II-1-4. Rubber Footwear

(1) The Position of the Rubber Footwear Industry

The Malaysian rubber footwear industry is one of the industries that would utilise natural rubber (NR) - an important primary product of Malaysia. So, it is designated as one of the priority industries by the Industrial Master Plan (IMP).

Accordingly, the rubber footwear industry is given additional incentives applied for only the rubber products industry, that is, the discounted purchasing rates of natural rubber (NR) and electricity bills as well as a variety of general incentives.

The ratio of the output of the rubber footwear industry to the total production of the rubber products industry is 4.5%. And also, the ratio of employment by the rubber footwear industry is nearly 16.4% of the total employment by the rubber products industry. This indicates that the rubber footwear industry is a labour-intensive industry which employs more workers.

The size of the rubber footwear industry is shown in Table II.1-12.

Table II.1-12 Size of the Rubber Footwear Industry Compared to the Whole Rubber Products Industry (1986)

	Total Output	Number of Employees
Rubber Footwear Industry	M$159 million (4.5%)	5,291 (16.4%)
Rubber Products Industry in whole	M$3,504 million (100%)	32,358 (100%)

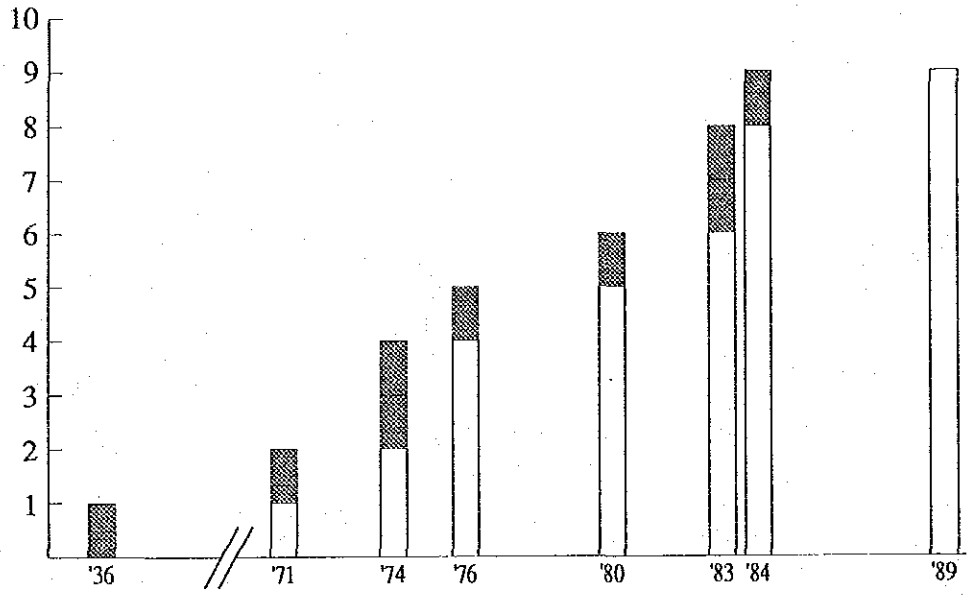
Source: Department of Statistics, "Industrial Survey 1986"

The production ratio of the rubber footwear industry is rather low at 4.5% because tyre production has been expanded recently. But, as rubber footwear has been an essential good for a long time, there is one manufacturer which started production 53 years ago. The year of establishment of nine of the manufacturers currently operating is shown in Fig. II.1-8.

The rubber footwear industry itself has a longer history. But, its association is just one of the sub-committees of the Malaysian Rubber Products Manufacturer's Association (MRPMA) because its members are rather few in number, and it is not so active.

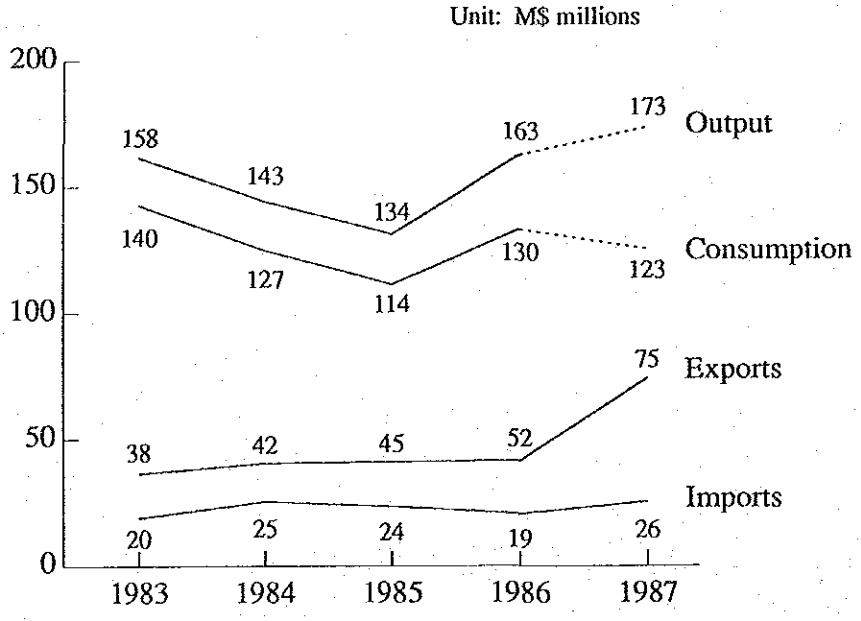
The trends of production, export, etc., of the rubber footwear industry including the nine main manufacturers are shown in Fig. II.1-9. It is conspicuous that export is expanding recently.

Fig. II. 1-8 Year of Start of Production of Manufacturers Now in Operation



Note: ▒▒ The number of manufacturers established during each year.
Source: Survey Questionnaires

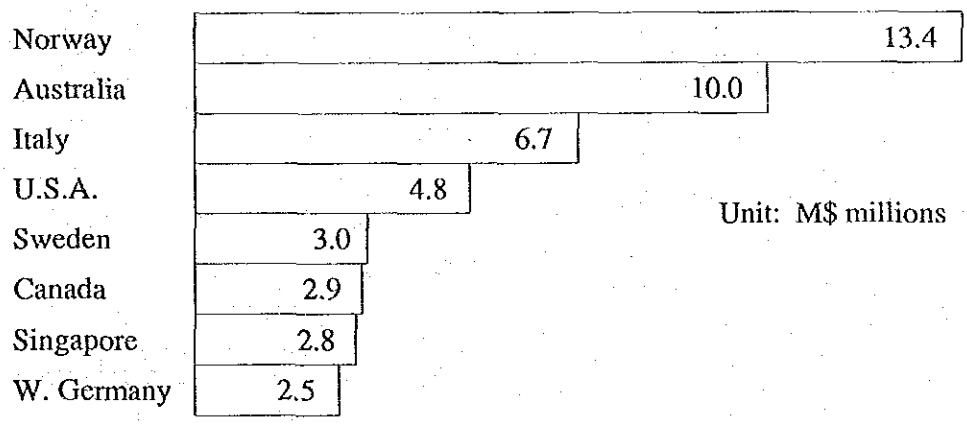
Fig. II. 1-9 Demand and Supply of Malaysian Rubber Footwear



Source: Department of Statistics, "Rubber Statistics Handbook"
Department of Statistics, "Malaysian External Trade Statistics"

The export markets are shown in Fig. II.1-10. Europe and Australia are major export markets. Exports to the U.S. which is the biggest importing country in the world and other areas are strongly expected.

Fig. II. 1-10 Main Market of Malaysian Rubber Footwear (1987)



Source: Department of Statistics, "Malaysian External Trade Statistics" 1987

(2) The Present Situation of the Rubber Footwear Industry

First, the problems facing the rubber footwear industry have to be clarified and then the measures to solve them must be taken in order to develop the rubber footwear industry and expand exports.

The ways and means to clarify these problems are stated below.

[1] Interviews with the rubber footwear industry, its peripheral industries and the related organisations and associations, etc.

[2] Field surveys at rubber footwear manufacturers' factories, etc.

[3] Questionnaires addressed to the rubber footwear industry.

[4] Testing and inspection of rubber footwear samples of manufacturers surveyed in order to check their quality and marketability in Japan.

[5] Requests to quote price and delivery period, etc., based on Japanese and Korean rubber footwear samples in order to check the technical levels.

The rubber footwear manufacturers surveyed are producing such rubber footwear products as canvas shoes, sports shoes or boots.

The major results of these surveys and analysis are shown below.

[1] Exports are expanding as shown in Fig. II.1-9. But, there is only one manufacturer which exports more than 50% of total output excluding a boot manufacturer which is exporting nearly 100% of its production. So, the rubber footwear industry is a domestic-market-oriented industry relying on domestic sales as shown in Table II.1-13.

Table II. 1-13 Export Volume Ratio of Manufacturers

Manufact-urers	Export Items				OEM Ratio	Export Markets
	Canvas Shoes	Sports Shoes	Boots	Sandals Slippers		
A	53%	97%			94%	Australia, France, UK, USA
B	41%				100%	USA, Singapore
C	36%	10%		3%	89%	Italy, Canada, Singapore
D	6%					Singapore, UK
E	0.5%					Netherland
F		20%			33%	Japan
G			98%		13%	Norway, Sweden, Denmark

Source: Survey Questionnaires

Concerning the details of exports, the ratio of OEM exports is high.This means that exports of self-developed products are very limited.Accordingly, in the future, their own development systems have to be implemented for making overseas market surveys for product development and also promoting overseas sales. The present product development systems are shown in Table II.1-14.

Table II. 1-14 Product Development Systems

Company / Item	A	B	C	D	E	F	G	H	I
Development Department	○	○	○	○	○	○	○	×	○
Number of Designers	2	6	3	2	3	1	1	0	1
Number of Patterners	2	5	0	1	5	1	3	1	5
Investment Cost (1987) (M$1,000)	500	—	80	32	—	12	Marginal	—	20
Investment / Total Sales (%)	2-3	—	1	0.5	—	1	—	—	Negligible

Source: Survey Questionnaires

[2] The quality of the Malaysian rubber footwear samples for both domestic and export markets was analysed in detail in the survey. These samples are the main products to be exported of manufacturers surveyed and were obtained from them in order to analyse and evaluate their quality and marketability in Japan. The results of analysis and evaluation are shown in Table II.1-15.

Table II. 1-15 Qualtiy Evaluations of Malaysian Rubber Footwear Samples

Samples			A	B	C	D	E	F	G	H	Total	(%)
Performance Testing	Good		8	12	11	12	12	13	11	10	(82) 89	(100) 108
	To be slightly improved		4	1	0	1	0	1	2	3	(11) 12	
	To be improved		2	0	3	0	2	0	0	0	(7) 7	
Appearance Testing	Production Related	Good	6	9	8	6	8	4	10	7	(66) 58	(100) 88
		To be improved	5	2	3	5	3	8	1	3	(34) 30	
	Design Related	Good	5	6	6	6	6	2	4	4	(72) 39	(100) 54
		To be improved	2	1	0	1	1	4	3	3	(28) 15	

Note: Figures are the number of evaluation items. The reason why the total numbers are not the same is because some items were not evaluated.

Source: Analysis in Japan

These evaluations are based on the standards for the Japanese market which are especially severe about the quality. Sample qualities are to be improved, but they are good in general. Accordingly, measures to improve specific points and produce more competitive products must be taken immediately.
The Malaysian Standard (MS) which presently helps to improve rubber footwear quality levels only stipulates three kinds of standards. Only one manufacturer has more severe standards about appearance testing which are not stipulated in the Malaysian Standard(MS). These standards have to be further promoted.

[3] The product quality depends on the specific operations in each manufacturing process. Malaysian manufacturing processes are the Vulcanising Process and the Cold Cement Process. In general, ordinary machinery and equipment for both

processes are installed. These two processes are mostly manually operated and consequently are labour-intensive and are difficult to be mechanised.Accordingly, the thorough standardisation of operations is a necessity to keep stable and well-maintained qualities in each factory. And training and education of operators for the standard operations are necessary. There are many unstable operations and also much "waste" noticed in each process. These points are restated in detail in a later chapter.

The efforts to eliminate such waste leads to quality improvement as well as cost reduction. Also, the information and material about quality improvement are not so easy to obtain at present. This situation must be improved. Based on these points and questionnaires surveyed, the requirements of the Malaysian rubber footwear industry management to the Malaysian Government for supporting training and education are shown in Table II.1-16.

Table II. 1-16 Expected Government Support for Training and Education

Support Measures	Number of Companies
1. OJT by Foreign Experts	7
2. Dispatching Public Institution Instructors	5
3. Subsidy for Training and Education	5
4. Increase of Technical Seminars	4
5. Expansion of Public Institutions	3

Source: Survey Questionnaires

[4] The evaluation of cost competitiveness of Malaysian rubber footwear manufactured in the above-mentioned processes is shown in Table II.1-17.

Table II. 1-17 Comparison of Export Prices of Malaysian Products and General Import Prices in Japan

Sample	Recomended Export Price	Supposed Import Price
A	FOB US$ 4.2	FOB US$ 4 - 4.5
B	5.2	4 - 4.5
C	7.0	6 - 6.3
D	2.8	4 - 4.5
E	4.0	4 - 4.5
F	7.8	4 - 4.5
G	4.5	4 - 4.5
H	3.6	3.5 - 4

Source: Survey questionnaires in Malaysia and interviews in Japan

In the table, the supposed import prices in Japan are import prices for the same kinds of Korean and Taiwanese products as the Malaysian samples. The

Malaysian samples are within the same price range as or relatively higher than Korean and Taiwanese ones except for one sample. Measures to lower these price levels and make them more competitive are to be taken in the future.

[5] Concerning the compositions of costs which are the basis of the export prices, natural rubber (NR) cost is only 5-10 % of the total production costs.
As the whole materials cost occupies about 50% out of the total production costs, the ratio of materials costs except natural rubber (NR) is higher.

The whole materials costs which occupy 50% of the total costs have been increasing for the past one or two years. This is a subject of concern for all rubber footwear manufacturers. The price trend of materials is shown in Table II.1-18.

Table II. 1-18 Main Materials Price Trend (1986 = 100)

Items		1987	1988
• Natural Rubber		120	135
• Synthetic Rubber	*	101	124
• Cotton Cloth		101	120
• Split Leather		100	104
• Nylon Taffeta	*	100	110
• Eyelet	*	128	135
• White Carbon	*	115	118
• Rubber Accelerator		107	126
• Zinc Oxide		100	154
• Titanium Dioxide		126	134
• Stearic Acid		100	124
• E.V.A. Resin	*	100	140
• E.V.A. Blowing Agent	*	100	110

Note : * Relying wholly on imports without domestic supply sources.
Source : Survey questionnaires

[6] There are many managers in the rubber footwear industry who are very concerned with adding higher values to their products in order to increase competitiveness. The results of the survey about export items of rubber footwear to be expanded are shown in Table II.1-19.

Table II. 1-19 Export Items to Be Expanded

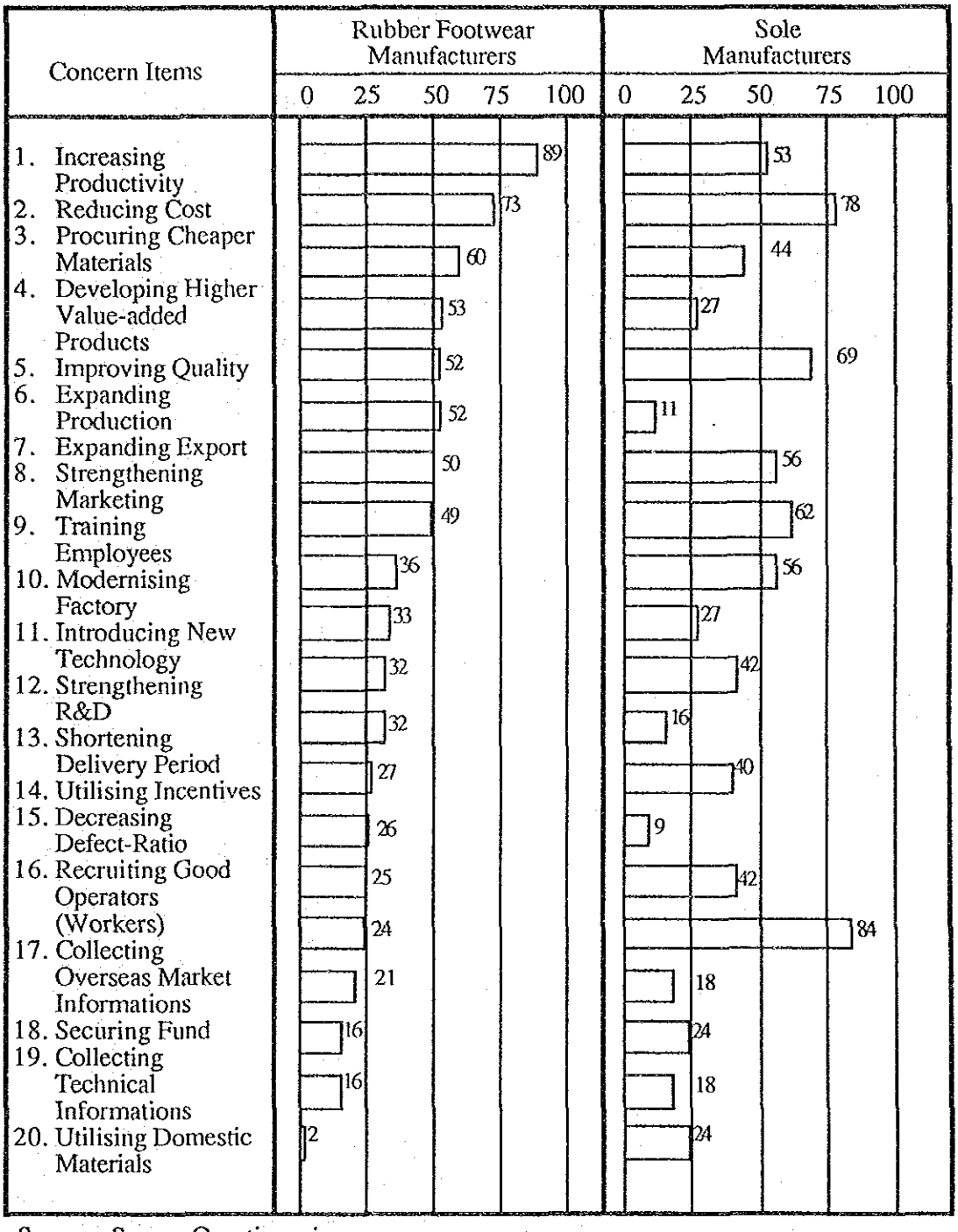
Classification	No. of Manufa-cturers	Items	Export Market
Present Products	3	Canvas Safety Boots ladies Boots	Japan, U.S.A. Europe
High Value-added Products	6	Sports/Leisure Shoes Casual Canvas Shoes Leather Sports Shoes Jogging & Court Shoes	Japan, U.S.A. Europe, Canada East-Europe

Source : Survey questionnaires

The analysis results show that the development and expansion of the higher value-added products are the final target for the Malaysian rubber footwear industry. Also, the supply of various kinds of materials for producing the higher value-added products should be well secured. On the other hand, the supply of moulds and lasts is not so sufficient as delivery takes 3 - 6 months. The present situation of importing them from Korea, etc., should also be changed and they should be procured domestically.

[7] The main concerns of the rubber footwear managers coping with the present problems above-mentioned are shown in Fig. II.1-11.
At first, 15 items are selected in order of concern by managers. Then, 15 points are given to the first selection, 14 points to the second selection and so on. After that, the total points for each item are calculated.
The main features of the table are summarised below in consideration also of the results of the interviews.
The matters for which the Malaysian rubber footwear industry managers presently have most concern are productivity improvement and cost reduction. For that purpose, procuring cheaper materials from every supply source, not only domestic ones, is sought. The next matters are development of new higher value-added products, production expansion and sales promotion in order to expand export aggressively.
With regard to securing funds, the concern is rather less in general, but among the small-scale industry it is of the highest concern. The situation is the same as in the small-scale sole manufacturers.

Fig. II. 1-11 Main Items of Concern by Managers



Source: Survey Questionnaires

(3) Trends in Main Overseas Markets

The world market for rubber footwear is following the trend of the U.S. market. In the U.S. market, jogging shoes appeared as people became more concerned about fitness. Aerobics shoes followed and the demand for fashionable and casual footwear expanded. At present, these casual sports shoes, including traditional basketball and tennis shoes, are the best sellers in the U.S. market.

The trends in the Japanese and U.S. markets will be stated here briefly as these countries provide potentially large markets for the Malaysian footwear industry.

1) The Japanese Market

In the Japanese market, with concern for fitness growing among youth and women, upper-market casual sports shoes have become most popular. This trend is also expanding to the older generations and even infants.

In 1987, the production volume of rubber shoes and boots was 49 million pairs and exports were 32 million pairs. Of the 30 million pairs of sports shoes sold annually, 50% are imported and almost all of the leather sports shoes are imported from overseas.

The fact that the Japanese market is traditionally strict concerning quality, delivery and pricing must be taken seriously when planning exports. It must also be kept in mind that the Japanese distribution channels are more complicated than those in the U.S. and Europe. The best way of penetrating the Japanese rubber footwear market is to enter into a tie-up arrangement with a specialised trading house or manufacturer in Japan.

One example of the severity of Japanese demands concerning quality is that an entire lot of products will be shipped back to the manufacturer if one defective item is found. Therefore, measures to reduce defects should be taken. Such measures will also lead to a reduction of production costs.

The following recent trends in the Japanese rubber footwear market should also be kept in mind.

[1] Casual sports shoes for youth constitute the main market followed by ladies sneakers.

[2] The most popular items are jogging shoes, aerobics shoes, basketball shoes and tennis shoes.

[3] Walking shoes and cross-country training shoes are also becoming popular.

[4] Canvas sports shoes are regaining their popularity but leather sports shoes dominate the market.

After meeting the strict qualifications of the Japanese rubber footwear market with respect to quality, pricing and delivery, it is quite easy to penetrate any market in the world.

2) The U.S. Market

Imported casual sports shoes are now dominating the U.S. rubber footwear market. The sales value of casual sports shoes in 1988 amounted to US$4.3 billion, up 80% compared to the previous year. Moreover, the size of the market for casual sports shoes has doubled in the four years since 1984.

Imports of casual sports shoes are mainly from Korea, followed by Taiwan, China and Hong Kong. However, Korean rubber footwear manufacturers are shifting their production bases to Indonesia and thus imports from that country are expected to increase in the near future.

The main reasons for the expansion of the market for casual sports shoes are the facts that concern over fitness has been increasing and leather shoes have taken the dominant place in the market over canvas shoes. Furthermore, the trend towards fashionable and casual shoes has increased and higher value-added products have been developed from the standpoint of higher and safer performance.

It is expected that the trend in the U.S. market from 1989 onwards will be toward an increase in the popularity of cross-country training shoes and walking shoes while basketball, tennis, jogging and aerobics shoes will retain their dominance in the market. Canvas shoes are expected to see a resurgence in the leather-dominated market.

The U.S. market is a diversified, brand-oriented market including many kinds of consumers. "High-tech" shoes are also becoming popular from the stand-point of higher and safer performance. The market for ladies rubber footwear is also a large and important one. Therefore, the trends in ladies fashion and the diversity of colours must be observed.

Strategies for gaining access to the U.S. rubber footwear market are as follows:

[1] The Malaysian government should make an effort to invite foreign manufacturers which produce well-known U.S. brand-name rubber footwear to shift their production bases to Malaysia. These efforts should include making known the fact that Malaysia has many appropriate production sites.

[2] OEM production of well-known U.S. brand rubber footwear.

[3] Joint ventures with U.S. rubber footwear manufacturers including

Korean or Taiwanese manufacturers producing famous U.S. brand products.
[4] Direct export of Malaysian rubber footwear to the U.S. market.

The opportunities for Malaysian firms to export to the U.S. market are increasing as the competitiveness of Korea and Taiwan are declining. Quick action by the Malaysian side to penetrate the U.S. rubber footwear market is desirable in order to give Malaysia an edge in the competition with Indonesia, Thailand and China.

(4) Moves of Major Competing Countries

South Korea and Taiwan have become major footwear supply bases in the world. Lately, however, part of the production that has been done there has begun to move to Indonesia, China or elsewhere. The phenomenon may be said to be similar to the general trend in the manufacturing industry in Asia since the G5 conference in September 1985. It may also be said that footwear production, because of its labour intensive nature, is moving to Indonesia, China or other countries which are considered to have relatively low wage levels.

1) Production

a) Annual production in South Korea, Taiwan and China ranges from 450 million to 800 million pairs, respectively, or 20 to 40 times as much as Malaysia's level. In Indonesia, production has grown remarkably since 1987, reaching 66 million pairs in 1988, or three times the Malaysian level.

b) As for the number of firms and their employees, a national survey in Indonesia has shown 71 firms and 28,000 employees, almost five times as many the number in Malaysia. China has 200 factories and 220,000 employees. Taiwan has 1,200 exporting firms alone as there are many small- and medium-sized enterprises. South Korea has 875 firms including component producers, with the firms producing rubber footwear alone numbering 365.

c) South Korea exports more than 70 percent of its production and Taiwan's ratio of exports is said to exceed Korea's In Indonesia and China, the export ratio ranges between 13 and 15 percent. In the latter two countries, the size of their domestic market cannot be ignored. China's population is said to have topped 1.1 billion while Indonesia has a population almost ten times as large as Malaysia's. Footwear imports in the latter two countries have been on the decline.

d) Plastic footwear accounts for most of the Taiwanese products, with the ratio reaching 69 percent in 1988. In contrast, leather sports shoes accounted for 36 percent and

canvas shoes 22 percent in South Korea in 1987. Indonesia produces mainly sports-type or casual-type shoes with rubber soles, while most of the Chinese products are also rubber-soled.

2) Exports

a) The volume of exports from South Korea sharply increased between 1985 and 1987, while that of Taiwan continued to fall in 1987 and 1988 after peaking out in 1986 at 840 million pairs. Exports from China and Indonesia have been rising sharply. Particularly remarkable is the growth of Indonesian exports since 1987. The country's exports in the first seven months of 1988 have already reached 9,480,000 pairs, or 1.6 times as many as the level for all of 1987 and a gain of 25.6 times from the volume in 1983. It may be no exaggeration to say that, since 1987, in one stroke Indonesia has caught up with Malaysia in footwear exports.

b) Classified by importing countries, the United States takes more than 50 percent of the exports from South Korea and Taiwan, while Japan takes the second largest volume. For China as well, exports to Hong Kong, the U.S. and Japan account for around 60 percent of the total. It is notable that the situation in Indonesia is quite different from the others. Its major export markets have totally changed through the above-mentioned rapid increase in exports. While Japan took 40.7 percent and the U.S. 26.6 percent of Indonesia's exports in 1983, the ratio in 1987 plummeted to 0.02 percent and 4.2 percent respectively. Replacing these two countries, the United Kingdom took 67.5 percent of the year's total. The volume of exports to Japan in 1987 was below 1 percent of that in 1983.

c) Classification by major export items corresponds to that by production items stated above. The breakdown of exports to the U.S. and Japan from South Korea and Taiwan indicates that the ratio of footwear with cloth uppers is relatively higher in exports to Japan than in those to the U.S.

d) As for export promotion activities, Indonesia appears to have fallen behind the other three countries or territories. Neither the government nor the people of Indonesia have become very active in efforts to promote exports, apparently because the producing factories are engaged mainly in OEM exports and do not feel a necessity for such efforts.

3) System, Policy, etc.

a) The countries or territories under survey appear to have no policies aimed specifically at the footwear industry. It seems due to the belief that general export promotion measures and tax benefits will be enough for the footwear industry, the strategic

importance of which is not regarded as relatively high compared with other industries. However, there are some instances of preferential measures. China is considering such measures for the promotion of rubber footwear exports, while South Korea has set up a footwear research institute to increase its international competitiveness.

b) As for standards and inspection, South Korea and China have an official system but Indonesia and Taiwan consider the fulfillment by individual firms of the standards in the importing countries will be enough. As a result, some Indonesian factories receive guidance and management on quality control from permanently stationed technical experts who have been dispatched from the buyers of their products.

The Japanese appraisal of Chinese products is not necessarily high. Moreover, complaints have been heard that Chinese producers have control problems, not only in terms of quality but also in terms of delivery.

4) Transfer of Production Bases

a) Notable lately has been the partial transfer of production from South Korea to Indonesia and Thailand or from Taiwan to China. This has had effects such as a sharp increase in footwear exports from Indonesia. The effects are similar to the general tendency of the manufacturing industry in Asia since the G5 conference held in September 1985.

b) As for exchange rates against the U.S. dollar, Taiwan has seen its currency sharply appreciate since early 1986, while the South Korean won rose steeply about a year later. Together with higher labour costs and raw material prices, the appreciation of currencies was responsible for the industries' overseas expansion. On the other hand, the Indonesian currency has tended to depreciate against the U.S. dollar. Along with stepped-up measures for the promotion of exports, the currency devaluation has attracted factories from foreign countries. The Chinese money has also depreciated against the U.S. dollar.

c) As a result of this, as many as 41 rubber footwear production projects of both domestic and foreign firms have been approved in Indonesia between January 1987 and November 1988.

d) The trend toward transferring production to Indonesia or China is due to the recognition that wage costs are relatively low in the two countries.

(5) Future Outlook

Fig. II.1-12 shows a scenario for the development of the rubber footwear industry and the promotion of the export of its products. To achieve these objectives, it is

necessary to eliminate the present bottlenecks in production and sales and improve access to overseas markets.

A process for bringing about various measures to realize the above-mentioned scenario for is shown in Fig. II.1-13. These measures are put forth as steps to cope with the major problems of the present situation which have been pointed out through an investigation of the current conditions of rubber footwear production in Malaysia and the result of an analysis of marketability in Japan of Malaysian products.

The major problems the Malaysian rubber footwear industry must cope with are as follows:

1) A rise of raw material prices
2) The necessity of rationalizing costs
3) A shortage of information on cost rationalization
4) The necessity of perfecting the foundation of product quality
5) The necessity of improving the level of product quality
6) Incomplete development of peripheral industries
7) The tendency toward a tight labour supply
8) A lack of information on export promotion
9) A shortage of working capital
10) Insufficient R&D investment
11) Lack of effective industrial activities

Measures recommended for coping with the above problems are roughly as follows:

1) Implementation of various cost reduction measures stated below:
   - Diagnosis and guidance for improvement of individual firms by experts on rubber footwear production
   - Opening up of new purchasing sources for raw materials and parts
   - Modernization of production facilities, etc.
2) Promotion of quality improvement activities
   - Vitalization of QC activities
   - Expansion of standards for rubber footwear
   - Expansion of product inspection functions
3) Expansion of R&D functions
4) Expansion of financing for small- and -medium-sized firms
5) Stepping up of export activities
6) Promotion of tie-ups with foreign firms

7) Stepping up of activities of industrial groups

Fig. II. 1-12 Scenario for the Promotion of the Rubber Footwear Industry in Malaysia

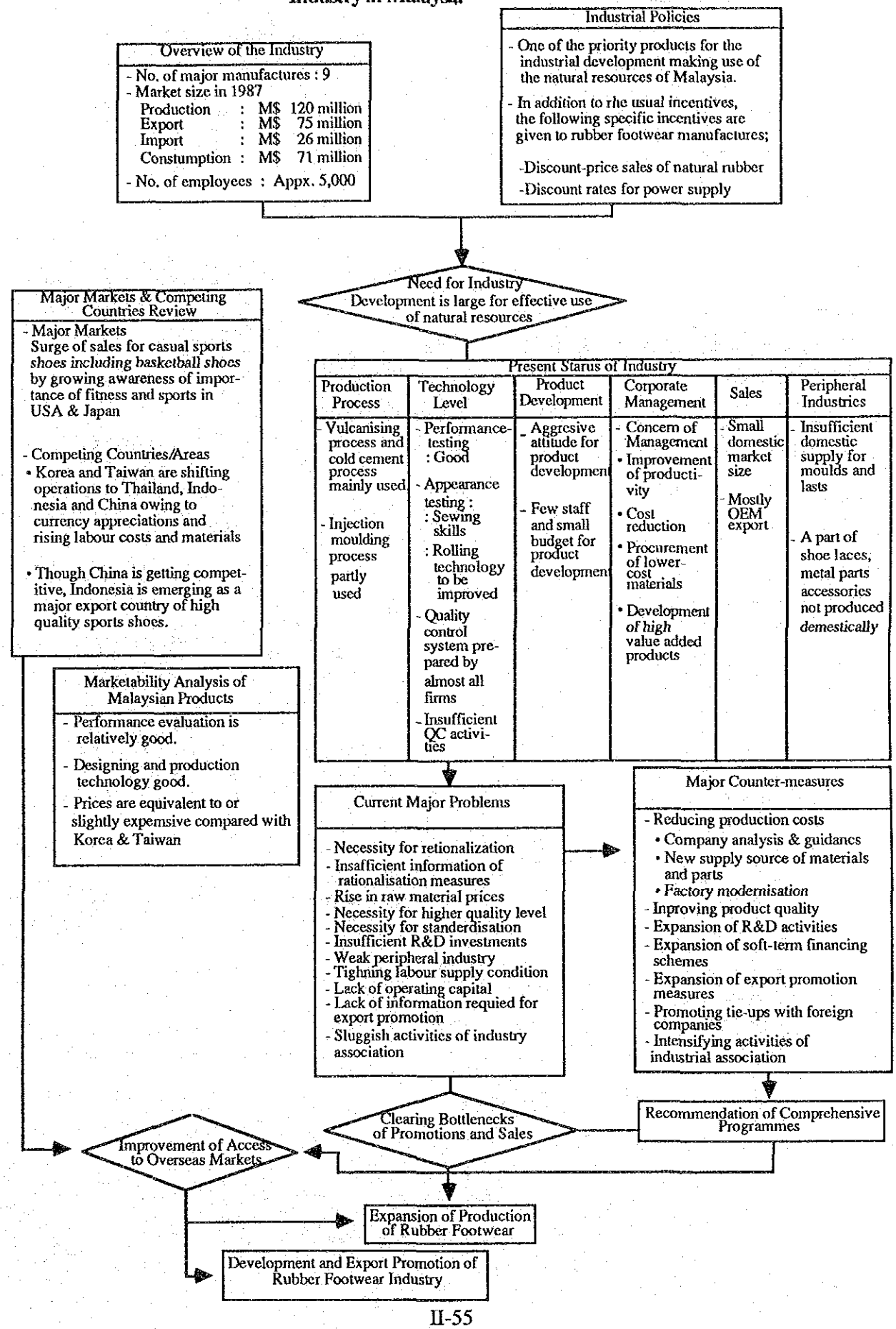
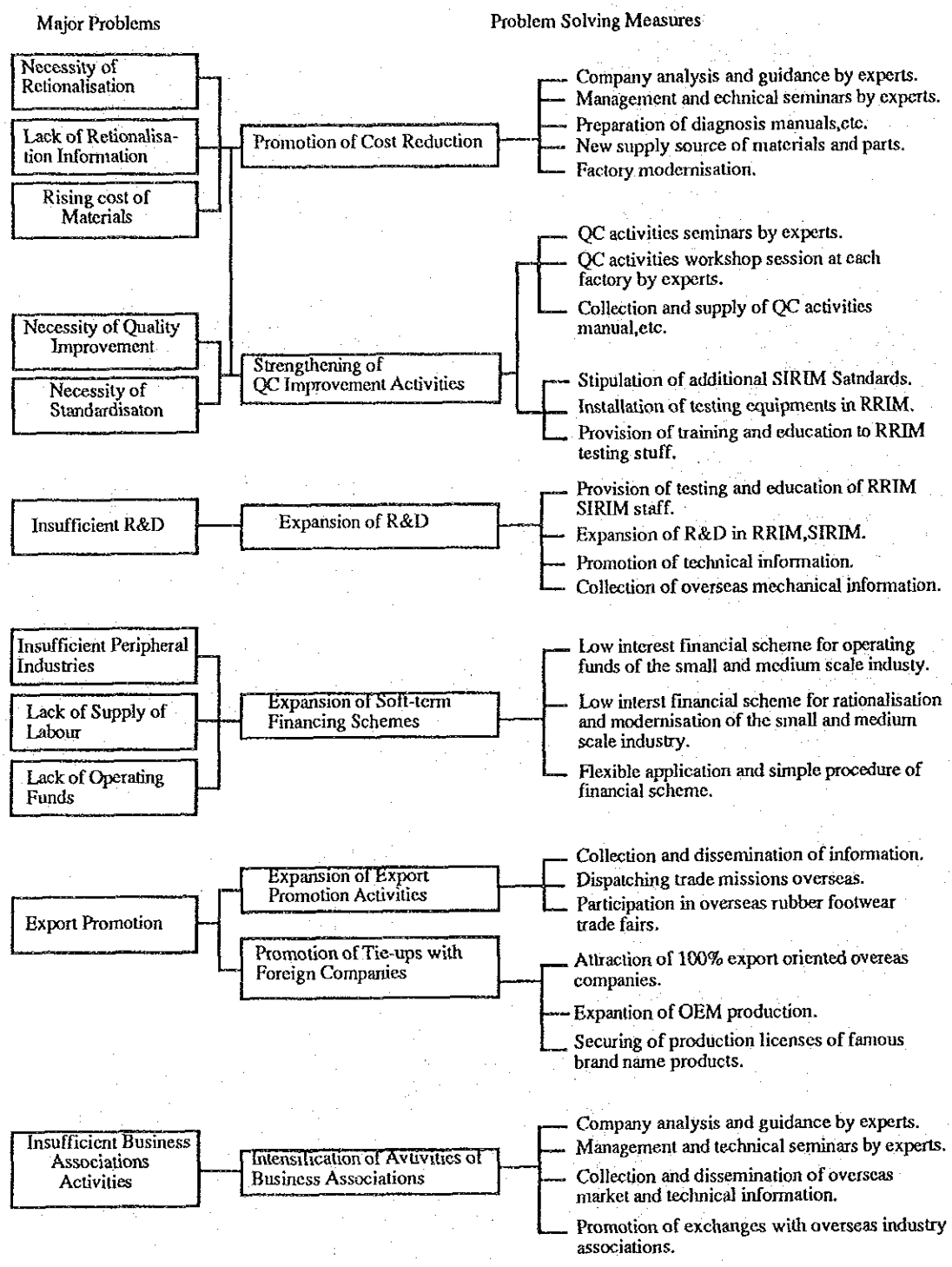


Fig. II. 1-13 Measures to Achieve the Goal of the Development Scenario of Rubber Footwear Industry



II-2. Summary of Recommendations

II-2-1. Comprehensive Promotion Programmes Proposed for Each Selected Industry

A scenario for the development of each of the selected four industries was formulated based on the understanding of the present status of the industry and the peripheral industries, related policies, supporting institutions, overseas market conditions and the results of cost analysis. The necessary measures for achieving the goals of the development scenarios were examined. By compiling these measures, the basic strategies for the development of each of the four selected industries were established and the comprehensive development programmes were proposed. The processes of formulating the programmes of the respective industries is shown in Fig. II. 2-1, Fig. II.2-2, Fig. II. 2-3 and Fig. II. 2-4.

The programmes proposed for each industry are as follows:

Comprehensive Promotion Programmes for the Office Electronic Equipment Industry

Programme 1. Intensification of Investment Invitation Activities
Programme 2. Strengthening of Policy-making Section for the Promotion of the Parts and Components Industries
Programme 3. Financial Support for the Introduction of Modern Production Equipment by Parts and Components Manufacturers
Programme 4. Strengthening of Quality Control Activities
Programme 5. Development of Engineers and Technicians and Intensification of R&D Activities in the Field of Electronics
Programme 6. Accumulation of High Level Technologies in the Field of Electronics

Comprehensive Promotion Programmes for the CRT Industry

Programme 1. Intensification of Investment Invitation Activities
Programme 2. Strengthening of Policy-making Section for the Promotion of the Parts and Components Industries
Programme 3. Development of Engineers and Technicians and Intensification of R&D Activities in the Field of Electronics
Programme 4. Strengthening of Quality Control Activities
Programme 5. Alleviation of the Problem of Industrial Wastes

Programme 6. Expansion of Soft-term Financing Scheme for Small- and Medium-scale Industries

Programme 7. Establishment of a Financial Support System for the Development of Key Industries

Comprehensive Promotion Programmes for the Ceramic IC Packages/Substrates Industry

Programme 1. Intensification of Investment Invitation Activities

Programme 2. Development of Engineers and Technicians and Intensification of R&D Activities in the Field of Electronics

Programme 3. Establishment of a Fund to Support the Training and R&D Activities of Industries

Programme 4. Strengthening of Policy-making Section for the Promotion of the Parts and Components Industries

Programme 5. Alleviation of the Problem of Industrial Wastes

Programme 6. Establishment of a System to Secure a Stable Supply of Electricity

Programme 7. Strengthening of Quality Control Activities

Comprehensive Promotion Programmes for the Rubber Footwear Industry

Programme 1. Company Diagnoses and Guidance by Experts

Programme 2. Strengthening of Quality Control Activities

Programme 3. Promotion of Rubber Footwear Product Standardisation

Programme 4. Expansion of R&D and Technology Extension Activities in RRIM or SIRIM

Programme 5. Expansion of Soft-term Financing Schemes

Programme 6. Expansion of MEXPO Activities

Programme 7. Promotion of Tie-ups between Local and Overseas Companies

Programme 8. Intensification of the Activities of the Rubber Footwear Industry Association

Fig. II. 2-1 Process of Formulation of Comprehensive Programmes for Development of the Office Electronic Equipment Industry

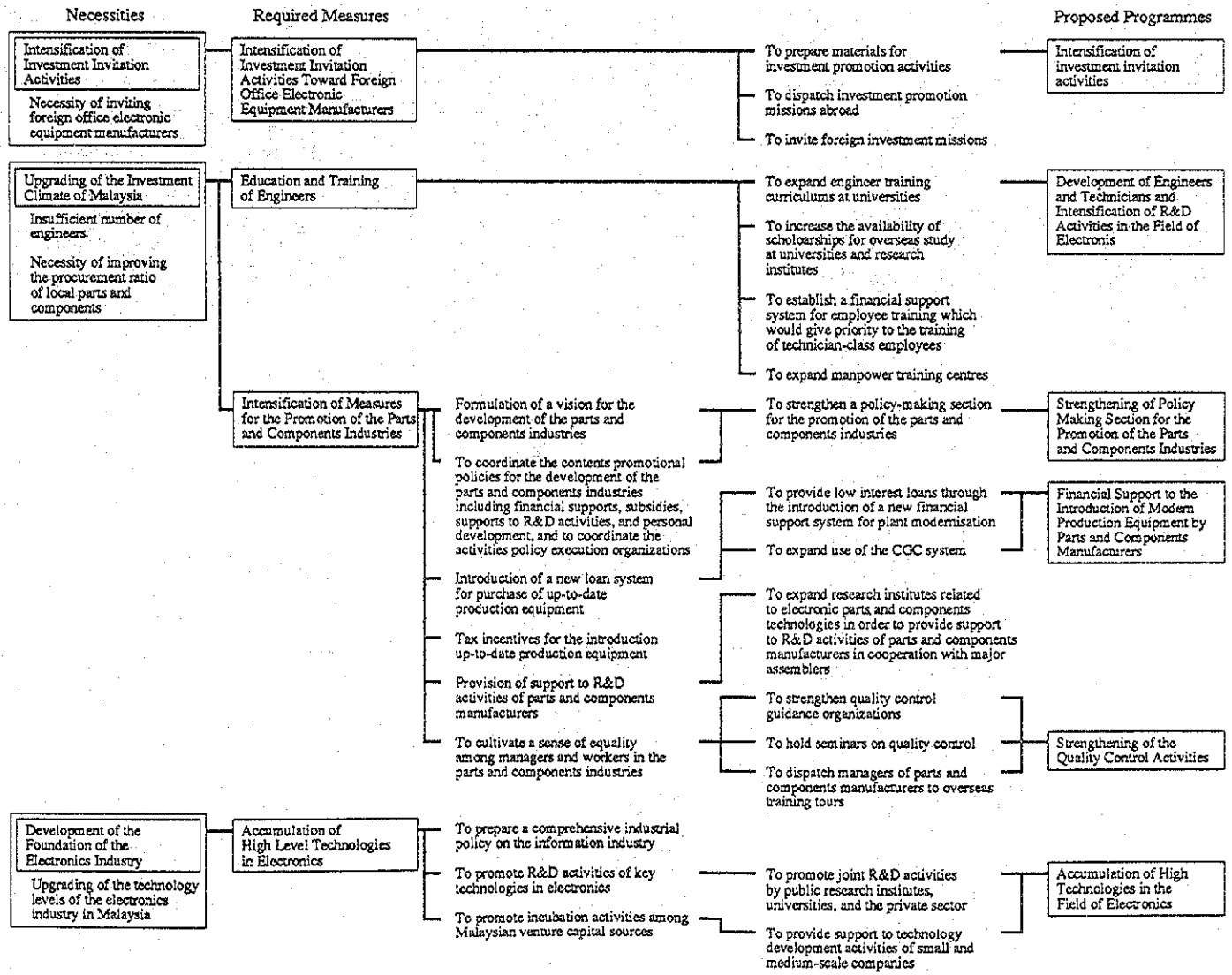


Fig. II. 2-2 Process of Formulation of Comprehensive Programmes for Development of the CRT Industry

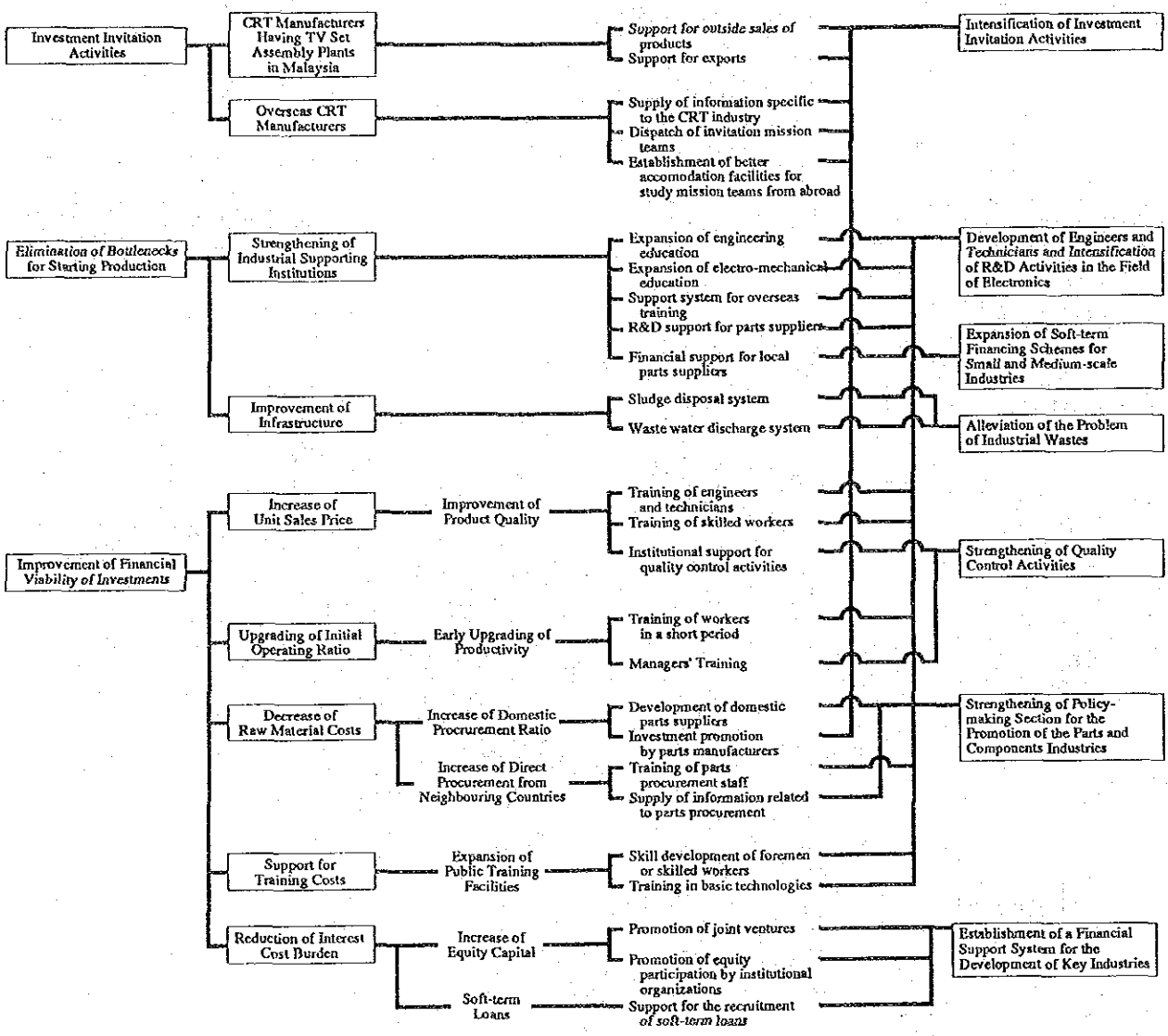


Fig. II. 2-3 Process of Formulation of Comprehensive Programmes for Development of the Ceramic IC Packages/Substrates Industry

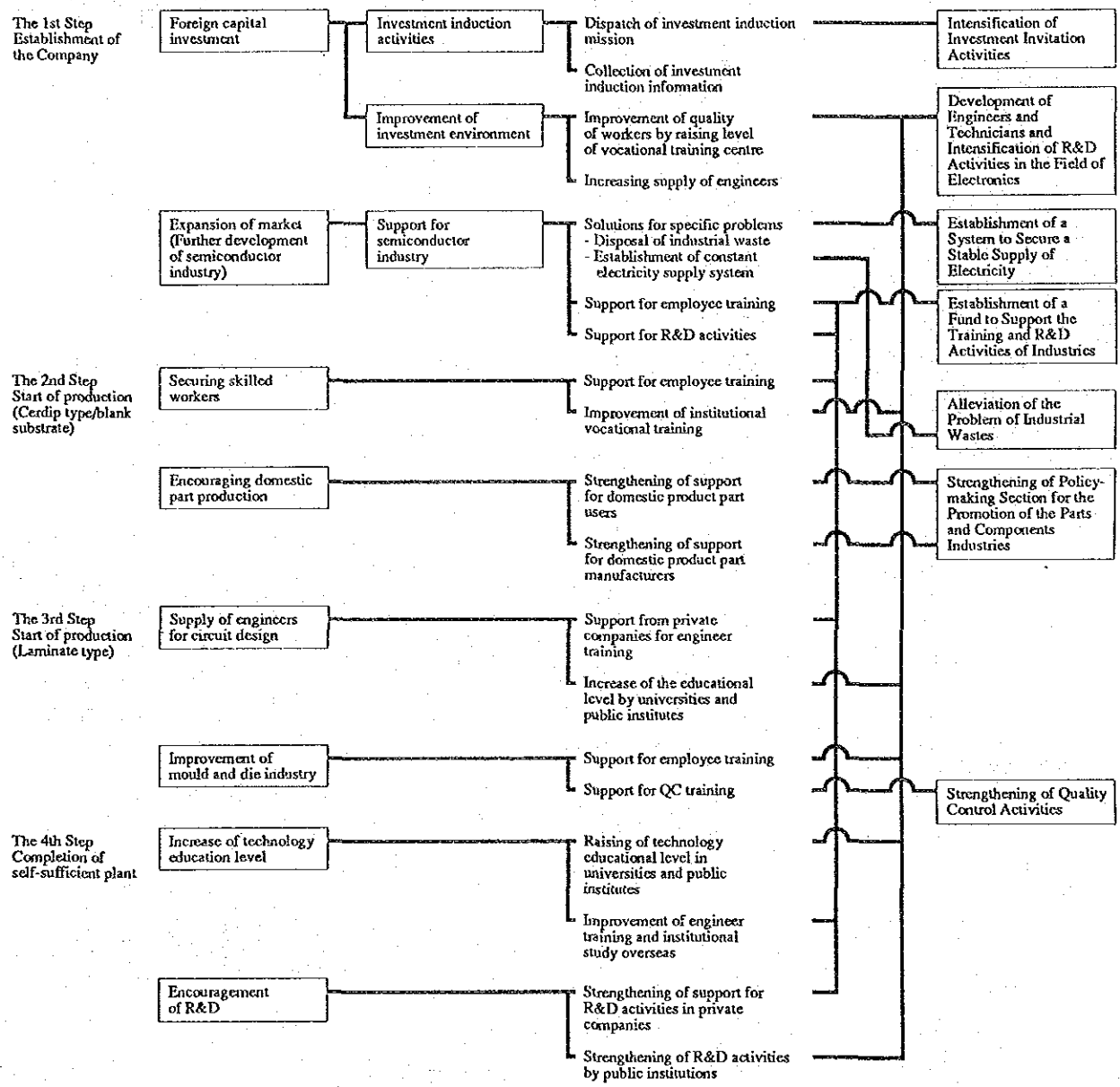
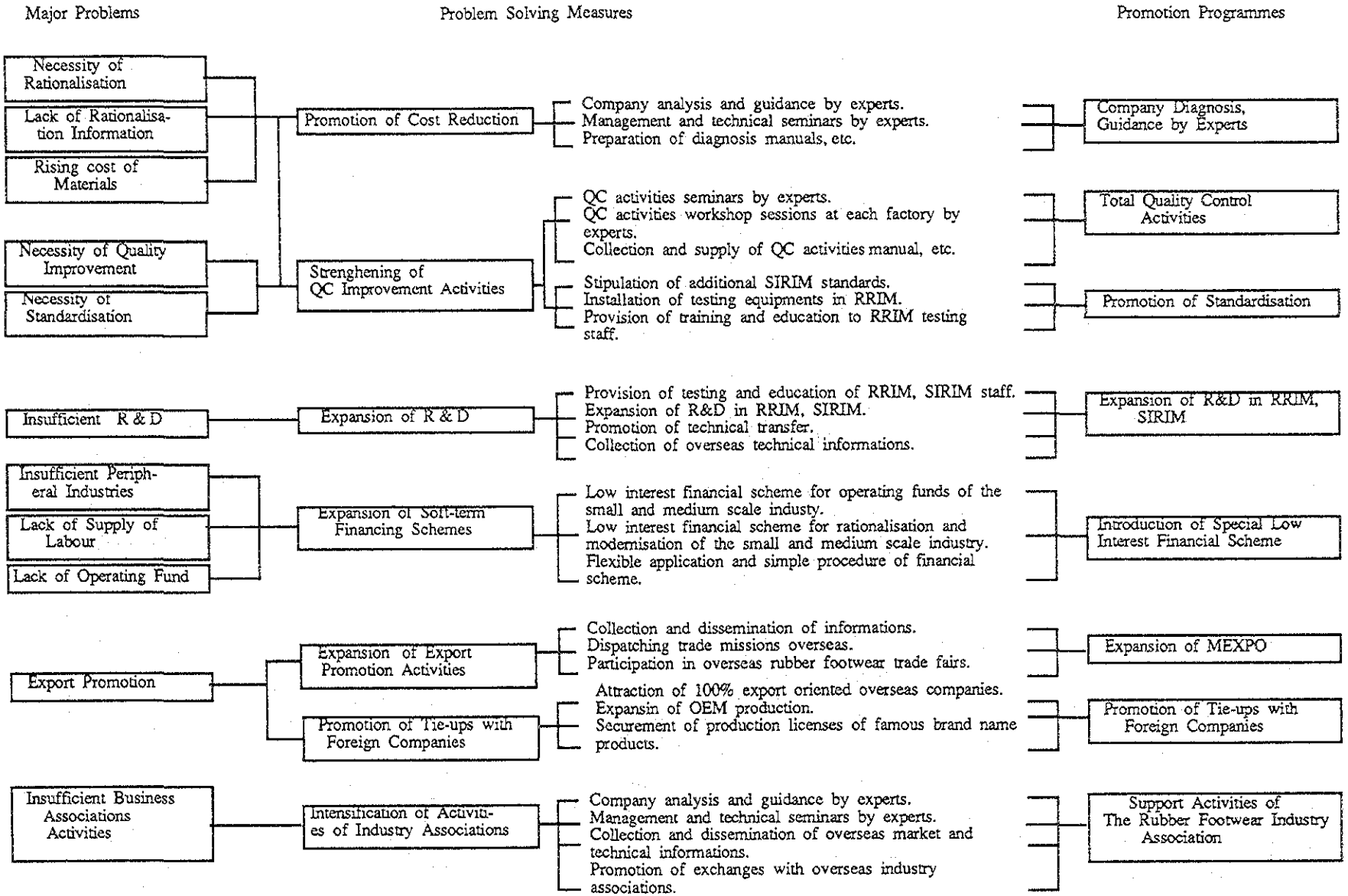


Fig. II. 2-4 Process of Formulation of Comprehensive Programmes for Development of the Rubber Footwear Industry



II-2-2. Integration and Priority Ranking of Proposed Programmes

(1) Integration of Programmes

Among the programmes proposed for each industry sector, a relatively large number of programmes have common or similar contents. By combining these similar programmes, and further by reviewing the present activities in Malaysia in the area of the proposed programmes, the following 12 projects were established. The measures recommended for executing the programmes and schedules for their implementation are summarized and shown in Table II.2-1.

(Programmes relating to both the electronics and rubber footwear industries)

Programme 1. Intensification of Investment Invitation Activities (Expansion of MIDA Activities)

Programme 2. Credit and Credit Guarantee Strengthening Programme for Small- and Medium-scale Industries

Programme 3. Strengthening of Quality Control Activities

(Electronics Industry)

Programme 4. Development Programme for Small- and Medium-scale Manufacturing Enterprises

Programme 5. Human Resources Development and R&D Expansion in the Field of Electronics

Programme 6. Alleviation of the Problem of Industrial Wastes (F/S for the Construction of Industrial Estates for High-technology Industries)

Programme 7. Establishment of a Financial Support System for the Development of Key Industries

Programme 8. Establishment of a System to Secure a Stable Supply of Electricity

(Rubber Footwear Industry)

Programme 9. Company Diagnoses and Guidance by Experts

Programme 10. Promotion of Rubber Footwear Product Standardisation, Product Testing, R&D and Technology Transfer Activities

Programme 11. Expansion of MEXPO Activities

Programme 12. Intensification of the Activities of the Rubber Footwear Industry Association

Table II. 2-1 Execution Measures and Schedules of the Proposed Programmes

[Common both to Electronics and Rubber Footwear Industries]

Name of the Programme and its Objectives	Contents of the Programme	Measures to be taken by Malaysian Side	Execution Measures and their Schedule			
			Measures	Execution Schedules		
				Immediately	At an early stage	After Preparation
1. Intensification of Investment Invitation Activities (Expansion of MIDA Activities) <Objective> - Promotion of investment in Malaysia by foreign manufacturers - Promotion of technical tie-ups between foreign and Malaysian manufacturers	1) Information service for the invitation of investment - Compilation of guidebook by industry - Preparation of a directory of domestic parts suppliers 2) Dispatch of investment invitation missions 3) Strengthening of accommodation facilities for receiving missions 4) Provision of a service to match partners	- Collection of detailed information specific for each industry - Strengthening the linkage between MIDA and MTI, Small and Medium Industry Div. - Appointment of PDT members and dispatch overseas - Strengthening the accommodation facilities in MIDA by industry and country - Listing of potential partner companies	Issue of guidebooks Information collection on potential investors Invitation of foreign experts Ad-hoc information and other services	X X X X		
2. Credit and Credit Guarantee Strengthening Programme <Objective> - Expansion of credit guarantee system for SMI	1) Accumulation of financial resources within the CGC with the assistance of the Bank Negara or international institutions, which are to be loaned to SMI through commercial banks 2) CGC's credit guarantee for above loans	- Review of overall financing system for SMI in Malaysia - Establishment of a business expansion programme of CGC - Modification of laws and regulations related to the implementation of the programme	Implementation of detailed feasibility study Receipt of capital assistance Invitation of foreign experts Overseas training of the staff of CGC	X	X X X	

Name of the Programme and its Objectives	Contents of the Programme	Measures to be taken by Malaysian Side	Execution Measures and their Schedule			
			Measures	Execution Schedules		
				Imme-diately	At an early stage	After Prepa-ration
- Expansion of the fund pertaining to soft-term credit for SMI - Provision of technical and managerial support for SMI	3) Establishment of a consulting service section within the CGC					
3. Strengthening of Quality Control Activities <Objectives> - Raising quality consciousness among SMI for the development of local parts suppliers - Raising the quality levels and productivity of export products' production	1) Under the sponsorship of NPC and industry associations; - the holding of QC seminars - the holding of QC workshops in individual companies 2) The compilation of QC manuals and their distribution to local companies	- Support of NPC activities - Support for the activities of industry associations	Invitation of foreign QC experts Overseas training of local QC experts		X X	

[Electronics Industry]

Name of the Programme and its Objectives	Contents of the Programme	Measures to be taken by Malaysian Side	Execution Measures and their Schedule			
			Measures	Execution Schedules		
				Imme-diately	At an early stage	After Prepa-ration
4. Development Programme for Small-and Medium-scale Manufacturing Enterprises <Objective> - Offering touring guidance in the areas of production technology, management and marketing skills for individual SMIs - Formulation of comprehensive policies to develop supporting industries in Malaysia and the coordination of activities of all related organizations for that purpose	1) Touring guidance to local SMIs on production technology with the cooperation of foreign experts and SIRIM staff 2) Touring guidance to local SMIs on management and marketing skills with the cooperation of foreign experts and the staff of such local organizations as NPC or MEXPO 3) Establishment of a policy and coordination section within MTI, Small and Medium Scale Industry Div.	- Organizational expansion of MTI, Small and Medium Scale Industry Div. - Appointment of touring guidance experts in SIRIM, etc. - Appointment of touring guidance experts in NPC, MEXPO, etc.	Invitation of foreign experts in production technology Invitation of foreign experts in management and marketing Invitation of foreign experts in the SMI's development policy making	X X X		
5. Human Resources Development and R&D Expansion in the Field of Electronics <Objectives> - Fostering of engineers	1) Support to private R&D activities through industry-university cooperation and expansion of electronics related education	- Promotion of the Design laboratory for Information Technology Scheme, USM - Promotion of the Engineering Application Centre Scheme, UKM	Invitation of foreign experts in information technology Introduction of advanced		X X	

Name of the Programme and its Objectives	Contents of the Programme	Measures to be taken by Malaysian Side	Execution Measures and their Schedule			
			Measures	Execution Schedules		
				Imme-diately	At an early stage	After Prepa-ration
and technicians required by the electronics industry - Promotion of R&D activities through industry-university cooperation	- promotion of Design Laboratory for Information Technology Scheme planned by USM - promotion of the Engineering Application Centre Scheme planned by USM 2) Reinforcement of vocational training facilities - improvement of the curriculum of electronics courses run by the MARA Vocational Training Institute - expansion of the Electro Mechanical Technology course newly established by Polytechnics 3) Examination of the possibility of the establishment of a training support system such as SDF in Singapore	- Expansion of the electronics courses in MARA Vocational Training Institute - Expansion of the courses of Electro Mechanical Technology, and Polytechnics - Investigation of the SDF operation in Singapore	equipment for education			
			Invitation of foreign experts in engineering application		X	
			Introduction of advanced equipment for education		X	
			Invitation of foreign experts in course designing	X		
			Invitation of foreign experts in such fields as robotics or computers		X	

Name of the Programme and its Objectives	Contents of the Programme	Measures to be taken by Malaysian Side	Execution Measures and their Schedule			
			Measures	Execution Schedules		
				Imme-diately	At an early stage	After Prepa-ration
6. Alleviation of the Problem of Industrial Wastes (F/S for the Construction of Industrial Estates for High-technology Industries) <Objective> - Establishment of standards for wastes and the provision of a statisfactory infrastructure	1) Carrying out of a F/S on the construction of industrial estates 2) Provision of an infrastructure for industrial wastes in cooperation with existing agencies in charge of the development of industrial estates 3) Setting up of national and local standards for industrial wastes	- Establishment of a committee for industrial wastes - Establishment of an overall infrastructure development programme for industrial waste water and sludge disposal - Expansion of environmental standards	Implementation of a F/S for the construction of industrial estates for high-technology industries Receipt of capital assistance Invitation of foreign experts for environmental standards	X	 X	 X
7. Establishment of a Financial Support System for the Development of Key Industries <Objective> - Financial assistance for large-scale investment projects, the development of which is politically desired	1) Establishment of an investment/finance system through political means for the introduction of various kinds of long-term funds required for the development of key industries 2) Examination of the possibility of establishing tax and other incentive measures in order to	- Investigation and study on a new investment/financing system - Investigation and study on a new tax and other preferential measures for investments for key industries	Overseas training in the field of institutional financing systems Invitation of foreign experts on long-term financing systems	X	 X	

Name of the Programme and its Objectives	Contents of the Programme	Measures to be taken by Malaysian Side	Execution Measures and their Schedule			
			Measures	Execution Schedules		
				Imme-diately	At an early stage	After Prepa-ration
	promote investment in key industries by institutional investors					
8. Establishment of a system to Secure a Stable Supply of Electricity <Objective> - Establishment of a system for the stable supply of electric power required for the operation of plants by high-tech companies	1) Improvements in the electric power infrastructure in order to provide a stable supply of electric power to IC and other high-tech manufacturers 2) Easing of restrictions on in-house generating facilities for companies facing problems with power stoppages	- A long-term projection study on the supply and demand of electricity - Establishment of a power supply expansion programme - Establishment of an overall power distribution programme - Promotion of existing power infrastructure development programmes - Review of existing restrictions on the in-house generating facility ownership	Implementation of a F/S on power supply development Receipt of capital assistance		X	X

[Rubber Footwear Industry]

Name of the Programme and its Objectives	Contents of the Programme	Measures to be taken by Malaysian Side	Execution Measures and their Schedule			
			Measures	Execution Schedules		
				Imme-diately	At an early stage	After Prepa-ration
9. Company Diagnoses and Guidance by Experts <Objectives> - Eliminating all waste in each production process & maintaining and handling machinery well - Guidance on general corporate management such as inventory control and financial management	1) Company diagnoses and guidance at factory site by overseas experts 2) Management and technical seminars by overseas experts 3) Preparation of operation and management manuals etc.	- Assignment of instructors at SIRIM & RRIM, etc., guidance for the private sectors - Strengthening activities of the Rubber Foodwear Industry Association and NPC, etc.	Invitation of experts (Production technology) Invitation of experts (Cooperate management) Preparation of manuals	X X	 X 	
10. Promotion of Rubber Footwear Product Standardisation, Testing, R&D and Technology Transfer Activities - Expanding standards and raising product reliability - Support R&D activities for production technology - Promoting technology transfer to the private sectors	1) Expansion of SIRIM Standards for rubber footwear by overseas experts 2) Installing testing & inspection equipments in RRIM 3) Expanding the functions of RRIM & SIRIM and transferring technology to the private sectors	- Stipulating additional rubber footwear Standards - Expanding testing & inspection facilities and strengthening training of instructors in RRIM	Invitation of experts (Rubber products standards) Invitation of experts (Testing & inspection and R&D of rubber footwear) Introducing Equipment	 	 X	X X

Name of the Programme and its Objectives	Contents of the Programme	Measures to be taken by Malaysian Side	Execution Measures and their Schedule			
			Measures	Execution Schedules		
				Imme-diately	At an early stage	After Prepa-ration
11. Expansion of MEXPO Activities <Objective> - Strengthening of marketing capability	1) Strengthening of collection of overseas marketing information - collecting systematically information of markets, new products and technologies, etc. - timely transfer of collected information to the private sectors 2) Dispatch of trade missions overseas 3) Participation in overseas trade fairs	- Expanding the budget and staff of MEXPO	Information collection Dispatch and reception of trade missions	X X		
12. Intensification of Activities of the Rubber Footwear Industry Association <Objective> - Intensifying the activities of the association to raise the level of technology and management of the rubber footwear industry	1) Arrangement by the association of company diagnoses and guidance at the factory site by experts Arrangement by the association of management and technology seminars by experts Collection by the association of information	- Administrative guidance by the Government to intensify the associations' activities	Invitation of experts Information collection	X X		

Name of the Programme and its Objectives	Contents of the Programme	Measures to be taken by Malaysian Side	Execution Measures and their Schedule			
			Measures	Execution Schedules		
				Imme-diately	At an early stage	After Prepa-ration
	on overseas markets and technologies 2) Increasing exchanges and meetings with overseas industry associations to promote tie-ups, etc., with overseas companies					

(2) Priority Ranking of Projects

To develop the selected industries, it would be ideal if all of the comprehensive programmes proposed for each industry were quickly implemented with full effort. However, given the reality of the very tight limitations on both financial and human resources, it is necessary to give a rough priority ranking to each proposed programme.

Because sufficient feasibility studies were not possible for all of the programmes proposed in this study, a priority ranking of each programme could not be given using strict criteria such as IRR (International Rate of Return) figures for each project. As an alternative, a priority ranking for each project was determined through the rather subjective judgement of the Study Team which considered the following basic criteria:

(1) Existence of established organizations in charge of the project
(2) Maturity level of the project
(3) Urgency of the project
(4) Investment scale of the project
(5) Level of direct impact of the project on the development of the industry
(6) Necessity for support from other organizations
(7) Industries to which the effects of the project would extend

The results of an examination of priorities are as shown in Table II.2-2. The five projects which have been selected as priority projects are as follows:

(1) Intensification of Investment Invitation Activities
(Expansion of MIDA Activities)
(2) Credit and Credit Guarantee Strengthening Programme for Small- and Medium-scale Industries
(3) Development Programme for Small- and Medium-scale Manufacturing Enterprises
(4) Promotion of Rubber Footwear Product Standardisation, Product Testing, R&D and Technology Transfer Activities
(5) Expansion of MEXPO Activities

Table II. 2-2 Result of Priority Project Identification

	Intensification of Investment Invitation Activities (Expansion of MIDA Activities)	Credit and Credit Guarantee Strengthening Programme for Small-and Medium-scale Industries (Three-step Loans Through OGC)	Strengthening of Quality Control Activities	Development Programme for Small- and Medium-scale Manufacturing Enterprises	Human Resources Development and R&D Expansion in the Field of Electronics	Alleviation of the Problem of Industrial Wastes (F/S for the Construction of Industrial Estates for High-technology Industries)
1. Existence of established organizations in charge of the project Polytechnic and others	Yes (MIDA)	Yes (CGC)	Yes (NPC)	Yes (MTI)	Yes (USM,UKM,KAEA MARA,Polytechnic and others)	No
2. Maturity level of the projects	High (Presently being supported)	Moderate (in planning stage)	Low	High (plan already exists)	Moderate (in planning stage)	Low
3. Urgency of the needs of the project	High	High	Low	High	Moderate	Moderate
4. Scale of investment in the project	Medium	Large	Small	Medium	Large	Small
5. Level of direct impact	Great	Great	Moderate	Great	Moderate	Moderate
6. Necessity of outside assistance	Moderate	Strong	Weak	Strong	Moderate	Moderate
7. Affected industries	OA machinery & equipment, CRT, IC packages, Rubber footwear	OA machinery & equipment, CRT, IC packages, Rubber footwear	OA machinery & equipment, CRT, Rubber footwear	OA machinery & equipment, CRT, IC packages	OA machinery & equipment, CRT, IC packages	CRT, IC packages
Priority Selection	A	A	B	A	B	B

Note: (A) means that the project is selected as a priority project
(B) means that the project is given a secondary importance

	Establishment of a Financial Support System for the Development of Key Industries	Establishment of a System to Secure a Stable Supply of Electricity	Company Diagnoses and Guidance by Experts	Promotion of Rubber Footwear Product Standardisation, Product Testing, R&D and Technology Transfer Activities	Expansion of MEXPO Activities	Intensification of the Activities of the Rubber Footwear Industry Association
1.Existence of established organizations in charge of the project Polytechnic and others	No	Yes (Electricity suppliers)	Yes (SIRIM,RRIM)	Yes (SIRIM,RRIM)	Yes (MEXPO)	Yes (Rubber Footwear Industry Association)
2.Maturity level of the projects	Low	Moderate	Moderate	Moderate (part in planning stage)	High (already receiving support)	Low
3.Urgency of the needs of the project	Moderate	Moderate	High	High	Moderate	Low
4.Scale of investment in the project	large	Large	Small	Medium	Medium	Small
5.Level of direct impact	Moderate	Moderate	Great	Moderate	Great	Small
6.Necessity of outside assistance	Moderate	Moderate	Moderate	Strong	Moderate	Weak
7.Affected industries	CRT	IC packages	Rubber footwear	Rubber footwear	Rubber footwear	Rubber footwear
Priority Selection	B	B	B	A	A	B

Note: (A) means that the project is selected as a priority project
(B) means that the project is given a secondary importance

III. General Electronics Industry

III. General Electronics Industry

III-1. Outline of the General Electronics Industry in Malaysia

III-1-1. General

In a span of around 20 years, the electronics industry in Malaysia has been established as one of the largest and most dynamic industry within the manufacturing sector. The total production of electronics industry in 1987 is estimated to have reached about M$9 billion. The total number of employment in the sector is in the region of 90,000. Electronics exports constitute 45% of the total Malaysian exports of manufacturing products.

Table III. 1-1 Position of the Electronics Industry in Malaysia

(Unit: M$ million)

	1985	1986	1987
Total value of electronics sales	5,732	6,835	9,461
Gross Domestic Product (GDP)	57,150	57,895	60846
Total value of manufacturing sales	11,263	12,111	13,663
Share of GDP	10.0	11.8	15.5
Share of manufacturing sales	50.9	56.4	69.2
No. of employees in electronics industry	65,707	71,970	93,146
Total no. of employees in manuf. industry	855,400	860,500	920,600
Share to total employment	7.7	8.4	10.1
Exports of electrical & electronic machinery & appliances	6,028	7,976	10,251
Total exports of goods & services	32,069	37,486	41,312
Exports of manufacturing products	12,111	15,329	20,216
Share of total exports	19.0	21.3	24.8
Share of total manufacturing exports	49.8	52.0	50.7

Source: Economic Report , Monthly Industrial Statistics

Among products manufactured in Malaysia, semiconductors occupy the most significant share. These semiconductors are manufactured almost exclusively in Malaysia, and Malaysia is presently one of the largest producers and exporters of the products in the world. The present operation of semiconductor industry is mostly confined to assembly and testing, but is gradually expanding into such field as wafer slicing and polishing.

The type of products manufactured in Malaysia is speedily diversifying. In addition to semiconductor devices including linear and digital integrated circuits, memories and micro-processors, optoelectronics, discrete devices, hybrids, arrays and high reliability military products, Malaysia also produces large amounts of other electronics, transformers, resistors, disk drive parts, cassette mechanisms, coils, ferrites, printed circuit board etc. Among the equipment manufactured are colour T.V. sets, audio and video cassette players/recorders, mobile radios, paging systems, telephone sets, public telephone exchanges, personal computers and computer peripherals.

III-1-2 Characteristics of the Electronics Industry in Malaysia

According to the "Electronics Data Yearbook, 1987" published by Benn Electronics, the total electronics production of Malaysia in 1987 was US$2,772 million, which occupied around 0.9% to the world total electronics production. Comparing this production value with those of other ASEAN nations, it is obvious that the electronics industry is well developed in Malaysia compared with its total economic size and with its size of manufacturing production.

Dividing the electronics industry into (1) electronic components sector, (2) consumer electronics sector and (3) industrial electronics sector, the weight of electronics components sector is extraordinary high in Malaysia. In 1987, the electronic components sector contributed about 80% of the total output of the electronics industry and the output of the consumer electronics sector comprising 11% and the industrial electronics sector 9%. This is mainly due to the existence of well established semiconductor industry in Malaysia. Since 1986, however, the growth of consumer electronics sector has been high, which indicates a possible structural adjustment taking place in the Malaysian electronics industry.

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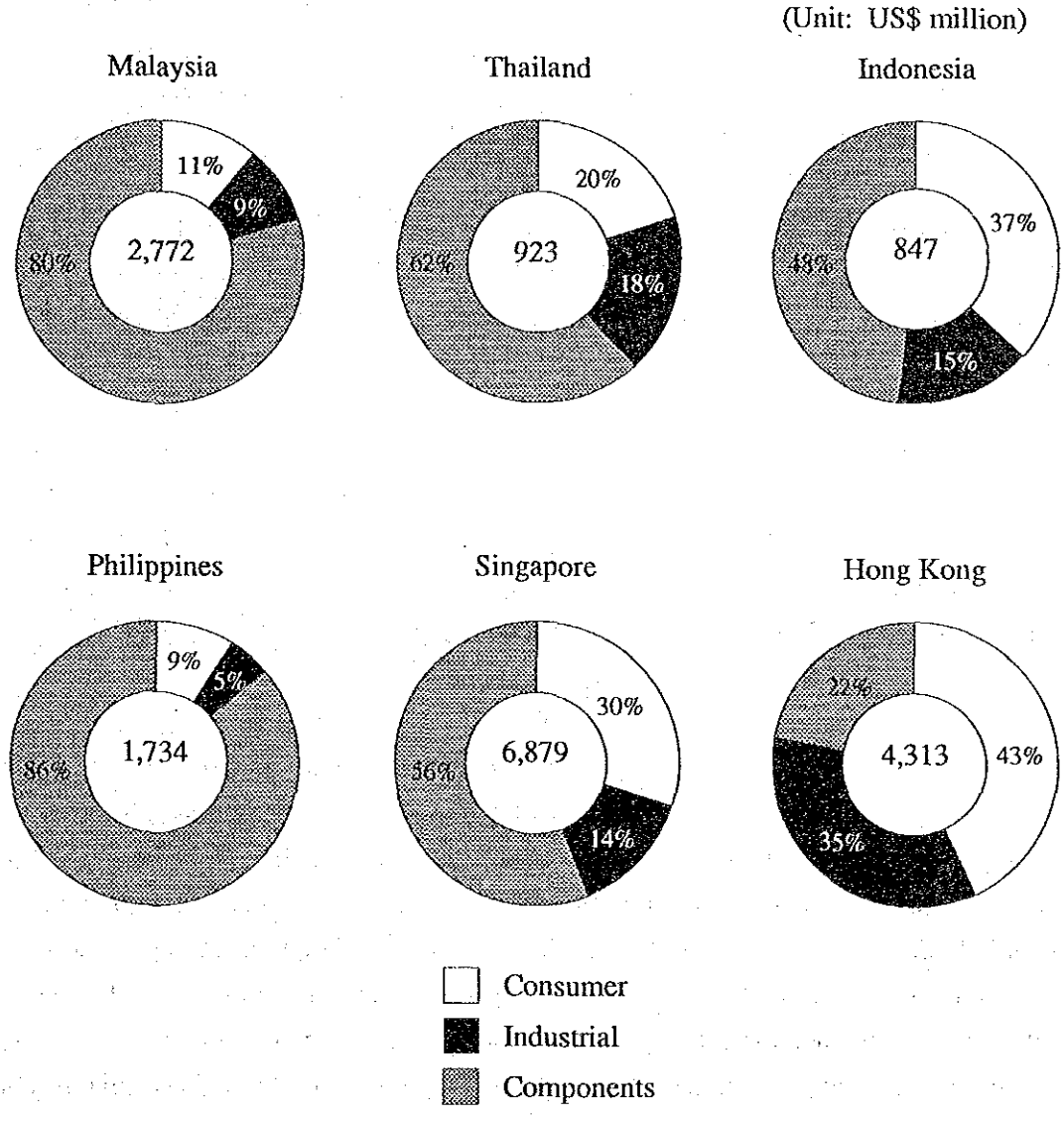
Fig. III. 1-1 Comparison of the Composition of Electronics Sub-sectors

(Unit: US$ million)



Source: "Electronics Data Yearbook 1987", Benn Electronics

III-1-3. Present Activities of Electrical and Electronics Companies in Malaysia

(1) Outline of the Questionnaire Survey in Malaysia

During October 25 - December 14, 1988, the project group conducted a questionnaire survey to electrical and electronics firms engaged in manufacturing activities in Malaysia. The questionnaire was sent to 154 firms selected from various directories, and responses were received from 91 companies. 87 of the responses were valid, resulting in a valid response rate of 56.6%.

The questionnaire survey had the following three main objectives:

1. Understanding of activities at electrical and electronics firms in Malaysia
2. Evaluation of the Malaysia investment environment by these firms
3. Uncovering of companies desiring joint ventures or technical tie-ups with foreign-affialite firms

The first of the above objectives will be covered in this section and Section II-2-3 "Use of Various Incentives"; the second, in Section II-4-1 "Evaluation of the Investment Climate"; and the third, in Addendum "The Possibility of Investment and Technical Tie-ups".

Development of the Malaysian electrical and electronics industry has necessitated the introduction of foreign capital. In the future as well, foreign investment will play a major role in increasing local content and advancing the industry itself. The attraction of foreign corporations has also been a key to domestic production of the office equipment, CRTs, and ceramic IC packages covered in this survey.

Malaysia's investment environment has already earned high marks, and foreign investment has grown dramatically since 1986, centered around the electrical and electronics industry. In the future as well Malaysia must actively attract investment in strategic and high-added-value fields of the industry. By understanding both the factors which are taken into consideration by firms which selected Malaysia as a destination for initial or continuous investment and the results of evaluation of the investment environment of Malaysia by firms currently operating there, it is hoped that this survey will serve as reference for Malaysia's future foreign capital attraction policies. Another objective of the survey is to identify appropriate measures for 1) the strengthening of

inter-industry linkages through the promotion of local sourcing, and 2) the introduction of technically-advanced high-added-value products and the establishment of R&D functions at existing firms.

(2) Activities of Electrical and Electronics Firms in Malaysia

1) Current Employment Conditions and Training Programmes

Employment Conditions

Table III.1-3, III.1-4, III.1-5 show a breakdown of employment structure in 1988 at responding firms according to job category, schooling, and years of experience. A total of 49,874 workers were employed by the 85 firms (two of the respondents neglected to answer this item).

When viewed by job category, semi-skilled and skilled labourers accounted for a majority of the total, with respective shares of 27.7% and 25.5%, but this varied to some extent depending upon the industry. Manufacturers of industrial products, for example, employed a comparatively high proportion of engineers, managers, and other staff, with engineers in particular accounting for 10.6% of the total. Thus, it can be assumed that domestic production activities are extending into more advanced fields. The small scale of employment in manufacturers of industrial products in comparison with manufacturers of consumer products and components was also a reason for the higher proportion of staff. In contrast, the field of consumer products stands out as the most labour-intensive sector, with blue-collar labour accounting for 80.5% of all employees. In the area of component manufacture as well, the ratio of blue-collar labour was high, at 76.8%, but the percentage of skilled labourers was also high in comparison with the manufacturers of consumer and industrial product, with the production process appearing to be somewhat more complicated.

When analyzed by capital structure, it can be seen that European and U.S. affiliates employed a high percentage of skilled labourers (44.3%). The reason for the small average number of workers under one foreman in local companies (5.1) in contrast to figures of 12.2 for Japanese affiliates and 8.9 for U.S. and European affiliates was probably due to smaller assembly lines. At other foreign affiliates like Singapore, Taiwan, however, an average of 25.8 workers were employed for each foreman. Although the reasons for this remain unclear, one is the high rate of automation at Japanese, U.S., and European affiliate plants. In the case of U.S. affiliates where automation have progressed, there are few labourers per machine, with worker tasks

having been shifted from assembly of the product on the conveyor belt to monitoring of the machines that assemble the product.

When broken down by schooling, graduates of lower secondary school were the most common, at 36.6%, followed by upper secondary school graduates, at 34.8%. Although ordinarily those employed as engineers have graduated from technical institutes or higher education, engineers were most commonly employed by manufacturers of industrial products (24.0%), followed by consumer products (17.3%) and components (11.0%). When viewed by capital structure, engineers constituted a high 18.1% of employees at U.S. and European affiliates. It is also conspicuous to note that at Japanese affiliates the ratio of primary school graduates was, at 3.9%, far less than for other groups.

When broken down according to years of experience, it must be kept in mind that 15 out of the 87 responding firms had been engaged in production for less than three years and that steady increases in new employment have been seen at the firms since 1986 together with expansion of production. Overall, however, roughly half of the employees had worked for less than three years, a relatively short period of time. Turnover was particularly evident at the manufacturers of consumer products, where 30.1% of all employees had less than one year of tenure and 48.5% less than three. The same figures at component manufacturers were 24.3% and 54.7%, respectively, the latter being quite high. Workers with less than one year's tenure are the most likely to change jobs and tend to drift from company to company, but there was an oft-expressed opinion that workers with more than three years of tenure were extremely likely to stay with their jobs.

Viewed overall, it appears that manufacturers of consumer products and components, which emphasize labor-intensive production processes, tend to employ a large number of blue-collar workers with few years of employment and lower educational levels, while employees at industrial products manufacturers have higher levels of academic backgrounds, longer years of employment, and are more likely to be the staff of administration.

Table III. 1-3 Job Categories

(Unit: %)

Ordinary Workers	Semi-skilled Workers	Skilled Workers	Foreman/ Inspector	Engineer	Clerical Staff	Manager	Total
23.0	27.7	25.4	8.3	3.3	8.6	3.6 %	100.0

Table III. 1-4 Education Level of Factory Workers

(Unit: %)

University	Technical Institute	Upper Secondary School	Lower Secondary School	Elementary School	Total
3.4	11.2	34.8	36.6	14.0	100.0

Table III. 1-5 Experience of Factory Workers

(Unit: %)

less than 1 year	1~3 years	3~5 years	5~10 years	Over 10 years	Total
24.1	25.0	18.1	22.7	10.0	100.0

Employment Problems

Table III.1-6 shows employment problems currently encountered by the survey respondents.

Overall the most commonly indicated problem was "a lack of skilled workers". This response was common to more than half of the responding firms, regardless of the number of employees or capital structure. The only firms reporting relatively few problems in this respect were manufacturers of industrial products, which gave a low response rate of 25.0%. This is probably due to the relatively high percentage of skilled workers already employed by these firms, as described before.

The next most often noted problem was "frequent job hopping." Although the frequency of this response did not depend on the number of employees, high figures were noted by both component manufacturers and Japanese affiliates. The latter phenomenon was partly due to Japanese manager's feeling accustomed to the Japanese lifetime employment system, and partly due to the fact that wages at these firms are less than at comparable U.S. and European affiliates, and promotion is difficult even for those spending a long time with the company. The fact that the U.S. and European affiliates do not often find the problem in a shortage of workers would be also because of this reason.

The third most frequently noted problem was "rapid increase of labour cost." The U.S. and European affiliates as well as local firms were especially vocal in this respect. The greatest variations in response rates for "shortage of workers" and "rapid increase of labour cost," however, were observed among various geographical locations. In those regions experiencing serious labour shortages, wage hikes and frequent turnover are only natural. Firms considering new investment are thus forced to choose between the

convenient regions with numerous firms already present but unfavorable in labour hiring conditions, and the less convenient areas offering favorable hiring conditions.

Another problem often reported by industrial product manufacturers and the U.S. and European affiliates was "high training costs for employees." Although this will be discussed in detail in a later section on training, both groups provided longer in-house training programmes than other types of firms. As for other questions, only one company in the present survey responded that "strong government request for the increased use of local workers" is the problem.

Table III. 1-6 Labour Situation

Problem Areas Identified	No. of Companies*	(%)
Shortage of Workers	16	(22.9)
Lack of Skilled Workers or Engineers	37	(52.9)
Frequent Job Hopping	29	(41.4)
Difficulty in Labour Negotiation	10	(14.3)
High Fringe Benefit Payment	10	(14.3)
Rapid Increase of Labour Costs	20	(28.6)
Strong Government Request for the Increased Use of Local Workers	1	(1.4)
Expenses for Training and Technical Support are Very High	11	(15.7)
Others	5	(7.1)

* Total Exceeds the Total Number of Respondents due to Multiple Answers

Labour negotiation was held to be difficult by ten firms, or 14.3% of the total. Before changes in 1988, the electronics industry in principle had no labour unions. In the present survey, which included manufacturers of electrical equipment as well, 23 firms, or 26.4% of the total, had labour unions, while 68.6% of employees at these firms belonged to the unions. Eight of the 10 firms indicating difficulties with labour negotiation had labour unions, showing a high mutual correspondence.

2) Employee Training Programmes

Seventy-three firms, or 83.9% of the total, answered that they were presently conducting some form of in-house training for employees.

The most frequent responses for this multiple-response item were as follows: 1) on-the-job training (32 firms); 2) quality control (eight firms); 3) technical training (six firms); 4) dispatch to the parent company for training (five firms); and 5) management

training (five firms). In addition, the following items were each noted by one firm: SPC; dispatch to outside organizations for training; and use of the German government-supported Apprenticeship Scheme.

The job categories for which the firms provided training are as shown below.

Job Category	No. of Companies	(%)
General Factory Worker	35	(40.2)
Skilled Worker	61	(70.1)
Foreman/Instructor	20	(23.0)
Engineer	39	(44.8)
Clerical Staff	41	(47.1)
Manager	31	(35.6)

70.1% of the the firms with training programmes provided training for skilled workers. Like unskilled labourers, these employees are assigned to the actual assembly line and must respond to instructions whenever there are changes in production items or the process itself. Since they are generally in charge of more complicated processes than unskilled workers, however, they are more likely to receive training. Unexpected was the fact that only 20 firms, or 23.0% of the total, offered training for their foremen.

Concerning the pre-employment training of skilled workers, 67 firms indicated that they rely on their past employment experience, while the next most common response was that they expect "the graduates of government training institutes," noted by 30 firms, or 34.5% of the total. Although there is no fixed definition for the term "skilled labourer," the perception of these workers as "graduates of vocational training schools" was frequently mentioned during the interviews.

Twenty-five firms provided additional in-house training for graduates of vocational training schools, corresponding to 83.3% of those firms employing such workers. Two firms indicated training periods of less than one month, 12 firms, periods of from one to three months, and 11 firms, periods of more than three months. The U.S. and European affiliates appeared to provide the longest training, with no firms answering "less than one month" and 66.7% indicating programmes lasting more than three months. On the other hand, 72.7% of all Japanese affiliates indicated training periods of from one to three months in duration.

The interviews indicated that in-house training was the rule for all workers from unskilled labourers to engineers. It was also frequently indicated that, because of the speed of technical progress and the fact that the technical training required for production varies from company to company, adequate training by government institutes was impossible.

When employees were sent abroad for training, the following patterns were common: 1) dispatch to the manufacturer for the training of the operation and maintenance of newly introduced machinery; 2) dispatch to the parent company in preparation for the production of new products; and 3) systems in which a specified number of employees are sent to the parent company for training each year. Training for employees other than unskilled workers was highly dependent on assistance from the parent company, including the dispatch of personnel from the parent company for technical instruction.

Given this situation, possible training assistance policies for the labourers currently employed in the electrical and electronics industry would be (1) the financial support for in-house training programmes or (2) the establishment and enlargement of low-cost lectures at government institutes concerning high-demand, generally applicable topics such as quality control.

As described above, a shortage of skilled workers was indicated as a problem by more than half of the responding firms. Expansion of the pool of skilled workers will therefore be indispensable to the improvement of productivity in electronics industry. The type of worker in greatest demand at corporations today is the line leader, who falls just below the foreman, is responsible for products coming off the line, and can perform simple repairs. In order to increase the pool of such workers, vocational training schools should provide potential skilled workers not only with a grounding in basic technologies but also with fundamental knowledge of electronics and machinery and an awareness of quality control.

3) R&D Activities

Twenty-six of the 87 firms responding to the survey (29.9%) indicated the existence of research and development departments in Malaysia. In essence, R&D activities were common at industrial products manufacturers and U.S. and European affiliates and not so common at component manufacturers and Japanese affiliates.

The average R&D staff at these firms was 8.5 (7.4 for Japanese affiliates, 13.4 for the U.S. and European affiliates, and 6.2 for local firms) with the following distribution.

1-4	staff	7 Co.
5-8		6
9-11		1
12-15		1
16-18		1
29-22		1
33-37		1

The most common activity being pursued by these departments was product development (five firms), followed by design (four firms), product improvement (two firms), modification of specifications (two firms), and information gathering (two firms). Commonly, they are in lack of original development capability; instead, their major emphasis are on applied development, such as product changes for the Asian market and modifications in design and specifications needed in order to use locally-sourced components. In the case of components, consumer electronics goods, and other items with a high export ratio to the U.S. and Europe, products must be designed and developed in proximity to the consumer, and in most cases this means in the firm's headquarters. Furthermore, the overseas production strategies of the parent firms generally dictate that R&D departments be located in the parent nation. Even when located in foreign countries, there was usually only one each for Europe, the U.S., and Asia. Currently, Malaysia's importance is as a production base, and its role in these corporate strategies is to concentrate on mass production. A look at the R&D activities of foreign affiliate corporations in the ASEAN region shows that even in Singapore, where a high-tech orientation was emphasized early on and which can offer a high-quality work force, not so many firms have moved to establish R&D departments. In order to promote such development, the Singaporean government began a programme of incentives in the early 1980s, but it is software development and not the originally intended fields that has seen steady growth in R&D activities.

Among local corporations, only 39.1% were engaged in R&D activities. One reason for this is a lack of funding. In addition to the large amounts of capital required for development, it is impossible to tell when commercialization will be possible, and few local firms have the money to spare for continuous investment in such activities.

4) Use of Subcontractors

Forty-five firms, or 51.7% of the total, used Malaysian subcontractors, 36 (41.4%) did not, and six did not respond to this item. The average company made use of

6.7 subcontractors (7.4 for Japanese affiliates, 8.9 for U.S. and European affiliates, 4.0 for other foreign affiliates, and 3.4 for local firms). Analysis shows that 35 firms used from one to six subcontractors, while some firms used up to 60. Virtually all of the contracts were for components, the supply of ancillary materials, and partial processing such as press machining.

Foreign affiliates accounted for 21.1% of all subcontractors used by the responding firms. The same ratio for subcontractors used by Japanese affiliate firms was, at 33.3%, significantly higher than the figure of 15.0% posted by the U.S. and European affiliates.

Forty-one firms, or 91.1% of those using subcontractors, provided some form of assistance. Among the types of assistance offered were: 1) technical (33 firms); 2) quality improvement (35 firms); 3) financial (five firms); 4) securing of steady sales (three firms); and 5) other (two firms). Six of the 45 firms were also engaged in equity participation in their subcontractors.

Evaluations of local subcontractors are provided below.

Item	Evaluation	No. of Companies	(%)
• Quality	Good	17	(38.6)
	Fair	24	(54.5)
	Poor	3	(6.8)
• Quantity	Enough	36	(85.7)
	Short	6	(14.3)
• Delivery	Punctual	14	(32.6)
	Sometimes Late	29	(67.4)
• Technical Level of Staff	High	4	(9.1)
	Middle	36	(81.8)
	Low	4	(9.1)
• Management	Good	9	(20.5)
	Fair	34	(77.3)
	Bad	1	(2.3)

More than 80% of the firms using subcontractors gave ratings of average or better for all items except delivery time.

A look at supply to foreign affiliate firms by local firms shows that 14 firms, or 60.9% of the total, currently maintain such business dealings. In the future 14 firms indicated the desire for such transactions, one firm indicated no such desire, and eight did not respond.

Among the problems involved in dealings with foreign affiliates were: 1) extensively long credit periods (five firms); 2) insufficient technical assistance (two firms); 3) short delivery times (one firm); and 4) lack of communication (one firm).

III-2. Policies to Support the Development of the Electronics Industry in Malaysia

III-2-1 Development Policy for the -Electronics Industry

(1) Industrial Master Plan (IMP)

Malaysia's industrial promotion policies are mainly led by the IMP, which was released in February 1986. The IMP is an "indicative plan" in nature, but holds the important position of a "pillar" of the Malaysian government and indicates the future direction of the Malaysian industrialization from 1986 to 1995. It also has, as its aim, the guidance of potential investors in a certain direction through administrative guidance and incentives.

The direction of development policies for the electronics (as well as electrical) industry in Malaysia is specifically shown in Volume II, Part 8 of the IMP. In the paper, both structural and operational problems are reviewed, the development objectives of the industry are set, and the development strategies of the industry are proposed. The structure of the development strategies of electronic and electrical industry proposed in the IMP are summarized and shown in Fig. III. 2-1.

(2) Product Strategy

The product strategy for the electronics and electrical industry has been formulated in the IMP based on the potential future market for specific products, both domestically and internationally, and the potential for Malaysia to supply those products at internationally competitive prices and quality. Especially for the first 5 years of the plan period between 1986-90, the major aims of the product strategies were set as follows;

1) To strengthen material and component supplies, making their products' cost and quality competitive with imports;
2) To strengthen backward and forward linkages within the electronics and electrical industry; and
3) To redress the imbalance in the intra-industry structure in favour of consumer electronics, selected industrial electronics and non-semiconductor components.

The indicative and schematic presentation of the electronic product strategy in the IMP is shown in Table III.2-1. The priority ranking of each product strategy given in accordance with the above IMP product strategy and in consideration of the export market potential and the present technology level in Malaysia. As being shown in the table all of

the selected electrical products for this survey, namely, office electronic equipment, cathode ray tube and ceramic packages/substrate, are given high priority ranking.

Fig. III. 2-1 Structure of the Development Strategy for the Electronics and Electrical Industry in Malaysia - IMP 1985-1995

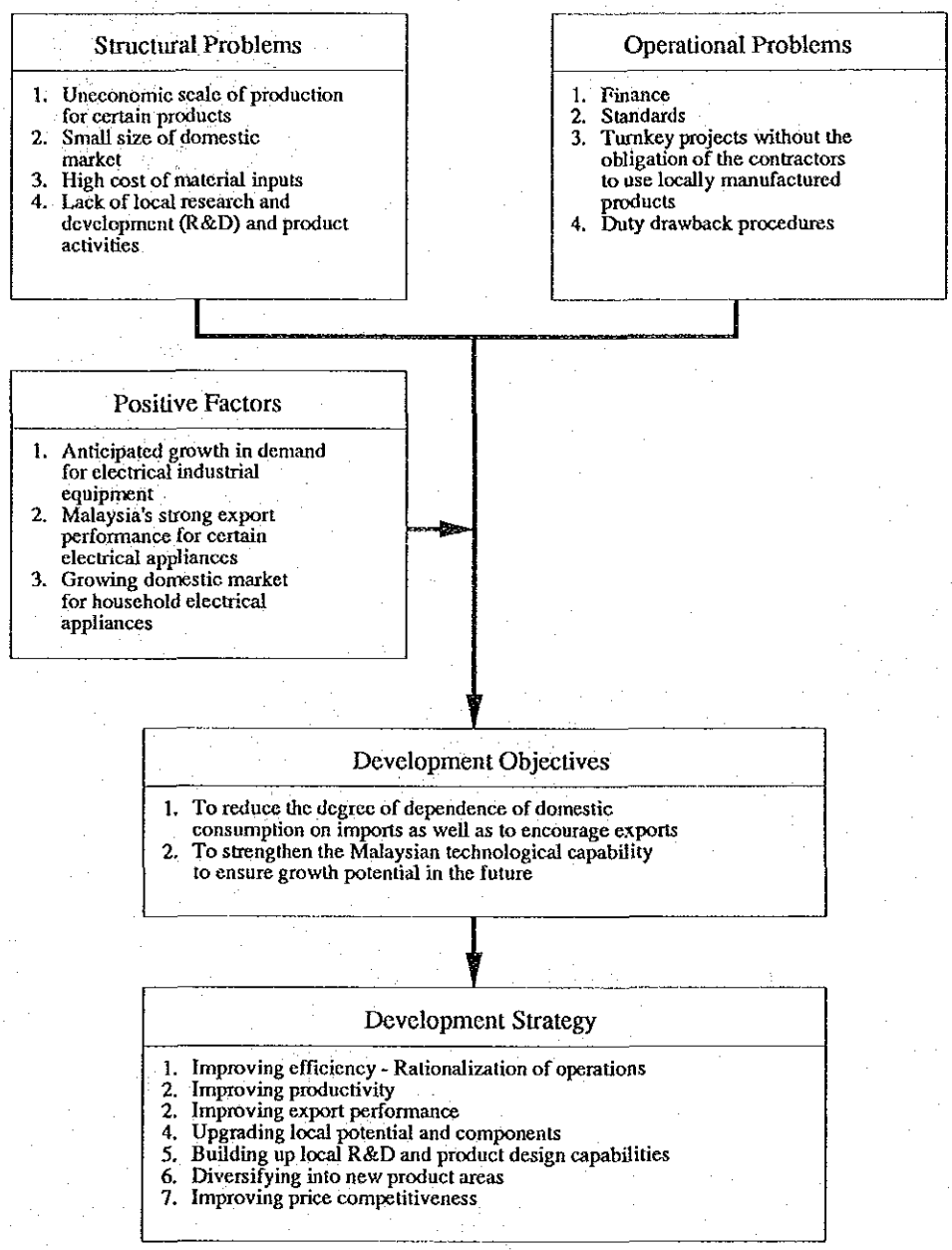


Table III. 2-1 Electronics Product Strategy for Malaysia

Consumer Electronics			Electronic Components			Industrial Electronics		
1st Priority	2nd Priority	3rd Priority	1st Priority	2nd Priority	3rd Priority	1st Priority	2nd Priority	3rd Priority
Colour TV receivers (I)	Car stereos and cassette players (I)	Car flashers (I) for solo (I)	IC lead frames, inc, for SORE	Metal oxide film transistors (I)	Switches & relays	Mobile & cellular radio (AI)	Add-on boards for microcomputers (A)	Pagers (I)
Radio Cassette recorders	Electronic fire alarms	Electronic toys & games (I)	Ceramic substrates & IC packages (I)	Aluminum electro-lytic capacitors (I)	AC power cords (I)	Digital PABXs (voice & data) (A)	Line cards for public switching equipment (A)	Intercoms (I)
Microwave overns (AI)	Dashboard displays (AI)	Quartz analogue watches/clocks (AI)	Audio speakers (I)	LED/LCD Displays	Antenna an tuning coils (I)	Modems, inc, board level (A)	UHT radio links (AI)	Telestering equipment (I)
Electronic telephones (AI)	Microphone (I)		Cassette mechanisms (AI)	Quartz crystal oscillators & filters (I)	PCB connectors (I)	PCX Multiplex equipment (A)	Electronic Medical equipment (AI)	Building manage-ment, environmental control systems (AI)
Electronic session controls for cars (AI)	Amplifiers (AI)		Wafer fabrication (I)	Double-sided (inc through plated PCBs (I)	Magnetic tapes (I)	3 1/2" Floppy disk drives (AI)	Telex and facsimile machines	Laser printers (AI)
Electronic ignition systems for cars (AI)	Loudspeakers (AI)		Multilayer ceramic capacitors (I)	Tin anodes (I)	Plasma displays (AC Mode) (A)	Ink-jet computer printers (AI)	Motor controllers (AI)	Keyboards (I)
Electronic ignition systems for autos	Electronic musical instruments (AI)		Relative networks (AI)	Gold and aluminum bonding wires (I) Headers and cars (I)	Electrolumine-scent displays (A)	Lightwave transmission equipment (A)	Process controllers (AI)	Data terminals (A)
Video cassette recorders (AI)	CATV systems (AI)		Hybrid circuits design fabrication (A)	Solar Cells (I)	Bubble memories (A)	Concentrator (AI)	Numerical controllers (AI)	
Digital TV (AI)			Switching power suppliers (AI)	Stepper motors (AI)		Local Area Networks (inc. fiber optic) (AI)	Optical storage systems (AI)	
Digital disk stereo (I)			Magnet/ferrite cores(I)	Programmable variable output and non-interruptible power supplies (AI)		Network controllers (AI)	Optical character readers (AI)	
Videotex system (AI)			Power transistors & smart power ICs wafer fab, design (I)	Sensors (incl. optical) and transducers (I)		Protocol convertors (AI)	Digital multimeters (AI)	
Optical video disk players/ recorders (AI)			Laser diodes, CCDs fabrication (I)	Multilayer and flexible PCBs (I)		Winchester Disk (AI) Drives (under 5") (AI)	OEM Microcomputers CPUs (AI)	
			Magnetic disk hands (A)	LSI peripherals design, d wafer fab (I)		Voice-data work station (A)	System design	
			Microwave components (I)	CATV components (I)		Micro satellite earth stations (I)	System integration	
			Telecommunications ICs Design			Vision robot (AI) systems	Electronic test Instrumentation (I)	
			Surface mountable resistors			CAD/CAM systems (AI)		
			Surface mountable capacitors (I)			Flexible manufacturing systems (AI)		
			Telecommunications ICs wafer fab (I)					
			Voice recognition/ synthesis circuits - design, fab (I)					

Key to Figure (A) = Assembly
(I) = Integrated Manufacturers
AI) = Assembly followed by Integrated Manufacture

denotes that a product is closely linked to office electronic equipment manufacture.

III-2-2 Investment Incentives for the Electronics Industry

(1) General Incentives

There are no specific incentives which are applied exclusively for any specific electronics product. However, the following general incentives offered to the manufacturing sector in Malaysia should also be applied to the manufacturers of electronics products.

1) Pioneer Status (PS)

Special encouragement is given for a selected number of electronics products that are listed in Table III.2-2, in which case of the Pioneer Status incentives, if awarded, can be extended to give a total tax holiday period of 10 years provided the investments involved reach the threshold of M$25.0 million and the projects employ over 500 full-time-workers. As being shown in the table, all of the electronics products selected for this study except for telex machines are included in this top priority product group.

2) Investment Tax Allowance (ITA)

The manufacturers of electronic products would be eligible to apply for the Investment Tax Allowance. The maximum amount of allowance that can be granted under the ITA is 100%. The rates vary depending upon the proportion of :

a) export ratio (upper limit of 30%);
b) local raw material content (20%);
c) added value (20%);
d) number of employees (15%); and
e) site location (15%)

3) Abatement of Adjusted Income

The abatement of adjusted income to large companies which purchase components from local small-scale companies has become to be given from the year of assessment 1990. The abatement is 5% of adjusted income or a total value of components purchased, whichever is lower.

(2) Incentives for Research and Development

In order to encourage research and development (R & D) activities in Malaysia, the following incentives would be provided:

1) Expenses required for scientific research for projects run by a company directly or through an agent and of a nature which would be lead to earnings in the future may be deducted. Expenses required for research approved by the Ministry of Finance may be deducted doubly.

2) Building used for the purpose of approved research are allowed the industrial building reduction of an initial 10% and subsequent 2%.

(3) Incentives for Training

The following incentives would be given for certain training activities to improve technical skills and productivity:

1) The Industrial Building Allowance (IBA) is granted to a company which has incurred expenditure on buildings used for approved industrial training. The incentive consists of an initial allowance of 10% and annual allowance of 2%.

2) Double Deduction of Operational Expenses is granted to a manufacturing company that has incurred expenditure for approved training.

(4) Incentives for Export Promotion

The manufacturers of electronic products would enjoy the following various export promotion incentives. The sale of such electronic components as CRTs or ceramic packages/substrates to assemblers located in FTZ or LMWs would also regarded as exports.

1) Abatement of Adjusted Income for Exports

An abatement of Adjusted Income for exports would be granted to electronic product manufacturing companies exporting, directly or through agents, products which are manufactured in Malaysia. The amount of the adjusted income to be abated shall be an amount equal to:

a) a rate which is equivalent to 50% of export sales as bears to total sales; and

b) 5% of the value of indigenous Malaysian materials which are incorporated in the manufacture of the products exported.

2) Double Deduction of Export Credit Insurance Premiums

To encourage the development of new markets, electronic product manufacturers would be allowed to make a double deduction for payments of premiums for export credit insurance.

3) Double Deduction for Export Promotion

Double deductions would be allowed for some specific expenses incurred by manufacturers for developing export markets for products made in Malaysia. The qualifying are as follows:

a) Overseas advertisements
b) Supply of free samples overseas
c) Surveys of export markets
d) Preparation for bidding overseas
e) Supply of technical information overseas
f) Displays and participation in trade or industrial fairs recognized by the Ministry of Finance
g) PR activities relating export
h) Overseas business trips of employees
i) Food and lodging expenses for Malaysian businessman on overseas trips (M$200 per day)
j) Expenses for maintaining overseas sales office

Table III.2-2 List of Electronics Products which Qualify for Tax Relief of 10 Years under the Promotion of Investment Act 1986

Colour television receivers/monitors	Microwave ovens
Video cassette recorders	Electronic cash registers
Computers	Optic fibre products and parts thereof
Printers	Cathode ray tube
Word processors	Wafer fabrication
Disk drivers	Multilayer printed circuit boards
Facsimile equipment	Tape player/recorder mechanisms

Photocopying machines	Ceramic substrate or packages
Electronic typewriters	Gold and aluminum bonding wires
Compact disk players	Stamping and plating lead frames
Telecommunication equipment	

III-2-3. Usage of Various Incentives

(1) Export Incentives

A survey of electrical and electronics firms operating in Malaysia shows that 73.5% of the firms have products for which at least half of production is exported and furthermore that 54.0% produce only such products, indicating the active nature of export activities in these industries.

Forty-eight of the firms, or 55.5% of the total, made use of export incentives. A breakdown of these firms by industry sector shows 17 consumer product manufacturers, 55 component manufacturers, 12 manufacturers of industrial products, and six other companies. Use of the incentives was most common in the consumer products sector, where 81.0% of the firms took advantage of the incentives. The figure was 50.0% for industrial product manufacturers, 54.2% for component manufacturers, and 50.0% for other firms.

Analysis of the results by capital structure shows that 73.0% of Japanese affiliates (27 firms), 73.3% of the U.S. and European affiliates (11 firms), and 80.0% of other foreign affiliates (four firms) made use of export incentives. Usage was extremely low among local companies, however, with only 27.3% (six firms) taking advantage of the incentives.

Thirty-one firms, or 75.5% of the total (excluding those who did not respond), answered that the incentives were effective. Japanese affiliates and local companies were especially satisfied with the programmes, with positive responses obtained from 85.7% (18 firms) and 80.0% (four firms) of the companies in the two groups. When analyzed by industry sector, there were some differences concerning the effectiveness of the incentives: while 83.3% of consumer product manufacturers (10 firms) and 79.2% of component manufacturers (19 firms) gave positive responses, 66.7% of other sectors (two firms), and both of the two manufacturers of industrial products considered them to be ineffective.

Table III. 2-3 shows the types of incentives being used. ECR was used by 22 firms (45.8% of the total); abatement of adjusted income for exports, by 35 (72.9%); double deduction of export promotion costs, by 12 (25.0%); industrial building allowance, by 12 (25.0%); and other incentives, by 15 (31.3%). Abatement of adjusted income for exports was the most popular. ECR, abatement of adjusted income for exports, double deduction of export promotion costs, and building deductions can be claimed simultaneously.

Table III. 2-3 Use of Export Incentives

Kinds of Incentives	ECR	Abatement of Adjusted Income for Exports	Double Deduction of Export Credit Insurance Premiums	Industrial Building Allowance	Others
No. of Answer*	22	35	12	12	15

* Multiple answer

There were only 26 responses which noted reasons for not making use of the incentives, and of these 14 were from local firms. These included: 1) complicated procedures (three firms); 2) lack of information (eight firms); 3) slow processing (0 firms); 4) no benefits expected (six firms); and 5) other factors (nine firms). It is noteworthy that the majority of companies indicating complicated procedures or lack of information as reasons for lack of use were local firms (two and four firms, respectively). In addition, half of the companies expressing doubt in the effectiveness of the incentives were local firms.

Of the firms benefiting from the export incentives, only 12.9% had fewer than 100 employees, while five of the eight firms noting lack of information as their reason for not making use of the programs had fewer than 100 employees, indicating that efforts to gather information in order to reduce costs were not promoted in smaller firms.

The major dividing line between those firms who were taking advantage of the incentives and those who were not was the 100-employee payroll. 81.3% of firms with over 1,000 employees, 75% of those with over 500 employees, and 64.3% of those with over 100 employees made use of the incentives, while only 30% of those with more than 50 employees and 28.6% of those with less than 50 took advantage of them.

Doubts concerning the effectiveness of the incentives also grew in inverse proportion to the number of employees. This item showed the most pronounced differences in opinion according to company size.

In summary, export incentives were most often used by foreign-affiliate manufacturers of consumer products with many employees. Japanese affiliates gave the highest evaluations of the incentives.

Forty of the 87 firms used GSP, 41 did not, and six did not respond, for a usage rate of 46.0%. When broken down by industry sector, 11 manufacturers of consumer products, one manufacturer of industrial products, and 25 component manufacturers made use of the system. Analysis by capital structure shows that while 60.5% of Japanese affiliates (23 firms), 62.5% of U.S. and European affiliates (10 firms), and

50% of other foreign affiliates (three firms) took advantage of the program, only 19.0% of local companies (four firms) made use of it.

According to the International Trade Division of the MTI, GSP was applied to exports of M$4.2 million, equivalent to 16.7% of the M$25.1 million in total exports to GSP supplying nations and not terribly significant. Although no breakdown by industry sector is available, it appears that, in addition to exports of palm oil, cocoa, rubber, and products made from the same, shipments by the electrical and electronics industry were heavy.

(2) Investment Incentives

Malaysia's investment incentives, reflecting the government's policy that foreign investment is indispensable to the promotion of industrialization, were given high priority since their inception. Since 1986, however, incentives have become even more favorable together with improvements in the investment environment, and at present Malaysia offers the most attractive investment incentive package of any of the ASEAN nations. Specifically, these incentives consist of various tax reduction and exemption measures. (See III 2-2)

Tables III 2-4 and III 2-5 show past and present use of the various incentives by electrical equipment and electronics firms. 66 firms responded to these questions, and the percentages shown in the Tables indicate the number of firms using the incentives divided by the number of responding firms. Companies must choose between pioneer status (PS) and ITA.

In the past, PS was the most frequently used incentive, with 49 firms, or 74.2% of the total, taking advantage of it. As the name of the program suggests, PS targets underdeveloped industries and those capable of making a major contribution to Malaysia and was designed basically for newly investing companies. Ordinarily, most firms switch to ITA after the period of eligibility for PS runs out.

PS, which provides exemption from taxation for five (and in some cases up to ten) years, is an extremely attractive incentive for investing firms, but relatively few companies are able to show a profit within one or two years after starting production, and, particularly in those industries requiring time for production to get under way, ITA is sometimes selected from the beginning. In the questionnaire, this trend could be seen at manufacturers of industrial products and components. 50% of the former and 24.4% of the latter used ITA, considerably higher than the figure of 5.9% posted by manufacturers of consumer products. Analysis by capital structure shows that fully 87.1% of the Japanese affiliates chose to use PS, more than for any other group. 31.8% of responding firms also took advantage of accelerated depreciation, with manufacturers of consumer products and the U.S. and European affiliates being especially apt to use this system.

At present PS remains the most frequently used incentive, but usage has dropped drastically, from 82.4% to 39.4%. 50 out of the 87 responding firms, or 57.5% of the total, had entered the field prior to February 1979, so that even if a ten-year exemption had been granted under PS it would have expired by now. The change was particularly noticeable among the U.S. and European firms and component manufacturers who had

experienced the investment boom of the early 1970s. In contrast, 80.0% of foreign affiliates from the NIEs and other nations who have been actively investing during the past two to three years made use of PS, indicating that the type of incentive chosen depends upon when the investment was made. Naturally, the ratio of firms receiving deductions for re-investment grew, from 6.1% to 12.1%, while the share of firms receiving export incentives fell markedly from 28.8% to 19.7%.

Table III. 2-4 Use of Investment Incentives (Past)

Kinds of Incentives	PS	ITA	Export Incentives	Accelerated Depreciation Allowance	Reinvestment Allowance
No. of Answers*	49	14	19	21	4
(%)	(74.2)	(21.2)	(28.8)	(31.8)	(6.1)

* Multiple Answer

Table III. 2-5 Use of Investment Incentives (Present)

Kinds of Incentives	PS	ITA Incentives	Export Allowance	Accelerated Depreciation Allowance	Reinvestment Allowance
No. of Answers*	26	13	11	22	8
(%)	(39.4)	(19.7)	(16.7)	(33.3)	(12.1)

* Multiple Answer

(3) Incentives for Training

Although the percentage of responding companies which conducted some form of in-house training grew to 83.9%, only nine had received incentives.

The only government policy for promotion of employee training is the tax incentive system established in 1985 to allow double deduction of operational expenses of training and Industrial Building Allowance for approved industrial training.

Since only three years have passed since enactment of the measure and few companies have made use of the system, its effectiveness is difficult to judge. One of the nine firms responded that it had increased its budget for training since becoming eligible for the deduction.

During the interviews a great deal of interest was indicated in this programme, and some of the firms had applied for eligibility, but most felt that approval was difficult. One of the reasons is the clause stating that the training must be for technical improvement required in the production of new or improved products or in a process in which new technology has been introduced. As a result, quality control training for the production of

existing products and training of new employees are not eligible for assistance.

(4) R&D Incentives

In addition to the training incentive described above, a measure was established to allow double deduction of R&D and related facility costs for the promotion of R&D. Only four firms, however, made use of this system. Although R&D activity itself is not particularly noteworthy, the fact that 26 firms (29.9% of the total) maintain R&D departments would appear to suggest that most of the R&D work currently being undertaken is incapable of meeting the eligibility criteria laid out in the incentive.

III-3. Supporting Institutions

III-3-1. Overview of Technical and Vocational Training Systems in Malaysia

(1) The Malaysian School System

The Malaysian school system is divided into primary education (six years), lower secondary education (three years), upper secondary education (two years), and higher education (two to six years). Uniform examinations are conducted nationwide for each of these divisions.

The main objective of the nationwide uniform examination given at the completion of primary schooling (6th year; Standard 6) is to determine academic achievement. Promotion to lower secondary education is automatic, regardless of the results of this test.

In the Lower Certificate of Education Examination, given at the completion of lower secondary schooling (9th year; Form 3) selection of students advanced to upper secondary school is performed, and the course of study -- general science, general arts, technical, or vocational -- is determined based on the choices of the selected students.

In the Malaysian Certificate of Education Examination, held at the completion of higher middle education (11th year; Form 5), further selection is performed, and the results determine which students will be allowed to enter the higher education system, which includes pre-university schools, teacher training schools, and polytechnics. Those students who chose the vocational course in upper secondary education are required to take the M.C.E. vocational exam, and successful candidates are guaranteed access to employment opportunities befitting their qualifications. Those passing the M.C.E. with excellent marks are allowed to enter pre-university schools (two years), while others are provided with the opportunity to study at teacher training schools (three years) or polytechnics (two years).

Those receiving high scores on the Malaysian Higher School Certificate Examination, conducted at the completion of pre-university schooling (13th year), are allowed to enter one of Malaysia's six universities.

(2) Technical and Vocational Training by Organisations Under the Ministry of Education

Malaysia maintains a wide variety of public institutions for technical and vocational training. Organizations under the control of the Ministry of Education form the basis for these.

In addition to the Ministry of Education-related institutions are the MARA Institute of Technology, Tunku Abdul Rahman College, the Technological University of Malaysia, and the Agricultural University of Malaysia, all of which were established with the objective of training sub-professionals.

There are also numerous technical and vocational training institutions for the training of skilled workers, including the Ministry of Labor's Industrial Training Institutes, the MARA Skill Training Institutes, the Ministry of Youth and Sports's Youth Training Centers, and the Ministry of Welfare Services' Training Centers.

Finally, the Agricultural Training Center (Ministry of Agriculture), the Standards and Industrial Research Institute of Malaysia (Ministry of Science, Technology and Environment), and the National Productivity Center are engaged in technical and vocational training in accordance with their respective objectives.

1) The Technical and Vocational Education Division

The Technical and Vocational Education Division was established in 1964 with the objective of promoting technical and vocational education in Malaysia. This organization comprises the following nine units and is responsible for drawing up, implementing, evaluating, and supervising all technical and vocational education plans at educational training institutions under the Ministry of Education.

1. Institutional Management
2. Development and Supplies
3. Student Affairs and Intake
4. Civil Engineering
5. Mechanical Engineering
6. Electrical Engineering
7. Commerce
8. Home Science
9. Agriculture

2) Technical and Vocational Education in the Lower Secondary Schools

The objective of technical and vocational education in the lower secondary schools is to help develop students' latent talents and hidden aptitudes. Since 1965, industrial arts, commerce, home science, and agricultural science have been present in the

curriculum as elective courses, and students are required to study one of them. At present, approximately 10% of total teaching hours (36 weeks per year) is devoted to technical and vocational education.

3) Technical and Vocational Education in the Upper Secondary Schools (Vocational Course)

The educational objective of the upper secondary vocational schools is to provide the students with practical training in skills that will lead to employment. In order to ensure the students possible future advancement in the form of further education and training, general education courses (languages, mathematics, science, etc.) are also included in the curriculum. The upper secondary vocational schools offer full-time classes for two years, and after completing this course students sit for the M.C.E. Vocational.

There are four departments at Malaysia's upper secondary vocational schools -- engineering, commerce, home science, and agricultural science -- together with the courses listed below. Technical and vocational training classes account for more than half of the curriculum, with the remainder devoted to general education.

1. Building construction
2. Machine shop practice
3. Welding and metal fabrication
4. Refrigeration and air-conditioning
5. Electrical
6. Electronics
7. Automotive
8. Business management
9. Office management
10. Catering
11. Fashion design and dressmaking
12. Beauty culture
13. Ornamental horticulture
14. Farm machinery
15. Farm management

4) Technical and Vocational Education in the Upper Secondary Schools (Technical Course)

The objectives of education in the upper secondary technical schools are: 1) to provide academic education; 2) to provide basic technical education as preparation for further education in higher technical institutions; 3) to elicit and maintain the interest of students with an aptitude for sciences by providing science and technology-related education; and 4) to improve the quality of skilled labour in order to meet the needs of industry.

At upper secondary technical schools, there are four departments: mechanical engineering, civil engineering, commerce, and agriculture. Ordinarily schooling lasts for two years, but some courses last for three. Laboratories, workshops, design rooms, and other facilities have been provided for physics and chemistry classes.

5) Polytechnics

Reflecting the fact that the training of engineers and technicians is indispensable to further promotion of industrialisation in Malaysia, the polytechnics were established with the main objective of training technicians.

In response to a serious shortage of technicians, the Ministry of Education in 1969 opened the first polytechnic at Ipoh. Today there are five such operating institutions located throughout the country.

Students who have passed either the Malaysian Certificate of Education Examination or the M.C.E. Vocational are eligible for admission, with test results for mathematics and the sciences being heavily emphasised.

Education at the polytechnics emphasises practical training in the workshops and laboratories, where about 55% of total class time is spent. There is also a factory practice period, falling between the first and second years and lasting six months, during which students are sent to either government or private-sector production plants. Courses available at the polytechnics are listed below. The majority are certificate courses lasting two years, but marine engineering and accountancy are diploma courses lasting four years and three years, respectively.

1. Mechanical engineering: General
2. Mechanical engineering: Production
3. Automotive and diesel
4. Air-conditioning and refrigeration
5. Plant engineering
6. Civil engineering
7. Public works and hydraulics

8. Architecture
9. Land surveying
10. Building services
11. Electrical engineering
12. Electronics and communication
13. Industrial instrumentation and control
14. Computer technology
15. Food processing technology
16. Business studies
17. Data processing
18. Bookkeeping
19. Secretarial science
20. Marine engineering
21. Accountancy

6) Expansion of Technical and Vocational Education and the Introduction of New Vocational Education Systems

As industrialisation progresses, workers with formal training are in increasing demand. In response, technical and vocational education is being expanded at a rapid pace.

In 1982, there were 29 upper secondary vocational schools, nine upper secondary technical schools, and two polytechnics. In 1988, these numbers had jumped to 46, nine, and five, respectively. By 1999, when the current development plans for technical and vocational education are completed, it is estimated that there will be 79 upper secondary vocational schools and seven polytechnics.

Based on the belief that the new mission of vocational education in the age of rapid technological innovation is to provide students with more advanced cognitive abilities, a series of reform was carried out in the vocational education system in 1987. The main thrust of these was the unification of the first-year (Form 4) curriculum and the expansion of vocational education opportunities (and hence the expansion of the skilled labour pool) through integration of upper secondary vocational and technical schools.

Under the reformed system, first-year students take classes under the unified curriculum, while second-year (Form 5) students are able to choose between vocational and technical courses, thus more accurately reflecting individual aptitudes.

In addition, a one-year short-term and specialised training course was newly established for those students who do not qualify for entering vocational schools due to

insufficient L.C.E. results. Students completing this course become eligible to sit for the NITTCB Skills Tests (to be described below). One-year specialised courses were also established for graduates of upper secondary vocational education who do not go on to higher education.

(3) NITTCB Skills Tests

1) National Industrial Training and Trade Certification Board (NITTCB)

The National Industrial Training and Trade Certification Board (NITTCB) was established in December 1971 with the objective of developing the skilled labor pool indispensable to realisation of the new economic policy objectives.

The NITTCB comprises the following members and is directly responsible to the Minister of Labour.

- Committee Chairman (ex-efficio, the Secretary-General of the Ministry of Labor)
- Ministry and agency representatives (14)
  - Economic Planning Unit
  - Malaysian Administrative Modernisation and Manpower Planning Unit (MAMPU)
  - Ministry of Education
  - Ministry of Culture, Youth and Sports
  - Ministry of Labour
  - Ministry of Trade and Industry
  - Ministry of Defence
  - Ministry of Public Works
  - Ministry of National and Rural Development
  - Majlis Amanah Rakyat (MARA)
  - Public Services Department
  - Sabah representative
  - Sarawak representative
- Labor and management representatives (6)
- Other (2)

The NITTCB has the following main functions: 1) continuous assessment of existing and future needs, both quantitative and qualitative for semi-skilled and skilled manpower; 2) recommendation of improvements for existing training programmes (appropriateness, duration, location); 3) establishment of evaluation criteria for existing

training programmes and facilities; 4) recommendations and assistance concerning the establishment of new training programmes and the most appropriate supervising institution and location therefor; 5) promotion or correlation of the in-house training activities undertaken by various training institutions; 6) development assistance for in-house training programmes at private companies; 7) sponsoring of seminars and workshops for technical instructors; 8) compilation of data concerning technical instructors; 9) establishment of National Trade Standards and development of training syllabi; and 10) sponsoring of the NITTCB Skills Tests and awarding of certificates.

2) National Trade Standards

The National Trade Standards reflect the types of skills required of a craftsman in this trade and form the basis for the implementation of training programmes and the evaluation of a worker's skill level.

In order to more accurately reflect the needs of industry, the National Trade Standards are established by NITTCB Ad Hoc Trade Standards Committees consisting of industry experts. At present, standards have been established for nine fields: automotive trades, building trades, woodworking trades, electrical and electronic trades, mechanical trades, printing trades, tailoring and beauty-care trades, testing and inspection trades, and drafting.

3) Trade Tests

The trade tests, based on the National Trade Standards, were first given to 384 candidates in 1973. Since then, reflecting strong demand of industry for skilled workers who have received certification under a national skills certification test, the number of candidates has grown steadily. The total number of candidates and their results at the end of 1987 is as shown below.

	The Number of Candidates	The Number of Successful Candidates
Basic Course	75,978	43,703
Intermediate Course	19,158	10,708
Advanced Course	208	81
Single Tier Course	149	53
Total	95,491	54,545

Trade tests and certification for the most trades are divided into three grades -- basic, intermediate, and advanced -- while for certain skills this type of division would not be appropriate. Each of the tests comprises two sections, one theoretical and the other practical, and candidates who receive passing marks in both sections are entitled to receive the National Certification of Skill Competency. The following qualifications are required in order to sit for the exam, although there is no stipulated educational qualification.

Basic course:

- Over 17 years of age or, in the case of students at government-approved training institutions, 15 years of age or over
- At least two years of actual experience in the relevant trade or completion at a government-approved training institute of basic course subjects in line with the National Trade Standards

Intermediate course:

- Acquisition of the basic grade certificate
- At least two years of actual experience or completion at a government-approved training institute of intermediate course subjects in line with the National Trade Standards following acquisition of the basic certificate

Advanced course:

- At least 21 years of age
- Acquisition of the intermediate grade certificate
- At least two years of actual experience following acquisition of the intermediate certificate

Prior to implementation of the trade tests, panels are established for each of the National Trade Standards. These panels consist of a minimum of seven individuals possessing extensive knowledge and experience in their respective trade: two employers' organisation representatives, two labour organisation representatives, and three experts appointed from industry. The role of these panels is as follows: 1) to formulate test questions in line with the National Trade Standards; 2) to evaluate and monitor test results; and 3) to appoint Chief other Examiners and Examiners for the tests. The former are nominated from among the panel members, while the latter are chosen from industry. By directly involving industry in the examination system, the government hopes to improve industry's evaluation of the system as well as more accurately reflect the needs of industry in the tests.

III-3-2. Supporting Services by Major Educational and Training Institutions

The present survey focused on the current state of electronics-related education and training in the institutions interviewed together with policies that would allow these institutions to assist in promotion of the Malaysian electronics industry.

(1) Universities

1) Universiti Malaya (UM)

Electronics education at the Universiti Malaya is carried out by the electrical engineering department.

The electrical engineering department offers a four-year course in which students study an average of seven subjects (class time for each is 50 hours) per year. Among the required subjects are: communication, power, computers, electronics control, and electrical basics. Students are also required to study four to six electives, which include data and computer communications, artificial intelligence, modern control systems, digital signal processing, microprocessors, high-voltage engineering, high-frequency technologies, fiber optics, and power practice. During the first two years of study, subjects outside the student's specialty (e.g., mechanics, physical properties) are emphasised in order to avoid excessive specialisation and provide students with a broader outlook. In addition, eight weeks in the first year and five months in the third year are devoted to a plant practice programme with the objective of having students experience the production site first-hand. The first-year session involves joint work with technicians and factory workers, while the third-year programme is spent in the company with engineers. Companies accepting the trainees are electronics firms like Motorola, Intel, IBM, and Texas Instruments.

At present, the electrical engineering department graduates approximately 50 students each year, but there are plans to increase this figure to 60-70. The majority of graduates find work at electronics firms in Penang.

In 1987 a master degree programme was established, with professors conducting lectures in Penang.

The cooperative relationship with corporations is limited to the acceptance of trainees. In order to establish a framework that would strengthen interaction between industry and academia and, in particular, allow private companies to utilize the university's specialized knowledge, technology, and facilities, the electrical engineering

department is currently considering the establishment of an engineering-related consulting firm.

2) Universiti Kebangsaan Malaysia (UKM)

An electronics department was established at Universiti Kebangsaan Malaysia in 1978. At the time it was placed under the School of Physics and Applied Science, but in 1984 it was transferred to the newly-established Faculty of Engineering. The latter currently comprises four departments: civil engineering, mechanical engineering, chemical engineering, and electronics. There are a total of approximately 120 students in the electronics department, and upon graduation most find employment in the local electronics industry.

Just as at Universiti Malaya, the UKM electronics department recognizes that interaction between industry and academia is indispensable to the promotion of Malaysian electronics industry. In fact, however, interaction with industry is proceeding at a snail's pace, the major factor being a lack of facilities. At present, for example, the department is capable of designing up to 16-layer printed circuit boards of the type widely used in electronics products. Due to a lack of manufacturing facilities, however, the university cannot meet the actual needs of industry. In an attempt to resolve this problem, the establishment of an Engineering Application Center is now under consideration.

3) Universiti Sains Malaysia (USM)

The Universiti Sains Malaysia was established in Penang in 1969 as Malaysia's second university. At present, the institution comprises the thirteen schools listed below. Of these, the School of Electronic and Electrical Science and the School of Materials and Mineral Resource Engineering were transferred to a branch campus established at Ipoh in July 1986. New buildings are currently under construction, with completion scheduled for sometime during 1989. Electronics education at the school is conducted in Ipoh at the School of Electronic and Electrical Science, which has 240 students (60 per year).

1. School of Pharmaceutical Science
2. School of Medical Science
3. School of Housing, Building and Planning
4. School of Industrial Technology
5. School of Electronic and Electrical Engineering
6. School of Materials and Mineral Resource Engineering
7. School of Humanities

8. School of Social Sciences
9. School of Educational Studies
10. School of Biological Sciences
11. School of Chemical Science
12. School of Physics
13. School of Mathematical and Computer Sciences

In Malaysia, where there is little interaction between academia and industry, USM's Industrial Research and Consultancy Service is a unique system established with the objective of strengthening ties between the two sectors.

The Industrial Research and Consultancy Service was established in 1981 with the objective of creating a formal framework to mobilise university resources for resolution of various problems faced by private industry, the government, and communities. The service is provided based on confidential commercial-base contracts, and the knowledge, information, facilities, personnel, and other resources available to the university are all mobilised for consulting and problem-solving. The majority of the schools listed above participated in this service, and project teams are organised for those projects requiring an interdisciplinary approach. Although turning a profit is not a major objective of the service, users are charged for expert services and the use of scientific equipment and other facilities. The Service has already handled numerous projects for a wide range of clients including multinational corporations, government institutions, and international organisations.

The School of Electronic and Electrical Science is also a participant in the Industrial Research and Consultancy Service and provides services in such fields as low-cost automation, radio and electromagnetic radiation problems, medical instrumentation and electronics, and calibration and standards. However, response has been less than outstanding, and since the move to Ipoh there have been no inquiries at all. The School of Electronic and Electrical Science believes that the introduction of new fields suited to industry's needs is needed to activate linkages with industry and is currently investigating the possibility of establishing a Design Laboratory for Information Technology together with construction of new school buildings.

(2) Polytechnics

The polytechnics are institutes of higher technical education established with the objective of training secondary school leavers as qualified mid-level technicians falling in between engineers and craftsmen. Ordinarily, graduates find employment as technicians,

supervisors, and foremen. The first polytechnic was established in 1969 at Ipoh in the state of Perak. Since then, four other schools have been opened around the nation: one in Kuantan in the state of Pahang (est. 1976); one in Batu Pahat in the state of Johore (est. 1983); one in Alor Setar in the state of Kedah (est. 1984); and one in Kota Bharu in the state of Kelantan (est. 1985). At present there are approximately 8,000 resident students at the polytechnics. Additional schools are scheduled to be established in Kuching in the state of Sarawak (projected 1989) and in Port Dickson in the state of Negeri Sembilan (1990).

Departments and course outlines for the polytechnics are as shown in the separate Tables. All certificate-level courses last two years and three months. Marine engineering and accountancy are diploma-level courses lasting four years and three years, respectively. Educational policy at these institutions places equal emphasis on theory and practice, and all students are required to undergo a 25-week industrial training session after completing their first year of schooling. The students are taken in by public and private corporations. Although the specific breakdown varies by school, all of the polytechnics maintain contacts with 100-150 private companies. These firms view the acceptance of trainees as both a social responsibility and as a chance to uncover prime candidates for later employment.

Instructors at the polytechnics include holders of academic degrees, holders of diplomas, graduates of teacher training colleges, and so on. To take the case of the Alor Star Polytechnic, there are 138 instructors for 900 students. The academic backgrounds and teaching obligations of the instructors are as shown below.

(Academic Career)	(Number of Persons)	(Lesson Hours)	Note
Acquisition of Academic Degree	50 Persons	18Hours/Week	8 Persons who have Master's Degrees are included in this figure.
Acquisition of Diploma	35 Persons	20Hours/Week	
Technical Instructor Education School Graduate	25 Persons	22Hours/Week	
Others	28 Persons		Librarian, etc.

The Establishment of Faculties & Courses by Polytechnic

Faculties	Course	①	②	③	④	⑤
CIVIL ENGINEERING	Construction	*	*	*	*	*
	Public Works & Hydraulics	*			*	
	Architecture	*	*			
	Land Surveying	*	*			
ELECTRICAL ENGINEERING	Power	*	*	*	*	
	Electronic & Communication	*	*		*	*
	Instrumentation & Control	*	*	*		
	Computer Technology	*	*			
MECHANICAL ENGINEERING	General	*	*	*	*	*
	Production	*	*	*		
	Automotive & Diesel	*	*			
	Air conditioning & Refrigeration	*				
COMMERCE	Business Studies	*				
	Secretarial Science		*			
	Data Processing		*			
	Bookkeeping		*			*
DIPLOMA LEVEL	Accounting (3 years)	*	*		*	
	Marine engineering (4 years)	*				
OTHERS	Food Technology		*			

Notes: i) Five numbers (① to ⑤) respectively show polytechnics in ① Ipoh, ② Kuantan, ③ Batu Pahat, ④ Alor Setar, and ⑤ Kota Bharu
ii) All courses but the diploma level are certificate ones.

Source: Polytechnics in Malaysia Handbook, T.V.E.D. Ministry of Education

The Electrical Engineering Department runs four courses: electrical engineering: power; electronic engineering: communication; industrial instrumentation and control; and computer technology. Classes common to all of the courses curriculae are English, Islamic education, mathematics I, drafting, and electricity basics for first-year students and Islamic civilisation, industrial management, mathematics II, and a project for second-year students. Remaining classes are electives.

Specialised subjects of each course

First Year	①	②	③	④
Basic Electronics	*		*	
Computer Technology I				*
Electric Installation	*			
Electronics I		*		*
Engineering Science	*	*	*	
Measuring Principles			*	
Workshop Processes and Applied Heat	*			
Workshop Processes and Basic Wiring Practice		*	*	*
Second Year				
Computer Maintenance & Troubleshooting				*
Computer Principles			*	
Control Principles & Systems			*	
Electrical Instruments & Measurements	*			
Electronic Machines	*			
Electronic Equipment & Measurement				*
Electronic Equipment Repair & Maintenance		*		*
Electronic Instruments & Measurements		*		
Generation, Transmission & Distribution	*			
Industrial Electronics & Control	*		*	
Instrument Workshop Practice			*	
Programming				*
Pulse & Digital Systems		*		
Telecommunications		*		

Notes: Four numbers (① to ④) respectively show ① the electrical engineering course, ② the electronic engineering course, ③ the industrial machinery research and control course, and ④ the computer technology course.

In the semiconductor industry and other electronics-related fields,workers who have undergone interdisciplinary education or training are increasingly in demand. Based on the recognition that greater absorptive capabilities by a versatile labour force will allow not only the promotion of technology transfer but also a more effective response to industry needs, there are plans to establish Electro-Mechanical Technology Courses at the Ipoh and Alor Setar polytechnics in 1989.

Outline of the Electro-Mechanical Technology Course:

This course comprises four semesters, one of which (the third) is devoted to factory practice. The specialised subjects allotted to each term are as follows:

First semester: Engineering science I; engineering drawing; electronic and electrical principles; workshop processes, materials and electrical installation; engineering measurement

Second semester: Engineering science II; electronic and electrical applications; digital electronics; pneumatics and hydraulics; instrumentation and control

Third semester: Electro-mechanical design; computer applications; semiconductor manufacturing processes and robotics; plant installation and maintenance; supervisory management; project and workshop practice

(3) MARA Vocational Training Schools

The MARA vocational training schools form one of MARA agencies under the authority of the Ministry of National and Rural Development. They have been engaged in vocational training since 1966 with the objective of producing Bumiputra (aborigine) technicians. There are nine schools at present, with plans in the Fifth MP for an additional three. Vocational training is currently being conducted for 39 trades, of which three are related to electronics technology: electronic instrumentation, industrial electronics, and radio and television repair. The training centers around repair and maintenance techniques.

Each of the training courses consists of two half-year semesters and is divided into basic, intermediate, and advanced levels. Due to a lack of qualified instructors, no advanced courses are being conducted at present, but there are plans to begin them in 1990. Classes are held 36 hours a week, with one semester consisting of 17 to 20 weeks. At the Petaling Jaya school studied in the present survey, there are 30 students per semester and a total of 120. In order to enter the school, students must have completed a course of upper secondary education (i.e., they must have completed eleven years of formal schooling and passed the M.C.E.).

Classes offered in each of the courses are as follows:

	Courses	(i)	(ii)	(iii)
(a)	Basic Electronics & Electricity	*	*	*
(b)	Basic Hydraulic		*	
(c)	Basic Pneumatic (Installation and Repair)	*		
(d)	Basic Pneumatic & Electropneumatic (Installation and Repair)		*	
(e)	Digital Electronics	*	*	*
(f)	Electronic Laboratory Instruments (Calibration and Repair)	*		
(g)	Industrial Control		*	
(h)	Microprocessor & Computer (Servicing and Repair)	*	*	
(i)	Radio & TV Repair			*
(j)	Video Player Repair			*

Table

According to MARA, instructors for the basic pneumatics course and industrial control and basic hydraulics course have insufficient knowledge and skills, and in the digital electronics class as well more qualified instructors are needed. Skills standards set by MARA for the advanced courses require mastery of the skills shown below, but at present there are no instructors capable of conducting such training. Instructor training is therefore the first consideration.

Advanced course skills standards:

- Repair
  Check the serviceability of components, including microprocessors and peripherals
- Calibration
  Calibrate ADC and DAC
- Microprocessors
  Write simple programmes on a microprocessor kit
  Test and debug programmes on a microprocessor kit
- Maintenance concepts

Prepare maintenance reports

- Interpretation of data

Correct interpretation of data: Errors (gross, systematic, random), accuracy, deviation

- Linear electronics

Analog computers: Block diagrams of 1st order with amplitude and time scaling

Analog-digital (ADC) or digital-analog (DAC) convertors: Resolution, linearity, accuracy, calibration

Basic characteristics of sample and hold circuits

- Microprocessors

Block diagram and functions of a typical microprocessor (6800/8086)

Functions and characteristics of buses

Functions of input/output devices: Keyboards, printers, floppy disks, video display units and monitors, hard disks

- Addressing techniques

- Memories

Read and write, addressing, refreshing, programming and erasing techniques

Functions and characteristics of interfacing techniques: RS232, IEEE488 (GPIB)

Programming: Flowcharts, programming, concepts, instruction sets

- Motors

Basic characteristics and operating principles of AC motors: Shant, series, and compound

Motor speed controller with feedback

Stepper motor drive

Tacho generator in speed precision control

- Maintenance concepts

Definition of basic equipment performance: MTBF, MTTF, MTTR, reliability

Application of control and analysis charts: Histograms, Pareto, fishbone SPC/SQC charts

(4) Centre for Instructor and Advanced Skill Training (CIAST)

The Center for Instructor and Advanced Skill Training (CIAST) was established in Shah Alam in the state of Selangor in 1984 with Japanese grants and technical cooperation. CIAST was established for the training and retraining of technical instructors of public training institutions and supervisors of private companies, and it is the apex public training facility in Malaysia. More than 2,000 students have undergone

training there since its inception, and in March 1988 it started regional training programmes targeting other regions in Malaysia. CIAST also functions as a regional training centre for ASEAN, and regional training programmes for ASEA member nations were conducted in 1988.

CIAST training courses can be roughly divided into two categories: 1) instructor and supervisor training; and 2) advanced skills training. Since the entrance qualification to CIAST is at least to hold NITTCB's intermediate certification, the majority of trainees are instructors of vocational training facilities and plant supervisors. In order to allow free selection by trainees, each course is divided into modules lasting two to four weeks. Trainees receive a "Module Certificate" after completion of each module and a "Proficiency Certificate" after completion of all the modules in a course.

The instructor training course comprises a six-month course on pedagogy training and nine one- to two-week module courses covering such topics as basic training techniques, skills analysis, and audiovisual education aids. The supervisor training course consists of seven one- to two-week modules covering topics such as quality control, safety management, and production planning management.

Advanced skills training is offered for 11 fields: automotive; machine operation and die making; forging and heat treatment; welding and metal fabrication; press work; foundry and casting; rubber moulding; plastic moulding; electrical; electronics; and instrument and automatic control. These courses also comprise several two- to three-week modules. CIAST modules are designed to avoid duplication of content with the NITTCB Trade Standards and are targeted at skills fields new to Malaysia as well as those fields going beyond the scope of the NITTCB Trade Standards.

Some illustrative modules and sub-modules for the electrical course are shown below. The electronics course covers such areas as television and radio repair and computer operating techniques.

<u>Electrical course:</u>

Relay maintenance and repair
- Contact circuit relay maintenance and repair
- Non-arcing circuit relay maintenance and repair
- Industrial wiring and distribution panel works

Motor trouble analysis
- Motor trouble analysis and repair
- Transformer trouble analysis and repair

Motor testing

Motor generator control testing
Motor automatic control

III-3-3. Other Supporting Facilities

(1) National Productivity Centre (NPC)

The National Productivity Centre (NPC) was established in 1962 as a joint project by the United Nations Special Foundation (UNSF) and the Malaysian government with the International Labour Organisation as the executing agency. With the enactment of the National Productivity Council Incorporation Act in 1966, the Centre became an independent organisation under the authority of the Ministry of Trade and Industry. The National Productivity Council is responsible for operation of the NPC and comprises 18 representatives from the Ministry of Trade and Industry, the EPU, the Ministry of Labour, the Ministry of Finance, the Ministry of Agriculture, institutions of higher education, commerce, industry, and finance organisations, and labour and management groups. The NPC is a non-profit organisation, with approximately 80% of its working budget coming from an annual government giant and the rest made up from Centre's own revenue.

The NPC is essentially a management training organisation with the objective of increasing productivity. Its main functions are as follows: 1) instruction in, promotion of, and dissemination of the concept of productivity; 2) the nurturing of local experts and techniques for productivity, management, and entrepreneurship; and 3) manpower development. The NPC is currently engaged in a wide variety of activities through the following 11 units and five branch offices (the latter are located in Kuantan, Penang, Johor Bahru, Kuching, and Kota Kinabalu).

[1] Management Development -- Personnel Development and Industrial Relations
[2] Industrial Engineering and Low-Cost Automation
[3] Management Accounting
[4] Sales and Marketing
[5] Hotel and Tourism Management
[6] Entrepreneurship Development
[7] Productivity Promotion
[8] Support Services
[9] QCC
[10] Consultancy
[11] Staff Development

Current NPC activities emphasise productivity promotion and QCC. Since 1980 the NPC has been engaged in a productivity promotion campaign, and in 1985 a special unit was established to carry out a campaign for fostering productivity awareness. Furthermore, in 1987 ILO experts were invited for the training of NPC instructors in productivity measurement methods. Concerning QCCs, the organisation sponsors a national conference each year and is working towards their promotion. There are currently about 300 QCCs in existence across the nation, mainly in the electrical and electronics industries, and activities are most active in Penang.

One other NPC activity worthy of note is the Management Consultancy Service. This service goes beyond mere advice-giving to provide concrete assistance in carrying out its recommendations. Established in 1970, the Service's functions include feasibility studies for the commencement of new companies, inter-firm comparison, programmes for organisational development, setting-up of management information system, recruitment of employees, in-house training, and introduction and implementation of industrial engineering techniques.

(2) Technology Parks

1) Malaysian Government Policies for R&D Promotion

The Malaysian government's R&D promotion policies are an attempt to pave the way for technological innovation in Malaysia. From this standpoint, R&D activities are defined as follows:

"A planned and systematic research aimed at the discovery of new technical/scientific knowledge with the objective of utilising this new knowledge to develop new products/processes/services or to bring about significant improvements to existing products/processes/services."

Based on this definition, the following types of activities have been singled out for eligibility under the R&D promotion policies:

[1] The concept development, formulation, design, analysis, construction, and testing for the creasion of a new or improved products

[2] Operation of pilot plants

[3] Construction of prototype models

[4] All engineering activities required to advance the product to the point at which it meets with functional and economic requirements and is ready for manufacture

[5] Searching for application of new research findings or other technical knowledge

2) An Overview of the Technology Park

Objective: To function as a medium and window for technology transfer

Location: Bangi, Selangor

Management: Managed as a joint venture between the government and the private sector, with the government to bear the initial development cost of 20 million ringgit

Projected occupants:

[1] Government research institutions
[2] R&D divisions of private firms
[3] R&D consulting firms (companies conducting product development under contract)
[4] Low-budget operations

Industries and products for promotion (3 - 8 assume joint ventures with foreign firms):

[1] Rubber	: Latex products
[2] Palm oil	: Oleo chemicals
[3] Food	: Cocoa products, canning and food processing
[4] Wood	: Chemicals extracted from wood
[5] Nonferrous metals	: Chemicals extracted from tin
[6] Nonmetallic	: Advanced ceramics
[7] Microelectronics	: Various products
[8] Biotechnology	: Various products

3) Incentives for Firms located in the Technology Parks (MIDA Proposals)

All of the existing incentives, including pioneer status, investment tax credits, export incentives, and R&D incentives, are benefit to firms only if development work is successful. As a result, they are of no assistance to a high-risk R&D activity itself. In order to lessen the risk of R&D activities in the development stage, MIDA has proposed the following new incentives., which target not at corporations themselves but rather at specific R&D projects carried out by the corporations.

Negotiable Tax Credit Certificates:

This incentive would allow a tax credit in the form of a negotiable certificate on 50% of operating costs and capital expenditure (excluding land purchases and construction costs) incurred as the result of R&D activities. The term of applicability for the incentive would be the two years following commencement of R&D activities, with the negotiable certificates being valid for five years. Consequently, this programme would reward successful R&D activities or partially compensate firms for losses incurred as the result of unsuccessful activities.

R&D Matching Grants:

This incentive would establish an R&D fund and provide grants to firms meeting certain criteria. Eligibility for the grants is limited to firms at which a minimum of 60% of the capital (30% Bumiputra) is held by Malaysians. Those firms meeting this condition are eligible to have 50% of all R&D outlays reimbursed in the form of a grant. The term of applicability of this incentive is two years, with reimbursement to be based on actual expenditures undertaken every six months.

Firms must choose between one of these two programmes.

Those corporations engaged in R&D activities lasting more than two years or embarking on commercialisation of the results thereof are eligible for existing incentives. The Malaysia Industrial Development Authority recommends that the government should enact the National Technology Park Act *, 1988, which incorporates incentives like those described above.

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*Note: Incentives incorporated in the Act are as follows:

1. Negotiable tax credits
2. Matching grants
3. Pioneer status
4. Double deduction allowances for R&D expenses
5. Industrial building allowances and capital allowances
6. Export incentives
7. Incentives for training
8. Agricultural incentives
9. Exemption from import duties

10. Unrestricted sales of products in the domestic market
11. Automatic approval for qualified expatriates

4) Qualifications Necessary to Apply for the Incentives (Guidelines for Approval)

Eligible Firms:

a) Existing manufacturing firms intending to transfer their R&D operations to or establish R&D Division at the technology park
b) New companies undertaking R&D activities at the technology park
c) Firms contracting out an R&D project to a consulting firm located in the technology park

Consulting firms are not eligible for the incentives.

Approval Guidelines:

a) All firms engaged in manufacturing activities in the technology park must have continuous plans for R&D activities. Furthermore, these R&D activities must fulfill the following conditions:
    i) The R&D budget must constitute at least 20% of the profits of the preceding year.
    ii) The R&D staff must represent a substantial portion of the total staff strength.
b) All R&D activities must be undertaken in relation to commercial application.
c) All products developed must be marketable.
d) The R&D staff must be on a full-time basis.
e) At least 40% of those involved with R&D projects must be technically qualified trained personnel with relevant experience training in the field of research.
f) The R&D content must have novelty for Malaysia.
g) Product research and manufacture must not infringe upon Malaysian patent law or copyright law.
h) Firms applying for pioneer status (10 years) must fulfill at least one of the following conditions:
    i) Products must be related to high-tech fields; know-how must not be well-known worldwide.

ii) Products must contribute to the improved export competitiveness of existing products manufactured in Malaysia.

iii) Products must contribute to earning or saving a substantial amount of foreign exchange for Malaysia.

III-3-4. Problems and Countermeasures

The history of technical training in the Malaysian electronics field does not go back very far, and stores of knowledge, technology, personnel, and facilities are less than bountiful. Viewed from a worldwide perspective, the electronics industry offers the most drastic changes in the areas of technological innovation and product improvement. Thus, technical training in the Malaysian electronics industry is faced with the dilemma of having to respond to a rapidly changing environment with scarce resources.

The two main problems clarified in the present survey were 1) the existing mismatch between industry's needs and training content and 2) the poor ability of training institutions to provide private companies with technical guidance. The two were noted with equal frequency by interviewees. It is believed that the first has a significant negative impact on the attraction of foreign investment, while the second affects the promotion of local industry.

(1) Resolution of the Mismatch

• Measures to combat obsolescence

[Problems]

Technical training requires facilities, instructors, training syllabi, trade standards, and teaching materials. Existing training capabilities due to the rapid advance of technology, inevitably become obsolete. This phenomenon is especially pronounced in the electronics field. In Malaysia, where training resources are scarce, linkages between academia and industry few, and input from industry lacking, various problems have developed in fighting obsolescence. Following are a few examples:

[1] An absence of qualified advanced course instructors at the MARA vocational training schools

[2] A shortage of experts capable of developing curriculae, selecting equipment, educating instructors, and establishing methods of evaluation needed for the establishment of electro-mechanical technology courses at the polytechnics

[3] A shortage of experts capable of establishing NITTCB Trade Standards and drawing up skills test questions in new fields

[Countermeasures]

1) Expansion of training resources:

In addition to facility renewal, the expansion of training "software" (including instructors, skills standards, training syllabi, teaching materials, etc.) is also important. Experts should be invited from nations or international organisations already possessing the necessary training resources and asked to participate in software development.

2) Strengthening of linkages between industry and academia:

In order to minimise the mismatch, continuous input concerning actual corporate needs is critical. Furthermore, costs for expansion of training resources are increasing every year, and it will be impossible to depend entirely on public funding.

The lack of linkages between industry and academia in the Malaysian electronics field is not unrelated to the fact that the industry has been dominated by multinational corporations. In the past, such firms were able to receive technological assistance from their parent firms, and there was no special need for stronger ties with local training institutions. Changes in the international economic environment, however, have brought about a situation in which localisation of management resources can be beneficial for such corporations. Moreover, in order to increase the added value of products produced locally, the quality of skilled labour will have to be improved.

To this end, unification of training in generally applicable technology (although probably not feasible in technology original to a firm) is thought to be quite possible.

Here, the Skill Development Centre, a joint project established in Penang with the cooperation of industry, academia, and PDC, is rich in suggestions of ways of strengthening linkages between industry and academia.

Outline of the Skill Development Centre:

In response to the shortage of skilled labour and the lack of appropriate technical training in the Penang area, electronics firms operating in Penang, USM, and the Penang Development Corporation (PDC) joined hands to establish this organisation for skills training. The electronics firms are responsible for providing necessary equipment and technicians; USM, for software; and the PDC, for land, construction, and coordinating functions. At present, the training is limited to employees of firms participating in the

project, but the future acceptance of trainees before hiring is said to be under consideration.

• Promotion of versatility

[Problems]

In the past, technical training policies in Malaysia emphasised the mastery of narrow single skills, lending only minor importance to the improvement of worker comprehension and cognitive abilities. This type of training brought about an increase in the number of skilled labourers in a relatively short period of time, but it also helped to create today's mismatch of training and industry needs. In other words, workers trained under this type of system are unable to improve their skills and adjust to new technologies.

Reforms have already been carried out in the vocational education system concerning this point, and at the polytechnics as well interdisciplinary training courses are being introduced, indicating a growing shift in training policies to an emphasis on improving skilled workers' versatility and adaptability.

[Countermeasures]

1. It is important to formulate a consensus among all involved with vocational education that the new mission of vocational education in today's age of rapid technological innovation is to provide labourers with more advanced cognitive abilities.
2. Efforts must be made to concretely reflect this consensus at the training site in the form of more thorough theoretical education and more interdisciplinary courses.

(2) Strengthening of Technical Guidance Capabilities

The presence of local supporting industries serves as a major attraction for foreign corporations considering investment in Malaysia. Consequently, promotion of local supporting industries is an important element in promotion of the electronics industry as a whole.

In order to induce local firms to move into such industries, technical consulting and troubleshooting services easily available for local firms will be necessary. When questions of financing, experience, and capabilities are taken into consideration, it is believed that the most realistic and appropriate method would be for existing public technical and skills training institutions to handle these services.

[Problems]

Although some of the existing public technical and skills training institutions currently provide such services or have the latent potential to provide such services, there are a variety of limitations preventing full development of these functions.

One of these limitations is the geographical location of the facilities. With the single exception of USM, all of the organisations capable of providing the services (SIRIM, CIAST, NPC, etc.) are concentrated around Kuala Lumpur, making it impossible for them to respond adequately to the needs of workers and corporations in local areas. Utilisation of the USM School of Electrical and Electronic Science's IRCS dropped to zero after its move to Ipoh, indicating the great impact of distance on ease of use.

Another limiting factor is the lack of facilities: UKM's Engineering Application Centre, USM's (Perak) Design Laboratory for Information Technology, and MARA's Electronics Centre all remain in the conceptual phase because of this.

The polytechnics possess adequate facilities, but since they are not authorised to charge fees for their services they are unable to serve in this capacity.

[Countermeasures]

In order to promote local supporting industries, technical consulting and troubleshooting functions should be shared among existing public technical and skills training institutions. The establishment of technology parks would also be an effective measure. The present proposal, however, places too wide a range of expectations on the parks (e.g., promotion of small business, etc.), and it is feared that this will result in a dilution of the parks' original role.

• Geographical restrictions

1. The existence of the services should be well publicised and programmes for local areas enlarged.
2. Measures to encourage corporations to bear training costs (cf. Singapore's Skills Development Fund) should be investigated.
3. Regional branch offices should be established.

• Facility-related restrictions

1. The above-described projects should be brought to fruition through an increase in facilities.
2. Interaction between industry and academia should be strengthened.

• Institutional restrictions

1. It should be possible for the polytechnics to provide such services without detriment to their original educational objectives. Ways in which the polytechnics could provide these services without infringing upon institutional framework (e.g., the Ministry of Education, which supervises these schools, might take over the business functions for services involving a fee) should be considered.