competitive? What strategies have successful countries adopted with respect to FDI and indigenous technology development?

The growing importance of competitiveness

International competitiveness has long been considered vital to growth in industrial economies. With globalization, it is also becoming crucial for the developing countries that have long insulated themselves from world markets (Lall, 2001). Attaining competitiveness is difficult, and needs much more than simply opening up passively to free markets. It is something that *has to be built*: and the process is generally complex, demanding and costly (UNIDO, 2002). Developed countries worry greatly about competitiveness, about maintaining their competitive lead over new entrants, and their concerns are revealed by the steady stream of productivity and competitiveness analyses. The process is more difficult, and the stresses correspondingly greater, for developing countries, though a large body of theory suggests that with their wage cost advantages all they should do is open up to global trade and investment flows. The evidence shows that this is too simple a view, and that it is leading to growing divergence industrial performance rather than convergence.

The main reasons for the rising importance of international competitiveness are technological. The rapid pace of innovation – and the resulting promise of productivity increase – makes it more costly to insulate economies from international trade and investment.

Since new technologies benefit all activities, traded and non-traded, rapid access to such technologies in the form of new products, equipment and knowledge becomes vital for national welfare. Insulation from global markets and technologies is no longer a viable option for any developing country. Then there is the shrinking of economic distance – a consequence of technological change in communications and transport – that reduces transaction and information costs and so forces economies together. The growing ability of firms to network far-flung activities, also a consequence of shrinking economic distance, allows production chains to be spread over longer distances, so leading to closer integration of activities, processes or even specific functions.

The interplay of these factors is causing significant changes to the location of productive activity across countries, and so to new patterns of global trade and national comparative advantage. There is a continuing surge of activities and functions seeking more efficient locations across the globe, led mainly by TNCs but also in some cases by other agents like buyers and retailers. Global value chains are now more tightly knit and coordinated, particularly in technologically sophisticated activities. Since such sophisticated activities are the fastest-growing segments of trade, entry into the most dynamic, technology-based activities entails "plugging into" TNC dominated-chains.

The growing mobility of productive factors does not, however, mean that they are spreading evenly across low-cost countries. On the contrary, there is a growing tendency – particularly in technology-intensive activities – for mobile resources to concentrate in a few sites. There are, in other words, few "sticky places" in the "slippery slopes" of globalized activities. What is more important, this stickiness is tending to rise over time because of cumulative forces like (path-dependent) capability, institutional and infrastructure development, scale and agglomeration economies and network externalities. Moreover, as first movers enhance their location advantages and incomes grow, the attractions of their domestic markets rise and reinforce their draw to the mobile factors. This is why the process of industrial divergence, once started, builds up cumulatively; at some stage, of course, it may be reversed if costs rise in advance of productivity or if there is undue congestion, but

this stage is still some way from being reached in the developing world.

The globalization of economic activity thus does not reduce the need for low-wage economies to become competitive (in non-wage terms): quite the contrary. As more low-wage sites compete for mobile resources, and as technical change erodes the competitive advantage of cheap unskilled labour, *the quality of local capabilities and institutions becomes the prime determinant of the ability to attract and use foreign resources*. What is more important is that emerging global value chains are not curtailed. Because of growing specialization, lead players in each value chain rely increasingly on independent suppliers of inputs, services and even innovation, even in highly concentrated technology-intensive industries. As a consequence, there is considerable scope for domestic enterprises to enter into global value chains as suppliers and, in some cases, as independent players. Increasingly, therefore, there are competitive pressures to foster efficient local clusters.

Growing competitive pressures are also a consequence of policy liberalization. To a large extent this also reflects technological realities – the realization that the only way for poor countries to benefit from new productive knowledge, reach large markets and share in the global shift of productive activity is to be more open. There is a growing belief that there is no other way to develop industrially than to participate in the dynamics of globalization.

Being more open does not, however, mean relying entirely on free markets. Competitive success in an innovation-driven global economy needs strong local capabilities, and the development of capabilities faces numerous market and institutional failures (Lall, 2001; Stiglitz, 1996 and 2002). Free market forces cannot achieve this. They cannot allocate resources optimally, facilitate structural change and dynamize competitiveness in economies with missing or grossly deficient markets, institutions and massive coordination problems. A strong strategic role remains for proactive government. If anything, this role is stronger with the opening of markets and the increasing mobility of productive factors. However, the role is very different from the traditional one assumed by governments during import-substitution, when policy interventions were not geared to

overcoming market and institutional failures in building internationally competitive capabilities. They have to specifically address such failures and attempt to tap global markets and technologies. There are many ways in which this can be done effectively, as the experience of East Asia shows (Lall, 1996 and 2001).

Technology and capability building: analytical framework

Technological effort is vital to developing countries, even though it is clear that they are not innovating at the frontier. They import new technology, equipment, patents and so on from more advanced countries, but they have to learn to use these inputs effectively. Using new technologies is not an automatic or simple process. It entails the conscious building of technological capabilities – a mixture of information, skills, interactions and routines that firms need to handle the tacit elements of technology.

Theory assumes that technology mastery and diffusion in developing countries are relatively easy, knowledge is not tacit, and that the markets involved are relatively efficient. Thus, developing countries simply import and apply existing technologies, picking them in line with their factor prices. Once selected, technologies can be used effectively from the start (apart from minor learning-by-doing). In this setting, free international trade and investment flows maximize the inflow of beneficial new technology.[1]

This approach is *over-simplified*. The international technology market is far from perfect.[2] Once imported, using

[1] Despite their emphasis on human capital and technology, endogenous growth models also assume that in developing countries openness to trade and investment (both conducive to technology flows) is both necessary *and sufficient*.

[2] The international technology market is fragmented and ill defined, and searching for the optimal technology deal can be costly and difficult. It is not easy to define the technology product or its price. The transfer can take many different forms (i.e. the product is not well specified). Much depends on how much technical and other information the seller includes (or the buyer asks for) and how it transmits this information and modifies it over time. The seller knows more about the product than the buyer does (otherwise it would have nothing to sell). The buyer thus operates under an information asymmetry, largely absent in transactions in physical products.

technology efficiently is not easy, costless or automatic (Nelson and Winter, 1982). Technology is not sold in embodied forms. Its tacit elements need effort and time to master. Its efficient use cannot therefore be assumed for poor countries that expose themselves to more world markets and technologies. Technological mastery entails building costly new capabilities; it takes time and investment and is uncertain (Lall, 1992 and 1993).

Some important features of the capability building process are described in box 1. The learning curve is not known in advance. Learning is technology and firm specific, and often occurs in an uncertain environment where the skills, information, networks and credit needed are not available. Many enterprises do not even know how to go about learning, and have to learn to learn. They interact intensively with other agents, with extensive spillovers. Once launched, the process is difficult to change. The learning process is, in other words, rife with externalities, agglomeration, path-dependence and cumulative effects.

Box 1. Ten features of technological learning in developing countries

1. Technological learning is a real and significant process. It is conscious and purposive rather than automatic or passive. Firms using a given technology for similar periods need not be equally proficient: each would travel on a different learning curve according to the intensity and efficacy of its capability building efforts.
2. Firms do not have full information on technical alternatives. They function with imperfect, variable and rather hazy knowledge of technologies they are using.
3. Firms may not know how to build up the necessary capabilities — learning itself often has to be learned. The learning process

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Even with full information, the two parties can have different valuations of the technology depending on their market positions, expectations and technological capabilities. Since technological information is constantly changing, the valuation also depends on which vintage is being transferred and how its future evolution is foreseen. For these reasons, the price and terms of technology transfer are subject to bargaining and the accompanying uncertainty and non-transparency (Radosevic, 1999).

Box 1 (continued)

faces risk, uncertainty and cost. For a technological latecomer, the fact that others have already undergone the learning process is both a benefit and a cost. It is a benefit in that they can borrow from the others' experience (to the extent this is accessible). It is a cost in that they are relatively inefficient during the process (and so have to bear a loss if they compete on open markets).

4. Firms cope with uncertainty not by maximizing a well-defined function but by developing organizational and managerial satisficing routines (Nelson and Winter, 1982). These are adapted as firms collect new information, learn from experience and imitate other firms. Learning is path dependent and cumulative.
5. The learning process is highly technology specific, since technologies differ in their learning requirements. Some technologies are more embodied in equipment while others have greater tacit elements. Process technologies (like chemicals) are more embodied than engineering technologies (machinery or automobiles), and demand different (often less) effort. Capabilities built up in one activity are not easily transferable to another.
6. Different technologies have different spillover effects and potential for further technological advance. Specialization in technologies with more technological potential and spillovers has greater dynamic benefits than specialization in technologies with limited potential.
7. Capability building occurs at all levels — shop floor, process or product engineering, quality management, maintenance, procurement, inventory control, outbound logistics and relations with other firms and institutions. Innovation in the sense of formal R&D is at one end of the spectrum of technological activity; it does not exhaust it. However, R&D becomes important as more complex technologies are used; some R&D is needed just for efficient absorption.
8. Technological development can take place to different depths. The attainment of a minimum level of operational capability (know-how) is essential to all activity. This may not lead to deeper capabilities, an understanding of the principles of the technology (know-why): this requires a discrete strategy to invest in deepening. The deeper the levels of technological capabilities aimed at, the higher the cost, risk and duration involved. The development of know-why allows firms to select better the technologies they need, lower the costs of buying those technologies, realize more value

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Box 1 (concluded)

by adding their own knowledge, and to develop autonomous innovative capabilities.

9. Technological learning is rife with externalities and inter-linkages. It is driven by links with suppliers of inputs or capital goods, competitors, customers, consultants, and technology suppliers. There are also important interactions are with firms in unrelated industries, technology institutes, extension services, universities, associations and training institutions. Where information flows are particularly dense, clusters emerge with collective learning for the group as a whole.
10. Technological interactions occur within a country and with other countries. Imported technology is generally the most important initial input into learning in developing countries. Since technologies change constantly, moreover, access to foreign sources of innovation is vital to continued technological progress. Technology import is not, however, a substitute for indigenous capability development — the efficacy with which imported technologies are used depends on local efforts to deepen the absorptive base. Similarly, not all modes of technology import are equally conducive to indigenous learning. Some come highly packaged with complementary factors, and so stimulate less learning.

Source: Based on Lall, 2000.

In sum, learning to use new technologies (new to a particular user or location) needs investment and conscious effort. Much of the effort lies within the firm, but a significant part lies outside, in other firms, factor markets and support institutions. While the capability building process is essential in both developed and developing countries, it tends to be more difficult in the latter, with weak enterprises, networks, markets and institutions. Furthermore, mastering new technology is not a once-for-all task. Most developing countries start with comparatively simple, labour-intensive technologies for which skill needs are low, learning is short and relatively less risky and there is little need for inter-firm or inter-industry coordination. Once mastery is achieved, continued development (with rising wages) involves the *upgrading* and *deepening* of technologies. Otherwise, countries that establish a

competitive niche in a low technology activity may stagnate at the bottom of the technology ladder. To sustain competitive growth, they must move into more advanced technologies and technological functions within activities. At each stage, learning needs new knowledge, skills, institutions and policies. This has always been true, but the new technological paradigm means that the challenges are greater.

A useful way to analyze this is to divide technological capabilities into four levels. At the bottom are the simplest (operational) ones, needed for running a technology efficiently: these involve basic manufacturing skills as well as some more demanding troubleshooting, quality control, maintenance and procurement skills. At the intermediate level are duplicative skills, which include the investment capabilities needed to expand capacity and to purchase and integrate foreign technologies. Next come adaptive skills, where imported technologies are adapted and improved, and design skills for more complex engineering learned. Finally come innovative skills, based on formal R&D, that are needed to keep pace with technological frontiers or to generate new technologies.

Continuous access to new technologies is essential to sustaining competitiveness (Radosevic, 1999). Such access can take two broad forms: *internalized* (from a TNC to foreign affiliates under its control) and *externalized* (between independent firms). While internalized modes necessarily involve TNCs, externalized ones may also involve TNCs selling technologies on contract (TNCs are often the largest sellers of licensed technology in world markets). However, there are also other sources of technology: locally owned enterprises, consultants, capital goods producers, research institutions or governments. The sale can take a variety of forms: minority joint ventures, franchising, turnkey projects, sale of equipment, licences, technical assistance, subcontracting or original equipment manufactures (OEM) arrangements. Internalized transfers bring a package of supporting inputs to ensure their efficient deployment. Externalized transfers may involve additional inputs by the technology seller, but generally tend to call for greater learning effort by the recipient.

Role of FDI in technology transfer and learning

The TNCs that dominate global FDI flows are also the main source of innovation: innovation is often the main competitive factor that allows them to become (and remain) transnational. Despite the recent growth of small technology start-ups, concentration in R&D remains high. For instance, in 1997 the largest 2 per cent (by employment) of manufacturing companies undertaking R&D in the United States accounted for nearly 80 per cent of industrial R&D spending (calculated from NSF, 2000). Such concentration is even higher in developed countries (UNCTAD, 1999). It does not seem to have declined over time.

As major innovators, TNCs are the main sources of international technology transfer. Their role is naturally larger in high-technology activities where they possess the strongest advantages (box 2).

Box 2. TNCs and technology

- Between 30 and 40 per cent of world trade is carried out within TNC systems (UNCTAD, 2002), between affiliates and parent firms or among affiliates. Such internalized trade contains the most dynamic exports today, moving within integrated international production systems (UNCTAD, 1993 and 2002, chapter V), where TNCs locate different functions or stages of production to different countries. Affiliates participating in such systems produce at massive scales and use the latest technologies, skills and managerial techniques. Examples of complex integrated systems in which developing countries are important are automobiles (mainly in Mexico, Brazil and Argentina) and electronics (Malaysia, Singapore, the Philippines and Mexico; UNCTAD, 2002, chapter V). The globalization of the value chain is likely to spread across many other industries, and linking local production chains to them will become a major source of growth, technology transfer and skill development.
- Some TNCs are locating non-production functions like accounting, engineering, R&D or marketing to affiliates – these are high value activities that feed into manufacturing competitiveness and local capabilities. This is what UNCTAD

/...

Box 2 (continued)

calls "deep integration" in international production, in contrast to earlier "shallow integration" where stand-alone affiliates replicated many functions and related to other affiliates or parents via trade (UNCTAD, 1993, p.113). However, the transfer of functions such as R&D lags that of production, particularly in developing countries. Over 90 per cent of overseas R&D by United States TNCs is in other developed countries **(source)**. TNCs from smaller countries are more international in terms of relocating R&D overseas, but TNCs from economies like the United Kingdom are also conducting very substantial amount of R&D overseas. However, much of such R&D remains confined to other industrial countries. For deep integration to occur, host countries have to be able to provide not just cheap labour but the whole array of modern skills, infrastructure, institutions, efficient business practices and supplier networks that TNCs need to be fully competitive in world markets. Very few developing countries are able to meet these needs.

- Large TNCs increasingly dominate the process of *innovation*: the creation of new technologies and organizational methods that lies at the core of competitiveness in all but the simplest activities. Most such companies originate in mature industrial countries. About 90 per cent of world R&D expenditure is in the member countries of the Organisation for Economic Co-operation and Development **(source)**. Within this group, seven countries (led by the United States) account for 90 per cent, the United States alone for 40 per cent. Access to new technologies thus involves getting knowledge from technological leaders in these countries. Many are increasingly unwilling to part with their most valuable technologies without a substantial equity stake. Thus, FDI becomes the most important – often the only – way of obtaining leading edge technologies.
- TNCs are often central to *exports by local firms* of technology-intensive products. Many such products are difficult to export independently because of the need for expensive branding, distribution and after-sales servicing. Thus, 60-70 per cent of consumer electronics made by Republic of Korea and Taiwan Province of China is sold to TNCs on an OEM basis **(source)**. The significance of OEM for Republic of Korea is shown by

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Box 2 (continued)

the following statistics. In 1985, over 40 per cent of Korean exports were in the form of OEM. In 1989, around 50-60 per cent of videocassette recorder and television and about 80 per cent of personal computer exports by the Republic of Korea were under OEM. In 1990, 70-80 per cent of total Korean electronics exports were under OEM (Cyhn, 2000). TNCs are also active in *exports of low technology products* where factors like scale economies, branding, distribution and design are important.

- TNCs can help *restructure and upgrade competitive capabilities* in import-substituting activities. Where the facilities are already foreign owned, TNCs are often better able to respond to liberalization than local firms by investing in new technologies and skills. They can also help local suppliers to upgrade, or attract investment by their suppliers overseas. This has been commonly found in Latin America. Where local firms own the facilities, TNCs help them to upgrade through mergers and acquisitions (M&As). While cross-border M&As are often regarded with suspicion or resentment, they can salvage existing facilities that would not survive in a liberalized environment. In fact, with globalization and liberalization, international M&As now constitute the bulk of FDI flows, accounting for some 80 per cent of FDI in developed countries and around one-third in developing ones (UNCTAD, 2000).
- FDI in services is rising rapidly as formerly homebound providers (as in utilities) globalize activities and take advantage of liberalization and privatization in their industries. The entry of service TNCs can provide rapid improvements in productivity and efficiency to host economies, not only to their industries but also to their customers (many of which are important exporters).

Source: Author's summary, based on various *World Investment Report*s.

In general, internalized technology flows are a very efficient means of transferring a package of capital, skills, information and brand names to developing countries. For many new technologies, internalized transfers are the *only possible* mode of transfer, since innovators are unwilling to part with them to unrelated parties. Even

where technologies *are* available at arm's length, internalization may be the most efficient way of transferring the tacit knowledge involved because of the commitment of the transferor and its capability to support learning. If the technology is changing rapidly, internalization provides the most direct access to improvements. If the activity is export-oriented, internalized transfers offer the additional advantages of international marketing skills and networks, established brand names or, of increasing relevance, access to integrated production structures spanning several countries.

However, internalized technology transfers also carry costs. Profits are realized by the TNC on the package as a whole rather than just the innovation component. If the host country already possesses other elements of the package, it may be cheaper to buy the technology separately (economies like the Republic of Korea and Taiwan Province of China did this because their enterprises had the necessary capabilities to master the technology). In general, the more standardized and diffused the technology and the more capable the buyer, the more economical will externalized modes be. However, there is a more subtle reason: the existence of learning benefits, deepening and externalities may tilt the choice in favour of externalization, even for relatively complex and difficult technologies. In these activities, reliance on FDI can shorten the learning period but reduce the other benefits of technology transfer and capability building.

One advantage of internalized forms of technology transfer lies in the long-term commitment of the foreign partner to the project and its ability to provide the elements needed to operationalize new technologies. At the lowest level, therefore, FDI is a very efficient way of transferring technology. Since all technologies need adaptation and improvement, foreign affiliates, with their base of high level management and technical skills, tend to be in the forefront of such activity in developing countries. In addition, TNCs have the experience of other affiliates in the developing world to draw on, and can shift knowledge and personnel across countries to help with the upgrading of local capabilities.

As capability development progresses to the top level, where local innovative efforts become viable, there can be a conflict of

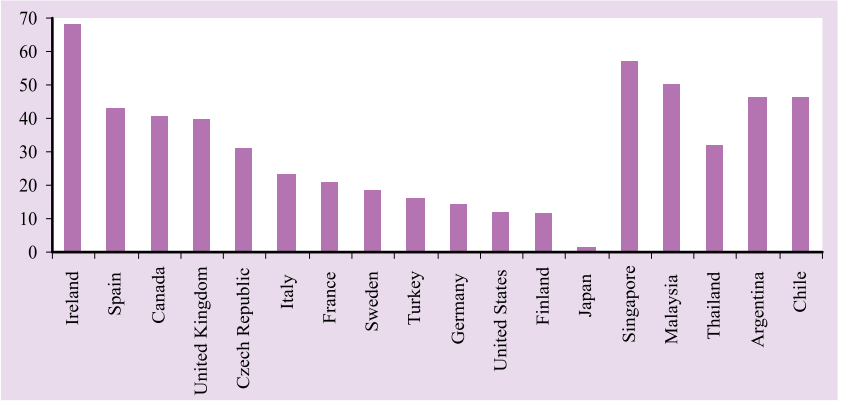
interest between the host country and the foreign investor. Internalized technology transfer and local capability development can, in other words, become *competitive rather than complementary*. There are good reasons for TNCs to keep innovative work centralized at home or in a few developed countries; these reasons include ease of coordination, skill availability, proximity to main markets, and more advanced science and technology infrastructures. At the same time, it is important for countries at a certain stage of industrial development to deepen their capabilities and move into innovation. *TNCs tend to transfer the results of R&D rather than the process itself*, whereas the sustained technological growth of developing countries calls for increasing local innovation. There is clear potential for a clash between the social interests of the host economy and the private interests of TNCs. At this stage, there is a case for restricting reliance on internalized forms to promote local R&D capabilities based on externalized forms or for intervening in the FDI process to induce TNCs to transfer more advanced technological functions.

However, while the innovation function of TNCs is the slowest to relocate from the home country, particularly to developing countries, it *does* shift to affiliates over time. Given the availability of the high-level skills and infrastructure (including R&D institutions and universities of sufficient quality), foreign affiliates in developing countries do start to conduct R&D. They initially start with simple adaptive tasks, move on to process development, then move to product development and finally to basic ("blue sky") research. Only a few economies have reached this stage, like Singapore, Brazil, India, the Republic of Korea or Taiwan Province of China (China is catching up fast), and the amounts involved are small relative to TNC R&D in advanced economies, but the trend is clear.

Figure 1 shows the share of TNCs in R&D in a selection of economies on which the relevant data are available. There is enormous variation in both industrial and developing countries. In the developed world, Ireland has an overwhelming share of foreign affiliates in national R&D. In the developing world, in Singapore, there is a similar high share. Both countries have very high FDI inflows relative to their economic size. Both have sought to attract TNCs deliberately and induce them to upgrade their manufacturing activities (from simple to complex) and functions (from manufacturing to design and development). Both have used instruments of selective industrial

policy assiduously to achieve technological development and upgrading through FDI.

Figure 1. Shares of foreign affiliates in R&D, 1996-1998
(Per cent)



Source: OECD, 1999, and national sources.

The important point to note is that technological upgrading *is possible* by relying heavily on TNCs, but that this requires considerable policy intervention. The pace and depth of technology development may not match that of countries that effectively adopt more autonomous strategies of building technological capabilities in domestic firms. These points will be analyzed later, when considering the East Asian experience.

Current trends in the global economy

Rapid technological progress is, as noted, causing significant long-term shifts in the structure of industrial activity, and it is vital for developing countries to be aware of these changes. While all activities undergo technical change, those with higher technological intensity – with higher than average expenditures on R&D – tend to grow faster than other activities. At the core of high-technology products is the group of information and communication technology (ICT) products that are one of the main engines of the current technological revolution.

The data in table 1, taken from the United Nations National Science Foundation (NSF, 2000), show that high-technology activities the world over are expanding in both production and trade much faster than other manufacturing activities. Note also that trade is growing much faster than production, indicating the globalization of all economies. The 68 economies in the NSF sample together account for over 95 per cent of world industrial production.

Table 1. Rates of growth of high-technology and other manufacturing in 68 economies, 1985-1997
(Per cent)

Economy	All production	All exports	High-technology production	High-technology exports
All	2.7	7.3	5.9	10.8
China	11.7	20.5	14.9	30.2
Republic of Korea	10.2	10.6	15.4	18.7
Singapore	8.0	15.0	13.1	21.7
Taiwan Province of China	4.7	12.0	11.6	18.9
Hong Kong, China	-0.2	13.5	3.5	18.1
United States	2.9	8.8	4.7	10.1
Germany	2.2	4.1	3.8	5.8
United Kingdom	1.7	6.3	3.3	8.0
Japan	1.7	2.4	5.2	4.4
France	1.2	5.8	3.6	10.8

Source: NSF, 2000.

Technology-intensive industrial activities offer other benefits apart from rapid growth: they also offer greater learning potential and greater spillover benefits for other activities. And such activities have become the most active field for international investment. This means that there are three arguments for developing countries to aim for deliberate technological upgrading of the industrial structure. First there is a market positioning argument: a country that wants to locate its production and exports in the fastest-growing markets has to move into technology-intensive activities and upgrade its technology structure. Second, countries that want to deepen technological development and gain from the spillover effects of learning in lead sectors again have to focus on technology-intensive activities. Third, those that wish to share in the most dynamic segments

of world trade — the international production systems of TNCs — have to build the capabilities for technology-intensive activities. They can enter the assembly stage, but later have to upgrade within the system, moving up into manufacturing, design, development, and regional service activities.

Now consider the detailed technological patterns of exports, broken down between primary and manufactures, with the latter sub-divided into four categories. These are: resource-based; low-technology (such as textiles, clothing, footwear, simple engineering products); medium-technology (industrial machinery, automobiles, chemicals, and so on); and high-technology (with ICT products shown as a sub-category). The medium-technology group is the largest—the heartland of heavy industry—but the high-technology group, with only 18 products at the 3-digit Standard International Trade Classification (SITC) level, is driving world trade and may soon be the single largest category.

Table 2 shows growth rates for the period 1985-2000. Primary products grew the slowest, and nearly halved their share of total exports. Resource-based manufactures followed. Low and medium-technology manufactures grew at more or less the same rate, and both slightly raised their market shares (in a more detailed calculation, not shown here, medium-technology products grew faster than low-technology after 1995). The fastest-growing group was high-technology products. At the start of the period, in 1985, the 18 high-technology products comprised about one tenth of total world trade; by 1998, they accounted for nearly a quarter. At current rates, these few products will soon account for the largest share of exports.[3] Of the 20 fastest growing products in world trade (with export values of $5 billion or more) in 1990-2000, the five leaders are all high-technology products. Of these, four are electronic or electrical products and one is pharmaceuticals.

In terms of market shares, primary products have been losing ground steadily since 1976. Within manufacturing, resource-based products have lost shares since the early 1980s, low-technology

[3] At the 3-digit SITC (rev 2) classification used here, there are 45 primary products, 65 resource-based, 44 low-technology and 58 medium-technology products.

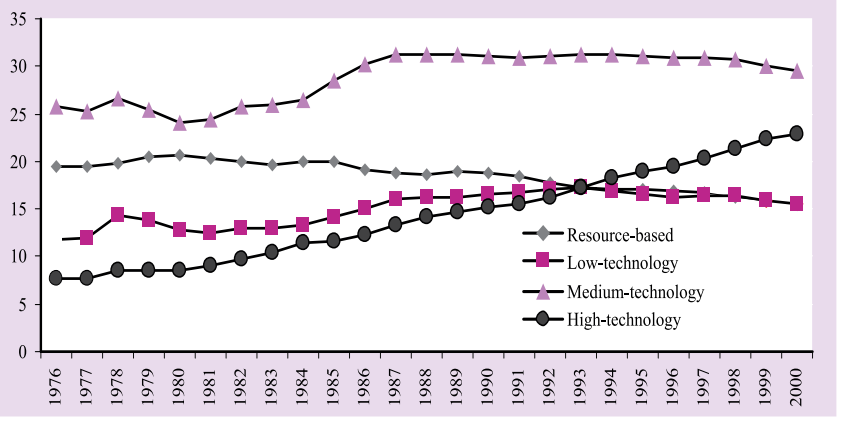
since 1993 and medium-technology since 1998 (figure 2). The only group to steadily raise its market share is high-technology. While these may not capture real long-term trends, they do suggest that exports of technologically intensive products are growing faster than other products.

Table 2. Structure of world exports, 1985-2000
(Million dollars and per cent)

Products	World exports 1985	2000	Annual growth rate	Distribution 1985	2000
All sectors	1,703,582.5	5,534,008.6	8.17	100.0	100.0
Primary products	394,190.5	684,751.1	3.75	23.1	12.4
Manufactures	1,252,573.7	4,620,266.8	9.09	73.5	83.5
Resource-based	330,863.9	863,503.5	6.60	19.4	15.6
Low-technology	241,796.1	862,999.0	8.85	14.2	15.6
Medium-technology	485,784.0	1,639,871.9	8.45	28.5	29.6
High-technology	198,029.7	1,269,587.2	13.19	11.6	22.9
Of which: ICT	90,151.8	773,119.2	15.40	5.3	14.0

Source: Calculations by UNCTAD, based on the United Nations Comtrade database, using the classification developed in Lall, 2001.

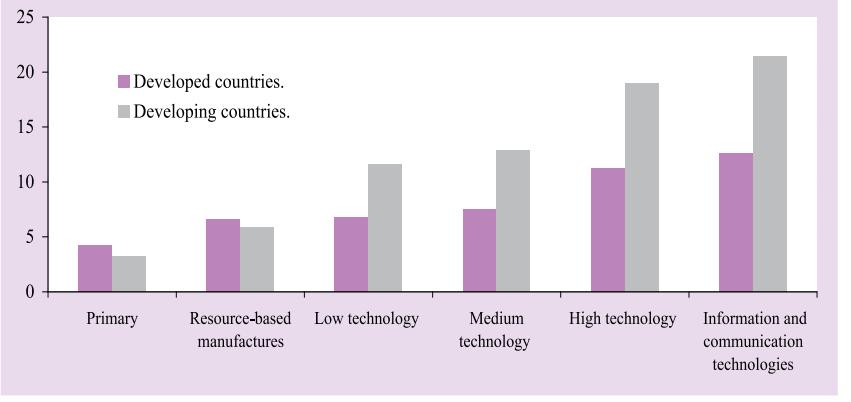
Figure 2. Shares of manufactured products in world exports by technology
(Per cent)



Source: UNCTAD, 2002, p. 145.

Developing countries as a group are doing rather well in this export scene. To start with, their total manufactured exports are growing faster than those of developed countries. This is to be expected, since they started from a lower base. However, the technological patterns of their growth are interesting, and somewhat unexpected. Developing countries grew more slowly than developed countries in primary products and resource-based manufactures (figure 3), presumably because of the faster application of new technology or because of trade barriers and subsidies in the developed world. Within other manufactured products, their relative lead over industrial countries rose with technology levels. At first sight, this is a counterintuitive outcome: theory would suggest that developing countries grow fastest relative to developed countries in low-technology, less in medium-technology, and least in high-technology, products. The data show just the reverse.

Figure 3. Annual growth rates of exports by developed and developing countries, 1985-2000
(Percentage)



Source: UNCTAD, 2002, p. 146.

Moreover, it is not just rates of growth that show this trend (caused, say, by the small base of high-technology products); the values involved are also very large. high-technology products are now the largest component of developing country manufactured exports. In 2000, at $445 billion, they were $60 billion larger than their primary exports, $210 billion larger than resource-based

manufactured exports, $39 billion larger than low technology exports and $140 billion larger than medium technology exports (UNCTAD, 2002).

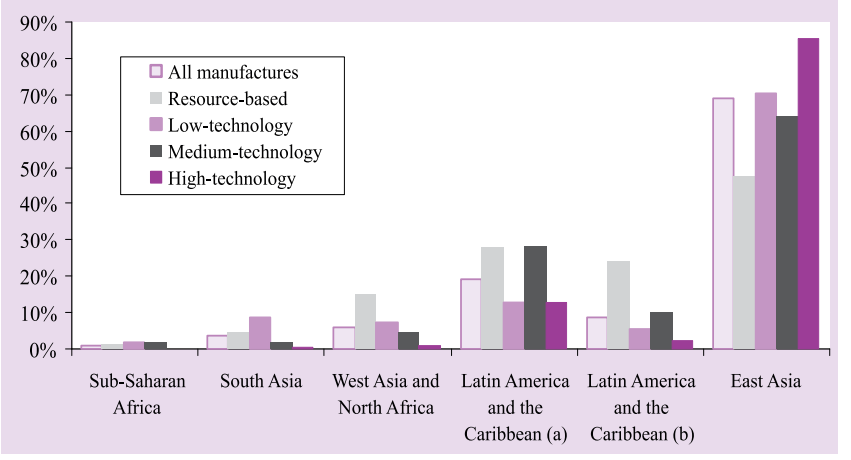
This pattern suggests that developing countries are doing well under globalization, raising their competitiveness overall and also moving rapidly into dynamic technology-based exports. Unfortunately this is only partially true. Export dynamism and success in technology-intensive exports are *highly concentrated*, both by region and by country. Moreover, the local depth and rooting of high-technology activity vary greatly among the successful exporters; those with shallow roots may find it difficult to sustain their recent growth of competitive production. It is important to consider these variations to assess how FDI and local technological effort affect competitive success in leading developing countries.

Consider first the concentration at the regional level (figure 4). Sub-Saharan Africa (even including South Africa, which accounts for over 40 per cent of its industrial production and even more of its manufactured exports) is very weak, and is losing its small shares over time. Its virtual absence in high-technology exports is one sign of its marginalization in the dynamics of world trade. In contrast, East Asia now accounts for about 75 per cent of total manufactured exports, and about 90 per cent of high-technology exports. What is more, its dominance has increased in practically all categories since 1985. It is this success of East Asia in technology-intensive manufacturing and export markets and its growing dominance across the board that justifies the focus of this article on the Asian tigers as insightful case studies, for policy lessons that may prove useful elsewhere.

South Asia does well in low-technology products, basically clothing, but greatly under-performs other categories (this excludes Indian software exports, not captured by these data). Except for Mexico, Latin America does poorly in dynamic products in world trade.

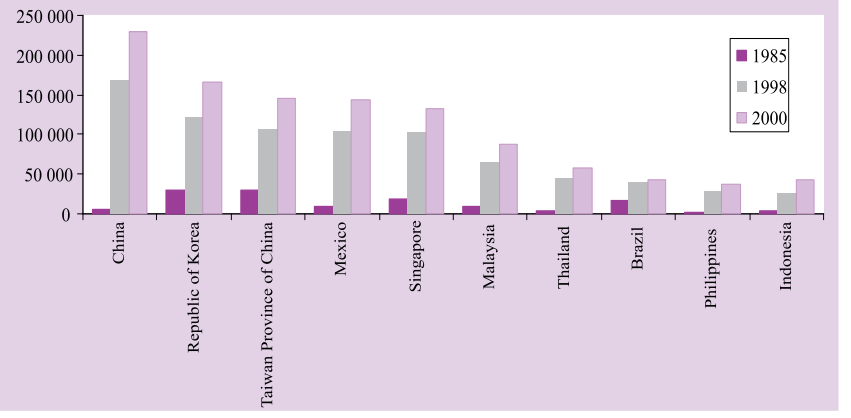
Figure 5 shows the 10 largest developing world exporters of manufactures in 1985, 1998 and 2000. These countries now account for over 80 per cent of developing country exports and

Figure 4. Shares of developing regions in manufactures exports, 1998
(Per cent)



Source: United Nations Comtrade database.
Note: Latin America and the Caribbean are shown twice: (a) includes Mexico and (b) excludes it (due to the NAFTA effect, giving Mexico access to United States and Canadian markets).

Figure 5. Manufactures exports by ten leading developing economies, 1985, 1998 and 2000
(Million dollars)



Source: United Nations Comtrade database.

their dominance is rising over time. Moreover, levels of concentration are higher in more advanced products, rising steadily from resource-based through low-technology, medium-technology and high-technology products. Thus, liberalization and globalization appear to be leading to higher rather than lower barriers to entry for new competitors, with the barriers rising with technology levels.

The countries in most figures tend to be the same: success in one category of exports tends to lead to success in others. *Competitiveness is, in other words, cumulative and widespread.*

Rationale for technology policy

In economic theory, the case for technology policy (any policy is intervention in free markets) is given by two factors: market failures that call for remedial action to restore equilibrium, and the ability of the Government, taking into account the risk of government failure, to undertake measures so that the benefits of intervention exceed their costs. Technology policy is only justified where market failures are clearly established and the investment is able to create net social benefit.

This neoclassical approach to technology assumes that markets are *generally* efficient and that it makes sense to treat technology markets as being prone to failures that can be remedied in principle.[4] It is not clear that this is the best way to analyze technology policy, where market failures revolve around information in the future: such failures are very diffuse and it is not clear that a theoretical optimizing solution exists even in principle (Stiglitz, 1996). This is even truer of developing countries where the basic conditions for technology use and development are very different from developed countries. In these conditions, policy interventions need to go well beyond restoring a unique static equilibrium. Economists accept that technology markets are prone to widespread failure even in mature industrial countries with well-developed markets, institutions and property rights. These failures are much greater in developing

[4] These types of market failures are analyzed in Stoneman (1987). On the theoretical limitations to this approach, and the distinction between remediable and diffuse market failures, see Stiglitz, 1996.

countries and they vary by the level of development, the industrial structure and the initial base of skills and institutions.[5]

Perhaps more importantly, the need for intervention differs according to the *vision of the society or Government on the desirable technological development path*, which then affects what constitutes market failure in technology development. For instance, Hong Kong (China) had (under the colonial administration) a vision of free market determined industrial and technological structures: for it, specialization in low-technology activities would be optimal, not a deficiency. The Republic of Korea, with a completely different vision of future development, would regard the same activities as a serious deficiency, calling for remedial action. Thus, the same objective situation would evoke no policy response in the former and massive interventions in the latter. "Vision" is very difficult to incorporate into neoclassical models that seek unique equilibriums.

Governments in fact use technology policy to go beyond correcting static market deficiencies to changing the basic parameters within which markets function: creating new factor endowments, industries, enterprises, capabilities, institutions and market structures. It is difficult to describe the latter set of interventions as remedying market failures in the neoclassical sense, since this defines failures with reference to a competitive equilibrium. In principle, markets can clear within a given set of endowments and parameters, even if these occur at low levels of income and growth. The conventional market failure approach has little to say on changing those endowments and raising the economy beyond "low-level equilibrium".[6]

Technology policies can thus be divided into two groups: those that address market failures in the conventional sense (deviations from static efficiency), and those that change basic endowments and parameters in line with a strategy of long-term development. The former can be described as *static*, the latter as

[5] See Lall and Teubal, 1998.

[6] On the possibility of multiple equilibria and the risk of low-level equilibrium for countries specializing in low technology activities; see Hoff and Stiglitz, 2001.

strategic. Most technology policies have mixtures of static and strategic elements, with the difference in balance and direction being their real distinguishing characteristic. This is true of East Asia, where technology policies had many common static elements dealing with generic market failures that affect technology development in all developing, and most developed, countries. They also had striking differences in their strategic policies, reflecting different ideologies and political economies.

While it is common to regard the stimulation of industrial R&D as the main, or even the sole, aim of technology policy, this is only one component of measures to raise technological competence, especially at low levels of industrial development. In developing countries, the bulk of technological activity consists of mastering imported technologies, adapting them to local conditions, improving them and finally using them as a base for creating new technologies. Formal R&D does assume increasing significance with industrial maturity, even in developing countries that have not reached the frontiers of innovation. As more complex technologies are imported and deployed, R&D is vital to absorb their underlying principles. It is also vital as a means of keeping track of new technologies as they emerge. A growing base of R&D capabilities also permits better and faster diffusion within the economy of new technologies, lowers the cost of technology transfer, and captures more of the spillover benefits created by the operation of foreign firms. Most importantly, it permits the manufacturing sector as a whole greater flexibility and diversification of industrial activity, and allows it greater autonomy by creating a technology culture.

There can be various market failures in stimulating the growth of a technology culture in a developing economy. There are well-known difficulties of appropriating fully the returns to private R&D; in newly industrializing countries the problems are compounded by the extra cost and risk of developing local research capabilities when technology can be imported from more advanced countries. There is a difficult choice to be made between importing ready made technologies and developing the capabilities to adapt, modify and improve upon them. Clearly, too much stress on one or the other can be uneconomical. A heavy dependence on technology imports can be costly and lead to a lack of technological dynamism; an over-

emphasis on indigenous technology creation can lead to costly efforts to "reinvent the wheel". Policies to stimulate local R&D clearly fall in the category of strategic choices – there is no clear market failure involved in remaining highly dependent on foreign technology.

Technology policy in developing countries should be seen as an *inherent part of industrial development policy*. It includes the elements of technology policy in the narrow sense – stimulating R&D, building technology support institutions, supporting small and medium-sized enterprises (SMEs) and so on – but it goes beyond into providing the setting in which industrial firms operate, seek technology and learn how to use and improve it. With this in mind, strategies by which countries have sought to become more industrially competitive are considered below.

Strategies for industrial competitiveness

What were the strategies pursued by successful countries to expand manufactured exports? Part of export growth was based on the better exploitation of existing advantages (natural resources and unskilled or semi-skilled labour), while part relied on the creation of new advantages (skills, technological capabilities, clusters and so on). Thus, some strategies (or part of larger strategies) involved liberalizing of export activity and attracting FDI to realize existing advantages; others went beyond, to dynamizing existing advantages by intervening in factor and product markets. The basic choice was between the *agents involved: local enterprises* or *TNCs*. All countries used both, but with a different balance and emphasis, depending partly on the nature of technologies involved (local firms in simpler technologies) and partly on strategic objectives.

To reiterate, the *main strategic issues* are as follows. The development of export competitiveness inevitably requires investments in capabilities of various kinds: procurement, production, engineering, design, marketing and so on. The realization of existing advantages in natural resources or unskilled labour tends to involve less effort, risk and externalities than the development of new advantages in complex activities (though the regional data suggest that even this effort has been out of reach of many countries). Sustained and rapid manufactured export growth needs moving from

easy to complex products and processes within activities, and across activities from easy to complex technologies. The choice between local and foreign firms to lead the capability building process depends on the existing base of skills and experience and the demands of exporting. It also depends upon the ability of governments and institutions to help enterprises to develop the necessary capabilities and tap externalities (e.g. coordinate investments in vertically linked activities or undertake collective learning).

TNCs and local firms face different markets and have to overcome different market failures in learning. TNCs have several advantages over local firms in using new technologies (new to a particular location) for export activity. They have mastered and used the technologies elsewhere; they may have created the technology in the first place. They have large internal reserves of skill, technical support, experience and finance to design and implement the learning process. They have access to major export markets, established marketing channels and well-known brand names. They can transfer particular components or processes from a production chain to a developing country and integrate it into an international system. This is much more difficult for local firms, not just because they may not have the experience or technological competence – they inevitably face higher transaction and coordination costs in integrating into TNC corporate systems. In addition, TNCs have considerable advantages in product markets: by definition, they have established international markets and brands and so can finance costly learning processes more easily and with less risk. They have "deeper pockets" to fund these processes.

While the TNC-led strategy has many benefits, and can be a highly effective and rapid means of exploiting existing advantages, a *passive* FDI strategy may not be the best way to dynamize competitiveness. TNCs may not invest in a particular country because of imperfect information or poor image. Thus, effective promotion and targeting of investors can allow a country to attract more and higher quality FDI. Where TNCs do invest, they initially transfer equipment and technologies suited to *existing* skills and capabilities. To move on to more advanced activities and functions, they have to upgrade local skills, technological capabilities and supply chains. This is economical only where the education and training base is growing,

local suppliers are raising their capabilities, technology institutions are able to provide more advanced services, and so on. Such supply side upgrading needs government support. Moreover, a policy to induce TNCs to enter more advanced activities by offering such inducements as specialized infrastructure and skills can accelerate the upgrading process. With a completely passive policy, TNC exports can remain at low, technologically stagnant, levels. Thus, a TNC-dependent export strategy needs a proactive element for dynamic competitiveness.

More important, an FDI-dependent strategy is not a substitute for building domestic capabilities. There are many activities in which TNCs have no competitive advantage over domestic firms, particularly those served by SMEs. The development of national enterprises may also lead to broader, deeper and more flexible capabilities, since the learning process within foreign affiliates may be curtailed as compared to local firms. The very fact that an affiliate can draw upon its parent company for technical information, skills, technological advances and so on means that it needs to invest less in its own capabilities. This applies particularly to functions like advanced engineering, design or R&D, which TNCs tend to centralize in developed countries. As they mature industrially, it is imperative for developing countries to undertake these functions locally to support their future comparative advantage. This is why some countries choose to promote technology development in local firms.

Different countries make different strategic choices in these respects. In leading developing country exporters, it is possible to distinguish between four:

- *"Autonomous"*, based on the development of capabilities in domestic firms, starting in simple activities and deepening rapidly over time. This strategy used extensive industrial policy, reaching into trade, finance, education, training, technology and industrial structure. It involved selective restrictions on FDI, and actively encouraged technology imports in other forms. All these interventions were carried out in a strongly export-oriented trade regime, with favours granted in return

for good export performance. The prime examples are the Republic of Korea and Taiwan Province of China.

- *"Strategic FDI-dependent"*, driven by FDI and exports to TNC global networks. There was strong effort to upgrade TNC activity according to strategic priorities, directing investments into higher value-added activities and inducing existing affiliates to upgrade their technologies and functions. This strategy involved extensive interventions in factor markets (skill creation, institution building, infrastructure development and supplier support), encouraging R&D and technology institutions, and in attracting, targeting and guiding investments. The best example is Singapore.
- *"Passive FDI dependent"*, also driven by FDI but relying largely on market forces to upgrade the structure (with rising wages and growing capabilities). The main tools were a welcoming FDI regime, strong incentives for exports, with good export infrastructure, and cheap, trainable labour. Skill upgrading and domestic technological activity were relatively neglected (though some countries had a relatively good base), and the domestic industrial sector tended to develop in isolation from the export sector. Malaysia, Thailand and the Philippines are good examples, along with the special economic zones of China (and the *maquiladoras* of Mexico).
- *"Import-substituting-industry restructuring"*, with exports growing from long-established import-substituting industries where competitive (or nearly competitive) capabilities had developed. The main policy tool was trade liberalization or strong export incentives (some, as in Latin America, within regional trade agreements). This led to considerable upgrading, restructuring and expansion of these industries along with their supplier networks. In some countries the main agents were domestic enterprises, in others they were TNCs. The main difference from the autonomous strategy was the lack of clear and coordinated industrial policy to develop export competitiveness, with haphazard (often weak) support for skills, technology, institutions and infrastructure. China and India are examples within Asia, the large Latin American economies elsewhere; elements of this strategy are also present in many other economies.

These strategies are not, of course, mutually exclusive. Countries generally combine them, and vary the combinations over time. Nevertheless, this simple typology is useful as an analytical tool, and it is to be used with appropriate caveats.

FDI, R&D and other drivers of industrial competitiveness

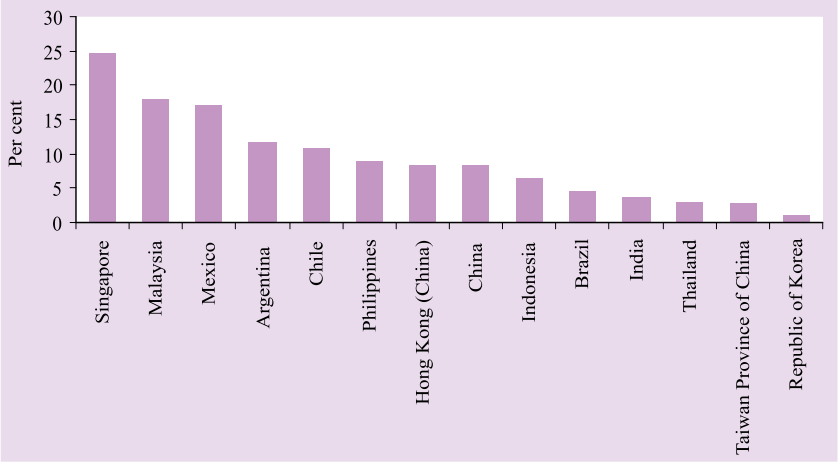
The main structural drivers of industrial competitiveness are *FDI, domestic R&D, skills, licensing and physical infrastructure* (UNIDO, 2002). This is not a comprehensive model explaining competitive performance, since it leaves out of account policies, institutions, governance and other factors that are difficult to quantify across a large number of countries. It is intended to provide a picture of the *structural factors* in industrial competitiveness, though the 'drivers' do correlate quite nicely with industrial performance.

The first driver is *FDI*. Reliance on FDI differs sharply among the newly industrializing economies, with very high reliance in Malaysia and Singapore in East Asia and in most of Latin America. There is very low reliance in the Republic of Korea and Taiwan Province of China, which deliberately restricted inward FDI to build up their innovative capabilities. Figure 6 shows FDI as a percentage of gross fixed capital formation (GFCF) in 1997 (the picture is similar over the longer term). This suggests a trade-off between deepening technological capabilities and relying on ready-made technology from TNCs.

TNCs also play varying roles in exports by different countries. Figure 7 illustrates for some countries on which data could be collected.

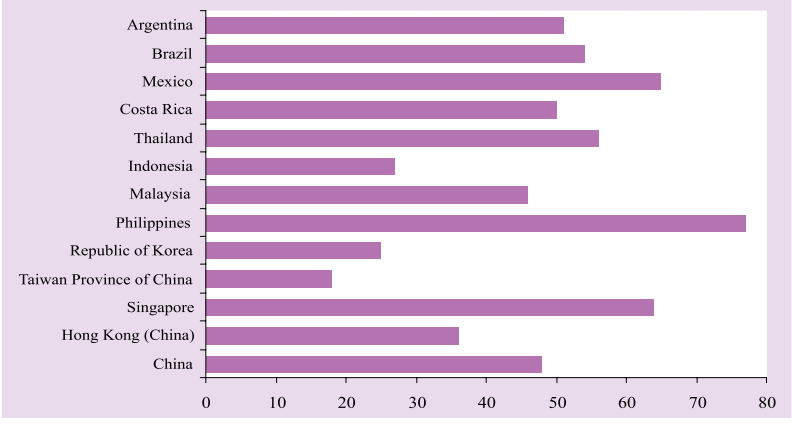
One of the main causes of export success in recent years has been *increasing participation in global production networks under the aegis of TNCs*. This has been particularly dynamic in high-technology activities, led by electronics, that has allowed countries (in labour-intensive assembly processes) to enter very fast-growing export activities and then to move up the value chain. All the major exporters from the developing world apart from the Republic of Korea and Taiwan Province of China have depended on such participation. The Republic of Korea and Taiwan Province

Figure 6. Leading exporters of resource-based manufactures, 1985 and 2000
(Million dollars)



Source: UNCTAD, 1999.

Figure 7. Leading exporters of low-technology manufactures, 1985 and 2000
(Million dollars)



Source: UNCTAD, 2002, p. 154.

of China, on the other hand, have tapped into global chains with domestic enterprises, using such mechanisms as OEM contracts, licensing and copying.[7] This has entailed a massive development of technological and other capabilities on the part of local firms, sustained by extensive government intervention in all markets, including selective infant industry promotion (Lall, 1996 and 2001).

The FDI-dependent countries have also used different sub-strategies. Singapore, for instance, has relied heavily on industrial policy to target and attract high-technology TNCs, build local skills and institutions and develop specialized infrastructure. As a result, it has moved to the top of the technological ladder, and is now targeting R&D and high value service activities by TNCs. Malaysia, Thailand, Indonesia and Philippines in Asia, and Mexico in Latin America, have been less proactive on FDI and the development of local skills and institutions (though they used industrial policy in other ways). As a result, they are much lower than Singapore on the technology spectrum. However, they are now acutely conscious of the need to upgrade capabilities and supplier networks to retain a competitive edge as wages rise and cheaper competitors emerge. As shown later, their technological capabilities lag well behind the Republic of Korea and Taiwan Province of China.

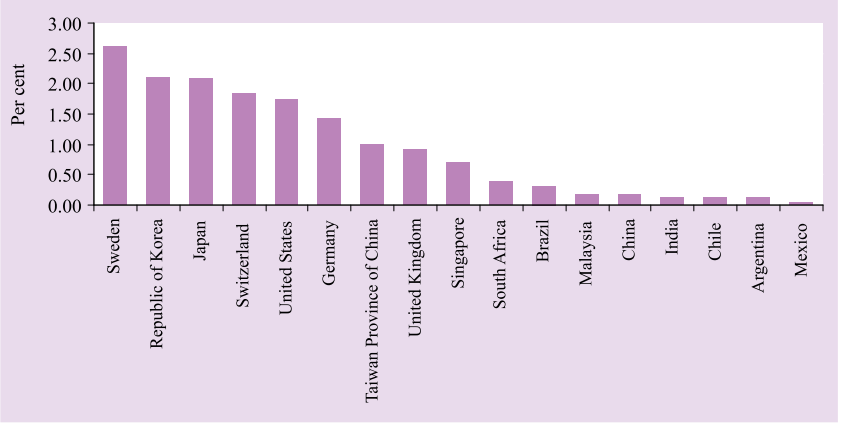
China is unique because of its size, industrial tradition, background and overseas ethnic linkages. It can combine elements from all the other strategies with its own policies to restructure and develop domestic enterprises (Nolan, 2001). While its base of skills and technological effort is low by international standards, it has enough to mount a spectacular surge in exports across the technological spectrum. And it is building its capability base rapidly while bringing its "surplus" human capacity into modern industrial activity, suggesting that the surge still has a considerable way to go. The experience of these successful countries does not mean that other countries that liberalize to FDI will automatically share in their success. In fact, few developing countries participate in these emerging TNC systems. While FDI in developing countries is rising rapidly (from an average of $37 billion in 1989-1991 to $223 billion

[7] On the role of OEM contracts in technological learning and technology transfer in the Republic of Korea, see Cyhn, 2002.

in 1999-2001), flows are highly concentrated. The top 10 developing countries accounted for nearly 80 percent, and the top 25 for almost 95 percent, of the total in 1999-2001 (UNCTAD, FDI/TNC database).

As for *R&D spending, financed by productive enterprises* (figure 8), the leaders in the world in this activity (measured by R&D as a percentage of GDP) are Sweden, Japan and the Republic of Korea. Yet only some 20 years ago, the Republic of Korea was a typical developing country, with 0.2 per cent of GNP going into R&D and 80 per cent of that coming from the public sector. Today, total R&D is over 3 percent of GDP, with over 80 percent coming from the private sector. Taiwan Province of China and Singapore come next in the developing world, with other countries well behind. Of these three mature tigers, Singapore lags the others due to its dependence on FDI – but such dependence does not prevent it from leading all other developing countries.

Figure 8. Leading exporters of medium-technology manufactures, 1985 and 2000
(Million dollars)



Source: UNIDO, 2002.

These data again show the highly differentiated responses to globalization and technical change among developing countries. Among industrializing countries, the three mature Asian tigers are in the lead, with other countries in Latin American and Asia lagging.

While the new tigers of Malaysia, the Philippines or Thailand do well in technology-intensive exports, their capability base remains weak and shallow (the latter two are so low that they do not appear in figure 12). This striking discrepancy between the technology intensity of their exports and their domestic skills and technological capabilities made up by TNC assembly activities has to be reconciled if they are to maintain their past performance. Otherwise, technical change and the entry of rivals with stronger skill bases will lead future dynamic activities to locate elsewhere. China is in an intermediate position, with a combination of capabilities and strategies from each of the three leading tigers. Its size and established capabilities suggest that it will continue to catch up with the other leaders and possibly do better.

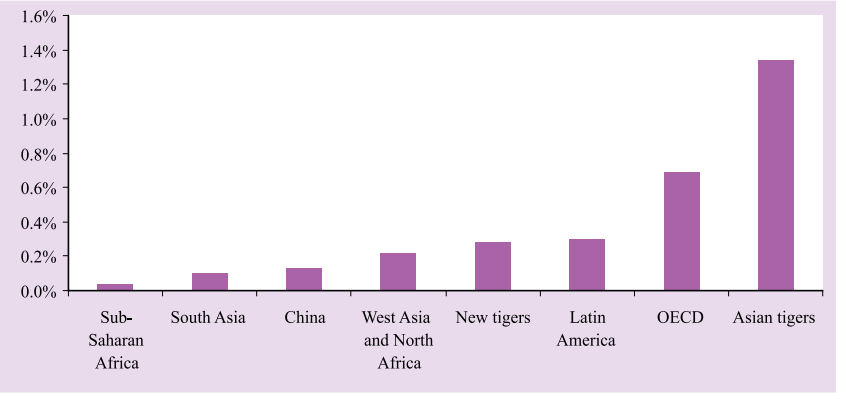
Latin American countries come fairly low on the R&D-scale in comparison to East Asia, but it does much better than other developing regions. At the national level, Brazil is the leader in Latin America, and ranks fourth in the developing world after the Republic of Korea, Taiwan Province of China and Singapore.

The different strategies also have implications for *human capital formation*. For instance, FDI dependent strategies in low-wage countries – at least in their initial phases – do not require high skill levels, while autonomous R&D dependent strategies clearly do. This is borne out by the data: there are sharp disparities in the base of skills in competitive countries. The figures are rough proxies for skill formation, since they only deal with formal school and university enrolments, ignoring quality and other differences in the education provided. The focus here is on high-level technical skills, as measured by tertiary enrolments in core technical subjects (pure science, mathematics, and computing and engineering) as a percentage of the population. Statistical analysis shows that this measure is the best variable for human capital in explaining export dynamism (figure 9).

The most striking fact about the figure is the enormous lead established by the four mature Asian tigers (Hong Kong [China], the Republic of Korea, Taiwan Province of China and Singapore) far outpacing even the industrialized countries. Note, however, that this

reflects mainly the investment in higher technical education by the Republic of Korea and Taiwan Province of China; Singapore and Hong Kong (China) are at significantly lower levels. The new tigers (Malaysia, Philippines, Thailand and Indonesia) and the main economic powers in Latin America (Argentina, Brazil, Mexico) follow much further behind. Sub-Saharan Africa lags the most in skill creation, with South Asia and China doing somewhat better.

Figure 9. Leading exporters of high-technology manufactures, 1985 and 2000
(Million dolalrs)



Source: Calculated from UNESCO, 1997.

In sum, using FDI to insert countries into global value chains is an effective way to build competitiveness in the new globalizing environment, and almost all successful economies (apart from the Republic of Korea and Taiwan Province of China) have used it. Of course, there are many countries that have not been able to use such strategies. However, it is important to note that simply plugging into global chains at the bottom end is not necessarily a sustainable strategy over the long term. As wages rise, more complex processes are introduced and technologies continue to evolve, it becomes imperative for countries to improve domestic capabilities: skills, supplier bases, R&D capabilities and the physical (particularly the ICT) infrastructure. TNCs contribute to building capabilities, of course. They train employees and diffuse technologies to local suppliers, but there are limits to how far this can improve national

capabilities. Ultimately it is up to the government to support capability development, by creating more skills, strengthening domestic firms and creating strong technology and research institutions. If this is not done, the most complex and value-creating activities may well be located in other countries – this is the strategic challenge facing the new tigers, as China appears as a giant competitor with lower wages, massive domestic markets and capable suppliers.

FDI targeting strategies

A striking feature of current globalization is how TNCs are shifting their mobile assets (technology, skills, brands and production) across the globe to find the best match with the immobile assets of different locations. In the process, they are also shifting functions that create their ownership assets like R&D, training and strategic management within an internationally integrated production and marketing system. The ability to provide the necessary immobile assets thus becomes a critical part of FDI – and competitiveness – strategy for developing countries. While a large domestic market remains a powerful magnet for investors, TNCs serving global markets increasingly look for other attributes, which are changing in response to policy liberalization and technical change. The opening of markets creates new opportunities and challenges for TNCs and gives them a broader choice of modes with which to access those markets. It also makes them more selective in their choices of potential investment sites.

Apart from primary resources – and taking a conducive policy and macro framework as given – the most attractive immobile assets for export-oriented TNCs are world-class infrastructure, skilled and productive labour, and an agglomeration of efficient suppliers, competitors, support institutions and services. Cheap unskilled labour remains a source of competitive advantage, but its importance is diminishing. Natural resources give a competitive basis for growth as long as they are plentiful in supply and face growing demand. However, most primary exports face slow growing markets and are vulnerable to substitution, while resource based manufactures are among the slowest growing in world trade.

The sites that will receive most FDI in the emerging economic and policy setting are those that provide for TNCs to set up competitive facilities able to withstand global competition. This means that the host country has to provide competitive immobile assets – skills, infrastructure, services, supply networks and institutions – to complement the mobile assets of TNCs. While transport costs and taste differences mean that large markets will continue to attract more investment than small ones, few countries can afford to take a continued inflow of FDI – especially high quality, export-oriented FDI – for granted. This means that the ultimate draw for FDI is the economic base: FDI incentives and targeting cannot by themselves compensate for the lack of such a base.

The East Asian experience, particularly of the new tigers like Malaysia and Philippines, shows that attracting FDI into high-technology activities can happen without any particular government strategy. In their case, it was largely a matter of their economic base, which may help by welcoming FDI policies. High-technology TNCs had already established a base in Singapore. The rise of the semiconductor industry and the need for cheap labour for assembling and testing devices led United States companies to look for cheap labour overseas. Over time, Japanese and other firms joined in this quest (helped by the rise of the Yen in the mid 1980s), and the tendency spread to a number of other export-oriented electronics activities. Countries with low wages, stable macro regimes, good export-processing-zone facilities, English-speaking workers and attractive FDI incentives were able to attract investments relocating from the developed countries as well as from Singapore. Apart from these general attractions, therefore, FDI targeting did not play much of a role.

However, the surge of high-technology export-oriented FDI did not spread to other parts of the developing world – countries in South Asia, North Africa and Latin America that played host to TNC assembly for export continued to concentrate on garments and other simple products. The main exception was Intel's investment in Costa Rica. Within South-East Asia, while TNCs invested in automation and skill creation in their high-technology assembly operations, sustained deepening of local content and technologies took place

mainly as a result of government interventions. These interventions involved incentives for upgrading, and supply side support in terms of skill and infrastructure creation and support for local suppliers. Malaysia adopted Singapore-style strategies to induce firms to raise local content; however, this was mainly by attracting other TNCs rather than by upgrading a (relatively weak) local skill and industrial supplier base. There was some increase in TNC R&D activity, but not to the levels reached by Singapore. Other countries in the region did not adopt similar proactive strategies. As a result, high-technology TNC operations still remain fairly shallow in Thailand, Philippines and Indonesia. This shallowness constitutes an important constraint to their future industrial growth and competitiveness, and their governments are seriously concerned to improve their FDI targeting and upgrade local skills and supply capabilities.

There is thus a *strong case for policy interventions* both to attract higher quality FDI and to induce investors to upgrade and deepen their activities over time. The economic rationale for interventions is three-fold: high transaction costs; deficient information on the potential of the host economy; and insufficient coordination between the needs of TNCs, the assets of the host economy and the potential to improve those assets.

First, *high transaction costs*. While most FDI regimes are converging on a common (and reasonably welcoming) set of rules and incentives, there remain large differences in how these rules are implemented. The FDI approval process can take several times longer, and entail costs many times greater, in one country than another with similar policies. After approval, the cost of setting up facilities, operating them, importing and exporting goods, paying taxes, hiring and firing workers and generally dealing with the authorities, can differ enormously (table 3).

Such costs can, *ceteris paribus*, affect significantly the competitive position of a host economy. An important part of competitiveness strategy thus consists of reducing unnecessary, distorting and wasteful business costs. This affects both local and foreign enterprises. However, foreign investors have a much wider set of options before them, and are able to compare transaction costs in different countries. Thus, the attraction of TNCs requires not just transaction

costs be lowered but also, increasingly, that they be benchmarked against that of competing host countries. One important measure that many countries are taking to ensure that international investors face minimal costs is to set up one-stop promotion agencies able to guide and assist them in getting necessary approvals. However, unless the agencies have the authority needed to negotiate the regulatory system, and unless the rules themselves are simplified, this may not help. On the contrary, there is a risk that a "one stop shop" becomes "one more stop".

Table 3. Illustrative list of transaction costs related to the legal and regulatory environment

Area of operation	Transaction	Enterprise exposure	Effects on
Business entry	Registration Licensing Property rights Rules Clarity Predictability Enforcement Conflict resolution	Monetary costs to firms Time costs (including compliance and delays) Facilitation costs Expert evaluations of rules and their functioning Number of rules, formalities	Rate of new business entry Distribution of firms by size, age, activity Size of shadow economy Rate of domestic investment FDI inflows, quantity and quality Investment in R&D
Business exit	Bankruptcy Liquidation Severance/layoffs Rules Clarity Predictability Enforcement Conflict resolution	Rate of change of rules Changes in costs and number of rules Availability of rules and documents to firms Rates of compliance and/or evasion Use of alternatives to formal institutions	Rate of exit (and entry) Prevalence of credit Average and distribution of profitability of corporations
Business operation	Taxation Trade-related regulation Labour hiring/firing Contracting Logistics Rules Clarity Predictability Enforcement Conflict resolution	Cost of compliance Higher costs of operation Costs of conflicts and conflict resolution Search costs and delays Insufficient manageria control Nuisance value Problems in making contracts Problems in delivery	Business productivity Export growth Size of shadow economy Growth of industries with specific assets or long term contracting Rate of innovation and R&D Rate of business expansion Rate of investment in new equipment Subcontracting

Source: Based on Stone, 1999.

Second, despite their size and international exposure, TNCs face *market failures in information*. They collect considerable information on potential sites, on their own as well as from consultants and other foreign investors. However, their information base is far from perfect, and the decision making process can be subjective and biased. Taking stable economic fundamentals as given, it may be worthwhile for a country to invest in altering the perception of potential investors by providing better information and improving its image. However, such promotion efforts are highly skill-intensive and potentially expensive. They need to be carefully mounted, and they should be targeted to maximize their impact. Targeting can be general (countries with which there are trade or historic connections, or which lack past connections but are ripe for establishing them), industry specific (investors in industries in which the host economy has an actual or potential competitive edge), even investor specific. Note that targeting or information provision is *not* the same as giving subsidies or fiscal incentives: incentives play a relatively minor role in a good promotion programme, and good long-term investors are not the ones most susceptible to short-term inducements. The experiences of Ireland, Singapore and more recently Costa Rica, suggests that promotion can be extremely effective in raising the inflow of investment and of raising its quality (UNCTAD, 2002).

Third, effective promotion should go beyond simply marketing a country into *coordinating the supply of immobile assets with the specific needs of targeted investors*. This addresses potential failures in markets and institutions for skills, technical services or infrastructure in relation to the specific needs of new activities targeted via FDI. A developing country may not be able to meet such needs, particularly in activities with advanced skill and technology requirements. The attraction of FDI in such industries can be greatly helped if the host government discovers the TNCs' needs and meets them. In Costa Rica, the fact that it was prepared to invest in training to meet Intel's skill needs was a major point in attracting the investment. Singapore goes further, and involves TNC managers in designing its on-going training and infrastructure programmes, ensuring that it remains attractive for their future high-technology investments. The information and skill needs of such coordination and targeting exceed those of promotion *per se*, requiring the agency involved to have detailed knowledge of the technologies involved

(their skill, logistical, infrastructural, supply and institutional needs) as well as of the strategies of the relevant TNCs.

Strategies to build domestic capabilities

The Republic of Korea and Taiwan Province of China, the technological leaders in the developing world, adopted highly interventionist strategies on trade and domestic resource allocation, with a clear preference for promoting indigenous enterprises and deepening local capabilities. They imported technology vigorously from leading TNCs, but assigned FDI a secondary role to technology import in other (arm's-length) forms. Their export drive was led by locally owned firms, and comprehensive policy support allowed local firms to build impressive technological capabilities. The domestic market was not exposed to free trade; a range of quantitative and tariff measures were used over time to give infant industries space to develop their capabilities. The deleterious effects of protection were offset by strong incentives (in the case of the Republic of Korea, strong pressures) to export and face full international competition (Westphal, 2002). During liberalization, the same careful strategic approach was used to ensure that no damage resulted to local enterprises; concomitantly, these enterprises were encouraged to go transnational and set up integrated production systems of their own.

The Republic of Korea went much further in developing advanced and heavy industry than Taiwan Province of China. To achieve its compressed entry into heavy industry, its interventions had to be more detailed and pervasive, along the lines of Japan but probably more comprehensive (Amsden, 1989; Westphal, 2002). It relied primarily on capital goods imports, technology licensing and other technology transfer agreements to acquire technology. It used reverse engineering (taking apart and reproducing imported products), adaptation and own product development to build upon these arm's length technology imports and develop its own capabilities. It drew upon OEM contracts to access technologies and skills from TNCs (Cyhn, 2002). Its private sector R&D is now the highest in the developing world and second highest in the world as a whole. The Republic of Korea accounts for around 53 per cent of total private sector R&D spending in the developing world (UNIDO, 2002). The R&D risks undertaken by the *chaebol* were

contained by the strict discipline imposed by the government in terms of export performance, vigorous domestic competition, and deliberate interventions to rationalize the industrial structure. The government also undertook various measures to encourage the diffusion of technology, putting pressures on the *chaebol* to establish supplier networks. Apart from the direct interventions to support local enterprises, the government provided selective and functional support by building a massive technology infrastructure and creating general and technical skills.

Taiwan Province of China's industrial policy encompassed import protection, directed credit, selectivity on FDI, support for indigenous skill and technology development and strong export promotion (Wade, 1990). While this resembles Korean strategy in many ways, there were important differences. Taiwan Province of China did not promote giant private conglomerates, nor did it attempt the intense drive into heavy industry that Republic of Korea did. Taiwanese industry is largely composed of SMEs, and, given the disadvantages to technological activity inherent in small size, these were supported by a variety of inducements and institutional measures in upgrading their technologies. Taiwan Province of China probably has the developing world's most advanced system of technology support for small and medium-sized enterprises (SMEs).

In the early years of industrialization, Taiwan Province of China attracted FDI into activities in which domestic industry was weak, and used a variety of means to ensure that TNCs transferred technology to local suppliers (Lall, 1996). Authorities also played a very active role in helping SMEs to locate, purchase, diffuse and adapt new foreign technologies. Where necessary, the government entered into joint ventures, to get into technologically very difficult areas such as semiconductors and aerospace.

Conclusions

What does this analysis suggest for strategies by developing countries to build local technological capabilities for competitiveness? Competitive success in industry depends vitally on the ability of each industrial system to cope effectively with technical change. This

ultimately determines how a country's local value chain relates to the international chain: where it is located, how rewarding the insertion is, and the rate at which its position in the chain improves over time. Globalization means that resources, finance and technologies are far more mobile than before, and that value chains are more tightly organized and controlled. Clearly, insertion into dynamic value chains is a very good way to build competitiveness, and the lead players are increasingly scouting the world for economical sites in which to locate their production and service activities. New technologies enable this to happen more efficiently and quickly than ever before.

However, all this *does not reduce the role of local technological capabilities*. On the contrary, it raises it because the efficiency of each location becomes the prime determinant of success. Technical efficiency requires access to new technologies from across the world, but simply exposing local industries to international trade, investment and information is not enough. It may even devastate them to the point of closure if measures are not undertaken to build up new capabilities and accelerate learning processes.

The evidence suggests growing divergence in industrial performance in the developing world. This is an unfortunate but perhaps intrinsic feature of the new technology-driven economy. The divergence is structural rather than a delayed response to liberalization: there is nothing endogenous in the globalization and liberalization process that will ensure that economies return to high growth paths. Skill development, industrial specialization, enterprise learning and institutional change create *cumulative, self-reinforcing processes* that promote or retard further learning. Countries set on a pattern with a low-technology, low-skill and low learning specialization find it increasingly difficult to change course without a concerted shift in a large number of interacting markets and institutions. Economic liberalization may help them to realize their static comparative advantages, that is, those based on inherited endowments like natural resources and cheap unskilled labour. However, it may not lead them to develop the more *dynamic* (skill and technology based) advantages they need to sustain growth and structural change. Thus, they may become outsiders in a world of rapid and accelerating technological change, new skill needs and integrated production

systems. They may suffer from long-term marginalization, having to export larger amounts of products facing static or declining markets to import foreign services and products.

The insiders are the relatively few developing economies that have been able to launch themselves on a sustainable high-growth path. The insiders also differ, depending on the strategies adopted. Two general strategies may be distinguished: *autonomous* and *FDI-dependent*. Autonomous strategies – as demonstrated by the Republic of Korea and Taiwan Province of China – entail a great deal of industrial policy and accompanying interventions in factor markets and institutions. They lead to a massive development and deepening of indigenous skills and technological capabilities, with the national ability to keep abreast of new technologies and for domestic enterprises to become significant global players in their own right.

FDI dependent strategies comprise two sub-strategies, *targeted* and *passive*. Targeted strategies – as in Singapore – also entail considerable industrial policy, but the intensity of government interventions is lower than with autonomous strategies (Lall, 1996). In particular, such a strategy needs free trade, if not for the whole economy then for the segments of industry that operate in export markets. The sources of technical change remain largely in the hands of TNCs, and there is thus less need to intervene to promote learning in domestic infant industries. However, industrial policy is still needed: to ensure the provision of the relevant skills, capabilities and institutions required by TNCs to transfer new technologies and higher value functions. Passive strategies involve less industrial policy in export-oriented activities to start with (though there may be intervention in domestic-oriented activity). TNCs are attracted mainly by low wages for unskilled or semi-skilled labour and good infrastructure, given a conducive macro environment and welcoming policies to FDI.

Subsequent dynamism and upgrading in such passive strategies depend on whether TNCs are induced from simple assembly activities into more advanced, value-added activities with deeper local roots. If no strategies are adopted, growth and competitiveness may run down as the existing stock of human and

technological capital is used up. Sustaining growth needs increasing policy intervention to deepen the local skill and supplier base and to target FDI itself. This is the challenge facing a number of developing countries (like Bangladesh, Mauritius or Morocco) that have done well out of the relocation of the clothing industry in building simple manufactured exports, but have not been able so far to upgrade into more complex or technology-intensive activities.

Simply opening up to free trade and investment flows is not an adequate strategy for countries at the low end of the technology ladder. Stabilization and liberalization can remove the constraints to growth caused by poor macro management, inefficient public enterprises, high entry costs for private enterprises and restrictions on FDI. However, it cannot by itself allow the economy to build more advanced capabilities, to escape a low-level equilibrium trap. Evidence on liberalizing countries like Kenya, the United Republic of Tanzania, Zimbabwe and Ghana shows that after an initial spurt of growth, economies with static capabilities slow down as their inherited advantages are exhausted (Lall, 1999). The initial spurt comes from using existing unused capacity as imported inputs and spares become available. As import competition in the final product market increases, however, enterprises find it difficult to cope and close down or withdraw into non-traded activities. Without any strategic support from the government, they find it difficult to bridge the gap between their skills, technologies and capabilities and those needed for international competitiveness.

New enterprises find it even more difficult to enter complex activities with even more stringent skill and technology requirements. There is a danger, therefore, that industrial structures in low-income countries with passive industrial policy regress into simple activities that do not provide a basis for rapid growth. This is one important reason why liberalization has had such poor results in sub-Saharan Africa. Liberalization has also led to technological regression in many countries of Latin America, with relatively weak growth and competitive performance. These countries often have a large base of capabilities in such industries as food processing and automobile manufacture, but find it difficult to move into dynamic high-technology activities.

The rule-setting parts of the international system that deal most directly with development (the Bretton Woods institutions and the World Trade Organization have so far been more concerned with *facilitating* globalization rather than with helping *countries to cope with its demands*. This approach has been based on a strong, but largely implicit, premise that free market forces are efficient will automatically accomplish both objectives: thus, liberalization is the best policy for all countries. As a result of external pressures as well as domestic changes, there has been considerable liberalization in the developing world and countries in transition. Governments are withdrawing from ownership of productive resources, from guiding resource allocation and, in many cases, also from the provision of several infrastructure services. The ultimate objective of current reforms is an open production, trade and investment framework where the driving force is private enterprises responding to market signals.

There is much to welcome in these trends. Many government interventions to promote development have a poor record and have constrained rather than helped growth and welfare. Giving greater play to market forces will contain many of the inefficiencies and rent seeking inherent in government intervention. However, as noted, simply opening up to market forces does not deal with many structural problems of development. The most successful developing countries in recent economic history (the Asian newly industrializing economies) intervened intensively in markets, with many different strategies to build up their competitive capabilities. Their experience suggests that there is a significant role for government in providing the collective goods needed for sustained development. The issue is not *whether* governments should intervene, but *how*.

It is possible to achieve impressive competitive success in manufactured exports by attracting export-oriented FDI on the back of a good location, well-managed macro-economic policy and moderate levels of skills and capabilities. None of the three new tigers considered here have showed much technological prowess beyond the mastery of simple technologies – and here it is only Thailand that stands out by virtue of its spread and dynamism. Domestic Malaysian and Philippine manufacturing enterprises have

shown relatively limited capabilities even in low and medium technology activities, and the latter have revealed growing weaknesses in what should be their areas of natural strength.

However, the entry of TNCs, particularly in the assembly of high-technology electronics products, allowed each of them to enter very dynamic areas of export activity. With rising wages, the high-technology TNCs have not left but have invested in greater automation and new technologies. Along with this they have also invested in creating new skills and some supplier capabilities (they have also attracted their own suppliers overseas to invest). The greatest diversification and deepening of the high-technology export structure has taken place in Malaysia and the least in the Philippines; however, the semiconductor boom in the latter is leading to some increases in local content and even some design activity. Thus, local capabilities have grown and deepened over time – to some extent.

The generic issue is, then, *how far TNC-led capability development can take the upgrading and deepening of the export structure before it becomes uneconomical for private agents*. The countries most pressed for skilled manpower and domestic technological deepening – Malaysia and Thailand – clearly feel that it will not go much further. The government has to upgrade the skill, technology and supplier structure to allow private enterprises to achieve a new and higher level of competitiveness. Different governments are adopting different strategies. While all claim to be investing in education and promoting technology development, Malaysia is the most active in terms of proactive industrial policy – the Multimedia Super-Corridor is the most striking example of a strong initiative to take the economy in a particular direction. Thailand is spreading its efforts more widely, and has a much more developed domestic industrial sector to upgrade. The Philippines is doing rather less than the others, apparently coasting on its skill base and the catch-up process.

All three economies have mush to learn from the mature tigers. Malaysia is caught between trying to emulate the Singaporean and Korean models, with rather modest success. Given its massive dependence on FDI for competitiveness, the former would seem to

be the way to go rather than the latter. However, both strategies need very high levels of skill in the population at large and in the administration; it is not clear that these can be produced in the near future. Thailand probably needs to follow the Taiwan Province of China model: promoting high-technology SMEs to be independent exporters and also suppliers to technology-intensive TNCs, while targeting new technology based FDI. However, this is again enormously skill intensive and needs strong support institutions (Lall, 1996). The Philippines has to build upon the semiconductor boom but, more importantly, to strengthen all other export activities. Its relatively strong base of skills may be quickly dissipated if the ability of the productive sector to absorb manpower in more competitive activities is not developed. This entails using bits of strategy from all the mature Tigers. More importantly, however, it needs the Philippine government to build up a strategic capability, something it currently seems to lack. ■

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Systemic coordination and the development of human capital: knowledge flows in Malaysia's TNC-driven electronics clusters

Rajah Rasiah [*]

Using two transnational corporations dominated electronics clusters in Malaysia, this article examines the development of human capital in two knowledge-and-skills acquisition modes: education and learning by performing. Ineffective systemic coordination from federal institutions has restricted the supply of high-technology human capital from formal institutions of education and training in Malaysia. Hence, firms in Penang and Klang Valley have faced growing demand-supply deficits. Restrictive immigration policies have hampered firms' options of seeking high-technology human capital from abroad. Differential systemic coordination at the local level has produced different levels of network synergies in Penang and Klang Valley. Stronger systemic coordination and network cohesion has stimulated greater differentiation and division of labour, which helped engender the movement of tacit and experiential knowledge embodied in human capital to support dynamic clustering in Penang. Weak systemic coordination and network cohesion has confined transnational corporations to largely truncated operations without significant levels of differentiation and division of labour in the Klang Valley.

Key words: transnational corporations, Malaysia, systematic coordination, human capital, tacit knowledge, experiential knowledge

Introduction

Two strategies have dominated human-capital development in rapidly industrializing economies. The first relates to education

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policy where the focus shifted from basic education to high-technology human capital derived from formal institutions (Lall, 1996; 2001). Demand-supply deficits in human capital – especially in high technology – often led successful economies to complement local supply with immigration (e.g. Ireland, Singapore and the United States). The second strategy emphasizes learning by performing (Arrow, 1962). Evolutionary economists and psychologists have worked considerably on the pool of tacit and experiential knowledge embodied in human capital developed in firms (Penrose, 1959; Polanyi, 1997). This article uses a framework that melds together both approaches but with systemic coordination as the effective driver of both.

The successful expansion of the Silicon Valley, the revival of Route 128 and the continued dynamism seen in Emilia Romagna are the product of both approaches (see Best, 2001; Sabel, 1995; Saxenian, 1994; 1999). Although the first is far more documented, the second and the mediation between the two has been instrumental in the development of human capital even in Japan, Taiwan Province of China and the Republic of Korea, where local firms were the prime propellants of economic growth. Transnational corporations (TNCs) figure prominently in Ireland and Singapore, where the effective confluence of the two strategies drove the development and appropriation of knowledge embodied in human capital. While there are considerable accounts of the successful development of human capital, few examples actually detail differential experiences under the same polities. Malaysia is a good example of TNC-driven clusters where differences in systemic coordination have produced contrasting consequences. Export-oriented TNCs began relocating on a large scale to Malaysia following the opening of Free Trade Zones and Licensed Manufacturing Warehouses since 1972. Coming in the wake of an ethnic bloodshed in 1969, the Government offset risks and uncertainty with generous tax holidays, tariff-free operations and controls on unionization (Rasiah, 1988). These efforts led to the share of electric and electronics in manufactured exports to rise from 0.7 per cent in 1968 to 71.0 per cent in 1997 (Rasiah, 2002, table 8).

This article examines the importance of systemic coordination in gluing together a coherent strategy for the development of human capital to make the participation of TNCs a complementary

instrument for dynamic clustering. Ineffective federal governance of tertiary institutions of human capital constrained the first channel of human capital development throughout Malaysia. Strong systemic coordination locally helped Penang produce greater skilled, technical and entrepreneurial synergies for differentiation and division of labour. Weak systemic coordination locally produced less human capital synergies to support differentiation and division of labour in Klang Valley.

Analytical framework

The theoretical framework of this article fuses together the two dominant approaches to examine human-capital development in the TNC-driven electronics clusters of Penang and Klang Valley. The first refers to the supply of basic, secondary and tertiary education through formal institutions. The second refers to tacit and experiential knowledge acquired from learning by performing. The first channel is coordinated at the institutional level – by the Government, and private and intermediary organizations. The second is developed in firms, but its spread and depth are affected by network density and cohesion.

Modern industrialization requires the employment of human capital with at least communication skills so that the conception, organization, coordination and execution of tasks are carried out smoothly. Primary and secondary schools offer the initial mass of labour for large-scale but low-skill mass production operations. Export-oriented TNCs relocate simple assembly operations to economies that offer large reserves of cheap but educated (trainable) labour. United States, Japanese and European TNCs relocated to Jamaica, Barbados, Malaysia, Singapore, Taiwan Province of China and the Republic of Korea in the late 1960s and 1970s to access cheap literate labour (Scibberas, 1977; Lim, 1978; Rasiah, 1987, 1988).[1] Political instability and restrictive policies discouraged similar relocations to China and India in the 1970s. China only became a

[1] In fact the United States customs items of 806.7 and 807 specifically offered generous exemptions to stimulate the relocation of low value-added manufacturing activities to developing economies (Scibberas, 1977).

major manufacturing target of TNCs from the 1980s on (World Bank Institute, 2001). TNCs did not figure strongly in the economies of the Republic of Korea and Taiwan Province of China. Singapore and Malaysia relied heavily on TNCs to generate assembly-type low-skill employment in the late 1960s and 1970s (Lall, 2001).

From basic and secondary schooling, the demand for technical and professional skills rises as firms move up the technology ladder (Pavitt, 1984). TNC-driven countries – e.g. Ireland and Singapore – have typically managed to stimulate spillovers and industrial upgrading by matching demand conditions with the supply of technical, tertiary and scientific and engineering human capital. Institutions associated with education often face collective action problems. Private agents are unlikely to participate in market-driven activities when the risks involved are not matched by returns. Research and development (R&D) scientists and engineers have increasingly become important to support innovative activities. Kenneth Arrow (1962) noted that interventions in markets are necessary when social returns exceed private returns. Joseph Schumpeter (1934) argued that rents are necessary to motivate innovators. Nicholas Kaldor (1957) contended that markets generate sub-optimal outcomes when involving investments that generate dynamic increasing returns.[2] The production of technical personnel, scientists and engineers involves considerable acquisition of knowledge, which is a public good – its consumption by one does not exclude that by others. Hence, learning institutions such as universities, R&D laboratories and technical schools that generate high-technology human capital fall under the category of public goods. Intermediary organizations such as development corporations and chambers of commerce play a critical role to coordinate information and knowledge flows between Governments and markets (Aoki, 1994; Rasiah, 1999; Doner, 2001). The Republic of Korea and Taiwan Province of China shortened the experience of the Western economies and Japan with strong government focus on local support (Amsden, 1989; Wade, 1990).

[2] M. Abramovitz (1956) produced a similar argument about increasing returns. New growth economists such as P. Romer (1986) and R. Lucas (1988) demonstrated these ideas using elegant models. See Scherer (1992; 1999) for a lucid account.

The second channel of human capital development – tacit and experiential knowledge – is produced through learning by performing. While domestic institutions are necessary to increase the supply of high-technology human capital, tacit and experiential knowledge is critical to run even innovating firms. Edith Penrose (1959) and Michael Polanyi (1997) made distinctive contributions to the understanding and significance of experiential and tacit knowledge respectively – which overlap and are specific to individuals. Nathan Rosenberg (1982) established the peculiar characteristics of human capital under which coordination and extraction of performance cannot be bounded. Schumpeter (1934) and Albert Hirschman (1958) had discussed extensively the role of entrepreneurs in economic development. However, conventional economic theory tended to confine the term entrepreneurship to a black box. Given the tacit and spontaneous nature of a number of human-capital actions, formal contracts can never be exhaustive and hence will always involve moral hazard problems. Hence, trust has become a critical mode of governance to stimulate that entrepreneurial synergies. Business theory helped define and differentiate entrepreneurs, with the focus largely on the evaluation and management of entrepreneurship. Management courses attempt to equip entrepreneurs with technical and professional knowledge so that they become better managers. Critical elements of the theory of entrepreneurship could be traced to John S. Mills (1848), Alfred Marshal (1890), Penrose (1959) and Alfred Chandler (1962), albeit without specific definitions and methodological instruments for empirical inquiry. The application of theory to the creation and growth of entrepreneurs became more dynamic with the works of Annalee Saxenian (1994; 1999) and Michael Best (2001).

Tacit and experiential knowledge is best engendered in integrated but open clusters. The term clustering refers to a network of inter-connected firms, institutions and other organizations whose synergy strength depends on strong systemic coordination and network cohesion. Clusters of firms and institutions enjoying strong network cohesion are likely to offer greater flexibility, and generate technological and market synergies than those characterized by truncated operations of individual firms. Causation involving the propellants of synergies in clusters is complex and is not uni-

directional (Smith, 1776; Young, 1928). Michael Porter (1990) discussed clustering alongside the four diamonds that drive competitiveness, but offered vague reference to systemic instruments and network cohesion. Sebastiane Brusco (1976), Frank Wilkinson and Jong-Il You (1992), Michael Piore and Charles Sabel (1984), Sabel (1995), Werner Sengenberger and Frank Pyke (1988) and Paul Hirst and Jonathan Zeitlin (1991), Rajah Rasiah (1994) and Best (2001) advanced elements of cluster cohesion much better.[3]

The role of systemic instruments in driving cluster cohesion has been important in the development of dynamic industrial districts. Inter-firm pecuniary relations through sales and purchases is only one channel of inter-firm interactions (Rasiah, 1995). Knowledge flows – rubbing off effects from the interaction between workers (Marshal, 1890), and the movement of tacit and experiential skills embodied in human capital – raise systems synergies (Penrose, 1959). Open dynamic clusters encourage inter-firm movement of tacit and experiential knowledge embodied in human capital, which, *inter alia*, distinguishes dynamic from truncated clusters (see Best 2001; Rasiah, 2001). New firms benefited from gaining managerial and technical personnel from older firms in the Silicon Valley irrespective of national ownership. United States-owned Intel, Dell and Solectron, and Japanese-owned Sun Micro Systems hired technical and managerial personnel from old firms in the Silicon Valley.[4] Mature firms gain new ideas and processes to ensure continuous organizational change as some old employees are replaced to make way for fresh ones with new ideas, while new firms benefit from the entrepreneurial and technical – tacit and experiential – knowledge to start new firms (Rasiah, 2001).[5] Saxenian (1994; 1999) offered an impressive documentation of inter-firm movement of human capital, which helped support new firm creation capabilities in the Silicon Valley.

While the prime propellants of cluster dynamics in the successful industrial districts of Emelia Romagna and Silicon Valley

[3] Variants of these arguments related to transactions costs to explain the existence of firms was advanced by R. Coase (1937) and O. Williamson (1990), and the relevance of non-market modes of coordination by G. Richardson (1960; 1972) and D. North (1991).

[4] Author's interviews (1995).

[5] Author's interviews (1995; 1999).

are local firms, five important developments have made this approach applicable even to TNC-driven clusters. First, host-government investments in basic infrastructure and bureaucratic coordination helped resolve customs, security and labour problems. Second, TNCs have increasingly integrated production at selected host sites (e.g. Ireland and Singapore). Third, falling production and product-cycle times in electronics has encouraged TNCs to subcontract out dissimilar activities to suppliers and contract manufacturers. Fourth, growing horizontal integration has diffused synergies to several layers of firms at host sites (e.g. Israel and Singapore). Fifth, TNCs increasingly rely on host-site institutions to access scarce high-technology human capital – through relocation and immigration (e.g. software in India).

Evolutionary economists introduced the concept of national innovation systems (NIS) to explain systemic effects on innovations (Freeman, 1988; Lundvall, 1992; Nelson, 1993).[6] The NIS framework posits the role of a range of economic agents - institutions and firms – which are critical for stimulating innovation synergies. Where national systems failed to meet human capital demand-supply conditions, dynamic clusters such as the Silicon Valley, Ireland and Singapore resorted to selective immigration policies (Best, 2001). Some TNCs have also relocated abroad to access human capital where large-scale immigration was difficult (e.g. software companies in India). Although existing work has hardly dealt with systems construction, which is necessary for underdeveloped locations, its focus on the necessary links between economic agents is similar to the cluster concept, in which a mix of firms and institutions is viewed as critical to stimulate innovative activities. Despite the similarities, however, the NIS framework seems to have evolved overly as a top down framework that focuses on institutional development and the creation of a science and technology infrastructure. The cluster approach amplifies more systemic synergies that arise from dynamic inter-firm and institutional links. Given the strongly overlapping and complementary nature of the two approaches, this article integrates

[6] Elements of the NIS can be traced to Smith (1776), Hamilton (1791) and List (1885).

systemic coordination and network cohesion and examines the NIS from the lenses of firms.

Four important propositions are identified here to examine the production and distribution of human capital in TNC-driven Malaysian electronics clusters. First, effective systemic coordination and network cohesion is necessary to stimulate demand-supply conditions for the creation and appropriation of knowledge both through formal educational institutions as well as firms. Second, dynamic clusters take advantage of tacit and experiential knowledge to intensify differentiation and division of labour. Third, a critical mass of technical personnel and R&D engineers and scientists is essential to enable firms' strong participation in innovative activities. Fourth, clusters benefit from open national frameworks so that human capital deficiencies can be overcome through selective immigration as experienced by the United States, Singapore, Israel and Ireland.

The Malaysian electronics industry is characterized by three major regional agglomerations, and moribund operations in Sarawak and Sabah. Penang is the largest of them in terms of number of firms, employment and value added, followed by the Klang Valley and Johor. Penang's electronics industry employed over 90,000 persons, followed by the Klang Valley with over 85,000 persons in 1995 (MITI, 1996, p. 38).

A snowballing research technique was used to trace firms – connections traced from firm-level interviews. Given the complexity of the analytic framework, firm-level interviews formed the prime vehicle for gathering empirical information. The article relied on two firm stints in Monolithic Memories Incorporated (MMI)[7] and Advanced Micro Devices (AMD) in 1986 and 1989-1991 respectively, firm studies in 1993-1995 and detailed interviews with 167 electronics, machine tool, plastic and other ancillary firms in 1999-2002 (table 1). Interviews were also carried out with training institutions, industry associations, the State Economic Development Corporations (SEDCs) of Penang and Selangor and government departments in Penang and Klang Valley.

[7] MMI was acquired by AMD in 1987 (Rasiah, 1988).

Table 1. Breakdown of the interview, 1995-2002

Segments	Penang	Klang Valley
Component electronics	19	16
Consumer electronics	16	31
Industrial and peripheral	10	7
Plastic	16	7
Machine tools	31	9
Packaging	3	2
Total	95	72

Source: Prepared by the author.

Explicit, tacit and experiential knowledge

The empirical investigation of human capital development and its appropriation in the electronics clusters of Penang and Klang Valley is undertaken here. The first examines the supply of basic and secondary schooling, tertiary and scientists and engineers. Since the formal institutions of learning throughout the country are governed by federal institutions, little coordination differences exist between Penang and Klang Valley. The second refers to tacit and experiential knowledge embodied in human capital acquired from learning by performing. Differences in systemic coordination between the two clusters have produced contrasting results.

Formal institutions of human capital supply

Formal education institutions in the country have been governed directly by the Federal Ministry of Education – general, vocational and technical education. Educational institutions in Penang and Klang Valley faced similar coordination problems (table 2). Basic education offered the acquisition of cognitive, judgmental and communication skills, which helped Malaysia develop a labour force attractive for labour-intensive low value-added activities for TNCs. However, little efforts have taken place to coordinate supply from technical institutes and universities to stimulate industrial upgrading in firms.

Table 2. Systemic coordination instruments, Malaysia, 2002

Systemic features	Penang	Klang Valley
Chambers of commerce	Strong	Weak
Density of TNCs and institutions	High	High
Network cohesion	Strong	Weak
Skills development and training	Strong	Weak
Matching of supplier firms with TNCs	Strong	Weak
Basic infrastructure support	Strong	Strong
Security problems	Strong	Strong
Meetings between State, TNCs and supplier firms	Strong	Seldom
Production of high-technology human capital	Low	Low
Industry-public R&D institution ties	Weak	Weak
Industry-university ties	Weak	Weak
R&D support institutions	Weak	Weak
Publication of documents on product and process technology of suppliers	Strong	None
Access to foreign high-technology human capital	Restricted	Restricted[a]

Source: Author's collection of information.

[a] IT firms in the Multimedia Super Corridor (MSC) enjoy liberal environment to import foreign engineers and scientists, but the narrow strip is still underutilized.

Malaysia has enjoyed excellent basic education – primary and secondary schooling – standards. Enrolment in primary schools has exceeded the global mean (table 3). The index of primary school enrolment (see notes of table 3 for the formula used) – remained slightly above 1 between the years 1970-1995, falling slightly only in 1995.

Secondary school enrolment improved in the period 1970-1975 to above the global mean but has subsequently fallen slightly to 0.9 (table 3). The slight decline was a result of improvements shown by other developing economies as primary school enrolment in Malaysia is near universal and the rates for secondary school enrolment have improved strongly. Between 1970 and 1990 when the unemployment rates fluctuated between 6.0-8.1 percent (Rasiah, 2002a, figure 6), labour reserves with strong primary and secondary education helped attract assembly-oriented TNCs to Malaysia (Lim, 1978; Rasiah, 1988). Political stability, good basic infrastructure, financial incentives and controls on unionization helped attract TNCs to Malaysia.

Table 3. Education enrolment, 1970-1995

Economy	1970	1975	1980	1985	1990	1995
Net Primary	n=60	n=57	n=78	n=78	n=72	n=89
Malaysia	1.2	n.a.	1.2	n.a.	1.2	1.1
Republic of Korea	1.3	1.2	1.3	1.2	1.3	1.1
Singapore	1.3	1.2	1.3	n.a.	n.a.	1.1
Hong Kong (China)	1.2	1.1	1.2	n.a.	n.a.	1.1
Japan	1.3	1.2	1.3	1.3	1.2	n.a.
South Africa	0.9	n.a.	n.a.	n.a.	n.a.	n.a.
China	n.a.	n.a.	n.a.	n.a.	1.2	1.2
Philippines	n.a.	1.2	1.2	1.2	n.a.	1.2
Indonesia	n.a.	0.9	1.1	1.2	1.2	1.1
United States	n.a.	n.a.	n.a.	1.2	1.2	1.1
Ireland	1.3	1.1	1.1	1.1	1.1	1.1
Thailand	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Israel	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Gross Secondary[2]	n=132	n=137	n=153	n=156	n=152	n=145
Malaysia	1.1	1.2	0.9	1.0	1.0	0.9
Republic of Korea	1.3	1.5	1.5	1.7	1.6	1.6
Singapore	1.4	1.3	1.2	1.1	1.2	1.2
Hong Kong (China)	1.1	1.3	1.2	1.3	1.4	1.1
Japan	2.7	2.4	1.8	1.7	1.7	1.6
South Africa	n.a.	n.a.	n.a.	n.a.	1.3	1.5
China	0.8	1.2	0.9	0.7	0.8	1.0
Philippines	1.4	1.4	1.2	1.2	1.3	1.2
Indonesia	0.5	0.5	0.6	0.8	0.8	0.8
United States	2.6	2.2	1.8	1.8	1.6	1.5
Ireland	2.3	2.3	1.7	1.8	1.7	1.8
Thailand	0.5	0.7	0.6	0.6	0.5	0.9
Israel	1.8	1.7	1.4	1.5	1.5	1.4
Gross Tertiary[3]	n=118	n=120	n=144	n=141	n=129	n=110
Malaysia	n.a.	n.a.	0.3	0.4	0.4	0.5
Republic of Korea	1.1	1.0	1.1	2.4	2.2	2.3
Singapore	0.9	0.9	0.6	1.0	1.0	1.5
Hong Kong (China)	1.1	1.1	0.8	n.a.	n.a.	n.a.
Japan	2.7	2.9	2.3	2.0	1.7	n.a.
South Africa	0.6	n.a.	n.a.	n.a.	0.7	0.8
China	n.a.	0.1	0.1	0.2	0.2	0.2
Philippines	2.6	1.8	1.8	1.8	1.6	1.3
Indonesia	0.4	0.3	0.3	n.a.	0.5	0.5
United States	7.2	6.0	4.2	4.3	4.2	3.6
Ireland	1.8	1.8	1.4	1.6	1.6	1.8
Thailand	0.5	0.4	1.1	1.3	0.0	0.9
Israel	2.8	2.6	2.2	2.3	1.9	1.8

Source: Computed from World Bank, 2001.

n.a. = not available.

Note: Figures calculated using the formula $x_i[S(x_1..x_n)]^{-1}n$ where x_i refers to the % of enrolment of country i and n the number of countries reporting data.

However, the strong basic education endowments failed to sustain FDI inflows in the 1990s, as the lack of sufficient supplies of technical labour restricted industrial upgrading. The inter-industry and occupational demand structure of human capital in Malaysia's manufacturing sector changed considerably in the 1990s as labour reserves depleted and unemployment rates fell from 6.1 percent in 1990 to 2.5 percent in 1997 (Rasiah, 2002a, figure 6). Rising wages and the emergence of low-cost economies, such as China, Thailand, Cambodia and the Philippines severely undermined the capacity of Penang and Klang Valley to retain such operations. With a similar primary and secondary schooling index but with a massive labour reserve, China easily overtook other developing economies as the prime target for labour-intensive TNCs from the 1990s. Despite the financial crisis and subsequent industry-wide downswing in the electronics industry, unemployment rates in Malaysia only rose to 3.1 per cent in 1998 (Rasiah, 2002a, figure 6). The Malaysian Government sought an alternative by seeking foreign labour imports – primarily from Indonesia and Bangladesh – which accounted for around 15-25 percent of the total national labour force in 1997.[8] However, foreign labour imports failed to stem the fall in FDI levels in gross fixed capital formation (GFCF) in Malaysia, which receded from their peak of 24.8 percent in 1992 to 8.8 percent in 1999 (World Bank Institute, 2001).

In addition, component firms began to experience production changes that required the utilization of high technology. However, local institutions failed to expand supply of engineers and technicians to match demand. Malaysia's tertiary education enrolment was well below the global mean in the period 1975-1995, though trend improvements have taken place (see table 3).

The above developments saw the Government transform industrial strategy from employment generating to industrial deepening. The Action Plan for Industrial Technology Development (APITD) of 1990 and the Second Industrial Master Plan (IMP2) of 1995 set the blueprints for the transformation. A series of instruments

[8] This figure has fallen significantly following the Government's aggressive efforts to deport illegal workers from 1998. Over 350,000 workers were deported in the period 2000-2001.

and organizations were launched, which included the adoption of the Human Resource Development (HRD) Act in 1992, requiring manufacturing firms with an employment size of 50 and more to contribute 1 percent of payroll to the HRD fund. Firms could reclaim the funds with bills from approved training. Higher-education institutions increased enrolment in the mid-1990s to expand the supply of technical, engineering and science graduates. The Private Universities Bill of 1995 opened the way for the introduction of private universities. Exemptions were offered for information technology firms in the Multimedia Super Corridor (MSC) – opened in 1997 - to import technical and professional human capital from abroad.

However, despite massive emphasis on the development of infrastructure, the supply of high tech human capital has remained limited. Ananda Krishnan, Rasiah and Selvaratnam Viswanathan (1995) had projected severe widening of demand-supply gaps. Rasiah and Osman Rani-Hassan (1998) reported a serious mismatch in skills between supply and demand in the manufacturing sector. Malaysia's R&D scientists and engineers index of 0.1 in 1995 was extremely low (table 4). The weak high-technology human capital endowments have severely restricted firms' capacity to drive R&D activities. Restrictive immigration policies prevented firms from hiring significant numbers of high-technology human capital from abroad. Ineffective coordination has also offered little incentive for Malaysian scientists and engineers qualified abroad to return. It is little wonder that few electronics firms in Malaysia – whether foreign or local – undertake R&D activities in Malaysia (see

Table 4. R&D scientists and engineers per million people, 1981-1997

(Per cent)

	1981 n=31	1985 n=36	1990 n=28	1994-97 n=65
Malaysia	na	na	Na	0.1
Republic of Korea	0.4	0.8	0.8	1.5
Singapore	0.3	na	0.7	1.6
Hong Kong, China	na	na	Na	na
Japan	2.8	3.5	2.8	3.6
South Africa	na	0.3	Na	na
China	na	na	Na	0.2
Philippines	0.1	na	Na	na
Indonesia	na	0.1	Na	na
United States	2.1	2.7	Na	2.5
Ireland	0.6	0.8	0.7	1.6
Thailand	na	na	Na	0.1
Israel	na	na	Na	2.6

Source: Computed from World Bank, 2001.

n.a. = not available.

Note: Figures calculated using the formula $x_i[\Sigma(x_1..x_n)]^{-1}n$ where x_i refers to R&D scientists and engineers per million people in country i, and n the number of countries reporting data.

Rasiah, 1996). The Republic of Korea and Singapore successfully raised their R&D scientists and engineers index from 0.4 and 0.3 respectively in 1981 to 1.5 and 1.6 respectively in 1995 (see table 5). Singapore, Ireland and Israel managed to keep strong high-technology human capital endowments by both increased emphasis on higher education domestically, as well as selective immigration policies. Ireland and Singapore continue to enjoy strong FDI levels in GFCF, while the much smaller share in Israel has risen in the 1990s (see World Bank Institute, 2001). The United States has offset its gradual decline in human capital supply from domestic institutions through selective immigration.

Hence, the formal institutions of human capital development have generally only managed to supply primary and secondary education, which was instrumental in attracting large-scale TNC operations in labour-intensive manufacturing activities from the early 1970s until 1990. The lack of high-technology human capital restricted industrial upgrading, which became necessary in the 1990s when labour reserves depleted and wages rose. Despite aggressive government efforts, both Penang and Klang Valley failed to enjoy sufficient supplies of high-technology human capital. Federal institutions neither produced sufficient numbers nor coordinated supply and demand conditions effectively. Immigration policies also restricted electronics firms from accessing foreign high-technology human capital to overcome the growing deficits.

Development and transfer of embodied knowledge

Penang and Klang Valley have enjoyed strong TNC operations in electronics manufacturing since the early 1970s. Foreign ownership of fixed assets rose from 70 per cent in 1968 to its peak of 91 per cent in 1993 before falling to 83 per cent in 1998 following the financial crisis (Rasiah, 2002a, table 6) In addition, Penang has developed systemic coordination and network cohesion to support flexibility and inter-firm technological interface. TNCs in Penang enjoy strong linkages with local firms and better coordination with support institutions. However, Klang Valley suffers from truncated operations without much systemic coordination and network cohesion, with some accessing supplier requirements from their affiliates (e.g. Chungwa Picture Tubes).

Table 5. Machine tool firms, 1993 and 2001

Firm	Cluster	Year 0pen	Employment 1993	Employment 2001	Sales RM million 1993	Sales RM million 2001	Products (2001)
BA[b]	Penang	1979	45	n.a.	2.5	n.a.	Precision components
BB	Penang	1983	22	43	1.4	9.1	Precision parts, automated machines
BC	Penang	1988	15	34	0.3	1.6	Precision parts fabrication
BD	Penang	1987	34	78	1.5	8.7	Precision parts, automated machinery
BE	Penang	1991	17	36	0.3	1.8	Precision parts
BF	Penang	1976	200	250	20.0	45.3	Precision components, automated machines
BG	Penang	1978	22	Closed	2.6	Closed	Precision parts, moulds, dies
BH	Penang	1984	85	112	10.0	15.1	Precision components
Bl	Penang	1980	68	96	15.0	18.3	Precision parts, automated machinery
BJ	Penang	1984	40	87	2.5	9.5	Precision parts and automated machinery
BK	Penang	1950	120	150	10.0	12.8	Precision parts, automated machines
BL	Penang	1980	40	85	1.7	7.5	Automated machines
BM	Penang	1982	128	266	12.0	46.2	Parts fabrication, jigs, fixtures, moulds, dies
BN	KV	1988	18	Closed	0.2	Closed	Jigs, fixtures, moulds, dies
BO	KV	1988	14	Closed	0.4	Closed	Jigs, fixtures, moulds, dies
BP	KV	1984	32	45	0.6	1.9	Parts fabrication, moulds, dies, jigs, fixtures
BQ	KV	1975	69	132	2.5	4.5	Precision parts, jigs, fixtures, moulds, dies
BR	Penang	1993	400[a]	1300	5.4[a]	42.9	Metal parts
BS	Penang	1990	n.a.	120	n.a.	n.a.	Automated machinery and precision engineering
BT	KV	1993	29[a]	52	106.0[a]	264.0	Precision components and sub-assemblies
BU	KV	1992	282[a]	332	61.6[a]	65.4	Aluminium components
BV	Penang	1994	30[a]	240	6.0[a]	21.6	Moulds, dies and metal components

Source: 1993 figures adapted from Rasiah (2002a and b, table IV); 2001 figures from the author's interviews conducted in 2001-2002.

Note: KV – Klang Valley; n.a. = not available.

[a] 1995 figures.

[b] Firm sold to different owner in 1995.

Penang: strong systemic synergies

The Penang Government established the Penang Development Corporation (PDC) in 1969 to "undertake and promote socio-economic development" (PDC, 1974, p. 4), which included the extensive promotion of export-oriented TNCs. TNCs helped raise the share of manufacturing in Penang's GDP from 13 per cent in 1971 to 46 per cent in 2000 (PDC, 2001). The Penang region built high-volume production capability in electronic components, consumer appliances, hard disk drives and personal

computers components, by inserting into TNC-driven global production chains. Changes in the dynamics of TNC production coincided with improvements in systemic coordination in Penang, which helped strengthen clustering since the 1980s.

Although Penang achieved dynamic clustering, a lack of R&D infrastructure (including a serious shortage in engineers and scientists) – where governance jurisdiction is held by federal institutions headquartered in the Klang Valley – restricted industrial upgrading. Strong systemic coordination helped the cluster generate and appropriate considerable network synergies. Integrated business networks with PDC's pivotal intermediary role fuelling cluster cohesion helped movement of tacit and experiential knowledge embodied in human capital for new firm creation, differentiation and division of labour.

Specialization synergies

Systemic coordination was instrumental in the relocation of industrial segments new to Penang, which helped sustain differentiation and extended the platform for human capital development in firms. A deliberate effort to promote sub-species to strengthen inter-firm links in Penang emerged from the late 1980s when a massive influx of electronics firms offered the state the opportunity to be selective. Personal approaches by the Penang Government since the early 1970s attracted TNCs. Penang Electronics – opened as a symbolic spur – was started in 1970, which was followed by the relocation of Clarion and National Semiconductor in 1971 and later by Intel, Motorola, Hewlett Packard, AMD and Hitachi by 1974. While a myriad of firms relocated, the early 1970s was dominated by the microelectronics segment. These firms use cutting-edge process technologies with extensive application of flexible production techniques from the 1980s.

Consumer electronics became important from the late 1970s on, but particularly since the late 1980s. Sony, Toshiba and

[9] Osram was renamed to Siemens-Litronix.

[10] Author's interviews (2001) with Penang's Chief Minister.

Pensangko were some of the consumer electronics firms. Disk-drive companies, such as Maxtor, Conner Peripherals, Seagate, Quantum and Komag, were actively wooed from 1989 on and "readrite" operations started in the early 1990s. Many of them have either closed down or relocated by the late 1990s, but Quantum, Seagate and Komag were still operating in 2002. In addition to product transitions in old affiliates, such as Komag and Osram,[9] the Penang Government promoted the opto-electronics segment in 2000-2001.[10]

The development of synergies from TNC operations also drew participation from Dell, which reported relocating to Penang to integrate around its product chain and strategically customize product development for the Asia Pacific market. Dell's movement to Penang attracted contract manufacturers such as Solectron and raised demand for other local suppliers.

Segments of industries – not new to the universe – have also evolved domestically to stimulate differentiation and diversity in Penang. Machine-tool and plastic molding species evolved from technological constraints emerging in the production dynamics of TNCs operating in Penang. The development of several tiers of firms in these industries has enabled the workforce to expand further embodied knowledge development and movement to the Penang cluster. Intel, AMD, Fairchild and Hewlett Packard subcontracted out a number of older products to Globetronics, Unisem and Carsem (the latter two located in Ipoh). TNC synergies initiated and stimulated the developments precision engineering, machinery and plastic injection molding firms in Penang – especially from the 1980s.

However, the lack of engineers, scientists and technicians has restricted Penang's capacity to stimulate horizontal integration. The Penang Government is keen on a pro-active strategy to step up the supply of engineers, scientists and technicians. Complementing imports from abroad are also necessary to alleviate the problem, but the jurisdiction for adoption and application rests with the federal government. China has already emerged as the biggest single threat to labour-intensive industries in Penang. In fact, four TNCs reported shifting operations from Penang to China in 2001.[11]

[11] Author's interviews (2001).

Training ground

Changes in TNC strategies from the 1980s helped widen and deepen the production of tacit and experiential knowledge in Penang. Intel's, Motorola's and AMD's progressive efforts from simple assembly to continuous improvement capabilities from the 1980s made it possible for greater technology transfer to Penang, which helped local plants to upgrade to more complex and higher value-added activities (Rasiah, 1988; Lim 1991). Intel, Motorola and AMD have been managed completely by Malaysians from 1980, late 1980s and mid-1990s respectively. Just-in-time (JIT) and the shift towards flexible production systems were introduced in the 1980s (Rasiah 1987), which enabled semiconductor firms in Penang to avoid massive capacity restructuring during business downswings. New firm creation – primarily by ex-TNC employees – helped TNCs to externalize dissimilar assembly and test lines to facilitate organizational and process integration and re-integration easily.

In addition, TNCs such as Motorola, Intel, AMD and Hitachi introduced redesigning activities in Penang, but confined to adapting older technologies. Motorola Penang enjoys design leadership in Asia for the CT2 cordless telephone. The Center does new product design, product-process interface and advanced manufacturing processes. Motorola's R&D centre, which started with four engineers in the 1980s, had nearly 120 in 1998 (Ngoh, 1994). However, Penang's short supply of R&D scientists and engineers made similar expansion by other TNCs difficult. Penang does not have a critical mass of high tech human capital and R&D labs to support rapid product innovation, and institutional support for greater deepening.

Dell has developed a mass customization system to reproduce in Penang its "produce to order" model that combines the Toyota production system (cellular manufacturing, JIT, Kanban, quick changeover, continuous improvement, self-directed work teams) with Internet to integrate production and distribution into a single high-throughput process. Dell's factory is being geared to respond directly to the final customer so that all intermediary distribution links are eliminated. Its Managing Director reported that Penang stood out not only because of the smooth coordinating approach of the State

Government and PDC, but also because of its cultural mix that offered regional customization potential for much of Asia (Rasiah 1995). Dell's unique fusion of design, process flow and final demand facilitated by the Internet has offered production and marketing flexibility. Dell's inter-firm production network has generated considerable information and knowledge synergies for stimulating differentiation and division of labour in Penang. However, Dell does not have a sufficiently large pool of engineers and scientists in Penang to drive rapid product-innovation and systems integration capabilities, which has constrained its efforts to achieve integrated manufacturing operations.

In addition, all electronics TNCs interviewed are engaged in cutting edge competition, which has forced them to raise skill levels of employees using a long- term vision of human resource development. Company chief executive officers reported that the application of Total Quality Management (TQM) requires that employees continuously improve operations at all levels. National Semiconductor's affiliates in Penang, i.e. Dynacraft and Micro Components Technology started to support its chip assembly affiliate, i.e. Fairchild, by training many of Penang's engineers in precision engineering and metal-working technology. These engineers now own and manage Prodelcon, Metfab and Rapid Synergy. The founders of these three firms also acquired their tacit and experiential knowledge from working in Micro Machining, which was an affiliate of National Semiconductor until 1989. Former employees of Intel managed Shinca, Shintel, Sanmatech, Unico, Globetronics and Solectron in 1999. Former employees of Micro Machining (then an affiliate of National Semiconductor, which changed its name to Fairchild in 1989) started the local firms of Prodelcon, Polytool, Rapid Synergy and Metfab. Komag, Quantum and Seagate also benefited from absorbing managers from older TNCs in Penang.

Redesigning operations in TNCs also produced human-capital synergies for other firms. Two of Motorola Penang staff joined the R&D division of Sapura, which was a local firm located in Klang Valley in the late 1980s. Two of Intel's R&D personnel left for AMD's NVD design centre in the mid-1990s. However, restrictions on immigration involving R&D personnel have restricted TNCs

capacity to upgrade in Penang. Intel, Motorola, AMD, Hewlett-Packard and Fairchild, and the supplier firms of Eng Technology, Trans Capital and Unico reported trying in vain to bring foreign experts to expand R&D activities.[12]

The creation of entrepreneurs, managers, technicians and skilled human capital has helped TNCs upgrade their own operations as the continuous movement out of older employees allowed the entry of fresh human capital with new ideas and willing to acquire new knowledge. Employees moved out to help start and support new firm creation in Penang. The increased inter-firm movement of human capital stimulated greater outsourcing of dissimilar activities while allowing TNCs to upgrade and specialize in higher value added operations. At the same time, this outsourcing helped increase the number of suppliers to TNCs.

Differentiation and division of labour

The expansion of of embodied knowledge in employees helped intensify differentiation and division of labour. Entrepreneurs and professional, technical and skilled employees developed in TNCs moved to start or strengthen new firms. Employees of Intel established Globetronics, Shinca, Shintel and Unico, while Motorola started BCM. Eng Technology, Metfab, Prodelcon and Choong Engineering grew strongly from technological diffusion from Intel. Wong Engineering grew with support from Motorola. The founder of Loshta gained his tacit and experiential knowledge working in Motorola. Polytool and Rapid Synergy absorbed considerable precision engineering technology from Intel and AMD. Complementary but dissimilar product lines were relocated as new firm creation expanded, which was accompanied by the emergence of a locally owned supplier base with increasing differentiation and division of labour.

Strong systemic coordination and the flow of embodied knowledge stimulated localization of inputs by TNCs. Local supporting firms in Penang sourced 46 percent of their inputs locally in 1996 (Narayanan, 1997, p. 23). Differentiation and the

[12] Author's interviews (2002).

development of tacit and experiential knowledge worked both ways. The economic advantages of introducing flexible production systems encouraged lead suppliers to actively differentiate and intensify the division of labour. Rasiah (1994) had reported only three stages in 1990:

> "The first-tier vendors (those who had the first links with the electronics sector firms) have, in time, chosen to specialize in certain functions, and passed on some of their previous tasks to second-tier machine tool firms whom they now nurture. These second-tier firms have gone on to spawn their own third-tier subcontracting firms, giving them simply tasks like parts fabrications, which were no longer sufficiently profitable for the former.", p. 288.

Increased differentiation and division of labour helped deepen and widen the movement of tacit and experiential knowledge embodied in employees. Most supplier firms in Penang have passed through the third and fourth stages of technology absorption and diffusion (Rasiah 1994). In the first stage, suppliers did simple grinding, machining, welding and stamping operations to supply trolleys, components and parts to TNCs, using imported machinery and designs and drawings supplied by TNCs. This stage characterized the local machine tool firms in the 1970s. In the second stage, supplier firms upgraded to assemble semi-automated machinery and precision tools using imported machinery and designs and drawings from TNCs. In the third stage, supplier firms adapted and reverse engineered imported machinery for their own use, and high-precision foreign components and machinery for sale to TNCs in Malaysia and affiliates abroad. In the fourth stage, suppliers developed their own original equipment manufacturing capabilities to supply precision components and machinery to TNCs in Malaysia and their affiliates abroad. In the fifth stage, suppliers introduced original designs, though much of production is oriented towards subcontract demand operations.

Several first-tier firms – operating at stage four – evolved from simple backyard workshops to modern firms and later to TNCs themselves. Eng Technology has affiliates in China, the Philippines, Malaysia and Thailand, while Atlan has affiliates in Malaysia and

Indonesia. The network of suppliers in Penang shows generally a vertical division of labour with firms confined to all the five stages of technology utilization. Nevertheless, a handful of firms (e.g. Eng Technology, BCM, Unico and SEM) show strong potential for horizontal integration. Strong technological interface between TNCs and suppliers have encouraged inter-firm simultaneous engineering activities.

Firms exploited the local systemic synergies and open but integrated business network of Penang to encourage the exit and entry of entrepreneurial, technical and skilled human capital to support new firm creation. The number of plastic, machine- tool and packaging firms linked directly or through first, second and third tier suppliers to electronics TNCs in Penang expanded from around 45 firms in 1989 to around 155 firms in 1993 and 455 in 2001.[13] The spread of TNC-driven synergies could not have reached high levels without the active intermediary role of PDC. The PDC also matched potentially capable local firms with TNCs in the 1980s. The PDC helped solve collective-action issues involving scale and scope (e.g. training) by coordinating the formation of training centres and encouraging active consultation between suppliers, institutions and TNCs. PDC's role helped translate TNC demand into the formation of the Penang Skills Development Centre (PSDC) in 1989. The PDC initiated the opening of the PSDC by offering a highly subsidized building – charging a symbolic rent of RM1 a year instead of the market rate estimated at RM1 million a year.[14] The PSDC is particularly important in offering specialized and generic skills training. In addition, Intel and Motorola have specialized continuous training centres where employees could also access training and skills unrelated to their formal work. Following the demonstration effects from Intel and Motorola, locally owned Atlan established its own training centre in the late 1990s. The PDC was instrumental in attracting capitalization of Globetronics from Malaysian Technology Development Corporation (MTDC).

The founding of Trans Capital, Unico and Globetronics in the 1990s – all dominated by former TNC employees – added a

[13] Author's interviews (1995; 2001).
[14] Author's interviews (1999; 2001).

new dimension to Penang, which helped raise local demand for skills for "front-end" operations like chip design, surface mount technology (SMT) – and applications engineering. In addition to offering demand for the absorption of R&D personnel from TNCs, these firms helped widen knowledge accumulation in local firms, though the lack of R&D scientists and engineers in the country has restricted horizontal integration.

Local suppliers achieved rapid process and product upgrades through in-house and simultaneous engineering links with TNCs. There are not only a larger number of local suppliers linked to electronics TNCs in Penang (tables 5 and 6), they have also developed strong technological capabilities and recorded generally higher value added and labour productivity growth than supplier firms in the Klang Valley (table 6). BB, BC, BD and BE – all located in Penang – enjoyed the highest annual average labour- productivity growth among the machine tool supplier firms connected to electronics TNCs in the two clusters. Only BI and BL, and BV recorded negative labour- productivity growth in the period of 1993-2001 and 1995-2001, respectively. BV's labour productivity declined considerably because of accounting procedures as its output between 1994-1996 was supported strongly by staff from BK – which is its parent firm. Penang's open cluster encouraged employees gaining tacit and experiential skills to support new firm creation.

Strong systemic coordination helped network cohesion and dynamic clustering in Penang, which stimulated inter-firm flows of embodied knowledge in Penang. Inter-firm movement of human capital – exposed to cutting edge manufacturing practices – helped the appropriation considerable tacit knowledge embodied in employees in Penang. The systematic promotion of electronics segments, the open integrated business networks, with strong employee movement to support new firm creation, helped increase differentiation and division of labour. However, limitations in the coordination of human-capital institutions responsible for the supply of technicians, engineers and scientists and immigration have restricted expansion into R&D activities. Hence, rising production costs and competition from cheap cost locations such as China and Philippines is threatening to stall further differentiation and division of labour in Penang.

Table 6. Technology deepening and performance, machine tool firms, 1993 and 2001

	Technology index								Average Annual Growth (1978 prices) 1993-2001[c]	
	Engineer		Techno-machinist		Computer-aided production machine		Computer-aided testing machine			
Firm	*1993*	*2001*	*1993*	*2001*	*1993*	*2001*	*1993*	*2001*	*VA*	*VA/L*
BA[b]	0.0	n.a.	26.7	n.a.	27.6	n.a..	33.3	n.a.	n.a.	n.a.
BB	0.0	10.0	68.2	72.2	21.1	65.3	23.1	55.2	25.1	15.0
BC	0.0	1.2	40.0	54.1	15.0	45.7	30.0	44.3	22.0	10.1
BD	0.0	n.a.	60.0	n.a.	11.8	n.a.	40.0	n.a.	23.3	11.1
BE	0.0	1.9	45.2	63.2	45.0	55.5	26.5	42.4	23.8	12.7
BF	2.0	6.5	47.0	77.8	34.3	68.3	78.9	58.7	9.6	6.6
BG	0.0	Closed	40.9	Closed	38.9	Closed	33.3	Closed	n.a.	n.a.
BH	0.0	3.7	52.4	70.4	47.2	55.6	29.4	45.7	4.2	0.7
BI	1.5	2.9	54.1	77.8	55.1	n.a.	71.4	n.a.	1.5	-2.8
BJ	2.5	4.1	50.0	80.5	25.0	44.3	60.0	56.7	16.9	6.1
BK	1.7	5.0	41.7	77.2	38.9	n.a.	33.3	n.a.	2.1	-0.7
BL	2.5	4.4	62.5	66.3	33.3	44.5	60.0	52.5	19.1	8.4
BM	1.7	2.1	40.2	49.6	29.2	48.7	73.3	66.3	17.1	6.9
BN	0.0	Closed	22.3	Closed	5.6	Closed	6.7	Closed	n.a.	n.a.
BO	0.0	Closed	20.6	Closed	6.8	Closed	10.8	Closed	n.a.	n.a.
BP	0.0	0.1	27.6	36.7	12.2	24.5	11.7	22.3	14.3	9.5
BQ	0.0	0.2	35.4	44.6	6.2	25.7	21.5	32.8	6.5	-1.8
BR	n.a.	4.1	n.a.	73.5	n.a.	55.7	n.a.	75.0	28.3[a]	14.6[a]
BS	n.a.	0.6	n.a.	66.5	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
BT	n.a.	4.5	n.a.	72.5	n.a.	75.4	n.a.	72.5	11.0[a]	4.3[a]
BU	n.a.	1.5	n.a.	70.1	n.a.	54.5	n.a.	45.8	-0.2[a]	-2.9[a]
BV	n.a.	3.5	n.a.	74.2	n.a.	36.4	n.a.	43.6	16.3[a]	-13.6

Source: 1993 figures adapted from Rasiah, 2002, table V; 2001 figures compiled from author interviews in 2001-2002.

[a] 1995-2001 figures; company was acquired by another owner in 1995; Engineer and techno-machinist (technicians and skilled machinists) indexes were calculated as shares of these employees in total employment. Machinery indexes were calculated as precision machinery shares in total machinery. Only three firms replied questions on the value of machinery and hence composition based on value was excluded.

[b] Firm sold to different owner in 1995.

[c] Growth rates computed after adjusting for machinery and transport equipment price inflation (computed from Bank Negara Malaysia, 2003).

Klang Valley: uncoordinated and porous

Klang Valley was better endowed than Penang when the first major influx of electronics TNCs relocated in Malaysia in the early 1970s. Matsushita – Malaysia's first electric and electronics firm – relocated operations to the Klang Valley in 1965. With Kuala Lumpur being the administrative capital until 1998, and the promotional agency of the Malaysian Industrial Development Authority (MIDA), federal support was strongest in Klang Valley. While Malaysia's political capital changed to Putra Jaya in 1998, Kuala Lumpur has remained the commercial hub of the country. The concentration of TNCs and institutions in the region offered considerable opportunity for the development of entrepreneurs, and professional, technical and skilled human capital for new firm creation.

However, weak systemic coordination has restricted network cohesion and hence produced less inter-firm human capital synergies in Klang Valley. Support organizations such the Selangor Economic Development Corporation (SEDC) hardly gathered and disseminated information, matched firms and mediated technology and skills development, or R&D activities.[15] While different segements exist, Klang Valley lacks network strength for the whole to exceed the sum of the parts. While in-firm development of tacit and experiential knowledge is strong, but the lack of network cohesion has restricted deepening and inter-firm human capital flows. Klang Valley had more than eight public and private universities in 2000, but still faced severe demand-supply deficits involving engineers and technicians.[16]

Uncoordinated segments

The Klang Valley hosts a range of electronics activities transplanted from abroad (e.g. components, consumer electronics and telecommunication products). With Penang, the Klang Valley shared the same federal strategy of approving FDI with incentives on the basis on employment and investment levels from in the 1970s. However, the massive influx of Japanese, Taiwanese and Korean investment sought to relocate to Malaysia from the late 1980s –

[15] Author' interviews in 1990 and 1999.
[16] Author's interviews (2002).

driven strongly by the Plaza Accord of 1985 (which led to the appreciation of the yen, won, new Taiwan dollar and the Singapore dollar) and the withdrawal of the Generalized System of Preferences (GSP) from the Republic of Korea, Taiwan Province of China and Singapore – applied serious pressure on space, labour and infrastructure in Malaysia. Penang used the situation to seek a critical mass of segments of firms to stimulate clustering, but SEDCs in Klang Valley only diverted highly labour-intensive firms from the neighbouring states of Negeri Sembilan and Melaka. There was no systematic effort to promote dynamic clustering by the institutions approving FDI applications. As one official from the Selangor SEDC put it,

> "MITI (including its promotional agency, MIDA) and officials from the government help promote Malaysia as a good place to invest. MITI even handles the investment approval process. We take potential inventors around to show what Selangor has to offer, allocate land and facilitate the starting of the factories. Our tasks end the moment firms start their factories. We do sit on coordination committees of MIDA, but do not involve in any monitoring and active appraisal of investment".[17]

Klang Valley's closed and generally opaque business networks have restricted its capacity to generate spillovers of dissimilar activities. Dissimilar but complementary products are either imported or produce in-house. SEDC also did not systematically promote the development of local segments of supplier firms. Hence, a few supplier firms – with no strong technological interface with TNCs – have developed in the Klang Valley. Hence, the supplier machine tool and plastic firms liked to electronics firms in Klang Valley traced using a snowballing methodology were limited in number (see table 1). Tables 5 and 6 also showed that Klang Valley's machine tool firms had relatively weaker technological capabilities and performance than Penang firms. Two of the firms had closed down by 2001, while BQ and BU recorded negative labor productivity

[17] Author's interviews (1999). MITI is to the Ministry of International Trade and Industry. MIDA is to the Malaysian Industrial Development Authority.

growth in the period 1993-2001 and 1995-2001 respectively. With the exception of BQ, which is linked to Motorola, the remaining machine tool firms did not emerge from the cluster synergies generated by the TNCs. Apart from foreign owned BU, the others started operations to take advantage of the Supplier Exchange Program (SEP) and Vendor Development Program (VDP) – introduced in the late 1980s by the federal government to stimulate linkages. JVC, Sony Hitachi and Chungwa Picture Tubes reported that local suppliers were technologically inferior and hence only supplied low value added components.[18] These firms sourced their critical components either from abroad or from foreign companies.

While considerable technological and product diversity has emerged in the Klang Valley, segments of firms do not show strong connectivity between each other. The disconnected operations of firms have impeded the creation and appropriation of cluster synergies. The bigger and more successful local firms, such as OYL Electronics and Sapura, tend to operate without production links with TNCs. Hence market opportunities arising from technological constraints generated from the continuous reconstitution of production in TNCs have not been appropriated effectively. The limited TNC-local firms links are confined to licensing agreements (e.g. Sapura and Nokia and OYL and York). Sapura and OYL Electronics benefited little from sourcing links with TNCs in the Klang Valley, though TNC-trained local personnel have been instrumental in their growth. Sapura and OYL have R&D capabilities, but with the exception of the voice activated phones of the former in the early 1990s, yet have to achieve success with new products.

Weak systemic coordination has restricted the orderly stimulation of new segments of industries for dynamic clustering. The Klang Valley lacks strong inter-firm connections to generate systemic synergies. The lack of network integration and the weak development of industrial species from abroad and locally has reduced the Klang Valley to a porous conurbation.

[18] Author's interviews (1999; 2001).

Training ground

The in-house skill formation process is considerable in the Klang Valley. TNCs have invested heavily in skills and technical training activities to be globally competitive. Motorola, Intersil, Texas Instruments, Sony, JVC, Hitachi and Western Digital also reported participation in incremental engineering activities. However the lack of systemic coordination to strengthen network cohesion has restricted the outflow of TNC-developed personnel to support new firm creation.

The lack of systemic coordination has constrained the growth and upgrading of local firms, which is necessary for TNCs to introduce simultaneous engineering and high-technology activities. Weak supplier support has restricted headquarters ability to transfer advanced technology to Klang Valley. Five TNCs interviewed in the Klang Valley contended that their operations would be upgraded if ancillary firms develop or relocate to handle stronger horizontal interface. The Managing Director of Motorola noted in 1996:

> "Our production strategy is to integrate best practice process technologies in Malaysia as it will enable us to achieve continuous improvement and productive flexibility. However, we do not have a strong supplier base here to facilitate that transition. We even have a considerable machinery workshop in-house because of it."[19]

TNCs have developed in-house manufacturing capabilities in the Klang Valley that use small batches or mass production capabilities (e.g. JIT, MRP2 and TQM systems), which are best practices that expose employees to world class embodied knowledge. However, the shortage of scientists and engineers in Malaysia and restrictive immigration policies – with the exception of the MSC region where information technology firms enjoy a waiver– has undermined the capacity of the region to make the transition to innovation related activities.

[19] Author's interviews (1996).

The lack of network cohesion has restricted the outflow of potential entrepreneurs and skilled personnel for new firm creation. Consequently, problems of information imperfection and moral hazard reduced outsourcing activities and inter-firm links. The Federation of Malaysian Manufacturers had a handful of machine tool and plastic supplier firms from the Klang Valley. If in Penang supplier firms enjoyed formal platforms to engage in consultative committees with intermediary and development organizations, only the more established and only a handful had access to such platforms. In addition, the managing director of one firm even mentioned that they have only participated passively in related meetings with development corporations, the Small and Medium Scale Industrial Development Corporation (SMIDEC) and other government meetings.

Some TNCs have introduced product-adaptation activities in the Klang Valley. Matsushita developed its split-level air-conditioners, using a flexible production model, approximating the Toyota multi-flow system with customization.[20] However, a lack of high-technology human capital has restricted stronger participation in R&D activities. The Malaysian executive director of the firm reported that product development activities would be strongly enhanced if only more qualified R&D personnel were available. Shortfalls in the supply of technical and R&D personnel was reported as a major constraint by Intersil, Motorola, Sony, Hitachi, JVC and Texas Instruments to expand innovative activities.

TNC participation in stimulating off-firm training has been thin in the Klang Valley. The success of PSDC in Penang encouraged the Government to initiate the Selangor Human Resource Development Center (SHRDC). However, the SHRDC lacks coordination dynamism from state organizations. National organizations such as American Business Council, JACTIM, JETRO and German Malaysian Institute (GMI) started training activities, but the limited depth and spread of their programmes has produced little impact on skills development. Japanese cooperation has included training of tool and die makers, and the Germans on precision engineering, which has been important but confined to low-end

[20] Author's interviews (1999; 2001)

activities. Hence, TNCs and local firms face considerable collective action problems.

The Multimedia Super Corridor (MSC) has not encouraged imports of high-technology human capital to most TNCs – thereby restricting the potential for generating greater human capital synergies. Although the MSC offers easy access to hiring foreign high-technology human capital, the TNCs involved in this study are not classified as information technology-based and those that are information technology-based reported being unsure about the future of their participation in Malaysia.[21] Motorola, Intersil, Matsushita, Sony and Texas Instruments reported restrictions in their capacity to hire foreign engineers.

Differentiation and division of labour

Despite the high density of TNCs, weak systemic coordination has constrained clustering in the Klang Valley. The lack of differentiation and division of labour has reduced inter-firm flow of embodied knowledge. Electronics TNCs have supplanted local supply requirements by either importing or sourcing from their own affiliates in Malaysia.

The first-tier supplier firms have hardly developed contacts with second-tier suppliers. Human capital in supplier firms in Klang Valley has not been exposed to tacit and experiential knowledge beyond the second stage of absorption. Instead of local firms appropriating synergies from an extensive division of labour as in Penang, TNCs source minimally and directly from first-tier suppliers.

Several Japanese and Taiwanese firms act as sourcing anchors (e.g. Matsushita group of air-conditioner companies, Sony Group of TV/Video companies, Motorola, Tamura Electronics, Chunghwa Picture Tubes, Formosa Prosonic Technics and Quality Technologies Opto). Local anchors in the Klang Valley include Sapura, OYL, M-SMM Electronics and Jasa Kita. Local firms – started largely with federal government support – use licensed technology. The anchors offer markets and technological support

[21] Author's interviews (2000) with an NTT official.

for foreign and local firms. Most local suppliers producing air-conditioner, television, video and refrigerator components are limited to low value-added activities. Key technologies such as liquid crystal display (LCD) are still imported from Japan, the Republic of Korea and Taiwan Province of China. All development work on audio and video equipment, including Discman and Internet music players is done abroad. Taiwanese-owned Chunghwa Picture Tubes has its own suppliers in Shah Alam. A number of high value-added components such as LCD displays and thin film transistor (TFT) screens are imported from affilitates or suppliers located in home countries. Locally owned Sapura and OYL Electronics have not penetrated TNC markets in the Klang Valley. Japanese, Taiwanese and Korean firms accounted for the critical components sourced domestically. The inter-firm division of labour involving these firms is either non-existent or generally limited to one to two first-tier supplier firms each.

A limited number of local firms supply TNCs, but are confined to non-core components. Procurement officers in four Japanese firms involved in the assembly of videos, CTVs and car air-conditioners in Bangi reported sourcing core components from Japanese suppliers. JVC in Shah Alam, and Sony Video and Nippon Denso in Bangi complained of the high defect rates involving components supplier by local firms, which to them is the reason why they source their critical components from Japanese firms.[22] Giovanni Capannelli (1999, p. 213) reported a similar finding:

> "Although the strategy of intra-group sourcing varied among the assemblers, as a general rule, the parts involving core technologies were often procured from sister companies of the same group. In contrast, the lower-end technology parts were mainly supplied by "Malaysian" firms. In several cases these input makers were joint ventures with third country firms from Singapore and Taiwan."

Capannelli (1999, p. 233) reported that only about a fourth of Japanese consumer electronics firms' supplies in Kuala Lumpur were sourced from Malaysian firms. TNCs located in Southeast Asia

[22] Author's interviews (1999).

– primarily Japanese owned – accounted for 60 per cent of the supplies. Rasiah (1996) and Suresh Narayanan (1997) also reported weak production linkages between TNCs and local firms in the Klang Valley.

United States and European firms source far less locally in the Klang Valley than in Penang. Motorola, Texas Instruments, Western Digital and Intersil reported sourcing between 2-20 percent of their purchases locally. Swedish-owned Ericsson reported sourcing around 45 percent of its purchases from domestic firms, but primarily from foreign affiliates. Japanese, Taiwanese and Korean firms source most of their supplies from affiliates of their own nationalities – a consequence of poor network cohesion rather than national idiosyncracies.[23] United States and European firms generally sourced from other TNCs or imported. Motorola and Intersil reported sourcing higher value added supplies from local firms located in Penang (Rasiah 1996). Texas Instruments reported importing machinery supplies from its affiliate in Singapore.

A study of linkages between four TNCs and four local suppliers in the Klang Valley found that the latter has evolved little over the years (Rasiah, 2002b). Only one of the four local suppliers had gained tacit and experiential knowledge from working as an employee of TNCs in Klang Valley. Japanese, Taiwanese and Korean suppliers have stage three and four operations using technology from their parent companies abroad, lack inter-firm links with other suppliers. Hence, differentiation and division of labour involving foreign suppliers domestically was low.

Klang Valley not only has few suppliers linked to TNCs (table 1), but also firms linked to TNCs show low technological capabilities (tables 5 and 6). Only BP recorded strong value added and labour productivity growth in the period 1993-2001. Two of the supplier firms had closed down by 2001, and the foreign owned BU recorded negative average annual growth in value added and labour productivity in the period 1995-2001. JVC, Toshiba, Sony, NEC, Fujitsu and Hitachi reported attempting to increase local sourcing following promotional efforts by the Government under the Subcontract

[23] Author's interviews (2002).

Exchange Programme (SEP) and the Vendor Development Programme (VDP) introduced in the late 1980s. Each TNC has attempted to use three to four suppliers for low-end inputs (e.g. plastic injection molding and molds and dies manufacturing). Short-termist links between anchor TNCs and local suppliers have stimulated little differentiation and division of labour.

Lacking systemic coordination to stimulate information flow, connectivity and identification of latent capabilities, TNCs in the Klang Valley have operated truncatedly. As a senior officer of Motorola put it:

> "The risk of failure is just too high. Private firms generally do not individually search and canvas for greater inter-firm collabouration and sourcing when known suppliers do not exist. It was possible in Penang because of the dynamic role of PDC, which created deliberation councils and took on a proactive role of promoting and matching firms. We will be glad to assist if some reliable organization assumes such a role here. We are aware of these developments from the operations of our telecommunications components and products subsidiary in Penang."[24]

Companies such as Texas Instruments, Intersil, Matsushita, Sony and Toshiba have not attracted or developed world-class first-tier suppliers including contract manufacturers, owing to a lack of systemic coordination and network cohesion. Most TNCs use flexible production systems, but retain in-house a number of even dissimilar activities such as machine tool support. Where specialized components are needed, such as microchips and lead frames, they are primarily bought from firms in Penang, Singapore, Taiwan Province of China, the Republic of Korea and Japan. The lack of a developed computer and peripherals segment, and dissimilar product segments such as machine tools and plastics engineering has also restricted the production and inter-firm movement of personnel.

The pool of managers, professionals, technicians and skilled personnel from the Klang Valley have generally either remained in

[24] Author's interviews (1999; 2001).

old firms or left to join newly relocating TNCs. Motorola, Texas Instruments, Intersil, Hitachi, Sony and Matsushita Electric reported that former personnel were hired by local firms with strong MNC-related sub-contract manufacturing activities (e.g. Unisem and Carsem).[25] Eight managers reported interest in starting their own firms after detecting considerable market potential for specialized capabilities, but have stuck with their TNCs owing to a lack of institutional support.[26] Also, no TNC in the Klang Valley reported developing local firms, with the Managing Director of Motorola stating that the environment has not been conducive.[27]

Despite the presence of a critical mass of electronics TNCs, the lack of systemic coordination has restricted the network cohesion necessary to stimulate the production and inter-firm movement of tacit and experiential knowledge effectively. Klang Valley has particularly lacked the movement of entrepreneurs for new firm creation. While a myriad of industries exist, four fundamental problems have undermined its capacity to engender inter-firm human capital flows. First, the lack of systemic coordination has constrained the ability of firms to resolve collective action problems associated with human capital development. Second, the lack of systemic coordination also restricted the orderly promotion of new, segments of industries to support inter-firm human capital synergies. Third, weak inter-firm connections have stimulated little the movement of entrepreneurs, professionals, technicians and skilled personnel to support new firm creation. Fourth, the lack of movement of embodied knowledge in human capital – tacit and experiential – has restricted differentiation and division of labour in the Klang Valley.

Conclusions

This article examined the role of systemic coordination in stimulating network cohesion and integration for the development of human capital synergies in two TNC-driven electronics clusters in Malaysia. The article's analytic framework fused the two dominant

[25] Author's interviews (1999, 2001-02).
[26] Author's interviews (1999; 2002).
[27] Author's interviews (2001).

channels of human capital development, i.e. learning from formal education institutions, and the stimulation and appropriation of tacit and experiential knowledge from firms. The findings offer ramifications for both theory and policy. While basic education in the country has achieved universal standards, weak federal coordination has constrained the supply of high-technology human capital in Malaysia. Hence, TNCs expanded labour-intensive operations in Penang and the Klang Valley in the 1970s until the early 1990s – accessing low wage literate workers. However, when the labour reserves were exhausted by the mid-1990s, both TNCs and local firms lacked sufficient supply of technical labor and engineers and scientists to stimulate industrial upgrading to higher value added activities. Differences in systemic coordination locally have produced differences in cluster strength with contrasting consequences in inter-firm human capital synergies in Penang and Klang Valley. Because both channels of human capital production generate important synergies that are not substitutable, strong network cohesion was not sufficient to spur strong innovation activities in Penang.

Network cohesion in Penang has created strong differentiation and division of labour, and stronger integration with institutional support economic agents. The strong intermediary role of PDC and the Penang Government helped bring together the business associations and the firms, giving the systemic coordination necessary to raise the rate of systemic knowledge flows, inter-firm links as well as motivating new firm creation. Despite the lack of innovative activities, the Penang experience supports the proposition that TNCs can integrate and participate in dynamic clustering. The lack of similar mechanisms in the Klang Valley restricted such developments. For the Klang Valley to achieve similar features of dynamic industrial districts, the Selangor SEDC and the government departments of Kuala Lumpur and Selangor should strengthen systemic coordination between firms, institutions and business associations.

Both Penang and the Klang Valley failed to engender a critical mass of technical personnel and engineers and scientists to stimulate firms strong participation in R&D activities, whether from domestic institutions or imports. Government has been critical in supporting

institutions associated with knowledge production and learning in the successful industrializers (e.g. United States, Germany, Japan, the Republic of Korea and Taiwan Province of China), but only when accompanied by smooth demand-supply coordination. However, the higher education institutions of learning in Malaysia have lacked effective supply-demand coordination to produce high tech human capital. Constraints on immigration policies have also restricted imports to overcome shortages. Waivers in the MSC have not only been too narrowly confined to IT industries only but also to a strip of location where critical electronics TNCs are not located. Thus, growing deficits in technical and R&D scientists and engineers has undermined the capacity of TNCs and local entrepreneurs in Penang and Klang Valley to introduce higher value-added activities.

This article also replicated Smith's (1776), Marshal (1890), Young (1928), Penrose (1959), Polanyi (1997), Saxenian's (2000), Rasiah's (2001) and Best's (2001) arguments and findings that firms act as "invisible colleges" to stimulate human capital synergies. TNCs have been important training grounds for the development of tacit and experiential knowledge embodied in entrepreneurs, professionals, technicians and skilled human capital for new firm creation in Malaysia. However, human capital synergies and its consequent effect on differentiation and division of labour were strong only when clustering was supported by strong systemic coordination. Strong local systemic coordination helped strengthen network cohesion and the expansion of human capital synergies to support differentiation and division labour in Penang. Weak local systemic coordination constrained network cohesion and differentiation and division of labour in Klang Valley. ■

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RESEARCH NOTE

World Investment Report 2002: Transnational Corporations and Export Competitiveness Overview

United Nations Conference on Trade and Development*

TRENDS IN INTERNATIONAL PRODUCTION

The role of TNCs in the globalizing world economy is increasing,…

International production continues to grow, as transnational corporations (TNCs) expand their role in the globalizing world economy. Recent estimates suggest there are about 65,000 TNCs today, with about 850,000 foreign affiliates across the globe. Their economic impact can be measured in different ways. In 2001, foreign affiliates accounted for about 54 million employees, compared to 24 million in 1990; their sales of almost $19 trillion were more than twice as high as world exports in 2001, compared to 1990 when both were roughly equal; and the stock of outward foreign direct investment (FDI), increased from $1.7 trillion to $6.6 trillion over the same period (table 1). Foreign affiliates now account for one-

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Table 1. Selected indicators of FDI and international production, 1982-2001
(Billions of dollars and percentage)

Item	Value at current prices (Billions of dollars)			Annual growth rate (Per cent)					
	1982	1990	2001	1986-1990	1991-1995	1996-2000	1999	2000	2001
FDI inflows	59	203	735	23.6	20.0	40.1	56.3	37.1	-50.7
FDI outflows	28	233	621	24.3	15.8	36.7	52.3	32.4	-55.0
FDI inward stock	734	1 874	6 846	15.6	9.1	17.9	20.0	22.2	9.4
FDI outward stock	552	1 721	6 582	19.8	10.4	17.8	17.4	25.1	7.6
Cross-border M&As [a]	..	151	601	26.4[b]	23.3	49.8	44.1	49.3	-47.5
Sales of foreign affiliates	2 541	5 479	18 517[c]	16.9	10.5	14.5	34.1	15.1[c]	9.2[c]
Gross product of foreign affiliates	594	1 423	3 495[d]	18.8	6.7	12.9	15.2	32.9[d]	8.3[d]
Total assets of foreign affiliates	1 959	5 759	24 952[e]	19.8	13.4	19.0	21.4	24.7[e]	9.9[e]
Exports of foreign affiliates	670	1 169	2 600[f]	14.9	7.4	9.7	1.9	11.7[f]	0.3[f]
Employment of foreign affiliates (thousands)	17 987	23 858	53 581[g]	6.8	5.1	11.7	20.6	10.2[g]	7.1[g]
GDP (in current prices)	10 805	21 672	31 900	11.5	6.5	1.2	3.5	2.5	2.0
Gross fixed capital formation	2 285	4 841	6 680[h]	13.9	5.0	1.3	4.0	3.3	..
Receipts from royalties and licence fees	9	27	73[h]	22.1	14.3	5.3	5.4	5.5	..
Export of goods and non-factor services	2 081	4 375	7 430[i]	15.8	8.7	4.2	3.4	11.7	-5.4

Source: UNCTAD, *World Investment Report 2002: Transnational Corporations and Export Competitiveness*, table I.1.

[a] Data are only available from 1987 onward.
[b] 1987-1990 only.
[c] Based on the following regression result of sales against FDI inward stock (in millions of dollars) for the period 1982-1999: Sales=323+2.6577*FDI inward stock.
[d] Based on the following regression result of gross product against FDI inward stock (in millions of dollars) for the period 1982-1999: Gross product=364+0.4573*FDI inward stock.
[e] Based on the following regression result of assets against FDI inward stock (in millions of dollars) for the period 1982-1999: Assets= -1 153+3.8134*FDI inward stock.
[f] For 1995-1998, based on the regression result of exports of foreign affiliates against FDI inward stock (in millions dollars) for the period 1982-1994: Export=254+0.474*FDI inward stock. For 1999-2001, the share of exports of foreign affiliates in world exports in 1998 (34 per cent) was applied to obtain the values.
[g] Based on the following regression result of employment (in thousands) against FDI inward stock (in millions of dollars) for the period 1982-1999: Employment=12 138+6.0539*FDI inward stock.
[h] Data are for 2000.
[i] WTO estimates.

Note: Not included in this table are the value of worldwide sales by foreign affiliates associated with their parent firms through non-equity relationships and the sales of the parent firms themselves. Worldwide sales, gross product, total assets, exports and employment of foreign affiliates are estimated by extrapolating the worldwide data of foreign affiliates of TNCs from France, Germany, Italy, Japan and the United States (for sales and employment) and those from Japan and the United States (for exports), those from the United States (for gross product), and those from Germany and the United States (for assets) on the basis of the shares of those countries in the worldwide outward FDI stock.

tenth of world GDP and one-third of world exports. Moreover, if the value of worldwide TNC activities associated with non-equity relationships (e.g. international subcontracting, licensing, contract manufacturers) is considered, TNCs would account for even larger shares in these global aggregates.

The world's largest TNCs dominate this picture. For example, in 2000, the top 100 non-financial TNCs (with Vodafone Group, General Electric and ExxonMobil Corporation in the lead) accounted for more than half of the total sales and employment of foreign affiliates (see table 2 for the top 25 of these firms). Mainly as a result of major mergers and acquisitions (M&As) in 2000, the foreign assets of the 100 largest TNCs increased by 20 per cent in 2000, their foreign employment by 19 per cent and their sales by 15 per cent. M&As also affected industrial composition, resulting in an increase in the number of telecom and media companies on the list. All this, of course, represents only a snapshot of the situation just before the global economic slowdown took hold, the euphoria about new technology firms and the stock market at large evaporated, and the problem of auditing irregularities in a number of TNCs emerged.

For the first time since UNCTAD started collecting data on the largest TNCs, a record five firms headquartered in developing economies – Hutchinson Whampoa (Hong Kong, China); Petronas (Malaysia); Cemex (Mexico); Petróleos de Venezuela (Venezuela); and LG Electronics (Republic of Korea) – made it to the top 100 list for 2000. These are also the companies that have mainly driven the continued transnationalization of the top 50 companies from developing countries (see table 3 for the top 25 of these firms). These top 50 were less affected by stock market rallies and the cross-border M&A wave. Consequently, their overall foreign assets, sales and employment expanded more modestly, as is evident if the top five companies are excluded from the list.

Data for the top 25 TNCs in Central and Eastern Europe (CEE) confirm that Russian TNCs are larger and more globally spread than other TNCs from this region (see table 4 for the top 15 of these firms). Lukoil, for example, with foreign assets of more

Table 2. The world's top 25 non-financial TNCs, ranked by foreign assets, 2000
(Millions of dollars and number of employees)

Ranking in 2000 by:		Ranking in 1999 by:					Assets		Sales		Employment		TNI[a]
Foreign assets	TNI[a]	Foreign assets	TNI[a]	Corporation	Home economy	Industry[b]	Foreign	Total	Foreign[c]	Total	Foreign	Total	(Per cent)
1	15	-	-	Vodafone	United Kingdom	Telecommunications	221 238	222 326	7 419	11 747	24 000	29 465	81
2	73	1	74	General Electric	United States	Electrical & electronic equip.	159 188	437 006	49 528	129 853	145 000	313 000	40
3	30	2	22	ExxonMobil	United States	Petroleum expl./ref./distr.	101 728	149 000	143 044	206 083	64 000	97 900	68
4	42	47	79	Vivendi Universal	France	Diversified	93 260	141 935	19 420	39 357	210 084	327 380	60
5	84	4	82	General Motors	United States	Motor vehicles	75 150	303 100	48 233	184 632	165 300	386 000	31
6	46	3	43	Royal Dutch/Shell	United Kingdom	Petroleum expl./ref./distr.	74 807	122 498	81 086	149 146	54 337	95 365	57
7	24	10	18	BP	United Kingdom	Petroleum expl./ref./distr.	57 451	75 173	105 626	148 062	88 300	107 200	77
8	80	6	81	Toyota Motor	Japan	Motor vehicles	55 974	154 091	62 245	125 575	..	210 709	35
9	55	30	73	Telefónica	Spain	Telecommunications	55 968	87 084	12 929	26 278	71 292	148 707	54
10	47	50	80	Fiat	Italy	Motor vehicles	52 803	95 755	35 854	53 554	112 224	223 953	57
11	57	9	49	IBM	United States	Electrical & electronic equip.	43 139	88 349	51 180	88 396	170 000	316 303	53
12	44	12	45	Volkswagen	Germany	Motor vehicles	42 725	75 922	57 787	79 609	160 274	324 402	59
13	64	-	-	ChevronTexaco	United States	Petroleum expl./ref./distr.	42 576	77 621	65 016	117 095	21 693	69 265	47
14	52	-	-	Hutchison Whampoa	Hong Kong, China	Diversified	41 881	56 610	2 840	7 311	27 165	49 570	56
15	23	19	57	Suez	France	Electricity, gas and water	38 521	43 460	24 145	32 211	117 280	173 200	77
16	93	7	50	DaimlerChrysler	Germany	Motor vehicles	..	187 087	48 717	152 446	83 464	416 501	24
17	11	31	14	News Corporation	United States	Media	36 108	39 279	12 777	14 151	24 500	33 800	85
18	4	11	2	Nestlé	Switzerland	Food & beverages	35 289	39 954	48 928	49 648	218 112	224 541	95
19	62	-	-	TotalFinaElf	France	Petroleum expl./ref./distr.	33 119	81 700	82 534	105 828	30 020	123 303	48
20	87	16	54	Repsol YPF	Spain	Petroleum expl./ref./distr.	31 944	487 763	15 891	42 563	16 455	37 387	29
21	51	20	32	BMW	Germany	Motor vehicles	31 184	45 910	26 147	34 639	23 759	93 624	56
22	48	22	42	Sony	Japan	Electrical & electronic equip.	30 214	68 129	42 768	63 664	109 080	181 800	57
23	77	-	-	E.On	Germany	Electricity, gas and water	..	114 951	41 843	86 882	83 338	186 788	39
24	3	21	3	ABB	Switzerland	Machinery and equip.	28 619	30 962	22 528	22 967	151 340	160 818	95
25	10	33	35	Philips Electronics	Netherlands	Electrical & electronic equip.	27 885	35 885	33 308	34 870	184 200	219 429	86

Source: UNCTAD, *World Investment Report 2002: Transnational Corporations and Export Competitiveness*, table IV.1.

[a] The transnationlity index (TNI) is calculated as the average of the following three ratios: foreign assets to total assets, foreign sales to total sales and foreign employment to total employment.

[b] Industry classification for companies follows the United States Standard Industrial Classification.

[c] In a number of cases companies reported only total foreign sales without distinguishing between exports from the parent company and sales of their foreign affiliates. Some foreign sales figures might therefore also include parent company exports.

.. Data on foreign assets, foreign sales and foreign employment were not available. In case of non-availability, they are estimated using secondary sources of information or on the basis of the ratios of foreign to total assets, foreign to total sales and foreign to total employment.

Note: In some companies, foreign investors may hold a minority share of more than 10 per cent.

Table 3. The top 25 non-financial TNCs from developing economies, ranked by foreign assets, 2000
(Millions of dollars and number of employees)

Ranking by					Assets		Sales		Employment			
Foreign assets	TNI[a]	Corporation	Home economy	Industry[b]	Foreign	Total	Foreign[c]	Total	Foreign	Total	TNI[a] (Per cent)
1	11	Hutchison Whampoa	Hong Kong, China	Diversified	41 881	56 610	2 840	7 311	27 165	49 570	50
2	8	Cemex	Mexico	Non-metallic mineral products	10 887	15 759	3 028	5 621	15 448	25 884	55
3	15	LG Electronics	Korea, Republic of	Electrical & electronic equip.	8 750	17 709	9 331	18 558	20 072	46 912	43
4	20	Petróleos de Venezuela	Venezuela	Petroleum expl./ref./distr.	8 017	57 089	49 780	53 234	5 458	46 920	36
5	27	Petronas	Malaysia	Petroleum expl./ref./distr.	7 690	36 594	11 790	19 305	3 808	23 450	30
6	43	New World Development	Hong Kong, China	Diversified	4 578	16 412	565	2 633	800	23 530	16
7	39	Samsung Corporation	Korea, Republic of	Diversified/trade	3 900	10 400	8 300	40 700	175	4 740	18
8	21	Samsung Electronics	Korea, Republic of	Electrical & electronic equip.	3 898	25 085	23 055	31 562	16 981	60 977	35
9	4	Neptune Orient Lines	Singapore	Transport and storage	3 812	4 360	4 498	4 673	6 840	8 734	79
10	29	Companhia Vale Do Rio Doce	Brazil	Mining & quarrying	3 660	10 269	758	4 904	6 285	17 634	29
11	7	Sappi	South Africa	Paper	3 239	4 768	3 601	4 718	9 399	19 276	58
12	26	COFCO	China	Food & beverages	2 867	4 543	4 767	12 517	350	26 000	31
13	1	Guangdong Investment	Hong Kong, China	Diversified	2 852	4 605	460	634	6 837	7 875	88
14	19	China National Chemicals, Imp.& Exp.	China	Chemicals	2 603	4 701	10 755	18 036	600	8 600	37
15	47	Hyundai Motor	Korea, Republic of	Motor vehicles	2 488	25 393	4 412	25 814	6 532	84 925	10
16	42	Keppel	Singapore	Diversified	2 293	22 180	338	3 657	5 910	16 389	17
17	2	First Pacific	Hong Kong, China	Electrical & electronic equip.	2 116	2 322	652	809	8 511	8 560	81
18	13	Citic Pacific	Hong Kong, China	Construction	2 076	4 022	981	2 058	7 118	11 354	49
19	34	Grupo Carso	Mexico	Diversified	2 043	8 827	4 000	9 315	19 542	89 954	26
20	24	South African Breweries	South Africa	Food & beverages	1 966	4 384	1 454	5 424	15 763	48 079	31
21	3	Orient Overseas International	Hong Kong, China	Transport and storage	1 819	2 155	2 382	2 395	3 792	4 414	81
22	46	Singtel	Singapore	Telecommunications	1 790	8 143	..	2 845	2 500	12 640	13
23	45	Posco	Korea, Republic of	Metal and metal products	1 777	15 901	2 311	10 873	2 741	26 261	13
24	30	San Miguel	Philippines	Food & beverages	1 738	3 061	300	1 861	3 091	14 864	28
25	17	Jardine Matheson	Hong Kong, China	Diversified	1 641	10 339	7 148	10 354	50 000	130 000	37

Source: UNCTAD, *World Investment Report 2002: Transnational Corporations and Export Competitiveness*, table IV.10.

[a] The transnationlity index (TNI) is calculated as the average of the following three ratios: foreign assets to total assets, foreign sales to total sales and foreign employment to total employment.
[b] Industry classification for companies follows the United States Standard Industrial Classification.
[c] In a number of cases companies reported only total foreign sales without distinguishing between export from the parent company and sales of their foreign affiliates. Some foreign sales figures might therefore also include parent company exports.
.. Data on foreign assets, foreign sales and foreign employment were not available. In case of non-availability, they are estimated using secondary sources of information or on the basis of the ratios of foreign to total assets, foreign to total sales and foreign to total employment.
Note: In some companies, foreign investors may hold a minority share of more than 10 per cent.

Table 4. The top 15 non-financial TNCs based in Central and Eastern Europe,[a] ranked by foreign assets, 2000
(Millions of dollars and number of employees)

Ranking by					Assets		Sales		Employment	TNI[b]	
Foreign assets	TNI[b]	Corporation	Country	Industry	Foreign	Total	Foreign	Total	Foreign	Total	(Per cent)
1	11	Lukoil Oil	Russian Federation	Petroleum and natural gas	4 189.0	12 008.0	7 778.0[d]	14 436.0	20 000	130 000	35
2	6	Novoship	Russian Federation	Transport	963.8	1 107.0	271.5	372.0	88	7 406	54
3	1	Latvian Shipping[c]	Latvia	Transport	459.0	470.0	191.0	191.0	1 124	1 748	87
4	5	Primorsk Shipping	Russian Federation	Transport	256.4	444.1	85.3	116.5	1 308	2 777	59
5	24	Hrvatska Elektroprivreda	Croatia	Energy	296.0	2'524.0	10.0	780.0	..	15 877	4
6	7	Gorenje Group	Slovenia	Domestic appliances	236.3	420.8	465.5	615.5	590	6 691	47
7	10	Far Eastern Shipping	Russian Federation	Transport	236.0	585.0	134.0	183.0	263	8 873	39
8	13	Podravka Group	Croatia	Food & beverages/ pharmaceuticals	..[e]	440.1	139.8	316.5	516	6 827	32
9	9	Pliva Group	Croatia	Pharmaceuticals	181.9	915.9	384.7	587.6	2 645	7 857	40
10	3	Atlantska Plovidba[c]	Croatia	Transport	138.0	154.0	46.0[d]	46.0	..	509	63
11	8	Krka	Slovenia	Pharmaceuticals	129.2	462.4	212.0	273.0	483	3 322	40
12	20	MOL Hungarian Oil and Gas	Hungary	Petroleum and natural gas	102.7	3 281.6	758.8	3 632.2	870	18 016	10
13	14	Tiszai Vegyi Kombinát Rt.	Hungary	Chemicals	101.2	481.8	272.9	537.8	208	4 548	25
14	2	Adria Airways[c]	Slovenia	Transport	116.3	129.2	103.4	104.6	19	597	64
15	19	Petrol Group	Slovenia	Petroleum and natural gas	98.8	536.1	129.0[d]	1 187.9	49	1 943	11

Source: UNCTAD, *World Investment Report 2002: Transnational Corporations and Export Competitiveness*, table IV.17.

[a] Based on survey responses.
[b] The Transnationality Index (TNI) is calculated as the average of the following three ratios: foreign assets to total assets, foreign sales to total sales and foreign employment to total employment.
[c] 1999 data.
[d] Including export sales by the parent firm.
[e] Data not revealed by the firm; estimates have been made using secondary sources of information.
.. Data on foreign assets, foreign sales and foreign employment were not available. In case of non-availability, they are estimated using secondary sources of information or on the basis of the ratios of foreign to total assets, foreign to total sales and foreign to total employment.

Note: In some companies, foreign investors may hold a minority share of more than 10 per cent.

than $4 billion, is on par with some of the largest TNCs from developing countries. In 2000, most of these top 25 TNCs continued to grow, with their expansion abroad surpassing that of their operations at home. However, not all top TNCs in the region are on a growth path. Some Czech, Slovak and Polish firms are undergoing major restructuring, which often involves withdrawing from foreign activities.

The expansion of international production is driven by a combination of factors that play out differently for different industries and for different countries. Three forces are the main drivers. The first is policy liberalization: opening up national markets and allowing all kinds of FDI and non-equity arrangements. In 2001, 208 changes in FDI laws were made by 71 countries (table 5). More than 90 per cent aimed at making the investment climate more favourable to inward FDI. In addition, last year, as many as 97 countries were involved in the conclusion of 158 bilateral investment treaties, bringing the total of such treaties to 2,099 by the end of 2001. Similarly, 67 new double taxation treaties, were concluded. Moreover, the investment issue figured prominently at the Fourth WTO Ministerial Conference in Doha, Qatar, in November 2001. Part of the follow-up work involves a substantial effort to help developing countries evaluate better the implications of closer multilateral cooperation in the investment area for their development process.

The second force is rapid technological change, with its rising costs and risks, which makes it imperative for firms to tap world markets and to share these costs and risks. On the other hand, falling transport and communication costs – the "death"of distance – have made it economical to integrate distant operations and ship products and components across the globe in the search for efficiency. This is contributing, in particular, to efficiency-seeking FDI, with important implications for the export competitiveness of countries.

The third force, a result of the previous two, is increasing competition. Heightened competition compels firms to explore new ways of increasing their efficiency, including by extending their international reach to new markets at an early stage and by shifting

Table 5. National regulatory changes, 1991-2001

Item	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Number of countries that introduced changes in their investment regimes	35	43	57	49	64	65	76	60	63	69	71
Number of regulatory changes	82	79	102	110	112	114	151	145	140	150	208
of which:											
-more favourable to FDI [a]	80	79	101	108	106	98	135	136	131	147	194
-less favourable to FDI [b]	2	-	1	2	6	16	16	9	9	3	14

Source: UNCTAD, *World Investment Report 2002: Transnational Corporations and Export Competitiveness*, box table I.2.1.

[a] Including liberalizing changes or changes aimed at strengthening market functioning, as well as increased incentives.

[b] Including changes aimed at increasing control as well as reducing incentives.

certain production activities to reduce costs. It also results in international production taking new forms, with new ownership and contractual arrangements, and new activities being located in new sites abroad.

…although FDI flows declined sharply in 2001 as a result of the economic slowdown,…

These driving forces are long-term in nature. The investment behaviour of firms is also strongly influenced by short-term changes in business cycles, testified by recent trends in FDI. After the record high levels of 2000, global flows declined sharply in 2001 – for the first time in a decade. This was mainly the result of the weakening of the global economy, notably in the world's three largest economies which all fell into recession, and a consequent drop in the value of cross-border M&As. The total value of cross-border M&As completed in 2001 ($594 billion) was only half that in 2000. The number of cross-border M&As also declined, from more than 7,800 in 2000 to some 6,000 in 2001. The number of cross-border deals worth over $1 billion fell from 175 to 113, their total value falling from $866 billion to $378 billion.

As a result, the decline in FDI was mainly concentrated in developed economies, in which FDI inflows shrank by 59 per cent, compared to 14 per cent in developing economies. Inflows to Central and Eastern Europe as a whole remained stable. World inflows of FDI amounted to $735 billion, of which $503 billion went to developed economies, $205 billion to developing economies and the remaining $27 billion to the transition economies of CEE. The shares of developing countries and those of CEE in global FDI inflows reached 28 per cent and 4 per cent respectively in 2001, compared to an average of 18 per cent and 2 per cent in the preceding two years. The 49 LDCs remain marginal recipients, with only 2 per cent of all FDI to developing countries or 0.5 per cent of the global total.

The economic slowdown has intensified competitive pressures, accentuating the need to search for lower-cost locations. This may result in increased FDI in activities that benefit from

relocation to, or expansion in, low-wage economies. Outflows may also rise from countries in which domestic markets were growing slower than foreign markets. There are signs that both factors have contributed to the recent increase in Japanese FDI to China and the growth of flows to CEE.

Meanwhile, flows to the developing world and to CEE remain unevenly distributed. In 2001, the five largest recipients attracted 62 per cent of the total inflows to developing countries, while the corresponding figure for CEE was 74 per cent. Among the top 10 country gainers in terms of absolute increases, eight were developing countries, led by Mexico, China and South Africa. Conversely, among the 10 countries experiencing the steepest declines in FDI inflows, eight were developed countries; Belgium and Luxembourg, the United States and Germany reported the sharpest declines.

It could be argued that 2001 saw a return of FDI to "normal" levels after the hectic M&A activity of the previous two years. In developing countries and economies in transition, FDI proved fairly resilient despite the global economic downturn and the tragic events of September 11. This resilience is more pronounced in comparison to inflows of portfolio investment and bank lending. On a net basis (inflows less outflows), FDI flows were the only positive component of private capital flows to developing countries and transition economies during 2000-2001. The total of net private capital flows was projected to be a low of $31 billion in 2001.

Despite the dampening impact of weak demand in the largest economies, the longer-term prospects for FDI remain promising. A number of surveys of investment plans suggest that major TNCs are likely to continue their international expansion. More specifically, they suggest that the most preferred destinations will include large developed-country markets (such as the United States, Germany, the United Kingdom and France), as well as a number of key destinations in developing countries (especially China, Brazil, Mexico and South Africa) and in CEE (e.g. Poland, Hungary and the Czech Republic). Interestingly, many of these developing countries and economies in transition have been especially successful in attracting export-oriented FDI.

…with major regional differences,…

Recent developments in FDI vary significantly between different regions. As already mentioned, the slowdown in FDI activity in 2001 was mainly related to developed countries. Both outflows and inflows of FDI fell sharply in these countries, by more than half, to $581 billion and $503 billion, respectively, after reaching a peak in 2000. The United States, despite the economic slowdown and the events of September 11, retained its position as the largest FDI recipient, but inflows more than halved, down to $124 billion (figure 2). The country regained its position as the world's largest investor, although outflows of $114 billion reflected a decline of 30 per cent (figure 3). Major partners for inward and outward FDI were again the European Union (EU) countries; nevertheless, the importance of the North American Free Trade Agreement (NAFTA) partners as a destination for United States FDI increased, partly due to the acquisition of Banamex (Mexico) by Citigroup. Regarding inward FDI, cross-border M&As continued to be the primary mode of entry, led by the acquisition of VoiceStream Wireless Corp. by Deutsche Telekom for $29.4 billion, the largest cross-border M&A deal worldwide in 2001.

Inflows and outflows to and from the European Union in 2001 dropped by about 60 per cent to $323 billion and $365 billion, respectively. This was mainly due to a decline in M&A-related FDI. Inflows to the United Kingdom (the main recipient in Western Europe) and Germany declined the most, while those to France, Greece and Italy increased. Declines in outward FDI were even greater, the only exceptions being Ireland, Italy and Portugal. As in previous years, outflows comprised mainly cross-border M&As. France became the largest outward investor of the region, followed by Belgium and Luxembourg. Intraregional flows accounted for an increased share of FDI in the EU.

Countries of other Western Europe experienced similar developments, with Switzerland accounting for 75 per cent of FDI to these countries. Among other developed countries, FDI outflows from Japan grew in 2001, while domestic investment as well as inward

FDI declined, mainly due to the prolonged economic recession in that country. FDI flows to and from Australia and New Zealand, countries that have closer economic ties to the Asia-Pacific region, were less affected by developments in the United States than was Canada, where inflows fell by 60 per cent.

FDI inflows to developing countries also fell, from $238 billion in 2000 to $205 billion in 2001. However, the bulk of this decline was limited to a relatively small number of host countries. In particular, three economies – Argentina, Brazil and Hong Kong, China – saw a decline in FDI inflows amounting to as much as $57 billion. Africa remains a marginal recipient of FDI, even though FDI inflows rose from $9 billion in 2000 to more than $17 billion in 2001. At first sight this increase looks impressive, but it masks the fact that for most African countries FDI flows remained at more or less the same level as in 2000. The increase by $8 billion was largely due to a few large FDI projects, notably in South Africa and Morocco, and the way they are reflected in FDI statistics. However, although the continent received only 2 per cent of global FDI inflows, relative to its economic size, the amount of FDI to Africa did not differ much from that to other developing regions. Also, the overall pattern hides some dynamic developments at the country level, including least developed countries (LDCs) such as Uganda. Furthermore, there are indications that certain policy initiatives, notably the African Growth and Opportunity Act (AGOA), of the United States, have contributed to increased FDI in some countries that benefit from improved market access.

Recent figures also show that the sectoral composition of FDI inflows into the African continent is changing. While more than half of FDI flows went into the primary sector, particularly into oil and petroleum, FDI flows into service industries (such as banking and finance, and transport) have become almost as important over the past two years. This suggests a gradual broadening of investment opportunities over time, albeit at a slow pace.

FDI inflows to the developing countries of Asia and the Pacific fell from $134 billion in 2000 to $102 billion in 2001. Much of the decline was due to an over 60 per cent drop in flows to Hong

Kong, China from a record level of $62 billion in 2000. Hence, excluding Hong Kong, China, inflows in 2001 reached the same level as in the peak years of the 1990s. While inflows remained stagnant in North-East and South-East Asia, they increased significantly in South and Central Asia (by 32 per cent and 88 per cent, respectively). The share of the Asia-Pacific region in world inflows rose from 9 per cent in 2000 to nearly 14 per cent in 2001. Within these overall trends, economies performed unevenly in 2001. China regained its position – lost to Hong Kong, China in 2000 – as the largest FDI recipient in the region as well as in the developing world as a whole. India, Kazakhstan, Singapore and Turkey were significant recipients in their respective subregions. The Association of South-East Asian Nations (ASEAN) saw a fall in FDI levels in recent years, causing some concern among its member States: FDI inflows to this region during 2000-2001 were only $12 billion per annum, which corresponds to only about one-third of the peak in 1996-1997. Outward FDI from developing Asia, at about $32 billion in 2001, hit its lowest level since the mid-1990s, mainly because of a fall in outflows from the largest traditional investor, Hong Kong, China. Chinese TNCs are becoming more visible in world markets.

FDI into Latin America and the Caribbean declined for the second consecutive year, mainly because of a significant drop in FDI to Brazil, where the privatization process of the past few years has almost stopped, and Argentina, where the economic and financial crisis has discouraged any new investments. Meanwhile, Mexico became the largest regional recipient with the acquisition of the bank Banamex by Citicorp (United States) for $12.5 billion. Outflows from Latin American economies remained modest and mainly directed at other countries in the region.

FDI in the 49 LDCs was small in absolute terms, but it continued to make a contribution to local capital formation, as shown by the high share of FDI in gross domestic capital formation in a number of those countries. As a percentage of total investment, it averaged 7 per cent for LDCs as a group during 1998-2000, compared to 13 per cent for all other developing countries. However, FDI flows to LDCs are highly concentrated, though the share of the top five recipients is lower now than it was in the late 1980s. More

than 90 per cent of these flows were through greenfield investments rather than cross-border M&As. In 2001, despite the general economic slowdown, FDI in LDCs rose to $3.8 billion, mainly as a result of increased flows to Angola. Official development assistance (ODA) remains the largest component of external financial flows to LDCs, even though it declined in absolute and relative terms between 1995 and 2000. LDCs as a whole received $12.5 billion in bilateral and multilateral ODA in net terms in 2000, compared to $16.8 billion in 1990. For bilateral ODA, the amounts declined from $9.9 billion to $7.7 billion during this period. FDI, on the other hand, has become more prominent: 28 LDCs experienced simultaneous increases in FDI and decreases in bilateral ODA during the 1990s. But only in seven LDCs (Angola, Equatorial Guinea, the Gambia, Lesotho, Myanmar, the Sudan and Togo), did FDI inflows exceed bilateral ODA in 2000, and three of them are major oil exporters. Since most LDCs rely on ODA as their major source of finance, and ODA and FDI are not substitutes for each other, this decline in ODA is worrying.

LDCs themselves have begun to promote their countries more actively to foreign investors. Investment promotion agencies have been established in 38 LDCs, 28 of which have joined the World Association of Investment Promotion Agencies. Moreover, at the end of 2001, 41 LDCs had concluded a total of 292 bilateral investment treaties and 138 double taxation treaties. Finally, a growing number of LDCs are now signatories to relevant multilateral agreements. For example, as of June 2002, 20 LDCs had acceded to the Convention on the Recognition and Enforcement of Foreign Arbitral Awards; 37 LDCs had ratified or signed the Convention on the Settlement of Investment Disputes between States and Nationals of other States; 34 LDCs were members (another six in the process of becoming members) of the Multilateral Investment Guarantee Agency; and 30 LDCs were members of the World Trade Organization.

FDI inflows to ($27 billion) and outflows from ($4 billion) CEE remained at levels comparable to those of 2000. FDI inflows increased in 14 of the region's 19 countries, and the region's share of world FDI inflows rose from 2 per cent in 2000 to 3.7 per cent

in 2001. Five countries (Poland, the Czech Republic, the Russian Federation, Hungary and Slovakia) accounted for more than three-quarters of the region's inflows in 2001. FDI outflows from CEE declined somewhat in 2001, due to a slowdown in flows from the Russian Federation, which accounts for three-quarters of the outward FDI from the region.

…as well as national differences, as revealed in two UNCTAD indices developed for benchmarking inward FDI performance and potential.

While the role of TNC activity is increasing in most parts of the world, there are notable differences by country. Benchmarking the performance and potential of individual economies in attracting FDI, as measured by UNCTAD's Inward FDI Performance Index and Inward FDI Potential Index, respectively, can provide useful data to policy-makers and analysts on the relative performance of countries.

According to the Inward FDI Performance Index, which compares the ratio of a country's share in global FDI flows to its share in global GDP, an index value of one implies that a country's share of global FDI is equal to that country's share of world GDP. Countries with an index value higher than one attract more FDI than may be expected on the basis of the relative size of their GDP. On the basis of this measure, during the period 1998-2000, the developed world as a whole was more or less balanced in terms of the FDI it received, although the EU reported the highest score (1.7) and Japan the lowest (0.1). In terms of changes during the past decade, Africa experienced a fall in its score (from 0.8 during 1988-1990 to 0.5 during 1998-2000), while Latin America's improved significantly (from 0.9 to 1.4). East and South-East Asia had scores above one (1.7 during 1988-1990 and 1.2 during 1998-2000), while West and South Asia, by contrast, reported low scores over the past decade (0.1-0.2). CEE had a score close to one.

The country rankings for FDI performance yield interesting findings. The top 20 countries included 5 small developed countries,

12 developing economies and 3 from CEE. The 20 countries with the lowest scores were mainly developing countries, including several LDCs, but they also included some developed countries, such as Japan and Greece. The greatest gains in the Performance Index over the past decade were those for Angola, Panama, Nicaragua and Armenia, whereas the largest declines were recorded for Oman, Greece, Botswana and Sierra Leone.

UNCTAD's Inward FDI Potential Index ranks countries according to their potential for attracting FDI. This Index is based on structural factors that tend to change only slowly. As a result, the index values are fairly stable over time. The top 20 economies in 1998-2000 by this measure were developed countries or high-income developing economies, while the bottom 20 ranks were all held by developing countries.

The ranking of countries according to both the Performance and Potential Indices yields the following matrix (table 6):

- countries with high FDI performance (i.e. above the mid-point of the ranking by performance of all countries) and high potential (i.e. above the mid-point of the ranking by potential of all countries): the "front-runners";
- countries with high FDI performance (i.e. above the mid-point of the ranking by performance of all countries) and low potential (i.e. below the mid-point of the ranking by potential of all countries): the "above-potential economies";
- countries with low FDI performance (i.e. below the mid-point of the ranking by performance of all countries) and high potential (i.e. above the mid-point of the ranking by potential of all countries): the "below-potential economies"; and
- countries with low FDI performance (i.e. below the mid-point of the ranking by performance of all countries) and low potential (i.e. below the mid-point of the ranking by potential of all countries): the "under-performers."

In 1998-2000, there were 42 front-runners, i.e. countries that combined strong potential with strong performance. This group

Table 6. Country classification by FDI performance and FDI potential, 1998-2000

	High FDI performance	Low FDI performance
High FDI potential	**Front-runners** Argentina, Bahamas, Bahrain, Belgium and Luxembourg, Bulgaria, Canada, Chile, Costa Rica, Croatia, Czech Republic, Denmark, Dominican Republic, El Salvador, Estonia, Finland, France, Germany, Guyana, Hong Kong (China), Hungary, Ireland, Israel, Latvia, Lithuania, Malaysia, Malta, Namibia, Netherlands, New Zealand, Norway, Panama, Peru, Poland, Portugal, Singapore, Slovakia, Spain, Sweden, Switzerland, Thailand, Trinidad and Tobago and the United Kingdom.	**Below potential** Australia, Austria, Belarus, Botswana, Brunei Darussalam, Cyprus, Egypt, Greece, Iceland, Islamic Republic of Iran, Italy, Japan, Jordan, Kuwait, Lebanon, Mexico, Oman, Qatar, the Republic of Korea, the Russian Federation, Saudi Arabia, Slovenia, Suriname, Syrian Arab Republic, Taiwan Province of China, United Arab Emirates, the United States and Uruguay.
Low FDI potential	**Above potential** Angola, Armenia, Azerbaijan, Bolivia, Brazil, China, Côte d'Ivoire, Ecuador, the Gambia, Georgia, Honduras, Jamaica, Kazakhstan, Kyrgyzstan, Malawi, Mozambique, Nicaragua, Papua New Guinea, the Republic of Moldova, Romania, the Sudan, TFYR Macedonia, Togo, Tunisia, Uganda, Venezuela, Viet Nam and Zambia.	**Under-performers** Albania, Algeria, Bangladesh, Benin, Burkina Faso, Cameroon, Colombia, Dem. Rep. of the Congo, Congo, Ethiopia, Gabon, Ghana, Guatemala, Guinea, Haiti, India, Indonesia, Kenya, Libyan Arab Jamahiriya, Madagascar, Mali, Mongolia, Morocco, Myanmar, Nepal, Niger, Nigeria, Pakistan, Paraguay, the Philippines, Rwanda, Senegal, Sierra Leone, South Africa, Sri Lanka, Tajikistan, Turkey, Ukraine, the United Republic of Tanzania, Uzbekistan, Yemen and Zimbabwe.

Source: UNCTAD, *World Investment Report 2002: Transnational Corporations and Export Competitiveness*, table II.3.

included industrialized countries such as France, Germany, Sweden, Switzerland and the United Kingdom; the Asian "tigers", including newer ones, such as Hong Kong, China, Malaysia, Singapore and Thailand; and a number of Latin American countries, such as Argentina and Chile. It also included strong entrants to the FDI scene such as Costa Rica, Hungary, Ireland and Poland.

The above-potential economies comprised mainly those without strong structural capabilities that have done well in attracting FDI; most of them are relatively poor and lack a strong industrial base. Brazil and China are notable exceptions, which were nevertheless, also part of this group. The below-potential economies included many rich and relatively industrialized economies that have a weak FDI performance because of policy preferences and a tradition of low reliance on FDI (Italy, Japan, Republic of Korea and Taiwan Province of China, especially in the earlier period), unfavourable political and social factors or weak competitiveness (not captured by the variables used here). The United States fell within this category, along with some developing countries that are relatively capital-abundant (e.g. Saudi Arabia) and in which FDI flows may not adequately reflect the extent of TNC participation because of non-equity forms or a reliance on local financing. The 42 under-performers were generally poor countries that, for economic or other reasons, did not attract their expected share of global FDI.

What policy implications emerge from this analysis? For front-runners wishing to remain important recipients of FDI, the issue is one of retaining their competitive edge in terms of FDI attraction. The under-performers may need to improve various aspects of their investment environment to upgrade their position in the Potential Index. Countries that move from under-performers to above-potential economies have to strive to build their competitive potential quickly to retain their edge in attracting investors. Similarly, for countries that retain high potential but slide in FDI attraction, there may be a need to address investor perceptions and undertake more targeted efforts to promote existing locational advantages.

TNCs AND EXPORT COMPETITIVENESS

Improving export competitiveness helps countries develop…

An important consideration for policy-makers when promoting development is to improve "export competitiveness". While export competitiveness starts with increasing international market shares, it goes far beyond that. It involves diversifying the export basket, sustaining higher rates of export growth over time, upgrading the technological and skill content of export activity, and expanding the base of domestic firms able to compete internationally so that competitiveness becomes sustainable and is accompanied by rising incomes. Competitive exports allow countries to earn more foreign exchange, and so to import the products, services and technologies they need to raise productivity and living standards. Greater competitiveness also allows countries to diversify away from dependence on a few primary commodity exports and move up the skills and technology ladder, which is essential for increasing local value added and sustaining rising wages. It permits a greater realization of economies of scale and scope by offering larger and more diverse markets. Exporting feeds back into the capacities that underlie competitiveness: it exposes enterprises to higher standards, provides them with opportunities for easier access to information and subjects them to greater competitive pressures, thereby encouraging domestic enterprises to make more vigorous efforts to acquire new skills and capabilities. Ideally, attaining increased market shares should be accompanied by all these other benefits in order to maximize the developmental impact.

However, these developmental impacts from improved export competitiveness cannot be taken for granted. For example, if all economies aim at exporting the same products at the same time, most of them may well become worse off. Similarly, in the absence of adequate national policies to strengthen national capabilities and increase local value added, an expansion in market shares may not produce the expected benefits.

TNCs can help raise competitiveness in developing countries and economies in transition, but tapping their potential is not easy. Attracting export-oriented TNC activities is itself an intensely competitive business – and even successful countries may find it difficult to sustain competitiveness as their wages rise and market conditions change. Coherent and consistent policy support is essential to ensure that attracting export-oriented TNC activities is embedded in a broader national development strategy. Export competitiveness is important and challenging, but it needs to be seen as a means to an end – namely development.

…and the changing international production systems of TNCs can play a key role, …

Through equity and non-equity links, TNCs account for substantial shares of exports in a number of developing countries, and their role spans all sectors. In the primary sector, besides minerals and petroleum, TNCs can contribute to the development of resource-based exports in such areas as food processing and horticulture. In manufacturing, TNCs tend to be the leaders in export-oriented production and marketing, especially for the most dynamic products, for which linking up to marketing and distribution networks is crucial. Their international production systems can take various forms, ranging from production-driven, FDI-based systems involving intra-firm trade among affiliates to looser, buyer-driven, non-equity-based networks of independent suppliers (as in international subcontracting and contract manufacturing). The increased tradability of services offers new opportunities for exports, the Indian software industry being the best-known example so far. Opportunities also extend to such services as regional headquarters, procurement centres, shared-services centres and R&D activities.

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

internal to their international production systems. Trade in parts and components, especially those of the dynamic industries, has assumed more importance, indicating an increasing trend towards trade specialization associated with international production systems. The most dynamic products in world trade are found mainly in non-resource-based manufactures, particularly electronics, automotive and apparel. TNCs have played an important role in the export expansion of these products, albeit in different ways. They can play a similar role in other products and industries, using similar strategies.

The growth of international production systems reflects the response of TNCs to dramatic changes in the global economic environment: technological change, policy liberalization and increased competition. Falling barriers to international transactions allow TNCs to locate different parts of their production processes, including various service functions, across the globe, to take advantage of fine differences in costs, resources, logistics and markets. They exhibit an unending search for enhanced competitive advantage through the optimal geographic configuration of their activities. What is distinct about the rise of international production systems as opposed to earlier TNC operations is, first, the intensity of integration both on a regional and a global scale and, second, the emphasis on the efficiency of the system as a whole. Global markets therefore increasingly involve competition between entire production systems, orchestrated by TNCs, rather than between individual factories or firms.

Three core elements of international production systems are critical in this context: governance, global value chains and geographic configuration. Governance concerns the structure of control that determines the geographic and functional distribution of business activities and ensures their coordination. Governance in international production systems occurs in various forms. These range from ownership (or equity) linkages that provide direct managerial supervision, to various non-equity linkages in which formally independent intermediaries – suppliers, producers and sales outlets – are linked through a variety of relationships such as franchising, licensing, subcontracting, marketing contracts, common

technical standards or stable, trust-based business relationships. Equity-based governance systems internalize control and allow stronger protection of firm-specific advantages. Where these advantages lie in brand names and marketing, more externalized forms of control may suffice.

The second element of an international production system is the organization and distribution of production activities and other functions, in what is commonly known as the global value chain. It extends from technology development, through production, to distribution and marketing. Value chains are becoming fragmented, as business functions are differentiated into ever more specialized activities. In many industries, TNCs have recently tended to focus more on the knowledge-intensive, less tangible, functions of the value chain such as product definition, R&D, managerial services, and marketing and brand management. In consequence, contract manufacturers have grown rapidly.

The third element of international production systems, which holds particular interest for developing countries, is their geographic configuration. The past 15 years have seen great changes in the determinants of the optimal location of TNC activities, and hence in the geographic distribution of technology, production and marketing activities within international production systems. Production has been internationally dispersed for decades, but the trend towards integration on ever larger geographic scales is relatively new. Supply chains have extended to new areas of the globe and integrated formerly distinct regional production activities. However, while distance might matter less for many transactions (due to improved information and communication technology), proximity to main markets remains important for certain products.

Whereas the growth of international production systems is well recognized, less well known is the growing tendency for firms, even large TNCs, to specialize more narrowly and to contract out more and more functions to independent firms, spreading them internationally to take advantage of differences in costs and logistics. Some are even opting out of production altogether, leaving contract manufacturers to handle it while they focus on innovation and marketing. The main suppliers and contract manufacturers are

themselves often large TNCs, with global "footprints" matching those of their principals, and with their own subcontractors and suppliers. However, TNCs also increasingly use national suppliers and contractors in host economies. Specialization does not stop there: leading TNCs are also entering into joint innovation arrangements with other firms – competitors, suppliers or buyers – and with institutions like research laboratories and universities. Thus, the emerging global production system is increasingly open in terms of ownership, but with tighter coordination by lead players in each international production system.

…providing opportunities as well as challenges for developing countries and economies in transition, …

Changing corporate strategies and production systems open new possibilities for developing countries and economies in transition to enter technology-intensive and export-oriented activities they could not otherwise undertake, and to become a part of international production systems. At the same time, the increasing demands put on key suppliers raise the barriers to market entry for the smaller and newer suppliers from developing countries and economies in transition which do not possess the capabilities and competitive advantages that modern production systems require.

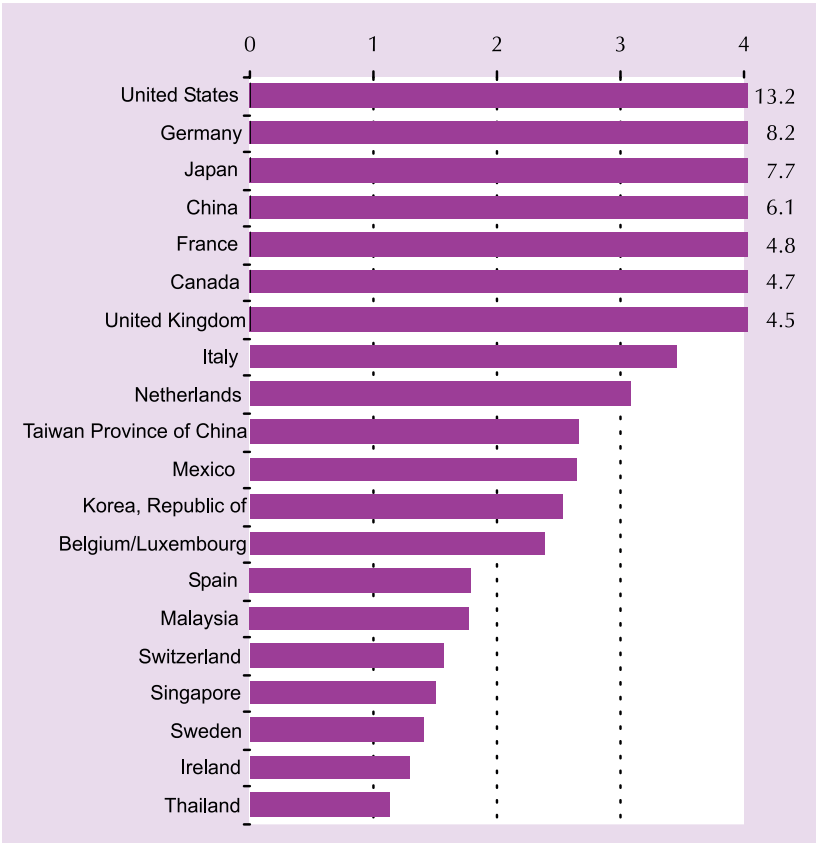
Improved export competitiveness can have significant consequences. In terms of market shares, only 20 economies together account for over three-quarters of the value of world trade (figure 1). Developed countries, especially Germany, Japan and the United States, are major traders. However, it is mainly developing economies, such as China, the Republic of Korea, Mexico, Malaysia, Thailand, Taiwan Province of China, Singapore, the Philippines, and economies in transition, such as the Hungary, that accounted for the largest gains in market share during 1985-2000 (figure 2). In fact, with their recent market-share gains, seven of these economies now belong to the 20 largest exporters in the world. In other words, dramatic changes are taking place in the composition of world trade, and a number of developing countries and economies in transition are among the principal beneficiaries.

The growth of exports from many of these winner countries is directly linked to the expansion of international production systems, especially in the electronics and automotive industries. For example, foreign affiliates now account for about half or more of exports of manufactures in a few of these countries (table 7). However, such systems tend to be concentrated by country, region and activity. It is possible that the export dynamism seen in the "winners" will spread to other developing countries and economies in transition as

Figure 1. World export market shares, 2000

The 20 economies with the largest export market shares, 2000

(Percentage)



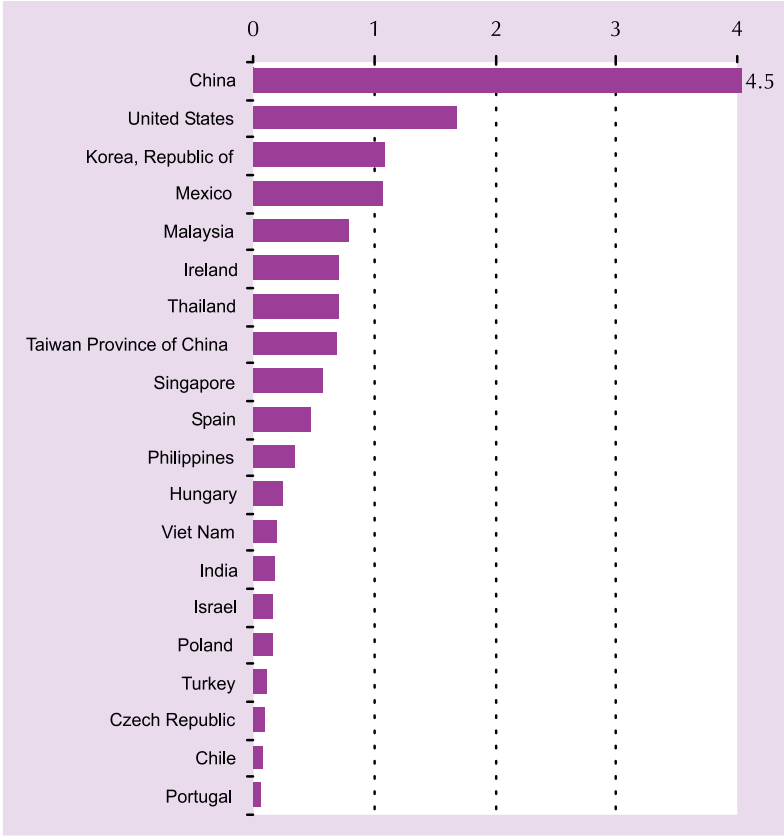
Source: UNCTAD, *World Investment Report 2002: Transnational Corporations and Export Competitiveness*, figure VI.1.

international production gathers pace and increases in scope, but to date the bulk of such TNC-related export activity – especially in the most dynamic segments of world trade – is concentrated in a handful of countries, mainly in East and South-East Asia and in regions contiguous to North America and the European Union. At the same time, though, TNCs are also significant players in many countries that are not major global exporters.

Figure 2. Changes in world export market shares, 1985-2000

The 20 winner economies, based on export market share gains, 1985-2000

(Percentage points)



Source: UNCTAD, *World Investment Report 2002: Transnational Corporations and Export Competitiveness*, figure VI.1.

Table 7. Shares of foreign affiliates in the exports of selected host economies, all industries and manufacturing,[a] selected years

(Percentage)

Economy	Year	All industries	Manufacturing[a]
Developed countries:			
Austria	1993	23	14
	1999	26	15
Canada[b]	1994	46	41
	1995	44	39
Finland	1995	8	10
	1999	26	31
France[b]	1996	22	27
	1998	21	26
Ireland[b]	1991	..	74
	1999	..	90
Japan	1988	4	3
	1998	4	4
Netherlands[b]	1996	44	22
Portugal[b]	1996	23	21
	1999	17	21
Sweden[b, c]	1990	21	21
	1999	39	36
United States	1985	19	6
	1999	15	14
Developing economies:			
Argentina[d]	1995	14	..
	2000	29	..
Bolivia[d]	1995	11	..
	1999	9	..
Brazil[d]	1995	18	..
	2000	21	..
Chile[d]	1995	16	..
	2000	28	..
China	1991	17	16
	2001	50	44[e]
Colombia[d]	1995	6	..
	2000	14	..
Costa Rica	2000	50	..
Hong Kong, China	1985	..	10
	1997	..	5

/...

Table 7 (concluded)

Economy	Year	All industries	Manufacturing[a]
India	1985	3	3
	1991	3	3
Malaysia	1985	26	18
	1995	45	49
Mexico[d]	1995	15	..
	2000	31	..
Peru[d]	1995	25	..
	2000	24	..
Republic of Korea	1999	..	15[i]
Singapore	1994	..	35
	1999	..	38
Taiwan Province of China	1985	17	18
	1994	16	17
Central and Eastern Europe:			
Czech Republic	1993	..	15
	1998	..	47
Estonia[b]	1995	..	26
	2000	60	35[f]
Hungary	1995	58	52[g]
	1999	80	86[f]
Poland[b]	1998	48	35[g]
	2000	56	52[f]
Romania	2000	21	..
Slovenia	1994	..	21
	1999	26	33[f]

Source: UNCTAD, *World Investment Report 2002: Transnational Corporations and Export Competitiveness*, table VI.3.

[a] Share of exports of foreign affiliates in the manufacturing sector in the merchandise exports of host economies.
[b] Data for exports of foreign affiliates refer to exports of majority-owned foreign affiliates only.

[c] Manufacturing includes mining and quarrying.
[d] Data for exports of foreign affiliates were based on 1998-2000 average and were provided by ECLAC, International Trade and Integration Division, based on a sample of 385 foreign-owned firms: 82 in Argentina, 160 in Brazil, 20 in Chile, 21 in Colombia, 93 in Mexico and 9 in Peru.
[e] 2000.
[f] 1998.
[g] 1993.

Note: For full footnotes to this table, see *World Investment Report 2002: Transnational Corporations and Competitiveness,* table VI.3.

Each of the six countries selected for further analysis in *WIR02* – China, Costa Rica, Hungary, Ireland, Mexico and the Republic of Korea – experienced not only a sharp increase in market shares, but also a shift in their export repertoire: from non-dynamic to dynamic products and from low-technology to medium- and high-technology activities. Asian winner countries gained market shares in all principal markets (Japanese, European and North American), while those from other regions advanced mainly in a regional context. Western and Eastern European countries gained mainly in European markets, and countries in Latin America and the Caribbean have mainly in North American markets.

In all of them, TNCs have played an important role in expanding exports, either through equity or non-equity relationships. But large as the share of TNC activities is in the exports of these countries, it varies considerably. Of the leading exporters, the Republic of Korea is an example of a winner with a relatively small presence by way of inward FDI, although non-equity links have played a role in enhancing the competitiveness of large domestic companies, which are at the heart of the Korean economy. The other winners, especially in non-resource-based manufactures – the most dynamic in world trade – have relied on TNCs to boost their export performance. China, Costa Rica, Hungary, Ireland and Mexico became export winners mainly by relying on FDI to generate their most dynamic exports. Beyond that, each country had its own specific advantages that enabled it to become linked to international production systems. China's advantage is the size of its economy, which allows economies of scale and helps expand exports. For Hungary, Ireland and Mexico it is their preferential access to a major market. In Costa Rica and Ireland, national policy in the form of a proactive approach to attracting high-technology FDI and linking up to international supplier networks has been an important factor.

…but the development gains from export expansion cannot be taken for granted.

Improving export competitiveness is important and challenging, but it is not an end in itself. It is a means to an end: the promotion of development. This raises the question of the benefits

resulting from TNC-associated trade, beginning with improving the trade balance and continuing with upgrading export operations and sustaining them over time. Even though export-oriented FDI helps to increase exports, foreign affiliates also import. In some cases, net foreign exchange earnings may be small, and high export values may coexist with low levels of value added. In each case, the issue is how host developing countries can most benefit from the assets that TNCs command. Much depends on the strategies pursued by TNCs, on the one hand, and the corresponding host-country capabilities and policies, on the other.

Over-dependence on TNCs for export competitiveness has its own drawbacks. TNCs may focus solely on the static comparative advantages of a host country. While this might resolve some of the short-term, efficiency-related problems of TNCs, it means that a number of the longer-term benefits that can be associated with export-oriented foreign affiliates may fail to materialize in the host country. In particular, dynamic comparative advantages may not be developed and affiliates may not embed themselves in the local economy by building linkages to the domestic entrepreneurial community, by further developing labour skills, or by introducing more complex technologies.

Upgrading exports involves both an improvement in the efficiency of production and a restructuring of static to dynamic comparative advantage. The starting point is that specialization in different segments of international production systems may imply different benefits and competitive prospects. There is therefore reason for concern that specialization in labour-intensive segments, even of high-technology exports, may, in some instances, be undesirable; it may provide few benefits in training or technology and meagre spillovers to the local economy. Besides, the competitive edge of low-cost labour may disappear as wages rise. On the other hand, labour-intensive exports are economically beneficial as long as local value added is positive at world prices, even if it does not rise at the same pace as exports. In fact, where surplus labour is unlikely to be used in more remunerative or economically desirable activities, it is in the interest of the countries concerned to use it in export-oriented production. Any theory of comparative advantage would suggest that these countries should specialize in labour-intensive processes

at the beginning of their export drive; the question is whether they can subsequently upgrade and sustain their exports.

TNCs can contribute to the upgrading of a country's competitiveness either by investing in higher-value-added activities in industries in which they have not invested before, or by shifting within an industry, from low-productivity, low-technology, labour-intensive activities to high-productivity, high-technology, knowledge-based ones. This underlines the importance of ensuring the sustainability of export-oriented foreign affiliates. If these foreign affiliates are to become embedded in host economies, they need to upgrade as well as progressively establish backward linkages with domestic enterprises. Where such linkage creation takes place, the exports involved are not only likely to be more sustainable and broadly beneficial for the host countries, but also to involve higher domestic value added and contribute to strengthening the competitiveness of the domestic enterprise sector – the bedrock of economic development. The success of the national industrialization strategies of a number of (mainly Asian) countries that have combined efforts to attract export-oriented TNC activities with the development of domestic capabilities, serves as a model to others.

In sum, it would appear that the benefits of TNC export activity can be further exploited. Technologies are changing. Processes and functions are increasingly divisible, and the boundaries of what is internal and external to firms are shifting. The diminishing cost of transport is stretching location maps. New activities are likely to join the globalization surge, including many from developing countries and economies in transition. The challenge for countries that would like to improve their export competitiveness in association with TNCs is, first, to link up with the international production systems of these firms and, next, to benefit more from them. This is where policies – and the need for national policy space – come in.

PROMOTING EXPORT-ORIENTED FDI

Policies to promote export-oriented FDI are evolving…

A priority among countries – whether rich or poor – is to upgrade and sustain exports so that they contribute more to development. Just as firms are forced to make their production systems more competitive, countries have to figure out how to move, in any industry, into higher-value-added activities. There are many ways in which TNCs can help to enhance host countries' export competitiveness. The challenge is to tap TNC potential for this purpose. In order to attract export-oriented FDI and to ensure that such investment translates into development gains, countries need to find the most effective ways to make their locations more conducive to the kind of export activities they aim to foster. Even traditionally significant recipients of export-oriented FDI need to upgrade to sustain rising wages and maintain their competitiveness as an export base.

In line with the dynamic changes in corporate strategies affecting key export industries, the rising competition among countries and sub-national entities for export-oriented FDI, the changing regulatory environment, and the changing development objectives of countries themselves, policy formulation and implementation are evolving. While recognizing that macroeconomic stability as well as structural factors, such as technological capacity and human resources, are key in making a location competitive, the focus here is on policies related to export-oriented FDI: how to attract, upgrade and benefit from such FDI. It is beyond the scope of the *WIR02* to look into what policies are needed for upgrading human resources and technology per se. Rather, this volume focuses on other important lessons that can be drawn from the experience of developing countries and economies in transition that have successfully taken advantage of inward FDI to enhance their export competitiveness. Care must be taken, however, in applying these lessons: the effectiveness of any given policy depends on the specific economic, historical, geographical, cultural and political context.

Access to key markets is a necessary, but not sufficient, condition for attracting export-oriented activities. Although multilateral trade liberalization has been an important facilitating factor behind the emergence of international production systems and the establishment of export-oriented activities abroad by TNCs, access to developed-country markets, especially for products of export interest to developing countries, needs to be further improved. In particular, tariff peaks, tariff escalation and non-tariff barriers in agriculture, textiles and clothing need to be addressed. Meanwhile, a rise in protectionism could effectively jeopardize the prospects for poor countries to exploit their comparative advantages fully. The growing use of trade measures, such as anti-dumping and safeguards, and of targeted subsidies in developed countries all give cause for concern in this context.

Despite the erosion of preferential margins, many regional and preferential arrangements still remain important for the location of export production (e.g. in the context of the European Union and its association agreements, NAFTA, the United States Caribbean Basin Initiative and AGOA) as do various offshore production schemes. While host-country policy-makers need to be aware of opportunities arising from such arrangements, they also need to understand their limits. For example, offshore production schemes generally discourage the use of local components and may thereby restrict the upgrading of local operations. Trade preferences in and by themselves provide neither a sufficient nor a sustainable basis for developing competitive export industries (with or without FDI). The same applies to countries that have attracted export-oriented FDI thanks to unused quotas for export to countries that restricted access for textiles and clothing products under the Multifibre Arrangement. As the quotas are to be phased out by 2005, there is a risk of the relocation of existing investment to countries that offer more competitive conditions. Trade preferences need to be seen as a temporary window of opportunity that provides time to allow countries to strengthen their locational advantages.

On the part of host-country Governments, there are a number of measures that can be considered to improve the long-term attractiveness of a country as a base for export-oriented

production. While the focus here is on policy measures that are directly related to FDI, it should be re-emphasized that these have to be viewed as part of broader efforts to promote development.

A key policy area is to improve access to imported inputs through trade facilitation measures. Such efforts are important, as the competitiveness of export-oriented activities (especially in non-resource-based industries) often depends, to a large extent, on imported inputs. Various countries have tried to induce more exports from foreign affiliates through export-performance requirements. However, in order not to deter inward FDI, these have normally been tied to some kind of advantage received by the investor. In an increasingly competitive environment, and in the light of WTO rules, mandatory export performance requirements are becoming more difficult to use.

In order to lower production costs and risks, many countries offer incentives aimed at inducing new or more export-oriented FDI. The use of incentives also has evolved over time. Developed countries frequently employ financial incentives (such as outright grants), whereas fiscal measures are more common in developing countries (which cannot afford a direct drain on the government budget). Incentives have been an important element in the development strategies of many countries, especially those successful in attracting export-oriented FDI. Some of these countries have adopted an increasingly targeted approach to attracting FDI.

The challenge for developing countries wishing to use incentives in their efforts to promote export-oriented FDI is to weigh the benefits and costs involved. Where effectively implemented, incentives have typically complemented a range of other measures aimed at enhancing aspects such as the level of skills, technology and infrastructure. To compensate for major deficiencies by offering incentives may not always be a wise strategy, as it increases the risk of public funds being spent on projects that do not offer the externalities needed to warrant the incentives in the first place. Without efforts to improve the business environment, make it more conducive to attracting investment, upgrading production and embedding FDI into the local economy, there is a greater risk that investors will leave

as soon as the incentives expire. Thus, subsidies should not be used as an isolated measure, but rather as part of a broader policy package.

The setting up of export processing zones (EPZs), with a view to providing efficient infrastructure and removing red tape within the confines of a limited area, is also a widely used tool in the context of promoting export-oriented FDI. In fact, most of the winners identified in figure 4 have established EPZs (or other schemes that share some of their characteristics), and a number of them account for a large share of non-resource-based manufactured exports. However, the performance of EPZs depends very much on other policies, notably policies that aim at enhancing human resources and creating the infrastructure necessary to attract and upgrade export-oriented FDI. Successful zones can be found in countries such as China, Costa Rica, the Dominican Republic, the Philippines and Singapore. On the other hand, there are many EPZs that have failed to attract substantial investments and where outlays have far exceeded social benefits.

As in the case of other policy areas, the nature and use of EPZs are also evolving. As already noted, the requirement to export has been relaxed in many countries in recent years, thus allowing for significant domestic sales. More domestic companies are now established in the zones and efforts are being made by Governments to encourage more linkages between foreign affiliates and domestic firms, as well as to encourage the training of local employees and the development of technical and technological infrastructure. The industrial composition of production within EPZs and other zones is also changing. While it used to be dominated by low-technology, labour-intensive, incentive-driven manufacturing activities, a number are now moving into new areas such as electronics assembly, electronic design, testing and R&D, not to mention regional headquarters and global logistics centres. In developing countries, such trends may be accelerated by the WTO disciplines in the area of export subsidies.

…in the light of WTO rules on export subsidies, …

When considering using incentives, not least in the context of EPZs, developing countries not only need to identify the most

effective ones, but also to ensure that they conform with the international regulatory framework, notably WTO rules. In this context, attention is especially warranted to the role of export subsidies. Apart from the WTO members listed in Annex VII of the Agreement on Subsidies and Countervailing Measures (namely, LDCs and members listed in Annex VII until their per capita GNP reaches $1,000), other developing country members will have to eliminate export subsidies as of 1 January 2003, with the exception of those that will be granted an extension of the transition period. And even these need to consider what to do once it expires. The possibility of offering other specific incentives that do not meet the definition of prohibited subsidies remains, but any "specific" subsidy that causes adverse effects to another WTO member's interests is actionable and potentially subject to remedial action. Furthermore, subsidized imports into another WTO member may be subject to countervailing measures by the latter, if they cause, or threaten to cause, material injury to a domestic industry providing the like product in the importing member. The provision of "specific" subsidies therefore becomes risky.

EPZs are likely to continue to play an important role in the overall strategy of countries to promote export-oriented FDI. They can continue to exempt exports by companies in these zones from indirect taxes (such as sales taxes), border taxes (e.g. consular fees) and import charges. Duty drawback and duty exemption systems are thus permissible. While duty drawback schemes may not include capital goods used to produce exported goods, many smaller WTO members may have little or no domestic production of such capital goods, and thus could consider simply lowering or eliminating import duties on such goods. Furthermore, arguably, the most structural advantages in the form of well-functioning infrastructure and streamlined administrative procedures remain unaffected. Partly in the light of this, a number of countries, including some developed ones, are beginning to turn their EPZs into industrial parks or science parks that can act as catalysts for cluster development.

There is a risk that intense competition for export-oriented FDI will translate into a race to the bottom (in social and environmental standards) and a race to the top (in incentives). Such concerns have been voiced especially in the context of EPZs. Successful EPZs

should not be judged solely on their capacity to attract FDI or increase exports and foreign exchange earnings. They should also be assessed by the extent to which they help meet broader economic and social objectives. Countries that pursue more integrated policy approaches to attracting export-oriented FDI – for example by involving tripartite representation on EPZ committees, guaranteeing workers' rights (including freedom of association and collective bargaining), and upgrading skills and working conditions – have tended to attract higher-quality FDI. Singapore and Ireland are two examples of countries that have pursued more integrated policy approaches in this area. In both these countries, efforts were made to promote training, facilitate dialogue between labour and management, and provide first-class infrastructure for investors. Good labour relations and the upgrading of skills enhance productivity and competitiveness.

With regard to the risk of an incentives race to the top, while the Agreement on Subsidies and Countervailing Measures prohibits the use of export subsidies, other incentives, especially locational ones, are still widely used in both developed and developing countries to promote export-oriented FDI. As competition for export-oriented FDI increases, the risk of ever-increasing incentives by competing locations calls for further international cooperation in this area. The differences in resources available for public support to private investment also suggest that developing countries are at a disadvantage in such incentive-based competition. A reduction in the use of locational incentives by developed and developing countries should help Governments allocate more resources for the development of skills, infrastructure and other areas relevant to the attraction of export-oriented activities. At the same time, a case could be made for making certain development-oriented subsidies to foreign affiliates non-actionable under WTO rules, for example, if they serve to encourage the provision of technology, technical assistance and training to local suppliers and their personnel. However, to avoid free riding, firms receiving incentives should be required formally to commit sufficient resources on a long-term basis.

…while investment promotion becomes more targeted, …

The choice of policy instruments with regard to export-oriented FDI needs to be in tune with a country's overall development strategy. There is growing recognition that various policy tools are most effective if they are applied in a targeted and coherent manner. Because TNCs typically consider a number of potential investment locations for export-oriented FDI, the need for a focused approach to investment promotion is particularly relevant. A targeted approach is likely to be less costly in relation to the results achieved, than one in which a country attempts to attract export-oriented investment in a more ad hoc fashion. But, above all, the main reason to target is to increase the chances of attracting investment that furthers the specific development objectives of a country. This requires, among other things, that Governments determine what type of FDI is likely to have the greatest potential for linkages with indigenous investment.

An important starting point for successful targeting is a good understanding of the relative competitiveness of a host country (or an area within it) for specific activities. While an assessment of a location's strengths and weaknesses can be undertaken at various levels of sophistication and detail, useful insights can be obtained from a relatively inexpensive rule-of-thumb approach involving an analysis of existing trade and industry patterns, consultations with existing investors (domestic and foreign), an analysis of which competing locations are exporting and what they have attracted in terms of export-oriented FDI, and an identification of other factors that might attract export-oriented FDI, including membership of free trade areas, preferential trade schemes, clusters of economic activity, and industrial parks. Such an assessment can form the basis for a narrower segmentation of the market, for example, based on economic, geographic, demographic and other criteria.

Another important element of targeting is a sound analysis of corporate strategies affecting the choice of location. In response to increased geographical and functional specialization in many industries, countries may find it useful to identify production niches through which they can link up with international production systems.

The more focused the approach, the easier it is to streamline the activities of investment promotion agencies (IPAs) to meet the needs of investors. Important clues as to where to look for potential investors relate to foreign affiliates that are already established in the country. They are "living proof" of the existence of investment opportunities, and their presence may be indicative of where to search for additional investment. Their competitors, too, may potentially be prime targets, especially if the existing foreign affiliates are linked to leading TNCs. Companies that are part of the value chains of domestic as well as foreign affiliates in the host country (e.g. as buyers or suppliers) are also potential targets. Nurturing close contacts with existing firms may generate useful insights into their investment strategies and how these "related" firms make their investment decisions.

Targeting should not be a one-off initiative but a continuous learning process in which relationship-building plays a key role. Governments need to recognize the importance of dynamism in niche market identification, and be aware of the need to revise their strategies over time, as competitive conditions and corporate strategies evolve. Advantages based upon preferential market access, for example, are valuable but must fit into a clear plan for creating sustained advantage over time. IPAs can contribute to such plans, but their conceptualization and implementation also involves other agencies of government and public-private partnerships.

There are, however, risks involved in developing a more targeted and focused strategy. Resources may be focused on attracting investments that do not materialize, or considerable efforts and resources may be devoted to seeking the wrong types of firms, or firms that would have invested in any event. Improving the overall policy environment for investment – domestic and foreign alike – should not be sacrificed to a selective focus on attracting a few firms. A realistic understanding of the strengths and weaknesses of a location as a base for export-oriented production provides a stronger base for targeting. There is an obvious risk of wishful thinking in seeking to win "high-status" TNCs if a country does not have the basic conditions to attract this type of investor (such as an educated and highly skilled workforce and excellent, low-cost infrastructure). Competition for high-profile investment projects can be intense and,

for every winner there are often several losers that, in the end, may have expended considerable resources in a failed attempt to attract a project. Thus, for most developing countries, the investors to target will probably not be the top 100 TNCs, but smaller firms within the appropriate industry or activity.

While it is clear that adopting an investor targeting strategy can be effective in attracting FDI, it also presents considerable challenges for Governments. Effective targeting requires business-oriented IPAs with well-developed links to the private sector as well as to other branches of government. Investor targeting should be well integrated into the overall development strategy of a country, and IPAs need to work closely with other parts of government to identify and, indeed, create comparative advantages that are sustainable rather than ephemeral.

…and integrated into a comprehensive approach to meeting the competitiveness and development challenge.

To repeat, expanding exports is a means to an end: promoting development. To maximize the benefits of government intervention, the promotion of export-oriented FDI should be an integral part of the overall development strategy of a country. The bottom line is that the degree of success of a host country in attracting and upgrading export-oriented FDI as well as in reaping development benefits from such investment relies critically on its ability to develop domestic capabilities. Indeed, some of the countries most successful in boosting export competitiveness and leveraging export-oriented FDI practised a two-pronged approach based on developing domestic capacities while targeting foreign resources and assets. Important elements of such an approach can include:

- ensuring that what is targeted through investment promotion is in line with the country's broader development and industrial strategies;
- providing a package of incentives in a focused way to encourage TNCs to invest in strategic activities (taking into account WTO rules on export subsidies);
- involving foreign affiliates in the development and upgrading of human resources;

- developing high quality infrastructure, such as EPZs and science parks; and
- providing targeted support for domestic enterprises and supplier and cluster development.

The last bullet addresses a particularly important issue. To benefit fully from export-oriented FDI, facilitate an upgrading of export-oriented activities and make them sustainable, host countries need to encourage linkages between foreign affiliates and local suppliers. Export-oriented foreign affiliates – especially if operating in enclaves – often import all or most of their input requirements of components and raw materials, assemble the product in the host country and then export the semi-finished or finished output. It is partly against this background that linkage promotion has become an increasingly important policy area. Linkages with foreign affiliates are a key channel for the diffusion of skills, knowledge and technology to domestic firms. As discussed in depth in *WIR01*, key policy instruments include information provision and matchmaking; encouraging foreign affiliates to participate in programmes aimed at upgrading domestic suppliers' technological capabilities; promoting the establishment of supplier associations or clubs; the joint provision of training; and various schemes to enhance domestic suppliers' access to finance. Meanwhile, as in other policy areas, linkage promotion strategies also have to adapt to the changing nature of corporate strategies. For example, some countries (e.g. Ireland) are abandoning the idea of promoting linkages only between local firms and foreign affiliates and, instead, promote the participation of domestic firms in supply chains of TNCs based anywhere in the world.

Linkages between domestic suppliers and foreign affiliate buyers can also take place more frequently if buyers and suppliers operate in the same spatial and industrial area. Indeed, the increasingly interdependent nature of policies on investment, trade, technology and enterprise development calls for a more integrated approach to fostering export-oriented FDI and economic development. As the development of infrastructure, business services and specialized skills often involves significant levels of investment, many countries have encouraged the formation of localized industrial clusters. Such efforts seek to create conditions that will promote

dynamic interaction, learning, technology upgrading and competition among all relevant actors. A number of countries that have seen improvements in their export competitiveness over the past two decades have hosted agglomerations of mainly foreign-owned producers. Prominent examples include Ireland, Malaysia (Penang), Mexico, Singapore and a few CEE countries. However, not all export-oriented projects are good candidates to become nodes of dynamic industrial clusters. The chances of production concentrating in a limited number of locations increase when there are economies of scale at the plant level, relatively low costs per unit of output, low barriers to trade, and the presence of externalities and spillovers.

While the formation of industrial clusters can be spontaneous, resulting from the agglomeration of firms engaged in similar or related activities, increasingly, strategic government intervention can facilitate their creation. Three kinds of effort have been identified as essential for the development of clusters involving inward FDI. The first is *investment and business promotion* in a targeted manner. As policy-makers have to understand the competitive needs of different industries to avoid making misdirected investments in the wrong sort of clusters, cluster diagnostics is fundamental. There is also a special need in FDI-based cluster development for close cooperation between IPAs and related government institutions.

The second is *institution-building*, which is a complex process. Agglomeration tendencies can be encouraged by the establishment of EPZs, industrial parks and other specialized facilities, often specializing in one or more industries. Institutions engaged in metrology, standards, testing and quality assurance provide the infrastructure of modern industrial activity. Their importance to competitiveness is growing as a result of increasingly stringent quality, precision, tolerance and other standards in international markets. Other relevant institutions are those responsible for initiating research, providing access to financial resources, and creating business networks and professional associations.

The third element focuses on the *training and upgrading of human resources.* For knowledge-based activities, in particular, training and upgrading of relevant human resources are key (*WIR99).*

Such efforts may involve the establishment of specialized training centres, possibly with the involvement of foreign affiliates. Another approach is to attract internationally mobile skills to complement the local skills base. In general, the more knowledge-intensive the activity, the more important it becomes for clusters to attract skills.

In conclusion, the continuous need for countries to move up the value-added ladder and improve the attractiveness of their locational advantages is a challenging task for policy-makers in developing countries. It calls for more sophisticated and comprehensive policy approaches that take into account changes in corporate strategies and international rule-making. Furthermore, at the top of the agenda should be the development of domestic capabilities, as this helps not only to attract quality FDI but is also necessary to facilitate an upgrading of existing activities. Given the potential of improved export competitiveness for promoting development, the need for developing countries to preserve sufficient policy space to pursue their development objectives also has to be recognized. Finally, the extent to which developing countries profit from new opportunities created by the emergence of international production systems depends largely on their own actions. Developed countries can also help in a number of ways: they can provide assistance for the development of institutional capacity, disseminate information about export-oriented investment opportunities, and dismantle barriers to exports from developing countries. ■

BOOK REVIEW

World Investment Report 2002: Transnational Corporations and Export Competitiveness

United Nations Conference on Trade and Development
(New York and Geneva: United Nations, 2002), xxx+345 pages

For many years we have been accustomed to reports on the ever-increasing flows of foreign direct investment (FDI) and the continuous advancement of globalization. The annual *World Investment Report*, the most comprehensive and authoritative review of trends and patterns in globalization, came with a different message in 2002. A dramatic change has taken place worldwide, with FDI flows in 2001 recording their greatest downturn in at least 30 years.

The *World Investment Report 2002 (WIR02)* is important reading for researchers, policymakers and those who are just generally interested in where globalization is heading. Although it will take time to grasp the full scope of the recent variations in FDI flows, *WIR02* already casts new light on what is under way at global, regional and national levels. Apart from statistical data, it offers a number of illustrative case studies examining the significance of transnational corporations (TNCs) to their host economies, especially as regards their export competitiveness – which is the special subject of this year's *WIR*.

WIR02 demonstrates that the downturn in FDI concentrated mainly in developed countries (-59 per cent), with modest declines in the developing world (-14 per cent) and a slight increase in the economies in transition (2 per cent). It shows that, despite the slowdown, the significance of TNCs' international production continues to grow – albeit at reduced pace – and the global activities of TNCs keep expanding. This is not least important for developing countries, where FDI remains by far the greatest source of financial, technological and skills transfers. On the other hand, *WIR02* shows that FDI continues to be concentrated in a handful of developing countries, and seldom reaches the poorest ones. Forty countries receive an unchanged 95 per cent of the total allocated to the developing world. For the least developed countries, FDI remains considerably smaller than official development assistance.

WIR02 enters a daring exercise of trying to put numbers on the performance as well as potential of countries with respect to their attraction of FDI, which comes in the form of an "Inward FDI Performance Index" and "Inward FDI Potential Index", respectively. The former compares the ratio of a country's share in global FDI flows to its share in global GDP, whereas the latter is based on a set of economic and structural factors of relevance for foreign investors. *WIR02* notes that these indices should be interpreted with care; they are not exhaustive, nor do they measure to what extent countries actually benefit from FDI. Indeed, while they do drive home the message that a country should pay attention both to its specific potential and to its actual ability to capitalize on it, they miss out qualitative aspects. More is not always better.

WIR02 underlines the significance of policies related to promoting export-oriented FDI, and points to the presence of partly contradictory trade and growth patterns in developing countries. Developing economies and economies in transition have displayed an impressive spurt not least in high-technology industries, but value added is relatively stagnant, reflecting a continued emphasis on simple labour-intensive operations rather than complex manufacturing or local research and development. For developing countries to attract and benefit from export-oriented FDI, a pro-active approach is needed that can help promote linkages between foreign affiliates and domestic suppliers, i.e. root TNCs better in the host country. For this to happen, *WIR02* argues, policies must foster competitive conditions plugging into the appropriate "functional specialization" of the value chain.

In this context, a targeted policy approach to FDI promotion is recommended if host countries are to take advantage of the changing international production systems. On this point, *WIR02* runs the risk of overstating the precision and effectiveness of Governments. It is important that policy should be based on a clear rationale, and on the anticipation that an intervention will enable positive externalities or other social gains that outweigh the risks and costs of the measure itself. At the same time, any successful strategy for promoting FDI inevitably requires a certain focus if scarce public resources are to be used sensibly. There is a fundamental need for Governments to improve their understanding of the opportunities and challenges of globalization, and *WIR02* stresses that FDI policies must be consistent with the overall national priorities and strategies of a country.

Various issues related to the quality of FDI will require further work. The spurt in FDI over the last years primarily took the form of mergers and acquisitions (M&A) under conditions of greatly expanded room for manoeuvre for management relative to equity owners. A race for rapid positioning and exploitation ultimately unleashed bubbles and widespread failure. Developed countries, which were the prime battleground, subsequently found themselves in a downturn, pondering costs inflicted on them in their capacity as host as well as home countries. For developed and developing countries alike, conditions distorting the ownership and governance of firms, and messing up entrepreneurial and innovative efforts in society, may not necessarily show up in smaller FDI flows in the short term, although they are likely to lessen the presence of socially desirable transfers of competence and technology – and reduce the scope for long-term investment flows.

WIR02 notes that the observed decline in FDI may lead to an intensified international specialization in investment as well as production activities. This may potentially carry huge social, economic and environmental consequences. The size and characteristics of FDI flows will greatly influence whether developing countries increasingly lag behind developed countries – and witness a widening knowledge, technological and progress divide – or whether they will be able to turn the tide and pursue more effective catch-up strategies than in the past. There are several impressive examples in *WIR02*, collected from highly diverse conditions, suggesting that success is feasible. Further work is needed to nail down how the conditions can best be put in place to enable a greater number of countries to attract and benefit from FDI in a way that can really help bridge the existing income and knowledge gap between developing and developed countries.

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Theories and Paradigms of International Business Activity: The Selected Essays of John H. Dunning, Volume I

John H. Dunning
(Cheltenham and Northampton, MA: Edward Elgar, 2002),
ix+521 pages

No one has contributed more than John Dunning to the theoretical and empirical literature concerning the foreign direct investment (FDI) process. His eclectic paradigm of international production has been a major organizing framework in the international business literature for understanding the structure of international production. Dunning's seminal contributions span four decades, and his influence extends through the research and teaching careers of numerous scholars who have made their own noteworthy contributions to our understanding of the causes and consequences of foreign ownership and international production patterns.

This volume encompasses 16 previously published papers from the period of 1973-2002. They discuss the eclectic theory and empirical support for its relevance, as well as the robustness of the paradigm in light of major developments in the world economy. While a number of these studies have already caught attention as articles previously published in major journals and are undoubtedly well known to most researchers and students of the FDI process, others may be less familiar to a wider audience.

Taken as a whole, this anthology provides several extremely valuable services. In various places, it summarizes and synthesizes various streams of literature addressing the FDI process. Most notably, chapter 1 identifies the contributions and limitations of international trade theory, location theory, capital market theory and the industrial organization literature to our understanding of the motivation for international production. Chapter 2 describes how elements of these various streams of literature can be integrated into a comprehensive framework that addresses the main issues surrounding the international production process. Those main issues are the following: Why are specific production activities carried out

in some countries and not others? Why are those activities carried out by specific firms and not by others? Why is foreign production carried out under specific types of governance structures, e.g. through foreign affiliates, and not others?

Chapter 6 considers the similarities and differences between the approaches of the strategic management analyst and the economic theorist towards explaining the globalization of production. Chapter 8 discusses historical antecedents to the eclectic paradigm in the economics literature. Chapter 9 evaluates the contribution of political, legal, organization and marketing scholars to our understanding of international production. Inevitably, there is some redundancy in the discussions across these chapters. Nevertheless, the redundancy is a small price for the convenient, comprehensive and thoughtful literature review that is provided.

The identification and evaluation of major changes in the environment surrounding global production constitutes another valuable contribution of the volume. For example, chapter 10 contains an appraisal of the eclectic paradigm in the light of what Dunning has identified as "alliance capitalism". The latter describes a situation where the organization of production and transactions involves both cooperation and competition among firms. Chapters 13, 14 and 16 also, in various ways, consider how the emergence of cooperative global networks of firms affects the relevance of the basic eclectic paradigm. Dunning argues that the growing importance of "created" intangible assets along with economies of scale in creating those assets underlie the growing importance of cooperative networks. The eclectic paradigm can accommodate this development by embracing new variables contributing to ownership and location advantages, as well as by recognizing that there are other motivations for the choice of a specific governance structure besides transaction costs. The emergence and growth of electronic commerce is another major development identified. In chapter 15, Dunning and a co-author consider whether and how received theories of international business activity should be reoriented in the context of electronic markets. They acknowledge the uncertainty surrounding this issue but essentially conclude that the eclectic paradigm will continue to be a robust framework with appropriate extension.

An important recurring theme of the volume is that factors conditioning the determinants of international production patterns vary in importance over time and across situational contexts. For example, chapter 5 highlights the linkage between a country's inward and outward FDI and its stage of economic development. Chapter 7 contains a discussion of how the asset advantages of particular TNCs may be expected to vary according to the factor endowments and other characteristics of the countries from which they originate and/or in which they operate. Chapter 11 identifies the growing importance of corporate strategy and government policy as determinants of firm-specific and location-specific assets with the increasing relevance and mobility of "knowledge-based assets", while chapter 12 discusses the impact of financial market developments on the net advantages of fully internalizing ownership advantages within traditional foreign affiliates.

If this volume has a prominent weakness, it is the limited empirical evidence that accompanies the extensive and provocative conceptual discussions it contains. In particular, the econometric studies described in chapters 3 and 4 are dated and also limited in focus. Having said this, it must be noted that the two prominent findings highlighted in these chapters have stood the test of time. Specifically, host-country market size is a prominent determinant of location attractiveness for inward FDI, while human capital intensity is a prominent determinant of ownership advantage. Nevertheless, empirical evidence on important developments identified in the volume has been accumulating and would inform considerations of the relevance and importance of the conceptual extensions to the eclectic paradigm that are suggested in various chapters. This includes a rapidly growing literature on the importance of national legal and regulatory governance structures as determinants of international production patterns.[1]

Another topic for which more coverage would have been timely is the changing nature of FDI in the 1990s. In particular, cross-

[1] For reviews of the literature and some recent evidence, see Kaufmann, Kray and Zoido-Lobaton (1999) and Globerman and Shapiro (2002).

border mergers and acquisitions (M&As) became an overwhelmingly dominant source of FDI flows during the 1990s. By way of illustration, for the developed countries, the ratio of cross-border M&As to world FDI inflows increased almost continuously from around 62 per cent in 1991 to virtually 100 per cent in 1997 (Kang and Johansson, 2000). Although the two data series are not directly comparable, an indication of the importance of cross-border M&As is that, in 1999, they accounted for around 83 per cent of the total value of global FDI inflows (UNCTAD, 2000).

Unfortunately, the cross-border M&A phenomenon receives only very brief mentioning in two of the chapters. Within the eclectic paradigm, Dunning wants to treat M&As as a manifestation of the broader trend towards greater use of cooperative alliances; however, this would not seem appropriate for corporate takeovers. Indeed, there would seem to be a major role for stock markets in the cross-border M&A boom. Evidence suggests that domestic stock market attributes such as liquidity and regulatory governance can influence inward and outward FDI through the corporate takeover process.[2] While both domestic and cross-border M&A activity has fallen off substantially with the decline in the stock markets of the developed countries, it might be anticipated to increase in prominence again once equity markets stabilize. With corporate governance at the top of the regulatory policy agenda in the United States and, to a lesser extent elsewhere, the linkage between FDI flows and equity markets is of great current relevance whether or not it can be readily incorporated into the eclectic paradigm.

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[2] Several relevant studies are reviewed in Globerman (2002).

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Global Capitalism, FDI and Competitiveness: The Selected Essays of John H. Dunning, Volume II

John H. Dunning
(Cheltenham and Northampton, MA: Edward Elgar, 2002),
xi+458 pages

John H. Dunning's first major publication predates the first documented use of the term "multinational corporation" by David Lilienthal at a conference at the Carnegie Institute of Technology in 1960. *American Investment in British Manufacturing Industry* (1958) was the beginning of a 44 year torrent of books and articles dealing with foreign direct investment (FDI), the transnational corporation (TNC) and, more recently, globalization and alliance capitalism. His eclectic paradigm, expressed in terms of the OLI advantages, is one of the major foundation stones of the theory of FDI; Dunning, who is as productive as ever, is one of the scholars who have stood in the forefront of the International Business disciple for most of the post-War era. He has been influential in the world of policy as well, serving as Senior Economic Advisor to UNCTAD's Division on Investment, Technology and Enterprise Development.

The book reviewed here is the second of a two-volume set of Dunning's selected essays. The first, *Theories and Paradigms of International Business Activity*, deals with the area of scholarship for which he is best known. The second volume covers a broader range of topics including the emergence of a global world economy, the economic, political and social implications of globalization, factors affecting firm and country competitiveness, the spatial organization of economic activity and economic regions, and the role and economic responsibilities of government. With one exception, the 15 chapters were originally published between 1988 and 2001.

As would be expected of one whose academic life has been devoted to a phenomenon arising from market imperfections and transaction costs, Dunning is not a narrow or doctrinaire economist.

These essays deal with political, social and historical, as well as economic, issues and the vast range of literature referenced and discussed includes Karl Marx as well as Adam Smith, and Émile Durkheim as well as David Ricardo.

Given both the eclectic nature of the collection and the familiarity of most readers with Dunning's work, I see little point in commenting in detail on the contents. Rather, I would much prefer to pursue two ideas that wend their way through the entire warp of the book: the role of government in a market economy and alliance capitalism.

Writing about economic development in the mid-1990s, Dunning observes that "most governments are acclaiming FDI as 'good news', after a period of being highly critical, if not downright hostile…" (p. 223). He accounts for this "change of heart" (in large part) by renewed faith in the workings of the market economy, the increasing globalization of economic activity and the internationalization of production, and the increased importance of "created assets" (p. 224) (e.g. technology, intellectual capital, organizational competence), which are both mobile across borders and likely to be housed in TNCs.

During the 1990s, there was a wide-spread dismantling of laws and regulations limiting inflows of FDI; between 1991 and 1998, 94 per cent of changes in regulations affecting FDI were positive in the sense that they encouraged increased flows (UNCTAD, 1999). The deregulation of FDI was part of a more general post-Cold-War liberalizing trend, which included privatization, as well as the removal of controls on cross-border flows of capital. This was considered in some quarters to be the "end of history" and the triumph of free-market capitalism.

No triumphalist he. In his Raúl Prebisch lecture (one of the most interesting chapters in the book), Dunning makes his views on "Globalization, Restructuring and Development" clear: "it would be wrong to conclude that the renaissance of the market system should reduce the role of government to a minimalist one. It is yet another paradox of globalization and alliance capitalism that, to ensure its efficient functioning, there needs to be closer cooperation between

the public and private sectors" (p. 99). He goes on to note that to fulfil their social function, techno-economic systems require a macro-organizational framework which "only governments, as custodians of the interests of their citizens" can provide (p. 101). Or put a bit differently in a later chapter: "It is one thing to argue that …market forces should play a more decisive role as a mechanism for resource allocation. It is, however, quite another to argue that, by themselves, such forces are sufficient to ensure the efficient organization of the economic system of which they are a part" (p. 377).

This theme pervades the book. It is an institutionalist perspective, under which the government provides the legal and institutional framework "within which the resources and capabilities in its jurisdiction are created and deployed" (p. 374). It follows the contours of Douglas North's and Robert P. Thomas' (1973) argument that, given transaction costs, efficient economic organization requires institutional arrangements and property rights that channel individual economic efforts into activities that result in a convergence between the private and social rates of return. (North is cited in the chapter on governments and economic activity.)

Dunning argues that globalization is increasing the need for internal and external market governance, that the increased breath and depth of cross-border transactions and the nature of markets for knowledge and finance, for example, have increased transaction costs. Thus, it is even more important for global capitalism to be embedded in an externally supplied institutional framework than it is for independent national capitalist systems. In the context of contemporary (global) capitalism, "the market should not be regarded as the sole determinant of how scarce resources are utilized, but rather as an institution embedded in a web of related institutions, which taken as a whole, characterize a society" (p. 33).

And therein lies the rub. In the modern or post-Westphalian international political system, it is the geographically bounded sovereign State that functions as the "physical container of society", the space in which social solidarity is nurtured, constitutional forms of government emerge and the framework of the rule of law develops (Agnew, 1994; McGrew, 1997).

In *The Great Transformation* (1944), Karl Polanyi argues that the self-regulating market is corrosive and not sustainable over time, that it and all markets must be subject to the control of a wider social order. Since the modern political-economic system emerged from the ruins of feudalism, wider social order has meant the territorial State: the market, society and the polity all existing within its borders. Discussion about embedding the market in broader social institutions has always assumed a geographic congruity between economics, politics and social relations.

The emergence of an integrated world economy invalidates that assumption; it results in a marked geographic incongruity between a global economy and the social and political institutions, which remain national. Without discounting the emergence of significant forms of cross-border social organization (international civil society, for example) or the importance of international economic institutions such as the World Trade Organization or the International Monetary Fund, it is not yet possible to envision a global society or global institutions in which to embed a global world economy. For the foreseeable future, we are stuck with a world of governance without government.

Dunning acknowledges the problem. He notes that, while the arena of "market based modalities" has widened, the "domain of national governments has remained unchanged" (p. 405), and goes on to argue that this emerging dichotomy between the boundaries of economic and political jurisdiction necessitate a reappraisal of the institutional framework of national economic systems. However, other than a suggestion that countries, like firms, might have to engage in alliances, the matter is not really pursued.

This emerging asymmetry between the scope and domain of the sovereign State and that of the world economy is one of the more serious problems of our time. It is representative of a wider class of issues such as the environment, drugs, the AIDS crisis and financial instability, which are inherently global in nature, but where coordinated international solutions are difficult to achieve in a world order comprised of fragmented territorial States. Unless one believes that the genie can be put back in the bottle, that economic integration

can be reversed and national autonomy and independence restored, we face a need for politics to catch up with global markets (Habermas, 2001).

One hopes that in the future Dunning will pursue this question in greater depth. There is a large and growing literature in International Politics dealing with international regimes, international institutions and global governance that might provide fertile ground for further efforts in this regard.

A second theme running through the essays in this book is that of alliance capitalism. While the concept is a very useful descriptive summary of much of what is going on in the current phase of globalization of the world economy, I am afraid that it does not provide all of the analytical traction that one might like; it tends to synthesize rather than explain.

Dunning brings a very wide range of literature and concepts to bear on this issue. He argues that the emerging world economy is characterized by three features (p. 148). The first, which is another theme that pervades the book, is that intellectual capital and other created assets are now the critical wealth creating assets in most industrial economies. As noted above, these created assets are both mobile internationally and likely to be found within the TNC. Second, the combination of technological advances in transportation and communications and the lowering of barriers to trade and investment have resulted in the globalization of economic activity. Last, and relevant here, is the emergence of alliance capitalism whose distinctive feature is the "growing extent to which, in order to achieve their respective objectives, the main stakeholders in the wealth-seeking process need to collaborate more actively and purposefully with each other" (p. 149).

Dunning later notes that cooperation – between firms and their suppliers, between various departments of a firm, between labour and management, and between the public and private sectors – is now a critical component of economic success: "(H)ence the term alliance capitalism has been coined to reflect the kind of socio-institutional structure now emerging in market-based economies" (p. 378).

He believes that a new form of economic organization is emerging as the successor to hierarchically structured mass production: its essence is captured in "the techno-economic concept of flexible and innovation-led production, and the socio-economic concept of alliance capitalism" (p. 82). The latter is motivated by the ever escalating costs of research and development and ever-shortening product-life cycles which puts pressure on firms to combine with other firms to fully exploit their core competencies.

It is difficult to establish exactly what kind of socio-institutional structure Dunning envisions emerging. It entails, to a greater or lesser degree, more cooperative arrangements and inter-firm alliances, a marked increase in the breath and depth of cross-border structural integration, the increased importance of internationally mobile created assets and network-related flexible productions systems. In a number of places, Dunning uses the term of post-Fordism, which is generally taken to imply replacement of vertically integrated and hierarchical systems of production with flatter, more flexible and more innovative networks.

This newly emerging form of economic organization is seen as "changing the face of capitalism" (p. 87). Dunning argues that, at least in the Triad countries, "bureaucratic and authoritarian regimes of hierarchical governance are being replaced…by less adversarial relationships between the various participants in the wealth creating process". This new governance of production relies increasingly on trust, forbearance and consensus: "The distinctive feature of alliance capitalism is that its success depends upon the harmonious interaction of the wealth-creating constituents in society. Cooperation and competition go side by side; they are the opposite sides of the coin of economic progress" (p. 105).

Well, it would be nice if someone reminded Bill Gates of that. While there is no question that the dramatic increase in alliances, both within supply chains and in the development of technology, has increased the importance of trust and cooperation in the wealth-creating process, I feel that Dunning has taken his argument a bit beyond the evidence at this point. He seems to generalize from the theoretical requisites of a successful cooperative alliance to the characteristics of an emerging system of production.

He also argues that alliance capitalism is reconfiguring the location of production, although he believes that the exact balance between centralization and decentralization depends on the specific nature of the alliances that are formed. It is to be noted here that Dunning is an economist who takes economic geography seriously and has read widely in that literature. One of the strengths of this book is its emphasis – in a number of contexts – on the spatial implications of changes in the nature of FDI and of globalization. He brings a wide range of literature to bear on that topic to good effect.

Thus, alliance capitalism affects the locational decisions of firms (the L in the OLI paradigm) in a number of ways. First, the cross-border mobility of created assets widens the locational options of firms. (It also implies that there is greater scope for governments to influence these locational decisions by providing appropriate complementary assets.) Second, the increasing tendency of firms to engage in networks and the tendency towards geographic agglomerations or industrial clusters is requiring "a reappraisal of the appropriate or optimum spatial unite of organizational governance" (p. 186). Dunning believes that both a realignment of the geography of business units (individually and in networks) and the jurisdiction of governments is occurring; that sub-national units and cross-border regions are becoming more important at the expense of the territorial State; and that there will be a greater plurality of governmental forms.

Where does that leave us? As Dunning himself notes, the world economy was very international at the end of the 19th century; others have called that era the Golden Age of international economic integration. What is different this time around? In what sense is alliance capitalism a transformative concept representing the emergence of a new form of capitalist organization? What is the causal mechanism that will force the restructuring of political and economic structures, institutions and modes of governance?

Dunning offers a number of suggestions. The increased importance of technology, innovation, and other created assets and the fact of their international mobility certainly affects both economic organization and governance institutions significantly. So does the marked increase in alliances and other inter-firm cooperative arrangements and the internationalization of production.

I believe, however, that one has to push further if the concept of alliance capitalism is to have analytical traction, if it is to explain rather than describe the emergent and very significant changes in economic organization and economic governance. The deep-seated cross-border structural integration we are now experiencing is certainly part of it. But the basic change, which affects politics and the social order as well as economics, is a change in the mode of organization: a change from hierarchy to networks.

While Dunning certainly deals with networks in many of the essays in this book, and he mentions the increased importance of international civil society, he does not examine systematically the implications of networked forms of organization, what Manuel Castells (2000) calls the basic material infrastructure of this emerging mode of organization. Networks, whether in the form of complex inter-firm alliances, international social action groups or the anti-globalization protest movement, are transforming social, political and economic organization. Furthermore, most international networks are creatures of the digital age; they exist because electronic integration and the Internet render geography and space irrelevant.

Networks are relational forms of organization; it is the pattern and density of relationships that are important rather than the characteristics of the nodes. They are amorphous, lacking both a centre and borders. They do violence to both the idea of the firm as an entity with a clearly defined centre and discrete borders and to international politics as a system of mutually exclusive territorial jurisdiction. Electronic networks allow Nike to function as a virtual firm subcontracting all production to a relatively large numbers of facilities throughout Asia and the anti-globalization movement to maintain some degree of organization and coherence among a very large number of intellectually and geographically disparate groups.

The two themes running through these essays – the role of government in a market economy and alliance capitalism – are difficult to separate. Dunning is right on the mark when he argues that characteristics of alliance capitalism such as cooperation, trust and consensus apply to governments as well as firms. Polanyi's argument was not simply that a self-regulating market is impossible, but that it

was the reaction to the breakdown of the social order resulting from attempts at cutting the economy free that led to the fascism and communism of the mid-twentieth century.

The economy must be embedded in a wide social order, in an institutional framework. Establishing that social order or framework for a global world economy, for Dunning's alliance capitalism, will require an unprecedented degree of cooperation, trust and consensus building among international political orders. At this point, that includes TNCs and non-governmental organizations, as well as the States.

Global Capitalism and Competitiveness is not a book that will be read from cover to cover by many readers. Given John Dunning's breath of vision, familiarity with a very wide range of ideas and literature and concern with many of the most pressing problems of our day, I believe that virtually everyone will find stimulation in many of these essays.

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Dragon Multinational: A New Model for Global Growth

John A. Mathews
(Oxford and New York: Oxford University Press 2002), xiv+258 pages

This book is clearly a masterpiece on transnational corporations (TNCs) from developing economies and will remain so for many years to come. In the past, studies of this group of TNCs often emanated from the so-called "Third World multinationals" literature that viewed these "unconventional" TNCs from the perspective of established large corporations from advanced industrialized economies. What distinguish this book from that literature are its novel argumentation, as well as its original insight that seeks to explain the emergence of these TNCs from developing economies in their own right. Many of the book's ideas are refreshing for anyone interested in global business research. Through his carefully articulated and often highly critical theoretical perspective, the author has produced an excellent treatise on TNCs in general and globalizing firms from Asian newly industrializing economies in particular.

The book starts by questioning the conventional wisdom in the strategy-structure analysis in international business studies. The author argues that the rise of "dragon multinationals" (TNCs from the Asian newly industrializing economies) cannot be traced to "conventional sources of success, such as product or process innovation, but instead to innovations in strategy and organization" (p. 9). Through their novel strategies and organizational adaptations to the new global economy, these dragon multinationals are able to leverage external resources and competitive advantages embedded in global networks. They are not constrained by path dependencies that shape so much the growth trajectories of existing giant corporations.

After contrasting these novel arguments with theoretical perspectives in international business studies, part I of the book proceeds to paint a broad picture of what the author calls the "new

zoology" of the global economy. Here, newcomers and latecomers to the global economy – rapidly globalizing firms from Asia (and elsewhere) – are introduced. The specific case of Acer Group from Taiwan Province of China is then described in detail as a showcase how a selected sample of Asian firms just did it – internationalizing and succeeding rapidly in the new global economy.

Part II of the book focuses on the characteristics of these new global latecomers. The author first meticulously describes the incremental expansion of dragon multinationals that culminates in their extensive global spread within a short period of time. He then contends that this successful expansion could not be achieved without two significant innovations: strategic innovation and organization innovation. On strategic innovation, he notes that dragon multinationals did not start with capitalizing on their internal resources and advantages – a process of transnationalization commonly found among today's large corporations. Rather, these dragon multinationals tapped into external resources and network advantages through engaging and managing linkages, leverage and learning with other firms in innovative ways. This strategic innovation, however, does not mean that dragon multinationals did nothing internally to achieve this leapfrogging in their internationalization processes. Internally, dragon multinationals constantly (re)organized to adapt to new challenges arising from their rapid globalization. In particular, the book identifies "cellular clusters" – a kind of differentiated networks among strategic units of dragon multinationals – as a key organizational innovation underscoring the success of these firms. In fact, the book goes so far to argue that dragon multinationals are truly global corporations because of their adoption of these cellular clusters in organizing their global activities.

In the final, third part of the book, the author revisits theoretical perspectives in international business studies. He finds inadequacy in most leading theories of TNC growth and expansion. He offers a process-oriented account of dragon multinationals' transnationalization in which three key elements are emphasized: outward orientation, leverage through building linkages and achieving organizational efficiency through integration. The book ends with a critical evaluation of our conventional wisdom of globalization as an

unstoppable gale force orchestrated by large global corporations to wipe out all national differences. In his usual reflexive manner, Mathews shows how dragon multinationals are indeed key players in globalization precisely because they are global in their outlook and strategic organization.

I particularly like the book for three reasons. First, it offers a non-essentialist reading of globalization. To the author, globalization allows for "other futures, other pressures, other designs, that are generated not at the center but from the periphery" (p. 7); it is "an open-ended process, creating multiple outcomes rather than the single, convergent global system" (p. 11); and it creates "opportunities for the newcomers and latecomers, and these players in turn are now helping to shape the global trends that will create yet more opportunities in the future" (p. 223). This measured view of globalization certainly represents an important correction to the ultra-globalist view of the single global economy on the one hand and the pessimist's resistance to the alleged evil spirits of global forces.

Second, Mathews does not take for granted existing theories in international business studies. What is so wonderful about this book is that it confronts and interrogates these theories from the perspective of the transnationalization of dragon multinationals. This comparative evaluation of leading theories shows vividly their embeddedness in particular historical moments (e.g. the Uppsala School of incremental internationalization process and the Harvard product life-cycle model) and geographical contexts (e.g. the Reading School of the eclectic framework and the internalization theory of TNCs). Through these critical engagements, Mathews makes an explicit commitment to the "resource-based view" of the firm that has risen to prominence in the strategic management literature during the 1990s. Even so, he does not stop short of offering new theoretical insights for the resource-based view literature. Grounded in his case studies of dragon multinationals, Mathews argues that the resource-based view of TNCs must be revised to take in account strategic targeting of external resources for leverage by these latecomers to the global economy. In this way, the book significantly advances our understanding of the strategic accumulation of resources – internal or external – by dragon multinationals. This revised resource-based

view should be highly useful for future research into the globalization of TNCs from any economy.

Third, the book offers very detailed and sometimes repetitive case studies, albeit largely limited to the Acer Group from Taiwan Province of China and the Li & Fung Group from Hong Kong, China. Acknowledging the small sample of dragon multinationals, Mathews notes that "a reasonable case can be made that they capture many of the most striking and original features of the new "species" of firm in the changing "zoology" of the international economy" (p. 179). This reflexive mode of reasoning and case-study approach is much worthy of praise, particularly because the mainstream literature in international business studies and strategic management tends to be oriented towards "number crunching" in their self-fulfilling prophecy for scientific rigour and predictability. I wish more future management studies would follow the spirit of this exemplary work. That indeed might be one of the most desirable unintended outcomes of this *tour de force*. I do not hesitate, even for a second, to recommend this lucid and easy-to-read book to all students and practitioners of international business, strategic management, global political economy, and development studies.

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Managing the Global Supply Chain

Philip B. Schary and Tage Skjøtt–Larsen
(Copenhagen: Copenhagen Business School Press, 2001),
second edition, revised, 542 pages

Both practitioners and academics experience the supply-chain revolution. Globalization and the rise of information and communication technologies are constantly changing the sources of competitiveness. While adapting to these changes in the operational environment, new forms of business models appear that question the underlying assumptions about how business is operating. These assumptions affect the strategic "make or buy" decision and the operational unit of management actions, as well as inter-organizational structures. Instead of vertical integration, companies try to focus on core competencies and outsource complementary operations. The previous management focus on distinct activities is followed by another one stressing the management of the whole value-creating process. Concentrating on core competencies and the process view of operations directly lead to the need for new inter-organizational forms: classic market relations and organizational hierarchy are complemented by intensive interfirm coordination, leading to the birth of a supra-organizational unit, the supply chain.

The appearance of this supra-organizational unit – and the need to manage it successfully – is accompanied by an explosion of new business models and theoretical concepts. Cross-docking, modular product design, agile manufacturing, fourth-party logistics providers, lateral organizations, quick response, decoupling points, efficient customer response, demand management, e-commerce, and so forth, are current buzzwords in the literature. These themes embrace a number of strategic and operational aspects of business operations and challenge a wide range of management fields, from organizational theory, through manufacturing and logistics, to strategic management.

The uniqueness of the book by Philip B. Schary and Tage Skjøtt-Larsen lies in its multidisciplinary nature, reflecting the most

recent evolution in international business research. In order to treat the problems stemming from this multidisciplinary approach effectively, a comprehensive structure has to be developed. This comprehensive structure is one of the strengths of the book.

The structure of the book looks like follows:

In the first (conceptual) part of the book, new concepts resulting from the development of the supply chain as an organization on its own are presented. The authors also describe the internal structure of the supply chain, which helps to understand its operations and dynamics. This inside structure involves:

- activities as special building blocks of the value stream;
- organizations as owners and leaders of specific activities; and
- processes as a value creating sequence of activities.

The main problem of the supply chain is how to build up effective value-creating processes by reengineering the traditional ones (create a new system of activities) and by shifting activities or sub-processes flexibly between organizations (create a new structure of activity deployment). The effective design of value-creating processes is indeed the core question of the second part of the book, while the management consequences of the activity deployment is the basic topic of the third part.

Following the classification of Michael E. McGrath and Richard W. Hoole (1992), the authors define five operating processes that describe best the supply chain. These processes, which determine the structure of their discussion, are areas as follows:

- *product:* product design determines the production process and the logistics requirements;
- *production:* production and related processes add value to the product-flow and influence inventory, transport and time for delivery;

- *procurement:* procurement or purchasing links stages of manufacturing together; it becomes "the manager of outside production";
- *distribution:* this provides the link between production and the market; and
- *demand management:* this includes several activities related to market: forecasting, customer-order processing, market coordination and sales support activities.

Later on, in the second part of the book, the authors restrict the scope of their discussion to distribution, production and procurement. Although some relevant questions and techniques of the product design and demand management processes are presented in other parts of the book, it would have been more reasonable to discuss them in accordance with the previous classification.

On the other hand, the above-mentioned classification of processes is complemented, in chapter 7, by a separate analysis of transport and logistics services in Europe.

While describing and analyzing processes taking place in the supply chain, the authors do not strive for completeness but rather for collecting and presenting new developments in the field. Besides the multidisciplinary nature, another important value of the book is the structured approach and discussion of these latest developments in supply chain management and its complementary fields.

The third (conceptual) part of the book is devoted to defining management problems related to the supply chain and presenting techniques developed for handling these problems. Among management problems, three areas are emphasized in the book:

- organizational challenges and solution techniques;
- performance measurement of the supply chain; and
- information systems supporting both decision making and operation.

At the end of that part, the strategy of supply chain management is considered. Strategic considerations include sources

of competitive edge, the questions of how to determine strategic directions, how to separate core competencies, and the classic elements of corporate strategy-formulation. The closing chapters of the book point out several actual problems in the development of strategic management such as the web-based supply chain, resource-based strategies and organizational learning.

Concerning strategy, the book should have addressed one more basic question, i.e. how the demand characteristics of the product supplied by the chain influence strategy formulation (Fisher, 1997). Characteristics of demand set priorities for supply-chain strategy and lead to different focuses in both the design and the management of operational processes.

A very valuable part of the book is the appendix presenting case studies. Successful supply-chain management is illustrated through the case of Bung & Olufsen, an internationally known producer of audio and television equipment; Cisco Systems, one of the most highly considered information-technology company; Coloplast, a Danish company supplying surgical products; and finally the approach of Dell Computer.

This is the second edition of a book first published in 1995 (Schary and Skjøtt-Larsen, 1995). During the six years that elapsed between the two publications, the authors significantly widened and restructured the content of the book. Therefore I can recommend the new edition of the book not only for those international business scholars and practitioners to whom it is new, but also for those, who have already read the first edition.

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La séduction des nations ou comment attirer les investissements

Charles-Albert Michalet
(Paris: Economica, 1999), 134 pages

In this book, Charles-Albert Michalet examines the notion of "attractiveness for foreign direct investment (FDI)" in a globalized world economy. His basic question is how globalization has changed the way in which investors assess the advantages of a potential FDI location. He also discusses the role of the State in promoting inward FDI and its actual margin of manoeuvre in that respect. Rather than providing specific recipes for success (if such things do exist), he discusses how FDI promotion should be conceived, overall, in that globalized economy. He first analyzes different modes of globalization; then examines corporate investment strategies, competition for FDI and key elements of attractiveness. The last chapters discuss the diminishing role – if not the end – of the nation State, and the emergence of new economic spaces.

The author starts out his book with what is, in his view, a non-issue ("*une fausse controverse*") i.e. whether or not globalization is a new phenomenon. The debate becomes meaningless as soon as one admits the global nature of capitalism. Referring to authors ranging from Adam Smith and David Ricardo to Karl Marx and Vladimir I. Lenin, Michalet stresses the inherent tendency of capitalism to extend beyond national borders and spread worldwide. It is hence not surprising to find a number of characteristics common both to the capitalism of the nineteenth century and that of the 1990s. But the mode (or type) of globalization has varied over time. Indeed, globalization is a multi-dimensional phenomenon, encompassing the mobility of goods and services, as well as that of productive activities, capital, labour and technology. Depending on the period or region concerned, some of these dimensions are more important than others. For instance, goods and capital are more mobile than labour. The author recognizes the somewhat simplified nature of this presentation, but its value lies in that it helps to characterize the present state of the world economy, and its continuous process of transformation.

Based on the three main dimensions of globalization (mobility of goods and services, FDI flows, and other capital flows), and the extent to which any of these dominates over the others in different periods, Michalet establishes a typology of the various phases of globalization. First came the phase of the *inter-national economy* (basically from the sixteenth century to the early 1960s), when trade in goods and service dominated international economic relations, and financial flows were mainly determined by "real transactions". In that phase, while liberalism was strongly advocated by many economists, the role of the State in international economic relations was overwhelming (for instance, enterprises exporting or investing abroad did so under the umbrellas of political alliances or within colonial empires). The picture changed at the beginning of the 1960s, with the advent of the *multi-national economy*, characterized by the widespread expansion of FDI and the increasing mobility of firms' productive activities. The main difference between those two phases lies in the development of transnational corporations (TNCs), their new modes of operations, and their powerful role in the transformation of the world economy. The third phase, the *global economy*, starts at the beginning of the 1980s. It is characterized by the predominance of financial aspects. While it is true that, during that period, international trade in goods and services has continued to increase rapidly and FDI has risen substantially, the fastest growing and most profitable element has been a financial one. The financial rationale now extends beyond finance *per se*, encompassing more and more economic areas. Financial concepts and practices pervade the strategies and organizational modes of enterprises. In such an environment, managers tend to develop new approaches to deal with their various sectors of activity, considering them more as a portfolio of assets that can be disposed of, in line with their firm's overall profitability objective. Reacting quickly to events, mobility, and maximization of short-term profitability become important management criteria in the real economy. In this latest phase of globalization, firms engage in fierce competition. At the same time, the role of the nation State is diminishing; what tends to emerge is a new configuration consisting of supra- or sub-national territories.

In the second chapter of the book, the author addresses the strategies of firms in a globalized economy. A better understanding

of such strategies helps countries to design a successful FDI promotion policy, and know what is worth doing and what not to expect. The author notes that nowadays the most common strategy pursued by TNCs is a horizontal or market-seeking strategy (where firms invest abroad mainly to produce for the host country market or a broader regional market), in contrast to a vertical or cost-minimization strategy (where firms take advantage of differentials in factor endowments). Increasingly however firms with a global development strategy combine both horizontal and vertical approaches and these should be seen as complements rather than alternatives.

One of the interesting points of this chapter is the discussion of the "trade-off" theory, based on the outcome of a 1997 survey of the Foreign Investment Advisory Service (FIAS), a joint service of IFC and the World Bank, on how firms select their FDI locations. That hypothesis assumes that firms make trade-offs between countries when selecting FDI locations. If such a trade-off hypothesis is confirmed, FDI would flow, for instance, to countries in Central and Eastern Europe, diverted from developing Mediterranean countries. This was a widely shared opinion in the mid-1990s following the opening of the Central and Eastern European economies. The survey did not support that hypothesis. On the contrary, Michalet stresses, firms' selection proceeds on the basis of specific country groupings: such groupings are based on countries' level of attractiveness, and firms establish a short list of the most attractive locations. Interestingly, the composition of the short list was virtually the same for all enterprises in the survey.

In Michalet's view, there are basically four country groupings:

1. The first group includes the Triad (North America, Western Europe and Japan), the prime regions both in terms of FDI inflows and outflows.
2. The second group includes countries of the "new frontier", mainly host countries with very high power of attraction (after the Triad); this constitutes the short list that developing countries and economies in transition should be aiming to join.

3. The third group includes "potential host economies", which are good candidates for the short list but require some improvements in their business or overall economic environment.
4. The last group includes countries of the "periphery": their attractiveness, based mainly on one specific element (be it cheap labour, natural resource, etc), is of interest to a specific and usually limited group of corporations.

Competition takes places between countries of the same grouping: there is no trade-off between a country that is part of the short list and one that is not, for instance.

Of course, the author recognizes the limitations inherent to the survey, as to any such exercise. Besides, borderlines between groupings are somehow blurred; one could argue, for example, that a few advanced countries in developing Asia can be considered as serious competitors for some of the Triad members. In any case, an interesting fact remains: firms' perceptions of potential locations are based on a hierarchical approach by which countries outside the short list or core group are not even considered.

What matters for governments in developing countries and economies in transition is hence to make it onto the "most attractive countries" short list. A number of conditions need to be fulfilled for this to happen. Some of them are absolute prerequisites; they are mainly related to the level of uncertainty that foreign investors are willing to accept as well as to the associated transaction costs. They include political and economic stability, the latter including in particular macro-economic components such as sustainable growth rates, fiscal and balance-of-payments equilibrium, inflation rate and external debt. They also include a number of conditions pertaining to the investment climate of the potential candidate, such as exchange-rate and capital-flow regimes, tax systems, customs, labour laws, private-sector policies, administrative procedures and red tape, individual security issues and everyday life environment. Particularly important are the state of the legal and regulatory systems and their levels of efficiency and transparency. Once these are secured, a series of complementary conditions for inclusion in the "short list" also apply. These relate to:

- the size and growth potential of market of the potential candidate;
- the state of its communication and telecommunication infrastructures;
- the level of qualification of its labour force, an increasingly important factor; and finally
- the existence of a significant and efficient local network of enterprises, a parameter that the author stresses as particularly crucial.

However, all of the conditions mentioned above have to be fulfilled simultaneously, Michalet stresses. This raises a number of questions. First: is that realistic? As he recognizes, this is not possible for a number of countries. In addition, it can lead to a tautology: how can attracting FDI be a viable and efficient development strategy since attractiveness presupposes that a number of specific conditions are met, implying that a certain level of development has already been achieved? This argument is frequently made to challenge opinions overestimating the true contribution of TNCs to development. Michalet recognizes that there is some truth in it, but regards this view as too static. Following a dynamic approach, he argues in particular that, while it is true that firms initially invest in a country because of its existing attractive conditions and level of development, their investments lead in turn to an increase in the competitiveness of the host territory.

The "real" competition takes place among members of the short list. This is where a proper "marketing" policy comes into play: it can make a difference between candidates within the same group and help them successfully attract FDI. The author devotes some time to the description of an efficient marketing policy. While not providing detailed recipes, he stresses a number of principles, which are worth reminding. One of them, quite obvious but not necessarily applied, is that there is no point in spending resources on a marketing policy if the prerequisites and the necessary conditions are not fulfilled. It can even be counterproductive to market an image that does not correspond to reality: investors can not be fooled for long and the price in terms of credibility lost can be very high. The author

then touches upon the four main elements of a marketing policy, i.e. image building, investor servicing (pre- and post-investment), investor targeting and financial incentives. On the latter point, interestingly, the author concludes that incentives may influence the location decision in the case of countries pertaining to the "attractive countries" short list; they will however not influence firms' decision as regards the composition of the short list itself. In other words, financial incentives cannot compensate for a missing necessary condition, a conclusion that is in line with a number of studies on the usefulness of incentives for investment promotion. Besides, "serious investors" decide independently of financial incentives. The sums spent on incentives could be used more efficiently, Michalet argues, to improve infrastructure networks, for instance, or even raise civil servants' salaries!

The last chapter of the book concludes with a discussion of the emergence of new economic spaces or territories, whose borders are not determined any longer by political or historical developments but rather by a new economic rationale resulting from globalization. Michalet examines the impact of this new configuration on corporate strategies and on FDI promotion. In that respect, he highlights the advantages of industrial districts, or clusters of industries, a notion developed by Alfred Marshall at the beginning of the twentieth century. In such districts – or clusters – firms take advantages of the externalities arising from geographic proximity and develop a network of tight economic relations. This generates a specific industrial atmosphere (or business climate) that can be particularly attractive to firms with a global development strategy. At the same time, because of the tight relations they develop with partners, they become more closely associated with the territory and their investment becomes much less mobile.

The last part of the book also provides an interesting discussion on the diminishing role of the State in the new economic environment, from an interventionist role in a Keynesian perspective to that of a mere facilitator, responsible for law and order and the maintenance of an attractive business environment, in a liberal framework.

Overall, the dynamic perspective and broad angle adopted by the author in examining FDI promotion leads him to cover a wide range of issues. This book is more a conceptual analysis of countries' attractiveness (*La séduction des nations*) than a detailed prescription list for investment promotion policies one could expects, given its subtitle (*Comment attirer les investissements*). Its combination of theoretical references and concrete examples, historical analysis and discussions of key contemporary issues, and its forward-looking perspective make it a very interesting reading.

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JUST PUBLISHED

UNCTAD's Division on Investment, Technology and Enterprise Development: Activities Report 2001
(UNCTAD/ITE/Misc.57)

This is the second annual Activities Report of the UNCTAD's Division on Investment, Technology and Enterprise Development (DITE), which is the focal point, within the United Nations system, for matters related to foreign investment and technology. The Division is in charge of one of UNCTAD's three flagship publications – the *World Investment Report* series ? as well as the FDI/TNC and the bilateral-investment-treaty/double-taxation-treaty databases, the *Series on Issues in International Investment Agreements*, the *Investment Policy Reviews*, the *Investment Guides* for least developed countries, the *World Investment Directory* series, the *Transnational Corporations* journal and analytical studies on various subjects, including foreign portfolio investment and insurance. An advance version of this report can be downloaded from: http://www.unctad.org/en/docs//poitem57.en.pdf.

UNCTAD Series on Issues in International Investment Agreements
Dispute Settlement (Investor-State)
(Sales No. E.02.II….) ($15)

Investor-State dispute settlement is an area of investment practice that has prompted a broad range of legal issues and a substantial number of approaches to tackle them. In practice, this issue has more significance for the foreign investor than for the host State. When foreign investors enter a country, they usually seek from the host State either specified treatment standards, or guarantees on compensation for expropriation or the right to transfer capital, profits and income. These rights are often encapsulated in particular provisions in bilateral investment treaties, or in regional and multilateral instruments. It is evident, however, that treatment standards and guarantees are of limited significance unless they are subject to a

dispute-settlement system and ultimately, enforcement. Against that background, this study examines the main aspects of investor-State dispute settlement. States negotiating investor-State dispute settlement mechanisms have a number of options with respect to dispute-settlement provisions in international investment agreements, namely, no reference to dispute-settlement procedures; reference to dispute-settlement procedures granting exclusive jurisdiction to the courts and tribunals of the host State; reference to dispute-settlement procedures that offer parties a choice between national and international systems; and, exceptionally, compulsory recourse to international dispute settlement. As for procedural matters, this study considers them with a view to highlighting the main approaches that are available to host States and investors in the prevailing economic environment.

Dispute Settlement (State-State)
(Sales No. E.02.II….) ($15)

State-State investment disputes are rare, in that the bulk of disputes triggered from international investment agreements involve investors versus States. State-to-State disputes can arise either out of an exercise of diplomatic protection on the part of the home State of an investor, or as a result of a dispute over the interpretation or application of the agreement. State-State dispute settlement mechanisms can involve negotiations or consultations as a preliminary step; ad hoc inter-State arbitration; permanent arbitral or judicial arrangements for dispute settlement; and political or administrative institutions whose decisions are binding. State-State disputes also raise the issues of standards applicable for the settlement of such disputes, the nature and scope of outcomes of dispute settlement mechanisms, and compliance with settlement awards.

Investment Policy Review of Ghana
(UNCTAD/ITE/IPC/Misc.14)

Ghana is making a comeback in terms of attracting FDI. An African front-runner in the mid-1990s, Ghana slipped into economic crisis in 1998 and has only recently begun to recover. The immediate

challenge is to broaden and sustain that FDI recovery. The main plank of FDI strategy in the immediate future should be to encourage existing investors to expand and reinvest in Ghana's economy. New investments by existing foreign investors in mining, agribusiness, telecommunications and financial services will contribute to the recovery of employment, exports, foreign exchange receipts, tax revenues and economic growth. A "booster programme" is recommended to regenerate domestic and existing investor initiative. In order to sustain the recovery longer-term measures will also be required. Sustained FDI inflows in the future will require an investment environment that enhances the competitiveness of business and of the Ghanaian economy as a whole. This Investment Policy Review outlines Ghana's FDI potential and the strategic directions that are needed to tap it. With the right policies in place, FDI may be attracted in the longer term by a revamped privatization programme; infrastructure development through the private sector; a reinvigorated Gateway strategy to remove supply constraints to export-oriented manufacturing for markets in Europe, the United States and the rest of Africa. One of the main conclusions and recommendations of this Investment Policy Review is that the agenda should be shaped through dialogue with all stakeholders and implemented by the Government in close partnership with the private sector. The full *Investment Policy Review of Ghana* can also be downloaded from: http://r0.unctad.org/ipr/ghana.pdf.

FDI in ACP Economies: Recent Trends and Developments
(UNCTAD/ITE/IIA/Misc.2)

This report, prepared for the Third Summit of ACP Heads of State and Government, held in Fiji, on 18-19 July 2002, analyses the trends in FDI and its development impact in the 78 African, Caribbean and Pacific (ACP) economies. FDI indeed can play an important role in economic growth and development, as it can bring not only much needed additional capital but also access to technology and know-how, as well as access to international markets. These assets are important for economic growth and development and for better integrating the ACP economies into the global economy. A number of those economies recognize this. While FDI flows to ACP countries generally are small in absolute terms, they can nonetheless constitute

a significant proportion of the overall capital formation in these economies. Indeed, these economies offer opportunities for FDI. While official development assistance (ODA) remains the most important source of external resources, it is declining. Although FDI cannot be a substitute for ODA, it is an important source of capital formation. But to realize the full potential for more FDI inflows into these economies, more efforts by the countries themselves to become more attractive are required, as well as by the international community to provide assistance. A limited number of copies of this report is available free of charge.

Transfer of Technology for Successful Integration into the Global Economy:
A case study of the South African automotive industry
(UNCTAD/ITE/IPC/Misc. 21)

This publication reviews the development of the automotive industry in South Africa, from a highly protected, inward-focused industry to one with a marked export orientation, able to compete effectively in global markets. The Motor Industry Development Programme, which reversed the import-substitution programmes that had shaped the industry from the early 1960s, played a significant role in this turnaround. Institutional support also contributed significantly to innovation and technological development to meet the high technical standards necessary to compete in international markets. The extensive foreign ownership of both vehicle and component manufacturers facilitated the transfer of skills and organizational development and provided access to international markets. Chapter I discusses the factors that have shaped the formation of technological capability in the South African automotive industry, including the importance of FDI and the aspects that attracted foreign automotive producers during the 1990s. Chapter II examines the performance of the South African automotive industry, both qualitatively and quantitatively. Chapter III analyses the policies and institutions supporting the automotive industry in South Africa. Chapter IV contains company case studies of successful integration into the global markets. This publication can be downloaded from http://www.unctad.org/en/docs//iteipcmisc21_en.pdf.

Managing the Environment across Borders
(UNCTAD/ITE/IPC/Misc.12)

This booklet highlights the key research findings of a project undertaken between 1998 and 2000 on the environmental practices of more than 160 affiliates of European TNCs operating in China, India and Malaysia. On cross-border environmental management, the study highlights the main features of those policies, the different types of management systems, the issue of managing other entities through supply chain management and product stewardship, and the main determinants of individual environmental practices. The specific survey findings highlight such factors as the influence of headquarters, regulatory pressures and market forces through green consumerism. The booklet concludes with the detailed findings on individual countries. This publication can be downloaded from http://www.unctad.org/en/docs//iteipcmisc12_en.pdf.

Progress Report on Work undertaken within UNCTAD's work programme on international investment agreements between the 10th Conference of UNCTAD, Bangkok, February 2000 and July 2002
(UNCTAD/ITE/IIT/2002)

This Progress Report sums up the Trust Fund activities undertaken in such areas as policy analysis, regional symposia, international exchange of views, training courses and workshops, negotiation facilitation events, background seminars and investment institution technical assistance in the context of the post-Doha technical cooperation programme in the area of FDI. It also provides an update on progress with the publication of the UNCTAD Series on Issues in International Investment Agreements. This Report can be downloaded from: http://www.unctad.org/en/docs//poiteiit02.en.pdf.

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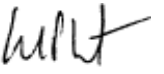

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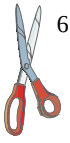

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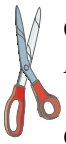

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