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Southeast Asian industrialisation and the changing global production system

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ABSTRACT *The diversion of foreign direct investment (FDI) flows into developing Asia, from Southeast Asia to China, has renewed doubts about whether Southeast Asia's traditional reliance on FDI has left the region without the local capabilities required to sustain the region's long-term competitiveness. Southeast Asia's industrialisation has involved deepening integration into international production networks, comprising internal exchanges between multinational corporations (MNCs) and their subsidiaries, affiliates and subcontractors. While indigenous industry has been secondary to Southeast Asian industrialisation, this paper highlights three elements of local technological accumulation and clustering within foreign-dominated export industries: production deepening, co-location of design, engineering and R&D with off-shore manufacturing, and the spatial clustering of MNCs in particular industry segments. Southeast Asian governments have responded to these trends by broadening investment promotion from manufacturing to business services and regional headquarters operations, by targeting incentives and infrastructure development to foster industrial clusters, and by invigorating technical support programmes for local small and medium-sized enterprises (SMEs) in supporting industries. Taken together, these trends suggest that Southeast Asia will remain an important site within multinationals' international production networks.*

The same historical forces that propelled Southeast Asia's development 'miracle' now cast a dark shadow across the region. The globalisation of manufacturing by multinational corporations (MNCs) transformed the region's resource-based economies into export dynamos in less than two decades. Post-crisis trends, however, appear to herald Southeast Asia's decline as a preferred site for global manufacturing. Recurrent slumps in global electronics markets, political instability and partial economic reforms in Southeast Asia, and China's emergence as the premier off-shore manufacturing platform have curtailed the flow of new foreign direct investment (FDI) into Singapore, Malaysia, Thailand, the Philippines and Indonesia. MNCs have trimmed their existing Southeast Asian operations by transferring out production lines or shutting down entire facilities. Is Southeast Asian industrialisation running out of steam? Has the Southeast

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Asia's FDI-reliant strategy led to a 'high-level dependency trap', leaving its economies without the capabilities required to chart a new development course as MNCs shift their attention to new and greener pastures?

Questions about the continued viability of Southeast Asia's industrial model are linked to important debates about the nature of Asia's regional political economy. Indeed, that model's distinctive characteristic is not FDI-reliance *per se*, but rather the region's embeddedness in a particular mode of the international division of labour, one that is *internalised* by MNC-orchestrated international production networks (IPNs). A burgeoning multidisciplinary literature analyses how IPNs have reshaped the geography of the global economic system and, in their regional form, integrated Asia's economies despite the absence of strong formal regional institutions (Doner, 1993; Lim, 1995; Ernst, 1994; Ravenhill, 1998; Borrus *et al*, 2000). During the boom era of the late 1980s and early 1990s these networks were often credited with fostering a coherent regional growth process based on complementary industrial specialisation, technology transfer and dynamic structural change across a multi-tiered Asian political economy. More recently, the 'flying geese' pattern of co-ordinated regional development has come apart in the face of Japan's languishing leadership and China's drive to overtake Asia's newly industrialised economies (NIEs).

Neoliberal commentary blames Southeast Asia's current travails on governments' failure to invest in the workforce skills and technology development needed to attract FDI into more advanced industries. Critical observers find confirmation of their earlier warnings that MNC-led industrialisation has resulted in a form of 'captive development' by thwarting opportunities for autonomous industrial development in the region's less advanced economies. Both critiques suggest that Southeast Asia's earlier industrial success was an artefact of external forces, chiefly MNCs' global strategies. Indigenous sources and dynamics of industrial change were weak at best, and host government industrial policies were lacking or ineffective. In this gloomy perspective Southeast Asia's boom failed to impart durable advantages or to localise capabilities for industrial change, and thus left the region vulnerable to marginalisation in post-crisis Asia's shifting international division of labour.

Drawing on an analysis of international production networks and local policy responses to them, this paper advances a somewhat more optimistic argument about the dynamics of Southeast Asian industrialisation in the rapidly changing global political economy. The architecture of global production is not, in fact, driven by an immutable economic logic of intensifying cost competition, but rather involves crucial strategic dimensions. Several boom-era foreign investment trends suggest that Southeast Asia's embeddedness in corporate IPNs has not, *per se*, precluded localised processes of technological upgrading. Nor were the region's governments entirely ineffective in harnessing the FDI boom to enhance local capabilities and locational advantages.

As multinationals reconfigure their production networks in post-crisis Asia, Southeast Asia's industrial prospects hinge on the interplay between these territorially specific processes of development and the structural forces animating MNCs' regional and global strategies. Two important features of the evolution of IPNs are the upgrading of technical capabilities within MNCs' Southeast Asian

affiliates and, in parallel, a pronounced pattern of co-location of particular production activities and industry segments in specific locations. Upgrading and clustering are largely expressions of MNCs' changing global production strategies in response to competitive pressures and technological advances. Yet host-country policies have also evolved to reinforce and encourage these trends. Following Singapore's aggressive lead, several Southeast Asian governments have moved to revamp their investment policy regimes with an eye towards upgrading their existing roles within MNCs' network structures. Such 'post-nationalist' industrial strategies, however, demand a broader and more sophisticated set of policy capabilities on the part of state actors than traditional industrial or FDI promotion policies. In this regard, Southeast Asian states' political and institutional weaknesses pose severe constraints on cluster-building strategies. These trends, uneven as they are, nonetheless seek to build upon Southeast Asia's first-mover advantages as a platform for global production, and thereby to anchor multinational activity against the tidal pull of competition from the expanding global roster of low-cost production sites. The likely outcome of the reconstruction of IPNs in Asia, then, is an even more fine-grained division of labour integrating Southeast Asia with China and East Asian countries of origin.

Southeast Asia's strategic conundrum—reconsidering FDI-led industrialisation

Early in his term in office Prime Minister Thaksin Shinawatra announced his intention to alter Thailand's FDI-based industrialisation policies, which he declared had made the Kingdom a 'slave to the world' (*Far Eastern Economic Review*, 19 April 2001). 'The system must be changed, because it puts Thailand at a disadvantage … We're ready to see lower export revenues as long as we increase the value of these exports domestically. From now on, when considering privileges for foreign manufacturers, we must also consider what we will get back in return' (*The Nation*, 29 March 2001). A year earlier, Malaysian Prime Minister Mahathir Mohamed had declaimed, 'we had thought of globalisation in terms of Foreign Direct Investment, of inflows of capital technology and market access. But our recent traumatic experience has shown that globalisation can also mean massive outflows of capital in order to impoverish and weaken us and to prepare us for foreign takeovers of our businesses, and possibly our countries too' (*New Straits Times*, 12 April 2000). Even Singapore publicly fretted that its hugely successful FDI-led growth policy had run out of steam. In his Year 2001 National Day address, Prime Minister Goh Chok Tong warned of the 'hollowing out of the Singapore economy as China opened up and MNCs rushed to invest there … Our biggest challenge is … to secure a niche for ourselves as China swamps the world with her high-quality but cheaper products … How does Singapore compete against 10 post-war Japans, all industrializing and exporting at the same time?' (*Asiaweek*, 31 August 2001).

The sense of crisis in Southeast Asian capitals was understandable in the light of several alarming trends. An unexpectedly swift recovery in growth in the year 2000 was not matched by a significant revival of FDI inflows to the region. Investments approved by the Philippines' Board of Investment fell by two-thirds

in 1999 against a backdrop of political instability. In Indonesia FDI approvals fell by half during the first three quarters of 2001. More ominously, the stagnation in inward FDI appeared to be a structural rather than a cyclical phenomenon. ASEAN's share of FDI inflows to developing Asia shrank from an average of 40% during 1989–94 to 10% in 2000 (see Table 1).

China's FDI inflows (excluding Hong Kong) averaged just under US$14 billion per year during 1989 to 1194, but rose to over US$40 billion per year in the late 1990s and 2000. Its share of FDI flows to developing Asia reached 50% in 1998 and, in conjunction with Hong Kong, accounted for more than two-thirds by the end of the decade. The collapse in the world electronics market that began in late 2000 dealt a further blow to the largest export industry in Southeast Asia's rapidly industrialising economies. Manufactured exports fell dramatically in 2001 (see Table 2).

Major electronics MNCs announced a raft of downsizing initiatives as the downturn gathered momentum. The leading disk drive manufacturer, Seagate Technologies, cut its global workforce (of which 80% were employed in Southeast Asia) by half over 1998–2000, and in the latter year closed two factories in Malaysia with over 4000 laid off. Advanced Micro Devices let go another 1300 employees from its Penang plant as it transferred some production lines to China. In Singapore, Hewlett-Packard announced a 7% global workforce reduction that fell heavily on the city-state, disk-drive maker Maxtor laid off 700, or 10% of its local employees, Aiwa cut 85% of its workforce, and Hitachi shut down cathode-ray tube production, laying off 950 workers.

TABLE 1
FDI inflows (US$ million) in developing Asia

Country	*1989–94 average*	*1995*	*1996*	*1997*	*1998*	*1999*	*2000*
Brunei	6	13	–69	2	–20	–38	–19
Cambodia	52	151	294	204	121	135	153
Indonesia	1542	4346	6194	4677	–356	–2745	–4550
Laos	19	95	160	91	46	79	72
Malaysia	3964	5816	7296	6513	2700	3532	5542
Burma	135	277	310	387	314	253	240
Philippines	879	1459	1520	1249	1752	737	1489
Singapore	4798	8788	10372	12967	6316	7197	6390
Thailand	1927	2004	2271	3627	5143	3562	2448
Vietnam	651	2336	2519	2824	2254	1991	2081
ASEAN	13973	25285	30867	32541	18270	14703	13846
China	13951	35849	40180	44237	43751	40319	40772
Hong Kong	4164	6213	10460	11368	14776	24591	64448
China + HK	18115	42062	50640	55605	58527	64910	105220
Developing world	59578	113338	152493	187352	188371	222010	240167
South, East, and Southeast Asia	35078	73639	89406	98507	86004	96224	137348

Source: UNCTAD (2001).

TABLE 2
Export performance among Asia's electronics producers

Country	*Exports as % of GDP*[1]	*Electronics as % of exports*	*Yr-on-yr change in exports*[2]
South Korea	42	38	–20.0%
Taiwan	54	47	–28.4%
China	22	24	6.6%
Thailand	57	33	–8.0%
Malaysia	122	58	–13.5%
Singapore	180	64	–24.0%
Philippines	51	59	–25.0%
Indonesia	35	14	–0.2%
USA	11		

Notes:
[1] 1999 data.
[2] July 2000 data except Malaysia and Philippines (June), Thailand and Indonesia (May).
Source: Asiaweek, 31 August 2001.

Sluggish FDI and export trends suggest that Southeast Asia's ailing tiger economies are caught in a 'structural squeeze' between an ascendant China and more advanced NIEs like South Korea and Taiwan. Notwithstanding its tremendous export performance during the boom period of the 1980s and 1990s, Southeast Asia's aspiring NIEs failed to develop the design and innovation capabilities necessary to move towards the more sophisticated production profiles of Taiwan and South Korea. In the past five years, meanwhile, China's export profile has come to include not only labour-intensive products like textiles, toys, plastic items, and electrical items but also a growing share of own-design (ODM) and even own-brand (OBM) manufacturing in white goods and consumer electronics, along with aggressive thrusts into high-technology sectors such as wafer fabrication. According to the United Nations classification, Chinese exports of high and new technology products rose from US$7.7 billion in 1996 to over $37 billion in 2000, with foreign-invested enterprises accounting for 81% of the total (UNCTAD, 2001: 26). In this view, China's recent success represents not the take-off of the latest member of East Asia's 'flying geese', but the cross-wind of an entirely new flock.

How is it that Southeast Asia's once-vaunted NIEs find themselves groping for an entirely new growth model, seemingly pessimistic about building upon their prior success as manufactured export platforms by shifting into higher-technology production? Their present strategic dilemma lends considerable weight to critical analyses of international production networks that emerged in the 1990s in response to liberal and product-cycle based theories of regional integration in Asia. Liberal theorists maintain that FDI smoothes the operation of the international product cycle, transferring technology to developing host countries and enabling them to achieve dynamic structural change (Yamazawa, 1990; 1995; Petri, 1993). Insofar as they acknowledge industrial organisation

theories of FDI, they maintain that diffusion processes and host country learning eventually erode the monopoly rents of MNCs' firm-specific assets. By contrast, neo-structuralist literature emphasises that IPNs reflect multinationals' efforts both to control and exploit firm-specific assets such as technological know-why, as well as to regulate and *limit* technology diffusion.[1] IPN architecture reflects MNCs' global geo-economic strategies and, in transposing internal corporate organisation to the transnational domain, reinforces international hierarchies (Borrus, 1993; Zysman & Borrus, 1994; Machado, 1999). While shifting manufacturing and testing to offshore affiliates in developing countries during the 1980s and 1990s, even in high-technology sectors, MNCs retained control over design, R&D and brand management in home-country headquarters, resulting in a stark 'international division of knowledge' in the Asia Pacific region (Morris-Suzuki, 1992).[2]

By no means were these challenges unique to Southeast Asia. A stream of literature starting with Cumings' (1987) seminal article emphasises that the industrial take-off of South Korea and Taiwan, no less than Southeast Asia's later boom, was entrenched within regional dynamics shaped by the production and marketing strategies of major Japanese and US corporations. The developmental state analysis of Northeast Asian industrialisation focuses on those countries' neo-mercantilist trade and industrial policies, in which protected domestic markets enabled national infant industries to exploit protected domestic markets while penetrating export markets (Amsden, 1989; Wade, 1990). Yet, in technology-intensive sectors like electronics, Korean and Taiwanese firms started out as capacity-manufacturing sub-contractors within the same sort of transnational functional division of labour as that described above, and were just as dependent on foreign suppliers of technology, components, and capital goods.[3] The key difference from the Southeast Asian model, therefore, lay not in the structural constraints of a hierarchical division of labour shaped by MNC strategies, but rather in the governance arrangements that regulated IPNs. A strong national ownership presence in electronics afforded sufficient autonomy to invest in localised technological learning and linkage formation, such that local electronics firms steadily expanded from simple manufacturing into more engineering, design and ultimately innovation-intensive activities.[4] State intervention was a second key factor. Under the USA's cold war sponsorship, East Asia's developmental states were able to impose a range of performance requirements on inward FDI, notably including local content requirements, while subsidising investments in skills and technology to support the upgrading and expansion of local industry (Mardon, 1990; Dahlman & Sananikone, 1990).

Southeast Asia's industrial take-off in the 1980s occurred in a different phase of the globalisation of manufacturing. As leading MNCs from the Triad had begun to exploit new technologies and organisational techniques (such as total quality management (TQM) and just in time (JIT)) to more closely control and integrate their international operations, they began to view *internalisation* as a source of strategic competitive advantage. Rather than upgrading their joint-venture affiliates in Southeast Asia, established in earlier decades to serve local markets, the big five Japanese electronics makers insisted on establishing green-field operations under 100%-owned subsidiaries in order to serve global production

roles. The US semiconductor assembly facilities set up in the 1970s had always remained wholly foreign-owned, but their free trade zone-based operations expanded swiftly as the boom progressed, instead of gradually divesting the manufacture of maturing or medium-technology product lines to nationally owned subcontractors, as they had in Korea and Taiwan.

During the decade of the post-Plaza FDI boom (1986–96), MNCs from the Triad and the first-tier NIEs greatly expanded their Southeast Asian operations, and introduced more advanced products and sophisticated processes. To a great extent, however, this dynamism represented an upgrading of the region's existing assembly role rather than a structural transformation. Even as the new investment boom broadened Southeast Asia's electronics complex into consumer products, PCs and subsystems, and office equipment, the hoped-for linkage effects (Wong, 1991) remained limited. Gradual production deepening did occur as small and medium-sized component makers from East Asia followed their chief customers off-shore. Yet indigenous supplier industries remained underdeveloped. Singapore was an exception in this regard, and there was limited linkage formation in Penang (Malaysia) and Thailand's car manufacturing sector. Even in these cases, few local firms progressed vigorously along the value-added chain, to full turnkey original equipment manufacturing (OEM) and then into ODM and specialised niche manufacturing based on proprietary engineering, design or innovation capabilities. Moreover, foreign makers continued to dominate production of technologically mature industry segments such as electrical appliances and white goods. Japanese principals often tightened their managerial grip over domestic market joint ventures in order to integrate their procurement and marketing functions with regional operations (Hatch & Yamamura, 1996). As Bernard and Ravenhill (1995) convincingly argued, these dynamics highlighted the strategic, control-orientated nature of the IPN system into which Southeast Asia had become deeply integrated. Indeed, Southeast Asia's present-day competitiveness dilemma might well be understood as confirming the most critical assessments offered during the boom period.[5]

Intra-MNC dynamism in Southeast Asia's boom: internalisation, industrial upgrading, and co-location dynamics

As the neo-structuralist or 'captive development' analysis of the regional political economy has argued, Southeast Asia did not, in fact, replicate key elements of the Northeast Asian late-industrialisation model, particularly in terms of building nationally owned export industries (Jomo *et al*, 1997). The extension of MNCs' proprietary networks reflected strategic, control-orientated motivations rather than the workings of the international product cycle, and structural change within host Southeast Asian economies remained overwhelmingly dependent upon a transnational logic of production articulated in multinationals' strategies. Recent work in the economic geography of globalisation shows, however, that the 'borderless' nature of trade and investment under MNCs' globe-spanning operational reach does not, in fact, diminish the importance of territory (in the sense of spatial specificity) in organising economic activity. While manufacturing has become more internationally dispersed, it has also become more spatially

concentrated at the local or micro-level (McKendrick *et al*, 2000). Recognition of this pattern has contributed to a new interest in the role of industrial clusters in both advanced and developing countries.

In contrast to the general thrust of neo-structuralist critiques, Southeast Asia's foreign manufacturing sector has displayed clustering properties with important dynamic effects. While the region's industrial sectors remain entrenched in MNC-controlled networks, these have encompassed localised processes of industrial capability building and technological accumulation. MNCs use IPNs to exploit their technology assets in Asian locations and to regulate the diffusion of technology to competitors and host economies. But at the same time they have invested large amounts in deepening and upgrading the capabilities of their offshore establishments as an integral part of quasi-oligopolistic competition in global markets. To this extent, the global logic animating MNCs' strategies has converged, in part, with Southeast Asian countries' desires for progressive industrial change, even as they clashed with regard to the issue of technology diffusion to local industries.

With regard to the *internal dynamism* of the multinational production base in Southeast Asia, three boom-era clustering trends made the image of a region confined to simple end-stage assembly increasingly outmoded. First was significant production deepening among MNC-dominated export industries, as foreign firms moved from simple assembly into the production of parts and components. Emblematic of this trend was the massive complex of 18 Matsushita assembly, components and tooling subsidiaries established in Malaysia to produce air-conditioners and colour televisions for regional and global export markets.[6] Host governments had long been concerned about the enclave nature of foreign manufacturing, which since the 1970s had usually operated in special Free Trade Zones or under their administrative equivalents, namely various import duty exemption or drawback schemes. As the FDI boom progressed, however, most Southeast Asian economies saw a new wave of FDI by small and medium-sized firms from East Asia, who took advantage of liberalised policies on foreign equity ownership to follow their principal assembly customers to the region. The migration of foreign suppliers allowed flagship MNCs to resurrect a partial facsimile of their home-country *keiretsu* or sub-contracting systems on Southeast Asian soil (Guyton, 1996).[7] From the standpoint of Southeast Asia's industrial trajectory, production deepening via the relocation of foreign supplier industries reflected *both* the degree to which IPNs enshrined foreign control *and* an important degree of mobility along the value-added chain for the region as a whole.[8]

A second aspect of intra-foreign cluster dynamics was a marked pattern of spatial co-location among MNCs in particular industry segments. Moving a generation ahead of its neighbours, Singapore cycled through several vintages of clustered FDI, notably including the assembly of PCs with Apple and IBM in the early 1980s, followed by the relocation of a large share of global hard disk-drive production late in the decade (McKendrick *et al*, 2000), and finally by a wave of wafer-fabrication investments in the early and mid-1990s. By the early 1980s Malaysia's Penang hosted key assembly facilities of most of the world's leading semiconductor companies, including National Semiconductor and Intel, while Motorola and Texas Instruments sited their operations near Kuala Lumpur; they

were followed by the world's leading silicon wafer makers.[9] In the mid-1980s Malaysia's Klang Valley became the favoured location for Japanese and Taiwanese production bases in electrical and electronic home appliances, including air-conditioners, televisions and VCRs. Thailand attracted overflow investments in disk-drive assembly from Singapore and in the 1990s lured the lion's share of new investments in car assembly. In the late-1990s, the Philippines developed clusters of computer assembly in Subic Bay Zone and disk-drive assembly in Laguna province south of Manila. As the neo-structuralist literature on IPNs notes, the pattern of specialisation across the region had a distinctly hierarchical cast, often with each stage of production sited in different host countries to take advantage of cost differentials.[10] FDI clustering in Southeast Asia was therefore not analogous to Porter's (1990) competitive 'diamond', which involves a full set of vertical linkages to supplier and user industries, nor to the collections of complementary assemblers, designers and components makers that define innovative SME clusters in the literature on Europe. Rather, they were horizontal groupings of foreign manufacturers performing similar production functions, lured by suitable cost and infrastructure factors and, significantly, by the externalities (skills, knowledge, logistics infrastructure) generated by each other's presence.

The third important trend stemmed from the functional co-location pressures operating within individual foreign firms. Over time, the advantages of locating engineering, design and even R&D close to manufacturing led many MNCs to transfer a greater share of those responsibilities to their Southeast Asian subsidiaries. Shrinking product-cycle times in the electronics industry meant that local assembly operations were called upon to introduce automation technology in the late 1980s and to ramp-up to mass production quickly using new product and process technology. Indeed, over the period of the boom, MNCs' Southeast Asian operations changed from producing only mature and declining product lines to take on global product-launch roles, in which they stabilise and introduce their parent companies' cutting-edge products. Although still concentrated on assembly roles, the shift to more sophisticated products and production techniques required local subsidiaries to expand local engineering capabilities and invest in upgrading workforce skills. In the case of Singapore, process-engineering capabilities in several branches of electronics soon became world-class, and subsidiaries there began to conduct R&D into process technology development (Wong, 2001). Malaysian expertise became crucial to the global operations of several companies, notably including Intel and Motorola, who began sending teams of local engineers abroad to assist in establishing new factories.

These internal co-location dynamics eventually extended to product design and R&D. Singapore began attracting FDI into R&D operations in the late 1980s. Among the less advanced Southeast Asian countries, however, the growth of design functions is also evident. The Japanese consumer appliance makers entering Malaysia in the late 1980s quickly set up R&D subsidiaries to adapt designs for local production and materials-procurement conditions, and to create new products for regional markets. Matsushita, for example, set up a formal R&D unit for its television subsidiaries in 1990, followed in 1992 by a separately

incorporated air-conditioning R&D Centre (MACRAD), and a third subsidiary (MACTEC) to serve as a regional mould and die design and production centre. By 1994 the three technology units employed more than 120 engineers and technicians, fully equipped with sophisticated computer-aided design facilities, and linked to home-country R&D laboratories through electronic data interchange (EDI) systems. Like Matsushita, Sony Corporation equipped its new audio, TV, and VCR export plants with formal R&D units to create new model designs within a standard product range (*The Star* (Malaysia), 19 December 1996). In 1994 Hitachi moved its entire regional VCR division to Malaysia, including R&D, marketing and product planning. Sharp-Roxy set up an R&D centre the same year for its audio compact disc products, VCRs, and colour TVs. Thailand was less successful than Malaysia in inducing MNCs to undertake formal R&D, but several electronics manufacturers did set up design units to support their new export bases.

Several points about this trend are important in the light of the discussion of structural mobility within MNC-controlled networks. First, except in certain sectors in Singapore, the localisation of design and R&D naturally did not involve basic or strategic innovation at the core of MNCs' technology development efforts. Rather, most local innovation involved incremental adaptations of product designs and process technology to suit local market and production conditions. Moves towards locally integrated production remained constrained by the transnational logic of parent companies' IPNs, and did not equal the more self-contained technological capabilities seen in the East Asian NIEs. Yet the region's role as an offshore assembly site had not been the technological dead-end that many projected, but in some cases had given rise to a dynamic accumulation of innovative capabilities within MNC operations.

Second, this progress represented an intersection of transnational and local forces. The decision to upgrade local subsidiaries' in-house technical capabilities was largely an outgrowth of MNCs' global strategies for cost reduction and production flexibility. Yet the reverse causation was also important—Southeast Asian-based MNC subsidiaries' accumulated technical expertise allowed them to compete against other subsidiaries to win sophisticated production tasks and advance within their parent companies' internal division of labour.

Third, by implication the localisation of modest innovation capabilities had very little to do with the product life cycle. In fact, pressure to co-locate engineering and design with manufacturing, which arose out of shrinking design-to-market cycle times, was higher in more technologically dynamic or immature sectors, such as semiconductors and industrial electronics (eg PCs and disk-drives) than more technologically mature sectors.

Creating locational advantage—government policies and 'contingent clustering'

Another misleading implication in much of the neo-structuralist literature is the notion that foreign ownership of Southeast Asia's export industries meant, almost by definition, that host-country industrial policies were irrelevant. In the long-running state vs market debate about the origins of East Asia's industrial ascent,

the promotion of national enterprise and the search for ever-greater economic autonomy were seen as the keystones of statist–nationalist development projects. Singapore always fitted uncomfortably into this mould and hence was often treated as an anomalous exception. In fact, however, Singapore's FDI-led, yet highly interventionist, growth pattern has furnished an influential template for emulation by its less-proficient neighbours. With available roles in IPNs no longer confined to simple labour-intensive assembly, Southeast Asian governments exchanged (gradually and to varying degrees) their ambitions to build nationally controlled industries for efforts to secure more advantageous positions *within* MNC-orchestrated international divisions of labour. These 'post-nationalist' industrial policies sought to build locational assets that would complement MNCs' evolving global production strategies and thereby encourage foreign firms' moves to upgrade their local activities.

The post-Plaza FDI boom coincided with concerted efforts on the part of Southeast Asian governments to liberalise their FDI policy regimes and attract their share of the investment bonanza. Restrictions on foreign ownership for export projects were lifted in the mid-1980s, largely as a desperate response to a region-wide recession. Soon, however, governments' investment promotion agencies (IPAS) began to hone their investment 'pitch', and ministries of trade and industry moved to invest in specialised infrastructure and skills in a bid to complement MNCs' regional production strategies. Singapore's Economic Development Board (EDB) spearheaded a renovation of the city-state's investment promotion, targeting incentives to encourage multinationals to invest in design and R&D activity. The multinational presence was also harnessed to help build a highly flexible and responsive human resource development system. The EDB went into partnership with foreign governments and individual MNCs to set up sector-specific skills training centres to facilitate the integration of higher-end manufacturing with innovation tasks, like design and R&D. Meanwhile, Singapore continued its continuous effort to develop world-class infrastructure suited to globally linked production. The Port of Singapore Authority became a world leader in the application of electronic customs clearance technology, while the telephone monopoly implemented value-added network services, ISDN and, eventually, island-wide broadband infrastructure. A Science Park opened in 1989 to host foreign research units, equipped with specialised prototyping equipment, patent database and services, and links to the national university. Finally, the EDB established capital investment funds as a partner with foreign companies in wafer fabrication and other strategic investments.

Malaysia followed suit, with a few years' lag, in similar ways. In 1986 the Malaysian Industrial Development Authority (MIDA) was turned into a one-stop shop for investment approvals and reorganised along sectoral lines. Tax incentives for R&D investments were promulgated around the same time. Five years later, as Malaysia shifted from labour surplus to shortage, pioneer status tax incentives were curtailed for most investments, leaving room to reward high-technology or strategic investments with full tax holidays. In 1993 a Human Resources Development Fund, patterned on Singapore's Skills Development Fund, levied 1% on all corporate payrolls with the amount redeemable for firms' investments in worker skills in approved training programmes. Malaysia built a

science park outside Kuala Lumpur, and a specialised-infrastructure industrial park in Kedah state to house investments in wafer fabrication and other designated high-technology projects. Less formally, the government made known its willingness to relax other investment conditions (including limits on expatriate work permits, supervision of the ethnic employment ratio, etc) for those MNCs who localised design or R&D activities. In the mid-1990s a special-purpose government investment vehicle was set up to form the state–foreign joint ventures seemingly required to go into wafer fabrication. Mahathir's high-technology brainchild, the Multimedia Super Corridor, took the logic of MNC-complementing policies even further. In addition to generous fiscal incentives and unlimited expatriate work permits, willing multinationals were invited to participate in the governance of the zone by serving on its Advisory Panel and providing input into the development of national 'cyber legislation'.

Thailand's investment policy regime was likewise adapted, albeit much less adroitly, to encourage upgrading within multinational operations. The Board of Investment (BOI) pursued sector-specific investment promotion and launched an R&D tax incentive in 1989. The Board has co-operated in granting promotion to projects affiliated with the National Science and Technology Development Agency (NSTDA), a quasi-government body set up in 1991 to sponsor and conduct applied research in electronics, biotechnology and materials. The BOI has been the key point of contact for export manufacturers bedeviled by an inefficient Commerce Ministry and Customs Bureau. In 1995 it established a non-profit Investor Club Association to serve as an organisational interface for providing post-investment services, which has since enrolled 800 BOI-promoted companies. The Association's 60 staff operate an electronic raw materials tracking system, linked to the Customs Department through electronic data interchange, which manages the documentation necessary to avail itself of import-duty drawbacks. In 1997 the BOI also co-ordinated the establishment of a one-stop office with the Immigration Department to process applications for work permits. Beginning in 1995 Thailand relaxed its local content programme in exchange for new commitments from major car-manufacturing MNCs to expand their investments and launch exports.

The Philippines, as a latecomer to the regional boom in FDI-driven export growth, has only belatedly sought to adjust its investment promotion policies to focus on the skill and technological content of FDI.[11] Nonetheless, government investment promotion agencies and private industrial park developers have noted and encouraged emergent trends towards the clustering of investment. A new agency, the Philippines Economic Zone Authority (PEZA), was set up in 1995 to co-ordinate the inflow of new export-oriented FDI, together with separate authorities in the Subic Bay and Clark Free Trade Zones. Zone growth itself has been striking: from 16 zones in 1994, the total reached 40 in 1998 with 20 more under construction. Industrial parks with specialised infrastructure (pure water, industrial gases, redundant power supplies) facilitated the clustering of Japanese semiconductor and disk-drive assemblers in Laguna province south of Manila.

Indonesia is largely an exception to the regional trend towards more proactive FDI policies. Liberalisation measures in the early 1990s created the basic conditions (import duty-drawback schemes, etc) required to induce export-

orientated FDI. But Indonesia's ambitions for technological development remained vested in the strategic heavy industries push led by Suharto's protégé (and successor as president), BN Habibie. Most FDI remained concentrated in light, labour-intensive assembly. The only partial exception was Indonesia's participation in Singapore's bid to foster transborder clustering in the form of a 'Growth Triangle' that embraced Indonesia's Batam island along with Malaysia's Johor state.

The actual efficacy of host-country FDI policies in shaping regional IPNs is difficult to measure and easy to question. Compared with Singapore's disciplined and highly detailed efforts to create the precise microeconomic conditions for specific FDI clusters, most of the region's policies suffered from slow or haphazard implementation. On the other hand, the administration of investment zones, policies, incentives and skills development policies displayed a genuine learning curve. Their cumulative effects made Southeast Asia a highly conducive environment for globally linked production. Indeed, the expansion and technological complexity of foreign production during the 1990s, particularly in electronics, would have been difficult to predict based on fundamentals like the levels of skilled human capital, supplier industries, or technological investments. The opposite causation was far more significant, in that foreign firms were key players in upgrading local workforce skills and industrial capabilities. Once its initial low-wage advantages were eroded, Southeast Asia's locational attractions lay primarily in administrative and policy-related efficiencies. As MNCs built region-spanning networks to produce for intensely competitive global electronics markets, they ironically became more vulnerable to supply disruptions in any part of the network. Their sensitivity to the 'hidden costs' of foreign operation, especially those linked to poor administration of investment policies, customs and logistical systems, and physical and human resource infrastructure, has grown accordingly. These factors are even more important in a dynamic sense, as MNCs seek locations in which they can continuously upgrade their processes and products, and debug and ramp-up production efficiently in order to compress design-to-market cycles. Finally, Southeast Asia's investment promotion efforts during the boom period succeeded in encouraging parallel investments in a series of sectors and individual product and technology categories. MNCs have found it useful to be located where their competitors also operate, and both deliberate inter-foreign co-ordination as well as unintended spill-overs (of skills, information, infrastructural development) further enhanced Southeast Asia's locational attractions.

What is distinct about this pattern is that it is 'local' only in a very abstract sense. Typically, checklists of locational advantages and cluster properties emphasise territorially rooted skills, institutions and, above all, nationally owned firms which are often presumed to be more committed to reinvesting locally than foreign firms. The key dynamic in Southeast Asia's MNC-based industrialisation, by contrast, might better be termed 'contingent clustering', in that there were relatively few territorially *generated* assets that could explain the dynamism of the foreign production establishment. Rather, it was the co-ordination economies arising from MNCs' investment decisions which gave rise to localised externalities among firms whose origins and primary linkages were non-local. Government

policies further encouraged the vertical internal, and horizontal external/inter-firm, co-location dynamics that drove local industrial upgrading beyond the point that local endowments of skills or technology would have otherwise allowed. The key distinction here is articulated by the eminent theorist of regional economies, Michael Storper (2000: 43), who notes:

> the strategic, financial, and technological capacities of large firms have developed to the point that what goes on inside these firms or, alternatively, in networks of key firms and their principal partners and dependent contractors, has become at least as important as the classical relations between firms and territories … 'Localization' or 'territorialization' refers to economic activity dependent upon territorially-specific resources. These resources can range from asset specificities available only from a certain locale *or, more importantly, assets that are available only in the context of certain interorganizational or firm-to-market relationships that necessarily require geographical proximity*. [emphasis added]

What is at stake in the post-crisis period, however, is precisely the question of the durability of the locational advantages of Southeast Asia's 'contingent clustering'.

Generic trends in international production networks

Several trends during the 1990s have transformed the governance of IPNs, particularly in electronics and to varying degrees in other international manufacturing systems. Though overshadowed by the surge of investment flows into China, these changes hold perhaps even more long-term significance for Southeast Asia's industrial prospects, and define the strategic context in which the regional division of labour is being reshaped. First, leading multinationals have progressively shifted their international strategies towards what Dieter Ernst (1997) calls 'systemic globalization', defined as the international dispersal and integration potentially of all elements of the value-added chain. Not only manufacturing, but marketing, financing, logistics, design, training, procurement, and even R&D functions may be located abroad and co-ordinated with home-country operations. R&D activities remain strongly concentrated in multinationals' home country laboratories (Patel, 1997), yet this is more a symptom than a cause of the global distribution of underlying technological capabilities. Keen observers of multinational business (Dunning, 2000) discern that 'asset seeking' motivations are increasingly important in the locational decisions of major MNC investments, as they seek to tap into localised concentrations of knowledge and skills around the world.

Systemic globalisation makes possible a more complex variety of IPN configurations. At one extreme is the pursuit of a horizontal intra-corporate global division of labour, in which overseas units are given *global product mandates*. Subsidiaries perform global exports of specific products (or product groups), allowed to create fully vertically integrated supply chains for specific products (or product groups), and vested with R&D, design, engineering, procurement, logistics and marketing responsibilities. This IPN configuration results in relatively horizontal patterns of trade and information exchange between MNCs' overseas establishments. At the other end of the strategic spectrum lie efforts to

integrate all overseas operations into a single intra-firm functional hierarchy. MNCs have their offshore subsidiaries become increasingly specialised in specific components, or a single stage of the production process, serving the parent company's entire product range on a global basis through vertical, intra-firm trade. In reality, a mix of strategies has been observed, varying by sector and by individual corporation. During the 1980s and 1990s, however, MNCs' globalisation strategies took on a distinctly regional cast, as newly internationalised functions such as design, procurement and customer relations were devolved to off-shore facilities in various regions and then concentrated in regional headquarters. In Asia regional headquarters were most often located in Singapore and Hong Kong.

The second broad trend affecting IPNs in Asia is *systematic outsourcing*. Many critiques of IPNs draw on industrial organisation theories of FDI, in which corporations secure quasi-monopoly rents by leveraging their firm-specific assets, including technology, to internalise a growing range of transactions. In the past five years, however, MNCs' competitive strategies have led them in the opposite direction. Leading firms in electronics (and other sectors to a lesser extent) have started outsourcing a growing range of functions, including ancillary services, administrative functions, design and engineering, and various stages of production up to and including the entire manufacturing process. Borrus (1999) and Borrus *et al* (2000) offer the clearest conceptualisation of the effects of these trends on MNCs' global competitive strategies, labelled 'Wintelism'. MNCs choose to specialise in a specific stage of the value chain, at a point that allows them to set the 'architectural' technology standards for an entire industry. Flagship corporations are then able to shed responsibility for lower-margin parts of the production process in order to focus on product or technology definition, and brand building and marketing. In contrast to internalisation strategies based on proprietary standards, Wintelist competitors disseminate their 'private but open' technical standards to a wide range of complementary network collaborators, including manufacturing and design subcontractors, distributors and strategic development alliance partners (Borrus, 1999; Borrus *et al*, 2000).

A third shift, closely related to the others but even more momentous, is the advent of electronic commerce as a generic technology for co-ordinating IPNs. Business-to-business (B2B) e-commerce technology enables the real-time exchange of production-related data over a global scale, and makes the entire value-added chain transparent to all network participants. In contrast to its predecessor EDI systems, web-based B2B technologies radically diminish the fixed-cost entry barriers to participating in electronic networks. Moreover, their open standards are less inherently hierarchical, and permit more flexible, horizontal information exchange, as well as empowering network participants to reshape their own network linkages. One result of this trend, and its associated advances in data management and distributed processing, has been to commodify international production logistics, once a prime source of MNCs' competitive advantage. Increasingly, then, flagship MNCs are choosing to outsource a great part of their supply networks to specialised logistics providers. In a major sign of this trend, a rapidly growing proportion of global production of consumer, telecommunications and PC-related electronics is carried out by specialised

contract electronics manufacturers (CEMs) like Celestica, Solectron, SCI Systems and Flextronics. The most important of these are shown in Table 3.

CEMs work with brand-holding principals, who remain IPNs' flagship corporations, to produce to precise design and quality specifications, but they have nearly complete autonomy to manage procurement, assembly, logistics and, sometimes, final distribution on a world-wide basis.

These trends clearly hold enormous implications for the geography of production in Asia, yet the precise impacts are difficult to discern, and will only emerge over the next several years. In terms of the debate about IPNs and development, their major significance is a departure from the closed, hierarchical network structures that have characterised Southeast Asia's integration into the global economy. Borrus' (1999) argument is that US multinationals such as Dell, Cisco, Qualcomm, Sun Microsystems and of course Intel and Microsoft were able to out-compete their Japanese rivals because their open networks allowed them to exploit low-cost manufacturing expertise across developing Asia more fully and systematically. Japan's 'Big-5' electronics heavyweights are unlikely to abandon their traditional proprietary network practices overnight, but recent examples suggest significant effort to absorb the lessons of their US competitors' more flexible transnational production systems. In 2000, for example, Sony sold two of its plants to Solectron, a Silicon Valley CEM, and its affiliate Aiwa sold or closed nine separate plants in Southeast Asia while increasing its outsourcing contracts. In 2001 NEC hived off three telecommunications equipment factories to Solectron and Canada-based Celestica. European makers have also joined the trend. In 2001 Sweden's Ericsson announced that it was exiting the manufacturing of handphones and subcontracting its entire product range to Singapore-based Flextronics.

An optimistic analysis of these changes is that the shift towards more open, 'Wintelist' forms of IPN governance is creating new opportunities for developing countries to achieve upward mobility in global value chains. Systematic global-

TABLE 3
Top 10 CEM companies 2000 (US$ billion)

CEM company	*2000*	*1999–2000 growth (%)*
Solectron Corp	16.9	83
Flextronics International	10.1	199
Celestica	9.7	84
SCI Systems Inc	9.1	27
Sanmina Corp	4.2	202
Jabil Circuit Inc	4.0	78
Elcoteq Inc	2.1	173
Manufacturers Services Ltd	1.75	91
Benchmark Electronics Inc	1.7	94
C-MAC Industries Inc	1.7	110

Source: Technology Forecasters Inc.

isation means that MNCs may continue to shift towards less hierarchical IPN configurations, and locate more complex functions in the region. Southeast Asia may hope to lure some of these functions, including design and training headquarters, IT support centres, back-office and other specialised business service centres, and even R&D units, particularly in manufacturing process development and resource-based industries. Likewise, the outsourcing or externalisation trend offers *prima facie* advantages to Asian producers seeking the autonomy to expand from simple manufacturing to more integrated, innovation-based production. Smaller players, such as the handful of local sub-contractors in Southeast Asia, may hope to compete with China's enormous scale advantages by accessing the more open system of global supply networks and by capitalising on leading MNCs' bids to establish their technologies as industry standards through accelerated diffusion to OEMs and other subcontractors. Insofar as Southeast Asian industries are already linked to flagship Japanese, US and European firms through their legacy systems of proprietary networks, they may have an inside advantage in forging new, expanded sub-contracting partnerships. Southeast Asian sub-contractors may aspire, like Singapore's NatSteel Electronics (recently bought out by Solectron), to take over manufacturing and logistics functions as MNCs downsize to focus on core competences or cutting-edge product lines. Finally, the e-commerce revolution, by diminishing the importance of geographic proximity to final markets, holds out the prospect that economies with smaller industrial bases and domestic markets, such as those in Southeast Asia, may nonetheless maintain a presence in global supply networks despite their small domestic markets or geographic remoteness.

There is, of course, a far more pessimistic analysis of how changing IPN governance will affect host economies like those in Southeast Asia. In this perspective, changes in global manufacturing systems herald vastly intensified and increasingly delocalised competition. Simply put, open IPN architecture may signal MNCs' greater willingness to tap into *pre-existing* clusters of manufacturing and technological expertise, while simultaneously reflecting their *reduced* commitment to developing *new* capabilities and linkages in their traditional production locations, or even to maintain their existing offshore establishments in the face of mounting cost competition.

As MNCs adopt systemic globalisation, their locational decisions are influenced by complex economies of co-location among different parts of the value-chain. As noted above, Southeast Asia has benefited from MNCs' growing need to co-locate design and engineering with their assembly operations in order to compress product cycle times and achieve rapid ramp-up to mass production. Yet the ongoing rationalisation of IPNs promises to alter, and even reduce altogether, these *internal* co-location dynamics. Even as IPNs become more horizontal at a global level, with MNCs transferring design, procurement, and R&D responsibilities to their East and Southeast Asian subsidiaries, they simultaneously become more hierarchical and vertically specialised *within* the region, as these more complex and lucrative functions are re-centralised in regional headquarters. Thus, systemic globalisation may enhance Singapore's efforts to shift its economy into innovation-driven producer services and R&D, while diminishing the chances for lower-tier economies like Thailand and the

Philippines to augment their manufacturing roles with co-located design and development capabilities.

The outsourcing trend also has ambiguous implications for latecomer technological learning. For those economies already equipped with the capacity for large-scale production and continuous productivity improvement, specialised design expertise or international logistics and co-ordination abilities, outsourcing may allow rapid expansion along the value chain towards turnkey OEM and ODM. Yet, compared with flagship MNCs' proprietary networks, the leading contract electronics manufacturers may have even *less* interest in their local environments and supply networks, especially with regard to vendor development, ie identifying co-located suppliers and nurturing them with technical and financial assistance. In fact, CEMs' core competitive advantage, as integrators of new, truly global supply networks, is their capacity to arbitrage the cost and productivity advantages of manufacturing capacity in different locations. They continuously reshuffle production volume on a global basis in response to short-term cost and logistical advantages.

E-commerce may likewise greatly sharpen locational competition, to Southeast Asia's potential disadvantage. A key aspect of e-commerce networks' greater openness is the diminished importance of geographic proximity in the configuration of IPNs. Electronic networks' co-ordination efficiencies depend upon the rigorous codification of technical exchanges. While this involves the diffusion of common technical standards, it excludes the transmission of tacit, experience-based knowledge, which lies at the heart of the type of localised technological learning observed in industry clusters. B2B exchanges and electronic marketplaces, with their radically diminished entry barriers and delocalised structures, are contributing to a consolidation of regional and global markets for components and other intermediate goods. This may favour established sub-contractors who are possessed of autonomous technological capabilities, massive production scale, and regional or global production presence. But they are likely also to shift bargaining power to major buyers, or IPN flagship corporations, who can use electronic market systems to squeeze supplier firms into more direct, transparent price competition over ever wider domains.[12] As MNCs use e-commerce to streamline their regional and global supply chains, they have less incentive to develop new linkages in any specific location. The social interactions and serendipitous exchanges that promote learning within more embedded networks may easily be lost in delocalised electronic systems. In short, the same qualities that make web-based networks more effective at integrating existing capabilities from diverse localities may lessen IPNs' role in developing them in new locations.

These contrasting scenarios point to the dual role of IPNs: as mechanisms for integrating and mobilising existing assets, and as communities in which knowledge can be shared and interactive learning can occur. Southeast Asia's industrial future depends upon the balance struck between these two roles. In general terms, the region's governments have become increasingly aware of the need to upgrade their local capability-building mechanisms and invest in the diffusion of technical standards and e-commerce capabilities among a broader range of domestic enterprises. Changes in IPN governance and geography may offer new opportunities for upward mobility along value-chains into more

complex and lucrative value-added roles. Yet Southeast Asian host economies can rely even less than before on their existing MNC presence automatically to generate the technology diffusion and learning effects that create cluster effects. Instead, cluster-building efforts depend more than ever on local factors, including policy capacities of state investment and industrial extension agencies.

Southeast Asian policy responses

In response to the tectonic shifts in global production systems, Southeast Asian governments have amplified their search for policies that will secure their positions within MNCs' global supply and manufacturing architectures. They continue to seek, in difficult conditions, to root foreign multinationals to their territories, to encourage MNCs' internal localisation of key functions and their formation of local external linkages, and to exploit the foreign presence for technological diffusion and learning. As in the boom period, their strategic options are heavily circumscribed by MNCs' global strategies. Yet Southeast Asia's reliance upon IPNs for integration into the global manufacturing capacity does not mean that localised capability building is necessarily disadvantaged, or that local conditions will have little effect on the geography of transnational production. Southeast Asian governments are pursuing new industrial strategies that seek to complement and exploit MNCs' changing IPN systems by encouraging localised capability building, both within MNC establishments and through broader efforts to build complementary locational assets, or cluster dynamics, in the form of specialised infrastructure, human resources, and supplier bases. These policies pose tremendous challenges to Southeast Asian states' generally weak administrative and policy capabilities, and some policy changes, such as the liberalisation of formerly protected telecommunications and financial sectors, are highly politically contested. Southeast Asia's changing policies thus do not amount to a fully formed strategic response to China's competitive pressure or to other changing global conditions; with the perennial exception of Singapore, the shift in direction typically remains muddled and incremental. Yet the sum effects may complement MNCs' own interests in maintaining and developing Southeast Asian production locations, to a degree that the region's industrialisation trajectory survives, in modified form, the sudden ascendance of the Chinese behemoth.

The first policy thrust builds on ASEAN's prior success in promoting FDI in manufacturing, but extends the scope of investment policy regimes to capitalise on systemic globalisation by encouraging MNCs to co-locate production-related service and co-ordination functions with their manufacturing roles. Industrial policies in the late 1990s began to shift their goals from targeting individual sectors to co-ordinating investments that would form industrial clusters of complementary assembly, components production, producer-services, skill-development, and technology support. In addition to attracting new green-field FDI, this goal draws attention to the importance of encouraging established producers to reinvest in deepening their local operations, upgrading skills, forming local linkages, and undertaking a higher profile in their parent companies' global operations. In a related shift, Southeast Asian IPAs and

industry ministries have also widened the coverage of their incentives to capitalise on new types of FDI associated with the outsourcing trend, including producer services, logistics, venture capital and back-office functions.

Singapore's EDB has pioneered these 'third generation investment policies (UNCTAD, 2001), from which other Southeast Asian IPAs have sought to learn. An early and salient response to MNCs' systematic globalisation strategies has been new programmes to grant special incentives to investments in regional or operational headquarters (RHQs or OHQs), ie multinational corporate offices established to provide managerial and technical support to affiliates throughout Southeast Asia. Singapore launched its RHQ scheme in 1986, as its labour-intensive manufacturing base began to relocate to other Southeast Asian countries. By the end of 2000 Singapore had granted over 200 certificates to investments worth US$543 million and employing 2000 executives; the EDB mandarins had set a target of 1000 global and regional headquarters offices. Investment promotion was matched by a broader effort to create a conducive environment for integrated international logistics operations. Ariba, a leader in the global B2B service provider sector, established its regional headquarters in Singapore in 2000. An example of the potential ultimate effects of systematic globalisation was the case of Caltex Corporation, which decided in 2000 to relocate its global headquarters from the USA to Singapore in order to be closer to its key production, refining and distribution networks. Flextronics, a US-owned CEM, has its global operational headquarters in the city state.

Malaysia followed suit in 1990 and by mid-1999 had awarded incentives to 45 OHQs. Its cluster-based Second Industrial Master Plan, announced in 1996, targeted investment promotion on MNC investments in design, engineering and logistics projects. Thailand began in 1996 with an RHQ scheme whose criteria were liberally defined to include consulting, exporting, wholesaling and equipment maintenance and, by 1999, its BOI had approved some 102 trade and investment support offices, with cumulative investment of more than 3.2 billion baht. The Philippines investment code also offers incentives to foreign investors establishing RHQs to provide managerial support to affiliated companies abroad. The scheme met with little response, and so in 1997 eligibility was extended to a wider range of managerial activities and relaxed to permit RHQs to generate sales revenue in the local market.[13] Similar incentive programmes target procurement and supply-chain management functions as MNCs have localised these within the region. Again, Singapore holds a tremendous advantage in this locational competition by virtue of its superior infrastructure and longstanding status as a trading and transshipment centre. Malaysia awarded International Procurement Office (IPO) status to 39 investments by 1999, when Thailand also extended IPO incentives.

Concern about their over-reliance on electronics manufacturing (greatly accentuated by the severe slump in 2001), has also led authorities to seek to use investment policies to promote entirely new sectors, including high value-added services that are increasingly internationalised or outsourced by leading multinationals. Following on its decision to accelerate the liberalisation of its telecommunications markets in 1999, for example, the EDB began to grant pioneer status to telecommunications service providers, network integrators, and content

developers. A bid to create an integrated hub for petrochemicals processing came on stream in 2000 with the opening of a purpose-built industrial zone on offshore Jurong Island, augmented by an EDB-promoted B2B exchange for the procurement of chemical feedstocks across Asia (*Business Times*, 24 August 2000). Another cluster targeted for promotion was engineering services, including precision engineering of metal and plastic parts, transport engineering such as aircraft maintenance and repair, and process or factory engineering. In recognition of the blending of its traditional manufacturing base with information-intensive functions, the EDB began granting 'Manufacturing Headquarters' (MHQ) promotional status to these and other cluster-augmenting investments. The internationalisation of product and technology development has also given Singapore's authorities a new strategic focus. Hewlett-Packard Singapore now holds global product mandates for the design and development of handheld computing devices as well as inkjet printers and cartridges. In the late 1990s Seagate's Singapore unit designed a new, cutting-edge disk drive (the U series) that went on to capture a third of the global market. The EDB has been quick to identify new niches in the regional division of labour opened up by e-commerce. Dell Computer, the poster-child for build-to-order supply-chain management, set up its online data centre in Singapore, designated its Asia-Pac 'Web Farm'. IBM partnered with Singapore ISP Pacific Internet in 2000 to develop new e-commerce tools. Cisco systems opened a US$6 million 'proof of concept' laboratory in the same year, and in 1999 Ericsson opened a $7 million CyberLab to develop wireless e-commerce applications.

Malaysia's over-hyped Multimedia Super Corridor (MSC) was conceived as a grand strategy to leapfrog the country into innovation-based software and IT-systems development, in direct competition with Singapore and other IT clusters among the first-generation NIEs. The broad consensus is that this bid has been an expensive failure. Yet, while the MSC has not produced a Silicon Valley-like cluster, Malaysia has seen a more modest trend of foreign investment in IT, especially including manufacturing-linked services and back-office operations. In 2000, for example, IBM located its ASEAN/South Asia Customer Support Operations centre in the MSC, a move followed by 3-COM in setting up a web-based call centre and retail-chain management operation, and by Ericsson's US$40 million regional training and support service centre and a separate design centre. Even more than Malaysia, the Philippines has come to view MNCs' globalisation of non-manufacturing business processes as one of the most promising opportunities to develop new niche clusters within IPNs. This strategic focus began with Federal Express's choice of the Subic Bay Free Trade Zone for its regional logistics and flight operations headquarters in 1994, with arch-rival UPS following seven years later. In 1998 America On Line (AOL) set up one of its global customer call centres in the Clark Development Zone, citing low costs and high workforce English language proficiency. The Zone authorities and the Department of Trade & Industry (DTI) reacted by formulating a new promotional drive to consolidate the Philippines' status as a primary regional centre for back-office operations like customer services, accounting and computer coding and data processing. In April 2000 Amazon.com announced it would locate distribution, accounting and data-coding operations in the Philippines.

A third and potentially more significant policy trend is a renewed focus across Southeast Asia on the development of small and medium-sized enterprises. SME support programmes have perennial political appeal as populist economic measures, but recent initiatives reflect awareness that cluster building requires a more focused and multi-faceted effort to nurture populations of competitive supplier firms. In the late-1990s the region's governments jump-started the dissemination of the ISO9000 quality systems standards by setting up government training and certification authorities. In the past few years, the focus has shifted towards diffusing e-commerce tools, as supply chains have increasingly migrated onto web-based systems. Again, Singapore's example set the paradigm for regional policy learning. The EDB's Local Industry Upgrading Program (LIUP), begun in the early 1980s, subsidised MNCs' vendor-development activities, including providing technical assistance and training to local sub-contractors. Beginning in 1996, the city-state's National Computer Board worked with major multinationals like Oracle Corp to set up a parallel programme for the diffusion of electronic commerce technology to local supplier industries. The goal of the IT-LIUP was to ensure that local suppliers would retain their position in supply chains as MNCs' migrated their regional procurement onto web-based systems, or outsourced them to specialised CEMs and logistics providers. From 1999 onwards, Singapore's supplier development programmes were consolidated under a new 'Technopreneurship' strategy, which packaged technical assistance with new financial incentives targeted at encouraging the formation of new, technology-based start-ups (Wong, 2001). A US$1 billion Technopreneurship Fund (later expanded) was set up to operate with foreign venture capital companies (VCs) on a matching-fund basis, and this facilitated the entry of over 10 American VCs by the end of 2000. Although the bursting of the dot-com bubble dealt a severe blow to Singapore's bid to emulate Silicon Valley's array of support for new technology-based SMEs, the establishment of a venture-capital industry, backed by the government's patient capital, created a new institutional infrastructure for SME support that has survived the downturn. In late 2000 the Infocomm Development Authority established a new e-Business Industry Development Scheme to assist SMEs to adopt e-commerce technology. An investment arm of the Singapore government helped to establish Sesame.com, which quickly became a leading B2B e-commerce portal with an Asian regional spread. Rosetta-net, a non-profit association dedicated to creating and diffusing an open-source e-commerce standard, had enlisted over 100 members by mid-2001, and had set up an e-learning centre to offer sector-specific training courses. Singapore's linkage-development programmes have spawned a comparatively broad and deep base of local supply firms in precision engineering, components manufacturing, and OEM sub-contracting. Indeed, a government-invested company named Natsteel Electronics quickly rose in the late 1990s to become one of the world's top five CEMs, with plants around the Asia Pacific, before being acquired by Solectron (the world number one contract manufacturer).

SME programmes in the rest of Southeast Asia, despite their ubiquity, are generally less ambitious and successful as instruments of industrial strategy. Yet in an effort to remediate the meagre linkage effects of the boom-era FDI, several countries launched special linkage-support programmes during the 1990s along

the lines of Singapore's LIUP. Most of these begin with government investment promotion agencies, which are the key contact points with foreign investors, seeking to play a match-making role between MNCs and potential local suppliers. The large gap in skills and technology between foreign and local firms, however, has caused governments to revamp their industrial extension systems to upgrade local supplier industries, often packaging technical support with dedicated financing programmes. Malaysia initiated a Vendor Development Program in 1993, under which multinational and local 'anchor companies' would provide guaranteed purchasing contracts and technical assistance to local vendors, who would also receive subsidised finance from local banks and technical support from government institutes. Under the cluster-based Second Industrial Master Plan (1996–2005), this was expanded into a broader Linkage Development Program under the auspices of a new Small & Medium Sized Industry Development Corporation (SMIDEC). A Global Supplier Program launched in 1999 aimed to help established MNC subcontractors move beyond dependence on local linkages to a single principal buyer and enter international supply networks. SMIDEC's programmes had assisted 832 SMEs by April, 2001. As with Singapore's LIUP, SMIDEC's programmes subsidise MNCs' secondments of engineers to local supplier firms for training and technical assistance. SMIDEC also administers an Industrial Technology Assistance Fund (ITAF), which since the early 1990s has provided matching grants to SMEs for technology acquisition and productivity improvement. A separate grant scheme for the adoption of e-commerce technology was launched in July, 2000, and 674 applications had been approved by April 2001 for the adoption of ERP and e-commerce applications. The MSC's development corporation also launched several venture capital funds, totalling some US$300 million, to nurture technology-based start-ups, although their performance has not matched Singapore's similar funds, which operate closely with private foreign VC partners.

Linkage development has been most notable in Penang state, where a proactive local development authority has long fostered networking among MNC managers, including American companies' Malaysian-recruited executives, and local suppliers of engineering parts and services. The Penang Skills Development Centre (PSDC) has become the focal point of cluster-enhancing initiatives, most notably in engineering training courses jointly managed by MNCs as well as supplier development efforts subsidised by SMIDEC's Global Supplier Program. A few sub-contractors in Penang have grown to become key players in the regional supply networks of their chief MNC customers, and have established facilities in the Philippines, China and elsewhere.

Thailand's supplier base was initially nurtured through traditional local content programmes in cars and electrical appliances, which gave rise to a relatively large base of supporting industries in metalworking, tool and die, plastic products, printed circuit-board assembly, and electrical components. While local content policies often result in the creation of uncompetitive industries, Thailand's programme ultimately laid the foundation for success, not as a nationally owned export industry, but as a 'contingent cluster' of international production by MNCs. The presence of a large group of cost-competitive parts makers, together with what was once the region's largest car market, became a major attraction for new

investments in car assembly in the late 1990s. In the wake of a US$1 billion investment committed by General Motors in 1995, new Japanese and European investments transformed the sector from an import-substituting industry to a base for regional exports. Thailand's Eastern Seaboard Development project, implemented from the late 1980s, created special infrastructure (including a new port) for petrochemicals and car manufacturing clusters.

As for specific linkage programmes, Thailand's BOI launched a scheme called BUILD (Board of Investment Unit for Linkage Development) in 1992, but its efforts produced meagre results until late 1997, when the programme was revamped. A more proactive match-making effort named the 'buyers meet vendors' programme worked to arrange site visits to leading MNCs, and created 'reverse investment fairs' of foreign buyers' potential procurement needs, and sector-specific informational workshops. By 1999 the BOI had arranged visits to 18 large companies involving a total of 491 potential suppliers, and claimed that 58 contracts worth nearly 1 billion baht had resulted from the meetings, rising to 2.64 million baht in 2000, although the actual importance of the government's intervention is unclear. In 2000 the BOI also established an ASEAN-wide supporting industries database (AASID), which included some 20 000 firms by the end of 2001. Finally, the Board also used its main promotional incentives to develop supporting industries in order to deepen the export structure, but much new investment in supporting sectors represented additional foreign investment from Japan and East Asia. While the BOI has been active within its sphere of authority, Thailand's overall efforts to foster industrial clusters have been hampered by an inadequate infrastructure for providing financial, skill and technical support for SMIs. Many or most small and medium suppliers lack access to commercial bank lending, for example, despite the establishment of a special SMI Finance Corporation. In 1999 the Ministry of Industry corporatised several of its sectoral divisions to create quasi-public extension and training institutes under an Industrial Promotion Foundation. The new organisational framework boded well for an enhanced extension effort, yet funding limitations have prevented them from fulfilling this potential. The adoption of e-commerce has also lagged in Thailand, although the BOI works with local international service providers to subsidise the adoption of simple e-commerce tools among suppliers registered in its database. A comparatively small number of 106 software projects received promotional status after the introduction of incentives in mid-1997 through mid-2001. Despite Thailand's slow progress in developing relevant policy and institutional infrastructure, in early 2001 the BOI announced new plans for cluster-based policy making involving an expanded BUILD programme covering light manufacturing and agro-based industries as well as electronics and cars. The car sector has gone on to new strength in the post-crisis period, as leading MNCs rapidly expanded exports, winning a global product mandate (including exports into the Japanese home market) from Toyota for the production of one-ton pick-ups.

Conclusion—Southeast Asia's prospects in the global production system

The collapse of global electronics markets in 2001 hit Southeast Asia tre-

mendously hard. Simultaneously, China has offered prospective investors a potent combination of competitive advantages: the world's only fast-growing economy, the biggest potential domestic market in a range of products, and the promise of easier access with the country's accession to the World Trade Organization (WTO). In the light of these factors, the sudden rise of China to potential regional economic dominance is perhaps easily explicable, at least in hindsight. Whether the current perception of a 'China threat' to Southeast Asia's industrial prospects is exaggerated remains to be seen. Ben Anderson (1998) reminds us that the industrialisation of Southeast Asia was an unlikely byproduct of the Cold War, which cut off the Chinese industrial heartland bordering the East China Sea from the global economy. In his pessimistic analysis, Southeast Asia has failed to convert its FDI windfall into durable local advantages, based on human resource and technological development, and may yet revert to its historical status as a tropical, resource-rich hinterland to an industrialised Northeast Asia. Similar, if less despairing, conclusions are often heard within the region, in the form of a renewed development policy emphasis on the agricultural sector and resource-based industries. Clearly, the question of political stability will overshadow the momentum of industrial investment and growth. Mobilising investments to develop the region's comparatively poor human resource base will also be a basic condition of sustained growth. Despite the weak indigenous foundations of Southeast Asia's industrial ascent, however, its serendipitous boom has in fact created durable legacies. The region's advantages as a node within a networked global production economy will not evaporate in the face of the Chinese challenge, but will evolve in the direction of particular niches and horizontal clusters of multinational activity.

While MNCs currently pour money into China to create the production base required to serve the booming market and achieve cost-reduction in mass production for global export markets, China presents a rather thorny bouquet from the standpoint of IPN governance. The key long-term strategic consideration in IPN evolution is MNCs' ability to appropriate and deploy core intangible assets—knowledge, skills and business alliances—on a global basis while regulating their far-flung networks for maximum competitive advantage. China's policy making with regard to foreign invested operations may yet see significant shifts, and the administrative complexities of dealing with national, provincial and local officials will continue to be an important stumbling block to MNCs' efforts to optimise their production networks there. Informal barriers to efficient management and supply logistics will remain significant for years to come, despite WTO accession. China's low-wage advantages are deceptive: social insurance fund contributions and local payroll levies often impinge on MNCs' cost structures. The security of intellectual property will be a perpetual concern, not merely in terms of software and media products, but also in terms of high-technology product designs and process technologies. By contrast, Southeast Asia offers leading MNCs an environment in which they can articulate their global production strategies with maximum flexibility and security. These countries' post-crisis struggles reveal more policy continuity than much of the political rhetoric and external commentary would suggest. Despite some second-guessing, the region's governments have enhanced their efforts to upgrade their policy and institutional

infrastructures, and remain well positioned for the revival of electronics and other manufactured export industries. As MNCs continue to build and reshape their IPNs, they will inevitably seek to develop and integrate Northeast Asian operations, including China, with their established Southeast Asian bases.[14] It is important to note that Indonesia accounts for some 60% of the decline in FDI to Southeast Asia from 1996–2001. Indeed, when Indonesia is excluded, FDI flows into Southeast Asia in 2001 registered a net *increase* over the average annual totals registered from 1990–95. Despite the falloff in export growth during the US recession, then, FDI totals have remained fairly stable across most of industrialising Southeast Asia, albeit at lower levels than their peaks in the late boom era.

A new regional division of labour is emerging, in which Southeast Asian industries must build upon their existing advantages to locate new niches with potential for dynamic localisation effects. In addition to maintaining political stability and investing in human resources, they will need to continue developing their capacity for implementing cluster-building policies. In contrast to the general tenor of much commentary on the region's reform process, the crucial task is not to shrink the state's economic role decisively, but to enhance its efficacy in investing in, and diffusing, the institutional, infrastructural, technical and skills base appropriate to globally linked production.

Notes

[1] Hatch and Yamamura (1996) put it starkly: 'By building keiretsu-like production networks that embrace and even smother local entrepreneurs, technicians, and workers in Asia, Japanese MNCs carefully control the pace of technology transfer. In effect,t hey lock it up in the vertical, quasi-integrated networks they control. In doing so, they are able to extract an unusually large share of the rent on the use of their know-how' (p 10).

[2] Much of this critique has been elaborated with particular reference to Japanese IPNs, and there is a large literature focusing on the differences in network structures and localisation behaviour among MNCs from different home countries (Borrus *et al*, 2000). US electronics companies have practised a relatively more open approach to network governance, at the local, regional and global scales, than Japanese and other East Asian multinationals. Yet the syndromes of MNC network-based control, limited host-country autonomy, and constrained structural dynamism are much broader questions than variation by MNCs' national origin.

[3] Indeed, even in comparatively xenophobic Korea, FDI accounted for a large share of electronics production and exports from the industry's beginnings in the 1960s until the late 1970s.

[4] Hobday's (1995) account richly documents how localised learning propelled East Asian electronics makers' mobility along the value chain, as leading firms moved from original equipment manufacturing (OEM), or capacity subcontracting, to own-design (or turnkey) manufacturing (ODM) and, in some cases, to own-brand manufacturing (OBM) and exports.

[5] Hatch and Yamamura (1996) write: 'the ASEAN-4 … may not actually feel the pinch of captive development until Japanese high-tech manufacturers stumble … we can expect these firms to take advantage of the built-in flexibility of their regional production networks. They will undoubtedly "squeeze" their junior partners in Asia, much like the large manufacturers in Japan used to (and still do, albeit more subtly) squeeze their keiretsu suppliers in hard economic times'.

[6] By 1995 Matsushita's Malaysian operations accounted for 25% of its parent group's overseas production, and a similar proportion of its global (including Japan) production of air conditioners and televisions.

[7] The extent of production deepening in Southeast Asia was often obscured by the parallel trend towards greater regional integration. Local procurement ratios, measuring the sourcing of components within a given national territory, rose only slowly and typically stagnated at around 30%–35% by value, even after a decade or more of production. At the same time, however, the *regional* procurement of components increased markedly over the boom period, a trend that has continued in the wake of the crisis. In 2000 Japan experienced a deficit with Asia in the trade of intermediate goods—parts and components—for the first time.

[8] Host governments were confronted with an unanticipated trade-off between production *deepening* and the technology *indigenisation* that they had assumed would accompany greater linkage effects. MNCs were willing to raise local content by forming linkages with other foreign firms, often their trusted home-country suppliers. Local value-added would thus increase, but technology diffusion to local industry would not result. On the other hand, any effort to regulate the inflow of foreign suppliers in order to steer sub-contracting business and technology spill-overs to local firms risked slowing down the much-desired progress of linkage formation.

[9] This did not, however, represent a case of backward integration. Silicon ingots were manufactured in Malaysia, sliced and polished into disks, exported to wafer fabrication facilities across the globe, and re-imported for packaging and assembly in Malaysia before being re-exported.

[10] McKendrick *et al* (2000) illuminate the remarkably fine-grained functional hierarchy that typifies the regional division of labour in hard disk-drives.

[11] Moreover, the country's labour surplus conditions mean that investments in labour-intensive assembly are still very attractive.

[12] This fear has often been expressed *vis à vis* the collaborative B2B exchanges set up by otherwise competing car manufacturers for the procurement of standard parts. Examples include GMs' TradeExchange and Ford's AutoXchange, which have sought to include Japanese car makers in order to increase monopsony power. Indeed, GM, Ford and Daimler-Chrysler have developed a shared B2B parts exchange, Covisint.

[13] As in other countries, the original exclusion of in-country revenue generation was designed to distinguish genuine RHQs, with their skill-intensive managerial control and co-ordination functions, from mere representative offices, which simply arrange local sales.

[14] Also significant is the fact that China itself has rapidly become an important source of FDI in Southeast Asia.

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