



**TOGETHER**  
*for a sustainable future*

## OCCASION

This publication has been made available to the public on the occasion of the 50<sup>th</sup> anniversary of the United Nations Industrial Development Organisation.



**TOGETHER**  
*for a sustainable future*

## DISCLAIMER

This document has been produced without formal United Nations editing. The designations employed and the presentation of the material in this document do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations Industrial Development Organization (UNIDO) concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries, or its economic system or degree of development. Designations such as “developed”, “industrialized” and “developing” are intended for statistical convenience and do not necessarily express a judgment about the stage reached by a particular country or area in the development process. Mention of firm names or commercial products does not constitute an endorsement by UNIDO.

## FAIR USE POLICY

Any part of this publication may be quoted and referenced for educational and research purposes without additional permission from UNIDO. However, those who make use of quoting and referencing this publication are requested to follow the Fair Use Policy of giving due credit to UNIDO.

## CONTACT

Please contact [publications@unido.org](mailto:publications@unido.org) for further information concerning UNIDO publications.

For more information about UNIDO, please visit us at [www.unido.org](http://www.unido.org)



17142

Distr. LIMITED

ID/WG.478/6(SPEC.)

9 September 1988

ENGLISH

Original: ENGLISH/FRENCH

**United Nations Industrial Development Organization**

---

Global Preparatory Meeting for the  
First Consultation on the Electronics Industry  
Grenoble (France), 28 November - 2 December 1988

THE ELECTRONICS INDUSTRY IN THE ASEAN COUNTRIES

MALAYSIA\*

prepared by

R. Chaponnière\*\*

R. Tiberghien\*\*

65

---

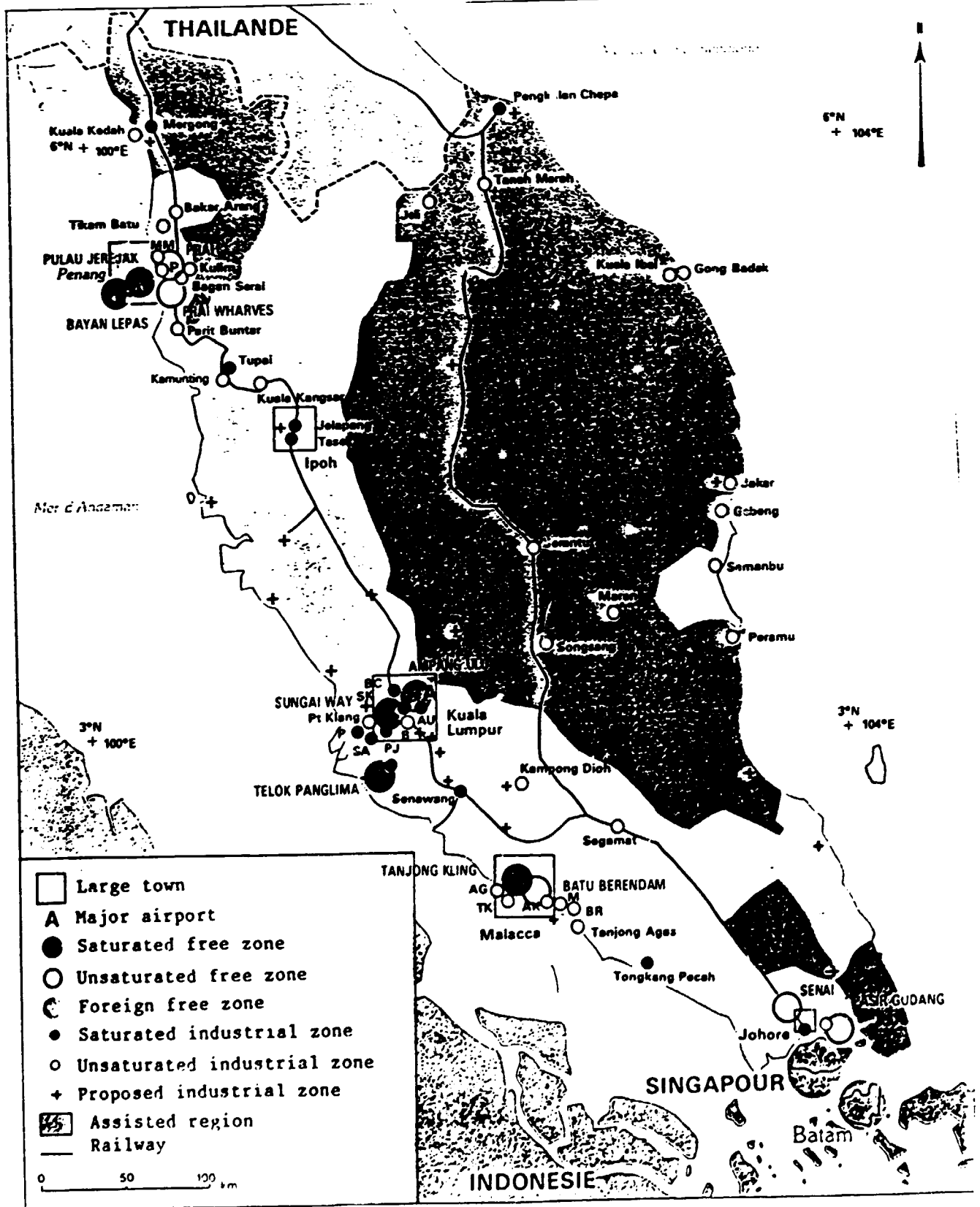
\* The views expressed in this paper are those of the authors and do not necessarily reflect the views of the Secretariat of UNIDO. This document has been translated from an unedited original.

\*\* Institute of Economic Research and Development Planning, Grenoble University of Social Sciences.

V.88-26679 (EX)

US Dollar in Ringgits :

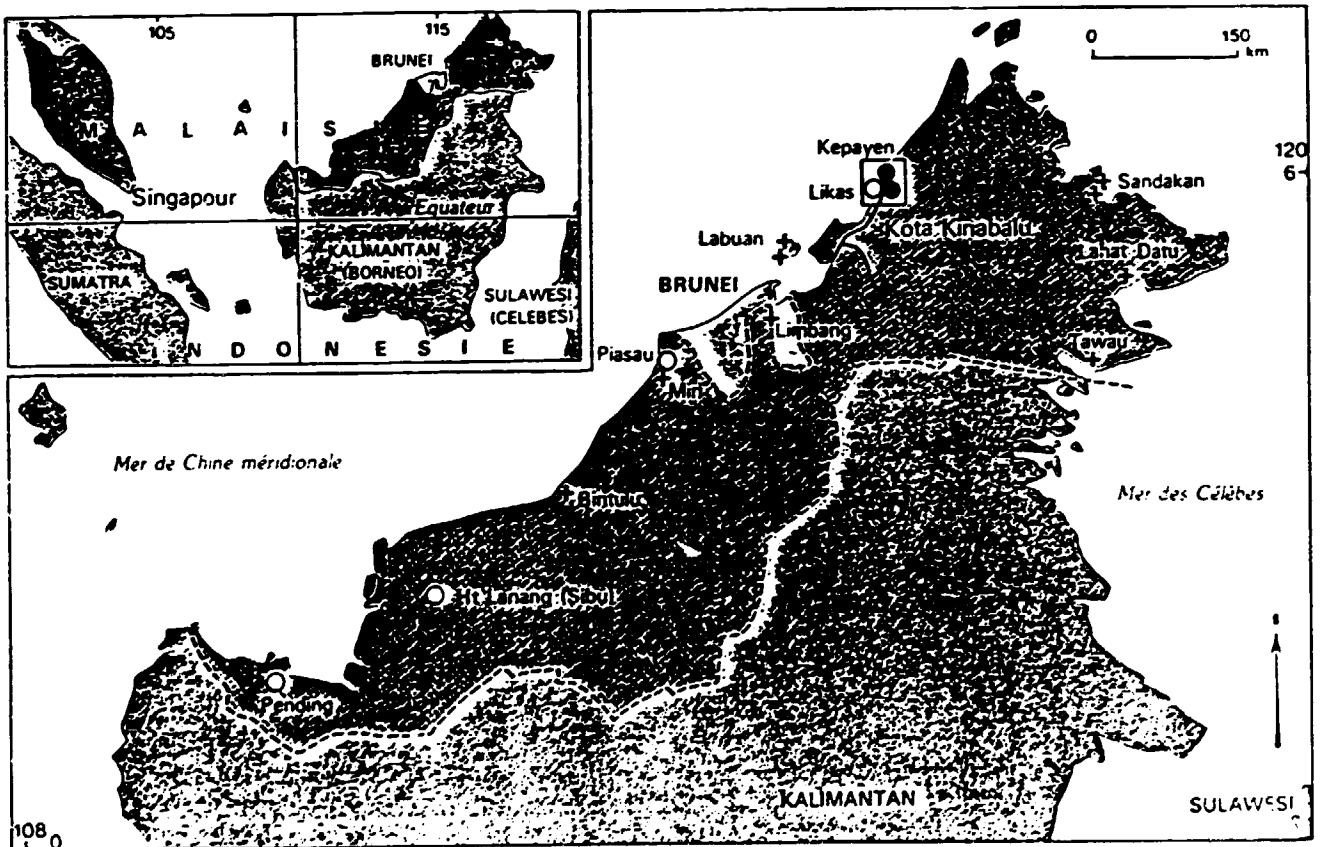
1980 : 2,18	1981 : 2,30	1982 : 2,33	1983 : 2,32
1984 : 2,30	1985 : 2,48	1986 : 2,58	1987 : 2,50



---

# MALAISIE

---



CONTENTS

	<u>Page</u>
1. INTRODUCTION	1
1.1. Economic development	1
1.2. The manufacturing industry	4
1.2.1. Industrial policy	4
1.2.2. The role of the State and the private national and international sectors	5
1.2.3. Structure of the manufacturing industry	6
1.2.4. Trading	6
2. THE DEVELOPMENT OF THE SECTOR	6
2.1. History	6
2.2. General statistics	7
2.3. Evolution of the macro-economic parameters	14
2.3.1. Production, value added and employment	14
2.3.2. Imports and exports	15
2.3.3. The development of the domestic market	27
3. PRODUCTION AND THE ORGANISATION OF PRODUCTION	32
3.1. The structure of production	32
3.2. Organisation of the sector	37
3.2.1. Companies	37
3.2.2. Wages and factor costs	39
3.2.3. The competitiveness of the Malaysian electronics industry	39
4. THE TRANSFER AND MASTERY OF TECHNOLOGIES	39
4.1. The transfer of technology	39
4.2. The national effort to develop technology	45
4.3. Conclusions	49
5. PROSPECTS FOR THE DEVELOPMENT OF THE SECTOR	49
5.1. General objectives	49
5.2. Quantified prospects and implementation	50
5.2.1. Projections up to 1995	50
5.2.2. Investment and employment	50
5.2.3. Implementation	50
5.3. Advantages and constraints	54
5.3.1. Advantages	54
5.3.2. Constraints	54
5.4. Strategies	55
5.4.1. Raising the technological level of the products and processes	55
5.4.2. Pursuing an export strategy	56
5.4.3. Reinforcing links with the rest of industry	56
5.4.4. Developing a strategy of public buying	56
5.5. Policies	56

## 1 INTRODUCTION

### 1.1 Economic development (Table 1)

1950-1970 : The diversification of a plantation economy.

The Malaysian Federation which achieved independence in 1957 is a rich and monetarised economy, already open to exports, and a multiracial society where the Bumiputras are barely in a majority. Industry and commerce are in the hands of the Chinese and the Indians, whilst the Bumiputras are limited to agricultural crops.

The Government has established as its objectives economic diversification (rubber and tin account for two-thirds of all exports) and social diversification. Industrialisation takes its place within this desire for diversification. At the time of independence industry employed 60,000 persons. The Government has multiplied the guarantees and encouragements for "pioneer" enterprises: foreign companies, as well as the Chinese, invested. At the end of ten years the economy was diversified, the rate of growth was 6.3% a year and rubber and tin only accounted for half the exports.

1970-1980 : Restructuring society.

The riots of 1969 damaged confidence in the liberal economy, and a "New Economic Policy" (NEP) was needed to reduce poverty, to heal the ethnic divisions by facilitating the entry of the Bumiputras into industry and to redistribute more fairly the wealth created in this way. The NEP was based on two strategies: the increasing intervention of the State and increased openness towards foreign investors. The seventies were the Age of Gold of the Malaysian economy: agriculture was seen to be diversifying, the oil resources ensured self-sufficiency with some available for export, industrial jobs were trebled and the manufacturing sector accounted for nearly 20% of the GDP.

1970-1986 : A sad awakening

The launching of the Plan coincided with the downturn in world economies. By 1981 all the markets were falling, and for the first time the trade balance showed a deficit. The State, the main driving force behind the economy, was in difficulties. New slogans appeared: better cooperation between the State and the business world and privatisation. In 1985 the rates of growth were at their lowest, but a recovery seems to have been confirmed in 1986 and 1987.

Table 1

MANUFACTURING INDUSTRY (MALAYSIAN PENINSULA) in 1983

	Companies	Jobs	Percentage of :	
			V.A.	Jobs
Agro-food industry	962	55605	16.0	12.9
Beverages	33	4871	2.8	1.1
Tobacco	18	4541	5.0	1.1
Textiles	179	27337	3.2	6.4
Clothing	183	30515	2.4	7.1
Leather	22	619	0.1	0.1
Footwear	11	946	0.1	0.2
Timber	430	36859	4.7	8.6
Furniture	189	7306	0.8	1.7
Printing & publishing	174	17707	4.4	4.1
Papermaking	99	6852	1.3	1.6
Rubber	190	27147	5.9	6.3
Chemical products	71	4750	2.3	1.1
Other chemicals	137	9633	3.7	2.2
Plastics	213	14433	2.1	3.4
Petroleum products	9	1402	3.3	0.3
Misc. oil and chemical prods.	20	845	0.4	0.2
Pottery	10	2191	0.3	0.5
Glass	7	2294	0.5	0.5
Non-metallic minerals	270	19409	6.7	4.5
Iron and steel, metallurgy	119	10143	3.5	2.4
Non-ferrous metals	20	3059	0.8	0.7
Metal products	302	17039	3.2	4.0
Mechanical equipment	330	12954	2.3	3.0
Electrical equipment	215	81611	17.9	19.0
Transport equipment	150	16427	4.6	3.8
Scientific equipment	14	5752	0.7	1.3
Miscellaneous	108	8105	0.9	1.9
<b>TOTAL</b>	<b>4485</b>	<b>430352</b>	<b>100.0</b>	<b>100.0</b>

Table 1 - continued

GROWTH OF THE GDP AND OF INDUSTRY (as percentages)

	60-70	70-80	80-84	1985	1986	1987
GDP	6	7.80	5.25	-1.02	1.20	5
Manufacturing industry	12.50	10.50	5.57	2.50	4	4
Agriculture	6	5.10	2.67	-3.83	7.50	8

Source : Department of Statistics

BREAKDOWN OF THE GDP (as percentages)

	1960	1970	1980	1981	1986
Agriculture	38.5	30.8	23.8	22.4	19.5
Mining	6	6.3	4.5	9.0	9.8
Manufacturing	8.5	13.5	18.6	19.6	20.5
Building	3.3	3.9	4.6	5.0	5.2
Transport	5	4.7	6.9	6.0	6.3
Commerce	19.2	13.3	13.5	11.9	12.6
Services	19.5	27.5	28.2	25.3	26.1
TOTAL	100.0	100.0	100.0	100.0	100.0



## 1.2 The manufacturing industry

### 1.2.1 Industrial policy

After independence the Government implemented an industrialisation policy to meet the rapid growth of the population and to ensure the diversification of the economy. The first measures taken were the result of the Report of the Industrial Development Working Party which was submitted to the Government in 1957 after a visit from a World Bank mission. In 1958 its recommendations led to the Pioneer Industries Ordinance which suggested tariff protections and the restriction of imports. The system of tariff protection was formalised in 1963 by way of the Tariff Advisory Board. Despite this encouragement for the development of a local industry the general policy followed was of a liberal type, and by 1972 the effective level of protection did not exceed 55%, whereas it was much higher in countries such as India and the Philippines.

In 1968 the Investment Incentives Act was published; this guaranteed very many advantages in order to attract foreign investments, in particular in the exporting industries. Industrial zones were created, particularly the free zones (EPZ's). At the same time the Government created a body, the Federal Industrial Development Authority (FIDA), to promote, coordinate and accelerate industrial development.

In order to implement the industrial policy decided on within the framework of the NEP the Government created the Capital Issues Committee (CIC) and the Foreign Investments Committee (FIC). The function of these two committees was to identify projects, to develop specific programmes for promoting investment and to assist the private sector.

Finally the Industrial Coordination Act was introduced in 1975; this is effectively a system of licences requiring all enterprises with more than 25 employees to restructure their capital according to the principles of the NEP.

The Fourth Plan (1981-1985) insisted on the development of heavy industry, the principal project being the Heavy Industries Corporation (HICOM). Furthermore the Government took shares in industry by way of Bumiputra institutions such as PERNAS and MARA (the Council of Trusts for Indigenous Peoples).

Finally a Ten-Year Masterplan (1986-1995) was drawn up by the Malaysian Industrial Development Authority and UNIDO. The object of this Masterplan is to reinforce certain industrial sectors, in particular the electronics sector and to propose accompanying policies in fields such as R&D, training, fiscal policies and measures to encourage development.

1.2.2 The role of the State and the private national and international sectors

Table 2

MALAYSIA : OWNERSHIP OF SHARE CAPITAL IN THE CORPORATE SECTOR, 1970-83 (as percentages)

	1970(a)	1975	1980	1983
<b>Malaysian residents</b>				
<u>Bumiputra</u> individuals and trust agencies	2.4	7.8	12.5	18.7
Individuals	1.6	2.3	5.8	7.6
Trust agencies	0.8	5.5	6.7	11.1
Other Malaysian residents	34.3	37.3	44.6	47.7
Chinese	27.2	27.9		
Indian	1.1	1.2		
Other(b)	6.0	8.2		
<b>Foreign residents</b>	63.3	54.9	42.9	33.6

(a) Peninsula Malaysia only

(b) Including nominee

Sources : Third Malaysia Plan 1976-80  
Mid-Term Review of the Fourth Malaysia Plan, 1981-85.

An interventionist State: since 1969 the State has increasingly intervened in industry. It has launched State enterprises and has not hesitated to manipulate the rules of the market in order to ensure their profitability. Liberalisation of imports would place these public enterprises in difficulty. In the same way, and within this Federal State, each of the 13 States has created State Economic Development Corporations which have invested in industry but, as elsewhere, privatisation is on the agenda, and 60 enterprises are privatisable.

Chinese groups hold an important position since they held 28% of the capital in 1975.

The Bumiputras saw their share increase through the Trust Agencies.

Finally foreign investments are very important. In 1969 more than half the capital belonged to foreign shareholders: at the present time the figure is of the order of 30% in the manufacturing sector. Japan and the United States have supplanted Great Britain which suffered greatly under the NEP. Japanese projects are twice as numerous as projects of American origin. Nearly half of all manufactured exports come from Japanese and American enterprises.

### 1.2.3 Structure of the manufacturing industry

In 1986 the Malaysian manufacturing industry employed 820,000 persons. In terms of value added we can distinguish three groups of activities :

- activities linked to agriculture (the agro-food industry, beverages, tobacco and timber) which account for 35% of the value added;
- the processing activities (refining, cementworks, iron and steel) with 15% of the value added;
- the electronics industry which accounts for 19% of the value added.

The whole of the mechanical, electrical and electronics engineering and transport sector (the engineering industries) employs 150,000 persons in 1,400 establishments (Table 3).

The industry is highly concentrated. The Government's policy of encouragements has favoured the largest enterprises at the expense of the smaller and medium-sized ones. According to the latest survey of 1981 some 9000 establishments have fewer than 5 employees and another 9000 employ between 5 and 50 persons. The remaining 2400 establishments, which employ more than 50 persons, account for 71% of all jobs.

There is an obvious contrast between the industrialised west of the Malaysian peninsula and the States of Borneo and East Malaysia which have 17% of the population but which have very little industry.

### 1.2.4 Trading

Table 4 gives the principal data on trading. It can be seen that exports of manufactured products have shown a rate of increase of the order of 30% and in 1984 represented 30% of all exports as against only 12% in 1970. There are two important categories of manufactured products : electronics products which at the present time represent 50% of exports as compared with 3% in 1970, and textiles which account for 9% of all exports.

## 2. THE DEVELOPMENT OF THE SECTOR

### 2.1 History

The electronics industry in Malaysia was born in 1967 when two Japanese companies, Matsushita Electric and Toshiba Ltd set up plants to assemble radios and black and white television sets for the domestic market.

The Government then decided to implement a promotional policy for the electronics industry, directed principally towards exporting. Numerous encouraging measures were therefore put into effect: the Investment Incentives Act of 1968 and the establishment of Free Zones (FTZ's) and also permitting enterprises termed Licensed Manufacturing Warehouses (LMW's) to enjoy the same status as those established in the free zones.

Between 1967 and 1981 a total of 267 projects were approved for the development of the sector. The majority of these are directed towards exporting, in particular those approved during the periods 1973-74 and 1978-80. In the first period of investments one can see the repercussions of the promotional measures. The second period is that of the relocation of enterprises installed in Singapore where labour costs became too high, obliging the companies to concentrate their production on products of higher value added. The encouragements implemented to attract foreign investors, together with the conditions specific to the country (cheap female labour) allowed Malaysia to become one of the largest exporters of components and, in particular, of integrated circuits (Figure 1).

## 2.2 General statistics

The electronics industry is the sector which has contributed most to the development of the manufacturing industry. In 1981 it accounted for about 13% of the value added and of jobs in manufacturing. At this same period the contribution of electronics products to exports of manufactured products was 35.5%. Total employment is of the order of 80,000 persons.

The basis of the electronics industry in Malaysia is formed by the assembling and testing of semiconductors which account for about three-quarters of the total production and 90% of the exports of electronics products.

Table 3

### EMPLOYMENT AND COMPANIES IN THE ENGINEERING, ELECTRICAL AND MEANS OF TRANSPORT INDUSTRY

	Companies				Employees			
	1981	1983	1984	1985	1981	1983	1984	1985
381 (see below)	489	463	519	493	23288	21751	22388	20337
382	543	445	433	381	17427	14614	14444	13510
383	208	207	230	233	79965	86974	93129	81738
384	225	220	225	214	20114	21136	20258	18295
385	23	20	16	14	4763	5604	4843	5752
<b>TOTAL</b>	<b>1488</b>	<b>1355</b>	<b>1423</b>	<b>1335</b>	<b>145557</b>	<b>150079</b>	<b>155062</b>	<b>139632</b>

- 381 Manufacture of fabricated metal products except machinery and equipment.
- 382 Manufacture of machinery except electrical equipment.
- 383 Manufacture of electrical machinery.
- 384 Manufacture of transport equipment.
- 385 Manufacture of professional and scientific instruments.

Source : Yearbook of Statistics.

Table 4

Malaysia: Exports of principal commodities, 1971-84  
(M\$ billion)

	1971	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984 <sub>a/</sub>
Rubber	1.5	2.0	3.1	3.4	3.6	4.5	4.6	3.7	2.7	3.7	3.8
Tin	0.9	1.2	1.5	1.7	2.0	2.3	2.5	2.1	1.5	1.7	1.2
Timber	0.8	1.1	2.4	2.4	2.5	4.2	4.0	3.6	4.6	4.0	4.2
Palm oil	0.4	1.3	1.2	1.8	1.9	2.5	2.6	2.8	2.8	3.0	4.7
Petroleum	0.4	0.9	1.7	2.0	2.3	4.2	6.7	6.9	7.7	7.9	8.5
Manufactures	0.6	2.0	2.5	2.8	3.6	4.8	6.1	6.4	7.4	9.6	11.6
Other	0.4	0.7	1.0	1.1	1.2	1.7	1.7	1.5	1.6	2.6	4.3
Total	5.0	9.2	13.4	15.0	17.1	24.2	28.2	27.1	28.1	32.8	38.3

Sources: World Bank, Malaysia: Structural Change and Stabilization, 1983;  
Ministry of Finance, Economic Report 1984/85.

a/ Estimates. 1/ Ministry of Finance, Economic Report, 1984/85.

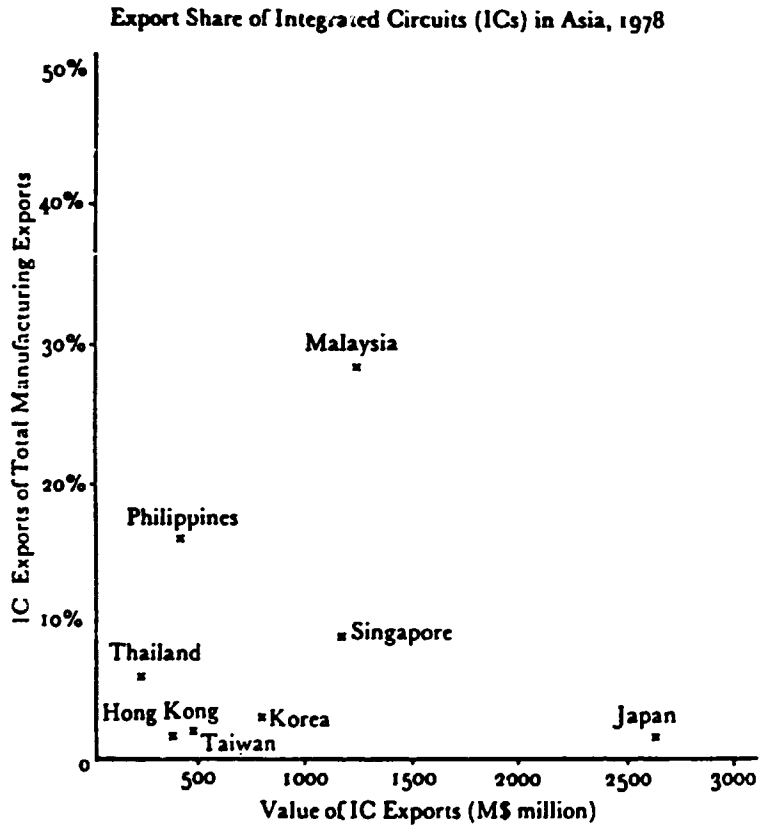
Malaysia: Exports of manufactures, by commodity group, 1970-84  
(per cent)

	1970	1977	1978	1979	1980	1981	1982	1983	1984 <sub>a/</sub>
Food, beverages, tobacco	18	10	8	7	9	9	7	6	6
Textiles, clothing	7	12	13	12	13	12	11	10	9
Wood products	14	11	10	10	8	7	6	5	4
Rubber products	3	2	2	2	1	1	1	1	1
Chemicals and petroleum products	32	7	5	5	6	7	7	9	12
Manufacture of metals	4	3	3	3	4	3	5	4	3
Electrical machinery etc.	3	31	43	46	47	47	52	52	52
Other machinery and transport equipment	11	6	7	6	5	7	7	7	7
Other	8	18	10	9	8	6	6	6	6
Total	100	100	100	100	100	100	100	100	100

Sources: Ministry of Finance, Economic Report 1984/5; Mid-Term Review of the Fourth Malaysia Plan 1981-85.

a/ Estimates.

Figure 1



Sources: Malaysia, *Malaysian Industrial Development Authority Annual Report*, Kuala Lumpur, various years.

United Nations, *Yearbook of International Trade Statistics*, United Nations, New York, 1979.

United Nations, *Yearbook of Industrial Statistics*, United Nations, New York, 1979.

Note: In 1978, the major markets for Malaysia's electronics and IC exports were United States (56.8%), Singapore (18.8%), EEC (10.2%) and Japan (4.6%).

Table 5

a)  
BASIC STATISTICS ON ELECTRONICS INDUSTRIES OF MALAYSIA AND SELECTED  
REFERENCE COUNTRIES, 1981

	Malaysia	Singapore	Republic of Korea	Japan	United States
(1) Total Output of Electronics Industry (US\$ Millions)	1,740	2,711	(4.00)	47,034	113,000
(2) Electronics Industry Output as % of Manufacturing Sector Output	10.36	15.25	(5.74)	4.55	n.a.
(3) Total Value Added of Electronics Industry (US\$ Millions)	532	769	(1,377)	27,361	n.a.
(4) Electronics Industry VA as % of Total Manufacturing VA	12.60	16.65	(5.00)	0.25	n.a.
(5) Electronics Industry VA as % of GDP	2.13	5.96	(2.01)	2.40	n.a.
(6) Electronics Industry Employment	70,658	69,358	(145,498)	902,768	1,605,600
(7) Electronics Employment as % of Total Manufacturing Employment	12.21	24.46	(5.97)	0.51	7.59
(8) Fixed Assets of Electronics Industry (US\$ Millions)	294.24	397.69	(966.82)	n.a.	n.a.
(9) Fixed Assets of Electronics as % of Total Manufacturing Fixed Assets	6.32	9.02	(3.61)	-	-
(10) Electronics Exports (US\$ Millions)	1,272	2,364	2,218	23,739	23,543
(11) Electronics Exports as % of Output	73.1	87.2	50.5	50.5	20.7
(12) Electronics Exports as % of Manufactured Exports	35.5	21.82	11.05	15.69	12.40
(13) Electronics Exports as % of Total Exports	11.05	11.20	10.43	15.64	10.07
(14) Electronics Imports (US\$ Millions)	1,315	2,374	1,743	2,740	19,609
(15) Electronics Imports as % of Total Imports	11.87	8.61	6.67	1.92	7.20
(16) Electronics Imports as % of Apparent Consumption	73.75	87.25	52.56	10.52	17.91
(17) Avg. Annual Growth in Electronics Industry Value Added, 1973-81 (%)	24.24	21.13	n.a.	n.a.	45.38 (b)
(18) Avg. Annual Growth in Manufacturing Value Added, 1973-81 (%)	18.25	19.00	30.50	7.70	9.00
(19) Avg. Annual Growth in Electronics Industry Employment, 1973-81 (%)	15.72	17.26	n.a.	n.a.	5.27 (c)
(20) Avg. Annual Growth in Manufacturing Employment, 1973-1981 (%)	7.57	4.80	6.20	0.00	0.40

a) For the calculation of Malaysian output, value added and employment, the 1981 Census of Manufacturing Industries was used. 'Electronics' was defined to include SIC codes 30322, 30321 and 30329.

b) 1970-1980; based on value added figures for three subsectors of U.S. electronics industry: SIC 357 (computers); SIC 3651 (consumer electronics); SIC 3674 (semiconductors).

c) 1973-1982; based on employment figures for four subsectors of U.S. electronics industry: SIC 3651 (consumer electronics); SIC 3674 (microelectronics); SIC 3671 (vacuum tubes); SIC 3573 (computers and peripherals); does not include communications equipment.

Note: Figures in parentheses are based on 1982 data.

Sources: IMF International Financial Statistics

UN Yearbook of Industrial Statistics, 1981 edition

UN Yearbook of International Trade Statistics, 1982 edition

Electronic Market Data Book, 1982 edition Electronic Industries Assn., U.S.

Electronic Industries in Japan, 1984 edition Electronic Industries Assn. of Japan

Japan Electronics Almanac, 1984 edition Dunpe Publications

Statistics of Electronic and Electrical Industries, 1984 edition Electronic Industries Assn. of Kor

Report on Mining and Manufacturing Survey, 1982 edition, Republic of Korea

Census of Manufacturing Industries, 1981, Malaysia

Report on the Census of Industrial Production, 1982 edition, Republic of Singapore

Table 6

GROWTH OF ELECTRONIC PRODUCTIONS IN MALAYSIA, 1970-1983

Indicator	1970	1973	1975	1977	1979	1981	1982	1983	1984	1985
Gross value of output (\$ million)	24.5	291.9	821.3	1,266.6	2,678.6	3,896.8	4,122.6	4,893.9	5,924	5036
Value added (\$ million)	9.2	147.2	278.0	n.a	680.9	1,192.4	1,217.8	n.a	n.a.	1,556
Full-time workers ('000)	0.6	21.1	28.2	43.6	65.0	70.7	68.2	78.8	83-0	71,9
Salaries & Wages (\$ million)	1.4	29.7	76.1	131.0	255.4	326.9	386.5	433.3	531-8	559,7
Fixed assets (\$ million)	n.a	65.9	146.3	n.a	353.8	659.1	783.8	885.0	n.a.	n.a.
Value added/Output (%)	37.1	50.4	33.8	n.a	25.4	30.6	29.5	n.a	n.a.	30,9
Value added/Worker (\$'000)	15.3	7.0	9.8	n.a	10.5	15.1	17.9	n.a	n.a.	21,64
Salaries & Wages/Value Added (%)	15.5	20.2	27.4	n.a	33.1	27.4	31.7	n.a	n.a.	35,9
Fixed Assets/Worker (\$'000)	n.a	3.1	5.2	n.a	5.4	9.3	11.5	11.2	n.a.	n.a.

Sources: Dept. of Statistics, Monthly Industrial Statistics (various issues);  
Ministry of Finance, Economic Reports (various issues);  
Computer Centre, Prime Minister's Department.



Table 7

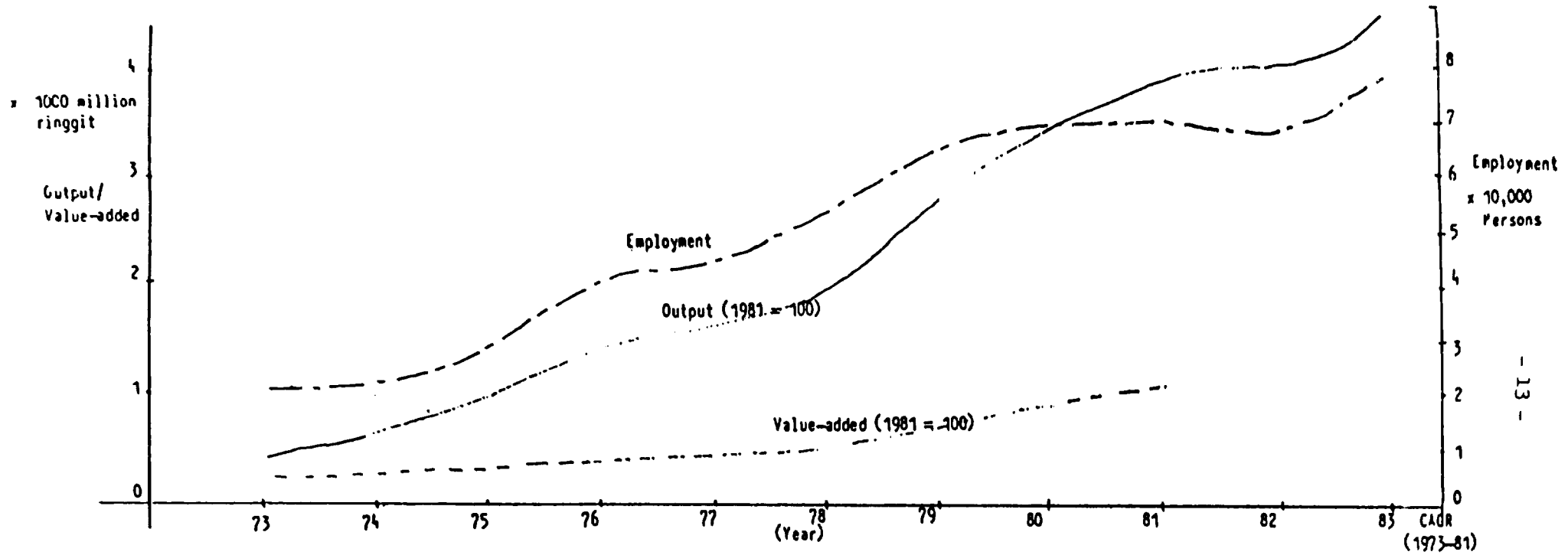
GROWTH OF ELECTRONIC PRODUCTIONS IN MALAYSIA - 1984-1987

Gross Value of output 106	1984		1985		1986		1987	
	Ringitt 5890	US \$ 2480	Ringitt 4936	US \$ 1994	Ringitt 5467	US \$ 2161	Ringitt 6877	US \$ 2772

Source : Been Electronics - America Japan Asia Pacific Electronics Data 1987.

Figure 2

TREND OF PRODUCTION OUTPUT, VALUE ADDED AND EMPLOYMENT



Output (ringgit) (1981 = 100)	0.29 (0.41)	0.52 (0.63)	0.82 (0.99)	1.20 (1.41)	1.23 (1.35)	1.86 (1.98)	2.68 (2.85)	3.56 (3.79)	3.90 (3.90)	4.12 (3.99)	4.89 (4.54)	38% pa (33%)pa
Value-added (ringgit) (1981 = 100)	0.15 (0.21)	0.21 (0.25)	0.28 (0.34)	0.36 (0.42)	-	0.47 (0.50)	0.68 (0.72)	-	1.19 (1.19)	-	-	28% pa (23) pa
Employment (persons)	21,106	21,974	28,208	40,888	43,645	53,593	65,013	68,653	70,658	68,202	78,755	16% pa
Value-added (ringgit) per employee (1981 = 100)	7,000 (10,000)	9,300 (11,205)	9,800 (11,807)	8,800 (10,353)	-	8,800 (9,362)	10,500 (11,170)	-	15,100 (15,100)	-	-	10% pa (6%)pa

- : data not available  
pa : per annum

Source : Department of Statistics, Malaysia

The semiconductors industry is the domain of the multinationals: Malaysian investments are still fairly limited and involve the production of consumer goods (colour televisions) and telecommunications equipment for the domestic market.

Comparison with other countries (Table 5) shows the following main characteristics. In terms of production (in 1981) the Malaysian industry represents less than half that of Korea, and this figure would undoubtedly be still lower in 1983. The value added per employee is also much lower. The specialisation of Malaysian industry in electronics is very significant when employment is compared to total employment and exports to total exports and also the percentage of the production which is exported. In overall terms this specialisation is similar to that of Singapore.

### 2.3 Evolution of the macro-economic parameters

#### 2.3.1 Production, value added and employment

Tables 6 and 7 and Figure 2 provide a series of figures for the period 1970-1987 on production, value added and fixed assets.

In the case of production this increased by 38% in constant terms between 1973 and 1981. From 1981-82 onwards growth slowed down, particularly in 1985 as a result of the world crisis in components. It was not until 1987 that the value of production (in current Ringgits) returned to the 1984 figure.

The value added in real terms increased over the period by 7 points more than employment, so reflecting an increase in productivity. On real terms the value added per employee increased by 6%. This increased productivity should be compared with the increased investment per employee since the fixed assets figure per employee rose from 3,100 Ringgits in 1973 to 11,200 Ringgits in 1983.

Employment in the electronics sector is now about 80,000, whereas it was 6,000 in 1970, reaching a maximum of 83,000 in 1984. This corresponds to a rate of increase of 16% between 1973 and 1981.

By contrast over the period 1981-85 there is little change in the ratio of value added to production; this remained in the region of 30%, undoubtedly reflecting the difficulty in going beyond the stage of insertion and assembly, whether in the components or the consumer goods sectors. The increasing number of upstream and downstream links is undoubtedly one of the major problems facing the development of the electronics sector in Malaysia.

One important point must be made concerning the data relating to the growth of the sector. It is possible to see a reduction in the growth of production, and particularly, of employment, from the eighties onwards. But by contrast the value added continues to increase. This may be partly explained by the automation of the production process and by a production which calls on more sophisticated technologies, in particular in the phase of testing integrated circuits and the insertion of components into printed circuits. This move towards more highly developed technologies and higher skills in employees has been encouraged by the Government.

Finally the production units are highly concentrated (Table 8). They are mostly located in the Free Trade Zones or operate as Licensed Manufacturing Warehouses. In 1982, for example, 83% of the sales from FTZ firms were electronics products. There are nine FTZ's, the most important being Bayan Lepas in Penang (1971); Sungak Way (1972), Ulu Kelang (1973) and Telok Panglima Keling (1975) in Selangor, and Batu Berendam (1973) and Tanjong Keling (1975) in Meleka.

### 2.3.2 Imports and exports

Exports of products from the electronics industry in 1986 rose to Rt 7 billion and imports to more than Rt 6b, giving a trading surplus of nearly Rt 1b (Table 9).

Electronics products accounted for 64% of the exports of the mechanical, electrical and electronics industries (SITC 7) and 20% of the total exports. Electronics components represented 80% of the Class 7 exports.

The data contained in Table 10 and Figures 3 and 4 provide significant supplementary information on imports and exports from the electronics enterprises directed towards exporting, located in the FTZ's and representing 90% of the production of the sector.

In 1973 exports from the electronics industry represented only 2.7% of the total exports as against 20% in 1986. The rise in exports is highly correlated with the rise in the imports of raw materials by these firms for their assembly operations. However between 1974 and 1982 one can see a fall in imports as compared with production: the ratio fell from about 80% in 1974 to 70% in 1981, with a figure of 50% in 1979. Similarly it can be seen from Figure 4 that from 1978 to 1979 imports of raw materials increased more slowly than exports, reflecting an increase in the value added for these enterprises.

The external trade statistics supplied by UNIDO for the years 1980 and 1984, together with the national statistics, provide more significant information.

The following comments may be made on the whole of the sector (Table 11): the trading balance, which was in deficit in 1980 and 1984, provided a surplus in 1986 of nearly US\$ 380 million. In the case of exports the contribution of components (SITC 776) fell from 91% in 1980 to 81% in 1986. By contrast exports of consumer goods (SITC 761, 762 and 763) increased from 4% to 12%, giving a trading surplus of nearly US\$ 300m. In the case of imports components represented 75% of all imports whilst telecommunications equipment (SITC 764) represented some 13%.

Considering all the external trading in the sector (Table 12) it can be seen that the leading client and supplier is the USA with a 1984 balance of trade in favour of Malaysia. By contrast the trading balance with Japan is in deficit: this country is the second largest supplier with 20% of the imports but it only takes 6.5% of the exports.

Table 8  
GEOGRAPHICAL DISTRIBUTION OF ELECTRONICS  
COMPANIES IN PRODUCTION AS AT  
31ST DECEMBER 1981

State	Percentage of total number of companies
Selangor	36.52
Penang	23.48
Johore	13.04
Malacca	7.83
Kedah	6.09
Negeri Sembilan	4.35
Pahang	3.48
Perak	2.61
Others	2.61
Total	100.00

Source: MIDA

Table 9

EXPORTS AND IMPORTS, 1986  
(10<sup>6</sup> Ringgits)

	(1) Total	(2) Engineering Industry SITC 7	(3) Electronic Industry (1)	(4) Components (2)	4/3	3/2	2/1	3/1
Imports	27921	12579	6228	4741	0,76	0,50	0,45	0,22
Exports	35720	9009	7175	5796	0,81	0,64	0,25	0,20
Balance	+ 7799	- 3570	+ 947	1055				

(1) SITC 75, 761, 762, 763, 764, 776

(2) SITC 776

Source : External Trade Statistics 1986 Malaysia.

Table 10

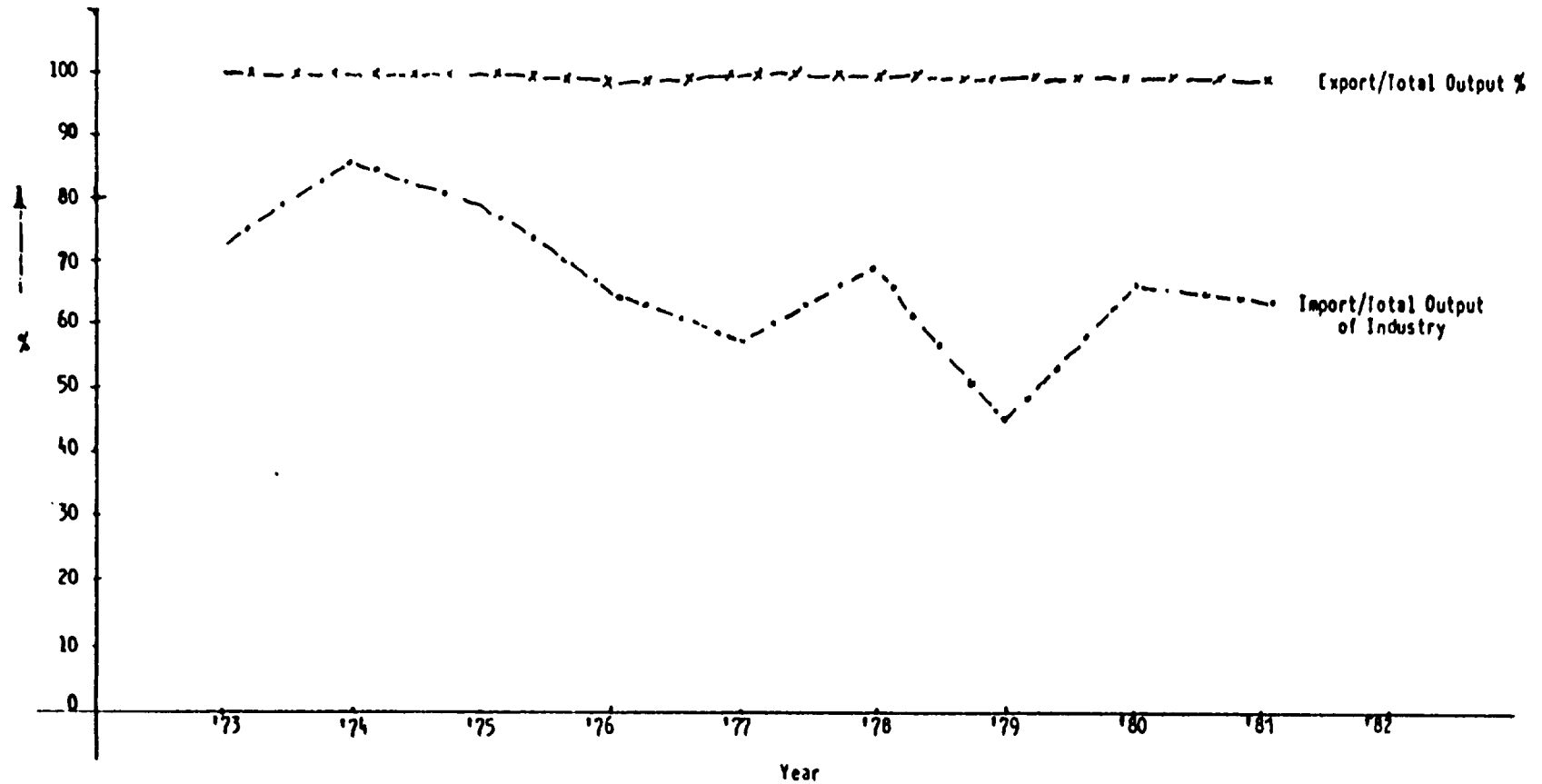
## EXPORTS AND IMPORTS OF EXPORT-ORIENTED ELECTRONICS INDUSTRY, 1973-82

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
1) Export (\$ million)	204	374	545	900	983	1,714	3,167	3,369	3,639	3,761
(1981=100)	(291)	(451)	(657)	(1,084)	(1,084)	(1,823)	(3,369)	(3,584)	(3,639)	(3,641)
2) Imported Raw material (\$ million)	148	322	430	587	572	1,194	2,217	2,253	2,342	2,730
(1981=100)	(211)	(388)	(518)	(691)	(629)	(1,270)	(2,358)	(2,397)	(2,342)	(2,643)
3) Export/Output (%)	99.9	99.6	99.8	98.0	99.7	99.8	99.3	99.6	99.6	99.2
4) Export/Total Export (%)	2.7	3.7	5.9	6.7	6.6	10.0	13.1	12.0	13.1	13.4
5) Import/Total Output (%)	72.5	86.1	78.9	65.2	58.2	69.7	45.1	66.9	64.4	72.6

Source: Prime Minister's Department, Malaysia.

Figure 3

TREND OF EXPORT AND IMPORT AS A RATIO TO OUTPUT IN THE EXPORT-ORIENTED ELECTRONICS COMPANIES



Import/Total Output * of Industry	72.5	86.1	78.9	65.2	58.2	69.7	45.1	66.9	64.4	-
Export/Total Output*	99.89	99.57	99.79	98.03	99.74	99.84	99.29	99.59	99.63	99.23

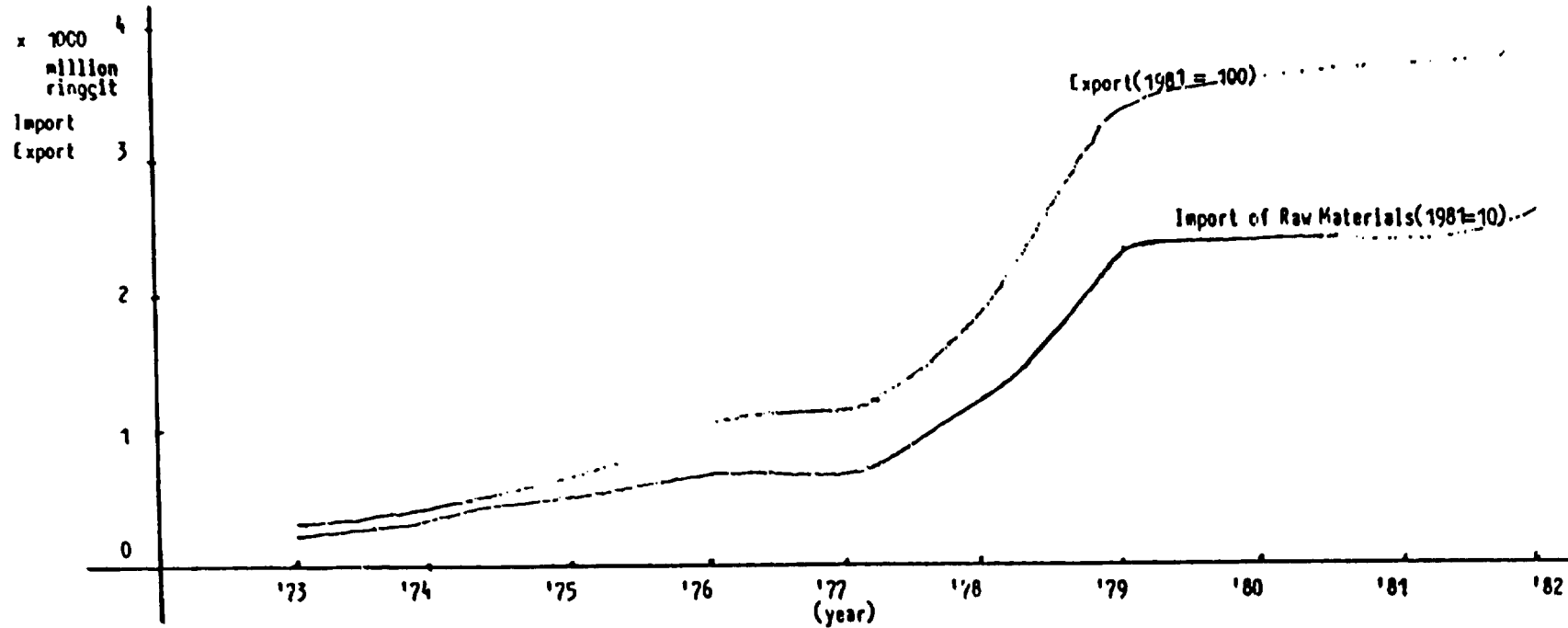
\* for export-oriented companies only

Source : Prime Minister's Department - Malaysia



Figure 4

TREND OF EXPORT AND IMPORT OF EXPORT-ORIENTED ELECTRONICS INDUSTRY



	'73	'74	'75	'76	'77 (year)	'78	'79	'80	'81	'82	<u>CAGR</u>
Export, million ringgit (1981 = 100)	204 (291)	374 (451)	545 (657)	900 (1,084)	983 (1,084)	1,714 (1,823)	3,167 (3,369)	3,369 (3,584)	3,639 (3,639)	3,761 (3,641)	38 (32)
Imported Raw Materials, million ringgit (1981 = 100)	148 (211)	322 (388)	430 (518)	587 (691)	572 (629)	1,194 (1,270)	2,217 (2,358)	2,253 (2,397)	2,342 (2,342)	2,730 (2,643)	38 (32)
Trade Balance, million ringgit (1981 = 100)	56 (80)	52 (63)	155 (139)	313 (368)	411 (452)	520 (553)	950 (1,152)	1,116 (1,187)	1,297 (1,297)	1,031 (998)	48 (42)

Source : Computer Centre, Prime Minister's Department  
CAGR : Compound Annual Growth Rate

Table 11  
EXPORTS - IMPORTS - TRADING BALANCE  
SECTOR TOTALS

EXPORTS					
	1980	1984	1980	1984	1986
Export					
SITC 75	1890	28227	.16	1.15	.60
SITC761	867	36551	.07	1.48	3.20
SITC762	45710	137983	3.95	5.60	9.10
SITC763	2993	52658	.25	2.14	.50
SITC764	52658	123433	4.55	5.01	5.90
SITC776	1053139	2085345	91.01	84.63	80.70
TOTAL	1157157	2464197	100	100	100

IMPORTS					
	1980	1984	1980	1984	1986
Import					
SITC 75	65794	156943	4.91	6.32	6.01
SITC761	62196	34334	4.63	1.39	.87
SITC762	39697	69584	2.95	2.82	2.42
SITC763	29940	69466	2.23	2.81	1.30
SITC764	175197	282649	13.04	11.45	13.30
SITC776	970661	1857364	72.24	75.21	76.10
TOTAL	1343885	2469442	100	100	100

TRADING BALANCE			
	1980	1984	1986
SITC 75			
761	-64114	-127816	-136031
762	-61329	2217	70554
763	6013	68399	202190
764	-27037	-16810	17070
776	-122537	-159216	-162646
	82278	227981	421826
TOTAL	-186729	-5245	412965

Source : 1980-1984 : UNIDO  
1986 : Yearbook of Statistics

Table 12  
ELECTRONICS INDUSTRY - ALL TRADING

	EXPORTS				IMPORTS				TRADE BALANCE	
	1980	1984	1980	1984	1980	1984	1980	1984	1980	1984
USA	816713	1385566	53.60	57.46	647031	1114167	49.24	46.42	-26318	271399
Japan	58260	156156	5.85	6.48	220594	483821	18.79	20.16	-162734	-327655
Netherlands	815	3095	.07	.13	5560	7424	.42	.31	-4745	-4329
Germany, Fed. Rep.	89873	148360	7.70	6.15	66958	56588	5.03	2.11	22215	97675
France	35490	41769	3.07	1.73	11922	21161	.91	.86	23566	20606
Brunei	535	2249	.05	.09	2417	4335	.18	.19	-1832	-2066
Indonesia	2853	5722	.25	.24	66	8109	.01	.34	2787	-2367
Malaysia	0	0	0	0	0	0	0	0	0	0
Philippines	22521	28071	1.95	1.16	52671	200028	4.02	9.33	-30350	-171957
Singapore	154258	269791	13.36	11.19	153479	268767	11.68	11.20	779	1024
Thailand	10210	10202	.86	.42	24102	7230	1.83	.30	-13892	2972
S. Total ASEAN	190427	316035	16.50	13.11	332935	488469	17.73	20.33	-42508	-172434
Hong-kong	77042	97264	6.57	4.03	14077	46752	1.07	1.95	62965	50532
	1067620	2148268	92.67	89.08	1198177	2212482	91.19	92.19	-129557	-64214

There is thus a very considerable difference between the USA and Japan as trading partners: with the latter the trading balance is also negative in the case of consumer goods.

The trading balance is also in deficit with the Philippines and Holland but is positive in the case of the Federal Republic of Germany and France.

Components thus represent the largest part of external trading in the sector, with the surplus rising from US\$ 82m in 1980 to US\$ 230m in 1984 and to US\$ 420m in 1986. Malaysia is one of the largest exporters in the world of components and of semiconductors in particular (Table 13).

Table 13

EXPORTS OF COMPONENTS (SITC 776), 1984 (US\$ 100's)

Japan	11,025
USA	4,530
Singapore	2,399
Malaysia	1,948
Republic of Korea	1,775
Hong Kong	1,526
Philippines	1,279
Taiwan	1,705

Source : Asia-Pacific. Electronics Data

The principal client countries for components (Table 14) are the USA (about 60% of the exports) followed by Singapore and Japan. The supplier countries are the USA (about 55%) followed by Japan (13%), Singapore (11%) and the Philippines (11%). The trading balance is thus largely in surplus with the USA but in deficit with Japan and the Philippines.

In the case of telecommunications equipment (SITC 764) the trading balance is in deficit. The largest suppliers in 1984 were Japan (45%) and Singapore (12%). Exports increased appreciably between 1980 and 1984. Singapore and the United States are the principal clients.

Finally in the case of consumer goods (SITC 761 and 762; Table 15) the trading balance was positive in 1984. The leading clients are the USA (80% for radios and 31% for television sets) and the Federal Republic of Germany (31% for television sets). The leading supplier is Japan (70% to 75% of imports), followed by Singapore; the trading balance is in deficit for both of these countries.

Table 14  
TELECOMMUNICATIONS EQUIPMENT

EXPORT	1980	1984	1980	1984	IMPORT	1980	1984	1980	1984	1990	1994
	S I T C	7 6 4	7 6 4	7 6 4		S I T C	7 6 4	7 6 4	7 6 4		
USA	21051	46721	39.98	37.85	USA	15974	31242	9.12	11.36	5977	15472
Japon	832	1264	1.58	1.02	Japon	55196	127348	31.51	45.06	-54366	-126064
Netherlands	43	23	.69	.02	Netherlands	1941	979	1.11	.34	-1898	-347
Germany, Fed. Rep	855	2488	1.62	2.02	Germany, Fed. R	32040	10253	18.29	3.63	-31185	-7775
France	129	657	.23	.54	France	1175	2621	.67	.93	-1955	-1952
Brunei	70	94	.13	.08	Brunei	0	0	0	0	79	94
Indonesia	17	409	.03	.32	Indonesia	1	0	.00	0	16	400
Malaysia	0	0	0	0	Malaysia	0	0	0	0	0	0
Philippines	814	46	1.55	.04	Philippines	34	140	.02	.05	760	-94
Singapore	21470	44137	40.77	35.76	Singapore	17266	33372	9.86	11.81	4294	10765
Thailand	40	704	.02	.57	Thailand	220	609	.13	.22	-180	95
S/Total ASEAN	22411	45281	42.56	36.77	S/Total ASEAN	17521	34121	10.00	12.67	4650	11260
Hong-Kong	30	4344	.06	3.52	Hong-Kong	3669	5538	2.09	1.99	-3639	-1244
Total	52658	123433	100	100	Total	175197	282649	100	100	-122539	-155216

COMPONENTS

EXPORT	1980	1984	1980	1984	IMPORT	1980	1984	1980	1984	1990	1994
	S I T C	7 7 6	7 7 6	7 7 6		S I T C	7 7 6	7 7 6	7 7 6		
USA	598948	1253920	55.92	60.13	USA	614120	1029858	63.26	55.45	-25172	224062
Japon	52372	150209	4.97	7.20	Japon	97535	242647	10.05	13.07	-45163	-52528
Netherlands	39	740	.00	.04	Netherlands	567	659	.06	.04	-528	81
Germany, Fed. Rep	78385	103127	7.44	4.95	Germany, Fed. R	25227	31469	2.60	1.69	53156	71658
France	28602	29545	2.72	1.42	France	10181	18083	1.05	.97	18421	11462
Brunei	419	220	.04	.01	Brunei	0	0	0	0	419	220
Indonesia	2831	5213	.27	.25	Indonesia	65	7566	.01	.41	2766	-2373
Malaysia	0	0	0	0	Malaysia	0	0	0	0	0	0
Philippines	26498	27413	1.95	1.31	Philippines	52837	199876	5.44	10.76	-32337	-172463
Singapore	127775	212104	12.13	10.17	Singapore	104683	211350	10.60	11.38	22892	754
Thailand	10079	9174	.96	.44	Thailand	23881	6585	2.46	.33	-13602	2589
S/Total ASEAN	161662	254124	15.34	12.19	S/Total ASEAN	181666	425397	18.71	22.90	-20064	-171273
Hong-Kong	76631	91593	7.28	4.39	Hong-Kong	6149	29275	.63	1.58	70482	62318
Total	1052139	2065345	100	100	Total	970661	1857364	100	100	62278	227661

Table 15

EXTERNAL TRADING IN ELECTRONICS PRODUCTS

OFFICE EQUIPMENT AND COMPUTERS

	1980	1984	1980	1984	1980	1984	1980	1984	1980	1984	
EXPORT	S I T C 7 5				IMPORT	S I T C 7 5				Trade balance	
USA	961	13177	51.12	46.68	USA	16649	53716	25.23	37.78	-15686	-39539
Japan	41	500	2.18	1.77	Japan	15611	38557	23.66	24.71	-15570	-38057
Netherlands	1	85	.53	.30	Netherlands	1714	2743	2.69	1.76	-1704	-2658
Germany, Fed. Rep	14	78	.74	.28	Germany, Fed. R	6676	3575	9.21	2.29	-6652	-3497
France	5	22	.27	.68	France	497	450	.76	.29	-494	-422
Brunei	35	110	1.86	.39	Brunei	2417	4335	3.66	2.78	-2358	-4225
Indonesia	1	32	.05	.11	Indonesia	0	6	0	.00	1	25
Malaysia	0	0	0	0	Malaysia	0	0	0	0	0	0
Philippines	53	52	2.82	.18	Philippines	0	12	0	.01	53	40
Singapore	555	6117	31.65	21.67	Singapore	1495	14425	2.27	9.24	-900	-8308
Thailand	3	100	.16	.35	Thailand	1	12	.00	.01	2	83
S/Total ASEAN	687	6411	36.54	22.71	S/Total ASEAN	3913	16790	5.93	12.04	-3226	-12379
Hong-Kong	81	825	4.31	2.92	Hong-Kong	472	7392	.72	4.74	-391	-6567
Total	1860	28227	100	100	Total	65994	156043	100	100	-64114	-127616

RADIOS

	1980	1984	1980	1984	1980	1984	1980	1984	1980	1984	
EXPORT	S I T C 7 6 1				IMPORT	S I T C 7 6 1				Trade balance	
USA	25	29719	2.28	80.21	USA	193	174	.31	.51	-168	29145
Japan	263	14	23.41	.04	Japan	33161	23378	53.32	66.09	-32958	-23364
Netherlands	0	0	0	0	Netherlands	1306	3037	2.10	8.35	-1736	-3037
Germany, Fed. Rep	0	668	0	1.83	Germany, Fed. R	2636	1123	4.24	3.27	-2636	-455
France	68	161	7.84	.44	France	14	5	.02	.01	54	156
Brunei	60	8	6.92	.82	Brunei	0	0	0	0	60	8
Indonesia	3	23	.35	.06	Indonesia	0	432	0	1.26	3	-409
Malaysia	0	0	0	0	Malaysia	0	0	0	0	0	0
Philippines	11	10	1.27	.03	Philippines	0	0	0	0	11	10
Singapore	350	503	43.83	1.38	Singapore	17528	5448	26.18	15.87	-17146	-4945
Thailand	20	1	2.31	.00	Thailand	0	24	0	.07	20	-23
S/Total ASEAN	474	545	54.67	1.49	S/Total ASEAN	17528	5904	29.18	17.20	-17054	-5357
Hong-Kong	7	11	.81	.03	Hong-Kong	472	237	.76	.70	-465	-228
Total	867	36551	100	100	Total	62196	34334	100	100	-61328	2217

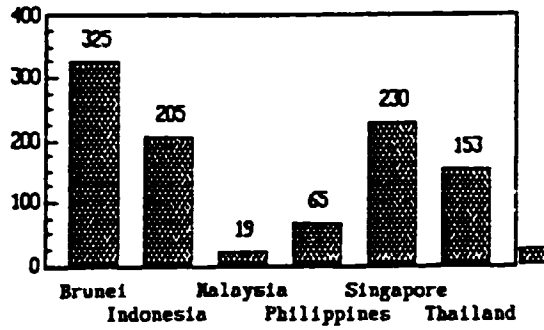
TELEVISION SETS

	1980	1984	1980	1984	1980	1984	1980	1984	1980	1984	
EXPORT	S I T C 7 6 2				IMPORT	S I T C 7 6 2				Trade balance	
USA	7728	42429	16.91	39.75	USA	95	171	.24	.25	7633	42258
Japan	4812	4169	10.53	3.02	Japan	19089	51691	48.09	74.29	-14277	-47522
Netherlands	723	2247	1.58	1.63	Netherlands	32	15	.08	.02	691	2232
Germany, Fed. Rep	5619	42002	21.04	30.44	Germany, Fed. R	79	4258	.20	6.12	6540	37744
France	6695	11372	14.65	8.24	France	53	2	.13	.00	6642	11370
Brunei	1	1817	.00	1.32	Brunei	0	0	0	0	1	1817
Indonesia	1	54	.00	.04	Indonesia	0	85	0	.12	1	-31
Malaysia	0	0	0	0	Malaysia	0	0	0	0	0	0
Philippines	1145	550	2.50	.40	Philippines	0	0	0	0	1145	550
Singapore	4036	6520	8.87	5.02	Singapore	12307	4172	31.00	6.00	-8269	2758
Thailand	68	237	.15	.16	Thailand	0	0	0	0	68	237
S/Total ASEAN	5253	9574	11.49	6.94	S/Total ASEAN	12307	4257	31.00	6.12	-7054	5317
Hong-Kong	293	511	.54	.27	Hong-Kong	3315	4258	8.35	6.12	-3022	-3747
Total	45710	137993	100	100	Total	35697	65584	100	100	6013	68799

Table 16

EQUIPMENT IN HOUSEHOLDS

Radios per 1000



EQUIPMENT IN HOUSEHOLDS

Television sets per 1000 persons

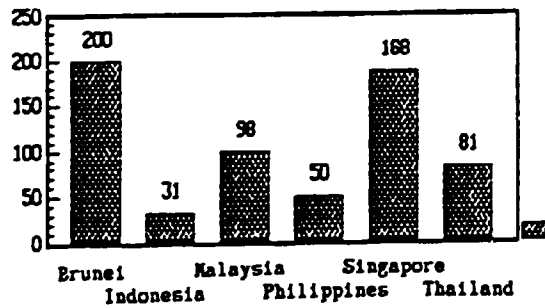
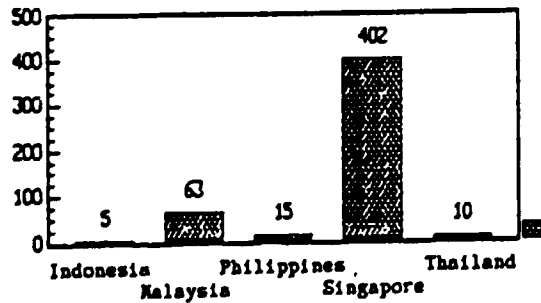


Table 17

TELEPHONE EQUIPMENT

Subscribers per 1000 inhabitants



### 2.3.3 The development of the domestic market

The domestic market represents only a limited market for production: the levels of equipment of households is shown in Tables 16 and 17.

In the case of consumer goods the domestic market stagnated between 1985 and 1987 (Table 18), whereas the projections made in 1984 forecast an increase (Table 19). The projections up to 1995 show an increase of 11.2% over the period 1985-90 and of 9.1% over the period 1990-95. However a higher rate of growth of 20% to 26% is forecast for exports. For this reason the percentage of the production exported will be nearly 70% in 1995 as against 46% in 1981. However there will, over the same period, be some replacement of imports since the level of imports will fall from 54% to 44%.

Table 18

#### EVOLUTION OF THE DOMESTIC MARKET (millions Ringgits)

	1985	1986	1987
Consumer goods	561	498	510
Industrial goods	670	700	740
Components	886	859	914
<b>TOTAL</b>	<b>2117</b>	<b>2057</b>	<b>2164</b>
Of which (as thousands units) :			
Television sets	524	504	503
Radios	1072	1115	1277

Source : Asia Pacific Electronics Data. 1987, Benn Electronics

In the case of industrial goods (Table 20) the domestic demand should grow between 1985 and 1987. For the future an increase in the domestic demand of 15.5% is forecast: exports should increase at a rate of 25.5%. Production should meet a larger part of the domestic demand since a fall in the level of imports is also forecast.

In the case of components (Table 21) the domestic demand has increased slightly in recent years. For the future an increase in the demand of about 9% is forecast for both the domestic and import markets between 1985 and 1990, with a moderate increase of 5% in exports between 1991 and 1995.

The domestic market thus represents only a small part of the outlets for production (Table 22): 88% of the production was exported in 1985. Projections up to 1995 show an overall level of 80% exported. An increase of the order of 10% is forecast for the domestic market, but in 1995 it will still be exports which will drive production forward. At the same time a reduction in the imports ratio on the domestic market from 53% to 44% for consumer goods, from 85% to 74% for industrial goods and from 94% to 80% for components is forecast.



Table 19

## SUPPLY AND DEMAND PROJECTIONS FOR CONSUMER ELECTRONICS INDUSTRY

- All financial numbers in million ringgit at 1981 constant prices -

	1981 Actual	1984 (Est.)	1985	1986	1987	1988	1989	1990	Avg-annual growth rate % 1985-1990	1991	1992	1993	1994	1995	Avg-annual growth rate % 1991-1995
<b>Demand</b>															
Domestic Consumption	348	763	839	1,005	1,097	1,197	1,306	1,425	11.2	1,555	1,697	1,852	2,021	2,206	9.1
Export	217	287	353	419	543	697	887	1,120	26.0	1,351	1,626	1,954	2,346	2,815	20.2
Total	765	1,050	1,192	1,424	1,640	1,894	2,193	2,545	16.4	2,906	3,323	3,806	4,367	5,021	14.6
<b>Supply</b>															
Production	471	620	744	893	1,072	1,286	1,543	1,851	20.0	2,164	2,530	2,950	3,458	4,049	16.9
Import	294	430	448	531	568	608	650	694	7.0	742	793	848	909	972	7.0
Total	765	1,050	1,192	1,424	1,640	1,894	2,193	2,545	15.3	2,906	3,323	3,806	4,367	5,021	14.6
<b>Ratio</b>															
Export/Production	0.46	0.46	0.47	0.47	0.51	0.54	0.57	0.61		0.62	0.64	0.66	0.68	0.70	
Export/Industry Export	0.08	0.06	0.07	0.08	0.09	0.10	0.12	0.13		0.15	0.16	0.18	0.19	0.21	
Import/Production	0.62	0.69	0.60	0.59	0.53	0.47	0.42	0.37		0.34	0.31	0.29	0.26	0.24	
Import/Consumption	0.54	0.56	0.53	0.53	0.52	0.51	0.50	0.49		0.48	0.47	0.46	0.45	0.44	

Source : Masterplan - MIDA/UNIDO 1985  
Electronics and Electrical Industry

Table 20

## SUPPLY AND DEMAND PROJECTIONS FOR INDUSTRIAL ELECTRONICS INDUSTRY

- All Financial numbers in million ringgit at 1981 constant prices -

	1981 Actual	1984 (Est.)	1985	1986	1987	1988	1989	1990	Avg-annual growth rate % 1985-1990	1991	1992	1993	1994	1995	Avg-annual growth rate % 1991-1995
<b>Demand</b>															
Domestic Consumption	378	434	501	579	669	773	893	1,030	15.5	1,190	1,374	1,587	1,833	2,110	15.5
Export	112	148	186	233	292	366	459	579	25.5	730	920	1,159	1,460	1,881	26.0
Total	490	582	687	812	961	1,139	1,352	1,609	18.5	1,920	2,294	2,746	3,293	3,991	19.9
<b>Supply</b>															
Production	167	210	262	327	408	510	637	797	24.9	995	1,243	1,553	1,940	2,430	24.9
Import	323	372	425	485	553	629	715	812	13.9	925	1,051	1,193	1,353	1,561	13.9
Total	490	582	687	812	961	1,139	1,352	1,609	18.5	1,920	2,294	2,746	3,293	3,991	19.9
<b>Ratio</b>															
Export/Production	0.67	0.70	0.71	0.71	0.72	0.72	0.72	0.73		0.73	0.74	0.75	0.75	0.77	
Export/Industry Export	0.04	0.03	0.04	0.04	0.05	0.05	0.06	0.07		0.08	0.09	0.10	0.12	0.14	
Import/Production	1.93	1.77	1.62	1.48	1.36	1.23	1.12	1.02		0.93	0.85	0.77	0.70	0.64	
Import/Consumption	0.85	0.86	0.85	0.84	0.83	0.81	0.80	0.79		0.78	0.76	0.75	0.74	0.74	

Source : Masterplan - MIDA/UNIDO 1985  
Electronics and Electrical Industry

Table 21  
SUPPLY AND DEMAND PROJECTIONS FOR ELECTRONIC COMPONENTS INDUSTRY

- All financial numbers in million ringgit at 1981 constant price -

	1981 Actual	1984 (Est.)	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	Avg-annual growth rate % 1985-1990	1995	Avg-annual growth rate % 1991-1995
Demand																
Domestic Consumption	3,068	3,267	3,597	4,132	4,477	4,832	5,195	5,590	6,037	6,520	7,042	7,605	8,213	9.2	7,605	8.0
Export	2,320	4,322	4,400	4,796	5,228	5,699	6,211	6,770	7,185	7,608	8,007	8,367	8,600	9.0	8,367	5.0
Total	5,388	7,589	7,997	8,928	9,705	10,531	11,406	12,360	13,222	14,128	15,049	15,972	16,813	9.1	15,972	6.3
Supply																
Production	3,359	4,410	4,610	5,295	5,784	6,303	6,850	7,415	7,981	8,559	9,141	9,715	10,226	10.0	9,715	6.6
Import	2,329	3,179	3,387	3,631	3,921	4,228	4,556	4,945	5,241	5,569	5,908	6,257	6,587	7.9	6,257	5.9
Total	5,688	7,589	7,997	8,926	9,705	10,531	11,406	12,360	13,222	14,128	15,049	15,972	16,813	9.1	15,972	6.3
Ratio																
Export/Production	0.77	0.98	0.95	0.91	0.90	0.90	0.91	0.91	0.90	0.89	0.88	0.86	0.84		0.86	0.84
Export/Industry Export	0.82	0.91	0.89	0.88	0.86	0.84	0.82	0.80	0.78	0.75	0.72	0.69	0.65		0.69	0.65
Import/Production	0.71	0.72	0.73	0.69	0.68	0.67	0.67	0.67	0.66	0.65	0.65	0.64	0.64		0.64	0.64
Import/Consumption	0.76	0.97	0.94	0.88	0.88	0.88	0.88	0.88	0.87	0.85	0.84	0.82	0.80		0.82	0.80

Source : Masterplan - MIDA/UNIDO 1985  
Electronics and Electrical Industry

Table 22

## SUPPLY AND DEMAND PROJECTIONS FOR TOTAL ELECTRONICS INDUSTRY

- All financial numbers in million ringgit at 1981 constant prices -

	1981 Actual	1984 (Est.)	1985	1986	1987	1988	1989	1990	Avg-annual growth rate % 1985-1990	1991	1992	1993	1994	1995	Avg-annual growth rate % 1991-1995
<b>Demand</b>															
Domestic Consumption	3,994	4,464	4,937	5,716	6,243	6,802	7,394	8,045	10.3	8,782	9,591	10,481	11,459	12,329	9.3
Export	2,849	4,757	4,939	5,448	6,063	6,762	7,557	8,469	11.4	9,266	10,194	11,120	12,173	13,296	9.4
Total	6,843	9,221	9,876	11,164	12,306	13,564	14,951	16,514	10.8	18,048	19,745	21,601	23,632	25,625	9.4
<b>Supply</b>															
Production	3,897	5,240	5,616	6,515	7,264	8,099	9,030	10,063	12.4	11,140	12,332	13,652	15,113	16,705	10.7
Import	2,946	3,981	4,260	4,649	5,042	5,465	5,921	6,451	0.7	6,908	7,413	7,949	8,519	9,120	7.2
Total	6,843	9,221	9,876	11,164	12,306	13,564	14,951	16,514	10.8	18,048	19,745	21,601	23,632	25,625	9.4
<b>Ratio</b>															
Export/Production	0.73	0.91	0.88	0.84	0.83	0.83	0.84	0.84		0.83	0.82	0.81	0.81	0.80	
Import/Production	0.76	0.76	0.76	0.71	0.69	0.67	0.66	0.64		0.62	0.60	0.58	0.56	0.55	
Import/Consumption	0.74	0.89	0.86	0.81	0.81	0.80	0.80	0.80		0.79	0.77	0.76	0.74	0.73	

Source : Masterplan - MIDA/UNIDO 1985  
Electronics and Electrical Industry

### 3. PRODUCTION AND THE ORGANISATION OF PRODUCTION

#### 3.1 The structure of production

The structure of the Malaysian electronics industry is quite specific (Table 23). The electronics components sector accounts for 80% to 85% of the production (80% of this being semiconductors), the consumer goods sector about 10% and the industrial goods sector 5%. These percentages have changed little in recent years. This structure of the production is very different from that in Singapore or the Republic of Korea (Figure 5). In these two countries the components sector represents some 45% to 50% of the production, the consumer goods sector about 35% and the industrial goods sector 15%.

Mass consumer electronics represent only about 10% of the production of the sector. However changes have taken place since the start of the eighties (Table 24): the increase in the production of consumer goods is much more rapid with rates of growth of 30% to 35% between 1982 and 1986. In 1986 860,000 television sets were assembled. In the first seven months of 1987 the increase in production of mass consumer electronics should be of the order of 40% to 50% (Far Eastern Economic Review, 26.11.87 "Malaysia's electronics enjoy a spectacular boom"). This increase in the production is mainly the result of exports, consumer goods representing 13% of the sector's exports in 1986 as against 5% in 1980. Furthermore relations with local industry are becoming more important since 20% to 25% of the inputs are purchased locally.

In the components sector (Table 25) it is the active components, and in particular the semiconductors, which represent the most important part of the sector (80% to 90%). Only assembling operations are carried out, requiring a high labour content and testing. However three major companies have recently decided on large investments in wafer production: National Semiconductors, Intel and Motorola (Far Eastern Economic Review, 26.11.87; Asia Wall Street Journal, 6.2.88). This production will allow greater national integration. It is estimated that at the present time 95% of raw materials for the production of components are imported, whilst only 15% of the components are utilised locally in the production of industrial equipment goods and consumer goods.

Professional electronics accounts for only 4% of the production of the sector, the largest part of this being telecommunications equipment. The enterprises involved in this sector are joint ventures with foreign companies such as Plessey, Philips, NEC, Siemens and Ericson.

Table 23

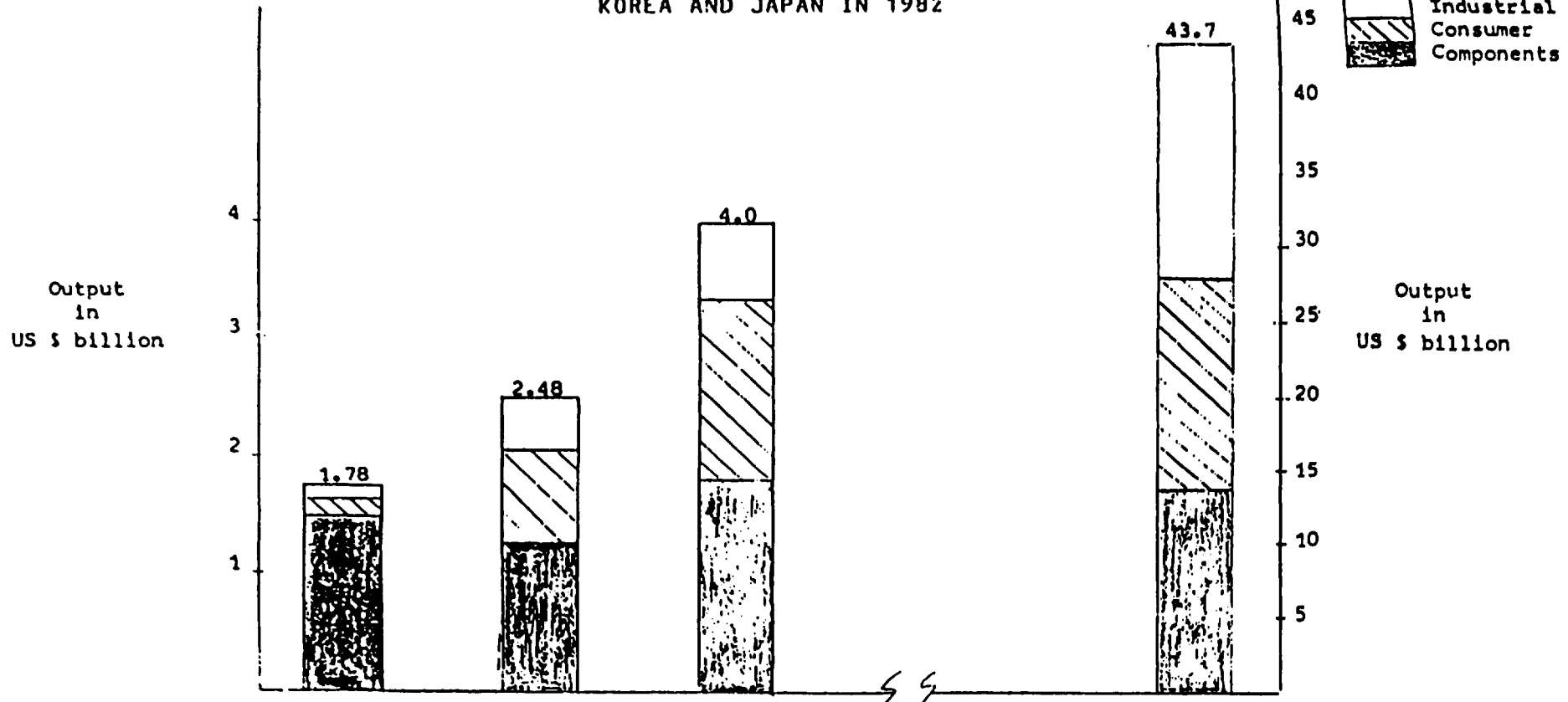
**MALAYSIA : STRUCTURE OF ELECTRONICS INDUSTRY, 1976-1984**  
 (At constant price, 1981 = 100)  
 \$ bil. Ringgit

	1976	1977	1978	1979	1980	1981	1982	1983	1984
<b>Consumer</b>									
Output (\$ bil.)	0.16	0.14	0.20	0.35	0.44	0.40	0.35	0.47	0.62
%	11.6	10.5	10.1	12.3	11.6	10.2	8.7	10.3	11.8
<b>Industrial</b>									
Output (\$ bil.)	0.08	0.08	0.09	0.21	0.22	0.17	0.23	0.22	0.21
%	6.0	5.6	4.3	7.5	5.8	4.4	5.7	4.8	4.0
<b>Components</b>									
Output (\$ bil.)	1.16	1.13	1.69	2.29	3.13	3.33	3.41	3.85	4.41
%	82.3	84.0	85.6	80.3	82.6	85.4	85.6	84.9	84.2
<b>Total (\$ bil.)</b>	<b>1.41</b>	<b>1.35</b>	<b>1.98</b>	<b>2.85</b>	<b>3.79</b>	<b>3.90</b>	<b>3.99</b>	<b>4.54</b>	<b>5.24</b>

Source: MIDA and Department of Statistics, Malaysia.

Figure 5

COMPOSITION OF THE ELECTRONICS INDUSTRY IN MALAYSIA COMPARED TO SINGAPORE, REPUBLIC OF KOREA AND JAPAN IN 1982



	Malaysia	Singapore (in US \$ billion)	Republic of Korea	Japan
Total Output	1.78	2.48	4.0	43.7
Industrial (%)	0.10 (5.7%)	0.37 (14.8%)	0.64 (16.0%)	15.7 (35.9%)
Consumer (%)	0.16 (8.7%)	0.82 (33.3%)	1.54 (38.6%)	14.1 (32.2%)
Component (%)	1.52 (85.6%)	1.29 (51.9%)	1.82 (45.4%)	13.9 (31.9%)

Source :  
MASTERPLAN

Table 24

PRODUCTION OF SOME ELECTRONIC COMPONENTS AND ASSEMBLIES

	1982	1983	1984	1985	1986
<b>Integrated circuits (millions units)</b>	2193	2689	3874	2561	3277
<b>Transistors (millions units)</b>	2212	2597	3831	3450	3719
<b>Television sets (units)</b>	249000	382766	443025	568387	862573
<b>Radios (thousands units)</b>	35388	5501	7821	8829	10521

Source : Bank Negara Malaysia Quarterly Bulletin,  
September 1987, page 75



Table 25

**Bonn Electronics - America, Japan & Asia-Pacific Electronics Data 1987**

**MALAYSIA : PRODUCTION**

**CONSUMER**

	1984			1985			1986			1987		
	RM	SP	No. x 1000	RM	SP	No. x 1000	RM	SP	No. x 1000	RM	SP	No. x 1000
<b>TOTAL</b>	527	224		605	244		573	231		620	250	
<b>Video Equipment</b>												
Colour Television	186	79	371	220	89	492	210	85	440	220	89	460
Monochrome Television	10	4	72	10	4	76	10	4	72	10	4	70
<b>Video Equipment Total</b>	196	83		230	93		220	89		230	93	
<b>Audio Equipment</b>												
Radios & Radio Combinations	298	127	7821	340	137	8829	320	129	8400	355	143	9200
Record Players & Tape Recorders (inc. Hi-Fi Equipment & Combinations)	18	8	417	19	8	460	18	7	435	19	8	455
<b>Audio Equipment Total</b>	316	135		359	145		338	136		374	151	
<b>Other Consumer Equipment</b>												
Electric/Electronic Watches	14	6	720	15	6	730	14	6	700	15	6	710
Electric/Electronic Clocks	1	-	40	1	-	45	1	-	45	1	-	50
<b>Other Consumer Equipment Total</b>	15	6		16	6		15	6		16	6	

**COMPONENTS**

	1984		1985		1986		1987	
	RM	SP	RM	SP	RM	SP	RM	SP
<b>TOTAL</b>	4639	1983	3658	1475	4226	1704	5534	2230
<b>Active Components</b>								
Valves & Tubes	109	47	102	41	100	40	105	42
Discrete Semiconductors	1506	644	1205	486	1330	536	1600	645
Integrated Circuits & Other Microcircuits	2607	1114	1940	782	2400	968	3400	1371
<b>Active Components Total</b>	4222	1805	3247	1309	3830	1544	5105	2058
<b>Passive Components</b>								
Capacitors	57	24	55	22	53	21	58	23
Resistors	23	10	25	10	24	10	25	10
Small Transformers, Chokes, Coils & Other Inductors	91	39	85	34	84	34	90	36
Relays, Switches & Connectors	39	17	37	15	35	14	37	15
Printed Circuits	63	27	61	25	57	25	68	27
<b>Passive Components Total</b>	273	117	263	106	258	104	278	111
<b>Active &amp; Passive Components Total</b>	4495	1922	3510	1415	4088	1648	5383	2169
<b>Audio Components</b>								
Microphones	2	1	2	1	2	1	2	1
Loudspeakers	17	7	18	7	18	7	19	8
Amplifiers	5	2	4	2	4	2	5	2
Unrecorded Media	5	2	4	2	4	2	5	2
A P & SP for Consumer & Professional Communications Equipment	115	49	120	48	110	44	120	48
<b>Audio Components Total</b>	144	61	148	60	138	56	151	61

### 3.2 Organisation of the sector

#### 3.2.1 The companies

Foreign firms are very strongly represented in Malaysia: out of a sample of 78 firms (of the total of 181 which formed the sector in 1980) 77% were foreign (Table 26). According to another study carried out by the DEG (Table 27) 90% of the employees in the sector belonged to foreign enterprises.

The American companies (National Semiconductor, Texas Instruments and AMD in 1972, Intel, Motorola and Mostek in 1973 and RCA and Harris in 1974) and the Japanese companies (Hitachi in 1973, NEC and Toshiba in 1974) were essentially established during the period 1971-1975.

The American companies produce only components, but by contrast the Japanese companies also produce consumer goods.

The Malaysian or Joint Venture enterprises were created during the whole of the period analysed (1971-1985). Malaysian enterprises are mainly present in the consumer goods sector, but are also present in other sectors (Table 27).

The Malaysian-American Electronics Industry (MAEI) association provides interesting information of the firms present in Malaysia (Table 28): there are 13 of these, all of which except one began production between 1971 and 1975. This is the result of the advantages granted by the Investment Incentives Act of 1968 and the Free Trade Zone (FTZ) Act of 1971. In 1986 these companies employed 35,000 persons out of the total sector manpower of 80,000. Productivity (in current Dollars) practically doubled between 1979 and 1984; the fall in productivity in 1985 was the consequence of the under-utilisation of production capacities due to the world crisis in that year. Technical personnel and engineers are increasing in number, tending to confirm that the technologies utilised are more complex and that the capacity to master them is gradually developing. In this connection Mr Jerry Lee of Texas Instruments has stated "We came for the cheap labour and the tax advantages, but we are staying because of the expertise we have built up here. As far as assembly and testing are concerned we have more expertise here than we have in the USA. We sometimes have to send our Malaysian engineers to the States to solve their problems." (UNIDO Microelectronics Monitor, Issue No.23, 1987).

Finally, as has been pointed out by Fong Chan Onn in his article "Direct Foreign Investment in Malaysia: Technology transfer and linkages by North and South Countries" (November 1987), differences in attitudes can be seen between companies in the developed countries and the developing countries: the American companies are always majority shareholders in the capital of the enterprise, whereas Japanese companies very often adopt the joint venture formula. By contrast companies from Hong Kong, Taiwan and the Republic of Korea are in joint ventures with local partners. It can also be seen from Table 27 that forms of investment in joint ventures are generally recent and that the size of the enterprises is smaller than that of other types of enterprises.

Table 26

ACTIVITIES OF A SAMPLE OF 75 ESTABLISHMENTS, 1980

	Company origin :				Total
	Malaysia	Japan	U S A	Other	
Consumer goods	10	6	2	5	23
Components	6	12	16	5	39
Industrial goods	6	2	-	2	10
Others	4	1	-	1	6
<b>TOTAL</b>	<b>26</b>	<b>21</b>	<b>18</b>	<b>13</b>	<b>78</b>

Source : Fong Chan Onn. Technological Leap. Malaysian Industry in Transition.

Oxford University Press, 1986.

Table 27

CHARACTERISTICS OF THE COMPANIES ACCORDING TO THEIR ORIGIN  
(From a sample of 45 companies)

Origin	Number	Total manpower	MP per company	Date of start-up :		
				1971-1975	1975-1980	1981-1985
Malaysia	6	2065	340	3	2	1
Joint Venture	9	1542	170	3	2	4
U S A	11	23315	2100	9	1	1
Japan	10	6986	700	7	3	0
Others	9	5498	610	4	1	4
<b>TOTAL</b>	<b>45</b>	<b>39406</b>	<b>3920</b>	<b>26</b>	<b>9</b>	<b>10</b>

Source : Directory DEG - Ministry of Industry.

### 3.2.2 Wages and factor costs

The principal reason for the establishment of foreign firms in Malaysia is the lower labour cost: the latter, however, increased by 300% between 1970 and 1979, with the daily wage rising from M\$3 to M\$10. A comparison with factor costs in Japan (Table 29) shows that labour costs represent only 11.9% in Malaysia against 33.2% in Japan.

Table 30 shows that at the start of the eighties labour costs were still low in comparison with other countries. However low productivity reduces this comparative advantage to a significant extent. Therefore considerable efforts are required on the part of the companies to improve productivity if the competitiveness on the Malaysian industry is to be maintained. This is all the more essential when it is realised that the cost of labour in Thailand is only half the Malaysian figure.

### 3.2.3 The competitiveness of the Malaysian electronics industry

A study was carried out in 1980 on a sample of 18 Malaysian, Japanese and American enterprises. The degree of international competitiveness is measured by the Domestic Resource Cost coefficient (DRC): this expresses the value of the domestic resources needed to save (replacement of imports) or to gain (export) one unit of the national currency (at the rate of exchange in force). If for example the DRC coefficient is 1.5 this means that a supplementary cost of 50% has to be accepted to gain one unit of currency. According to this criterion the activity in question is not competitive.

The results are set out in Table 31 which gives the DRC coefficient for each firm studied and the work productivity. It can firstly be seen that with only one exception all the companies have a DRC which is less than unity and secondly that as the work productivity (VA/L) rises so does the level of competitiveness (DRC).

## 4. THE TRANSFER AND MASTERY OF TECHNOLOGIES

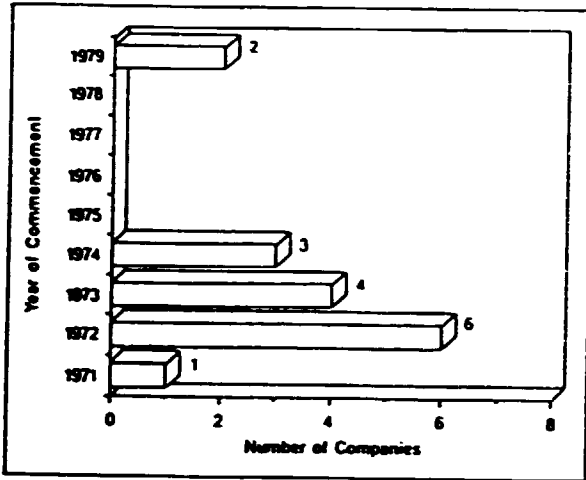
### 4.1 The transfer of technology

The number of agreements by type and by group of industry registered between 1981 and 1985 (Table 32) shows two main features: firstly the contracts for technical assistance and know-how are the most numerous (278 out of 601), and secondly the transfers of technology relate essentially to the electrical and electronics industry and to the automobile industry (182 out of 601).

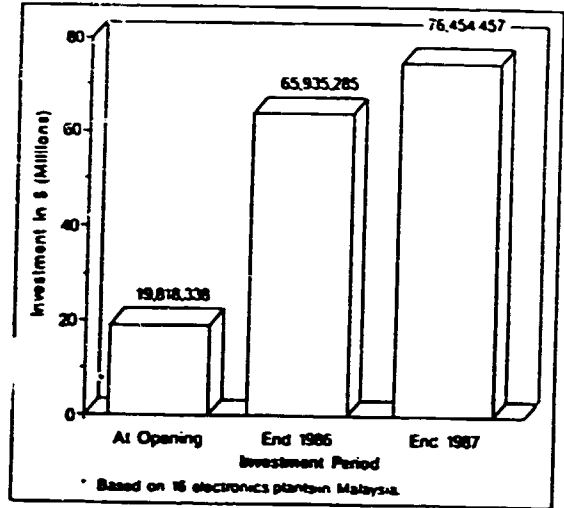
In the case of the electronics industry an in-depth study has been carried out. Table 32 shows the respective forms of the transfer of technology. For Malaysian enterprises the purchase of equipment coupled with management contracts forms the principal form for the transfer of technology. For the Japanese firms the forms of transfer are very varied: turnkey contracts, joint ventures or the purchase of equipment. For the American firms the purchase of equipment and turnkey plants are the two main forms of transfer.

Table 28

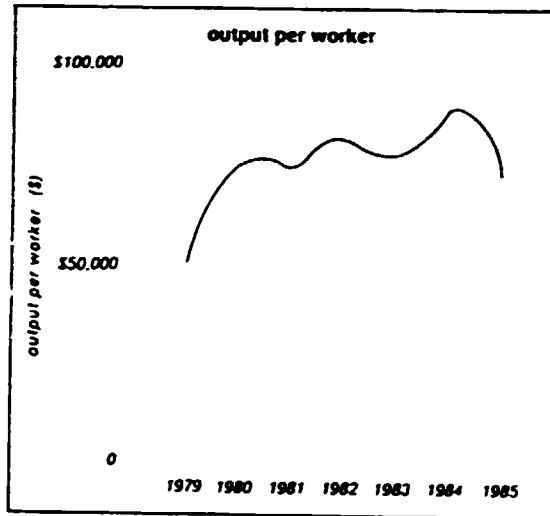
U.S. Electronics Companies:  
Years of operation in Malaysia



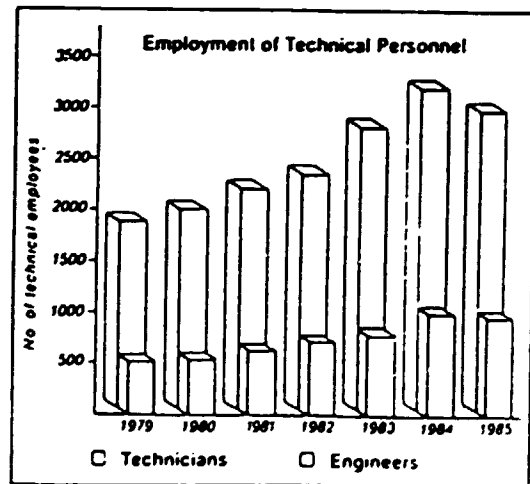
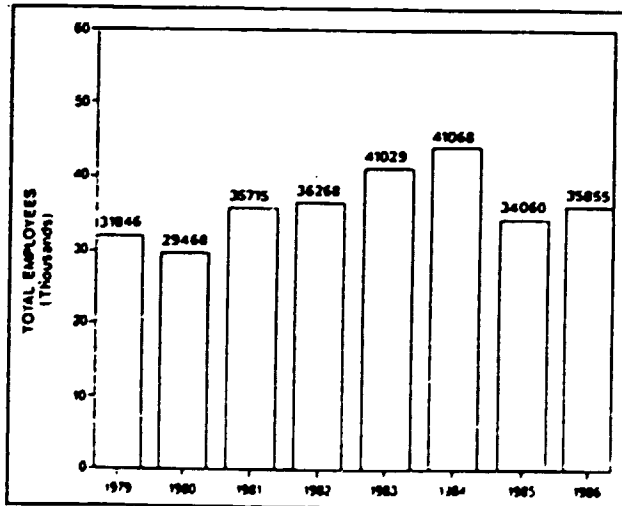
U.S. Electronics Companies in Malaysia:  
Average Capital Investment



Source: MAEI



U.S. Electronics Companies in Malaysia: Employment



The Composition of Production Costs of Electronics  
Establishments by Product Type, 1980

Product Type	Number of Establishments	Percentage of Total Production Cost				Total
		Material	Labour	Fuel & Utilities	Others	
Malaysia: <sup>1</sup>						
Consumer Products	7	65.8	9.4	1.6	23.2	100
Components	13	76.5	16.6	2.4	4.5	100
Industrial Products	11	80.3	9.9	1.2	8.6	100
Aggregate for Malaysian Electronics Industry <sup>1</sup>	31	74.2	11.9	1.7	12.1	100
Aggregate for Japanese Electronics Industry <sup>2</sup>	n.a.	42.8	33.2	24.0		100

Sources: <sup>1</sup> Data collected from a survey of 78 electronics establishments located throughout Peninsular Malaysia in 1980.

<sup>2</sup> Japan, *Nikkei Annual Corporation Reports 1978*, Tokyo, 1979.

Source : Technological Leap - Fong Cham Onn  
Oxford University Press

Table 30

COMPARISON OF LABOUR COSTS AND LABOUR PRODUCTIVITIES IN SEMICONDUCTORS/ELECTRONIC COMPONENTS  
FOR MALAYSIA AND SELECTED REFERENCE COUNTRIES

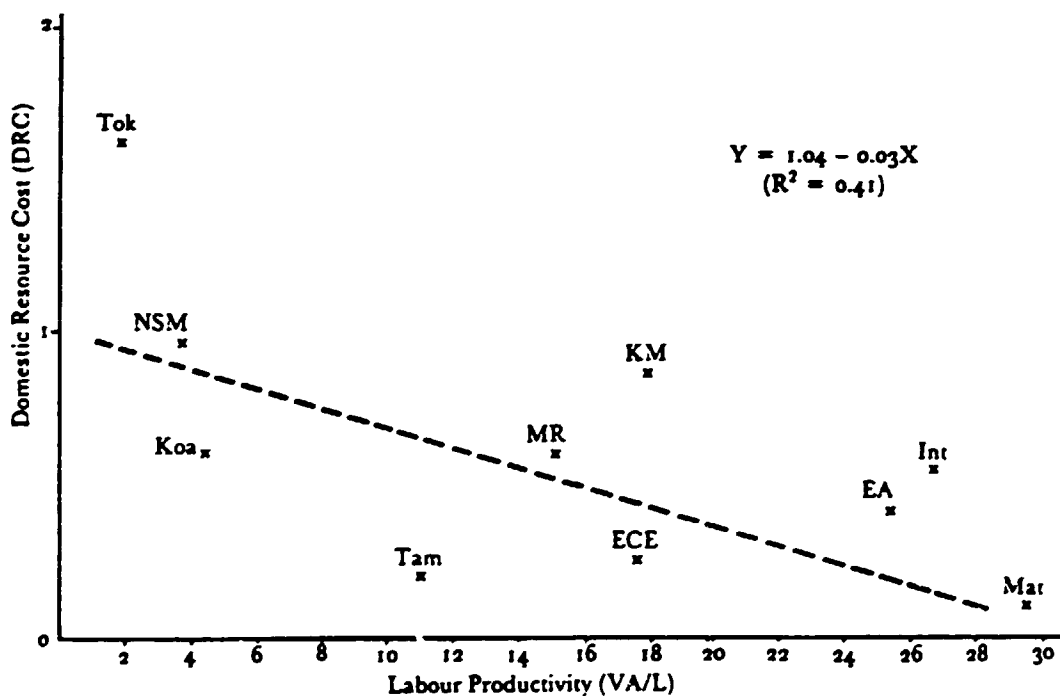
	Annual Remuneration per employee		Remuneration Index (US=100)	Value added per employee		Value added Index (US=100)	Value added/Employee Remuneration/Employee
	Local Currency	Malaysian Ringgit		Local Currency	Malaysian Ringgit		
Malaysia (1981) Semiconductors, Other Electronic Components & Communications Equipment and Apparatus	4688	4,688	11.7	15250	15,250	18.2	3.25
Republic of Korea (1982) Electronic Tubes and Other Electronic Parts and Components (3 <sup>a</sup> 325)	1,980,000 won	6,600	16.5	4,917,000 won	16,390	19.6	2.48
Singapore (1982) Semiconductor Devices (38441/2/3)	S\$12,183	11,164	27.9	S\$25,363	23,241	27.8	2.08
Japan (1982) Electronics and Communications Apparatus and Components (357)	JY2,468 mn	24,680	61.7	JY6,343 mn	63,430	75.9	2.57
United States (1982) Semiconductor Devices (3674)	US\$17,242	40,001	100	US\$36,033 <sup>(a)</sup>	83,597 <sup>(a)</sup>	100	2.09

(a) Estimate

Source: Departments/Bureaus of Countries Concerned

( Table 31 )

**MALAYSIAN ELECTRONICS INDUSTRY : LABOUR PRODUCTIVITY AND COMPETITIVENESS**



Key: VA/L: MS'000 value added per labour per year

Source : Technological Leap - Fongchan Chu  
Oxford University Press.



Table 32  
MALAYSIA: TECHNOLOGICAL TRANSFER  
AGREEMENTS BY TYPE, 1981-85  
(Number)

Type of agreement	1981	1982	1983	1984	1985	Total
Technical assistance and know-how	64	48	61	54	51	278
Joint venture	22	14	14	17	9	76
Management	6	10	13	10	6	45
Trademarks/patents	8	8	7	18	5	46
Service	7	2	7	2	1	19
Basic engineering	5	4	4	6	—	19
Others	19	8	55	12	24	118
Total:	131	94	161	119	96	601

Source: Ministry of Trade and Industry.

MALAYSIA: TECHNOLOGICAL TRANSFER  
AGREEMENTS BY INDUSTRY GROUP,  
1981-85

Industry group	1981	1982	1983	1984	1985	Total
Electronics and electrical	16	19	15	21	21	92
Motor vehicles and shipping	16	11	31	17	20	90
Chemical	21	5	15	17	17	75
Food	12	1	37	6	10	66
Non-metallic	4	16	9	17	—	46
Fabricated metal	14	7	12	3	—	36
Basic metals	10	13	5	5	—	33
Rubber and leather	14	2	7	5	4	32
Hotels	2	4	8	7	4	25
Textiles	5	2	5	6	1	19
Plastics	6	1	2	7	—	16
Pulp, paper printing	—	4	1	6	3	14
Palm oil and petroleum	3	3	4	—	—	10
Scientific and optical equipment	—	3	5	—	—	8
Others	13	3	5	2	16	39
Total	131	94	161	119	96	601

Source: Ministry of Trade and Industry.

Malaysian Electronics Industry: Methods of Technology Transfer

Ownership	Turnkey Factory	Joint Venture	Licensing and Royalty	Management Contract	Direct Equipment Purchase	Formal Training Programme	Number of Establishments
Malaysia	1	6	6	10	19	1	26
Japanese	5	3	6	6	6	5	21
United States	4	1	1	3	4	3	18
Others	4	2	2	6	6	4	13
Total	14	12	15	25	35	13	78

Source: Data collected from a survey of 78 electronics establishments located throughout Peninsular Malaysia in 1980. An establishment may have more than one method of technology transfer. Direct equipment purchase is usually coupled with management contract. Formal training programme is not a direct form of technology transfer by itself, but linked to another form of technology transfer (e.g., joint venture).

Malaysian Electronics Industry: Cost of Technology Transfer

Ownership	Cost of Percentage of Fixed Assets <sup>1</sup>			
	Equipment Purchase	Licensing and Royalty	Management Contract	Formal Training Programme
Malaysian	40.4	21.1	5.0	4.2
Japanese	16.4	3.8	3.6	0.7
United States	21.6	0.2	2.0	1.4
Others	23.9	0.1	0.3	0.6

Source: Data collected from survey of 78 electronics establishments located throughout Peninsular Malaysia in 1980.

Note: <sup>1</sup> Percentage is on the basis of establishments which incurred the cost: not all of the establishments in the sample.

Source :

Technological  
Leap - op. cit.

In terms of the cost of the transfer (Table 32) the purchase of the equipment and the licences represent the greater part of the cost of the transfer, which is not the case with Japanese and American firms. In the case of the latter training costs and royalties are not so high.

In terms of research and development (Table 33) it may be seen that the foreign enterprises are totally dependent on the parent firms for their R&D. In the case of the Malaysian enterprises 14 out of 26 have R&D activities. The survey also showed that, taken overall, the R&D activities are not highly developed in the electronics firms.

In conclusion, therefore, the forms of transfer differ considerably according to the origin of the firms. There is little development of training and R&D activities; these depend totally on the parent company. Only the Malaysian enterprises pursue any internal R&D efforts.

The legislation on transfers of technology provide for an agreement with the Ministry for Trade and Industry prior to any transfer. The following are regarded as forms of transfer: joint ventures, licences, know-how, technical assistance, assistance to management, turnkey contracts and trademarks. The remuneration for the technology can be made in the form of a fixed lump sum fee or by the payment of royalties of between 1% and 5% on sales. In general when the technology is not very sophisticated the rate applied is 2%. The period is five years, renewable after acceptance by the Ministry.

#### 4.2 The national effort to develop technology

The electronics sector employs about 80,000 persons: recent data on qualifications is lacking. Between 1981 and 1983 the percentage of skilled staff increased from 18.9% to 20.5% (Table 34). The data relating to American companies (Table 28) show an increase in the technical personnel and engineers in their enterprises from 8% in 1979 to 10% in 1985. However the document relating to the 1986-1990 Plan notes a lack of qualified personnel, confirming the observations made by the authors of the Masterplan in respect of the electrical and electronics industries sector.

In regard to training 26800 students received higher education diplomas between 1981 and 1985, and the next Plan forecasts a doubling of these numbers. In the field of skilled and semi-skilled workers 79640 persons have been trained, including about 38000 for the mechanical, electrical and electronics industries (Table 35). Specialised institutions have been created, such as the Centre for Instructor and Advanced Skill Training (CIAST) and the Standard and Industrial Research Institute of Malaysia (SIRIM).

R&D expenditure represents only 0.5% of the GNP, 85% of this being in the public sector, 5% in the University and 10% in private firms. The MALAYSIAN INSTITUTE OF MICROELECTRONIC SYSTEMS (MIMOS) was created in 1985 to develop fundamental and applied research in microelectronics. In particular training is given in the field of VLSI circuits. In the next Plan priorities have been established in the field of R&D in microelectronics, laser technology, opto-electronics and software.

Table 33

**MALAYSIAN ELECTRONICS INDUSTRY  
DEPENDENCE ON PARENT COMPANIES FOR  
RESEARCH AND DEVELOPMENT**

<i>Degree of Dependence</i>	<i>Ownership</i>			
	<i>Malaysia</i>	<i>Japanese</i>	<i>United States</i>	<i>Others</i>
Complete dependence	6	15	16	11
Partial dependence	6	6	2	2
Not dependent	14	0	0	0
Total number of companies	26	21	18	13

*Source:* Data collected from survey of 78 electronics establishments located throughout Peninsular Malaysia in 1980.

Source : Technological Leap - op. cit.

Table 34

## EMPLOYMENT IN SEMICONDUCTOR FIRMS IN MALAYSIA

Year	Total employees	Semiskilled employees		Technical, Supervisory and Management Staff	
1981	46,000	37,300	81.1%	8,700	18.9%
1982	46,400	37,100	80.0%	9,300	20.0%
1983	49,800	39,600	79.5	10,200	20.5%

Source: MIDA

Table 35

**MALAYSIA: OUTPUT OF SKILLED AND SEMI-SKILLED MANPOWER  
BY COURSE FROM PUBLIC TRAINING INSTITUTIONS,  
1981-90**

<i>Course</i>	<i>1986</i>	<i>1987</i>	<i>1988</i>	<i>1989</i>	<i>1990</i>	<i>1981-85</i>	<i>1986-90</i>
Engineering trades	12,531	15,227	17,196	20,156	23,102	47,091	88,212
Mechanical trades <sup>1</sup>	6,687	8,195	9,328	10,957	12,428	24,778	47,595
Electrical trades <sup>2</sup>	4,171	5,296	6,036	7,265	8,526	13,543	31,294
Civil engineering trade <sup>3</sup>	1,622	1,674	1,770	1,872	1,994	8,621	8,932
Other engineering trades <sup>4</sup>	51	62	62	62	154	149	391
Building trades <sup>5</sup>	2,510	3,071	3,671	4,414	5,110	8,162	18,776
Printing trades <sup>6</sup>	64	116	121	181	193	460	675
Commerce	2,101	2,477	2,872	2,937	3,317	9,230	13,704
Agriculture	1,046	1,053	1,053	1,213	1,373	4,459	5,738
Home Science <sup>7</sup>	1,186	1,070	1,074	1,394	1,722	5,847	6,446
Others <sup>8</sup>	737	939	1,208	1,548	1,731	2,954	6,163
Skill-upgrading	678	884	879	1,040	901	1,437	4,382
<b>Total</b>	<b>20,853</b>	<b>24,837</b>	<b>28,074</b>	<b>32,883</b>	<b>37,449</b>	<b>79,640</b>	<b>144,096</b>

*Sources:* Ministry of Education and various institutions

*Notes:*

- <sup>1</sup> Include general mechanics, general machining, tool and die making, motor vehicle mechanics, welding, sheet metal works, fabrication, marine engineering, and manufacturing courses.
- <sup>2</sup> Include electrical installation and maintenance, radio and TV servicing, refrigeration and air conditioning, electrical fitting and armature winding, and electronic engineering.
- <sup>3</sup> Include construction.
- <sup>4</sup> Include material technology and food processing technology.
- <sup>5</sup> Include carpentry and joinery, woodwork machining, bricklaying, and plumbing.
- <sup>6</sup> Include hand composing, machine composing, offset printing, bookbinding, and letterpress.
- <sup>7</sup> Include sewing, cooking and catering, cosmetology, and hairdressing.
- <sup>8</sup> Include surveying, architectural draftsmanship, photography, laboratory science dispensing optics, computer programming and information processing, confectionery and hotel catering, heavy plant operation, architecture, and quantity surveying.

#### 4.3 Conclusions

Some national capabilities in this field are now being developed. They are mainly linked with the operations of assembling and testing semiconductors. However for some years experience has been accumulated in the fields of automated production as companies have invested in more automated plant (robots and CAM systems). On this subject of developing capabilities Mr Jerry Lee of Texas Instruments has said "We came here for the cheap labour and the tax advantages, but we are staying because of the expertise we have built up here. As far as assembly and testing are concerned we have more expertise here than we have in the USA. We sometimes have to send our Malaysian engineers to the States to solve their problems." (UNIDO Microelectronics Monitor, Issue No.23, 1987).

### 5. PROSPECTS FOR THE DEVELOPMENT OF THE SECTOR

#### 5.1 General objectives

The Malaysian electronics industry, which was practically non-existent in 1970, has experienced a major development. There are now 80,000 employees with a turnover of more than US\$ 2500 million. This growth is due above all to the presence of the multinationals in the field of semiconductor manufacture; towards the seventies these firms were seeking cheap labour. At the present time the country has the largest assembling capacities in the world, together with testing facilities which now require more investments and more skilled labour.

However these very important results must not be allowed to obscure certain realities: diversification is still very limited, whether in mass consumer or industrial electronics. Furthermore there are still very few local entrepreneurs, in particular those involved with exports from the sector.

The electronics industry is one of the priority industries of the Fifth Plan. The following are the objectives as set out in the 1986-1995 Masterplan:

- Diversification of the industry in the mass consumer and industrial electronics sectors, with major emphasis on exporting.

- Increasing levels of national integration by developing subcontracting industries and by developing the phases of semiconductor manufacture upstream of the assembling and testing operations.

- Increasing the value added of the whole sector by encouraging the development of design, research and development activities.

- Increasing productivity considerably so that the products remain competitive on the international markets.

- Greater participation of Malaysian capital in the development of this industry by encouraging joint venture operations.

## 5.2 Quantified prospects and implementation

### 5.2.1 Projections up to 1995

Table 36 summarises the principal changes forecast in the structure of the electronics industry. The contribution of components should fall from 84% to 61%, of which only 50% is semiconductors. By contrast mass consumer electronics should double their share, from 12% to 24%, whilst professional electronics should more than treble from 4% to 15%.

Employment should double from 70,000 in 1981 to 150,000 in 1995. The contribution of the sector to the value added of manufacturing should increase from 13% to 18% with exports still representing 80% of the production. The contribution of imports to domestic consumption should fall from 89% to 73%. Finally a slight increase in the VA/P ratio from 30% to 33% should be noted.

For the three major sectors of the electronics industry the changes are considerable (Tables 19, 20 and 21). For consumer goods a very considerable increase in exports is forecast (a rate of increase of 20% to 26% per year), together with an increase in the domestic market. For industrial electronics the growth will be very considerable both on the domestic market and for exports, necessitating a very considerable increase in production. In the case of components the forecast growth will be lower than for the other sectors.

In terms of products the priorities for the three sub-sectors are given in Table 37: the order of priority has been established as a function of the potentialities of the market and the degree of technological complexity.

### 5.2.2 Investment and employment

Table 38 summarises the data for the whole of the sector. Over the decade the necessary investment is estimated to be Rt 6.8b, of which Rt 4.5b is for the creation of new capacity.

Productivity in 1995 will be Rt 111,800 per employee, placing Malaysia on the same level as the industrialised countries. Finally investment per employee will have to be modified in a radical manner since the figure will increase from Rt 49,900 per employee over the period 1985-1990 to Rt 85,500 over the period 1991-1995.

### 5.2.3 Implementation

Over the period 1986-1990 the three major objectives to be attained are as follows :

- 1) To reinforce technological capability and the production capacities of the suppliers of components.
- 2) To reinforce the upstream and downstream links within the electronics industry.
- 3) To modify the structure of the sector for the benefit of mass consumer electronics and certain industrial electronics products.

Table 36  
THE ELECTRONICS INDUSTRY IN 1995

Source : Masterplan

	Units	1981	1984 (Estimated)	1995	Growth (Times) (1984-95)
Output-Total	Million Ringgit	3,897	5,240	16,405	3.2
Electronic components	Million Ringgit	3,259	4,410	10,226	2.3
Semiconductors	Million Ringgit	(2,838)	(3,980)	(8,181)	2.1
Consumer electronics	Million Ringgit	471	620	1,049	6.5
Industrial electronics	Million Ringgit	167	210	2,430	11.6
Value Added (VA)	Million Ringgit	1,192	1,572	5,513	3.5
Employment	Persons	70,658	83,000	149,420	1.8
Exports	Million Ringgit	2,849	4,757	13,296	3.1
World market share	Percentage	0.04	0.05	n.a	
Import to domestic consumption ratio	Percentage	74.0	89.0	73.0	
Contribution to GDP	Percentage	2.13	2.10	4.62	
Contribution to manufacturing VA	Percentage	12.68	12.05	17.84	
Intra-industry structure	Percentage				
Electronic components		83.6	84.2	61	
Semiconductors		(72.8)	(76.0)	(49)	
Consumer electronics		12.1	11.8	24	
Industrial electronics		4.3	4.0	15	



Table 37

ELECTRONICS PRODUCT STRATEGY FOR MALAYSIA

Consumer Electronics			Electronic Components			Industrial Electronics		
1st Priority	2nd Priority	3rd Priority	1st Priority	2nd Priority	3rd Priority	1st Priority	2nd Priority	3rd Priority
Color TV receivers (I)	Car stereo and cassette players (I)	Electronic toys & games (I) Car flashers (I)	IC lead frames, inc. for SOIC (I)	Metal oxide film resistors (I)	Switches & relays (I)	Mobile & cellular radio (AI)	Add-on boards for microcomputers (AI)	Processors (I)
Radio cassette recorders (I)	Electronic fire alarms (I)	Electronic toys & games (I)	Ceramic substrates & IC packages (I)	Aluminum electrolytic capacitors (I)	AC power cords (I)	Digital PBXs (voice and data) (AI)	Line cards for public switching equipment (AI)	Telemetering equipment (I)
Microvase ovens (AI)	Quartz analogue watches/clocks (AI)	Quartz analogue watches/clocks (AI)	Audio speakers (I)	LED/LCD displays (AI)	Antenna and tuning coils (I)	Modem, inc. board level (A)	UPF radio links (AI)	Building management systems (AI)
Electronic tele-phones (AI)	Cassette mechanisms (AI)	Cassette mechanisms (AI)	Cassette mechanisms (AI)	Quartz crystal oscillators & filters (I)	PCB connectors (I)	PCB Multiplex equipment (AI)	Electronic medical equipment (AI)	Building management systems (AI)
Electronic ambient controls for cars (AI)	Water fabrication (I)	Water fabrication (I)	Multi-layer ceramic capacitors (I)	Double-sided (inc. through plated PCBs) (I)	Magnetic tapes (I)	3 1/2" floppy disk drives (AI)	Telen and facsimile machines (AI)	Laser printers (AI)
Electronic ignition systems for autos (AI)	Multi-layer ceramic capacitors (I)	Multi-layer ceramic capacitors (I)	Relaxative networks (AI)	Tin anodes (I)	Plasma displays (AC mode) (A)	Ink-jet computer printers (AI)	Motor controllers (AI)	Keyboards (I)
Video cassette recorders (AI)	Hybrid circuits - design, fabrication (I)	Hybrid circuits - design, fabrication (I)	Switching power supplies (AI)	Gold and aluminum bonding wires (I)	Electroluminescent displays (AI)	Lightwave transmission equipment (AI)	Process controllers (AI)	Data terminals (AI)
Digital TV (AI)	Switching power supplies (AI)	Switching power supplies (AI)	Magnets/ferrite cores (I)	Headers and cans (I)	Public Memories (A)	Concentrator (AI)	Numerical controllers (AI)	
Digital disk stereo (I)	Power transistors & smart power ICs-wafer fab, design (I)	Power transistors & smart power ICs-wafer fab, design (I)	Programmable variable output inc. non-intermittible power supplies (AI)	Stopper motors (AI)	Local Area Networks (LAN) (fiber optic) (AI)	Network Controllers (AI)	Optical storage systems (AI)	
Videotex systems (AI)	Laser diodes, CCDs-fabrication (I)	Laser diodes, CCDs-fabrication (I)	Sensors (incl. optical) and transducers (I)	Microprocessors (I)	Telemetering (AI)	Process converters (AI)	Optical character readers (AI)	
Optical video disk players/ recorders (AI)	Magnetic disk heads (A)	Magnetic disk heads (A)	Multilayer and flexible PCBs (I)	LAT peripherals - design, wafer fab (I)	Video-data work stations (A)	Minicharger disk (AI)	Digital multimeters (AI)	
	Microwave components (I)	Microwave components (I)	Surface mountable resistors (I)	Surface mountable capacitors (I)	Microsatellite earth stations (I)	Voice-data work stations (AI)	ODM microcomputer CPUs (AI)	
	Telecommunications ICs-design	Telecommunications ICs-design	Surface mountable capacitors (I)	Surface mountable capacitors (I)	Video robot (AI)	System design	System design	
	Surface mountable resistors (I)	Surface mountable resistors (I)	Telecommunications ICs - wafer fab (I)	Telecommunications ICs - wafer fab (I)	CAD/CAM systems (AI)	System integration	System integration	
	Surface mountable capacitors (I)	Surface mountable capacitors (I)	Voice recognition/synthesis circuits - design, fab (I)	Voice recognition/synthesis circuits - design, fab (I)	Flexible manu-facturing systems (AI)	Electronic test instrumentation (I)	Electronic test instrumentation (I)	

Key to Figure: (AI) - Assembly  
(I) - Integrated Manufacture  
(AI) - Assembly followed by Integrated Manufacture

Source : Masterplan

Table 38

**INVESTMENT PLANS AND EMPLOYMENT PROJECTIONS  
FOR TOTAL ELECTRONICS INDUSTRY**

- All financial figures are in millions of ringgit at constant 1981 prices -

	1984	1985	1986	1987	1988	1989	1990	Total 1986-90	1991	1992	1993	1994	1995	Total 1991-95
Total output	5,240	5,616	6,515	7,264	8,099	9,030	10,063		11,140	12,332	13,652	15,113	16,705	
Annual net increase		376	899	749	835	931	1,033		1,077	1,192	1,320	1,461	1,592	
<b>Investment</b>														
At start of year		876	956	1,337	1,636	1,957	2,251		2,519	2,953	3,358	3,736	3,797	
Write off		-	(175)	(175)	(175)	(175)	(174)		-	-	-	-	-	
Depreciation		-	(8)	(64)	(118)	(100)	(224)		(313)	(389)	(468)	(552)	(614)	
Replacement		-	290	290	290	289	288	1,447	288	289	289	-	-	866
New plant & equipment		80	274	248	324	360	398	1,684	459	505	557	613	662	2,796
Closing Investment	876	956	1,337	1,636	1,957	2,251	2,519	3,131	2,953	3,358	3,736	3,797	3,845	3,662
Employment (000 persons)	83.00	85.23	93.53	98.79	104.39	110.39	116.73		122.55	128.72	135.26	142.21	149.42	
Output per employee (000 ringgits)	63.13	65.89	69.66	73.53	77.58	81.80	86.21		90.90	95.80	100.93	106.27	111.80	
Note: All figures in parentheses are negative														
													Total replacement investment 1986 - 1995	2,313
													Total additional capacity 1986 - 1995	4,480
													Grand investment total	6,793

Source : Masterplan

Over the period 1991-1995 the emphasis will be placed on the development of industrial electronics and components for this sector. High priority will be given to the telecommunications sector.

### 5.3 Advantages and constraints

#### 5.3.1 Advantages

- Labour costs which are still low, and increasing expertise: the data given in this report on labour costs and productivity, together with the data on competitiveness, show that the country still offers not unimportant comparative advantages in electronics production. But it will be necessary for the labour to increase its level of expertise to compensate for the increasing cost of labour so as to allow production of higher value added. This existing expertise relates to a high degree of mastery of testing operations and the ability to ensure the efficient functioning of increasingly automated production systems.

- The presence of the multinationals which continue to invest in the country: the most recent investments made by foreign firms in wafer production are proof that the country enjoys a good reputation.

- Diversification which is still timid but which is taking shape: the rapid progression in mass consumer electronics in recent years indicates that some diversification is in the process of taking place. Projections up to 1995 show that the public authorities wish this diversification to continue at a very rapid rate.

- An interesting geographical situation: the proximity of Singapore facilitates the outflow of products, but also makes it possible to attract those enterprises based in Singapore which are seeking to relocate themselves for products with a high labour and technology content. The concentration of production in the interior of the country is also of interest since firms can profit from the effects of agglomeration.

#### 5.3.2 Constraints

The study carried out jointly by MIDA and UNIDO (1986-1995 MASTERPLAN) lists a number of problems and constraints including :

- Links with the rest of industry which are still too weak: this includes both upstream and downstream links. However a stronger thrust towards the development of the consumer goods sector should result in a demand for certain components which could be manufactured locally, so increasing the local content which is now from 30% to 35%. In the case of the semiconductors sector it will be necessary to be able to increase upstream integration by attracting investors in the fields of lead frames, ceramic packages and gold and aluminium bonding wire manufacture. The current investments in wafer production are moving in the direction of greater national integration.

- The narrowness of the domestic market: Malaysia has only 16 million inhabitants with a per capita GNP of \$2000 (1985) whereas Korea has 42 million inhabitants and a per capita GNP of \$2300. The development of the sector will remain, for many years, dependent on exports, hence the necessity to reinforce the exporting capabilities of the country. One of the recommendations in the Masterplan is to encourage local firms to start OEM manufacture. In an OEM contract the sub-contractor offers not only production capacity but also design capabilities. He puts forward the drawings or the prototype of a product which he has developed. The advantage, however, lies in the fact that the ordering firm accepts responsibility for the exports. In order to develop such contracts the local enterprises must improve their expertise.

- Entrepreneurial capabilities which are still insufficient: Malaysian entrepreneurs still hesitate to invest in the sector since they fear problems of competition with the multinationals. Furthermore the levels of expertise are still insufficient. However the studies carried out on technological mastery have shown that the local enterprises have some R&D capabilities and the recent creation of the Malaysian Institute of Microelectronic Systems (MIMOS) is a major help extended by the Public Authorities to local industry.

- Insufficient and unsuitable aid for small local enterprises: the small enterprises do not seem to enjoy the same advantages as the large foreign firms. The Masterplan proposes the implementation of more appropriate systems for encouraging small local firms.

## 5.4 Strategies

### 5.4.1 Raising the technological level of the products and processes

In the case of the products it would seem to be necessary to develop design capabilities, in particular in the Malaysian enterprises, since it must be assumed that the foreign enterprises will continue to remain dependent on their parent company for a considerable period of time.

In the case of the processes the Malaysian electronics industry has only mastered a few production processes, and vertical integration is still very limited.

Implementation of this strategy will necessitate acquiring technologies from abroad. However the capacity for negotiation with the multinationals is not very great, since the domestic market is small in size. It would seem therefore that the strategy to be utilised must rely above all on joint ventures, which requires an input of Malaysian capital.

A strategy for technological development must permit, in the long term, the implementation of a strategy of "niches". Such a strategy is desirable insofar as the products are less subject to international competition.

#### 5.4.2 Pursuing an exporting strategy

The domestic market does not permit any major development of the electronics industry. Only the export markets make scale economies possible. The desire to increase very considerably the exports of consumer goods may come up against the protectionist policies which are developing in the industrialised countries. But it must be pointed out that the Malaysian share in the world market for mass consumer goods is only 0.05%. The future depends more therefore on quality and prices.

Furthermore exports are strongly dependent on the multinationals established in the country. New investments made by these firms show that Malaysia is an interesting country for the mass consumer goods industry. Finally it would no doubt be possible to open up other export markets such as China or the Gulf countries.

#### 5.4.3 Reinforcing links with the rest of industry

The majority of the firms are located in the FTZ's or enjoy LMW status: there are few links with local industry, as may be seen from Table 39 by way of the two ratios of purchases of local raw materials to total purchases and the purchases of local equipment to total purchases. These two ratios are very low but are nevertheless higher for those firms producing on an LMW basis. The authors of the Masterplan feel that there are great possibilities for links with local industry.

#### 5.4.4 Developing a strategy of public buying

The Public Authorities can play an important role in the development of the domestic market for certain products, in particular for everything concerning telecommunications.

Another possibility relates to the possibilities of buying data processing equipment for the administration and for schools, giving priority to enterprises which agree to produce locally.

In the longer term governmental aid to investments for productivity in the converting industries should create a specific market for industrial electronics.

### 5.5 Policies

Within the framework of the Masterplan, which recommends a series of measures for the manufacturing sector, more specific measures have been suggested for the electronics sector.

a) Encouragements for products felt to deserve priority. A list of products (Table 26) have been judged to merit priority status. For these products the encouraging measures should be as follows : loans at preferential rates, reduced prices for electricity, transport and industrial sites, reduced profits tax, tax exemptions for capital goods not produced locally and protection of the local market for a predetermined period.

Table 39

AGGREGATE ECONOMIC PERFORMANCE OF EXPORT-ORIENTED  
ELECTRONICS FIRMS IN MALAYSIA, 1982

('000 Ringgit unless stated)

	FTZ Firms	LMW Firms	Total
Total sales b/	3,347,158	463,114	3,810,272
Exports	3,343,835	437,092	3,780,927
Local sales	3,323	26,022	29,345
Imported raw materials	2,458,755	271,659	2,730,414
Local raw materials	57,449	26,590	84,039
Raw materials from FTZs	63,540	n.a.	63,540
Imported capital equipment	167,650	35,163	202,813
Local capital equipment	13,836	10,133	23,969
Employment (numbers)	52,954	13,403	66,357
Total wages paid	261,616	47,432	309,048
Total electricity used	46,661	7,280	53,941
Total taxes paid	4,934	2,377	7,311
Total value-added (VA)	720,753	141,325	862,078
VA/sales total (%)	21.5	42.6	22.6
Exports/total sales (%)	99.9	94.4	99.2
Local raw materials/ total raw materials (%)	2.2	8.9	2.9
Local capital equipment/ total capital equipment (%)	7.6	22.4	10.6
Wages paid per employee (ringgit)	4,940	3,539	4,657
VA per employee (ringgit)	13,611	10,544	12,992

Source: Malaysian Industrial Policy Studies (MIPS) Survey  
November 1983, and Penang Development Corporation

source :  
MASTERPLAN

a/ Export-oriented firms are defined to include those in  
Free Trade Zones (FTZs) and those with Licensed  
Manufacturing Warehouse (LMW) status

b/ In 1982, the total sales of FTZ and LMW firms accounted  
for 88 percent of all electronics sales in Malaysia.  
Their export sales accounted for 87 percent of all  
Malaysian electronics sales.

b) Identical measures could be taken for promoting exporting activities and for developing small and medium sized industries.

c) Measures for promoting technological mastery and R&D. It is not realistic to suppose that foreign firms will develop local R&D activities. By contrast the public bodies should reinforce the links between the Public Research Centres such as MIMOS and local enterprises. In addition to this a number of measures could be taken such as : tax credits on research, encouraging collaboration between the university laboratories and the enterprises, budget grants to MIMOS and the encouragement of joint ventures with foreign firms.

d) Training the workforce. Various measures have been proposed, such as special aid to those firms which organise training sessions in disciplines judged to merit priority. Greater collaboration is desirable between companies and the training bodies.

e) Encouragement for the local production of certain components and materials so as to build up an integrated industry.

f) Reinforcing the means of communication so as to follow up developments in the international markets. In particular it is proposed to open an office in Silicon Valley, California, so as to establish the initial contacts with future investors, to study the possibilities for the investment of Malaysian capital locally in joint ventures so as to obtain access to technology, and to maintain contact with Malaysian students.

**IN CONCLUSION** the authors of the Masterplan recommend greater intervention on the part of the Public Authorities in order to define and implement the appropriate policies.