

THE UNINTENDED CONSEQUENCES OF PRO-POOR GROWTH: GLOBALISATION, INDUSTRIAL UPGRADING AND THE UNDERDEVELOPMENT OF MALAYSIAN ELECTRONICS

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Abstract

Malaysian electronics emerged as part of a particular model of “pro-poor” growth based upon rapid industrialisation through foreign investment, coupled with a highly politicised affirmative action effort to achieve greater equity in the distribution of wealth. An unintended consequence of this model is that state support for its premiere manufacturing sector, electronics, was both piecemeal and reactionary. As electronics became the driver of export-oriented industrialisation in Malaysia, success in terms of attracting FDI were born at a costly expense. Domestic leadership and bargaining power was generally lacking and the country’s ability to motivate more ‘developmental’ forms of foreign investment was limited. Consequently, notable successes of local upgrading are relatively few in electronics and far overshadowed by exogenous dynamics which, over the 1990s, were to have limited Malaysia’s window of opportunity for indigenous industrial development.

This work illustrates how current trajectories in the evolution of global electronics production has problematised the opportunities for local upgrading in ‘latecomer’ countries. The basic lesson to learn from Malaysia’s experience is that in the case of global industries such as electronics, foreign investment comes with different forms of “baggage” (business models, firm strategies, outsourcing practices, *etc.*) which affect the channels and opportunities for local upgrading. Not only must industrial policy anticipate these differences when attracting foreign investment, but as the Malaysian case helps illustrate, the management of domestic integration into global production networks is likely to require far more policy integration and coordination than ‘industrial policy’ traditionally entails. In other words, targeted solutions to industrial upgrading require highly integrated efforts between different aspects of economic governance.

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Introduction

In recent decades, the search for the ‘secrets’ of economic growth in the developing world have been inspired partly by the industrialisation experiences of a number of East Asian countries and, more recently, by the ‘second tier’ industrialising countries of Southeast Asia (particularly Malaysia and Thailand). While much of the ‘miracle’ behind the former was associated with the role of their respective versions of the ‘developmental state’, much of the success of the latter seemed to be connected with their ability to creatively utilise foreign direct investment (FDI) as a central component of their development projects (Singapore, uniquely, welded both into its development project.)

As developmental models, many commentators are now pessimistic about the utility of the earlier East Asian experiences for developing countries trying to industrialise. To support their pessimism, they point to the highly particular historical circumstances surrounding East Asian industrialisation (the economic consequences of the Cold War, for instance), the seeming demise of the developmental state even in some of its leading exemplars (such as South Korea), and in particular, to the shrinking of ‘development space’ consequent to the changed international ‘rules of the game’ effected by the World Trade Organisation (Wade 2003). On the other hand, more hope seems to be currently invested learning lessons from the Southeast Asian countries. In particular, much debate has focussed on learning from their experiences in using FDI linkages to fast-track domestic industrial upgrading and integrate their economies into higher-value positions in global production networks (GPNs). Such debate, however, has also proved problematic in recent years.

A string of shocks appear to have derailed, if not actually undermined, Southeast Asia development. Dependence upon FDI and an export-led industrialisation strategy is vulnerable when the global forces behind it are, as now appears to be the case, shifting their sights elsewhere. For critics, if the Asian economic crisis did not reveal the fundamental weakness of the FDI model (which it did not; see Henderson 1999), then the curtailment of investment and closure of manufacturing operations in Southeast Asia surely do. In recent years, FDI inflows into Southeast Asia have begun to dry up and export performance, based in large part on the electronics sector, has been waning (Felker 2003). Much of this is attributed to the rise of China as a manufacturing economy. China is not only the world’s fastest growing economy with the largest potential domestic market, but it is also an alternative production platform that competes with its ASEAN neighbours on labour costs and, as evidenced by many high-profile plant relocations from elsewhere in the region, is able to rival their existing manufacturing capabilities as well.¹

Given such problems, what is to be learnt from Southeast Asian industrialisation? For some, the lesson of recent development stem lie in understanding the structural inevitabilities of their FDI-led growth. Yet others believe that strategic intervention is always possible were host governments to re-examine their policies, diversify foreign investment and govern FDI in ways that maximise gains for the national economy (see, for instance, Chang and Grabel 2004). But key questions remain. Has TNC-led industrialisation left Southeast Asia in a dependency trap? Did foreign investment actually do little to develop autonomous production capacities and improve the

¹ Lall and Albaladego (2003) have argued that while China is not necessarily a threat to its regional neighbours *per se*, in the case of electronics, it does pose a significant threat to the export-competitiveness of the Malaysian electronic sector.

competitiveness of a broad indigenous industrial base? If so, why has this happened and what policy changes are needed?

Answering these fundamental questions requires a more detailed examination of experiences in industrial upgrading through insertion into global production networks. In some relevant literatures (such as on global value chains) the analysis of upgrading is viewed as a process in which domestic firms “learn from global buyers” (*cf.* Schmitz and Knorriga, 2000; Humphrey and Schmitz, 2002). Such frameworks tend to stick to interests in knowledge and technology transfers or other spill-over effects, and underplay the changing organisational dynamics of particular sectors and the larger institutional and policy environments underlying national and international economic governance. As a consequence, too many views of upgrading are influenced by static methodologies that *inter alia*, abstract the relevant processes from broader GPN dynamics involved. As a result, the analyses of particular country experiences are rife with misleading interpretations.

To better gauge the link between FDI and development, one must recognise that FDI may affect industrialisation experiences in different ways depending on both substantive changes in the organisation of international production and the participation possibilities this opens up to different countries (Navaretti et al 2002). Industrial upgrading is not simply about the ability of individual firms to learn from global buyers, but about the dynamics which affect a country’s capacity to deviate (move on from) their original mode of integration in the global production network. Such considerations push the concept of upgrading beyond the immediate contexts in which foreign and local firms interrelate. At the very least, consideration of two other interrelated processes is required. Firstly, an adequate grasp of industrial upgrading necessitates that we examine *linkage-promoting* efforts as a subset of activities influenced by the larger ensemble of institutions governing growth (economic governance for short). Secondly, industrial upgrading, particularly in ‘global industries’ such as electronics, requires one to examine the *linkage-configuring* dynamics that govern the evolution of global production networks themselves.

Our analysis proceeds from a view that the problem faced by many developing countries concern their ability to govern the intermediation between domestic and international development; a balancing effort between the domestic governing of growth and the cross-national governing global production networks. This research extends this line of analysis by re-examining the experiences of Malaysian industrialisation. Our choice of country reflects current debates which place the Malaysian experience as a primary example of how a developing country can harness FDI for development aims (*cf.* UNCTAD, 2001, 2002; Rasiah, 1999a, Best and Rasiah, 2002).

There is much to applaud in Malaysia’s development record. Indeed, there is much fragmented evidence to support claims that technology and capabilities transfers have occurred in Malaysia between TNC subsidiaries and local firms. However, the *real* lessons to be learnt from Malaysian industrialisation may not necessarily be associated with these matters. The presence of firm-level successes do little to offset fundamental concerns about the underlying competitiveness of domestic producers and the limited extent to which industrial upgrading efforts have been able to move Malaysia away from its original mode of integration into the global system of manufacturing; as a platform for low-skilled assembly activities. Malaysian electronics, as with its Southeast Asian equivalents (Singapore being the perennial exception) is still widely recognised to be foreign dominated with local SME

suppliers disproportionately engaged in 'lower tier', lower-value added activities (Ernst, 2003).

In this paper we argue that such successes are often overemphasised at the expense of under-estimating and misrepresenting the dynamics that have severely limited Malaysia's ability to deviate from a low-cost, labour-based form of GPN integration. The deficiencies, we suggest, are two-fold. Firstly, much of the debate about Malaysia's ability to upgrade by 'levering' FDI in electronics has paid insufficient attention to broader changes affecting the organisation of the global electronics industry. Secondly, the role of regulation in promoting the competitiveness of Malaysia's indigenous electronics base is often only selectively examined and, even then, limited to a narrow reading of 'industrial policy' and its impact. Such approaches fail to recognise that the balance of policy impacts may have been as incoherent and conflicting as is the multifaceted system of Malaysian economic governance that produced it. Hoping to present a more balanced evaluation on the development of Malaysian electronics, our analysis seeks to redress these limitations.

In particular we raise two concerns of general importance for understanding the links between FDI and development. Firstly, as evidenced by the Malaysian case, the integration opportunities available to domestic firms are likely to be time-bounded; dependent upon the amalgam of international forces and trends governing the configuration of linkages within and between production networks (Felker 2003). While it was possible for East Asia's first NICs (South Korean and Taiwan, for instance) to impose performance requirements and local content conditionalities on inward FDI, this was much more difficult to effect in Southeast Asia, as the Malaysian case exemplifies. Secondly, current 'best practice' in regards to linkage-promotion efforts, fail to fully appreciate the conflicting spectrum of domestic social regulations and policies that affect the upgrading process. A number of social policies, such as anti-poverty affirmative action efforts and immigration policies, can operate as 'silent' industrial policies (Wade, 2001). As we discuss here, such policies may equally offset efforts to attract those forms of FDI willing and able to create linkages between indigenous manufacturing industries and TNC-dominated global production networks. Again, the Malaysian experience presents an interesting opportunity to examine the unintended consequences that social policy can have for economic development.

Malaysia is an interesting case for additional reasons. Economic development is always more problematic in contexts where inequalities derived from class and gender are compounded by inequalities associated with ethnicity or race. Unlike its East Asian and Southeast Asian counterparts (with the partial exception of Singapore), Malaysia is multi-racial. It is also the first 'Muslim majority' country to have industrialised. For both reasons, it has more in common, and thus perhaps more 'to say', to large parts of the developing world, than do its regional counterparts.

The ambition of this work is not to advance a more generic framework for analysing global production networks and economic development *per se*. While elements of such a framework guides our analysis (see Henderson et al 2002a and Henderson 2002 for broader discussion), for current purposes, they are left more implicit than explicit. Rather the core contribution of this work is to illustrate how current trajectories in the evolution of global electronics production has limited the opportunities for local upgrading in 'latecomer' countries, particularly developing countries like Malaysia with limited and reactionary attempts to manage the

modalities of domestic integration. To these ends, the structure of this paper is as follows.

We begin by placing the evolution of electronics in historical context. Malaysian electronics emerged as part of a particular model of “pro-poor” growth based upon rapid industrialisation through foreign investment, coupled with a highly politicised affirmative action effort to achieve greater equity in the distribution of wealth. This contextualisation is important for understanding why state support for electronics was both piecemeal and reactionary. We then proceed to the main body of discussion where we argue that Malaysia’s ‘stalled’ upgrading experience stemmed from the *kind* of investment attracted into electronics. From a production network perspective, foreign investment comes with particular “baggage”—such as the particular models of manufacturing and competitive strategies—which affect the channels and opportunities for local upgrading. In the case of Malaysia, the dominant production networks which established themselves in Malaysia each had particularities which problematised local upgrading processes.

Malaysian development and the rise of electronics

This section provides an overview of the evolution of Malaysian electronics within the broader context of industrialisation.

Initiating Conditions behind Industrialisation

In the decade following Malaysia’s independence in 1957, economic development was pursued through an industrial policy based on import-substitution. This strategy did not deliver on its growth promises. Nor was it able to reduce abject poverty or resolve an inequitable economic structure clearly divided along racial lines. An inheritance from its colonial past, the economy’s racial and class divisions culminated in a series of riots in May 1969. The riots provided a catalyst for Malaysia’s political leaders to revisit its prevailing strategy for realising economic development. Concerns over the ethnic divisions within society became central and served to frame much of Malaysia’s approach to development over the following decades. With the New Economic Policy (NEP) introduced in 1970 and its successor, the National Development Policy (NDP) in 1991, these overarching development frameworks sustained a thirty-year effort to achieve economic growth alongside a more equitable redistribution of wealth in society. Ultimately, the riots of 1969 would have a lasting influence reflected not simply in policy terms, but equally in the very functioning of the state apparatus, its governing institutions and its bureaucratic structures (see Henderson *et al* 2002).

The success of Malaysia’s affirmative action efforts were predicated upon a strategy for rapid economic growth. At the time, industrialisation in South Korea, Taiwan and Hong Kong were based upon the mobilisation of domestic, not foreign, capital. Such a model was difficult to replicate in the Malaysian context for two basic reasons. Firstly, Malaysia had severely limited manufacturing base by the early 1970s. Clearly, industrialisation would depend heavily on foreign investment and expertise. This option was further reinforced by the politically-sensitive concerns with racial equity. The indigenous manufacturing sector in Malaysia had itself been largely comprised of the richest segments of the population, the Chinese Malaysians. A government attempt to direct an already limited pool of domestic capital into the upgrading of the existing manufacturing base was thus plagued by political conflicts

tantamount to directly supporting the wealthiest segment of the population (Jesudason, 1989). Foreign capital represented a way of both avoiding ties between the State and local (Chinese) capital as well as means of ‘crowding out’ their influence on the Malaysian economy (Lim and Fong, 1991). Ultimately, Malaysia’s attempt to achieve growth with equity would stem from its use of foreign investment coupled with pro-poor political project focussed on redistributing wealth to the indigenous Malays (Bumiputera). As we discuss later, this combination would have uneven effects on the evolution of state structures which governed industrial development in electronics.²

While the first instance of foreign direct investment into the electronics sector was by Matsushita in 1965, it was oriented towards servicing the domestic market. This reflected both the general orientation of import-substitution strategies which dominated Malaysian industrial policy throughout the 1960s as much as the limited abilities of the existing manufacturing base to actually service export markets (Rasiah, 2002b). The shift towards export-oriented industrialisation, and the inflow of FDI in electronics, would themselves only begin to develop in the early 1970s after an ensemble of financial, regulatory and institutional changes were in place.³

Towards export-oriented industrialisation

Financial incentives came first. The Malaysian government introduced incentives to attract FDI with the Investment Incentives Act of 1968. With hindsight, some of the most important incentive schemes would include: investment tax allowances on capital expenditure, a system for renewable five- or ten-year tax holidays granted to foreign firms with “pioneer status”, and access to export credit refinancing provided by domestic banks at preferential interest rates (Rasiah, 1995). Yet while fiscal incentives were undoubtedly key to attracting FDI in electronics, such incentives were not substantially different from neighbouring countries at the time (Haggard, Li and Ong, 1998). Thus the provision of financial incentives alone, was not itself the catalyst for inward FDI into Malaysian electronics.

Substantial inflows of FDI into electronics would only begin in the early 1970s following added regulatory changes and the development of an intermediating institution specialised on the sector.⁴ On the regulation end, the Free Trade Zone (FTZ) Act of 1971 led to the creation of two duty-free export processing zones; one in Penang in the northern state of Kedah, the other in the Klang Valley in the central state of Selangor. This created a physical space in which foreign manufacturers could engage in export-oriented activities free from customs duties. The scope for accessing FTZ benefits were subsequently extended to investment in locations outside of the FTZs. This was achieved through the creation of a system of Licensed Manufacturing

² Domestic politics has always had a major influence on industrial policy in Malaysia (cf. Felker, 2001). The political project based around the redistribution of wealth, encapsulated in the Industrial Coordination Act of 1975 which required more successful firms to distribute 30 percent of their assets to state-managed Bumiputera interests, would create a ‘dual economy’ in Malaysia. For local SMEs, particularly those owned and managed by Chinese Malaysian, their growth was artificially limited so as to avoid meeting ICA redistribution criteria (see Ritchie, 2004).

³ For a historical overview of Malaysia’s industrialisation strategy see Rasiah, 2002a, 2002b; Clarke *et al*, 2003.

⁴ Other regulatory changes were important for developing an attractive package for FDI in manufacturing. In particular, labour regulations which banned the formation of unions in export processing zones, amendments to the Employment Act to allow three work shifts, and a government that controlled labour unrest, rounded out a complete cost-based package promoted to foreign manufacturing firms.

Warehouses (LMWs) introduced in 1972. Other critical regulatory changes augmented Malaysia's labour conditions. In particular, amendments to the Employment Act to permit companies to introduce up to three work shifts a day, a de-facto ban preventing unionisation in the electronics industry, coupled with tight government control over potential labour unrest, all provided a more competitive package that could be promoted to foreign manufacturing firms.

Yet someone needed to both actively promote Malaysia to foreign electronics firms as well as help in the tailoring of domestic conditions to meet the demands of these global players. This was achieved through a division of labour between federal and state government. The role of the federal government has been in the provision of fiscal incentives. Historically, little direct attention to industrial development in electronics has stemmed from the federal government. Rather, federal efforts have been preoccupied with managing the overarching problems of achieving economic growth with ethnic redistribution.

Federal support in the form of strategic industrial policies would only emerge in the early 1980s and even when introduced, they would not initially target the electronics sector. State targeting of strategic industries would only begin to mobilise in the early 1980s with the 4th Malaysia economic plan (1981-85). While electronics has established itself as the single largest segment of the manufacturing sector, a position it retains to this day, Malaysian industrial policy would target a different set of industries on which to build its indigenous manufacturing capacity. As had been done in Japan and Korea, heavy industries such as petrochemicals, iron and steel were the beneficiaries targeted by the newly elected prime minister, Mahathir, as part of his "Look East Policy" introduced in 1981. Unlike electronics, these sectors had substantial Bumiputera participation and represented a convenient solution for the political need to balance growth with redistribution. Electric and Electronics (E&E) did receive targeted attention in the first Industrial Master Plan initiated in 1986. However, in line with Malaysia's pro-poor growth model, some specific support for small and medium industries in E&E were placed under the control of the Ministry of Entrepreneurial Development and thus only open to local Bumiputera firms.

Given the preoccupation with managing growth with equity at the federal level, much of Malaysia's success in attracting FDI inflows in electronics would stem from differing locational dynamics and institutional infrastructure at the regional level (see Best and Rasiah, 2003). Foreign direct investment into electronics generally flowed into three distinct regional clusters in Malaysia: Penang in the northern state of Kedah, the Klang Valley in the capital state of Selangor, and along the Malaka straights running down to Jahor on the south border with Singapore.⁵ Generally speaking, Kedah would represent the most coherent clustering dominated by foreign investments into the manufacture of electronic *components* (semi-conductors and later hard disc drives) and the local manufacturing support. In Penang, Foreign investment in these segments tended to come from North America and Europe. In contrast, Selangor would generally attract foreign investment from the 'first tier' of East Asian NIEs (Japan and Taiwan especially) who concentrated in the export of a broad range of consumer electronics and electric household appliances. Finally, the Malaka region developed as an extension of Singapore's labour-intensive assembly activities as their labour costs increased in the 1970s. Jahor specialised in computer peripherals and

⁵ Unlike the clusters based on an extensive range of small firms engaging in complimentary manufacturing activities as found in industrial districts in Europe, FDI clustering in Malaysia, as elsewhere in Southeast Asia, was based more around the co-location of multinationals horizontally organised in terms of shared functional activities (Felker, 2003).

consumer electronics assembly. While largely dependent upon its relations to the Singaporean industry, Jahor has attracted foreign investment, particularly from North American contract manufacturers (discussed later) seeking tap into the regions high volume assembly specialty.

While federal incentives and regulatory reforms were critical for attracting foreign investment, state institutions at the regional level were instrumental in operationally influencing where this investment was located and in promoting local linkages. Consequently, the evolution of state institutional capacities were critical for industrial upgrading in Malaysia. In the context of a politically-driven “pro-poor” growth model, the division of labour between federal and state roles would have uneven effects on the development of industrial development institutions at the state level.

Outside of Penang, there has never been a significant capacity building in state-level government agencies to deal with the electronics sector (Rasiah, 1999a). For instance, in Selangor, while itself representing the second largest region for electronics manufacturing, electronics has always been a minor element among a diverse range of other unrelated sectors. A legacy of bureaucratic and regional political priorities, the Selangor Economic Development Corporation (SEDC) has only ever been focussed on the development of land and infrastructural services for the nation’s capital. Unlike its equivalent in Penang, Selangor thus never needed to develop special governmental intermediaries for the region’s electronics sector.

Given Malaysia’s uneven institutional development at the regional level, it should come to no surprise that much of inward investment into electronics became concentrated in Penang. And in relation to Malaysia’s best examples of upgrading from inward investment, it is also no coincidence both in the literature and among federal policy-makers interviewed, much of the information known about Malaysian electronics and its successes are derive from the Penang context.⁶ This is because it was only in Penang that a political and institutional infrastructure would emerge with a coherent industrial focus, matched by political motivation and administrative expertise, to attract FDI into electronics (see Haggard et al, 1998; Rasiah, 1999a; 2002a). This began with the creation of the Penang Development Corporation (PDC) in 1969.

The PDC represents a unique agency in the development of Malaysian electronics. As with other state economic development corporations in each of Malaysia’s state-regions, the PDC’s primary institutional resource was its control over land development and infrastructure maintenance. In terms of attracting FDI, such resources are of limited use compared to the financial incentives managed at the federal level. And yet the PDC provided Malaysia with a critical institutional asset—a proactive and adept administrative intermediary through which to coordinate a system of relationships not only between multinationals and local firms, but equally between the industry and the federal government. As the leading base of research and expertise on the electronics industry anywhere within the government bureaucracy, the PDC has evolved into a key source of information about the electronics industry for Federal decision-makers.⁷

⁶ Interviews carried out during June 2004 with a number of federal and regional agencies attested to the general association between Malaysian electronics and Penang.

⁷ The PDC regularly reports to the Malaysian Industrial Development Authority (MIDA) concerning the state of the electronics industry in Penang. Given its capacity to actively monitor developments in the industry and work extensively with foreign and local companies, the PDC’s input appears to also be a primary source of intelligence used in the development of industrial policies at the federal level.

The Turning Point

With regulatory changes, numerous pecuniary incentives, and a proactive governmental intermediary in place by the early 1970s, FDI into electronics, led by US semiconductor firms in Penang coupled with Japanese investments in other regional clusters. Between the early 1970s and mid 1980s, foreign investment in electronics was relatively modest. With much investment concentrated in Penang, and state institutions in the regions had been successfully building a coherent industrial cluster, little pressure was placed on the federal government to provide any further policy interventions in relation to electronics. This distant relationship between federal and state activities suited the growth with equity model precisely because it meant a federal government development initiatives were completely dissociated from the development of the Malaysia's indigenous electronics SMEs which were, from a federal standpoint, bounded to Penang and thus largely Chinese-run. To its detriment in later decades, this original steady-state division of labour would last for the better half of the first two decades of industrial development in electronics. It would only be disturbed following a severe downturn in the Malaysian economy in 1985.

In 1986, unemployment reached 7.4 percent; more than double the 3.4 percent level in 1982.⁸ These developments reflected distortions induced in the early 1980s through a conflicting match of import substitution policies and export-oriented fiscal incentives coupled with the federal government's costly experiment in sponsoring the growth of heavy industries (*cf.* Athukorala and Menon, 1999; Rasiah, 2002). The downturn provided a shock to the government in the run up to Mahathir's first re-election campaign in 1986. This coincidence appears to have placed an added pressure on the political elite to develop a more coherent vision for industrial policy. And in 1986, it saw the government's first attempt to fundamentally revisit the industrialisation strategy initiated in the early 1970s.

The government introduced Malaysia's first long-term Industrial Master Plan (IMP1) which ran from 1986 to 1995. The new policies espoused both the importance of manufacturing and the prevailing foreign-led, export-oriented industrialisation strategy, but equally the virtues of economic liberalism and a private-investment led form of growth more generally. Adding to previous financial incentives, a preferential tax policy for export-oriented manufacturers was introduced in 1986. Deregulation of foreign investment to allow complete ownership of local subsidiaries led to rapid growth in export-oriented manufacturers.

There were also some significant deviations in regards to the use of financial incentives to promote foreign investment. While previous fiscal incentives had merely sought to attract foreign manufacturers to take advantage of Malaysia's comparative advantage in low cost labour, IMP1 marked the Federal government's first concerted attempt to promote indigenous upgrading of technological capabilities and human resource skills coupled with attempts to create greater linkages between foreign multinationals and local small and medium enterprises (SMEs).

Over the previous decade, inward FDI into manufacturing, particularly in electronics, had limited links to the indigenous manufacturing base except as a source of low-cost assembly workers. Unlike the initiating conditions present for the first tier NIEs in East Asia, export-oriented FDI arrived in Malaysia knowing that most of the

⁸ Dept. of Statistics, Malaysia

intermediate components and subassemblies required for export activities would have to be imported. Furthermore, foreign multinationals had always been able to enter as majority or wholly owned foreign subsidiaries (see table 1).⁹ Given that local input was already at the lowest end of production chain, there was no “product life-cycle” effect underlying foreign investment in electronics and thus no incentive for the foreign subsidiaries to actually outsource activities to local firms as had done in previously with East Asian industrialisation (cf. Felker, 2003).

Table 1. Foreign Ownership of Fixed Assets in Electric/Electronics, 1968-1998

Year	Foreign Ownership
1968	70%
1975	84%
1980	80%
1985	73%
1990	89%
1993	91%
1998	83%

Source: Rasiah (2002b)

As economic stability returned and the liberalisation project was now underway, the federal government turned its attention to its first major revision of industrial policy to promote local upgrading in manufacturing. Shifting Malaysian manufacturing out of this starting position required a means of breaking the status-quo within which foreign investment had been allowed to take place. Under the IMP, this meant introducing new upskilling requirements through training and skills development initiatives.

During the first Industrial Master Plan, a Human Resource Development Fund (HRDF) was created and coordinated by the Human Resource Development Council. With an official launch beginning in 1993, upskilling was now a regulatory requirement for all firms with 50 or more employees.¹⁰ With all such firms forced to contribute 1 percent of their annual payroll to the Fund, the government attempted to incentivise the larger (foreign) firms to begin investing in the Malaysian workforce. Rather than a tax, all firm contributions to the fund could be reclaimed by sending workers to state approved training courses, or deducted were in-house training programmes developed. Any surplus created due to a lack of participation by larger firms would go to administration costs and the subsidisation of training of local SMEs.

The new upskilling emphasis of industrial policy, backed by impending regulatory measures, did have an effect on prompting multinationals such as Intel and Motorola to develop their own vendor development programmes in order to redirect upcoming training mandates to their own supply needs. While this could be done in-house, it could also be achieved in more aggregated fashion in regions like Penang where

⁹ By the mid 1980s, Malaysian industrial policy would adhere to the prevailing tenets of liberalisation and privatisation as a means to growth. Ownership regulations placed on FDI would be further relaxed to allow complete foreign ownership of subsidiaries in export-oriented manufacturing sectors. Thus unlike industrialisation in East Asia (as indeed in China today), FDI-led industrialisation in Malaysia would never lead to a significant building of nationally-owned export industries (see Jomo and Chen, 1997).

¹⁰ Firms with between ten and fifty employees but with a paid-up capital of more than RM2.5 million would equally have to contribute 1 percent of their wages to the HRDF. Other firms would have an option to register with the fund for 0.5 percent of their wages and benefit from a government subsidy which covered the other half percent.

coherent sets of manufacturing activities had been created by MNE co-location practices.

The new government regulations were instrumental in fostering greater communal responsibility between multinationals and local suppliers. By the end of the 1980s and facilitated by and administered underneath the PDC, foreign multinationals worked to create a unique skills development programme. The Penang Skills Development Centre (PSDC) was created in 1989 to provide specialist training courses. Rather than wait for regulations to force them to pursue state training schemes, the PSDC model was based on a training programme actively developed by the multinational executives on the institute's board. Similar skills development centres would be later instituted in each of Malaysia region-states although none have developed in as successful a manner as the PSDC nor harnessed as much commitment from the multinational firms (Best and Rasiah, 2003)¹¹. We will revisit this critical point later in the discussion.

Alongside its upskilling regime, the government also introduced its first direct attempts to promote linkages between foreign electronics multinationals and local SMEs. Prior to the early 1990s, the Malaysia Industrial Development Authority (MIDA)—the manufacturing branch of the Ministry of Trade and Industry—employed tax incentives to motivate foreign firms to engage research and development as well as education and training initiatives. This was equally true of its Industrial Linkage Programme (ILP). In effect, the ILP is a database of local suppliers which the government provided to MNCs. Foreign manufacturers which sourced from firms on this list were entitled to further tax allowances. Yet the ILP, as with other programmes based on tax incentives, would have little or no impact precisely because of the fiscal allowances, particularly the benefits of 'pioneer status' already accessible (Ong, 2000a). Indeed, when asked, one federal official commented that to their knowledge, the ILP had never been used by any electronics multinationals to access their local suppliers.¹²

By the early 1990s, as economic growth returned and a boom in foreign investment flowed back into Malaysia, the government used its momentary bargaining position to tighten its incentive structure so as to better promote local upgrading. The government would also attempt to attach more local sourcing conditionalities as foreign firms raced to invest in Malaysia. Alongside tighter financial incentives and the creation of new government institutions to address different technological gaps, MIDA would introduce a Vendor Development Program (VDP) in 1993 with relatively success in attracting foreign multinationals to mentor local SMES (cf. Ritchie, 2004). Given the forces driving much foreign investment into Malaysia (currency appreciations in Japan and Taiwan in particular) Malaysia was in a relatively strong bargaining position. This greater bargaining power, coupled with financial incentives such as preferential bank loans and technical assistance from public research institutes, provided a brief window of opportunity for the upgrading of several domestic electronics firms—themselves becoming some of Malaysia's most publicised success stories.

During this shift in industrial policy, a second wave of US foreign investment would flow into electronics. Beginning in the late 1980s, foreign inflow would be led by multinationals operating in the hard disk drive (HDD) segment. Maxtor's investment

¹¹ Interviews, June 2004

¹² Interview, June 2004

into Penang in 1988 marked the watershed for other HDD firms such as Conner, Hitachi Metals, Control Data and Applied Magnetics to follow. In Penang, foreign multinationals spurred the growth of electronics with employment by HDD firms increasing from 2,634 in 1990 to 31,902 in 1996. By 1996, the HDD segment represented 27 percent of all employment in electronics cluster in Penang (Haggard, Li and Ong, 1998).

Many of Malaysia's leading local firms would emerge from this new wave of foreign investment by US hard disk drive manufacturers. Trans Capital Holding Bhd evolved into a relatively diversified contract manufacturer from initial ties to Connor. Eng Teknologi was incorporated in 1992 and developed into upper tier OEM supplier from initial ties to Maxtor (cf. Rasiah, 1999b).

Beyond the HDD segments, the late 1980s saw US semiconductor firms, most notably Intel, increasingly linked to the growth of Malaysia's "intrapreneurs". These represented Malaysians which reached senior management positions in foreign subsidiaries and then left the company to form local enterprises. In many cases, these intrapreneurs formed firms which used their intimate knowledge of subsidiary operations, requirements and competitive pressures to form enterprises positioned to service subsidiary supply needs. While the development of local suppliers such as UNICO established in 1992 represented entrepreneurial moves by particular intrapreneurs, it equally reflected pressures facing a troubled US semiconductor industry to reduce costs by outsourcing more non-essential in-house capacities and to further develop their Asian supply base to reduce costs (discussed later).

Recent developments

By the mid 1990s, twenty years after the inception of electronics in Malaysia, the second Industrial Master Plan (IMP2) would finally provide its first coherent, long-term framework for industrial upgrading. Malaysia now had a target date of 2020 within which to become an advanced industrialised nation. This time, Malaysian industrial policy and upgrading strategy was heavily indebted to notions of cluster development championed by Michael Porter and his 'diamond' framework for national competitive advantage popularised after its publication in 1990. In particular, the IMP2 would adopt a 'Manufacturing ++ Strategy' which espoused the idea of moving along the value chain to higher-value activity such as R&D and marketing via efforts targeted to improve the productivity of manufacturing and increasing the value-added per employee. Such moves, coupled with the promotion of research and development through the government's Multimedia Super Corridor project initiated in 1996, represent attempts to attract investment in more valuable and durable projects such as the setting up of regional headquarters by foreign multinationals or investments in research-based activities.

Following the Asian Economic crisis, the Government pursued several time-limited measures maintain Malaysia's attractiveness to foreign investment in export-sectors over the crisis years. For instance, for investment in new projects, the Government granted full exemption on equity and export conditions for both foreign and local manufacturers. The government relaxed the export conditions which had limited foreign firms in export-oriented industries from servicing the domestic market—allowing foreign firms to sell up to 50 percent of their total output to the Malaysian market. The government also increase the tax incentives and exemptions available to export sectors to bolster output and investment levels. By now, while local sourcing conditionalities had been struck from practice to conform to ASEAN trade

agreements, the government would continue to, albeit with less bargaining power, sway foreign firms to sourcing locally in what limited product areas the government definitely knew local capabilities could service.

When looking at Malaysian economic development more broadly, the role of FDI into electronics has been paramount with the sector representing the single most important driver of export-oriented industrialisation. Electronics has consistently comprised over half of the Malaysia's gross exports, increasing from 56.6 percent in 1988 to 71.4 percent by 1999 (Ismail, 2001). Such performance has not gone unnoticed by the international community. Indeed, in late 2000, UN Secretary General Kofi Annan singled out of the Malaysian experience as a leading exemplar for other developing countries attempting to grow through foreign direct investment (Yanus, 2000). Such public applause has spurred added interest in understanding Malaysia's ability to foster linkages between indigenous small and medium-sized enterprises and foreign multinationals (UNCTAD, 2001, 2002; Rasiah, 1999a, Best and Rasiah, 2003). While there is much to applaud about Malaysian development, the lessons to be learned from its FDI-led industrialisation strategy are more difficult to tease out. As we now discuss in the following sections, much of Malaysia's highlighted successes in building global-local linkages have been overstated—over generalising the role of foreign multinationals and ignoring severe limitations in Malaysia's ability to deviate from a low-cost, labour-based form of integration into global production networks.

Stalled industrial upgrading and the low-skilled labour trap

The prospects for upgrading in Malaysian electronics had many favourable conditions. In terms of time, Malaysia has had over three decades within which to “learn” from foreign multinationals and develop its indigenous manufacturing capacities. Malaysia has also had a well-established system of medium and long-term planning and a range of financial incentives and proactive industrial policies. Yet Malaysia's experience in export-oriented industrialisation exhibits many signs of a stalled upgrading process with local electronics firms unable to successfully deviate from their original mode of GPN integration based on the provision of low-skilled labour.¹³

Some have argued that the competitive advantage of Malaysian electronics has shifted from its original model as a low-wage and labour-intensive manufacturing activities to a provider of low-cost and high-volume production based on increasingly automated manufacturing activities and specialist capabilities in assembly, testing, and packaging (Best, 1997). While Best, a leading advocate of the clusters approach to industrial development, admits that this transition is not yet sufficient to compete with nations of superior production and innovation capabilities (such as Taiwan and Singapore), he equally over-estimates the extent to which the electronic industry has shifted away from a low-wage, labour intensive forms of export contributions. As large segments of Malaysian electronics have remained oriented around highly commoditised goods

¹³ Some may link Malaysia's stalled upgrading in electronics manufacturing and its over-dependency on low-value low-skilled labour as general symptoms of FDI strategies based upon the creation of export processing zones. For instance, such zones may attract foreign investment which only engage in “consignment contracting” meaning firms maximise their use of regulatory allowances to import intermediate components (and therefore minimise local sourcing to the lowest-value labour based activities) so as to avoid taxation on the value-added contributions made in the country (cf. Sturgeon, 1999). Yet the fact that foreign firms could use EPZs in this way does not fully explain why they do, the extent to which they do so and why they are allowed to do so by domestic authorities.

that, in turn, rely upon much of the same line of low-skilled assembly work as was first introduced in the 1970s, Malaysia's export performance in electronics have become challenged by China's emerging export specialisation (cf. Lall and Albaldejo, 2003). Reflecting the localised focus of cluster frameworks, the competitive threats of China are noticeably absent in more recent studies of the Malaysian case (cf. Best, 1999; Best and Rasiah, 2003).

Ernst (2003) offers one of the most comprehensive overview of the Malaysia's limitations in upgrading from foreign investment in electronics. In effect, Malaysia was never able to develop a deep, multi-tiered industrial supply structure in electronics. Rather, the contribution of indigenous firms to export performance is dominated by SMEs disproportionately based on low-value "lower tier" assembly activities with relatively few select instances of local firms which have moved into "higher tier" OEM subcontracting positions. The relative lack of local suppliers in higher-tier supply positions, coupled with the preponderance of local SMEs in lower-tier and satellite supply positions, implies a shallow level of industrial specialisation.¹⁴ In other words, Malaysia's export competitiveness in electronics is based upon a limited, relatively shallow range of domestic supply capabilities.

While no research has yet been able to provide empirical support to directly show the extent of the structural asymmetry in local supply activities (detailed supply-chain mappings have only been conducted on the Malaysian automobile sector), the recognition of the 'gap' between firms in lower and higher tier levels of participation is widely shared among the regional and federal agencies interviewed during the course of our research. Currently, the most indicative measure as to the depth of the supply structure stems from analysis of import and export composition and gauging the extent to which the export of final goods is based upon the import of intermediate parts and components (cf. Yeats, 2001). While internationally comparable methods are problematic, they none-the-less present some indication as to the patterns of fragmentation and specialisation in the supply structure (Lall, Albaladejo and Zhang, 2004).

Malaysia has historically been more dependent upon the import of intermediate components in electronics than the first tier of East Asian industrialisers. For instance, one study found that in the late 1980s, 43 percent of Malaysia's final product exports was based upon intermediate imports. This was slightly more than the 37 percent used in Korea exports and the 8.2 percent used in Japan (Takeuchi, 1997 referenced in Ernst, 2003). Such figures would worsen over the 1990s as the domestic supply system would continue to be unable to meet changing component needs of multinational exporters. Recent estimates place intermediate imports at over half the value of all electronics exports. For instance, in 2003 RM108.7 billion (approx \$28.5 billion USD) or 73.1 percent of all electronic imports stemmed from the intermediate components used in the production of finished and semi-finished electronics exports.¹⁵ The import of intermediate components represented over 54 percent of the total value of RM199.5 billion (approx \$52.5 billion USD) in electronics exports during the same year. While the value of local content was thus

¹⁴ A handful of higher tier companies do exist in Malaysian electronics, but there are almost exclusively based in Penang. These 'success stories' include: BCM, Globetronics, Unico, LKT, and Eng Teknologi.

¹⁵ Figures provided by Ramli Othman, the director of the electronics industry division within MIDA. National Seminar on Opportunities in the Electronics Industry, Penang, 15 June 2004.

46 percent of electronics exports, the majority of this local input is likely to stem from foreign affiliates in Malaysia rather than local suppliers.¹⁶

Despite a number of pro-active industrial policies, the establishment of a recognised regional infrastructure and generous financial incentives, Malaysia has not succeeded in fostering a critical mass of investment by foreign electronics multinationals into the upgrading of the indigenous SME sector. While several studies reaffirm that technology transfer and upgrading of manufacturing processes has happened at the firm-level (e.g., Rasiah, 1995; Haggard et al, 1998; Jomo, Felker and Rasiah, 1999a) such examples do not offset the broader limitations underlying Malaysian electronics. For instance, total factor productivity (TFP), a proxy for the extent to which knowledge and technology transfer has occurred between foreign multinationals and local suppliers, dramatically declined in the mid 1990s (prior to the Asian Financial Crisis). The TFP of Malaysian electronics would drop from an average of 14.1 percent in the first half of the 1990s, to just 2 percent in the years leading up to the Asian Financial Crisis (Ernst, 2003). This rapid and seemingly premature decline in the total factor productivity of the electronics sector suggests severe limitations in the extent to which local firms have actually upgraded from spill-over effects, technology transfers and other linkages to foreign multinationals.

Much of the current debate over the fate of Malaysian electronics begins and ends with the rise of China and Malaysia's ability to cope with its new-found prospects for "forced upgrading". Despite three decades of experience in building an electronics industry, growing from four companies with 577 employees in 1970 to over 900 companies employing 360,048 workers in 2003, Malaysia's contribution to electronics manufacture and exports has remained overly dependent upon low-value production work. Even in the most advanced manufacturing region in and around Penang, 74.3 percent of all manufacturing employment was based on production work in 1990.¹⁷ By mid 1998, the region would only see a modest improvement with 67.1 percent of employment in production work (Ong, 2000b). As of December 2003, roughly 17 percent of all production workers in the electrical and electronics sector were classified as unskilled. While roughly 80 percent of production workers in electric and electronics are classified as "skilled and semi-skilled" in official PDC statistics, some estimate that roughly half of all employment in electronics may still be based on performing low-value assembly activities.¹⁸ Such findings are equally reflected in relatively modest changes in the skills composition of employment by foreign affiliates of US multinationals in Malaysia more generally. In 1977, 74 percent (roughly 19,000 workers) of employment were comprised of unskilled production workers. By 1994, unskilled production workers would only decline to 72 percent (roughly 33,100 workers) of all employment in US affiliates in Malaysia (Slaughter, 2002).

A number of high-profile plant relocations have spurred on fears about China's impact on Malaysian electronics in recent years. Yet we should not forget that China's impact did not simply begin with its WTO accession negotiations in 2000. China's competitive pressure on the second generation of Southeast Asian NIEs—the so-called "latecomers"—would have actually begun with its Open Door Policy introduced in 1979. This led to China's own engagement in export-oriented industries

¹⁶ For instance, in 1994 only 9 percent of the total value of US electronics exports (MAEI member companies) was accounted for by local suppliers (Driffield and Noor, 1999).

¹⁷ Production workers are distinguished from engineering, technical and other managerial and supervisory workers in PDC employment surveys.

¹⁸ Interview, Penang Development Corporation, June 2004.

which grew rapidly by the 1990s. As with its Southeast Asian neighbours, China's growth was equally fuelled by foreign direct investment. For instance, while Malaysia captured 7 percent of all FDI flows to developing countries in 1990, China would capture 9 percent. By 2002, China would increase this to 33 percent of FDI inflows to developing countries while Malaysia's share would drop to 2 percent.¹⁹ Labour-intensive export processing activities, particularly those concentrated in electrical and electronic goods but also in consumer goods such as apparel and footwear, were primary targets for foreign investment (Lemoine, 2000). By the late 1990s China had effectively equalled Malaysia in its export performance in electronics. Between 1995 and 1999, Malaysian electronics had supplied 6.4 percent of world export in electronics with China close behind at 6 percent (Sturgeon and Lester, 2002). In effect, China have been following in much the same mode of integration as Malaysia, focussed on low-level and labour-intensive assembly activities which transformed imported intermediate goods into finished or semi-finished products. The crucial difference is that China has been better not only in upgrading production capacities and actually decreasing its import of intermediate components, but it has also far outstripped Malaysia in terms of its scientific and research-base (Shafaeddin, 2004; Narayanan and Wah, 2000). This only begs the following question: Why then has Malaysian electronics only recently become impacted (or at least recognised as being so) by developments in China?

The timing of "China phobia" in Malaysia is peculiar. In 2004, over three decades after foreign electronics producers were first attracted to Malaysia, it is newsworthy for industrial ministers to highlight that firms in the electronics industry have been increasing their use of automated manufacturing and moving away from labour-intensive assemblies. What has insulated an industry dominated by low-skilled assembly from the longstanding regional pressures represented by lower labour costs elsewhere in the region? Much of this will have to do with improving perceptions about the risks of investing in China relative to established locations in Malaysia and elsewhere. Yet in the Malaysian case, much of this "insulation" from regional competition may have stemmed from more 'silent' dynamics underlying Malaysian electronics—its increasing dependence on the import of skills over the 1990s.

Imported labour and stalled upgrading

Malaysia has fared relatively poorly in relation to various indicators of technological capacity (see table 2).²⁰ Consequently, many commentators have highlighted Malaysia's need to import its more senior and professional employees as well as its advanced technicians and researchers due to a skills gap not fulfilled by the tertiary education system (cf. Ernst, 2003).

Table 2: Technology Indicators for Select East and Southeast Asian Countries

Country	R&D (as % of GDP) Various Years	High-Tech Exports (as % of manufactured exports), 1999	Scientists, Engineers and Technicians per million capita, 1996- 1998	Tertiary Science and Engineering Students (as % of population), Various Years
Hong Kong	0.49 (1999)	21.08	n/a	n/a

¹⁹ <http://www.unctad.org>

²⁰ Equally disturbing may be the possibility that linkages between MNCs and local SMEs may generate technology spill-overs and are negatively related to foreign affiliates pursuing technological activities in Malaysian electric/electronics sector (cf. Clarke, Driffield and Noor, 2002).

Korea	2.71 (1995)	32.20	2,511	1.34
Taiwan	2.05 (1999)	n/a	2,980	1.09
Japan	2.96 (1995)	26.69	5,736	n/a
Singapore	1.13 (1995)	60.90	2,619	0.56
Thailand	0.1 (1997)	32.40	142	0.32
Indonesia	0.1 (1994)	10.38	206	0.13
Malaysia	0.22 (1996)	58.95	125	0.15
Philippines	0.2 (1999)	58.69	179	n/a

Source: Ritchie (2004)

However, such skills gaps may not accurately reflect the employment demands arising from the corporate sector. For instance, one recent survey on firm performance in Malaysia conducted for the World Bank found that only 24 percent of respondents in the electronics sector reported a skills shortage.²¹ Such findings suggest that debate over Malaysia's skills gap may be biased in favour of domestic interests to reduce both the import of intermediate components as well as of professional and technical expatriate workers. Currently, little is known about the manner in which multinationals impact actually upon skills upgrading through foreign investment (Slaughter, 2002). While critics may attribute Malaysia's upgrading problems to passive and/or belated "brain gain" policies which have failed to address the gap in human resources early enough, we suggest an altogether different form of dynamic which may be affecting skill composition in the electronics industry and stalling Malaysia's prospects for upgrading in the sector.

Few recognise that Malaysian electronics also excels in the import of semi-skilled and unskilled foreign (migrant) workers.²² Growth in the import of low-skilled labour coincided with the liberalisation of the economy and the boom in foreign investment over the late 1980s and into the first half of the 1990s. In absolute terms, the use of migrant labour in electrical and electronics sectors mushroomed from 1,024 in 1990 to 46,470 in 1996—reaching 10.7 percent of all employment in the electrical and electronics industry (see table 3). Unpublished figures covering the period 1998 to 2003 suggest this trend has grown further over recent years.²³ Thus, while construction as a whole has historically employed more migrant workers than in manufacturing, recent trends place Malaysian electric and electronics as the single largest importer of migrant labour of any other industrial segment in the Malaysian economy.

Imported migrant labour is a key dynamic affecting one of the principles gains of FDI on a developing economy—improved employment prospects and skills transfer. Employers in the electronics industry have long been invested with resources to control wage levels. During the late 1960s, amendments in labour laws aimed to

²¹ Unpublished report.

²² Unlike 'expatriate' imports (skilled professional and technical workers), migrant workers occupy semi-skilled and unskilled forms of employment. Migrant workers are currently issued with three year visit passes for temporary employment which receive annual extensions for up to two further year. The distinction between the two classes of foreign workers is set in terms of their expected monthly salary. Currently, skilled workers are administratively defined as those who earn RM2,500 or more per month. Recent surveys in Penang show that as of December 2003, the average monthly salary for all categories of electrical and electronics production work (including those classed as 'skilled' workers) as well as for technical and supervisory positions, were far below this threshold. This means that in terms of federal distinctions, the overwhelming majority of employment in the electrical and electronics sector in Penang could be classed as semi and unskilled work and accessible to migrant labour import provisions.

²³ Unpublished statistics, Ministry of Trade and Industry.

attract foreign investment. From these efforts, unionisation was banned in the electronics industry and labour has never had an ability to engage in collective bargaining to improve wage levels. In 1988, this ban was eased but only to allow in-house unions at the firm level. Such moves were not likely to lead to an increase in the wage burden on foreign firms as production workers are susceptible to the cyclical restructuring and relocation of factories. For instance, retrenchment exercises brought about by periodic plant closures for renovation or even relocation create situations where to re-enter employment, retrenched workers must then compete with the recruitment of new, often younger prospects. Some research has found that the retrenched may be recruited along with new workers yet at a lower salary level (Wangle, 2001). In times of severe slowdown, the less fortunate, 16,051 domestic production workers in Penang alone, would leave the electronics labour market and return to their villages following plant closures and retrenchment exercises in 2001 (Too and Leng, 2002).

Table 3. Composition of Semi and Unskilled Migrant Workers in Malaysian Manufacturing, 1981-2000

Year	Total Manufacturing (%)			Electrical & Electronics (%)		
	Total	Local	Migrant	Total	Local	Migrant
1981	100	99.0	1.0	100	99.7	0.3
1982	100	98.8	1.2	100	99.7	0.3
1983	100	98.7	1.3	100	99.7	0.3
1984	100	98.4	1.6	100	99.7	0.3
1985	100	98.4	1.6	100	99.6	0.4
1986	100	98.5	1.5	100	99.7	0.3
1987	100	98.4	1.6	100	99.7	0.3
1988	100	98.3	1.7	100	99.7	0.3
1989	100	98.3	1.7	100	99.7	0.3
1990	100	98.0	2.0	100	99.5	0.5
1991	100	98.3	1.7	100	99.4	0.6
1992	100	96.8	3.2	100	99.1	0.9
1993	100	93.8	6.2	100	96.7	3.3
1994	100	91.2	8.8	100	94.5	5.5
1995	100	89.8	10.2	100	93.0	7.0
1996	100	85.9	14.1	100	89.3	10.7
1997	100	86.1	13.9	100	90.6	9.4
1998	100	86.4	13.6	100	91.3	8.7
1999	100	86.8	13.2	100	91.9	8.1
2000	100	86.1	13.9	100	90.0	10.0

Source: Department of Statistics, Malaysia Manufacturing Census

While government guidelines place limits on the extent to which firms can import low-skilled labour from abroad (one third of the proportion of domestically employed labour) in practice such guidelines are negotiable and depending on company circumstances, the government may allow as much as one half of a firm's employment to be low-skilled foreign workers. However, in practice, a foreign manufacturing firm is able to employ far more migrant workers than government guidelines would tolerate due to subcontracting arrangement.²⁴ Migrant labour is regulated only at the firm level and so foreign workers employed by subcontracted

²⁴ Interview, June 2004

firms have no relation to the lead manufacturing firm in regulatory terms. Consequently, a finished or semi-finished product exported by a lead firm may actually utilise thousands of imported workers to fulfil the most labour-intensive assembly work staggered across different sites in the subcontracting network.

From the firm's perspective, the import of low-skilled migrant labour serves as a buffer allowing management the flexibility to expand and contract assembly operations in line with demand. Yet such practices can create situations where imported labour is substituted for domestic labour. In 2000, the number of local individuals employed in E&E dropped 7 percent while the inflow of foreign workers into the sector increased by 17 percent. In such cases, the use of foreign workers is likely to have been a contributory force in the depression of wages in the electronics sector.²⁵

Wage depression is augmented by the likelihood that low-skilled foreign workers more readily accept poor terms of employment. Unlike domestic workers, migrant labourers are not allowed to bring any relations with them into Malaysia and workers enter the labour market incentivised to work as much as they can in order to make as much money as they can before contract termination. As one study of Bangladeshi migrants into manufacturing sectors highlighted, real earnings often fall below the level expected when workers initially seek out migrant labour contracts in Malaysia. As passage and remittance fees charged by temporary employment agencies are high and reflect what may be unrealistic earning potentials, the initial costs incurred by migrant workers create added incentives to extend their stay in Malaysia as long as is possible (Ishida and Hassan, 2000).

Many reasons may account for gaps in the expected earnings including the lack of bargaining power to negotiate terms with employers. Officially, migrant workers are covered underneath the same labour laws which protect the domestic labour market. However, lack of unionisation, fear that employment complaints may lead to the premature termination of contracts, coupled with the costs already incurred in order to gain temporary employment, all reinforce conditions where average salary expectations may fall short.

While the import of low-skilled foreign workers would have contributed to the depression of wages, it may have a more deleterious "lock-in" effects. The increased import of low and unskilled labour throughout the 1990s would have insulated the electronics industry from the lower labour costs of neighbouring countries. This would have the effect of preserving the utility of Malaysia's original mode of integration into the electronics GPN. That is, migrant labour has provided many foreign firms with a means of sustaining their traditional utilisation of Malaysia as a regional hub for low-cost, labour-based assembly of imported intermediate goods. In preserving this original model passed its effective sell-by date, the kinds of low-level assembly activities pursued by many foreign companies would have left little scope for more significant transfer of skills and technology to indigenous firms and stalling the process of upgrading which many East Asian industrialisers experienced from earlier forms of foreign direct investment.

Why has this developed? The usual explanation for the import of low-skilled migrant labour is that it reflected historical shortages in the labour force during the economic

²⁵ Some evidence of wage depression was confirmed in a recent study conducted on behalf of the National Economic Action Council by Ratings Agency Malaysia. Interview, June 2004.

boom following liberalisation in the late 1980s, coupled with increasing pay and working standards sought after by domestic labour market. It has also been assumed that Malaysia's rising wages would have created upgrading pressures to move away from the labour-intensive assembly of highly-standardised or 'commoditised' electronics products (*cf.* Wah and Narayanan, 1999). Such generalisations fail to address much of the devil in the details driving the evolution of GPNs in electronics. In the case of electronics, exogenous changes in the organisation of global production networks would reach Malaysia by the early 1990s. The overlap in timing is not, we believe, mere coincidence. As we now turn to, a new breed of global manufacturer and a new model of electronics manufacturing, largely emanating from North America, would change the rules of the game for Southeast Asian upgrading (Sturgeon and Lester, 2002). The new competitive dynamics they introduced would become a key driver for the rapid import of low-skilled migrant labour and in so doing, would change the prospects for Malaysia's ability to upgrade out of a low-value mode of GPN integration.

The Contract Manufacturing Revolution and the Low-Skilled Labour Trap

Contract electronic manufacturing (CEM) represents a more recent variation on the general evolution in the outsourcing of production and services functions in electronics.²⁶ The essence of CEM is a division of labour between "brand name" companies which design and market products and firms which actually engage in manufacturing and the management of supply-chain functions. In effect, the two functional domains are linked in terms of relations of complementarity and coordination rather than competition or simple market exchange.

In electronics, contract manufacturing represents the emergence of a particular form of supply system which provided a new solution to an old problem. Since its inception in the late 1940s, one of the critical problems faced by the electronics industry was the massive fixed costs of production facilities coupled with equally high costs of "in-house" product development. Both activities consume large sunk costs into capital investments and development projects that could take years to established but whose effective lifespan is ever-increasingly cut short by changing demand, decreasing product-life cycles, rapidly declining market prices and (by the 1970s and 80s) increasing international competition.

In the years prior to East Asia's challenge in the design of electronic goods, particularly in popular consumer electronic devices such as radio, video recorders and televisions, the original solution to the problem of sunk costs came in the form of international production networks led by US firms. Rather than simply a system of international production comprised of ownership relations between parent and subsidiary, US consumer electronics (followed later by their Japanese competitors) fostered the creation of a system of Original Equipment Manufacturing (OEM) in Asia.

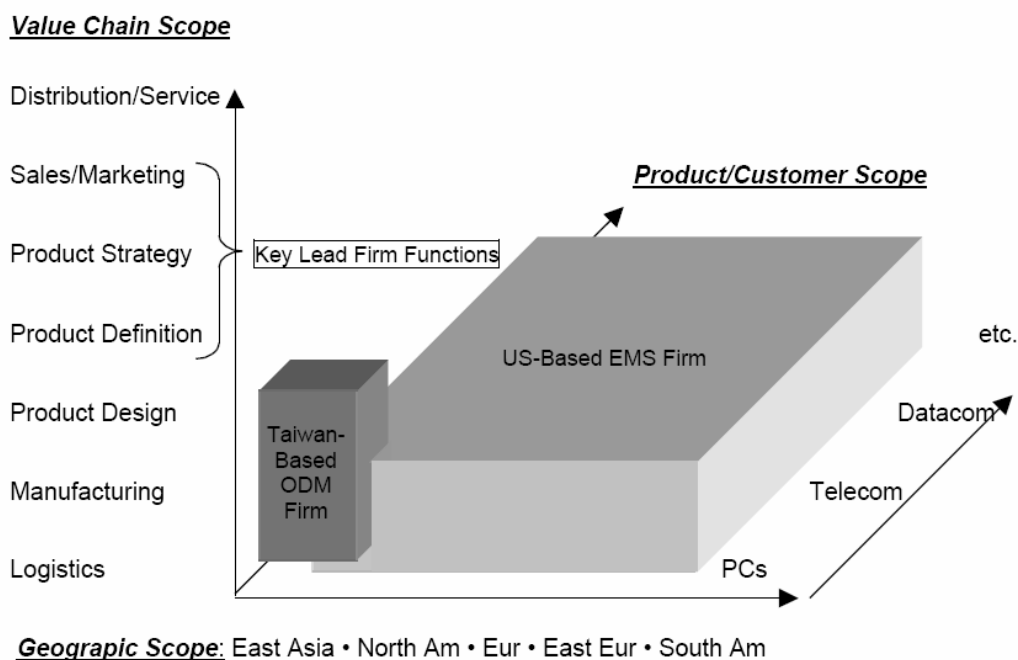
The OEM system is effectively a form of sub-contracting where OEM buyers—the leading "brand name" firms which design and market products—contracted out manufacturing services to suppliers which produce products under a particular contractual arrangement specified by the buyer. In these transactions, OEM suppliers

²⁶ Contract manufacturing is often captured by any number of similar terms such as "product service companies" or "electronics manufacturing services" or electronics contract manufacturing services.

produce to a given set of product, quality, packaging and labelling specifications. The outcome is an end product that looks to consumers as if it was originally produced by the OEM buyer themselves. By the late 1960s, much of the electronic exports from East Asia represented local suppliers meeting the needs of US OEM buyers in this way.²⁷

In contrast, contract electronics manufacturing would only begin to emerge in the 1970s. Most of the CEM frontrunners would start off as small manufacturing operations in North America, often relatively detached from the established supply relationships between US lead firms and East Asian OEM suppliers. Rather, many CEM firms would emerge from the niche offered by high-tech start-ups in the San Francisco bay area—establishing themselves by providing manufacturing services to “fabless” component design firms in Silicon Valley (Sturgeon, 2003).²⁸ However, over the 1990s, US CEMs would expand far more rapidly than their Asian counterparts and come to occupy a broader global reach of penetration into higher-value added position in the value-chain (see figure 1)

Figure 1. Stylised differences between Taiwanese OEM/ODM suppliers and leading North American CEM firms



Source: Sturgeon and Lester, 2002

As Asian producers moved from OEM supply positions into higher value own-design and some even into own-brand manufacture (ODM/OBM), East Asian electronics has become increasingly viewed as a competitor to major US brands (Sturgeon and Lester, 2002). In different areas of consumer electronics, Japanese firms (and later their Korean counterparts) would overtake many US and European incumbents. A critical element to the success of Asian consumer electronics firms stemmed from

²⁷ Yet as would happen in consumer electronics, the OEM system in East Asia would arguably be use more extensively by Japanese electronics firms which outstripped US firms first in cost and then gradually in quality as well (Ernst, 1998).

²⁸ Some CEMS were also used as buffers for large electronics firms during the 1970s. Acting as “board stuffers” who provided labour contracted on a consignment basis when needed to lead firms needed to increase capacity without added capital investments of their own (cf. Sturgeon and Lester, 2002).

dramatic cost reductions caused by their extensive use of the OEM supply base which had emerged in Asia (Ernst, 1998).

With consumer electronics increasingly dominated by East Asian firms, the mainstay of US electronics lie in the computer industry, semiconductors along with more peripheral components such as hard disk drives. Unlike consumer electronics firms which had pioneered the formation of production networks through the OEM system, US semiconductor firms had historically pursued international production merely as an extension of equity controlled subsidiaries so as to limit the leakage of critical technologies. This ownership model was challenged in the 1980s.

During this period, the US dollar had appreciated and raised the cost of components imported from offshore subsidiaries. Furthermore, a wave of ‘bust-up’ mergers and acquisitions had engulfed US manufacturing. Across the board, leading Fortune 500 firms were targeted by Wall Street raiders who profited from dismantling large manufacturing firms unable to meet the new competition from Asia (*cf* Best, 1990; O’Sullivan, 2000). Out of this context, vulnerable US semiconductor firms began to follow international production strategies developed by the highly cost-conscious consumer electronics segment—gradually moving to continuously upgrade their existing affiliates as well as to expand their outsourcing activities to Asian suppliers. Such GPN dynamics must not be forgotten when considering the timing and motivation behind upgrading efforts which produced some of Malaysia’s leading local suppliers in the 1980s and 1990s.

As firms from Asian OEM countries began to successfully move into forms of own-design and own-brand manufacturing which competed with the US and European electronics industry, the stage was set for a major movement out of the OEM system and into the emerging CEM system. Over the 1980s, CEM firms had gradually been acquiring the increasingly unviable production facilities of firms specialised in particular segments of the computer industry and then supplying components through “turn-key” contracts back to original owners.²⁹ This practice would dramatically increase in the early 1990s. By 1996, Apple finally sold of its largest production facility in Colorado to an emerging CEM firm named SCI (Sturgeon, 2002). In effect, this de-coupling of ownership for design and product-innovation activities from production functions saw Apple bow to the same reorganising dynamics in which the PC industry had already embraced.

While much of contract manufacturing developed quietly in North America in the 1970s, it would only move beyond Europe and into Asia in the 1990s. The timing of this move reflected the accumulation forces driving the evolution of CEMs as key organisers of global production networks. Asian expansion provided a way for CEM firms to position themselves as conduits not simply for the outsourcing of production services (as has long been serviced by OEM suppliers), but as enablers for the outright sale of productive facilities and providers of comprehensive global supply-chain management on behalf of major OEM customers. To do so, lead production suppliers will mirror moves by their major OEM clients producing patterns of co-location

²⁹ A critical difference between traditional OEM arrangements and CEM arrangements lies in the ability of CEMs to more comprehensively manage global supply chain functions. Where OEM suppliers traditionally represent smaller firms specialised in consignment services (ie producing products to specifications not managing supply chains and sourcing components), the major CEMs employ “turnkey” services in which they also procure materials on behalf of customers, purchasing and holding component inventories until products are manufactured. This has the effect of dramatically increasing their revenues as well as their costs (Sturgeon, 2002).

internationally (Felker, 2003). As major OEM companies moved into Malaysia following the ASEAN Plaza Accord in 1985 and subsequent liberalisation of the Malaysian economy in the late 1980s, CEM firms would equally follow their big customers.

While the movement of CEM firms into Malaysia was in response to moves by their major clients as well as client demands for CEMs to have a more consolidated 'global footprint', the timing of these developments also reflected the growing bubble in "New Economy" stock prices which provided US firms with a combination currency to grow by acquisition (cf. O'Sullivan, 2000; Sturgeon, 2002; Carpenter, Lazonic and O'Sullivan, 2003). Riding in the stock market boom coupled with poor performance of existing manufacturing facilities, US contract manufacturers would expand into Asia through the acquisition of existing production facilities. Between 1995 and 2002, the five large CEMs, all North American based, saw a compound annual growth rate in revenues of 47 percent. Roughly 67 percent of this revenue growth stemmed from acquisitions made over the previous three years (Sturgeon and Lester, 2002).

Growth via acquisition, combined with the reorganisation of the supply chain which inevitably followings from CEM acquisitions, changed the pathways in which local firms in Malaysia could participate in global production networks in electronics. Not only were Malaysia's few higher-tier suppliers now competing with contract manufacturers for the outsourcing business of major OEM customers, but some would represents targets for acquisition by newly expanding US CEMs themselves. The UNICO case is particularly illustrative of these dynamics.

UNICO Technology Bhd was established in 1992 and grew to be one of Malaysia's best exemplars of local upgrading through global linkages. As with many of Malaysia's most successful electronics firms, UNICO was set up by 'intrapreneurs' which moved out of senior management positions in local subsidiaries of foreign multinationals, particularly those from the US. In this case, UNICO was established by former managers of Intel's subsidiary in Penang. The company would expand its own production networks into China and elsewhere in Asia to become one of Malaysia's few first-tier OEM subcontractors. Its product range would include the assembly and testing of semiconductors, computer motherboards and other consumer electronics devices such as cordless telephones. Yet UNICO would never diversify away from a dependence upon its original links to Intel.

In October 2002, Intel Penang revealed plans to relocate its supply of labour-intensive motherboards to a Chinese supplier with UNICO's contract to be phased out. At the time, UNICO would not only be in possession of millions of motherboards contracted for delivery that quarter but was itself indebted to Intel for roughly \$20 million.³⁰ UNICO countered by threatening to immediately file for bankruptcy unless the chip maker would extend the termination of their supply contract and pay millions in damages to cover capital investments as well as retrenchment benefits for UNICO employees affected by Intel's plant relocation. Intel refused and in December 2002, UNICO closed down its electronic manufacturing operations which supplied motherboards to Intel and retrenched roughly 1000 workers in the process (Bakar, 2003). By late May 2003, UNICO Holding Bhd filed a lawsuit against Intel in the Malaysian High Court claiming \$43 million in damages for Intel's alleged breach of warranties and collateral contracts.

³⁰ Confidential sources

During this time, UNICO had sought after a potential buyer in the event that an amicable arrangement with Intel could not be reached. Initially, no domestic buyers could be found and its sale price plummeted. This provided an ideal window for the expansion of another US contract manufacturer in Malaysia—Three Five Systems (TFS).

Three Five Systems is a relatively new CEM firm which grew alongside the boom in the sector over the 1990s. Specialised on the design and manufacture of customised telecommunication handset components to Motorola, much of TFS's core business was positioned in a segment vulnerable to demand changes and overcapacity problems. Some market analysts estimate that by the end of 2002, TFS had no profitable core business and failing investments in proprietary research activities.³¹ Subsequent efforts to boost performance and regain investor confidence stemmed from a strategy common to the growth of the CEM sector—the acquisition of failing manufacturing facilities. Such growth strategies require acquisitions that are significantly under market-value such as troubled companies with no other options. UNICO Technology was an ideal candidate. The end result is a continuation of the growth strategies which underlie much of the US contract manufacturing model—expansion through acquisition bolstered by relatively high stock market values.

During the US internet bubble, TFS stock reached a high of \$1.7 billion and two equity offerings provided the company with large amounts of working capital.³² UNICO's predicament meant it would lose the majority of the equity in the company in exchange for modest capital investments. Indeed, much of the money used to acquire UNICO was actually paid for in the preferred currency of most US acquisitions since the 1990s, common stock. In April 2003, TFS acquired 60 percent of UNICO Technology in exchange for adding roughly \$5 million in working capital to the company and leasing UNICO's property, plant and equipment from its holding company. In May 2004, the remaining 40 percent of the relabelled TFS-Malaysia was acquired from UNICO Holding Bhd for approximately 423,000 shares of TFS common stock. The result of these events are ultimately a testament to the precarious position and overdependence upon labour-intensive activities of even Malaysia's most successful local suppliers. For the US contract manufacturing model, its expansion into Malaysia in the UNICO case is an example of how a decade of investment into the establishment of a leading local firm can be captured for a fraction of the cost spent locally to build up the firm.

In assessing the impact of CEM on Malaysian upgrading experiences, the expansion of foreign contract manufacturers coupled with their acquisition of leading (yet comparatively weak) local firms, would have made Malaysia's lower-tier suppliers increasingly subjected to the standards and requirements of the contract manufacturing model. While variations inevitably exist among different firms, a few traits are representative of the CEM model more generally. Firstly, CEMs compete for OEM supply contracts in terms of lower costs. Relative to more established OEM suppliers in countries like Taiwan, contract manufacturers are thought to offer upwards of 15 percent lower costs than most OEM rivals. At the height of the technology bubble in 2000, the operating margins for the top twelve CEMs would only be 2.6 percent of revenues. As the bubble crashed and the demand dropped following the 9/11 attacks in 2001, the leading 12 CEMs would actually sustain operating losses over the next three years.³³

³¹ <http://www.spinoffadvisers.com> (Spin Off Research, July 2003)

³² *ibid*

³³ <http://www.custerconsulting.com/>

The ability of CEMs to operate on such low margins stems, in part, from a particularly high use of temporary and flexible labour (Lüthje, 2002). Some CEM firms have been reported to fill upwards of 50 percent of their labour force with workers on temporary contracts (Sturgeon 2003). It is likely that foreign contract manufacturers, their local subcontractors, and even rival OEM suppliers, all would have sought to use temporary workers, particularly low-skilled foreign workers, to remain competitive in Malaysia.³⁴

The ability of the CEM sector to offer lower costs for OEM customers also stems critically from their growth model: acquisition and standardisation of manufacturing capacities globally. CEMs provide major OEM customers with a channel to sell off struggling in-house manufacturing facilities. In effect, the global expansion of the CEM sector has been driven by their ability to manage the financial risks of modern manufacturing by pooling production capacities from a range of more specialist manufacturers (such as the manufacturing capacities Apple owned and which only produced Apple Mac computers) and creating a more standardised, generic and 'merchant' form of manufacturing capacity. Such a broad base allows leading CEMs with greater economies of scope in the sourcing of components—this purchasing power underwriting both the ability to offer lower costs and promoting a greater use of CEMs as consolidated global supply-chain managers for lead firms concentrating on product innovation.

Contract electronics manufacturing has sometimes been referred to as the "McDonald's" approach to manufacturing (Lüthje, 2002). This refers to their high degrees of standardisation in many common manufacturing procedures such as assembly, warehousing and logistics. This also implies that CEMS firms tend to focus on highly commoditised product markets. This feature of the CEM model, coupled with the use of flexible labour contracts to adjust to demand changes, is particularly important for understanding their disposition to use temporary foreign workers. In countries like Malaysia whose export profile in electronics covers highly standardised, commodity goods, much of the investment by foreign electronics firms will themselves be in areas that comprise high levels of standardised, low-level assembly. Such conditions are ideal for the CEM model and the employment of flexible and foreign workers. As they moved into Malaysia throughout the 1990s to acquire manufacturing capacities and service the larger OEM customers already in Malaysia, it is understandable why the electronics sector was particularly vociferous in the mid 1990s in lobbying the Malaysian government to make access to imported labour a relatively easy affair, a request that was ultimately serviced to appease the country's main source of investment in manufacturing.

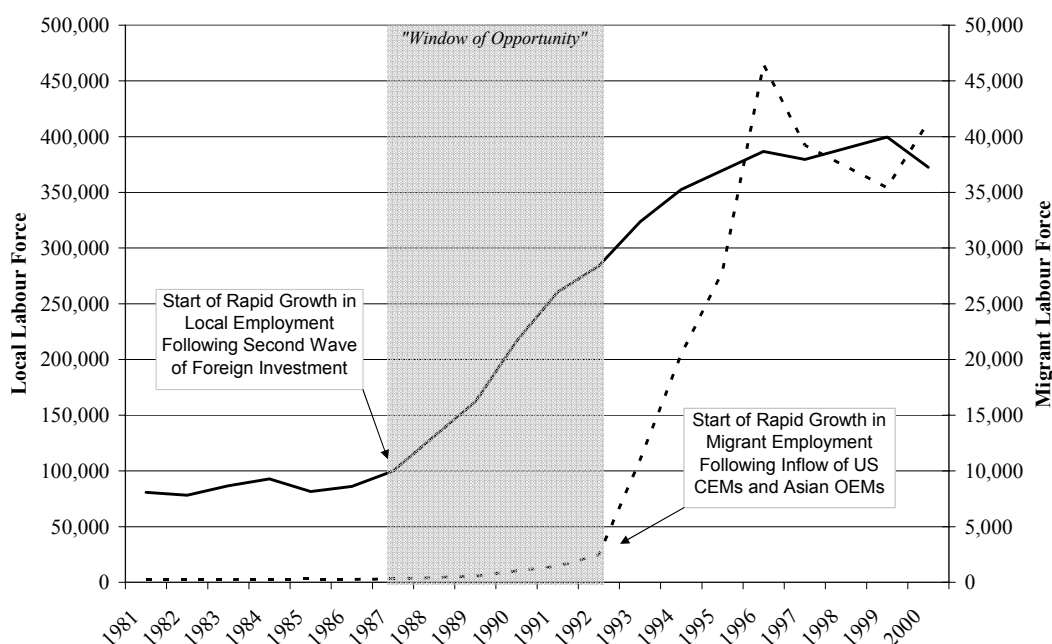
Are contract manufacturers the only importers of low-skilled foreign workers? As regulatory requirements only differentiate controls on foreign workers depending on industrial category, statistics do not offer more meaningful patterns to understand the sourcing of imported foreign workers. However, a shared view from interviews at several different federal and regional agencies was that the largest importers of foreign workers were indeed from foreign contract manufacturers. Yet while this relatively small class of foreign firms may have captured the largest numbers of migrant labour, the picture is balanced by a wide range of domestic SMEs importing much smaller levels of foreign workers. Without a survey to detail subcontracting

³⁴ In the mid 1990s, organisations such as the World Bank were recommending policy-makers in Malaysia to relax tight immigration policies and promote the inflow of foreign workers (cf. World Bank, 1995)

linkages between local firms and foreign CEMs, it is impossible to verify the extent to which the growth of foreign workers in electronics is directly related to the contract manufacturing supply system. At present, available evidence and personal reports only suggests connections which are consistent with our current understanding of these two developments and their interrelations. And as a key driver for the import of migrant labour into Malaysian electronics, the evolution of contract manufacturing is likely to have both directly, and indirectly, preserved the importance of low-skilled assembly in Malaysian electronics.

While such exogenous GPN developments would have contributed to the insulation the electronics sector from upgrading pressures posed by Malaysia's regional neighbours, the evolution of contract manufacturing would also have helped stall Malaysia's upgrading process by changing the rule of the game in which local firms could "learn" from their linkages to global suppliers. Historically, Malaysia's window of opportunity to move out of lower-level subassemblies to more comprehensive OEM supply services probably lie for a brief period in the late 1980s and early 1990s (see figure 2). Many of Malaysia's successful SMEs would emerge from this period. However, these success stories were few in number and based largely from isolated entrepreneurial aspirations of particular "intrapreneurs" and prevailing outsourcing pressures and opportunities faced by US multinationals. Government policy was far too reactionary and attempts to reform significantly industrial policy would only begin to emerge until the late 1980s. As reviewed earlier, more substantive reforms in industrial policy which aimed at promoting linkages between foreign and local firms would only emerge around 1993 by which time contract manufacturing and inflow of Asian (esp. Taiwanese OEM suppliers) investment had come into fruition. The international expansion of CEM firms was fuelled by a growth-through-acquisition strategy matched by lead firm demands for a consolidation of their supply-chain relationships. Such developments would increasingly concentrate ownership in first-tier OEM supply positions in Malaysia; which implies that the position of local firms lower down in the subcontracting equation would be increasingly one of a 'captive' local supplier.

Figure 2. Employment in Electric/Electronics Sector in Malaysia, 1981-2000



Source: Department of Statistics, Malaysia Manufacturing Census

Ultimately, the impact of the CEM revolution must not be overstated given that by 1999, only 18 percent of electronics production was outsourced to CEM firms (Hobday, 2001). Equally, Malaysia's overdependence upon foreign workers in electronics was not specific to Malaysia but rather an employment pattern common to electronics manufacturing in general. Even in the most advanced electronics nations such as US, South Korea, Singapore and Taiwan, rapid increases in temporary and foreign workers occurred in the 1990s to cover labour-intensive operations. International migration and the reconfiguration of the workforce has gone hand-in-hand with the increased outsourcing of manufacturing services by lead firms specialising in product-level innovations and brand-building activities. The problem for Malaysian upgrading is that this would hit the electronics industry precisely at the time when Malaysia had only just begun to actively target SME development and to promote linkages aimed at moving the local supply base out of its original mode of integration as an assembler of imported components.

Asian production networks and stalled upgrading

While the rise of contract manufacturing may have limited local firms to a lower-level form of integration, equally limiting the forms of knowledge and technology transfer possible, we should also recognise that US multinationals more generally have offered the most outsourcing opportunities to local firms.³⁵ For instance, recent surveys by the Malaysian American Electronics Industry, a subgroup of the Malaysian American Chamber of Commerce, showed that the local outsourcing of goods and services by member companies increased from RM6.7 billion in 2000 to RM13.8 billion in 2003.³⁶ Many of the most successful examples local firms reaching higher-tier supply positions are generally linked to US multinationals in Penang. Indeed, one of Malaysia's most highlighted linkage programmes, the Global Supplier Programme, was driven largely by US multinationals and its success reportedly based on the genuine commitment by MNC managers to local upgrading—a commitment shown by actually improving the supply positions of a select group of GSP graduates. For developing countries like Malaysia, the benefits of FDI in electronics are likely to depend upon the origin of the multinational and the broader competitive dynamics in which they are situated.

It is no coincidence that most of Malaysia's exemplary cases of upgrading tend to stem from Penang—a region dominated by US multinationals based largely in the export of computer components (microprocessors, hard disk drives, printed circuit boards, etc.). The opportunities for local participation in these sectors themselves a reflection of the 'open-system' model of competition which has driven the US computer industry. In terms of Malaysia's output structure, electronic components represents an increasingly dominant segment, growing from 65 percent of total electronics output in 1998 to 77.4 percent in 2002 (see table 4). This is a relatively positive sign for Malaysian upgrading given that competition in this sector relies upon outsourcing practices of western multinationals.

³⁵ While European and Japanese consumer electronics firms have also pursued significant outsourcing strategies, US computer firms such as IBM, Hewlett-Packard, Intel, Fairchild, Texas Instruments, Dell Computers and Cisco Systems are widely regarded as major leaders in the outsourcing of electronics production (Hobday, 2001).

³⁶ <http://www.amcham.com.my/>

Table 4. Output Structure of the Electronics Industry, 1998-2002

Year	Electronic Components (%)	Consumer Electronics (%)	Industrial Electronics (%)
1998	65.1	24	10.9
1999	66.7	21.2	12.1
2000	68.6	20.5	10.9
2001	65.5	22.7	11.8
2002	77.4	22.2	0.4

Source: Malaysian Industrial Development Authority (MIDA)

However, when looking more historically at Malaysia's upgrading process, it also means that much of inflow of FDI may not have contributed much to the upgrading of the local supply system. The second wave of foreign investment into electronics in the late 1980s through to the mid 1990s was dominated far more by the expansion of Asian production networks into Malaysia than either US or European counterparts. In general, Japan and Taiwan far outstripped US foreign investment in the 1990s. For instance, between 1960 and 1985, one study found that 27 Japanese electronics factories had been established in Malaysia. Immediately following a dramatic appreciation of the Yen, 96 electronics factories were established between 1986 and 1991 (Edgington and Hayter, 2000). While investment into electric/electronics segment is not disaggregated by origin, aggregate investment patterns suggest Asian investment may well have outstripped US investment in electronics. This would begin at the start of the 1990s as Taiwanese investment in Malaysia would increase over four fold from \$167 million over 1986-89 to \$783 million over 1990-92. Over the same period, Japanese investment in Malaysia would increase from \$1.2 billion to \$2.3 billion (World Bank, 1995). Over the period 1988 to 1995, Japanese firms invested roughly \$8.1 billion in Malaysia with Taiwanese firms close behind with roughly \$8 billion in investment. US investment over the period was over 70 percent less than the combined investment of Japan and Taiwan into Malaysia (see Table 5).

Table 5. Top Ten Sources of Foreign Investment in Malaysia (US\$ Millions)

Country	1988	1990	1992	1995	1988-1995
Japan	461	1,584	1,077	839	8,097
Taiwan	313	2,383	602	577	7,991
USA	202	213	1,324	721	4,587
Singapore	158	337	178	403	2,581
France	198	7	1,632	39	1,963
UK	74	326	523	76	1,627
South Africa	16	245	40	242	1,587
Indonesia	9	20	193	35	1,305
Australia	10	141	857	56	1,225
Hong Kong	113	141	32	70	1,153

Source: Ariff and Ng (1998)

The movement of Asian production networks into Malaysia is likely to have limited the scope for domestic industrial upgrading for two basic reasons. Firstly, by the late 1980s, firms from first-tier East Asian NIEs such as Taiwan had already established themselves as major OEM suppliers able to produce a wide range of products to the design specifications of major OEM firms. As Malaysia has developed relatively few backward linkages through which to upgrade local firms, Asian expansion into Southeast Asia, coupled with the expansion of rival US contract manufacturers, would have positioned themselves as the preferred points of consolidated supply for major outsourcing movements pursued by the leading US OEM firms. With global

“flagship” firms using the services of either other Asian OEM subsidiaries in Malaysia or the new global suppliers from the US and Singaporean CEM sector, the traditional routes for local firms to move out of low-level assembly were closing off. In upgrading terms, the 1990s would see the scope for ‘learning from global buyers’ diminishing as new intermediaries redefined the modalities of integration into the supply system for local firms.

The second impact on Malaysia’s stalled upgrading lies in the general differences in strategy between US and Asian-led production networks. Current wisdom suggests that the latter are far more closed to local participation and limited in the scope for knowledge and technology transfer (Dore, 1986; Lim and Fong, 1991; Taylor, 1995; Yamamura and Hatch, 1997; Borrus, Ernst and Haggard, 2000; Belderbos *et al* 2001). Asian production networks tend to be much less reliant upon outsourcing practices and are based more upon “in-house” production via wholly-owned foreign subsidiaries. This is particularly true for the local sourcing of Japanese electronics firm from Keiretsu affiliates in Southeast Asia (cf. Aoyama, 2000). Furthermore, much evidence suggests that the transfer of knowledge and technology to foreign subsidiaries in Southeast Asia has been primarily related to areas which enable firms to establish market position based on lower-level, labour intensive production activities (Yamashita, 1991; UNDP, 1994; Taylor, 1995).

Interviews carried out in June 2004 confirmed the general perception that Taiwanese production networks in Malaysia, and to a lesser extent the Japanese production networks, are largely based on activities of wholly-owned local MNC subsidiaries and effectively closed to local electronics firms except in low-level activities. Japanese firms have long had the reputation for being closed to foreign participation although this has been changing (cf. Aoyama, 2000). While one MITI official confirmed the close nature of Japanese investment into electronics, they equally thought that in terms of the scope for linkages with local firms, Taiwanese investment was “even worse”. This suggests that prevailing characterisations of Taiwanese production networks as more open than the Japanese should be revisited (cf Borrus, Ernst, and Haggard, 2000).

Differences in openness between US and Asian production networks are themselves reflected in differences in the location of investment. For instance, the bulk of US investment tends to go to the computer-related segments of the electronics industry in Penang. The industrial cluster in the region is also one which has developed the greatest capacity for forging backward linkages to local firms. In contrast, much of Asian investment would go into consumer and industrial electronics segments located primarily in Selangor and Johor clusters (cf. Aoyama, 2000). These regions developed far less advanced electronics manufacturing capabilities than in Penang and the location of operations in these regions reflect, in part, the differential dynamics of the segment they specialise in—namely mature consumer electronics devices such as radios, televisions, etc. Such commodity products tend to only require regions able to provide a match between volume assembly activities, ancillary support industries such as plastics, and better shipping facilities for the larger consumer electronic devices.³⁷ In other words, the locational choices of Taiwanese and Japanese production networks is consistent with their limited need for local electronics sourcing and interest to aid in the upgrading of local electronics firms. Such differences are manifest in the training and vendor development initiatives in the region.

³⁷ Malaysia Industrial Development Authority, June 2004.

Attempts to imitate Penang in terms of developing an institutional infrastructure to promote the upgrading of human resource in Selangor have been limited, in part, due to an inability to attract active MNC participation in the region. In 2002, the Selangor Human Resource Development Corporation (SHRDC), the equivalent to the Penang Skills Development Corporation (PSDC), attempted to reproduce the Global Supplier Programme successfully setup in Penang in 2000. The project was terminated prematurely due to a lack of participation by local SMEs. SHRDC representatives claimed that the most reported reason for this stemmed from perceptions by local firms about a lack of genuine commitment in the project by the region's electronics MNCs. When looking at the finer details about how the two respective programmes were implemented, differences in the scope for global-local upgrading are apparent—dependent upon the commitment of a particular composition of multinationals coupled their own preferences, strategies and requirements for local outsourcing.

For instance, the GSP in Penang was based on specific training regimes whose content was drafted by MNC representatives and targeted to eight local firms identified by the participating multinationals. Following completion, most of those firms selected for the programme would receive improved commercial positions such as a higher volume of work or a broader range of supply activities. Yet in the case of Selangor, the disparate composition of MNCs across discontinuous segments of consumer electronics has raised greater difficulties in identifying a coherent set of training needs than in Penang.³⁸ This helps account for the far more passive role by MNC participants in pursuing skills upgrading.³⁹

The actual skills content of the Selangor GSP project, as with their other training programmes, was developed by SHRDC staff and only authorised by the multinational representatives on the board. Furthermore, no local firms in Selangor were actually targeted by the MNCs themselves. Rather, a list of local suppliers was given to SHRDC staff by participating multinationals. It was from this list that SHRDC staff would have to screened local firms for suitability to the programme. Rather than criteria set by the multinationals themselves, screening was based on bureaucratic conditionalities set by the federal government as to which firms qualify as a local SME for training support purposes. Ultimately, what might have been seen as a lack of commitment by local firms may equally have been perceptions by MNCs about the quality of local firms and/or a limited need for local suppliers in Selangor's electronics industry. The end result was that no backward linkages were formed through Selangor's GSP initiative and what was to have been a 2-year programme to help create such linkages was terminated after only six months.

In summary, the ability of local firms to “learn” from global buyers has been severely dampened by the evolution of US and Asian production networks in Malaysia. Asian production networks which moved into Malaysia over the 1990s tend to organise along ownership lines and are far more resistant to forging linkages which develop local suppliers. In contrast, US production networks, while more open to outsourcing, have been increasingly shaped by contract manufacturers who not only produce to the specification of OEM buyers, but provide both financial services as well as complete procurement and supply chain management services on behalf of the major OEM

³⁸ Indeed, the training content of Penang's Global Supplier Programme was offered to SHRDC to emulate (yet interestingly enough, only through a licensing arrangement) yet this was not pursued due to the different activities and skillset in Selangor's electronics cluster.

³⁹ Some representatives from foreign multinationals equally attribute the lack of linkages in Selangor to the passivity of the region's own state economic development corporation in relation to electronics (cf. Rasiah, 1999).

firms. The ability of CEMs to compete with traditional OEM suppliers lies in their ability to accept lower margins which is itself depending upon their model of achieving greater flexibility through the use of temporary contracts and imported foreign labour. Ultimately, the flexibility needed to maintain the contract manufacturing model leaves little room for medium to long-term investment in the upgrading of local suppliers. Thus US and Asian investment both created new intermediaries in the chain, augmenting the pathways between local suppliers and global buyers and introducing different sets of dynamics which problematised Malaysia's ability to shift out of its original mode of integration as a low-cost, labour based assembler of imported components.

Conclusions

The globalisation of manufacturing sectors such as the electronics industry has been central to industrialisation experiences in Asia. Yet as electronics grew to be Malaysia's primary driver of export-oriented industrialisation, success in attracting FDI was born at a costly expense. Domestic leadership and bargaining power was generally lacking and as a whole, the country's ability to attract more 'developmental' forms of foreign investment was limited. As the electronics case illustrates, the fate of Malaysian manufacturing in general, and the upgrading of local industrial capacities in particular, was left far too much to chance. Consequently, notable successes of local upgrading are relatively few in electronics and far overshadowed by exogenous dynamics which, over the 1990s, were to have limited Malaysia's window of opportunity for indigenous industrial development.

The Malaysian case illustrates the importance of timing to the success of any attempt by developing countries to upgrade through global production networks. Attempts to better gauge the timing of interventions can only be accomplished through better understanding and judgement of prevailing dynamics affecting the configuration of global production networks. For developing countries, this implies a significant capacity-building effort to establish a range of institutional linkages needed to monitor and forecast likely GPN dynamics and integration scenarios. In Malaysia's case, therein lies the unintended consequence of its "pro-poor" growth model. Many opportunities to build institutional linkages as well as firm-level linkages would have been missed, and continue to be so, due to the uneven forces behind Malaysian economic governance. Malaysian politics has much to do with this uneven development.

For instance, too much emphasis has been placed on Penang as the centre of Malaysian electronics. While a more coherent and integrated regional cluster, it is equally highly dependent upon computer related components, semiconductors in particular and thus far more affected by swings in global demand for a few core electronic items.⁴⁰ In Penang, the large Chinese population and leading Chinese administration have always been under political pressure to proactively maintain the growth of its primary driver, the electronics sector.⁴¹ Its lead agency, the Penang Development Corporation, was itself initially a device for maintaining local Chinese

⁴⁰ Consequently, the downturn in 2001 would see the overwhelming majority of labour retrenchment in electronics derived from factories in Penang.

⁴¹ As Terrence Gomez has pointed out, while the local Chinese political party was actually only leading in seats for a short time during the 1970s, the dominant political party, UMNO has never actually taken over state operations in Penang in large part because the Chinese led government has been able to actively and efficiently maintain the growth of the region.

control over civil servant staffing (Haggard, Li and Ong, 1998). This is because in Malaysia's federal system, state control over staffing is only effective at the municipal level and not actually at the state level—state civil servants being largely controlled by federal appointment.

While Malaysian political structures may have motivated proactive efforts in regions such as Penang, in other major electronics regions such as Selangor—itsself actually a more consistent source of electronics investment in recent years—there has never been political pressure for state agencies to actively promote the development of electronics and foster local sourcing and linkages (Rasiah, 1999a). This is due both to the much greater range of sectors in the nation's capital region, coupled with an overriding political pressure to target Bumiputera firms. Selangor's own state economic development corporation has never developed a remit to intervene in the operations of the electronics sector. Critical electronics support sectors, such as the machine tooling industry, were largely dominated by Chinese firms and thus not fitting with development priorities. Consequently, prevailing state structures meant that the SEDC in Selangor has only ever focussed on infrastructure and land rentals.

Prevailing state structures also contribute to missed opportunities due to policy implementation which suffer from the high degree of compartmentalisation in the federal bureaucracy. For instance, in recent years, a wide range of financial and training measures have been opened up to local SMEs. Yet such support measures are fragmented among many different agencies each with different access requirements and focuses. In 2003, the PDC created a sub-agency, the Collaborative Research and Resource Centre, precisely to help SMEs overcome the fragmentation of federal support programmes which hinder their application in the first place. Thus, it is not out of a lack of effort and financial commitment by the federal government that upgrading measures have had limited impact on local capacities in the electronics sector.

Ultimately, for developing countries seeking to upgrade indigenous industrial capacities through integration within global production networks, our analysis raises two broad lessons to be learnt from the Malaysian case. Clearly, linkage processes (as upgrading outcomes) are affected by “a host country's overall policy environment, including its economic and institutional framework, the availability of human resources, infrastructure and the degree of political and macroeconomic stability” (UNCTAD, 2001:173). What is also clear is that the building of more coherent and interactive forms of economic governance is central. In the context of Malaysian electronics, models of institution building are usually gleaned from the coordinating role of single agencies such as the Penang Development Corporation (cf. Best, 1999; Rasiah, 2002). Rather, industrial upgrading cannot be solely a function delegated to a particular regional agency or ‘siloed’ within the federal bureaucracy. As the Malaysian case illustrates, the policies and governing structures which affect industrial upgrading may well embody far more conflicts than are recognised when considering industrial policies in an exclusive sense. Consequently, successful forms of industrial upgrading are perhaps better conceived of in terms of a country's success in engendering a more proactive form of economic governance which straddles federal and regional divides as well as divisions in policymaking. In other words, targeted solutions required highly integrated institutional efforts.

Where the integration of national institutions of economic governance is a long term initiative, more immediate attention can and should be given to drafting a coherent form of industrial policy which recognises that upgrading is not a static process with

pre-defined evolutionary stages. The breakdown of the “flying geese” formation is a testament to the fact that for the current crop of latecomer developing countries, upgrading in global value chains is all about “leapfrogging” efforts. Despite change in metaphor, much of these aspirations are still rooted in linear assumptions that “catching-up” means moving from manufacturing into research and design. Malaysia’s stalled upgrading is a potent reminder that local firms do not simply enter at global production networks in low level assembly roles, and then improve manufacturing skills, expand supply capabilities through increase access to technological knowledge and export markets, and then upgrade into design and product-level innovation until they develop intellectual property and brand ownership. This linear sequence fundamentally misunderstands the differential learning dynamics and competitive requirements occurring at different parts of the value-chain (Lüthje, 2002). In particular, they ignore the deep-seated trends underlying the electronics industry (and many other sectors) which drive the uncoupling of product-level innovations from manufacturing and supply operations. Such bifurcating dynamics have meant that even well-established OEM nations such as Taiwan have had difficulties in the ability of firms to actually able to move out of manufacturing and into product-innovation and brand development.

If, as we argue, there are no fixed stages in the upgrading process, where does this leave developing countries and their attempts to create targeted linkage programmes? What upgrading criteria should be employed in designing and managing linkage promotion activities? Clearly, governments are limited in their degree of intervention in firm-level developments. Consequently, linkages programmes tend to revolve around a combination of three basic elements—matchmaking, promotional events, and training schemes. Yet for such programmes, criteria is often based on static features such as predefined upgrading outcomes or firm-level capabilities. In illustration, it is often thought that “the single most important host country factor influencing linkage formation is the availability of local suppliers with competitive costs and quality” (UNCTAD, 2001: 173). This only begs the question as to what these capabilities are—indeed, on the purpose of linkage promoting policies as well. Rather, the criteria employed in linkage programmes needs to focus on those which engender “dynamic capabilities” (*cf.* Teece *et al.*, 1997; Winter, 2002; Pettigrew *et al.* 2003). Much work has been done in this field yet with little connection to the context of global production networks or the drafting of linkage policies. While it is beyond the present paper to do so, we believe such starting points represent a fruitful focus for developing countries attempting to incorporate more dynamic measurements in the design and implementation of linkage/upgrading policies.

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