

## Foreign Firms In Penang's Industrial Transformation

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#### ABSTRACT

*This paper attempts to examine the impact of foreign manufacturing investment in Penang's economic growth and structural change. It was found that despite the increasing trend of manufacturing growth, intersectoral interdependence was weak. Hence government policies directed towards the strengthening of intersectoral interdependence as well as a broader based domestic industry were suggested. In addition, dynamic restructuring leading to a greater emphasis on skills training and development were also recommended.*

#### ABSTRAK

*Tujuan artikel ini adalah untuk memeriksa kesan pelaburan asing dalam sektor pembuatan ke atas pertumbuhan dan perubahan struktur ekonomi di Pulau Pinang. Sungguhpun terdapat trend pertumbuhan yang semakin naik dalam sektor pembuatan, saling kebergantungan antara sektor adalah lemah. Justeru itu, penulis mencadangkan dasar kerajaan yang mempelbagaikan asas industri dalam negeri. Selain daripada itu, penyusunan semula sektor pembuatan secara dinamis yang memberi penekanan terhadap latihan dan pembangunan juga dicadangkan.*

#### INTRODUCTION

The state of Penang with a total area of 1,031 km square and a population of 1.07 million in 1987 which is one of the smallest in Malaysia (PDC 1988: 1), has recorded remarkable growth in manufacturing in the last two decades; its contribution to Malaysia's fast growing real manufacturing value added (average annual growth rate in the period 1971–87 reached 8 per cent despite a serious cyclical downturn in 1985), increased from 12 per cent in 1971 to 13.6 per cent in 1987 (Malaysia 1987: 103). Only 20 years ago, plagued

by serious socio-economic problems its future looked uncertain. Unlike the other states, Penang's tertiary sectors of trade and administration had been extremely important during British colonialism, notwithstanding agriculture's (including forestry, fishing and livestock) position as the leading sector in terms of employment until at least the early 1970s. Although Agriculture contributed only 15 per cent of Penang's GDP in 1970, its employment contribution was still very significant in 1970 (24 per cent) (PDC, 1988: 5.2). Penang had benefitted considerably as a trading port within a network of global trade under British administration. It also acted as an entrepot centre for Northern Malaya, Sumatra, Southern Siam, Burma, Dutch East Indies and India (Twentieth Century Impressions of British Malaya, Vol I, p. 139; Vol II, p. 730; cited in PDC 1988: 7.1).

However, Penang's position became precarious with the gradual shift of trading to the Klang Valley since independence which culminated in the revocation of its free port status in 1969. The Penang Master Plan prepared in 1964 by a Colombo Plan consultant reported that it was besieged by "depression, spiralling inflation, labour unrest and political instability" (Munro 1964: 132; Goh 1988: 6). This grim assessment was compounded by tragic unemployment levels that had shot to 15.2 percent (PDC 1971) which was almost twice the national figure of 8 percent (Malaysia 1971). Thus, it was not surprising when the opposition Gerakan (which later joined the ruling National Front in 1971) won in the 1969 general elections (Kamal & Young 1987: 181). It was under such daunting circumstances, that the new political leadership pursued developmental goals, notwithstanding the role of the central government.

Both national and state policies had a strong impact on the nature of growth that characterised Penang in the 1970s and 1980s. The Penang Development Corporation (PDC) working within the guidelines set by national bodies began promoting industrialisation aggressively. Although the launching of the New Economic Policy (NEP) by the central government in 1970 was followed by greater emphasis on economic growth and restructuring with the twin prongs of poverty eradication, and the elimination of ethnic occupational identification, Penang's relatively smaller agricultural sector received far less attention than the mainland states. Nonetheless, the manufacturing sector, often identified by economists as the engine of growth (Kaldor, 1967),<sup>1</sup> began to grow rapidly as a con-

sequence of aggressive state efforts, both national and local. Foreign firms, particularly export oriented assemblies, became the fulcrum upon which much of the manufacturing output, employment and exports expanded.

This paper attempts to examine the impact of foreign manufacturing investment in Penang's economic growth and structural change. As a more rigorous econometric and input-output analysis of the contribution of foreign firms is difficult because of the lack of continuity in time series data on output, exports and employment, we draw our arguments from the performance of the foreign dominated sectors and sub-sectors. In the following section of the paper we discuss the interplay of the spread of foreign productive capital to LDCs, and domestic, both national and state industrial policies, to situate within the historical context the influx of foreign firms in Penang. This is accompanied by an analysis of the growth and structural change that took place in the 1970s and 1980s. Subsequently, we address the important issue of industrial planning for the next two decades.

#### THE SPREAD OF FOREIGN MANUFACTURING FIRMS TO LDCS

Penang's efforts to attract foreign investment came at a time when export processing manufacturing firms were already spreading in LDCs. Until 1914, despite extensive foreign participation in LDCs which accounted for 60 per cent of all foreign direct investment, the composition of manufacturing investment was relatively small (Dunning 1983: Table 5.2). Nonetheless, foreign manufacturing investment in LDCs began to expand significantly between the two world wars. However, much of it was directed to Latin America. For example, approximately 200 of the world's leading transnational firms had set up operations in Latin America by 1939, with only about 100 subsidiaries formed in the rest of the LDCs (Jenkins 1987: 5-6).

It was only after the end of the second world war, that foreign manufacturing investment began expanding rapidly into Asian and African LDCs. This was assisted by the promotional activities of the United Nations Industrial Development Organisation (Tsuchiya 1977: 4; Jenkins 1987: 129). Although the pilot FTZ project was begun in Shannon (Ireland), by 1980 there were 53 such zones

spread in 30 LDCs, with another 25 planned or already under development (Samuelson 1982; Jenkins 1987: 129). Malaysia and Penang had 10 and 4 FTZs respectively in 1989 (Rajah, forthcoming). In the period 1950–84, the share of U.S. direct foreign investment engaged in the manufacturing sector snowballed from 15 to 37 per cent (Wilkins 1974; Jenkins, 1987: 7–8). In general, foreign manufacturing firms in LDCs are mainly found in the manufacture of chemicals, machinery, electrical and electronics goods, transport equipment, textile and food processing (Weiss 1988).

## NATIONAL AND LOCAL INDUSTRIAL POLICIES

While the outward movement of foreign productive capital gradually intensified after the second world war, the developmental efforts of the state and its emphasis on wooing foreign investment is central in explaining the nature of investment that arrived in particular LDCs.<sup>2</sup> Although the public, agricultural and service sectors received considerable attention from the national government, the manufacturing sector was earmarked as the main engine to generate employment and support economic growth and structural change. As government policy between 1958 and the mid 1960s was geared toward promoting import-substituting firms without any systematic emphasis on infant local industry protection (Rajah, 1990),<sup>3</sup> when the influx of foreign firms fizzled out with the saturation of the domestic market by the mid 1960s (Hoffman & Tan 1980), Malaysia's manufacturing pace had begun to slacken; the GDP contribution of manufacturing hovered around 9 per cent both in 1960 (World Bank 1983: 153) and in 1965 (World Bank 1987: 205).

Consequently, the government formed the Federal Industrial Development Authority (FIDA) in 1965 to spearhead industrial growth, and enacted the Investment Incentives Act in 1968 to pave the way for the shift to export promotion (Jomo 1986). The Investment Incentives Act gave generous benefits to encourage firms to broaden their export markets for goods manufactured in Malaysia (Malaysia 1976: 366). Under this Act, exemptions from company tax, relief from payroll tax, investment tax credit, accelerated depreciation allowances, export incentives, tariff protection and exemption from import duty and surtax were granted to approved companies (Malaysia 1971: 149). MIDA and state development corporations went on to woo foreign investors. In addition, the Capital

Investment Committee (CIC) under the chairmanship of Tan Siew Sin was formed in 1969 to provide top level review of Malaysia's industrial policy (Malaysia 1969: 6).<sup>4</sup>

The Investment Incentives Act was augmented by the FTZ Act of 1971 and the Industrial Coordination Act of 1975. By far the most attractive platform for export-oriented firms to emerge from these acts were FTZs and licensed manufacturing warehouses (LMWs).<sup>5</sup> Following the FTZ Act, FTZs were specially designed and developed by state development corporations for firms manufacturing products essentially for export. FTZs are special industrial estates where the normal trade restrictions do not apply.<sup>6</sup> In this regard, Penang and Selangor took the lead in earmarking FTZs and LMWs as spearheads of industrialisation (Rajah 1987; Goh 1988).

In Penang, the Penang Master Plan Study (PMPS) of 1970 prepared by Robert Nathan and Associates which came to be known as the Nathan Report inter alia recommended the emphasis on exports apart from the re-zoning of industries by situating the heavy industries at Province Wellesley and light industries in Penang island (PDC 1988). The Penang Development Corporation (PDC) formed in 1971, adopted the Nathan Report as an important integral part of Penang's industrialization strategy. With the firm commitment of Penang's Chief Minister, Lim Chong Eu, PDC began promoting foreign investment aggressively.

Penang had eight industrial estates in 1988; four of them were FTZs which is mainly occupied by foreign firms. When compared with other states, Penang's FTZs had the most number of firms (55%), held the biggest amount of fixed assets (48.4%), and generated the most employment (53.8%) in 1987 (Rajah, forthcoming). The Bayan Lepas FTZ which remained the biggest in Malaysia even in 1987, had 41 firms with a total fixed asset of M\$524.2 million, and a labour force of 28,911 employees.

As existing published data on investments do not provide actual state figures and a continuous breakdown of foreign investment at both the national and state levels, we use information amassed on approved projects. Although not all approved projects are implemented, based on MIDA's (*Star*, May 4, 1988) assessment, about 75-8 per cent of the projects can be considered to be implemented. Nonetheless, since this information only lists figures from newly opening firms (excludes investments from existing firms), it is likely that it may underestimate the actual investment figures. Penang

ranked third amongst the Malaysian states, in terms of newly approved projects, capital investment and potential employment in the period 1971–89 (Figures 1, 2 & 3).

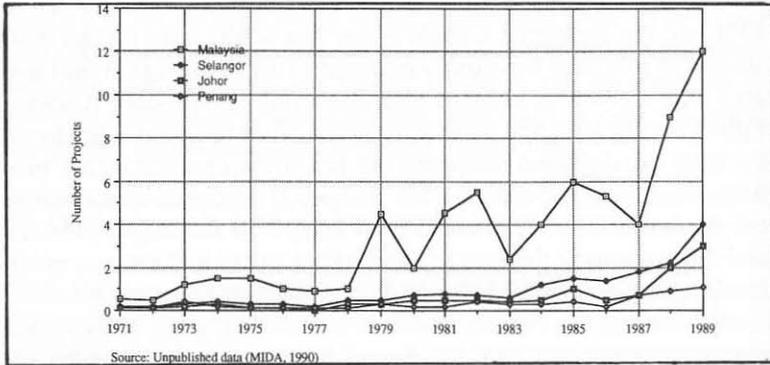


FIGURE 1. Approved Manufacturing Projects, Malaysia, 1971–89

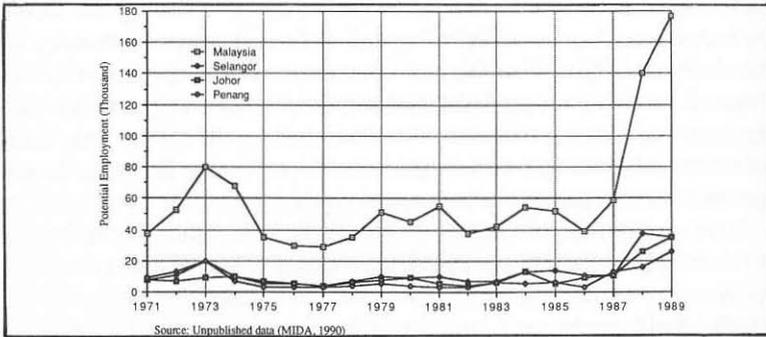


FIGURE 2. Potential Manufacturing Employment in Approved Projects, 1971–89

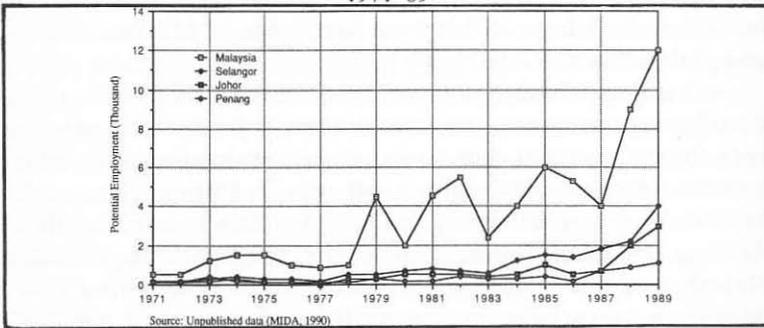


FIGURE 3. Potential Capital Investment in Approved Projects, 1971–89

Although in terms of numbers, interviews show that foreign firms were fewer than domestic firms, their contribution to employment and investment is considerable. New projects increased rapidly in the period 1971–3 as pioneering export oriented firms from abroad made their way to Penang. The labour-intensive electronics and textile firms also expanded employment and capital investment. However, following the oil crisis of 1973–5, the cyclical downturn in the electronics industry, Penang's graduation as a developed state in 1975 which reduced its array of incentives (particularly locational benefit) (MIDA 1975: 116), and more stringent regulation of projects under the Industrial Coordination Act of 1975, both domestic and foreign projects approved for Penang declined between 1975–6 and remained low until 1978.

This stagnation, despite the oil crisis of 1979–80 was however slightly offset by the relocation of labour-intensive industries from Singapore (MIDA 1983: 4; Rajah 1987). With the exception of 1983 when the electronics industry was experiencing a boom (which began in 1982) (Plossl, 1988), until the fast growth years of 1987–9 there was no significant increase in new projects. In the years 1987–9, new project approvals took a massive jump. Three main developments explain this: one, a buoyant world economy that stimulated the relocation of electronics, textile, garment and rubber based products from the developed market economies; two, more stringent trade controls against the Asian NICs influenced the outward movement of firms, particularly from Taiwan; and three, attractive revisions to incentives by the government including the provision of export subsidies to targetted industries. Taiwanese firms accounted for 31 of the 67 (involving an investment of M\$394.5 million) new firms that settled in PDC industrial areas in 1989. Hong Kong had two and south Korea one. The figure for local ventures was 23 (PDC, 1989: 22).

In addition to the inward movement of new firms, existing foreign firms, particularly in the electronics components sub-sector began to invest considerably in new production technologies (including increased emphasis on automated machines), manpower retraining and physical layout following restructuring and rationalisation efforts following the mid 1980s industry-wide crisis (Rasiah 1987). Interviews (Rasiah 1988) showed that all the foreign electronics component producers in Penang expanded production capacity considerably. In addition, National Semiconductor added its

tailend processes of wafer fabrication in Penang. To a lesser extent, new machinery such as air-jet looms began displacing old ones in textile and garment firms in the late 1980s (Tan 1989). In 1986 foreign paid-up capital accounted for 43 per cent of total paid-up capital and 51 per cent of total industrial assets (PDC 1988: 3.5). The electronics and textile sub-sectors accounted for 71 per cent of foreign manufacturing assets (MIDA 1986; PDC 1988: 3.5).

## STRUCTURAL CHANGE<sup>7</sup>

Since the shift in government policy, Malaysia's manufacturing sector began to pick up gradually. For example, the contribution of the manufacturing sector to GDP increased to 12.2 percent in 1970, 14.4 percent in 1975 (Malaysia 1976: 362), 18 percent in 1981 (World Bank 1983: 153), and 23.9 percent in 1988 (Bank Negara 1988: 167). Indeed in 1984, and again since 1987, manufacturing surpassed agriculture as the main component of GDP. Penang has been a crucial contributor to these high national growth rates. The manufacturing sector grew at an annual rate of 11.6 per cent between 1971-80 (Kamal & Young 1987: 185), far exceeding the national figure of 8.4 per cent in the same period. The contribution of the manufacturing sector rose from 21 per cent in 1971 to 41 per cent in 1980, falling slightly to 39 per cent in the recession plagued year of 1985 (Table 1). In terms of employment, the manufacturing sector's contribution increased from 15 per cent in 1970 to 28 per cent in 1980 and 29 per cent in 1985 (Table 2).

## INTER-SECTORAL STRUCTURAL CHANGE

Despite the relatively small size of its agricultural sector when Penang launched its developmental plans in 1970 (its GDP contribution was only 15 per cent in 1971), its employment contribution of 31 per cent in 1969 (PDC 1988: 5.1) was considerable. Moreover, the total land under agriculture increased from 68 per cent in 1969 to 75 per cent in 1985 (PDC 1988: 5.1-2). In addition, its GDP contribution of 15 per cent in 1971 (PDC: 1988 1.9), though, significantly smaller than the 29 per cent of South Korea and Philippines (Limqueco et al. Table 2.6), and 31 per cent of Malaysia in 1970, it was far more than the 3 per cent of Singapore when the latter city

TABLE I. Gross Domestic Product, Penang and Malaysia, 1971, 1980 &amp; 1985 (%)

Sector	1971		1980		1985	
	Penang	Malaysia	Penang	Malaysia	Penang	Malaysia
Agriculture*	14.6	29.6	6.5	23.8	5.3	21.0
Mining#	0.2	6.4	0.5	4.5	0.5	10.5
Manufacturing	21.0	14.3	41.0	18.6	38.9	19.8
Construction	5.2	4.2	4.2	4.6	4.4	4.8
Utilities@	2.9	1.8	2.0	2.3	2.4	1.7
Transport+	7.8	4.9	9.2	6.9	10.4	6.4
Trade-	26.0	12.9	16.6	13.4	15.2	12.2
Finance=	10.8	9.5	7.9	7.8	8.2	9.0
Government	7.5	9.6	9.4	12.2	12.1	12.3
Other services	4.1	6.9	2.7	2.9	2.5	2.3
Total	100.0	100.0	100.0	100.0	100.0	100.0
(M\$ million)	1,329	22,739	3,413	44,512	4,283	57,150

\* Includes forestry, fishing and livestock.

# Includes quarrying.

@ Comprises of electricity, water and gas.

+ Includes storage and communication.

- Comprises of wholesale and retail trade, and hotels and restaurants.

= Includes insurance, real estate and business services.

| At 1978 prices

Sources: Malaysia, Economic Report, various issues; PDC (1988).

state began industrialising rapidly in 1965 (World Bank 1987: 207). The transformation from agriculture to industry (manufacturing, construction and utilities), is clear as the latter rose from 29 per cent in 1971 to 48 per cent in 1985 while the former fell from 15 per cent in 1971 to 5 per cent in 1985. When compared with national figures of GDP composition, its performance has been spectacular as the relative expansion of industry in Penang in relation to the relative decline of agriculture has been far more rapid (Table 1).

Although incomparable to South Korea and Taiwan, Penang does show some features of early industrialisation, ie. growth in industrial output gradually outstripping growth in agricultural output (Thirlwall 1988; Kaldor 1967; Amsden 1989). Labour productivity (1978 prices) in agriculture rose from M\$37,000 per worker in

TABLE 2. Sectoral Employment in Penang,  
1970, 1980, 1985 (%)

Sector	1970	1980	1985
Agriculture*	24.3	13.5	14.5
Mining#	0.3	0.2	0.2
Manufacturing	15.0	28.4	29.0
Construction	3.0	5.9	5.6
Utilities@	1.0	0.1	0.1
Transport+	7.4	4.6	4.7
Trade-	17.2	19.2	18.8
Finance=	1.8	2.5	3.1
Government	23.4	24.7	23.2
Other services	6.6	1.0	1.0
Total	100.0	100.0	100.0
Amount ('000)	213	322	357

\* Includes forestry, fishing and livestock.

# Includes quarrying

@ Comprises of electricity, water and gas.

+ Includes storage and communication.

- Comprises of wholesale and retail trade, and hotels and restaurants.

= Includes insurance, real estate and business services.

Source: PDC (1988: Table 4).

1971 to M\$52,000 per worker in 1980. The rise in agricultural labour productivity in 1980 comes from both a reduction in agricultural labour (surplus workers) and increasing returns as absolute output increased from M\$194 million to M\$223 million (1978 figures). This figure fell to M\$44,000 per worker in 1985 because of an increase in agricultural workers (PDC 1988: 1.9) – possibly a consequence of widespread retrenchments and depressed employment opportunities in the manufacturing sector in the mid 1980s.

However, despite the increasing trend of manufacturing, inter-sectoral structural change within Penang's economy has fallen far short of the experience of South Korea and Taiwan (Amsden 1989; Rasiah, forthcoming). Its impact on the agricultural, transport, financial and service sectors have been relatively modest. In other words, manufacturing expansion does not appear to have aided sufficiently the growth of output in the other sectors despite Penang's

relatively early position on the industrialisation curve. The relatively unimpressive performance of the transport, finance and service sectors may be due to classification problems; state officials pointed out that several large transport, finance and service companies operating in Penang have been registered in other states. But if these sectors which are relatively small in typical early industrialisers, are considered to have been 'underestimated' because of classification problems, it is less likely to have affected the relatively modest performance of the agricultural sector. An exception here will be the off-estate processing sub-sector which in 1968, accounted for 7.9 per cent of Penang's manufacturing employment (eg. rubber processing and palm oil refining) (PDC 1988: 3.24). Nonetheless, as agricultural processing has gradually been shifted to the more resource based states in Malaysia (such as Johore, Selangor, Perak and Negeri Sembilan), the significance of this sub-sector has declined.<sup>8</sup> While interdependent relationships are likely to exist with its other sectors and that of other Malaysian states, the export oriented nature of Penang's industrialisation, where many large firms export completely their products, may reveal weak interdependent linkages with other sectors.

## MANUFACTURING STRUCTURAL CHANGE

Within manufacturing, Penang has undergone considerable sub-sectoral structural change. In 1968, the leading employers were textile and garment, and basic metals (Table 3). In 1984, the order was electronics/electrical and textile and garment. These two foreign dominated sub-sectors together accounted for 57.7 per cent of the employment in Penang's manufacturing sector in 1984. The electrical/electronics sub-sector expanded from an insignificant industry in 1968 to contribute more than a third (35.6%) of Penang's manufacturing sector employment in 1984.

Penang has also demonstrated considerable structural shift in terms of material/processing and light/heavy industry classifications of employment (Table 4). The composition of workers in heavy industry processing increased sharply between the years 1968 and 1984. This tremendous increase also tilted the balance toward heavy and processing type industry. In aggregate terms, such a shift compares favourably with South Korea, Taiwan, Singapore and

TABLE 3. Manufacturing Employment Structure in Penang,  
1968 & 1984

Sub-sector	1968		1984	
Food, beverages & tobacco	1,198	8.3	7,250	8.7
Textile, garment & wearing items	2,470	17.1	18,550	22.1
Wood & furniture	401	2.8	2,109	2.4
Paper, printing & publishing	1,511	10.5	3,939	4.7
Chemicals	423	2.9	1,695	2.0
Petroleum & coal	—	—	57	0.1
Rubber & plastic	na	na	4,710	5.6
Non-Metallic	na	na	1,039	1.2
Basic metals	2,115	14.7	4,183	5.0
Fabricated metal	564	3.9	2,833	3.4
Machinery	555	3.9	1,125	1.3
Electric/electronic	—	—	29,766	35.6
Transport	—	—	1,980	2.4
Precision equipment	—	—	1,567	1.9
Off-estate	1,139	7.9	na	na
Others	4,022	2.2	2,884	3.5
Total	14,398	100.0	83,685	100.0

Sources: PDC (1988: Tables 2 & 4)

Japan. In this regard, it is reasonable to compare the 1984 figures of Penang with the 1980 figures of the Asian NICs and Japan because of its much later state led industrialisation efforts. However, we do not have output and productivity figures for Penang for the year 1984 to make a more meaningful comparison of structural change between Penang, and the Asian NICs and Japan.

#### INTER AND INTRA SUB-SECTOR LINKAGES

If foreign firms have contributed considerably toward manufacturing structural change in Penang, their operations are also criticized often as being truncated (Lim 1978; Amjad 1981; Chee et al. 1981:

TABLE 4. Changing Composition of Manufacturing Employment, Penang, South Korea, Taiwan, Singapore and Japan, 1970 & 1985 (%)

Industry type	1970*					1980#				
	Penang	S.Korea	Taiwan	Singapore	Japan	Penang	S.Korea	Taiwan	Singapore	Japan
Light industry <sup>@</sup>										
material	13.3	8.1	8.4	7.6	7.8	8.1	7.1	7.6	4.4	7.6
processing	61.3	59.2	46.7	44.8	49.0	34.7	49.0	38.8	29.5	36.3
Heavy Industry <sup>+</sup>										
material	21.5	19.9	22.8	20.1	21.8	16.1	21.8	21.8	15.0	22.1
processing	3.9	12.8	22.1	27.5	31.3	41.1	22.1	25.9	51.1	34.0

\* 1968 figures for Penang.

# 1984 figures for Penang.

@ Light industry material type covers paper and pulp, and non-metal mineral products; processing type consists of foodstuffs, textiles, and other manufactures.

+ Heavy industry material type consists of chemicals, petroleum, coal and metals; processing type includes general and electrical machineries, and transport equipment and precision instruments.

Sources: Adapted from PDC (1988: Tables 2 & 4); Hanazaki (1989: Figure 6)

Kamal & Young 1987; Rasiah 1987) with little linkages to the domestic economy. As it is counterfactual to evaluate linkages solely on the basis of static comparisons of domestic/foreign sales and purchases (much of the data available which is reported below is in this format), and since there is little data on inter and intra industry linkages, we will address this issue in general terms. In the 1970s and early 1980s, interviews seem to support the view that linkages with the domestic economy were weak, which is borne out by FTZ and electronics industry statistics in Table 5. The nature of production had then remained very much confined to off-shore processing (Rasiah 1987).

The steep climb in domestic sourcing by foreign firms in the years 1984-7 may reflect the changing structure of production and markets (Table 5). From ratios of 0.2 per cent and 2.8 per cent in the year 1976, the domestic component of raw materials sourced by FTZ and electronics firms increased to 17.7 per cent and 17.9 per cent in 1987 respectively. It was in the mid 1980s, the electronics components sub-sector started introducing new production technologies including management techniques that necessitated the search for proximate sites.<sup>9</sup> Increasing direct shipments from Penang (inter alia caused by the rapid growth of the Pacific market)

TABLE 5. Local Raw Material Sourcing, Electronics Industry and FTZs, 1976-85 (%)

Year	Electronics	FTZs
1976	0.2	2.8
1977	4.5	5.5
1978	2.4	3.3
1979	2.4	2.8
1980	2.3	2.1
1981	2.8	3.2
1982	2.7	3.8
1983	2.4	2.7
1984	6.9	13.3
1985	8.0	11.6
1986	7.9	13.8
1987	17.7	17.9

Sources: MPPP and FTZ Annual Reports (various issues); PDC (1988: Table 6)

has also stimulated the growth of proximate supporting firms. The expansion of domestic supporting firms in Penang gained further boost when NIC currencies began to rise relative to the ringgit and when the U.S., Canada and the European Economic Community began to impose stiffer controls on Asian NIC exports (including the withdrawal of GSP) (Pongpaichit 1989; Rasiah forthcoming). Thus, foreign firms, particularly electronics components firms have been at the forefront promoting domestic ancillary support ventures for assembly and test operations in Penang.

Domestic capital goods supplies component fell gradually in the period 1976–84; 18 per cent in 1978, 8 per cent in 1980, 14 per cent in 1982 and five per cent in 1984. However, this figure rose to 25 per cent in 1986. The electronics industry exhibited a similar trend. The domestic share was 21 per cent in 1976, 14 per cent in 1978, 6 per cent in 1980, 9 per cent in 1982, 4 per cent in 1984. However, restructuring efforts in the mid 1980s pushed up these figures in the period 1985–7; domestic capital good supplies component was 15 per cent in 1985, 24 per cent in 1986 and 17 per cent in 1987.

With regard to FTZ finished sales, the domestic component hovered around 13–16 per cent between 1976–87. However, the electronics industry demonstrated weak sales linkages between 1976–83 (the domestic share recording between 0.0–0.1 per cent). This is because until 1984 almost all foreign electronics firms exported their products. Nonetheless, following state efforts especially in relaxing tight FTZ controls in the mid 1980s, foreign firms are now beginning to sell more in the domestic market as borne out by the 5–7 per cent domestic share in sales in the period 1984–6.

By 1985, the 38 sub-contracting firms reported in the PDC (1985a; 1985b) survey in Penang were involved in auto precision tuning works, precision engineering, plastic mould parts fabrication, manufacture of automation systems, precision plastic moulding products, plastic extrusion products, moulds, stamping, tool and die, and packaging. The foreign electronics firms have been a major influence in the growth of these firms; in 1985, 35 local firms had linkages with the electronics industry (Table 6). Plastic engineering generated 907 jobs (37.4%) of the 2,425 jobs created within Penang's recorded electronics industry supporting firms documented in 1985. The next biggest employment was created in metal packaging which had 783 workers (32.3%). Out of a total employment of 3,758, 3,554 worked in firms that had linkages with the electro-

TABLE 6. Domestic Ancillary Industries, Penang 1985

Ancillary activity	With electronics firms		Without electronics firms		Total	
	No. of firms	Employment	No. of firms	Employment	No. of firms	Employment
Metal Engineering	22	585	1	40	23	625
Metal Packaging	4	783	—	—	4	783
Plastic Engineering	7	907	1	440	8	1,347
Plastic Packaging	2	150	1	20	3	170
Total	35	2,425	3	500	38	2,925

Sources: Compiled from PDC (1985a; 1985b)

electronics industry. Interviews (Rasiah, 1987) showed that many had capitalised and provided the essential technology to domestic subcontractors for the manufacture of components and machines.

For instance, one firm now not only supplies automation systems and precision engineering parts and moulds to Penang's FTZ factories, but also exports to South Korea and the United States. In 1987, from a total sale of about M\$5 million, the firm sold 71 per cent in Malaysia. The remaining 29 per cent was exported: 17.4 per cent to South Korea; 5.8 per cent to the U.S.; 1.7 per cent to Singapore; and the rest were sent to Hongkong and the Philippines. This is a clear example of a firm that had benefitted from technology diffusion, funds and markets, both from the foreign firms operating in Malaysia, and their subsidiaries and partners abroad.

In addition, in 1987 Penang had six foreign supporting firms that had linkages with the electronics industry. Three of them that were Singapore controlled provide burn-in and other stress test services for semiconductor firms. These firms have been growing strongly with the boom since 1987. In fact, one large American firm for instance does 50 per cent of its burn-in in KESP (Singaporean); the American firm reported that this has helped reduce overheads markedly. Incidentally, one of these firms was domestic owned until it was sold. One American supporting firm modifies existing machinery and produces automation systems. Another two American supporting firms manufacture lead frames and perform some metal plating and stamping. The American supporting firms have shrunk in size since 1984 as the cheaper cost of domestic supporting firms

are gradually attracting attention. In line with cost-effective JIT requirements, the two firms stated that they may be phased out once domestic firms in Penang, the Kelang Valley and Ipoh mature. It is interesting to note that all the semiconductor and telecommunication firms are reported to have provided some form of assistance for the growth of domestic firms; chiefly in the form of funds, technology and demand.

Within Penang's electronics industry, consumer electronics firms show greater linkages with domestic firms, notwithstanding its relatively small domestic component. The larger semiconductor firms show lesser linkages. PDC and MIDA officials are quick to point out that the growth of supporting firms has received a tremendous boost from the reorganisation of production in the electronics component industry. In this regard, despite positive growth signs, there is still much to be done to strengthen input-output relationships with the domestic economy. In this respect, interviews show that domestic ancillary firms are plagued with expansion problems, and the lack of centralized engineering support facilities. Although amendments to the regulatory role of the Industrial Co-ordination Act of 1975 in the 1980s have reduced bureaucratic and ethnic-based constraints on small supporting firms, the lack of strong state support in subsidizing the growth of viable infant firms may continue to debilitate the creation of dynamic comparative advantages. As Amsden (1989) argues, the state in South Korea got relative prices wrong to create in the long term efficient capital-intensive firms. The metal and plastic based industry is one that needs serious R&D and other support if Penang and Malaysia harbour hopes of creating a broad-based domestic manufacturing sector similar to South Korea and Taiwan.

## SOCIO-STRUCTURAL CHANGE

The rapid pace of industrialisation also brought considerable socio-structural change. The composition of women in Peninsular Malaysia's manufacturing sector rose from 16.7 per cent in 1957 to 38.8 per cent in 1979 (Lochhead 1986: Table 4). The female composition of workers in Penang's FTZs was 63 per cent in 1982. In its semiconductor industry, women contributed 82.8 per cent of workforce in 1977 (Rasiah 1988: Table 6). This figure, however, fell gradually to 78.9 per cent in 1986. As Kamal & Young (1987: 185) noted,

female Malay migrants, mainly from Perak and Kedah (which accounted for 35.4 per cent and 31.4 per cent respectively of all in-migrants to Penang in 1980) form a major segment of the new labour force that has emerged in foreign firms.

The introduction of automated machinery and flexible production systems which intensified in the mid 1980s is expected to reduce the female bias in foreign firm employment patterns (Rasiah 1990). The female composition of the electronics workforce fell significantly in the years 1985–6 (Table 7). The figure increased fractionally in 1987 possibly due to the use of contract workers to service abnormal demand peaks. Interviews with managers from three American semiconductor firms show that contract workers are being used when demand rises ‘abnormally’. This shift in gender composition is further supported by developments in textile and knitting firms. With the introduction of state of the art technologies such as air-jet looms and weft knitting machines, and the tremendous physical energy required in moving cloth in dyeing operations, we can expect a slight shift. Indeed, one Hongkong firm had males comprising 60 per cent of its workforce in 1989 (Rasiah & Menon, 1989).

The nature of industrialisation in Penang also exposes it to serious socio-structural flaws. This is all the more so as the foreign dominated sectors of electronics/electrical, and textile and garment contribute more than half of Penang’s manufacturing workers (Table 3). As the fortunes of FTZ firms generally fluctuate with the amplitudes of volatile boom-bust cycles, workers – particularly

TABLE 7. Male and Female Employment in the Electronics Industry, Penang, 1980–7

Year	Male	%	Female	%	Total
1980	4,884	19.6	20,035	80.4	24,919
1981	4,999	20.4	19,505	79.6	24,504
1982	5,354	21.9	19,092	78.1	24,446
1983	5,712	21.4	20,980	78.6	26,692
1984	6,034	19.8	24,440	80.2	30,474
1985	6,092	23.2	20,167	76.8	26,259
1986	6,036	24.1	19,010	75.9	25,046
1987	6,290	23.9	20,028	76.1	26,318

Source: Unpublished data (PDC, 1988)

women workers – are often at the receiving end of labour shedding in times of recession (Kamal & Young, 1985; Rasiah 1987: Chapter 4; Grace, 1990). Official statistics on retrenchments during the mid 1980s recession put it at 4,600 in 1985 for the two sub-sectors (PDC 1988: 3.5). However, if induced resignations are included this figure may be much higher. As shown in Table 7, there was a decline in overall electronics employment in the recession hit years of 1985 and 1986. It was during this time, that the two Atlas plants in Penang were closed, Mostek was sold to Thomson (later bought by International Device Technology), and the other electronics component firms reduced their workforces and introduced salary reductions (Rasiah 1987: Chapter 4).

With regard to racial composition, in line with the regional disidentification objective of the NEP, bumiputera employment increased from 18 per cent in 1970 to 44 per cent in 1986 (PDC, 1988: 3.3). This jump, though, falls short of the national population composition of 57 per cent bumiputera, is remarkable given the fact that only 32 per cent of Penang's population were of bumiputera origin (1980 census) (PDC: *Ibid*). In 1982, more than 53 per cent of FTZ employees were from the bumiputera ethnic group. However, as evidenced in electronics firms, most of the bumiputera workers were in the lower rungs of the workforce, especially in the category of production operators (Rasiah 1987: Chapter 4; Kamal & Young 1987: 185).

## WHAT NEXT

Having presented a general overview of the kind of structural transformation that has characterised Penang in the 1970s and 1980s, we now turn to some suggestions that may quicken the pace further and at the same time remedy identified structural flaws. But as economic planning must be guided by hard facts, the state should compile and publish regularly input-output tables, intersectoral and inter-subsectoral statistics on the actual investment, output and employment. Further statistics on foreign firms, domestic firms and supporting firms too must be made available. Given the serious data constraints, we only provide general suggestions for state (including central government) policy toward foreign firms in Penang in the coming decade and the 21st century. As much of the govern-

mental role of Penang is determined in Kuala Lumpur, these suggestions are aimed at the central government.

Firstly, the state with the assistance of the central government should consider strengthening intersectoral interdependence which was identified in the paper to be weak. In this regard, Penang may choose between a foreign dominated manufacturing sector to fuel the economy as in Singapore, or a domestic led manufacturing sector with strong intersectoral interdependence with agriculture as in South Korea and Taiwan (see Rasiah, forthcoming). As the bulk of foreign firms in Penang are concentrated in electronics, and textile and garment manufacture, this is one area where priority for agricultural processing and inputs such as fertilizers and machinery, can be placed on domestic firms. Such firms may be situated in states such as Kedah and Perak where the agricultural sector is far more dominant to conform with economies of scale and national strategies. In this regard, the state may consider seriously priority to domestic firms for rubber based products instead of the current strategy; the endogenous nature of rubber products enhances this point further – technologies may be bought and improvised with state subsidy.<sup>10</sup>

Secondly, as foreign presence is already strong in Penang, and because its economic structure reveals characteristics of both the two types of industrialisers, foreign dominated Singapore, and domestic dominated South Korea and Taiwan, it may be good for the state to develop a dual strategy where both the foreign dominated light industry processing (particularly electronics, textile and garment, and scientific instruments) coexist with a broader based domestic industry. Wherever possible, joint ventures which are more beneficial to the domestic economy should be encouraged. But as interviews show that the fully owned American, Canadian, French and German firms are unlikely to share equity in their Malaysian subsidiaries, these firms should be relied upon mainly to provide employment, technology transfer and foreign exchange. As we approach the 21st century where the current labour shortage problems are bound to be exacerbated it may be necessary to revise incentives to promote higher value added operations in the foreign owned sector. As throughout their presence, foreign firms have often resorted to large scale retrenchments, depending on the business swings, a shift to capital-intensive production may help reduce retrenchment problems that have affected female workers most. Therefore, fo-

reign firms can be relied upon mainly to provide technology transfer – cumulative technical change from foreign firms and learning by doing can speed up tremendously the technological transformation of domestic firms (Eng Hardware and Loh Kim Teow are some of the many supporting firms that have upgraded their technology this way).

While the foreign based assemblies already exist, the domestic one is still very small. This leads to our third strategy; instead of the current strategy of accepting foreign ventures with little filtering, the state should identify certain industries for domestic promotion. On the national scene the central government is promoting heavy industry projects such as steel, cement and cars, notwithstanding foreign assistance from Japanese concerns. Indeed, as the waves of global competition influence the firms' operations, domestic firms tend to exhibit greater adherence to domestic interests as they look upon their governments for support (Rowthorn 1975: 158–80; Brewer 1980: 275–6).<sup>11</sup> Moreover, the nationalistic government's preference for domestic firms was far greater in South Korea and Taiwan (Amsden, 1989; Rasiah forthcoming). In this regard, the central government should give greater priority to metal and plastic based, garment, consumer electronics, wood based and food processing to domestic firms. Of these firms, top priority should go to metal and plastic based firms which are extremely important in servicing other industries. Indeed, as we approach the 21st century, if similar patterns of integrated manufacturing growth is achieved, then, the foreign based electronics and textile sectors should give rise to giant domestic corporations.

But as a late industrialiser, it will be impossible for Penang and Malaysia to implement free market policies in all sub-sectors if it is to harbour hopes of creating dynamic comparative advantages. Thus, fourthly, this may mean that the government may end up getting relative factor prices wrong (Amsden 1989). Even in the foreign based sub-sectors, contrary to the assertions of free market apostles such as Lal (1983), Little & Mirrlees (1974) and Balassa (1982), the Malaysian government got relative prices wrong to woo foreign investment. Increasing competition amongst LDC governments has often led to the provision of generous factor subsidies to foreign firms. The provision of subsidies and protection may be selectively imposed in targetted industries; HICOM's heavy industries enjoy massive distortions in factor prices. But in the case of Penang,

subsidies should be preferred to tariffs and quotas in extremely important industries such as the metal and plastic based industry. This prescription will ensure that foreign firms are not scared away. Such subsidies (eg. cheaper loans, subsidized exports, subsidized imports, and subsidized R&D support) must be given only in return for stringent performance targets. As performance must get top priority, ethnic regulation may have to be revised. Most metal and plastic based firms in Penang are small Chinese family concerns. Thus, a non-ethnic economic policy can help boost these firms considerably. As such, the new economic policy that emerges for the next decade and the 21st century may have to view restructuring in more dynamic terms.

Fifthly, to achieve the objectives of rapid manufacturing growth, the government must place greater emphasis on skills training and development. School curriculums should incorporate greater skill based learning as evidenced in Japan, Germany, South Korea and Taiwan. In addition, the technology park and R&D efforts of the state must work more closely with all promoted industries, technical institutions and professional bodies. Strong state subsidy in this area is necessary. In this regard, efforts should be undertaken to make all skill training institutions subscribe to high performance standards.

Sixthly, rapid manufacturing growth can only be meaningful for the masses if it raises real incomes, reduces income disparity and allows their greater participation in the economy. Thus, instead of following shortsighted wage freezing and tighter labour control policies, the government should pursue a productivity increment path that enables the gradual upliftment of workers' livelihood. Rising incomes can also help expand domestic demand. Even in the repressive regimes of South Korea, Taiwan and Singapore, the government allowed real wage to rise sharply (see Amsden, 1989; Rasiah, forthcoming). In addition, income disparity between the top and bottom occupational hierarchy is considerably low in South Korea. Taiwan and South Korea have also witnessed a greater democratisation of worker roles in the later half of the 1980s.

#### ACKNOWLEDGEMENT

I wish to thank Radzi Ahmad of MIDA and PDC officials for compiling for me unpublished data on the manufacturing sector in Malaysia and Penang respectively.

## NOTES

<sup>1</sup> Kaldor (1967: 3-23) identified manufacturing as the engine of growth after an early phase where agriculture provided the supply-demand conditions for the former to take off; a positive correlation between manufacturing growth and the growth of the economy has been argued for on the grounds that manufacturing growth increases static as well as dynamic returns (Thirlwall, 1989: 60).

<sup>2</sup> While manufacturing was identified as the main engine of growth, the early restructuring efforts of the Malaysian government included an allocation of 22 per cent from the development budget for the opening of new land schemes, planting of rubber, drainage and irrigation for cultivating double cropping paddy, and the improvement of social services and livelihood of rural people (Malaysia, 1976: 5).

<sup>3</sup> Unlike in South Korea and Taiwan, the government in Malaysia intervened little to create the conditions for the growth of domestic manufacturing firms during the ISI phase which lasted between 1958 and mid 1960s (Rasiah, 1990).

<sup>4</sup> The CIC was to coordinate and integrate the development efforts of both the central and state governments. The primary focus of this organisation was to promote labour-intensive and export-oriented industries (Malaysia, 1969: 6-7).

<sup>5</sup> LMWs were introduced to encourage the dispersal of industries and to enable the location of factories (mainly for export - not less than 80%, and whose raw materials/components are mainly imported), where the establishment of FTZs are neither practical nor desirable. These establishments are accorded similar facilities and incentives as those in FTZs (Malaysia, 1988: 56).

<sup>6</sup> FTZs (for companies producing entirely for export but in exceptional cases firms exporting not less than 80% can be considered for location) lie outside the Principal Customs Area (PCA) and thus goods imported to and exported from PCA are not liable to customs duty. However, goods imported from, and exported to PCA are liable to customs duty unless exemptions have been approved by the Treasury (Malaysia, 1988: 55). In addition, FTZ firms enjoy some of the most generous tax incentives such as pioneer status (provides complete exemption from corporate and development tax over a period of 5-10 years) and investment tax allowance.

<sup>7</sup> We are forced to avoid discussing several important components of structural change due to lack of data. The changing patterns of income distribution is a key issue omitted here.

<sup>8</sup> The off-estate sub-sector does not appear at all in the 1981 and 1984 census of manufacturing industries in Penang published by the Statistics Department.

<sup>9</sup> These included flexible production systems such as Just-In-Time (JIT), Materials Requirement Planning (MRP) and Materials Resource Planning (MRPI & MRPII) (see Rasiah, 1987; 1990).

<sup>10</sup> Even in the case of South Korea, although Samsung has its R&D, it depended mostly on bought technology for manufacturing some of the more important parts it uses. For example, Samsung bought the IC product design from abroad although it now claims to produce VLSI circuits. An agreement in 1983 with Sharp enable it to introduce the 16K SRAM and 256 ROM. In addition, another agreement with MICRON enable Samsung to produce 64K and 256K DRAMs (Edquist & Jacobsson, 1987: 28).

<sup>11</sup> As Hirokazu (1977) points out, in addition to tax incentives, ASEAN governments are widely believed to offer subsidized land, water and electricity.

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