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MALAYSIAN INDUSTRIAL MASTER PLAN

FINAL REPORT

VOLUME IA

(ENGINEERING/MACHINERY INDUSTRIES)

December 1984

SGV

THE SGV GROUP

SGV-KASSIM CHAN SDN. BHD.

MANAGEMENT SERVICES

TABLE OF CONTENTS

LIST OF TABLES

LIST OF TABLES

LIST OF TABLES

LIST OF TABLES

LIST OF TABLES

LIST OF TABLES

LIST OF TABLES

LIST OF TABLES

LIST OF TABLES

LIST OF TABLES

SGV-KASSIM CHAN SDN. BHD.

LIST OF TABLES

LIST OF APPENDICES

I. INTRODUCTION

1.1 STUDY BACKGROUND

The basic national strategy for the industrial development of Malaysia is succinctly outlined in the New Economic Policy (NEP) as elaborated in the Second Malaysia Plan. This was reiterated in the Outline Perspective Plan (OPP) of the Third Malaysia Plan.

The strategy's two fundamental objectives are:

1. Poverty redressal.

2. Restructuring of society by correcting the economic imbalance between different groups of people and between different regions.

The redressal of poverty is proposed to be implemented by improving the income earning capacity of the poorer sections of people in economic activities such as agriculture, industry, and services. Several institutional facilities are provided for the purpose. Restructuring of society is expected to be implemented by reducing the market imbalances and disparities in income, employment, ownership of assets among different groups of people and races, and among different regions. Institutional support and financial facilities are also provided for this purpose.

The manufacturing sector is a rapid growth sector in the Malaysian economy. Its contribution to national output was 20.5% in 1980 and is projected to increase to 26.6% by 1990. In constant 1970 prices, the sector's contribution to the nation's GDP is expected to increase from M$5.4 billion in 1980 to M$15.1 billion in 1990. The magnitude of growth in this sector would necessitate a substantial amount of new investment during the next decade. These investments would mostly emanate from the private sector as the Government follows a liberal economic policy of encouraging the private sector to play a predominant role in initiating and implementing investment decisions. This policy orientation of the Government is fully reflected in the Fourth Malaysia Plan.

However, the Government has to strike a balance between national socio-economic policies as embodied in the NEP and the direction as well as the structure of growth in the manufacturing sector. Since Malaysia is a predominantly private sector economy, investment decisions are undertaken mostly by private individuals and entities on the basis of commercial profitability. The sum total of such commercial decisions is not likely to reflect the national socio-economic priorities embodied in the NEP, particularly with respect to rapid poverty alleviation and restructuring of society. It is for this reason that the Government has felt the need to prepare an Industrial Master Plan for the country.

Industrial planning in Malaysia has in the past been done at a macroeconomic level with emphasis on long-term policies, strategies and incentives. This has so far served the country well. However, during the next phase of Malaysia's economic development, the scope for continued industrialization by means of import substitution is expected to narrow and relatively cheap industrial labor may become scarce. Consequently, the country will be faced with a number of hard options. Important among these are the planning of investment requirements in export-oriented industries, resource-based industries, heavy industries and skills-intensive industries. To reflect the Government's national socio-economic policies, it is also necessary to plan for the development of small-scale industries as well as to reduce regional imbalance in industrial development.

Viewed in this context, an Industrial Master Plan incorporating detailed industry plans and programmes is an essential ingredient in the implementation of the NEP. Currently the Five Year Plan for the manufacturing sector is prepared at various levels without the support of detailed plans and programmes from component industries and industry sub-groups. As a result of this lacuna, the developmental and financial institutions set up by the Government to support industrial programmes find it operationally difficult to effectively undertake the tasks assigned to them. There is no comprehensive set of guidelines for allocating scarce development resources among competing needs.

1.2 STUDY OBJECTIVE

In the light of foregoing discussion, the objective of the Project is to prepare an Industrial Master Plan to assist the Government of Malaysia in identifying priorities for industrial development. These priorities are to be determined on the basis of each manufacturing sub-sector's actual and prospective contribution to the Malaysian economy. The Project is expected to generate considerable data for monitoring the economic performance of each industry. On the basis of this information, present strategies, policies, and incentives can be revised and modified to accomplish the goals of the NEP as delineated in the OPP.

1.3 SCOPE OF STUDY

The Consultants' direct involvement in the Project is limited to the following sectors:

1. Engineering and Machinery

   a. Foundries

   b. Manufacture of Fabricated Metal Products

      - manufacture of cutlery, hand tools, and general hardware excluding tinsmithing and blacksmithing
      - manufacture of furniture and fixtures primarily of metals
      - manufacture of structural metal products
      - manufacture of tin cans and metal boxes
      - manufacture of wire and wire products
      - manufacture of other fabricated metal products n.e.s.

   c. Manufacture of Machinery except Electrical

      - manufacture of special industrial machinery and equipment

2. Chemicals

   a. Base Products and Intermediates

      - inorganic products and intermediates
      - fertilizers
      - petrochemical building blocks and intermediates
      - plastics and resins

   b. End Products

      - paints, varnishes, inks, pigments and dyes
      - pharmaceuticals
      - pesticides
      - cosmetics, soaps and detergents
      - miscellaneous end products

3. Transport Equipment

   a. shipbuilding

   b. railroad equipment

Focusing on these three sectors, the Consultants have undertaken to accomplish the following tasks as stipulated in the Terms of Reference:

1. Assessment of each sector's current status and development issues
2. Evaluation of each sector's future market potentials
3. Conceptualization of sectoral development strategies and investment criteria
4. Articulation of sectoral investment plans
5. Formulation of integrated sectoral development policies and programmes

Assessment of a sector's current status entails a full consideration of the following principal areas:

1. Current Status: macroeconomic contributions, inter-industry linkages, industry problems and opportunities, price and non-price competitiveness in the international market.

2. Technology: existing state of embodied technology, potential for indigenous research and development, priority areas for technological advancement, other technology-related issues

3. Factor Endowments: input structure in production, availability and cost of relevant major inputs, input productivity, facilities for expanding or upgrading input base

4. Promotional Policies and Issues: general and specific government incentives, perceived effectiveness of various promotional measures, areas for policy improvement

The following steps are necessary in the evaluation of a sector's future market prospects:

1. Survey of global market trends

2. Forecasting of domestic market demand

3. Forecasting of aggregate (domestic and export) market demand

Market projections are premised on the Consultants' ability to identify relevant causal relationships among domestic and international economic variables. Whenever feasible, econometric analysis is employed. The forecasting period is defined to be from 1985 to 1995.

The conceptualization of sectoral development strategy and investment criteria immediately follows the evaluation of a sector's current status and future potentials. In this connection, the following basic questions have to be addressed: (a) what criteria should be used to establish product priorities in each sector? (b) what products or product groups in each sector should receive top priority in terms of Government support, investment, and schedule of development? and (c) what sectoral strategies will enable Malaysia to develop its priority products and product groups in the most effective and efficient manner?

Given the forecasts of future market demand, the Consultants will subsequently direct their attention to the supply side. General investment and import requirements of each sector will be estimated in accordance with the schedule of development for priority products.

On the basis of the foregoing analysis, a set of coordinated policies and programmes aimed at fostering the rational, long-term development of the three sectors concerned are derived. Revisions or modifications to the following aspects of current public policies are examined to ascertain that resultant recommendations are consistent with the overall objectives of the NEP and the OPP.:

1. tariff structure
2. exchange rate policy
3. manpower development programmes
4. export promotion policies
5. fiscal and financial incentives
6. wage/price stabilization
7. technology transfer [illegible]

The sectoral assessment of the current status as well as future market potentials of the engineering and machinery, chemical, and transport equipment (shipbuilding, railway equipment) industries constituted phase one of the study. The articulation of integrated sectoral policies and programmes as well as recommended changes in the current public policy framework are incorporated into this Final Report.

1.4 ORGANIZATION OF RESEARCH

Because of the very specific data requirements stipulated in the Terms of Reference, a large proportion of the information contained in this Final Report was generated from a field survey of the three sectors which the Consultants conducted over a three-week period (July 30, 1984 - August 17, 1984). Respondent firms were selected from MIDA listings and from the membership of various industry associations such as the [illegible] Industries Council of Malaysia (CICM) and the Federation of Malaysian Foundry and Engineering Industries Associations (FOMFEIA). During this interval, a total of [illegible] firms located in various districts of the country [illegible] interviewed.

A decomposition of the respondent base according to sectoral and sub-sectoral classifications is presented below:

Sector/Sub-Sector		No of Respondents
1.	Engineering and Machinery	49
	o Foundries	14
	o Manufacturers of structural metal products	7
	o Manufacturers of tin cans and metal boxes	4
	o Manufacturers of wire and wire products	7
	o Manufacturers of other fabricated metal products n.e.s.	11
	o Manufacturers of special industrial machinery and equipment	6
2.	Chemicals	33
	o inorganic products and intermediates	5
	o fertilizers	6
	o petrochemical building blocks and intermediates	1
	o plastics and resins	9
	o paints, varnishes, inks, pigments and dyes	3
	o pharmaceuticals	3
	o pesticides	4
	o cosmetics, soaps and detergents	2
3.	Transport Equipment	7
	o shipbuilding	7

In the case of railway transport equipment, the Consultants interviewed officials from the Malayan Railway (Keretapi Tanah Melayu or KTM), the Ministry of Transport, and the Rolling Stock Division of Malaysia Shipyard and Engineering Sdn. Bhd. (MSE).

Published reports and statistics were obtained from the MIDA, EPU, Department of Statistics, and various industry sources. The Consultants also held regular discussions with UNIDO industry specialists.

A copy of the survey questionnaire used by the Consultants in the engineering and machinery industries forms Exhibit I of this Report.

1.5 REPORT FORMAT

The Consultants' Report is presented in three separate volumes. Each volume covers one of the industrial sectors specified in the contract. This volume (Volume 1A) discusses the current status, future propects and recommended strategies and developmental policies for Malaysia's engineering and machinery industries. All exhibits are contained in Volume 1B.

II. INDUSTRY BACKGROUND

2.1 THE MALAYSIAN MANUFACTURING SECTOR

Whereas the Malaysian economy, represented by its Gross Domestic Product (GDP) in 1970 constant prices, expanded at a rate of 7.8% per annum during the decade of the seventies, the manufacturing sector grew at a rate of 12.5% per annum, thereby increasing its share of GDP from 13.4% to 18.6% over that period. The growing importance of the manufacturing sector can be highlighted by contrasting its performance against that of the agricultural sector, whose share of GDP fell from 30.8% in 1970 to 23.8% in 1980.

Since 1980, however, the global recession has adversely affected the Malaysian economy, although to a lesser extent than some of the OECD economies. GDP registered a real growth rate of 6.2% per annum from 1981 to 1983, with the manufacturing sector growing at only 4.9% per annum over those three years. As a result, the manufacturing sector's share of GDP declined slightly from 18.6% in 1980 to 17.9% in 1983. By comparison, the services and agriculture sectors of the economy accounted for 47.9% and 22.4% of GDP respectively in 1983.

2.2 IRON AND STEEL BASIC INDUSTRIES

The iron and steel basic industries, represented by the primary iron and steel industries, foundries and other iron and steel basic industries, produce the inputs for the mining, quarrying, palm-oil refining, rubber processing, cement manufacturing, construction, transportation and manufacturing industries. Products of the primary iron and steel industries include blast furnace smelting products of pig-iron and steel ingots and semi-finished products from hot-rolling mills such as billets, blooms, slabs or bars of various types of steel.

The foundries manufacture iron and steel castings and forgings, including cast-iron pipes and fittings, cast-iron stoves, utensils and machinery parts. Other foundry products include wire rods and heavy gauge wire castings and forgings. The products of hot and cold-rolling and drawing such as sheets, tin-plate, terne-plate, black-plate, strip, tubes and pipes, rails and rods are classified under other iron and steel basic industries.

Table 1 shows that the iron and steel basic industries have grown rapidly between 1973 and 1981:

TABLE 1
IRON AND STEEL BASIC INDUSTRIES:
PRINCIPAL STATISTICS, 1973 AND 1981

					M$ Million In Current Prices					
	No. of Establishments		Employment		Gross Value of Output		Cost of Input		Value Added	
Industry	1973	1981	1973	1981	1973	1981	1973	1981	1973	1981
Primary Iron & Steel Industries[1]	12	24	2,207	2,174	97.0	234.7	57.6	n.a.	39.3	n.a.
Iron Foundries	126	269	2,547	4,918	29.9	119.6	16.4	77.4	13.5	42.3
Other Iron & Steel Basic Industries[1]	52	115	1,418	3,588	99.0	492.2	75.7	n.a.	23.3	n.a.
Total	190	408	6,172	10,680	225.9	846.5	149.7	n.a.	76.1	n.a.

Notes : 1. 1973 figures for Peninsular Malaysia only

Source: Census of Manufacturing Industries, Peninsular Malaysia, 1973
Census of Manufacturing Industries, Malaysia, 1981

Despite this favourable trend, however, these industries are still in a relatively underdeveloped state in terms of its range of products, size and nature of market and level of technology employed. In terms of their contribution to the total output of the manufacturing sector, these industries have not expanded as fast as the sector as a whole, accounting for 2.9% of manufacturing output in 1973, falling to 2.2% in 1981. Manufacturing output rose from M$225.9 million to M$846.5 million (in current prices) during this interval.

Although all three groups in the iron and steel basic industries have grown over the years since 1973, the most significant growth has been experienced by the hot and cold rolling and drawing mills (classified as "other iron and steel basic industries"). The total number of establishments belonging to this category more than doubled from 190 in 1973 to 408 in 1981. At the same time, this group increased its share in the gross output value of the iron and steel basic industries from 43.8% in 1973 to 58.1% in 1981, mainly at the expense of the primary iron and steel industries, whose share fell from 42.9% to 27.7% over that period. This change is not surprising in the light of the sharp increase in construction and related activities during the second half of the decade, between 1976 and 1981, and still evident in 1984.

Iron and steel foundries enjoyed a sustained, if unspectacular, increase in activity and output between the census years of 1973 and 1981. Value of output rose from M$29.9 million in 1973 to M$119.6 million in 1981, accounting for 13.2% and 14.1% of the total output of the basic iron and steel industries in those years respectively. With the demand for their products dependent on the activity of the local mining, cement manufacturing, quarrying and oil-palm and rubber processing industries, the iron and steel foundries may be considered to be the most susceptible to local market or economic influences. In addition, most of their raw material requirements are sourced locally.

2.3 THE MANUFACTURE OF FABRICATED METAL PRODUCTS

The manufacture of fabricated metal products, excluding machinery and equipment includes the following industries:

1. Manufacture of cutlery, hand-tools and general hardware
2. Tinsmithing and blacksmithing
3. Manufacture of furniture and fixtures, primarily of metal
4. Manufacture of structural metal products
5. Manufacture of tin-cans and metal boxes
6. Manufacture of wire and wire-products
7. Manufacture of brass, copper, pewter and aluminium products
8. Manufacture of other fabricated metal products not elsewhere classified

2.3.1 Local Production

Together, the above mentioned industries represent an important component of the Malaysian manufacturing industry. As may be seen in Table 2, their combined output of M$380.7 million made them the fifth largest contributor to manufacturing output in 1973, accounting for 4.8% of the total. By 1981, although actual output rose to M$1,285.4 million, their share of total manufacturing output had fallen to 3.5%, making them the eighth largest contributor as a group.

Within this group of industries, the manufacture of structural metal products is the largest, employing 12,289 workers or 36.7% of those employed in this group as a whole, and accounting for M$386.3 million or 30% of gross value of output in fabricated metal products as of 1981. This industry has maintained its leading position in the group since 1973, accounting for about a third of the group's total output and value added.

The second largest industry in terms of output value is the manufacture of wire and wire products such as fencing, netting, wire ropes, nails, tacks, screws, bolts, nuts, washers, rivets and cotters. In 1973, its output of M$82.2 million accounted for 21.6% of the total for the group, but by 1981, its output of M$230.2 million accounted for only 17.9% of the total. However, although the industry's output has increased almost three-fold since 1973, the manufacturing value added has only doubled. As such, its contribution to the total value-added has fallen from 20.9% in 1973 to 13.0% in 1981. This is indicative of the main problem facing the industries in this group, that of rising raw-material prices and increasingly competitive market prices.

Another major contributor to total output is the manufacture of tin-cans and metal-boxes, which accounted for M$76.7 million of output or 20.1% of total in 1973, and M$200.4 million or 15.6% of total in 1981. Manufacturing value added only increased from M$21.7 million to M$49.5 million, which meant that the industry's contribution to the group's value added fell from 18.3% to 12.8%, again reflecting the decreasing margins faced by the industry.

Amongst the other industries, rapid growth has been demonstrated by those classified under the manufacture of other fabricated metal products, with output rising from a mere M$16.7 million in 1973 (4.4% of total group output) to M$180.3 million in 1981 (14.0% of output). Although the diverse nature of this industry does not allow an analysis of the contributors to its rapid expansion, the development is not surprising in the light of the expanding and increasingly sophisticated industrial and consumer markets in Malaysia.

TABLE 2
MANUFACTURE OF FABRICATED METAL PRODUCTS
PRINCIPAL STATISTICS, 1973 AND 1981

ISIC Code		No. of Establishments		Employment		M$ Million at Current Prices: Gross Value of Output		Cost of Input		Value Added	
		1973	1981	1973	1981	1973	1981	1973	1981	1973	1981
38111	Manufacture of cutlery, hand-tools, and general hardware	296	293	1,471	1,786	17.1	25.6	9.9	15.3	7.2	10.3
38112	Tinsmithing and blacksmithing	642	727	1,039	2,457	15.2	37.0	9.8	22.6	5.4	14.3
38120	Manufacture of furniture & fixtures primarily of metal	39	77	1,209	1,775	16.6	60.1	12.6	41.7	4.0	18.4
38130	Manufacture of structural metal products	354	1,062	5,633	12,289	124.8	386.3	88.6	257.2	36.2	129.2
38191	Manufacture of tin-cans and metal bo xes	49	45	2,962	3,567	76.7	200.4	55.0	150.9	21.7	49.5
38192	Manufacture of wire and wire-product s	59	120	2,285	3,594	82.2	230.2	57.4	179.5	24.8	50.6
38193	Manufacture of brass, copper, pewter and aluminium products	114	189	2,448	4,493	31.4	165.5	18.5	109.0	12.9	56.4
38199	Manufacture of other fabricated metal products	81	153	1,091	3,495	16.7	180.3	10.5	121.2	6.2	59.1
	Total	1,634	2,666	18,138	33,458	380.7	1,285.4	262.3	897.4	118.4	387.8

Source: MIDA
Department of Statistics

2.3.2 Imports

Exhibit 2 shows that, with the exception of a temporary downturn in 1975, the importation of engineering/machinery products covered by this study has continuously risen from M$157.2 million in 1973 to M$526.0 million in 1981. A dramatic increase of 63.8% was registered between 1979 and 1980.

As summarized in Table 3, a sizeable reduction in the relative importance of cutlery, hand tools, and general hardware imports occurred between 1973 and 1981. Imports of tin cans and metal boxes suffered a slight decrease in relative terms during the same period.

TABLE 3
ENGINEERING/MACHINERY INDUSTRIES:
TOTAL IMPORTS, 1973 AND 1981
(IN PERCENTAGE TERMS)

ISIC Code	Product Group	1973	1981
37102	Foundries	0.8%	1.9%
381	Mfg. of fabricated metal products	99.2%	98.1%
38111	Mfg. of cutlery, hand tools and general hardware	45.2	26.7
38120	Mfg. of furniture and fixtures primarily of metal	0.7	0.8
38130	Mfg. of structural metal products	17.8	34.8
38191	Mfg. of tin cans and metal boxes	7.6	5.0
38192	Mfg. of wire and wire products	20.5	20.7
38199	Mfg. of other fabricated metal products	7.4	10.1
	Total	100.0%	100.0%

Source: Exhibit 2.

On the other hand, importations of structural metal products exhibited the most impressive expansion in relative terms, rising from 17.8% of total engineering/machinery product imports in 1973 to 34.8% in 1981. Other product groups that experienced improvements in relative shares were: other fabricated metal products (from 7.4% to 10.1%), foundries (from 0.8% to 1.9%), wire and wire products (from 20.5% to 20.7%), and furniture/fixtures primarily of metal (from 0.7% to 0.8%).

2.3.3 Malaysian Exports

Malaysia's exports of engineering/machinery products covered by this study totalled M$18.8 million in 1973. By 1981, the export value of this sector had risen to M$68.6 million. The data in Exhibit 3 show that export growth accelerated dramatically after 1975. In 1981, however, this sector experienced a marked deceleration in export expansion.

Table 4 describes the relative importance of various product groups in the total exports of engineering/machinery sector between 1973 and 1981. Structural metal products continued to be the most significant product group during this period, but its relative share in total exports of engineering/machinery industries was reduced from 53.3% in 1973 to only 35.9% by 1981. Exports of two other product groups also suffered declining relative importance: cutlery, hand tools, general hardware (from 10.5% to 9.8%) and furniture/fixtures primarily of metal (from 2.9% to 1.1%).

In contrast, foreign sales of miscellaneous fabricated products and foundry castings enjoyed the most vigorous expansion between 1973 and 1981. Iron and steel castings improved from 1.0% of total exports of engineering/machinery products to 7.6% during this period. Similarly, the export sales of miscellaneous fabricated products rose from 4.1% of sectoral exports in 1973 to 11.7% in 1981.

TABLE 4
ENGINEERING/MACHINERY INDUSTRIES:
TOTAL EXPORTS, 1973 AND 1981
(IN PERCENTAGE TERMS)

ISIC Code	Product Group	1973	1981
37102	Foundries	1.0%	7.6%
381	Mfg. of fabricated metal products	99.0%	92.4%
38111	Mfg. of cutlery, hand tools and general hardware	10.5	9.8
38120	Mfg. of furnitures and fixtures primarily of metal	2.9	1.1
38130	Mfg. of structural metal products	53.3	35.9
38191	Mfg. of tin cans and metal boxes	17.5	21.2
38192	Mfg. of wire and wire products	10.7	12.7
38199	Mfg. of other fabricated metal products	4.1	11.7
	Total	100.0%	100.0%

Source: Exhibit 3.

2.4 THE MANUFACTURE OF MACHINERY EXCEPT ELECTRICAL

The manufacture of machinery except electrical includes the following industries:

1. Manufacture of engines and turbines
2. Manufacture of agricultural machinery and equipment
3. Manufacture of metal and wood-working machinery
4. Manufacture of special industrial machinery and equipment except metal and wood-working machinery
5. Manufacture of office, computing and accounting machinery
6. Manufacture of refrigerating, exhaust, ventilating and air conditioning machinery
7. Machinery and equipment not else where classified

The Consultants were directed to focus their attention on the fabrication of machinery used in the palm oil, rubber, and timber-processing sectors. These activities are included under the following industrial classifications: manufacture of metal and wood-working machinery and manufacture of special industrial machinery/equipment.

2.4.1 Local Production

The manufacture of machinery except electrical, contributes a small fraction of Malaysia's manufacturing industry. Its output of M$118.5 million was only 1.5% of the country's manufacturing output in 1973. In 1981, its output contribution of M$978.5 million comprised 2.7% of the value of Malaysia's manufacturing output. (Table 5)

Within this classification, metal and wood-working machinery and special industrial machinery jointly contributed M$15.6 million or 13.1% of total sectoral output in 1973. The value of production in these two markets had risen to M$120.7 million by 1981, but its relative contribution dropped to 12.3%.

TABLE 5
MANUFACTURE OF MACHINERY EXCEPT ELECTRICAL:
PRINCIPAL STATISTICS, 1973 AND 1981

Sectors	1973 (M$'000)	1973 % of Total	1981 (M$'000)	1981 % of Total
1. Mfg. of engines and turbines	5,771	4.9	9,622	1.0
2. Mfg. of agricultural machinery and equipment	4,306	3.6	72,719	7.4
3. Mfg. of metal and wood-working machinery	2,862	2.4	20,402	2.1
4. Mfg. of special industrial machinery and equipment	12,690	10.7	100,292	10.2
5. Mfg. of office, computing and accounting machinery	4,912	4.1	8,621	0.9
6. Mfg. of refrigerating, exhaust, ventilating and air conditioning machinery	29,114	24.6	341,548	34.9
7. Machinery and equipment, not elsewhere classified	58,861	49.7	425,309	43.5
Total	118,516	100.0	978,513	100.0

2.4.2 Imports

Imports of special industrial equipment into Malaysia (Exhibit 4) was M$413.7 million in 1973, of which resource based equipment such as rubber, palm oil and timber processing equipment, etc., accounted for only M$19.8 million or 4.8% of the total. This sector displayed an upward trend during this period of 1973 to 1981, increasing to M$630.6 million and M$1828.7 million in 1977 and 1981 respectively. Imports of resource based equipment displayed a similar trend, (except for 1975 and 1976 which recorded a slight decrease) accounting for M$43.9 million in 1977 and M$160.6 million in 1981 or 6.9% and 8.8% of the total imports of special equipment respectively.

2.4.3 Exports

Exports of the special industrial equipment showed a more erratic behavior with a high of M$83.0 million in 1981 and a low of M$19.6 million in 1977. The rest of the years fluctuated from M$21.7 million to M$55.3 million (Exhibit 5). Similarly, resource based equipment also fluctuated from M$1.3 million to M$5.2 million. In terms of proportion, this section on average, accounts for 8.9% of the total special industrial equipment exports with extremes of 16.6% in 1980 and 3.2% in 1975.

III. DEVELOPMENT ISSUES

An analysis of the results study of the engineering and machinery industries has identified the following problems and issues of both a general and specific nature. The policies, programs and strategies to be formulated should address these with a view to eliminate their causes.

3.1 MARKETS

3.1.1 Small or Shrinking Domestic Markets

The historical development of the foundry and other ancillary industries has resulted in a small product and market base which is highly dependent on the resource based industries of tin mining, rubber and palm oil processing. The industries are therefore vulnerable to fluctuating market conditions, as exemplified by the severe impact of the current downturn in tin mining activity on the foundry industry. Similarly, the maturity of the palm oil and rubber industries is reflected by a saturation of the market for processing machinery and a stagnation in production. The local engineering and machinery sector, which is the next largest user of foundry products, is also underdeveloped.

However, well developed inter-industry linkages have resulted in a tin can and metal box manufacturing industry which is well matched, in terms of supply/demand quantity, quality and technology, with the tin canning industry. The size of the domestic market is therefore not a problem.

3.1.2 Competition from Imports

Where the domestic demand is relatively large, as is the case with some wire products and special industrial equipment, the inability of local manufacturers to compete with imported goods, especially from Taiwan, Japan and China, in terms of price and quality, has prevented them from capturing a larger share of the domestic market.

The dependence of the fabricated metal products manufacturers on imported inputs and distortions caused by the tariff system makes it difficult for them to be price competitive, especially when raw materials contribute significantly to the total costs of production.

3.1.3 Limited Export Capability

The exports of foundry, fabricated metal and special industrial machinery products have been limited for a variety of reasons. These include the lack of price competitiveness as a result of high input costs like energy or imported material content, the absence of scale economies in production, low or inconsistent product quality, unsuitability of the products for the export market, inadequate export incentives and a lack of export marketing capability. This has resulted from an overdependence and concentration on the domestic market which has not been as sensitive to these factors.

3.2 FACTOR ENDOWMENTS

3.2.1 Raw Materials

The manufacture of fabricated metal products is still highly dependent on imported raw material inputs, like steel wire rods, bars and sheets, of a quality not manufactured by the local basic iron and steel industry. As the basic iron and steel industry is ultimately dependent on imports of iron ore, pig iron and scrap, the ability to produce the necessary steel products competitively will depend on how efficient it becomes. Therefore, it is with the intention to exploit the availability of cheap natural gas available on the East Coast of Peninsular Malaysia, that HICOM is setting up a steel mill in Terengganu as the first phase in the development of an integrated steel complex that should be able to produce the basic iron and steel products required. It is imperative that the mill succeeds in producing steel products competitively.

3.2.2 Labour

The foundries and fabricators of metal products require a fairly high level of manpower input, both of skilled and unskilled workers. There appears to be a good supply of casual and unskilled labour, but there is a chronic shortage of skilled workers like machinists, welders, fitters, boilermakers, and chargemen. This situation is most severe in the Kelang Valley in which there is a very high concentration of industrial activity and therefore high demand for skilled labour.

Although the skill levels of the more experienced workers are high, in general, the industry is manned by workers of insufficient skill levels. The reasons for this include the movement of labour into industries with higher compensation levels, and a lack of technical training facilities that will create a larger pool of skilled workers useful on the shop-floor rather than white-colour workers with theoretical technical knowledge.

As the industry is expected to upgrade its technology and production processes, skilled labour in the areas of maintenance, quality control, instrumentation and production will become even more important. The training of labour is therefore an issue which will require even more attention.

3.3.3 Energy

Of the industries covered, only the foundries and some fabricators which require their products to be heat treated are highly dependent on energy and therefore sensitive to its cost. The smaller foundries have used cupolas for smelting, fired by wood, coke and gas which are fairly cheap fuels, but this method of smelting does not allow high quality castings to be made. However, arc/induction furnaces, which the larger and more advanced foundries use for the production of higher quality iron and steel, consume substantial amounts of electrical energy.

Electrical power in Malaysia is very expensive and among the highest in the ASEAN region. It is apparent from the table below that even among developing nations which have higher electricity rates than the newly industrialized nations, Malaysia has one of the highest electricity rates for industrial consumers.

COMPARATIVE ELECTRICITY RATES
(IN M$ PER KWH)

	Tariff Category	
Country	Low Voltage Industrial	High Voltage Industrial
Malaysia (Feb. 1984)	0.2312	0.1925
Indonesia (Feb. 1983)	0.2392	0.1874
Philippines (June 1984)	0.1919	0.1919
Thailand (May 1984)	0.1864	0.1723
Singapore (July 1984)	0.1715	0.1715
Taiwan (June 1984)	0.1429	0.1429
Korea (June 1984)	0.1610	0.1610

Source: Lembaga Letrik Negara, Malaysia

3.2.4 Land

As the engineering and machinery industries developed, the demand for suitable industrial land increased. The movement of town boundaries outwards as the urban centres grew also brought the industries much closer to the residential and commercial areas, a situation unsuitable in the eyes of local authority planners. The pressure on the industries to move to designated industrial areas has led to problems that stem from the unavailability of suitable land. Where industrial land may be available, it is usually priced prohibitively, especiallly for the smaller firms.

The high service orientation of the engineering industries exacerbates the problem since it is important for these industries to be located near their customers and in areas with well developed infrastructure. As such, locational incentives as are presently offered to industry will not be successful in encouraging the dispersal of such industries out of the traditional industrial and commercial centres such as the Kelang and Kinta Valleys.

It is therefore important that the issue of the availability of cheap industrial land be addressed in order to allow industries to relocate and to expand. Efforts by Malaysian Industrial Estates Ltd. (MIEL), a government agency set up to develop industrial land and make it available to small and medium scale manufacturers, has only been partially successful in alleviating some of the problems discussed. The major obstacle to the elimination of the problems here is the high price of land.

3.2.5 Infrastructure

It is generally felt by the industry that the infrastructure is sufficiently well developed to enable it to operate effectively, especially in the traditional areas of industrial activity. Inland transportation is generally adequate, especially the roads, although the railway system is not as well developed on the East Coast of Peninsular Malaysia and in East Malaysia. The standard of port facilities is important for both the import of inputs and the export of finished goods, and although some complaints have been received about inadequate storage facilities and delays in loading/unloading and clearance, the exporting manufacturers see biggest problem to be that of the high costs of shipping goods from Malaysia rather than those related to port facilities.

In those areas where utilities and services are available, electrical energy is expensive, as already mentioned. Telecommunication systems are adequate and are also being improved. The underdeveloped state of these utilities and services, as well as the lack of residential, commercial and social infrastructure in most areas outside the Kelang Valley, howeve., is an effective deterrent to industrial relocation or dispersal.

3.3 TECHNOLOGY

3.3.1 Production: Equipment and Processes

The level of technology employed in the foundry, fabricated metal and machinery industries varies greatly both between industries and within the industries themselves. In the foundry industry, the methods employed in smelting, mould making and casting range from outmoded, as in the case of the small foundries with very old cupolas and handling equipment suitable for very low volume batch production, to relatively modern as in the case of the largest foundries which use arc or induction furnaces, bottom pourers and mechanical handling equipment to increase batch size and production efficiency. In general, however, the foundry industry still utilities old equipment and machinery which has not been improved upon for about two decades.

In contrast, the tin can manufacturers, who are generally larger, have managed to steadily improve production technology by reinvesting in new machinery. The other advantage of the tin can manufacturers is that their production volume in terms of units is much higher, allowing them to enjoy the benefits of mass-production processes.

The degree of automation or adoption of mass-production technology has been limited primarily by the limited size of domestic market demand. This is also exemplified by the nut and bolt manufacturers who are reluctant to use advanced high speed forming machines because of relatively low production runs or volumes for each type of size of fastener, although in total the volume of production can be quite high.

It appears that the transfer or adoption of new production technology, apart from very high technology processes, is readily available in the form of machinery or technical assistance that may be provided as part of a purcha e agreement. Nevertheless, it should be recognised that foreign technology is still required to enable the industry to upgrade and this will probably best be done through joint ventures or technical and licensing agreements, as has been the case in a few firms who have done so successfully.

3.3.2 Production: Planning and Control

In the majority of firms in the industry, there is no formal production planning and control system. This is reflective of the historical development of the industry as an aggregation of numerous small establishments with small production volumes. This results in poor plant layout, inefficient job scheduling, low plant productivity and product quality.

There is, however, a growing awareness of the need for efficient production and quality control systems and procedures, even amongst the small family run businesses. This is probably due to the injection of younger blood into the management of the industry as the founding entrepreneurs hand over control to their heirs who have usually benefitted from secondary and tertiary education. The future of the industry will therefore depend on this "new guard" and on how it adapts to present and future conditions by developing better production, financial and general management skills.

3.3.3 Indigenous Research and Development

Concentration on a limited range of products and markets, and a dependence on foreign technology has not encouraged much indigenous research and development. Certainly, basic research has not been undertaken and development work has been limited to the slight modification of products and processes to suit local needs. Design work is undertaken by some firms, such as the manufacturers of wire products like special fasteners, mould and die makers and special industrial equipment manufacturers, but this is not widespread.

There is a need for instituting research and development efforts to broaden the product and market horizons of the industry. The setting up of the Metal Industry Research and Development Centre (MIRDC) and the Metal Industry Technology Centre (MITEC) at the Standards and Industrial Research Institute of Malaysia (SIRIM) is a step in the right direction but there should be more emphasis on active development rather than reactive investigation as is now undertaken by these centres. The role these centres can play as agents of change should not be underestimated and active cooperation between them and the industry should be encouraged.

3.3.4 Standards

Although there are firms in some industries, particularly the manufacturing of wire and structural metal products, which have demonstrated the ability to manufacture to internationally recognised standards, and specifications are often given for work done on a jobbing basis, the industry as a whole does not manufacture to a formal set of standards. This is because the domestic market has not required these products to meet any formal standards and also because of a lack of adequate equipment and competent personnel to carry out tests, formulate standards and accredit firms in these industries.

Internationally acceptable national standards for fabricated metal products and machinery will go a long way in creating an image of quality for Malaysian products, so important in the export markets.

3.4 GOVERNMENT REGULATIONS AND POLICIES

There are no explicit policies and regulations pertaining specifically to the foundry, engineering and machinery industries. As manufacturing industries, however, they are affected by the following statutory instruments and policies:

- Industrial Coordination Act, 1975 (ICA)
- Investment Incentives Act, 1968
- Environmental Quality Act, 1974
- Export Incentives
- Tariff Protection and Concessions
- New Economic Policy (NEP)

3.4.1 Industrial Coordination Act, 1975

It is generally held that the ICA is not very effective in regulating or promoting orderly growth of the industry. For example, the rule that establishments with fewer than 25 employees or less than M$250,000 in shareholders' funds be exempt from the licensing provisions of the Act allows indiscriminate development of small scale establishments, resulting in overcapacities in some industries. For those firms that do require licensing, bureaucratic procedures involved with obtaining licences and project approvals and restrictive conditions, especially with regard to Bumiputra participation along NEP guidelines, have inhibited investment growth in some areas.

3.4.2 Investment Incentives Act, 1968

Whilst the various fiscal incentives available under the Investment Incentives Act are apparently attractive, the benefits of these schemes can only be reaped if the investments made are profitable. In this light, it is generally believed that Pioneer Status accorded to new industries has indeed encouraged investment, both local and foreign, as has the award of investment tax credits. However, other incentives such as Locational Incentives, Labour Utilisation Relief (LUR) and Export Incentives have been less successful in achieving their stated objectives.

Certainly, the Locational Incentives offered are not sufficiently attractive to manufacturers to relocate in "development areas" which are far removed from their markets and ill-equipped in terms of infrastructure. LUR is also less than attractive when it is important that skill rather than volume of labour be used in the industry. This is especially true in these industries faced with declining productivity.

Although aimed at increasing the level of exports, application procedures for export incentives are complicated and several companies do not consider the effort worthwhile compared with the relatively low volume of exports.

3.4.3 Tariff Protection and Concessions

The tariff protection given to the industries varies tremendously from none in the case of industrial machinery to very high levels as in the case of wire and wire products which enjoy protection rates of between 25% and 40%. In between the two extremes, the tin can and structural metal product manufacturers enjoy a medium level of protection with import duties of between 5% and 25% levied on their products. These protective tariffs are granted if the domestic industry can supply a significant portion of domestic demand and if uneconomic plant size and a dependence on imported raw materials make local products non-competitive against imports.

Although there is a need to protect infant industries in the interests of industrial development, there is a real danger posed by this type of action. The first consequence of tariff protection is higher costs for domestic downstream or end users of these products. Downstream industries dependent on these inputs may become uncompetitive, especially in the export markets. Extended protection may also allow inefficiencies to develop and render the very same industries uncompetitive in export markets.

The administration and operation of the tariff protection and concession system on an ad hoc or case-to-case basis has resulted in some inconsistencies and distortions. For example, a manufacturer of woodworking machinery has to pay duty on imports of essential inputs, like electric motors, but then has to compete with imports of complete machines which are not subject to duty. This affects his competitiveness in both the domestic and export markets drastically.

Another example of how the ad hoc method of tariff protection has resulted in an anomaly is in the wire product industry. While recognising the necessity to protect the nut, bolt and screw manufacturers from very cheap imports by imposing duties of 35% or M$550 per tonne, whichever is the higher, on these products, the Tariff Advisory Committee also imposes a duty of M$180 per tonne on imports of high-carbon wire rods which are not available locally. This tariff structure allows the manufacturers to compete locally but not abroad.

Anomalies caused by the tariff system need to be eliminated, perhaps by streamlining the manner in which tariff protection is granted. Furthermore, the case-by-case approach to tariff protection requires a large amount of administration and monitoring to prevent abuse and ensure that the objectives of protection are met. This places a great deal of pressure on the agents responsible for the execution and supervision of the system, namely, MIDA, the Royal Customs and Excise Department, the Ministry of Trade and the Ministry of Finance. The administrative load may well render the system too unwieldy to be effective.

3.4.4 New Economic Policy

Whilst acknowledging that the NEP provides a necessary framework for guiding national development, the fulfilment of its stated objectives will be subjected to some constraints. These include the following points which should be noted by relevant authorities when trying to follow the stated guidelines.

- the industry is still dependent on foreign technology and stringent NEP conditions regarding foreign participation could discourage technology transfer

- industrialisation is capital intensive and the substantial outlays necessary may not be available locally

- the industry requires a high level of technical skills which may not be availabe among Malaysians, particularly Bumiputras since this sector has traditionally been dominated by non-Bumiputras

- the industry is faced with declining productivity and profitability, making it less attractive to intending Bumiputra investors who are invited to participate in the industry, thus making it difficult to meet capital restructuring objectives in accordance with NEP guidelines.

3.4.5 The Role of HICOM

The reluctance or inability of the private sector to initiate and undertake the development of heavy industry has made it necessary for the Government to do so through the establishment of HICOM. The dichotomy in its major roles, firstly, to spearhead industrial development by generating spin-off effects and secondly, to operate as an entrepreneurial investment company, may, however, limit its success in either or both roles.

One example of this is the plan to set up a foundry and forging plant to produce iron and steel castings and forgings for the automotive industry, particularly PROTON, the manufacturer of the Malaysian car. The desire for the supply of such parts of a sufficiently high quality and consistency, at the lowest possible prices, and a lack of confidence in the existing foundry and engineering industries to do so, has encouraged the proponents of this plan. The development of an "in-house" capability, albeit of a higher level of technology and for a new market, by HICOM may then minimise the spill-over effects to existing industry.

In order for the existing engineering and machinery sector to benefit from the impetus provided by HICOM projects, they must be allowed to participate actively, mainly as suppliers of intermediate inputs. The local content programmes should therefore be designed and administered in such a way as to encourage interest and commitment by the existing private sector establishments in the development of new products and therefore to make the necessary capital investments.

IV. EFFECTIVENESS OF REGULATORY AND PROMOTIONAL POLICIES

4.1 REGULATORY AND PROMOTIONAL FRAMEWORK

The objective of this section of the Report is to assess the impact of relevant Government policies and regulations on the development of the country's engineering/machinery industries. Initially, the perceived effectiveness of different Government regulations and incentives is discussed. Subsequently, Government ministries and agencies responsible for the execution, coordination, and promotion of pertinent regulations and incentives are identified.

The Consultants requested respondent companies to comment on the relative effectiveness of the following Government regulations and incentives:

1. Investment Coordination Act
2. Investment Incentive Act: various forms of fiscal concessions
3. Duty-free Imports and Duty Drawback Schemes
4. Equity Restructuring Incentives
5. Special financing facilities (e.g. MIDF loans, export credit facilities, CGC special credits)

The salient features of the Government regulations and policies numerated above are discussed in greater detail in Exhibit 6.

4.2 RELEVANT GOVERNMENT INSTITUTIONS

The government institutions responsible for execution and supervision of the aforementioned regulations and incentives are identified below:

(i) Malaysian Industrial Development Authority
(ii) The Royal Customs and Excise Department
(iii) Malaysian Industrial Development Finance Berhad
(iv) Standards and Industrial Research Institute of Malaysia

Since the regulations and incentives are not designed exclusively for the engineering/machinery industries, the responsibilities of these government institutions will naturally be broader in scope. A general profile of each of the four institutions cited above is presented to put the overall regulatory framework in a better perspective.

(i) Malaysian Industrial Development Authority

The Malaysian Industrial Development Authority (MIDA) is a statutory body responsible for the promotion and coordination of industrial development in Malaysia. MIDA processes all applications for the establishment of manufacturing projects as required under the Industrial Coordination Act (ICA). The former Tariff Advisory Board has been absorbed by MIDA and is now a functional unit known as the Tariff Advisory Committee. It deals with tariff matters including the processing of applications for tariff protection, import restrictions, quota restrictions, surtax exemptions and import duty exemptions.

MIDA also advises the Minister of Trade and Industry on the formulation of industrial policies. In this connection, it may:

1. undertake, directly or indirectly, economic feasibility studies and industrial possibilities;

2. perform industrial promotion work;

3. facilitate exchange of information and coordination among institutions engaged in, or connected with, industrial development;

4. recommended policies on industrial site development and, where it deems fit, undertake the development of such sites;

5. evaluate applications for incentives like pioneer status, locational incentives, export related incentives etc;

6. perform all such matters as may be incidental to, or consequential upon, the exercise of its powers or the discharge of its functions.

(ii) Royal Customs and Excise Department

The Royal Customs and Excise Department comes under the purview of the Ministry of Trade and Industry. This department was brought together more closely with the establishment of the Central Unit within MIDA in 1978. The Central Unit is composed of senior officers from these two departments, the Federal Treasury, the Immigration Department, the Ministry of Labour and Manpower, and the Industries and Domestic Trade Divisions of the Ministry of Trade and Industry. Investors can obtain all the necessary information and assistance from the Central Unit instead of having to visit one government department after another.

Basically, the role of the Royal Customs and Excise Department includes:

1. dealing directly with potential and existing investors and giving advice, guidance and classification on matters of laws, policies and procedures relating to tax exemption, drawback of import duty, Free Trade Zones, Licensed Manufacturing Warehouse facilities, excise tax, sales tax and refund of import duty;

2. receiving from investors, applications for exemption from sales tax on raw materials and components, applications for Licensed Manufacturing Warehouse facilities, locked van facilities, excise licence and sales tax licence;

3. participating, whenever appropriate, in meetings of Special Advisory Committee on Tariffs, the Machinery Committee and any other relevant meetings as determined by the Department;

4. liaising with MIDA to facilitate decision-making by the Department on matters to industry development and

5. conducting briefings on Customs laws and regulations to groups of investors whenever required

(iii) <u>Malaysian Industrial Development Finance Berhad</u>

The Malaysian Industrial Development Finance Berhad (MIDF), a development finance institution, was established under the sponsorship of the Government. Its funds are subscribed to by local and foreign commecial banks, insurance companies, and the Government. As a financial institution, MIDF provides medium and long-term funds to priority industries by granting loans and by issuing subscriptions to equity, by underwriting and managing the public issue of shares, and by arranging or guaranteeing loans by third parties. Its development functions include the identification and promotion of new projects and the provision of ancillary financial, technical and managerial advice.

(iv) <u>Standards and Industrial Research Institute of Malaysia</u>

The Standards and Industrial Research Institute of Malaysia (SIRIM) was established by the Government in 1975 to coordinate and to promote standardization, certification marking, industrial research as well as other related industrial activities.

In broad terms, SIRIM's responsibilities are as follows:

1. to promote, develop and promulgate standards for commerce and industry and for goods produced in or imported into Malaysia, whether for domestic consumption or for export or re-export;

2. to provide for the testing of commodities processes and practices, to encourage establishment of quality control facilities in industry, and to provide consultancy services in relation thereto;

3. to provide for the registration for Certification Marking for Quality Control and regulate its use;

4. to promote industrial efficiency and development;

5. to promote public and industrial welfare, health and safety;

6. to promote and undertake industrial research with the objective of improving technical processes and methods, discovering new processes and methods, encouraging the utilization of Malaysian products; and adopting/adapting technology developed in other countries for use in Malaysia;

7. to improve production processes and techniques at large.

The two centres in SIRIM that would have significant bearing on the engineering/machinery industries in Malaysia are the Metal Industry Research and Development Centre (MIRDC) and the Metal Industry Technology Centre (MITEC).

MIRDC promotes the use of new manufacturing technology by providing engineering consultancy services to metal industries. It assists in the design and production of dies and mould equipment and helps manufacturers of metal products with regards to processes, analysis of quality, metallurgy, and metrology. The Centre will also undertake research and development of prototype products, equipment and metal processing techniques. To increase and improve technical knowledge, the MIRDC is prepared to conduct in-plant training, short-term courses and seminars. In addition, the Centre offers testing services and assists in the inspection of materials for manufacturing products in conjunction with its metallurgy and metrology laboratories.

MITEC was established to facilitate the development of metal industries in Malaysia through the assistance of Japan International Cooperation Agency (JICA) in close collaboration with the Government. This Centre provides direct technical assistance to industries by:

1. conducting training courses for industrial entrepreneurs

2. supplying technical information services

3. providing consultancy and advisory services at factories

4. offering testing and verification services

It also extends assistance in the fields of electroplating, die-making, presswork and welding. Besides these, the Centre undertakes research on the application of metals in industries and provides specialized training to upgrade industry expertise in the areas of testing, quality control and production techniques.

4.3 PERCEIVED EFFECTIVENESS OF GOVERNMENT REGULATIONS AND INCENTIVES

As outlined in Table 6, a sizeable proportion of the companies surveyed either failed to respond or regard the various Government regulations and policies as being generally ineffective in achieving their avowed objectives. Approximately 40.5% of the respondents feel that the Industrial Coordination Act is not effectively implemented and therefore did not contribute to the orderly growth and development of the industry. The misgivings expressed are as follows:

1. Restrictive conditions attached to the approval of manufacturing licences, especially with respect to Bumiputra participation, have inhibited investment growth in the industries concerned.

2. The lack of consistency and coordination within the Ministry of Trade and Industry in general and between MIDA and the Royal Customs and Excise Department in particular from imported substitutes, with resultant negative effects on operations of domestic manufacturers.

3. There is a "loophole" in the sense that the backyard industry has proliferated and seriously disrupted orderly growth. This is because of licensing exemptions are given to industrial projects which employ less than 25 full time paid employees and have shareholders-funds of less than $250,000.

TABLE 6
ENGINEERING/MACHINERY INDUSTRIES:
PERCEIVED EFFECTIVENESS
OF
GOVERNMENT REGULATIONS AND INCENTIVES

Government Regulations/ Incentive	Not Relevant/ Inapplicable	Non Response	Not Effective	Effective	Very Effective	Total
Industrial Coordination Act	12.7%	23.4%	40.5%	23.4%	-	100.0%
Pioneer Status	47.8	25.0	4.2	6.3	16.7	100.0
Labour Utilization Relief	72.9	27.1	-	-	-	100.0
Locational Incentives	75.0	25.0	-	-	-	100.0
Export Allowances	50.0	29.1	8.3	6.3	6.3	100.0
Deduction for Promotion of Exports	50.0	29.1	12.5	2.1	6.3	100.0
Accelerated Depreciation Allowances	27.1	33.3	4.2	25.0	10.4	100.0
Investment Tax Credit	39.6	27.1	8.3	14.6	10.4	100.0
Duty Free Imports	20.8	16.6	35.5	22.9	4.2	100.0
Duty Drawback	35.4	29.2	20.8	8.3	6.3	100.0
Bumiputra Participation Incentive	54.1	27.1	14.6	2.1	2.1	100.0
Export Credit Facilities	52.1	31.2	10.4	4.2	2.1	100.0
CGC Special Loan Scheme	60.4	29.2	8.3	-	2.1	100.0
MIDF Loans	22.9	39.6	12.5	18.7	6.3	100.0

Source: SGV-KC Field Survey

In the case of duty free imports, some 35.5% of the respondents expressed dissatisfaction and considered the benefit ineffective for the following reasons:

1. Most of the existing establishments have not complied with the New Economic Policy and are therefore not entitled to the import duty exemption rate of 2% or 3%

2. Import duty exemptions are mostly restricted to raw materials used in finished products that are exported overseas. The contention is that duty-free exemptions should also have be extended to raw materials used in final products sold in the domestic market, but which are crucial to Malaysia's industrial development. This should help reduce production cost and make local industrialists more competitive against foreign producers, who enjoy higher plant efficiencies and economies of scale by nature of their international operations.

3. There is too much paperwork and it is time-consuming to process an exemption application. In most cases, the importers end up "paying under protest" to expedite the clearance of goods crucial to their production needs. They encounter difficulties in obtaining reimbursements later on.

Only 13 of the 49 establishments surveyed in the engineering/machinery industries claimed to enjoy pioneer status while none reported availing of Labour Utilization Relief. However, of the companies that obtained pioneer status, 11 admitted that the tax relief period enabled them to compete quite effectively during their start-up period. The absence of respondents availing of the locational incentive seems to suggest that the prospective fiscal benefits of situating a factory in a relatively backward region do not outweigh the benefits associated with closer proximity to markets and the superior infrastructure available in more developed areas.

The industry as a whole attached little significance and relevance to export-related schemes and incentives. Fifty percent of the establishments surveyed indicated that export allowances and deductions for promotion of exports are irrelevant while 35.4 percent felt the same way about import duty drawbacks. This appears to be reflective of the present status of the industry, which suffers from poor technical capability and caters predominantly to the domestic market.

A majority of respondents (54.1%) also indicated equity restructuring incentives are not relevant. While this seem to suggest that the incentives offered were not attractive enough to restructure since the establishments were already "viable" and that locating suitable bumiputra partners were lengthy processes, it could also be in part due to the fact that most establishments are family owned and managed enterprises which prefer to remain as they are. On the basis of survey results, it would also appears that engineering/machinery industries do not derive much benefits from special incentives currently available.

Export credit facilities are infrequently utilised simply because not many establishments export overseas. Some 60.4 % of the respondents indicated that the CGC Special Loan Scheme is not applicable to them mainly because they are not entitled to the Scheme. In the case of MIDF loans, the analysis is marred by a very high percentage of non-responses (39.6%). Among those who responded, however, 25.0 percent found this financial assistance effective or very effective.

V. FOUNDRIES

5.1 CURRENT INDUSTRY POSITION

5.1.1 Industry Background

The earliest foundries in Malaysia were established more than fifty years ago mainly to serve the needs of the tin mining and rubber processing industries. Today, most local foundries still depend heavily on these two industries although their client base has gradually diversified to include the construction, palm oil and cement manufacturing sectors.

Between 1973 and 1981, the number of foundries in the country increased from 126 to 269. The gross output of these establishments expanded at an average rate of 21.3% per annum from M$29.9 million to M$140.5 million during this period. In real terms, the growth rate was 13.1% per annum. At the same time, employment rose to 4,918 from 2,547 while the value-added per employee improved from M$5,300 to M$6,601 in current prices. In real terms, the value added per employee has declined by 8.3% during this period.

The strong linkages which foundries have with the tin mining, rubber processing, and machinery manufacturing industries explains why foundries are heavily concentrated in Selangor/Wilayah Persekutuan (28.6% of all such establishments in 1981), Penang (27.9%) and Perak (21.2%). These three states accounted for 77.7% of all foundries in Malaysia as of 1981.

In terms of ownership, 266 of the 269 foundries identified in the 1981 Census of Manufacturing Industries were owned by Malaysians and only three were foreign-owned. In 1973, the corresponding figures were 124 and 2 respectively. Data from the two census years also indicated that the members of foundries with less than 30 employees had increased from 92 (84.4% of total number) to 240 (89.9%) during the interval. This means that the industry is characterized by a proliferation of small establishments competing primarily to serve the needs of traditional markets.

5.1.2 Current Problems

Based on the field interviews, the major problems faced by the foundry industry are a shortage of land, lack of finance, and low technology (Table 7). It is obvious that this sector faces the first three problems because many of the establishments are small and employ traditional production technology. Foundries have often been blamed for pollution and irresponsible disposal of wastes. Consequently, many respondents regard the lack of land as a critical issue. The shortage of skilled labour is not perceived to be a major problem because many foundries utilize traditional production technology.

TABLE 7
FOUNDRIES:
PERCEIVED INDUSTRY PROBLEMS

Problems	No Response	Not Serious	Serious	Very Serious	Immediate Action	Total
Shortage of Land	28.6%	7.1%	28.6%	35.7%	-	100.0%
Lack of Skilled Labour	57.1	35.7	-	7.2	-	100.0
Heavy Govt. Regulations	57.1	35.7	7.2	-	-	100.0
Lack of Mgmt Skills	64.3	-	35.7	-	-	100.0
Low Technology	42.8	7.2	28.6	21.4	-	100.0
Limited Finance	41.7	8.3	8.3	41.7	-	100.0

Source: SGV-KC Field Survey

5.1.3 Perceived Future Threats

The principal threats as perceived by the industry are competition and a shrinking market (Table 8). These two concerns are closely related since the depressed market exacerbates competition among the numerous small foundries.

Given this situation, it is very likely that the prices of foundry output will decline in the future.

TABLE 8
FOUNDRIES:
PERCEIVED INDUSTRY THREATS

Threats	No Response	Not Serious	Serious	Very Serious	Immediate Action	Total
Supply of Raw Materials	57.2%	21.4%	-	21.4%	-	100.0%
Excessive Government Regulation	61.6	7.7	23.0	7.7	-	100.0
Shrinking Market	17.6	11.8	5.9	41.2	23.5	100.0
Emergence of Product Substitutes	35.7	14.3	21.4	28.6	-	100.0
Increased Competition	21.0	-	15.9	21.0	42.1	100.0

Source: SGV-KC Field Survey

With regard to competition, respondents consider price competition more important than non-price competition in both foreign and domestic markets (Table 9). Furthermore, labour cost is perceived to be the dominant determinant in price competition although its impact is felt to be less in the international market. Among non-price variables, product quality and labour productivity are considered the most critical elements.

TABLE 9
FOUNDRIES:
AREAS OF COMPETITION

Type of Competition	Domestic	Foreign
Price Competition:	57.2%	53.3%
Labour Cost	42.9%	30.0%
Material Cost	14.3	23.3
Non Price Competition:	42.8%	46.7%
Quality	14.3	13.3
Distribution	7.1	6.7
Advertising & Promotion	-	6.7
R & D	7.1	6.7
Labour Productivity	14.3	13.3
Total	100.0%	100.0%

Source: SGV-KC Field Survey

5.1.4 Key Success Factors

In Table 10, the primary variables critical to successful operations in domestic and international markets are identified.

The principal success factors in the domestic market are perceived to be market development, possession of superior technology and finance. Skilled labour, management skills and product development are considered to be less crucial concerns. Success in oversea markets is determined chiefly by the following variables: market development and possession of superior technology. Effective management skills, product development and finance are also considered to be quite important.

TABLE 10
FOUNDRIES:
KEY SUCCESS FACTORS

Domestic Market	No Response	Not Important	Important	Very Important	Absolutely Essential	Total
Available Land	21.4%	21.4%	21.4%	35.8%	-	100.0%
Skilled Labour	21.4	14.3	14.3	35.7	14.3%	100.0
Mgmt. Skills	21.4	-	21.4	42.9	14.3	100.0
High Technology	13.3	13.3	20.0	20.0	33.4	100.0
Available Financing	25.0	-	50.0	8.3	16.7	100.0
Product Development	14.3	14.3	50.0	7.1	14.3	100.0
Market Development	7.1	14.4	7.1	35.7	35.7	100.0

International Market	No Response	Not Important	Important	Very Important	Absolutely Essential	Total
Available Land	14.3%	14.3%	42.8%	28.6%	-	100.0%
Skilled Labour	14.3	14.3	28.6	42.8	-	100.0
Mgmt. Skills	14.3	-	14.3	42.8	28.6%	100.0
High Technology	14.2	-	-	42.9	42.9	100.0
Available Financing	28.6	-	57.1	-	14.3	100.0
Product Development	28.6	-	14.2	28.6	28.6	100.0
Market Development	-	-	-	42.9	57.1	100.0

Source: SGV-KC Field Survey

5.2 MARKETING ASPECTS

5.2.1 Products and Markets

The foundry manufacturers cater mostly to the domestic mining, construction and engineering sectors (Table 11). Almost all the establishments produce cast iron products such as gravel pumps, pipe fittings, manholes, etc. Only a few large establishments manufacture products of superior quality like dredge buckets, abrasive-resistant steel castings, grinding balls for cement mills, anchors, etc. A representative list of products manufactured by local foundries is presented in Exhibit 7.

TABLE 11
FOUNDRIES:
INTER-INDUSTRY LINKAGES

Market Segments		% of Respondents Serving Market
Domestic :	Construction	71%
	Tin	71
	Oil Palm	50
	Electrical Products	42
	Rubber	36
	Shipbuilding	21
International:	Tin	28
	Shipbuilding	7

Source: SGV-KC Field Survey

Except for the large companies, most of the foundries interviewed confine their activities to the domestic market. Oversea sales are mostly to the tin mining and shipbuilding sectors.

Survey findings indicate that 60.0% of the respondents manufacture products according to customer specifications. At the same time, 57.7% of the foundries interviewed have their own brands. The issuance of warranties does not appear to be a standard practice. Almost two-thirds (64.0%) of the respondents do not have such provisions for their clients.

5.2.2 Key Marketing Variables

The respondents believe that product quality is the most essential consideration in domestic marketing efforts. Other domestic factors are enumerated below in descending order of importance:

1. Price competitiveness
   Personal relationship
   Established market position

2. Location

3. Repair and maintenance capabilty
   Distribution network

4. Technical competence of sales force
   Prompt and reliable delivery

Among those sample firms that have penetrated overseas markets, price competitiveness is regarded as most important. Product quality, established market position, location and technical competence of the sales force are considered as slightly less significant variables, followed by personal relationships and repair/maintenance capability.

Lack of price competitiveness was cited by respondents as the primary cause for not tapping overseas markets. Other reasons mentioned are limited production capability, unsuitability of existing product lines and failure to approach potential foreign markets because of lack of manpower, experience and good distribution channel.

5.2.3 Product Pricing

There are many enterprises in Malaysia's foundry sector and this explains why a considerable degree of price competition exists in the market. Survey respondents showed no marked preference between cost-plus pricing and competitive pricing.

Exhibit 7 compares the price ranges of selected local foundry products with prices of imported substitutes. For products embodying relatively low technology, domestic manufacturers appear to enjoy a price advantage. Manhole and pipe fittings, gravel pumps and water pumps belong in this category. On the other hand, foreign foundries are able to sell high-technology products at lower prices. This is true for steel castings, chromed iron, stainless steel, alloy steel, and gate valves.

5.2.4 Distribution

The bulk of domestic sales of foundry products is delivered directly to the end-user. This seems logical since local foundries typically manufacture items according to customer specifications. Smaller companies do not usually employ a sales force as the marketing effort is undertaken by their owners and/or chief executive officers. The larger, well-established enterprises which fabricate some standardized products are more likely to employ salesmen and market their output through hardware shops. At this stage of the sector's development, infrequent international sales are invariably on a job-order basis.

5.2.5 Advertising and Promotion

Most of the foundries surveyed do not have a formal advertising and promotion budget. Promotion, if any, is limited to company brochures which are made available to interested parties when they visit factory premises. Advertising is minimal and confined to announcements in the yellow pages of the telephone directory.

5.3 PRODUCTION ASPECTS

5.3.1 Technology Assessment

Based on the survey findings presented in Table 12, 50% to 70% of the respondent firms are currently utilizing low-level technology.

TABLE 12
FOUNDRIES:
TECHNOLOGY ASSESSMENT

Production Processes	Low	Medium	High
	Percentage [1]		
1. Melting Process	50.0%	------50.0------	
2. Moulding Process	57.1	21.4	21.5
3. Sand Conditioning Equipment	66.0	20.0	14.0
4. Mould Making Machinery	38.5	------61.5------	
5. Cleaning/Finishing Machinery	60.0	------40.0------	
6. Pattern Making	67.0	------33.0------	
7. Testing Equipment	14.3	50.0	35.7

Note: 1. Percentages refer to proportions of foundries interviewed.

2. The Consultants' criteria for technological assessment is found in Exhibit 9.

The foundry sector in Malaysia began some fifty years ago by catering to the tin mining and rubber processing industries. Today, this sector is still highly dependent on these two industries although some degree of diversification towards the palm oil processing and construction industries has been achieved. Most of the cast iron products do not require high technological processes to fabricate. Hence, there is no urgency to improve in production method. However, the steel casting embodies a much higher level of technology.

The main smelting process used is cupola smelting. Sand moulding is the most common form of moulding but CO_2/cement moulding is used when more output is required. However, both these methods of moulding are not intended for mass production. Only a few of the larger companies have complete sand conditioning equipment.

Table 13 suggests a positive correlation between the size of a company (as measured by its paid up capital) and the level of technology it possesses i.e., the large companies are more likely to be producing higher quality products with better machinery. However, the data also imply that the prevailing technology in the country's large foundries is still well below international standards.

TABLE 13
FOUNDRIES:
FIRM SIZE AND TECHNOLOGY LEVEL

Process Stage	Less than M$3.0M	Paid Up Capital M$1.0M - M$3.0M	More than M$3.0M
1. Melting Process	1.5	2.0	2.0
2. Moulding Process	1.0	1.5	2.3
3. Sand Conditioning	1.8	2.5	2.3
4. Mould Making Machine	1.3	2.0	1.8
5. Cleaning/Finishing	1.3	1.5	2.0
6. Pattern Making	1.3	1.8	2.0
7. Testing Equipment	1.5	1.5	2.5
Average	1.4	1.8	2.1

Note : Ordinal indices of 1 (low technology), 2 (medium technology), and 3 (high technology) are used. Please refer to Exhibit 9 for definition of technology levels.

Source: SGV-KC Field Survey.

Although it is generally claimed that their existing machinery and processes are capable of manufacturing a wide variety of other products, the foundries surveyed have not ventured into product development. The most commonly mentioned reasons for the absence of product development are: (a) insufficient market size, and (b) lack of additional equipment. Interestingly enough, none of the respondents cited inadequate research and development or the low standards of product design as contributory causes. Among those foundries equipped with medium-level or high-level technology, upgrading of processes and equipment was effected through "learning by doing" or by outright acquisitions. Technology transfers through joint ventures are seldom resorted to.

5.3.2 Production Standards

More than half of the products manufactured by the foundries interviewed conform to certain technical standards (Exhibit 10). The British Standards (BS) as the most widely used set of criteria. Other technical standards are obtained from the following sources: Japan Institute of Standards (JIS), American Society for Testing and Materials (ASTM), American Society of Mechanical Engineers (ASME), American Bureau of Shipping (ABS) and the Standards and Industrial Research Institute of Malaysia (SIRIM).

About 64% of the respondents felt that their product quality is above average while the other respondents described their products as being average in quality. Their assessments of product quality were consistent with their technology assessments.

5.3.3 Production/Design Capability

All the larger and newer production facilities are operated by qualified engineers with several years of experience. On the other hand, manufacturing activities among smaller firms are usually undertaken by people with several years of experience but with no formal educational/vocational training. In many instances, those belonging to the latter group are also the owners of the companies.

Since foundry products are mostly custom-made, with the exception of standard gravel pumps, manholes, etc, most designs and specifications are supplied by the customers.

Most of the companies interviewed have at least a drawing office, but research and development is minimal. Only one respondent has access to new technology through its joint venture partner.

The others rely mainly on their expertise or occasionally hire consultants for special assignment.

Production technology is mostly purchased in the form of new machinery. The Consultants also noted that most of these companies are not geared for mass-production except those in die-casting.

5.3.4 Input Profile

The following raw materials are most commonly purchased by the foundries surveyed:

	Raw Materials	% of Respondents
1.	Mild Steel Scrap	57%
2.	Pig Iron	50
3.	Foundry Coke	50
4.	Sand	50
5.	Ferro Alloys	43
6.	Scrap Iron	21
7.	Non-Ferrous Materials	21
8.	Sand with Synthetic Resin	7
9.	Grey Cast Iron	7

A very high percentage of the respondents' requirements of foundry coke, pig iron and ferro alloys are imported. On the other hand, raw materials like scrap iron are obtained predominantly from domestic suppliers.

Considering the significance of foundry coke, pig iron, and ferro alloys in the production of foundry castings, local foundries may be considered to be highly dependent on imports as shown in Table 14.

TABLE 14
FOUNDRIES:
PERCEIVED RAW MATERIAL SUPPLY PROBLEMS

Problem Areas	Domestic Supply	Imported Supply
1. Excessive Price Fluctuations	21.0%	64.0%
2. Irregular Supply	7.0	14.0
3. Unreliable Quality	7.0	14.0
4. No Problems	36.0	-
5. No Response	29.0	8.0
	100.0%	100.0%

Note : Percentage refer to proportion of respondents.
Source: SGV-KC Field Survey

Domestic foundries appear to be most concerned about abnormal price movements of local as well as imported raw materials. However, their level of anxiety is much more acute with respect to foreign inputs.

In an effort to minimize this problem, the Federation of Malaysian Foundry and Engineering Industries Association (FOMFEIA) has formed a company (FOMFEIA Sdn. Bhd.) to undertake bulk purchases of raw materials on behalf of its members. Almost one-half (46.0%) of the foundries surveyed said that FOMFEIA Sdn. Bhd. is effective in performing its function. The other respondents either denied having received any assistance from this company (29.0%) or gave no response (25.0%).

5.3.5 Production Cost Structure

Table 15 reveals that significant variations in the production cost structure exists among foundries of various sizes. A company's paid up capital was used as an indicator of its size.

TABLE 15
FOUNDRIES:
PRODUCTION COST STRUCTURE

Production Cost Components	Paid Up Capital M$250,001-M$1.0M	$1,000,001-M$3.0M	More than M$3.0M	Al[illegible] Respon[illegible]
Direct Labour	24.8%	18.9%	15.5%	1[illegible]
Direct Material				
- Imported	36.6	22.8	20.6	2[illegible]
- Domestic	8.5	19.1	12.7	1[illegible]
Energy	3.7	11.6	20.5	1[illegible]
Depreciation	8.7	8.3	13.4	1[illegible]
Overhead	17.7	19.3	17.3	1[illegible]
Total	100.0%	100.0%	100.0%	10[illegible]

Note : Percentages refer to average proportions of total manufacturing cost.

Source: SGV-KC Field Survey

The percentage of labour cost to total manufacturing cost appears to decline as the company becomes larger. This is probably the result of more capital intensive technology employed by these companies as well as the larger sales volume they can capture. Conversely, the larger companies have higher depreciation costs.

The proportion of energy cost rises for the large companies because they use arc/induction furnaces which consume substantial amounts of energy. The small companies have low energy costs because all of them use the cupola smelting process. The fuels required in this process are firewood, coke and gas which are relatively cheaper.

Direct material of which 66.4% is imported, accounts for about 40.5% of the total manufacturing costs. Hence, it can be said that the foundry sector is at a sizeable disadvantage when competing against foreign substitutes in the domestic as well as international markets.

Among respondent companies, 43.0% reported capacity utilization rates of between 25% and 50%. Of the remainder, 36% classified capacity utilization levels in excess of 70%.

5.4 FINANCIAL ASPECTS

5.4.1 Ownership Structure

Slightly over three-fourths (77.0%) of the total paid up capital of the foundries interviewed is owned by ethnic Chinese. Foreign nationalities account for 12.2% while Malays own 10.8%.

5.4.2 Sources of Funds

According to the respondents, capital expenditures are usually financed by overdrafts and term loans (Table 16). This may be due to the relatively unsophisticated nature of the Malaysia's long-term capital market.

Overdrafts are the most commonly used form of financing for operational expenses followed by suppliers' credit.

TABLE 16
FOUNDRIES:
SOURCES OF FUNDS
FOR
CAPITAL EXPENDITURES

	Source of Funds Most Frequently Used	% of Sample
1.	Overdraft	50.0%
2.	Term Loan	50.0
3.	Leasing	35.7
4.	Retained Earnings	14.3

5.4.3 Profitability

The Consultants estimated two alternative indicators of profitability for the sample firms: the average return on sales (ROS) and the average return on investment (ROI). Table 17 distinctly reveals a progressive decline in the collective financial performance of the foundries interviewed.

TABLE 17
FOUNDRIES:
PROFITABILITY INDICATORS

Year	Av. ROS	Av. ROI
1981	8.1%	16.0%
1982	7.8	10.5
1983	4.8	8.6

Source: SGV-KC Field Survey

5.5 MANPOWER ASPECTS

5.5.1 Employment Structure

On the basis of field interviews, the Consultants estimated the rates of skilled direct labour to unskilled direct labour to be 1.23:1.00 in the foundry sector (Table 18). Direct labour comprises 76.9% of total work force on the average while managerial, supervisory, and administrative personnel account for the remaining 23.1%. Unskilled labourers form the largest job category with 34.5% of all employees. Moulders/operators follow with 33.0% of the total work force.

TABLE 18
FOUNDRIES:
LABOUR FORCE COMPOSITION BY SKILL CATEGORY

Category	% of Work Force
1. Management	8.4%
2. Supervisory	6.6
3. Administrative	8.1
4. Direct Labour	76.9
4a. Skilled	
Welders	1.5
Machinists	4.1
Fitters	1.8
Chargemen	1.0
Moulders	33.0
Others	1.0
4b. Unskilled	
General Labour	34.5
Total	100.0%

Source: SGV-KC Field Survey

5.5.2 **Wage Structure**

As presented in Table 19, the average monthly wages of skilled direct workers among respondent firms range from M$469 (operators) to M$1,315 (chargemen). General workers receive an average of M$426 per month.

TABLE 19
FOUNDRIES:
WAGE STRUCTURE

Job Category	Average	Range
1. Skilled		
Welders	M$665	M$510 - 900
Fitters	681	400 - 900
Machinists	605	400 - 750
Chargemen	1315	800 - 1575
Operators	469	450 - 655
Moulders	630	340 - 910
2. Unskilled		
General Labour	M$426	M$240 - 540

Note : Wages are expressed on a monthly basis.

Source: SGV-KC Field Survey

The Consultants noted that larger foundries offer higher monthly wages to the following categories of skilled production workers: welders, chargemen and operators (Table 20). No difference in remuneration was observed in the case of fitters, machinists and general workers. With respect to moulders, however, the smaller foundries in the field survey appear to offer a substantial wage premium.

TABLE 20
FOUNDRIES:
COMPANY SIZE AND WAGE STRUCTURE

Jobs Category	Paid Up Capital: Less than $1M Average	Less than $1M Range	More than $3M Average	More than $3M Range
1. Skilled				
Welders	M$ 535	M$350 - 700	M$ 570	M$350 - 700
Fitters	645	400 - 700	645	400 - 700
Machinists	560	400 - 660	560	400 - 660
Chargemen	1250	800 - 2000	1350	800 - 2000
Operators	448	340 - 500	475	340 - 500
Moulders	705	468 - 910	460	340 - 500
2. Unskilled				
General Labour	M$ 385	M$260 - 500	M$ 385	M$260 - 500

Note : Wages are expressed on a monthly basis

Source: SGV-KC Field Survey

The lower wages paid to moulders in larger foundries may be explained by the fact that moulders perform a less significant role in terms of supervisory planning and control among larger foundries.

Not surprisingly, variations in wage structure also exist among foundries located in various parts of Malaysia. Table 21 shows that welders, fitters, chargemen, moulders and general workers in the Kuala Lumpur/Selangor area receive more substantial compensation than their counterparts in the Ipoh/Penang region. On the other hand, machinists and operators appear to be better paid in Ipoh and Penang.

Differences in wage structure between regions may be attributed to regional shortages or gluts in particular job categories as well as cost differentials in basic subsistence requirements.

TABLE 21
FOUNDRIES:
GEOGRAPHICAL DIFFERENCES IN WAGE STRUCTURE

	Ipoh/Penang		Kuala Lumpur/Selangor	
Job Category	Average	Range	Average	Range
1. Skilled				
Welders	M$598	M$520 -M$650	M$ 606	M$350 -M$ 900
Fitters	634	520 - 650	654	400 - 900
Machinists	609	520 - 650	589	400 - 900
Chargemen	709	520 - 800	1272	550 - 2000
Operators	528	520 - 650	520	340 - 900
Moulders	528	520 - 650	539	340 - 900
2. Unskilled				
General Labour	M$345	M$260 - $468	M$ 482	M$260 - $ 900

Note : Wages are expressed on a monthly basis

Source: SGV-KC Field Survey

5.5.3 Labour Supply Situation

The shortage of skilled labour is recognized as a problem by 64% of the foundries interviewed. These respondents submitted the following comments regarding this issue:

1. The lack of skilled labour is due to the limited numbers of technical training institutes in the country.

2. Technical training institutes generally do not equip their students with sufficient specialized skills for employment purposes. Eighty-six percent of the respondent foundries said that they provide on-the-job training for their employees.

Among the various skilled labour categories, the shortage of qualified fitters is perceived to be most acute. Machinists, moulders, and welders are the other job categories for which current demand outstrips current supply. The relevant survey results are summarized in Table 22 below:

TABLE 22
FOUNDRIES:
PERCEIVED MAGNITUDE OF LABOUR SHORTAGE

Job Category	Labour Shortage Index
1. Welders	1.18%
2. Metal benders	1.00
3. Machinists	1.26
4. Fitters	1.30
5. Chargemen	1.00
6. Moulders	1.24
7. Core makers	4.2

Note : Shortage index as defined to be ideal number of workers/existing number of workers. Estimates were based on interviews.

Source: SGV-KC Field Survey

5.6 DEVELOPMENT ISSUES

5.6.1 Industry Characteristics

Iron and steel foundries enjoyed a sustained increase in activity and output between the census years of 1973 and 1981. Value of output rose from M$29.9 million in 1973 to M$140.5 million in 1981, accounting for 13.2% and 14.1% of the total output of the basic iron and steel industries in those years respectively. In real terms, the average growth rate was 13.1% per annum during this period.

During the inter-censal period, the number of foundries increased from 126 to 269 and employment rose to 4,918 from 2,547. Although value-added per employee improved from M$5,300 to M$8,601 in current prices, this actually represented a decline of 39.7% in real terms. The average number of employees per establishment decreased from 20 to 18 during this period.

Imports were only M$1.2 million in 1973 but increased to M$10.2 million in 1981 (current prices), representing 2.4% and 7.0% of total consumption respectively. Exports were only M$186,000 in 1973, increasing to M$5.1 million in 1981 and accounted for 0.6% and 3.7% of total production in those years respectively.

The foundry industry is characterised mainly by its overwhelmingly domestic orientation in marketing and operations. As a result of their heavy dependence on the traditional markets of the tin mining, rubber processing and palm oil refining industries, the foundries have been greatly affected by a downturn in mining activity, poor prices in rubber and a supply saturation in the limited palm oil refining industry. Current capacity utilization is estimated to be only 50%.

5.6.2 Major Issues

Faced with rapidly shrinking traditional markets, the foundry industry needs to be revitalised not just to prevent widespread commercial failures, but more importantly, to enable it to play an effective role as a fundamental component of a growing industrial economy. The issues to be addressed are as follow:

1. Market

   The local steel and iron casting industry operates in a market for products which are mostly made to order. The foundries, servings a limited market, are therefore vulnerable to economic and other dislocations. It is not surprising that this local industry, has been hard-hit by the current recession, particularly by a downturn in the tin mining sector on which it is highly dependent.

   The domestic market for intermediate foundry products used by the local engineering and machinery manufacturing sector is rather small as the latter industry is underdeveloped. Unless this sector develops, the prospects in the foundry industry are bleak as it will still be dependent on the declining traditional markets.

   The present casting products, which are mostly consumed locally, are relatively low in technology and not competitive in the overseas market. The non-competitiveness may be attributed to the relatively high energy/electricity and raw material costs, relatively small setups with no economies of scale in production and negligible efforts in research and development as well as in lack of capital investments, resulting in obsolete or inefficient manufacturing/production processes. Because of these factors, the local market has lately been flooded with cheap imports of casting products of comparable quality, resulting in closures of many of these inefficient establishments.

The export markets are practically untapped by the local establishments mainly due to their non-competitiveness in both price and non-price terms. Combined with the price disadvantage already discussed, the local foundries do not produce a suitable range of casting products that meet the quality standards demanded by the export markets. Furthermore, a lack of experience and distribution channels in these markets have not encouraged the local industry to develop products for export.

2. Technology

This industry has hitherto been serving the traditional markets for unsophisticated products of relatively low technology and volume. These products, such as gravel pumps, man holes, pipe-fittings and valves, can be manufactured without much difficulty by using the most basic foundry knowledge and unsophisticated but economical processes. The local establishments do not see a need to change most of the existing old/and obsolete equipment if they are only serving the local market, in spite of the knowledge that the traditional markets are shrinking. The nature of their business is such that production volume is low and automation is not always suitable.

Since products are not very often mass-produced but manufactured in single units, high fidelity repetition of operations is difficult. Moreover, since the processes of low volume manufacturing renders mechanisation difficult, expertise acquired through experience has assumed a vital role in the industry. For this reason, cultivating and securing skilled engineers will be indispensable for the adoption of new technology and the upgrading of products in this industry. At present such professionals are only employed in the few large establishments. This may be attributed to the nature of the industry which is dominated by family-run operations and the difficulty of establishing a presence in markets for high technology and quality castings both in locally and overseas.

3. Management

Although management skills in terms of technical and administrative functions are not critical in the present industry, these skills are perceived to be crucial if this industry is to break away from its traditional set-up to be competitive in the world market.

The lack of these skills ia a reflection of the nature of the family-run operations that characterise this industry.

4. Land

The shortage of land is acute in this sector as several old establishments are facing the possibility of eviction or cancellation of licence because they occupy land which is now deemed not appropriate for such industry. They are unable to get state-owned industrial land for various reasons such as non-compliance with NEP conditions, affordability and an apparent reluctance of some authorities in permitting such establishments for environmental reasons.

Non-compliance with NEP conditions is not wholly the fault of these establishments as this sector's return on investment is not attractive enough to potential Bumiputra investors. Most of these establishments also cannot afford to buy commercial industrial land because of their lack of finance and poor profitability.

This is one of the reasons why this industry does not invest further in capital equipment as the foundries are afraid that they may be asked to move out of their present sites.

5. Proposed HICOM Foundry and Forging Plant

The proposal of HICOM to establish a foundry and forging plant has deterred most, if not all, of the existing foundries in investing in modern equipment and developing new products for domestic and export markets. It is felt that such a development will succeed at the expense of the existing foundries.

It is the view of HICOM, however, that the establishment of a foundry and forging plant will not necessarily threaten the existing foundries if the new plant undertakes the production of castings not made presently, like high quality steel castings for use in the Malaysian car project. In this way, there would be no encroachment by HICOM into any of the existing markets. The decision to set-up the HICOM plant has not yet been finalised, but advocates feel that the lack of positive efforts by the private sector foundries to gear themselves up for higher technology production is sufficient to make it necessary for HICOM to take the lead.

On the other hand, the existing foundries argue that they have not made such products before as there has been no demand in the past; afterall, the Malaysian Car is the first attempt at anything more than local assembly. The adoption of "track record" as the major criterion in evaluating the capability of the foundry industry may therefore not be truly indicative. Certainly, the existing foundries feel that they can quite easily upgrade their own facilities to handle higher technology products, but will only do so if they are fairly confident of securing a market for those products as the capital investment required is quite substantial. There can, however, be no guarantees from PROTON, the manufacturer of the Malaysian Car, that it will buy casting products from any one foundry on the strength of a promise alone.

It is also understandable that PROTON has an obligation to manufacture the car as cheaply as possible, but not at the expense of quality. There is therefore the tendency to try to minimise uncertainty, and therefore to do things by itself. This does, however, run contrary to the original intention to set up the industry to allow the rest of Malaysian industry to benefit from the spillover effects.

It is apparent that a consolidation is required for this sector to become more viable in terms of production economy. An advancement in technology and quality is also necessary to enable it to enter the more sophisticated markets.

A form of subsidy may be required for the raw materials and energy required by this industry to enable it to be price competitive locally as well as internationally. An active research and development centre should be established to lead the way for higher technology and quality products. An international trading house or sogososha may be the best avenue to market these products in the competitive export markets.

VI. STRUCTURAL METAL PRODUCTS

6.1 CURRENT INDUSTRY POSITION

6.1.1 Industry Background

The structural metal products sub-sector encompasses a wide range of heterogenous metal products such as the following:

1. Doors and window louvres
2. Galvanized water tanks
3. Steel chairs
4. Steel and aluminium ceiling, partitions
5. Steam boilers
6. Pressed steel section tanks
7. Steel rolling shutters
8. Universal beams
9. Iron gates
10. Pressure vessels
11. Storage tanks
12. Water tubes

According to the 1981 Census of Manufacturing Industries, there were 1,062 manufacturers of structural metal products in the country. The fact that only 79 manufacturers of such products are registered with MIDA suggests that the great majority are very small establishments which are exempted from MIDA licensing requirements.

The geographical distribution of MIDA licensees in this sub-sector is presented in Table 23. Thirty (38.0%) of the registered companies are located in Selangor, eleven (13.9%) in the Federal Territory, and nine (11.4%) in Penang. A total of 71 licensed manufacturers of structural metal products are found in Peninsular Malaysia while the remaining eight are located in Sabah and Sarawak.

TABLE 23
STRUCTURAL METALS PRODUCTS:
GEOGRAPHICAL DISTRIBUTION OF FIRMS

State	Number	% of Total
Selangor	30	38.0%
Federal Territory	11	13.9
Penang	9	11.4
Johore	6	7.6
Kedah	5	6.3
Perak	4	5.1
Malacca	3	3.8
Negeri Sembilan	2	2.5
Kelantan	1	1.3
Sabah	5	6.3
Sarawak	3	3.8
Total	79	100.0%

Source: MIDA

The sub-sector does not appear to receive significant fiscal incentives. Of the 79 enterprises licensed by MIDA, 46 are without any such benefits. Only ten companies have been accorded pioneer status and these include fabricators of doors and window louvres, water tanks, aluminium, copper and bronze extensions, pressed metal products and galvanized steel poles. Nine others were granted Investment Tax Credits while the remaining 16 firms have not yet been able to avail of their previleges.

6.1.2 Current Industry Problems

Based on the survey results presented in Table 24, the shortage of land is the single most important problem in the sub-sector. Although other problems are considered of secondary importance, 14.3% of the companies interviewed perceive the lack of labour and shortage of management skills as requiring immediate attention. On the other hand, none of them apparently regard the shortage of land as the most critical issue although all agreed that this is an area of concern for the sub-sector.

TABLE 24
STRUCTURAL METAL PRODUCTS:
PRECEIVED INDUSTRY PROBLEMS

Problems	No Response	Not Serious	Serious	Very Serious	Immediate Action	Total
Shortage of Land	-	42.9%	42.9%	14.2%	-	100.0%
Lack of Labour	42.8%	14.3	28.6	-	14.3%	100.0
Heavy Govt. Regulations	42.9	57.1	-	-	-	100.0
Lack of Mgmt. Skills	42.8	28.6	28.6	-	-	100.0
Low Technology	57.1	14.3	14.3	-	14.3	100.0
Limited Finance	57.1	14.3	28.6	-	-	100.0

Source: SGV-KC Field Survey

6.1.3 Perceived Future Threats

TABLE 25
STRUCTURAL METAL PRODUCTS:
PERCEIVED INDUSTRY THREATS

Threats	No Response	Not Serious	Serious	Very Serious	Immediate Action	Total
Supply of Raw Materials	14.3%	71.4%	-	14.3%	-	100.0%
Excessive Government Regulation	14.3	42.9	42.8	-	-	100.0
Shrinking Market	14.3	28.5	18.6	28.6	-	100.0
Emergence of Product Substitutes	18.6	57.1	14.3	-	-	100.0
Increased Competition	14.3	42.8	28.6	14.3	-	100.0

Source: SGV-KC Field Survey

The majority of respondents identified a shrinking market followed by increased competition as the most important threats to the industry although none felt that these threats warranted immediate action. Excessive government regulation, with form of NEP ownership conditions, is also identified as a serious threat. Although supply of raw materials and product substitutes are cited as serious by some of the respondents, the majority of respondents considered them as not serious.

Several recent developments may prove useful in explaining the sub-sector's concern over a shrinking market for its products. First of all, the construction sector, which has grown impressively in the past decade, is currently depressed. Furthermore, the removal of import restrictions on boiler products has engendered increased pessimism among local manufacturers of these items.

Respondents differed radically in their evaluation of the different methods of competition in domestic as well as foreign markets. Price competition is regarded as the dominant element in local markets while non-price competition (research and development, labour productivity) is acknowledged as being decidedly more important in overseas markets. The Consultants have summarized pertinent survey findings in Table 26 below.

TABLE 26
STRUCTURAL METAL PRODUCTS
AREAS OF COMPETITION

Type of Competition	Domestic	Foreign
Price Competition	62.5%	33.3%
Labour Cost	25.0%	11.1%
Material Cost	37.5	22.2
Non-Price Competition	37.5%	66.7%
Quality	12.5	11.2
Distribution	-	-
Advertising and Promotion	12.5	-
R & D	-	33.3
Labour Productivity	12.5	22.2
Total	100.0%	100.0%

Source: SGV-KC Field Survey

Concern about research and development seems to be most acute among respondents manufacturing technically superior products like pressure vessels and boilers. Since most local establishments lack sufficient human and financial resources to sustain an effective research and development program, they have adopted the practice of negotiating with foreign companies for technical assistance either on a joint-venture or an agency basis. The royalty paid ranges from 2% - 5% of total sales of these companies.

6.1.4 Key Success Factors

The respondent companies were also asked to identify the principal factors needed to operate effectively in both the domestic as well as the international market. Table 27 presents the Consultants' findings pertaining to this question.

Analysis is somewhat difficult because of the significantly high percentages of non-responses. Those who replied perceive the principal success factors to be market development, available financing and skilled labour in both markets.

TABLE 27
STRUCTURAL METAL PRODUCTS:
KEY SUCCESS FACTORS

Domestic Market	No Response	Not Important	Important	Very Important	Absolutely Essential	Total
Available Land	71.4%	14.3%	-	14.3%	-	100.0
Skilled Labour	57.1	-	14.3%	14.3	14.3%	100.0
Mgmt. Skills	71.4	-	-	28.6	-	100.0
High Technology	71.4	-	-	28.6	-	100.0
Available Financing	42.8	-	-	42.8	14.4	100.0
Product Development	71.4	-	-	28.6	-	100.0
Market Development	57.1	-	-	14.3	28.6	100.0

International Market	No Response	Not Important	Important	Very Important	Absolutely Essential	Total
Available Land	71.4%	14.3%	-	14.3%	-	100.0
Skilled Labour	71.4	-	14.3%	14.3	-	100.0
Mgmt. Skills	71.4	-	-	28.6	-	100.0
High Technology	71.4	-	-	28.6	-	100.0
Available Financing	51.1	-	-	42.9	-	100.0
Product Development	71.4	-	-	28.6	-	100.0
Market Development	57.1			-	42.9%	100.0

Source: SGV-KC Field Survey

6.2 MARKETING ASPECTS

6.2.1 Products and Markets

A list of structural metal products manufactured by the respondent companies is presented below:

1. Boilers
2. Pressure vessels
3. Casement windows
4. Metal doors
5. Steel channels
6. Aluminium suspended ceilings
7. Curtain walls

The proportion of products that are custom-made ranges from 30% to 100%. Table 28 below presents the distribution of respondent companies by proportion of products custom-made.

TABLE 28
STRUCTURAL METAL PRODUCTS:
INCIDENCE OF CUSTOMIZED PRODUCTION

Proportion of Products Custom-made	% of Respondents
0%	-
1 - 25	-
26 - 50	28.6%
51 - 75	28.6
76 - 100	42.8
	100.0%

Source: SGV-KC Field Survey

Almost three-fourths (70.5%) of the respondents reported domestic sales exceeding 75% of this total sales. They are enterprises engaged primarily in the fabrication of window frames, metal doors and related products for the local construction industry. On the other hand, those companies that engage in more substantial exports are typically manufacturers of boilers and pressure vessels, which are sold to clients in Australia and other ASEAN countries.

Table 29 focusses on sales of respondent companies to other industries both domestic and overseas:

TABLE 29
STRUCTURAL METAL PRODUCTS:
INTER-INDUSTRY LINKAGES

Market Segments		% of Respondents Serving Market
Domestic :	Construction	57.1%
	Oil Palm	42.8
	Rubber	14.3
	Wood Processing	14.3
International:	Construction	28.6
	Oil Palm	28.6
	Rubber	14.3

Source: SGV-KC Field Survey

It would appear that the bulk of the sub-sector's domestic sales are accounted for by the construction and oil palm industries. The same preference exists in the foreign market although the number of respondents that have sold their products overseas is significantly less.

6.2.2 Key Marketing Variables

The manufacturers interviewed consider an established market position and good product quality to be the two most crucial factors in effective domestic marketing. These were followed by price competitiveness, reliable repair and maintenance services, personal relationships, favourable location, experienced sales force, good distribution network, and heavy advertising and promotion. Viable operations in the foreign market are attributed principally to an established market position and price competitiveness.

The Consultants observed that while local manufacturers of structural metal products are quite confident about their overall competitiveness in the local market, they harbour reservations about their ability to compete effectively overseas.

6.2.3 Distribution Method

The nature and use of an industry's products determine to a large extent the type of distribution outlets used. As most of the products including window frames, steel doors and boilers are usually custom-made to suit user requirements, it is only to be expected that most companies will deal directly with the customer. Table 30 below indicates the type of distribution outlets in use by the respondent companies.

TABLE 30
STRUCTURAL METAL PRODUCTS:
DISTRIBUTION METHODS USED

Types of Outlets	% of Respondents
Direct	85.7%
Hardware Shops	28.6
Machinery Traders	28.6

Source: SGV-KC Field Survey

The majority of the respondent companies employ a sales force. The nature of the job determines the minimum academic qualifications required of a salesman. As such the manufacturers of boilers and pressure vessels would have engineers in their sales teams whereas a Form Five school leaver would be sufficient in the selling of window louvres, steel frames etc.

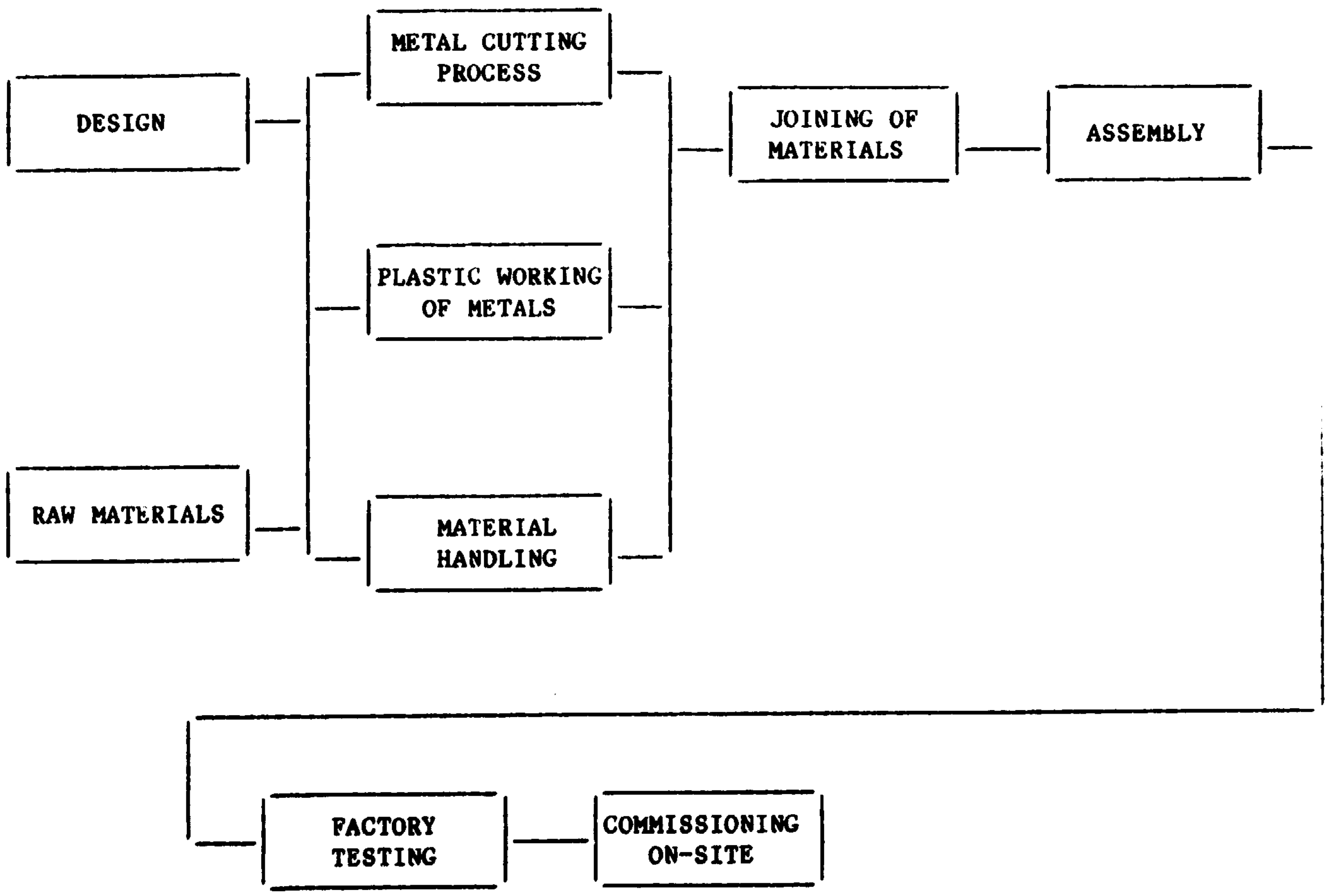
6.2.4 Advertising and Promotion

The survey revealed that only 28.6% of the respondents claim to have a formal advertising and promotional budget. However, such efforts are generally undertaken on an ad-hoc basis. The most popular forms of media used are newspapers, trade journals and magazines.

6.3 PRODUCTION ASPECTS

6.3.1 Technological Assessment

A typical process flow in the fabrication of structural metal products is depicted below:



The assessment in terms of production techniques or equipment used in this industry cannot be done in the same manner as in the Foundry Industry became of the different types of equipment which are used in different types of fabrication.

In general, the level of technology in terms of equipment used is dependent on the products made. Hence, the equipment such as submerged arc welding/TIG welding, X-ray/gamma ray equipment, etc., available in companies fabricating steam boilers could be classifed as high technology followed by the fabrication of pressure vessels/sterilizer doors, etc., with medium technology equipment. The equipment used in the production of window louvre/frames and other less sophisticated engineering metal structural products can be classified as low as it involves fundamental processes such as metal-cutting, stamping and welding without the need to satisfy rigorous technical standards.

6.3.2 Production Standards

Only the manufacturers of the sophisticated engineering products, such as steam boilers, pressure vessels, fire doors, etc., manufacture in compliance to the usual BS, ASME, JIS, API, etc., as required by law. Others do not as it is not generally required.

Most of these sophisticated engineering products manufactured are of high quality as the manufacturers receive independent certifications from ASME, ABS, Lloyds, etc.

6.3.3 Production/Design Capability

Most of the bigger establishments have their own design office and employ an engineering staff. However, even these manufacturers still rely heavily on foreign principals to provide them with more sophisticated designs in which they modify to meet local requirements. The smaller establishments, on the other hand, chiefly manufacture according to their clients' designs and specifications.

Much of the existing technology in the manufacture of structural metal products is acquired through direct purchases or licensing agreements with foreign companies. Direct purchases of technology are generally feasible only when relatively simple processes are involved. For more sophisticated products and procedures, however, a licensing arrangement is virtually the only option. The royalty paid by these manufacturers range from 2% to 5% of the sales.

The warranty period given is related to the nature of the product. On the average, boiler manufacturers give a warranty period of one year while curtain walls manufacturers issue warranties of as long as ten years.

6.3.4 Input Profile

The following raw materials are most commonly purchased by the manufacturers:

TABLE 31
STRUCTURAL METAL PRODUCTS:
MAJOR INPUTS

Raw Materials	% of Respondents
Steel Plates	57.1%
Steel Sheets	42.8
Steel Bars	42.8
Steel Rods	42.8
Control Instruments	42.8
Cast Iron	28.6
Aluminium Coil	14.3

Source: SGV-KC Field Survey

Steel plates, steel sheets, steel bars are mostly imported from Japan through local distributors. Cast iron, on the other hand, is available locally.

6.3.5 Production Cost Structure

Raw material requirements constitute the biggest element with 61.2% of total manufacturing costs. Within this input category, imports are more important although domestic components are also substantial as shown in Table 32.

TABLE 32
STRUCTURAL METAL PRODUCTS:
PRODUCTION COST STRUCTURE

Cost Item	Average Cost Breakdown	Range
Direct Labour	12.7%	2.4 - 20.0%
Direct Material		
import	33.3	20.0 - 54.0
domestic	27.9	6.0 - 43.5
Energy	3.1	1.5 - 5.0
Depreciation	3.9	2.0 - 6.0
Other Overheads	19.1	11.0 - 32.0
	100.0%	

Source: SGV-KC Field Survey

Within the structural metal products sub-sector an interesting comparison can be made between the cost structure of construction related metal products and that of boilers and pressure vessels. As outlined in Table 33 , the fabrication of construction-related products appears to entail relatively more direct raw materials than the manufacture of boilers and pressure vessels. However, the imported component in the latter is significantly higher than in the former. The data also indicate that construction-related products employ more energy-intensive and less labour-intensive manufacturing processes.

TABLE 33
STRUCTURAL METAL PRODUCTS:
INTRASECTORAL COST STRUCTURE COMPARISON

Cost Items	Construction-Related Products Average	Construction-Related Products Range	Boilers/Pressure Vessels Average	Boilers/Pressure Vessels Range
Direct Labour	11.0%	2.4 - 15.0%	15.0%	10.0 - 20.0%
Direct Material				
Import	29.8	20.0 - 43.5	38.0	30.0 - 54.0
Domestic	34.8	22.5 - 43.5	18.7	6.0 - 30.0
Energy	4.1	3.3 - 5.0	2.2	1.5 - 3.0
Depreciation	3.7	3.3 - 4.0	4.0	2.0 - 6.0
Other Overheads	16.6	3.9 - 32.0	22.1	11.0 - 31.0
	100.0%		100.0%	

Source: SGV-KC Field Survey

The different levels of technology embodied by these two structural metal product groups may explain why the production of boilers and pressure vessels is more import dependent. A larger proportion of the inputs utilized in manufacturing boilers and pressure vessels have to satisfy technical standards not attainable locally.

6.4 FINANCIAL ASPECTS

6.4.1 Ownership Structure

Of the 79 companies engaged in structural metal products fabrication which are registered with MIDA, 42 are wholly owned by Malaysian citizens (Table 34).

TABLE 34
STRUCTURAL METAL PRODUCTS:
OWNERSHIP STRUCTURE

Paid-up Capital	Wholly Malaysian Owned Bumiputra Share1			Joint Venture	
	0%	30%	30%	Malaysian Majority2	Foreign Majority
M$250,000	12	5	3	2	-
M$250,001 - M$1,000,000	5	7	6	10	8
M$1,000,001 - M$3,000,000	1	2	1	5	1
Over M$3,000,000	-	-	-	3	2

Note : 1 Refers only to percentage reserved and not actual Bumiputra Share.
2 Include reserved Bumiputra Share.

Judging from the available information, it would seem that the size of the companies wholly owned by Malaysians tend to be small, i.e., with paid-up capital of M$1.0 million or less. On the other hand, the incidence of joint ventures rises with the level of paid-up equity, with Malaysian citizen holding majority ownership in most cases.

This may be explained by the fact that large firms in this sub-sector typically manufacture higher technology products for which technological assistance from foreign fabricators is most beneficial. Foreign investments originate principally from Singapore, Japan, Hong Kong, Australia and United Kingdom.

Of the companies covered in the survey, four have paid-up equity not exceeding M$1.0 million. Three are owned predominantly by Malaysians of Chinese origin while one is completely Bumiputra in equity participation. The three other respondents in the sample are enterprises with paid-up capital of over M$3.0 million each. One is a joint-venture with Chinese majority ownership, another is wholly owned by Malaysian citizens with ethnic Chinese in control, while the third is owned by a public corporation.

6.4.2 Sources of Finance

The survey findings revealed that a substantial majority (70.6%) of establishments interviewed in this sector did not encounter any financial problems. Leasing appears to be the most popular source of financing used in capital expenditure while overdrafts are most frequently used to finance operating expenditure (Table 35).

TABLE 35
STRUCTURAL METAL PRODUCTS:
SOURCES OF FUNDS

	Have Used (% of Establishments)	Most Frequently Used (% of Establishments)
A. Capital Expenditure		
Source of finance		
Overdraft	42.9%	14.3%
Leasing	42.9	28.6
Term Loan	28.6	14.3
Equity	-	-
Retained Earnings	14.3	14.3
B. Operating Expenditure		
Overdraft	57.1	42.9
Retained Earnings	14.3	14.3
Suppliers Credit	42.9	28.6

Source: SGV-KC Field Survey

6.4.3 Profitability

On the basis of survey data, the profitability of the industry as measured by the ratio of pre-tax net profit to sales ranged from an average of 10.2% in 1981 to 13.8% in 1983, with a slight decline to 9.1% being recorded in 1982. By way of comparison, the following financial performance indicators can be estimated for the sector from the 1981 Census of Manufacturing Industries:

1. Net revenue/Fixed assets of 26.6%.

2. Net revenue/Total revenue of 7.3%.

6.5 MANPOWER ASPECTS

6.5.1 Employment Structure

A total of 12,289 persons were employed in the structural metal products sub-sector in 1981. Based on field survey data, the Consultants determined the functional composition of the sub-sector's work force as follows:

TABLE 36
STRUCTURAL METAL PRODUCTS:
FUNCTIONAL COMPOSITION OF WORK FORCE

Employment Classification	% of Total
Management	14.9%
Supervisory	16.3
Administrative	16.8
Direct Labour	52.0
	100.0%

Source: SGV-KC Field Survey

Among employees directly involved in production, metal benders/boiler makers constituted the largest occupational category with 36.8% of total production personnel. They were followed by machinists (21.3%), welders (17.4%), electrical chargemen (16.3%), fitters (4.5%) and operators (3.7%). On the average, the ratio of skilled labour to unskilled labour among the companies surveyed is 1.6 to 1.0.

Table 37 contrasts the different skills requirements needed in the manufacture of construction-related metal products vis-a-vis the fabrication of boilers and pressure vessels.

TABLE 37
STRUCTURAL METAL PRODUCTS:
INTRASECTORAL COMPARISON OF SKILLS REQUIREMENTS

Skilled Labour	Construction-Related Products	Boilers/Pressure Vessels
Welders	37.5%	10.4%
Metal Benders/Boiler Makers	10.0	46.2
Machinists	32.5	17.4
Fitters	5.0	4.3
Chargemen	-	21.7
Operators	15.0	-
	100.0%	100.0%

Source: SGV-KC Field Survey

Welders and machinists are the most commonly used skilled production workers in the former. On the other hand, the production of boilers and pressure vessels depend heavily on metal benders/boiler-makers and chargemen. The heavy dependence by these manufacturers of boiler/pressure vessels is due to the fact that this section involves significant amount of metal fabrication processes and chargemen are used in the electrical control system and for commissioning of the steam boilers.

6.5.2 Wage Structure

According to survey findings presented in Table 38, metal benders/boiler makers receive the highest average compensation in the sub-sector, followed by welders and electrical chargemen.

TABLE 38
STRUCTURAL METAL PRODUCTS:
WAGE STRUCTURE

Skilled Labour Category	Average	Range
Welders	M$810	M$600 - M$1,000
Fitters	695	450 - 900
Machinists	727	360 - 1,200
Metal Benders/Boiler Makers	836	750 - 960
Electrical chargemen	817	720 - 900
Operators	460	360 - 600

Note : Wages are expressed on a monthly basis

Source: SGV-KC Field Survey

It should be noted that considerable variation exists among the wages offered by different respondent firms in this sub-sector. The salaries of machinists exhibit the widest fluctuations (between M$360 and M$1,200) while the compensation of electrical chargemen is subject to the least variations.

A significant difference emerges when the wages of skilled workers involved in two basic groups of structural metal products are compared (Table 38). With the exception of operators, those employed by fabricators of boilers and pressure vessels earned substantially more than their counterparts in enterprises manufacturing construction-related metal products.

TABLE 39
STRUCTURAL METAL PRODUCTS:
INTRASECTORAL WAGE COMPARISONS

Skilled Labour	Construction-related Products		Boilers/Pressure Vessels	
	Average	Range	Average	Range
Welders	M$668	M$600 - 750	M$953	M$900 - 1,000
Fitters	600	450 - 750	742	500 - 900
Machinists	629	360 - 800	922	720 - 1,200
Metal Benders/Boiler Makers	800	-	855	750 - 960
Electrical Chargemen	-	-	817	720 - 900
Operators	467	-	450	300 - 600

Note : Wages are expressed on a monthly basis.

Source: SGV-KC Field Survey

Manufacturers of boilers and pressure vessels may offer their skilled production personnel premium wages partly because they tend to be larger establishments with more substantial financial resources. More importantly, they may find it imperative to attract the more experienced and more competent skilled workers because of the technically rigorous nature of their products.

6.5.3 Labour Supply Situation

High labour turnover appears to be the central concern of respondent firms in this sub-sector, with 57.2% of those interviewed mentioning this problem. Absenteeism and lack of discipline are the other two labour-related issues cited by respondents.

The average annual rate of turnover in the structural metal products industry is estimated to be 10.6% for skilled labour and 33.6% for unskilled labour. Because of the relatively high mobility of personnel in the sub-sector, nearly three-fourths (71.4%) of the manufacturers interviewed do not provide in-house training for their employees. Similarly, few companies sponsor their workers to local or foreign training institutions. By and large, the employee is expected to acquire the skills of the trade through his own initiative, i.e., on-the-job learning.

On the subject of skills shortage, 57.2% of the respondents admit to having labour supply problems. Operators, welders, machinists and electrical chargemen appear to command a premium.

6.6 DEVELOPMENT ISSUES

6.6.1 Industry Characteristics

The number of establishments in the structural metal products sector grew from 354 in 1973 to 1,062 in 1981 whilst employment grew from 5,633 to 12,289 employees. In those respective years, this sector accounted for 31.1% and 36.7% of total employment in the fabricated metal products industry.

The total output of structural metal products in 1981 constant prices, grew from M$219.3 million to M$409.1 million over those years, accounting for 32.8% and 30.4% of the total output of the industry. Although its output share declined, the average growth rate in real terms of this sector over the period was 8.1% per annum. Value added per employee was M$6,426 in 1973 and M$10,513 in 1981, in current prices. When translated into real terms, there was an overall decline of 6.9% over this period, indicating a decline in productivity.

Importations of structural metal products as a percentage of total apparent consumption fell from 19.8% in 1973 to about 13.4% in 1979, indicating a greater self-sufficiency as the decade progressed. However, this was sharply reversed in 1981 when imports of these products accounted for M$182.9 million or 32.2% of total local consumption. During the same period, the exports of such products were small, rising from a low of 3.1% of local production in 1975 to a high of 6.0% in 1981.

6.6.2 Major Issues

1. **Market**

Most of the products manufactured by these establishments are construction related items such as doors, window louvres. iron gates, tanks, etc., which are relatively low technology products. Because of the relatively small establishments which have no economies of scale and which are heavily dependent on expensive imported raw meterials, these products would be non-competitive both in price and non-price terms, when compared with foreign products if they were not protected by import duties which range from 20% to 35%. Nevertheless, those basic intermediate and finished products for the construction industry do not have export-potential as they can be easily manufactured.

The high technology structural metal products, mainly consist of pressure vessels, steam boilers, sterilisers and steriliser doors, etc., apparently have export potential but suffer from a disadvantage in terms of price-competitiveness because of the high cost of raw materials, components and auxillary plant equipment which are imported and therefore subjected to import duties and sales taxes ranging from 3% for basic steel to 15% for components/auxillary equipment. However, an apparent non-price competitive edge exists as these products are manufactured under licence or joint venture arrangements and have gained international acceptance and approval from such organisations as ASME, ABS, Lloyds, API, etc., underlining the quality and production capability of some of the manufacturers in this industry.

The marketing efforts of most of these companies are often concentrated in the local market. The reasons often cited for not venturing into foreign markets, besides price competitiveness, are a lack of international marketing experience/contacts, inappropriate manpower, high risks and a lack of finance. Although the first two reasons could be attributed to the nature of the establishments which are often family-owned, the high risks in terms of bad debts and the difficulty in getting finance or refinancing for exports are their immediate concerns. They find that the local insurance scheme too expensive and lacking in coverage for high risk countries while the export credit scheme is often cumbersome in procedure. Because of these factors, the manufacturers shy away from the overseas markets and concentrate their efforts locally.

2. <u>Manpower</u>

The shortage of skilled manpower especially of machinists, welders, fitters, boilermarkers and chargemen is particularly acute in this sector and it is obvious that their high technology custom-made products require personal skills. This shortage was felt in recent years during the construction boom. The present turnkey projects undertaken by foreign contractors also cause shortages as they offer substantially better wages than the local manufacturers.

The intake of apprentices has been poor because of the bias of the present educational system in favour of white collar occupations. This does not provide an opportunity for school-goers to learn the necessary skills.

3. <u>Land</u>

According to the Census of Manufacturing Industries, 1981, there were 1,062 manufacturers in the country with only 79 registered with MIDA, suggesting that the great majority are very small establishments which are exempted from MIDA licensing requirements. The larger establishments often cannot modernise as their present sites are not sufficiently large to cater for the expansion. For the small establishments it is usually a matter of affordability even if such sites are available.

Unless land and effective incentives are available, any cost reduction or productivity improvements carried out by these establishments would not be wholly effective as they would only be done on a piece-meal or adhoc basis.

It is apparent that this sector displays a comparative advantage in the high technology products such as steamboilers and pressure vessels. As these products are highly dependent on skilled manpower and well-established reputations which the local establishments possess, concerted market development and expansion in the export markets should be carried out immediately to maximise potential gains. As these products do not require large scale production volumes for economies of scale to be achieved, the present establishments can easily adapt with minimum disruption or alteration to production manufacturing processes, therefore minimising capital investments.

VII. TIN CANS AND METAL BOXES

7.1 CURRENT INDUSTRY POSITION

7.1.1 Industry Background

Although the number of local establishments involved in the manufacture of tin cans and metal boxes fell from 49 in 1973 to 45 in 1981, the gross value of output increased at 12.8% per annum from M$76.7 million to M$200.4 million over those years. Employment also increased from 2,962 in 1973 to 3,567 by 1981. As value added increased from M$21.7 million to M$49.5 million, the productivity in terms of value added per employee per annum rose from M$7,326 in 1973 to M$13,877 in 1981 (at current prices).

Since this industry is involved mainly in the manufacture of general purpose round and square tin cans as well as steel drums and casks, its growth has been related mainly to that of the food and beverage industry as well as the petrochemical and chemical industries. The apparent consumption of these products has grown from M$83.6 million in 1973 to M$218.3 million in 1981. Local production of tin cans accounts for about 92% of domestic demand.

With strong linkages between the tin can manufacturers and the food (including the edible oil manufacturers and refiners) and chemical industries, the geographical distribution of establishments in this sub-sector follows a pattern familiar to Malaysian manufacturing as a whole. In 1981, Selangor and Wilayah Perseketuan (Kuala Lumpur) accounted for 40% of the 45 firms in Malaysia, with other manufacturers located in Johore (18%), Pulau Pinang (13%), Perak (9%), Kelantan (5%), Melaka (5%), Sarawak (5%) and Sabah (5%).

The industry is dominated by manufacturers or firms already directly involved in the food and beverage industries. The largest manufacturers of general line tin cans, Metal Box Malaysia Bhd. and Malaysian Can Co. Sdn. Bhd., are wholly owned by FIMA Metal Box Bhd., one of the companies in Kumpulan FIMA Bhd., which is amongst the largest food manufacturers in the country. Another company, Tar Nam Tin Factory, was set up by the Lam Soon Oil and Soap Manufacturing Sdn. Bhd., one of the largest producers of cooking oils, margarine, other hydrogenated fats, soaps and detergents in Malaysia. This sort of vertical integration affords the food canners a consistency of quality and quantity of supply, while the tin can manufacturers have a ready market for their goods.

There are also a large number of smaller manufacturers in the industry, with 32 firms capitalised at under $1.0 million, of which 13 firms have a paid-up capital of less than $250,000. Table 40 below shows the distribution of firms according to their paid-up capital, indicating clearly the predominance of small manufacturers.

TABLE 40
TIN CAN/METAL BOX MANUFACTURING:
DISTRIBUTION BY CAPITALIZATION

	Small		Medium	Large
	(< $250,000)	(< $1 million)	(< $3 million)	(≥ $3 million)
Number of establishments	13	19	9	4
% of total	28.9	42.2	20.0	8.9

Sources: MIDA Listing

7.1.2 Current Problems

Field survey interviews conducted by the Consultants reveal that the main problems faced by this industry are a shortage of land and limited finance. Table 41 below also shows that a lack of labour in some parts of the country may be a serious problem facing the industry.

TABLE 41
TIN CAN/METAL BOX MANUFACTURING:
PERCEIVED INDUSTRY PROBLEMS

Problems	No Response	Not Serious	Serious	Very Serious	Immediate Action	Total
Shortage of Land	-	50.0%	-	50.0%	-	100.0%
Lack of Labour	-	50.0	50.0%	-	-	100.0
Heavy Govt. Regulation	50.0%	25.0	25.0	-	-	100.0
Lack of Mgmt. Skills	75.0	25.0	-	-	-	100.0
Low Technology	50.0	50.0	-	-	-	100.0
Limited Finance	50.0	-	-	50.0	-	100.0

Notes : Figures represent the percentage breakdown of responses to question regarding each problem area
Source: SGV-KC Field Survey

The problems of lack of available land and finance are particularly serious when the expansion of production facilities is contemplated. The move towards greater automation of tin can production requires the adoption of larger and higher volume machinery which in turn creates a need for additional factory space. Since most tin can manufacturers are located in traditional high-density industrial areas so as to be close to their customers, additional land for expansion is very difficult to come by.

With regard to finance, those firms with captive markets in the form of associated food manufacturing companies are relatively unperturbed by financial problems as funds may be obtained from their associate or parent companies. However, some of the independent manufacturers with small market shares face financial difficulties, particularly for purposes of capital investment, as a result of decreasing profit margins and difficulties in obtaining loans. This situation is common to small companies in Malaysia's manufacturing sector.

Depending on the location, the supply of labour is also a problem to some manufacturers. The problem is particularly serious in the Kelang Valley area due to the high concentration of industry in the region, thereby affording the workers a wide choice of employment. This not only results in a perennial shortage of labour, but also in a fairly high mobility of workers between companies or industries within the region.

7.1.3 Perceived Future Threats

Table 42, below gives a summary of the respondents' perceptions of industry threats in this sub-sector:

TABLE 42
TIN CAN/METAL BOX MANUFACTURING:
PERCEIVED INDUSTRY THREATS

Threats	No Response	Not Serious	Serious	Very Serious	Immediate Action	Total
Supply of Raw Materials	50.0%	-	50.0%	-	-	100.0%
Excessive Government Regulations	75.0	25.0%	-	-	-	100.0
Shrinking Market	50.0	-	50.0	-	-	100.0
Emergence of Product Substitutes	20.0	40.0	40.0	-	-	100.0
Price Competition	75.0	50.0	-	25.0%	-	100.0

Source: SGV-KC Field Survey

Of the possible threats to the industry, the supply of raw materials, a shrinking market and product substitutes are those more often considered to be serious, with at least 50.0% of respondents submitting their comments on these issues. Also mentioned is price competition, but this is to be expected in a market in which demand growth is constrained by or dependent upon the fortunes of another industry.

All the tin can manufacturers buy tin plate from Perstima (Perusahaan Sadur Timah Malaysia), the only local manufacturer. Only a small proportion of tin plate used is imported. As the supply of local tin plate is wholly dependent on one manufacturer, the interview respondents expressed reservations about the situation, particularly with regard to quality assurance and regularity of supply. The monopoly of Perstima is protected by tariffs in the form of a 20% (or M$330 per tonne, whichever is higher) import duty on foreign tin plate. The buyers of the local tin plate feel that an almost total dependence on a single supplier is dangerous not because of the possibility of irregular supplies but also inefficiences are very likely to develop in a protected industry. The inconsistant quality and high prices of local tin plate are certain to be reflected in the poor competitiveness of the ultimate manufacturers. The c.i.f. price of imported tin plate is about M$1,400 per tonne, which is lower than that of locally made tin plate at M$1,500 per tonne.

Although the market for tin cans, drums and casks is still increasing, changes within the food and packing industries in terms of end-products and their packing have led to changes in the structure of demand. The problem is mainly one of product substitution, particularly in beverage canning where the improvement of technology has resulted in the development of the aluminium 2-piece can, which has significantly affected the world-wide demand for tin cans. In Malaysia, there are no local 2-piece canning facilities. Consequently, competition comes indirectly in the form of food and beverage products packaged in 2-piece cans.

Other less significant changes in the use of tin cans includes the packing of fresh milk in waxed-paper cartons and the bottling of edible oils in plastic containers. These are not viewed as serious threats since the local demand for larger tin cans (round, open top or square), for powdered milk, other beverage mixes and for larger volumes of edible or cooking oils remains strong. Producers of containers utilizing alternative raw materials still find it difficult to be price competitive.

7.1.4 Key Success Factors

When asked about the relative importance of various factors in contributing to the success of the industry, the interview respondents answered as shown in Table 43 below.

TABLE 43
TIN CAN/METAL BOX MANUFACTURING:
KEY SUCCESS FACTORS

Key Success Factors	No Response	Not Important	Important	Very Important	Absolutely Essential	Total
Available Land	25.0%	25.0%	50.0%	-	-	100.0%
Skilled Labour	25.0	25.0	50.0	-	-	100.0
Management Skills	25.0	25.0	50.0	-	-	100.0
High Technology	25.0	-	75.0	-	-	100.0
Available Finance	50.0	-	50.0	-	-	100.0
Product Development	50.0	25.0	25.0	-	-	100.0
Market Development	25.0	50.0	-	25.0%	-	100.0

Notes : Figures represent the percentage breakdown of responses to questions regarding each success factor

Source: SGV-KC Field Survey

From the results of the interviews, it is apparent that although the manufacturers almost wholly cater to the domestic market, the external threats represented by product substitution and resultant shrinking markets are viewed to be serious enough to require immediate attention. Most of the respondents indicated that in order to be successful in the domestic market over the next five years, a host of success factors is required, including available land, labour and finance as well as product and market development.

In view of growing competition and increasing sophistication of the market, the adoption of high technology and greater market development are seen to be the most important success factors. Whereas technology can be easily obtained by purchasing newer production machinery, the development of new markets is much more difficult, particularly with regard to exports.

7.2 MARKETING ASPECTS

7.2.1 Products and Markets

The tin can and metal box manufacturers cater mostly to the domestic edible oil (particularly palm oil), food and chemical industries. Of the 45 companies in existence, 35 manufacture tin cans only, six fabricate steels drums, two produce both tin cans and drums whilst two manufacture steel cylinders for liquified petroleum gas (LPG).

The tin cans produced are of various types and include the following:

1. general line, 3-piece round tin cans (with either a soldered or welded seam) of a capacity less than 2 litres, used mainly for food and beverage products;

2. open-top, 3-piece round tin cans (with either a soldered or welded seam) with diameters of up to 18 cm, used mainly for dry foods, paints, chemicals etc.,

3. general line, 3-piece square tin cans of a capacity up to 18 litres, used mainly for edible oils, paints, thinners, chemicals etc.

Food canners are the largest customers of the tin can manufacturers, followed by the manufacturers of edible or cooking oils. The tin plated food can has proven to be the most economical and reliable container in preventing deterioration and humidification of contents. As such, there is no threat of product substitution and the size of demand is linked directly to the output of the food and beverage canners.

In the segment of the mar' ' represented by edible oil manufacturers, the use of plastic containers for holding smaller volumes (up to 5kg. in weight or 6.25 litres in volume) of these commodities has limited demand for tin cans. However, larger square tin plate containers for oil products continue to enjoy bouyant demand as they are still more practical and economical to use. The cost of a usable plastic container for the storage of up to 18 litres of oil would prove to be prohibitive when compared with that of a tin can.

The 25 to 45 gallon (113.6 to 204.6 litre) steel drum is used mostly in the petrochemical and chemical industries for such products as motor oil or lubricants, paints and other chemicals.

The market for these products is almost completely domestic although there have been some exports in the past. The obvious reason for the lack of export potential is that of volume, the transport costs of empty tin cans being extremely high on a unit value basis. In the past, some tin cans were exported in parts, with the seamed bodies in a flattened state. However, the establishment of local tin can manufacturing plants in traditional overseas markets (Hong Kong, Thailand, Papua New Guinea) has led to a decline of these orders.

The interview respondents indicated that the main growth area will be that represented by the food manufacturing industry. As such, the 3-piece round can (including open-top cans) is seen as the product for which demand will continue to grow in direct proportion to the food industry.

7.2.2 Key Marketing Variables

When asked about the reasons why their customers purchase their products, the interview respondents answered as shown in Table 44 below:

TABLE 44
TIN CAN/METAL BOX MANUFACTURING:
KEY MARKETING VARIABLES

Marketing Variable	% Positive Response
1. Long established relationship	100.0%
2. Well established in market	50.0
3. Good product quality	50.0
4. Good repair/maintenance/service	25.0
5. Experienced sales force	50.0
6. Government regulations	25.0
7. Price competitiveness	50.0
8. Good location	25.0
9. Fast market growth	25.0

Note : Figures represent positive responses as a percentage of total respondents.

Source: SGV-KC Field Survey

It can be seen from the table that the relationship between the customer and the manufacturer is of ultimate importance in this sub-sector. In particular, independent tin can manufacturers have sought to develop this critical seller-client relationship over the years through the provision of consistent product quality, good customer servicing and competitive pricing. The other manufacturers have the advantage of captive markets.

Regardless of the relationship between the producer and the customer, consistent quality is essential in the case of food cans because of the sensitivity of consumers to the quality of canned food. Combined with some degree of price competition, the tin can manufacturers are continually faced with the challenge of improving production technology and productivity to improve product quality and to reduce costs.

Another important factor is that of location. The tin can manufacturers need to be located close to their markets in order to minimize lead times and to be responsive to their customers needs. The food manufacturers do not hold high stock levels of empty cans as they take up too much valuable space. As such, an efficient stock control system needs to be implemented and this depends on the ability of the supplier to fulfill orders on time.

7.2.3 Product Pricing

The cultivation of close links between the suppliers and their customers allows the suppliers to find little market niches for themselves, thereby reducing the element of competition. Consequently, they are generally able to adopt cost-plus pricing methods. Competitive pricing is infrequently used.

7.2.4 Distribution

As most of the manufacturers make to order on a jobbing basis, sales are made as a direct basis. Finished goods go directly from the plant to the customer, without the use of any intermediaries. The manufacturers do, however, maintain a small sales force to service their customers. The main job activities of these salesman are order taking, promotion and the handling of customer complaints.

7.2.5 Advertising and Promotion

Since the tin cans and steel drums are not retail products, most manufacturers do not advertise their products nor do they have formal promotional or advertising campaigns. Normally, the manufacturers will list themselves in the regular trade directories and the yellow pages.

7.3 PRODUCTION ASPECTS

7.3.1 Technology Assessment

The earliest licences to be issued for the manufacture of tin cans and metal boxes were awarded in 1960 and 1970 to Metal Box which set up the first can manufacturing plant in the country. The issuance of manufacturing licences for various products since 1960 is shown chronologically in Table 45 below.

TABLE 45
TIN CAN/METAL BOX MANUFACTURING:
LICENCES AWARDED[1], 1960 TO 1983

Year	Number of licences awarded by type				
	General Line and Open Top Tin Cans	Beverage Cans	Composite Cans	Steel Drums	LPG Cylinders
1960	1	-	-	-	-
1970	2	-	-	-	-
1973	-	-	-	1	-
1974	2	-	-	1	-
1975	1	-	-	-	-
1976	5	-	-	-	1
1977	12	-	-	3	-
1978	4	1	-	1	-
1979	1	-	-	-	-
1980	4	-	-	1	-
1981	2	-	1	2	-
1982[2]	6	-	1	-	1
1983	2	1	-	1	-
Total	42	2	2	10	2

Note : 1. The number of licences issued is greater than the number companies as some have been issued with more than one.

2. Two licences in 1982 exclude open top tin cans.

Source: MIDA Listing

It can be seen from the table that between the years 1976 and 1980 inclusive, 26 manufacturing licences for general line tin cans (including open top cans) were issued, accounting for 62% of all licences issued up to the end of 1983. This is particularly significant when considering that only six licences were issued between 1960 and 1975. The implication of this on the technology employed is that up until the late seventies, 3-piece cans were manufactured with soldered longitudinal seams on the body. The beginning of the 1980's saw the introduction of higher technology in tin can manufacturing, with the use of newer machinery and greater automation.

The new can making machines mass-produce tin can-bodies in a continuous, automatic process as opposed to the semi-automatic processes used in older plants. Furthermore, the new machines fabricate can-bodies with welded longitudinal seams which are not only simpler, but also stronger and less susceptible to leakage than soldered seams. The use of continuous copper wire electrodes in the welding process allows the continuous production of can-bodies at rates exceeding 150 pieces per minute.

At least three manufacturers, all large, now utilise these high technology machines in the production of welded can-bodies, namely, Metal Box, Tar Nam Tin Factory and Kian Joo/Metal Paks. It is estimated that together, these 3 companies account for about 60% of total local production. Metal Box (and its associate company, Malaysian Cans) also hold the only licences for beverage cans and one of two licences for composite cans, issued in 1983 and 1982 respectively. The smaller manufacturers still use the low technology, semi-automated processes.

The Consultants evaluated the current technology of the tin can and metal box manufacturing industry in terms of can-bodies manufacturing and can construction techniques. The results of this assessment are presented in Table 46 below.

TABLE 46
TIN CAN/METAL BOX MANUFACTURING:
TECHNOLOGY ASSESSMENT

	Technology Level		
	Low	Medium	High
Can-body making techniques	25.0%	25.0%	50.0%
Can-construction techniques	25.0	-------75.0-------	
Packing techniques	25.0	25.0	50.0

Note : Figures represent percentage of respondents who employ different technology levels for each production process or technique.

Source: SGV-KC Field Survey

In the above table, low technology companies are defined as those producing 3-piece cans with soldered seams. Manual or semi-automatic machines are used to slit, notch, edge, bead, interlock and bump the edges of the can-body to be soldered. These firms also employ manual or semi-automatic flanging and seaming machines for the ends of the can. Typical products are 3-piece round and square cans (two longitudinal seams) for the packaging of dry goods (round cans) or oil (square). Output rates of such a line would be about 30 to 50 cans per minute.

Medium technology plants are taken to be those making either soldered or welded can-bodies and semi-automatic or automatic production lines. The plant, however, is not usually designed to handle large volume, mass production runs. Most of the work is done in batches. A certain amount of manual work is still required in transferring semi-finished products from one processing machine to another. Typical products include the food can, open top cans and square cans for the packaging of food, edible oils, paints, chemicals and other dry or liquid goods. Output of a typical line is about 60 to 80 pieces per minute.

The high technology plants employ large automated production lines in which most of the intermediate processes needed for soldering a seam are dispensed with. Instead, a simple welded butt joint is made after the tin-plate is bent automatically. Operating on a conveyor system, the ends of the welded can-bodies are then automatically flanged and sealed with the bottom end (and top end in the case of open top cans) itself the product of another automatic stamping process. Random leak tests are performed to ensure quality.

The medium and high technology plants usually have facilities to print designs onto the tin plate in several colours as well as lacquer the inner surfaces of the tin cans (prior to bending). Most of these printing facilities use a lithographic printing process in which at least 2 colours may be applied in one run.

Compared with the older lines, the high technology lines are much faster and can produce cans at a rate of over 150 per minute, the equivalent of at least 72,000 cans per 8-hour shift per line, or about 18 million cans per year.

The products of these lines have a consistency of quality not matched by the older lines which produce soldered can-bodies. Typically, the products include round, 3 to 4-inch diameter, 3-piece cans used for packging foodstuff in dry or liquid form. The open-top round cans are used for dry, powdered foods like milk or other powdered beverages. The larger cans may also be beaded to provide greater structural strength.

After coming off the production line, the finished cans are either palletized or packed in cartons, depending on their size. The larger cans are palletized either manually or automatically and the smaller ones packed in cartons, to be ready for delivery by truck.

7.3.2 Production Standards

As most manufacturers supply to regular customers, the consistency of product quality is important. As such, although manufacturers are not required to meet formal international standards such as B.S., J.I.S., A.S.T.M. etc, an understanding exists between the manufacturers and their customers about the standards of production and the reliability of the products.

Of the manufacturers interviewed, only one, actually manufactured to ISO specifications. Nevertheless, all the interview respondents felt that Malaysian product quality is adequate on the whole, especially in the case of the food can, which is required to be most consistent and reliable. Seventy-five percent of the companies interviewed felt that their products are of high quality.

7.3.3 Production/Design Capability

All the larger and newer production facilities are operated by qualified engineers with several years of experience, whereas the smaller firms are usually run by people with several years of experience but without formal educational or vocational training.

Since all the can makers manufacture on jobbing or contract basis, most designs are supplied by the customers who specify their own requirements. Of the firms interviewed, only 25% had their own design offices. With regard to research and development, there is only one firm with this sort of capability. Even in this case, a lot of research data is made available by the British parent company, which charges a royalty of two percent on the gross turnover of the enterprise's Malaysian operations.

Production technology is therefore mostly purchased in the form of new machinery. It is only in the case of one company that both home-grown and imported technology are used actively and continuously.

7.3.4 Production Cost Structure

The price competitiveness of any product depends on the manufacturers ability to minimise its unit fixed costs and the cost of its raw inputs. The interview survey showed the following to be the cost structure of the tin can and metal box manufacturing industry (Table 47).

TABLE 47
TIN CAN/METAL BOX MANUFACTURING:
PRODUCTION COST STRUCTURE BY SIZE OF FIRM

Production Cost Components	Percentage of Total Cost		
	Small	Medium	Large
Direct Labour	15.0%	5.0%	10.0%
Direct Materials			
Imported	5.0	5.0	10.0
Domestic	70.0	70.0	65.0
Overheads			
Energy	)	5.0	5.0
Depreciation	)10.0	10.0	3.0
Others	)	5.0	7.0
	100.0%	100.0%	100.0%

Source: SGV-KC Field Survey

The results show that this industry is not heavily dependent on foreign suppliers, with imported input comprising only 5 to 10% of total manufacturing expenses. With direct labour accounting for about 10% of total manufacturing cost and energy another 5%, aggregate variable costs exceed 80% of total production cost, regardless of the size of the firm. The high volume production of these products also helps to lower the fixed cost components relative to the other cost items.

The results of the survey also show that there are no real economies of scale to be exploited since all respondent companies reported equal material costs as percentage of total. However, it does appear that the level of technology employed affects the manpower or labour cost component, with the medium sized or larger firms with newer, more highly automated plants using less labour than the small firms. This is also reflected by the higher depreciation suffered by the larger firms.

Interview respondents generally held that this cost structure has been fairly stable, with most input costs rising in line with inflation. Labour costs, however, are rising a little faster, increasing at about 10% each year.

7.3.5 Technology Prospects

The food can and the beverage can are the two products perceived to have the largest potential for growth in the Malaysian market. Already, the more progressive manufacturers have adopted higher technology in the production of welded 3-piece cans. In this area, it is felt that production capability can be improved and upgraded further so that even welded can-bodies of diameters greater than 6 inches may be produced.

Although the two beverage can manufacturers have sufficient capacity to meet local demand for their products, they only represent about 60% of the total market for canned drinks. The other 40% is made up of imported canned drinks, often packed in the new 2-piece aluminium can. This represents the greatest threat to the 3-piece beverage can manufacturers and also the next level of technology they hope to adopt.

7.4 FINANCIAL ASPECTS

7.4.1 Ownership Structure

Of the 45 companies in existence, ?7 (60%) are wholly owned by Malaysians and 18 (40%) jointly with foreign partners. Of the 26 Malaysian-owned establishments, 7 are Bumiputra owned or controlled (with equity participation exceeding 51%), 10 have up to 30% Bumiputra participation and 9 are owned by Non-Bumiputras. Table 48 shows the breakdown of the tin can and metal box manufacturers by size of paid-up capital and ownership.

TABLE 48
TIN CAN/METAL BOX MANUFACTURING:
OWNERSHIP STRUCTURE

Capital issued and Fully Paid-up	Number of Establishments: Wholly Malaysian, Bumiputra share[1] 0%	Wholly Malaysian, Bumiputra share[1] 30%	Wholly Malaysian, Bumiputra share[1] 50%	Malaysian Partially[2] Foreign share 50%	Malaysian Partially[2] Foreign share 51%
1. Up to $250,000	5	1	-	5	2
2. $250,001 to $1,000,000	4	7	1	4	3
3. $1,000,000 to $3,000,000	1	2	2	2	2
4. $3,000,001 and above	-	-	4	-	-
Total	10	10	7	11	7

Note: [1] Bumiputra shareholdings include amounts reserved but not necessarily taken up

[2] Includes both Bumiputra and Non-Bumiputra shareholdings

Source: MIDA listing

The table indicates that of the 18 companies with foreign equity participation, 11 are controlled by Malaysian citizens. However, Bumiputras hold at least 51% equity in one company. It may also be observed that the ethnicity of ownership is related to the size of paid-up capital.

Of the 18 small, wholly Malaysian-owned establishments each with a paid-up capital of less than M$1.0 million, 17 (94.4%) are owned or controlled by Non-Bumiputras and only one (5.6%) by Bumiputras. However, of the five medium-sized Malaysian establishments each with a paid-up capital of between M$1.0 and M$3.0 million, three (60%) are controlled by Non-Bumiputras and two (40%) by Bumiputras. This situation is reversed with regard to the large companies. Of the four establishments with a paid-up capital of over M$3.0 million, all are Bumiputra-owned or controlled.

Therefore, although a greater number of firms is controlled by Non-Bumiputras (37 out of 45), those that are controlled or owned by Bumiputras are generally larger. As such, although Bumiputra controlled companies only make up 17.8% of the total number of establishments in the sub-sector, the equity either reserved for or already in the hands of Bumiputras amounts to about 42% of the industry total. Of the balance of capital invested, about 39% is contributed by Non-Bumiputras and 19% by foreigners.

7.4.2 Sources of Funds

Table 49 below shows the breakdown of responses to questions regarding the sources of funding for capital and operating expenditures.

TABLE 49
TIN CAN/METAL BOX MANUFACTURING:
SOURCES OF FUNDS

	% of Respondents			
	Capital Expenditure		Operating Expenditure	
Sources of Funding	Have used	Most often used	Have used	Most often used
1. Overdraft	25.0%	25.0%	75.0%	75.0%
2. Leasing	50.0	50.0	n.a.	n.a.
3. Terms of Loan	75.0	50.0	n.a.	n.a.
4. Retained Earnings	50.0	75.0	75.0	50.0
5. Suppliers Credit	n.a.	n.a.	75.0	75.0
6. Others	n.a.	n.a.	50.0	75.0

Note : Figures represent percentage of respondents who have used or most often use each source of funding

Source: SGV-KC Field Survey

As can be expected, the results of the interview survey suggest that tin can manufacturers most often use retained earnings, term loans and equipment leases for capital expenditures whereas operating expenditures are funded mainly by overdrafts, suppliers credit and other sources such as short term advances by directors or associate companies.

It is interesting to note that although the manufacturing industries may claim accelerated depreciation allowances against their income tax, the majority still prefer to obtain machinery through leasing and therefore keep these items off the balance sheet. The main reason for this is that lease rental payments do not burden the liquidity position of the firms as much as outright payments for capital purchases.

Generally, the respondents indicated that there were no real problems with funding in this industry.

7.4.3 Profitability

The field interviews indicate that on the average profit margins in the tin can manufacturing industry have increased slightly, from 13.7% in 1982 to 14.3% in 1983.

7.5 MANPOWER ASPECTS

7.5.1 Employment Structure

According to the 1981 Census of Manufacturing Indutries, the manufacturers of tin cans and metal boxes employed a total of 3,567 workers. The Consultants' field survey results indicated that the functional composition of the employees are as shown in Table 50 below:

TABLE 50
TIN CAN/METAL BOX MANUFACTURING:
FUNCTIONAL COMPOSITION OF EMPLOYEES

Function	% of total
Management	6.0%
Supervisory	6.5
Administrative	4.0
Direct Labour	83.5
	100.0%

Source: SGV-KC Field Survey

Of the direct labour, a little under half may be classified as skilled workers. The actual ratio of skilled to unskilled workers is 43.5%:56.5%, based on the results of the field survey. Within this industry, the skilled workers usually fall into the categories shown in Table 51 below. The table also presents the relative numerical importance of these skilled workers as determined by field survey.

TABLE 51
TIN CAN/METAL BOX MANUFACTURING:
COMPOSITION OF SKILLED PRODUCTION WORKERS

Category	% of total
Welders	4.6%
Metal Benders	5.7
Machinists	3.6
Fitters	4.9
Machine Operators	78.4
Chargemen	2.8
	100.0%

Source: SGV-KC Field Survey

The increasing automation of the can manufacturing process has led to a heavy concentration of machine operators in this industry. Not surprisingly, over 78% of skilled labour employed consists of machine operators. The high volume of output also necessitates a fairly large proportion of unskilled workers to perform routine packing and other production chores.

7.5.2 Wage Structure

The following wage structure emerged as a result of the field survey (Table 52). It should be emphasized that the wage tabulations do not include EPF and SOCSO contributions nor other benefits such as insurance or hospitalisation.

TABLE 52
TIN CAN/METAL BOX MANUFACTURING:
WAGE STRUCTURE

Job Category	Average/Month
1. Skilled	
Welders	M$450
Fitters	525
Machinists	575
Metal Benders	350
Chargemen	700
Machine Operators	440
2. Unskilled labour	
General Labour	M$220

Source: SGV-KC Field Survey

7.5.3 Labour Turnover

The companies interviewed report fairly low labour turnover rates, even among unskilled workers. On the average, skilled labour turnover is about 4% per annum and unskilled labour turnover about 5%.

7.5.4 Labour Training

With regard to the training of direct labour, all interview respondents indicated that it is given "on-the-job". Some companies also send their workers for training in local training institutions or overseas for special technical training. Table 53 below summarises the responses of interviewees to questions regarding training procedures and methods.

TABLE 53
TIN CAN/METAL BOX MANUFACTURING:
TRAINING METHODS USED

Training Type	% of Respondents
On-the-job	100.0%
In-house	25.0
Local Training Institutions	25.0
Overseas Training	25.0

Note : Figures represent percentage of respondents who are each type of training

Source: SGV-KC Field Survey

7.5.5 Labour Supply Situation

Where there are any problems at all related to labour, they are those that stem form a scarcity of supply. This is particularly significant in the case of skilled labour, especially in the Kelang Vally region, where a high concentration of manufacturing industries creates a large demand for experienced personnel. In the tin can manufacturing industry, the problem is especially acute with regard to machine operators. Table 54 below shows the breakdown of the additional demand for skilled labour in this industry as a labour shortage index, needed to increase present production output to maximum, based on the Consultants' field survey.

TABLE 54
TIN CAN/METAL BOX MANUFACTURING:
PERCEIVED MAGNITUDE OF LABOUR SHORTAGE

Job Category	Labour Shortage Index
Machine Operators	1.24
Welders	1.15
Fitters	1.24
Machinists	1.25
Metal Benders	1.15
Chargemen	1.00
Others	1.24

Note : 1. Labour shortage index (LSI) is defined as the ratio of the ideal no. of workers needed for full output to the actual no. employed presently

Source: SGV-KC Field Survey

7.6 DEVELOPMENT ISSUES

7.6.1 Industry Characteristics

The tin can and metal box manufacturing industry is the third largest contributor, after structural metal and wire products manufacturing, to the output of the fabricated metal products sector. With an average of 79 employees per establishment in 1981, it is also the industry with the largest but fewest participating firms.

Having strong historical links with the food manufacturing industry, especially with the producers of edible oils and powdered food products, the tin can manufacturing industry has developed into one serving primarily a domestic market for general purpose round and square tin cans. Other products include steel drums and casks used in the chemical and petrochemical industries. In total, local production accounts for about 92% of domestic demand.

This is the only industry in which inter-industry linkages are very well established. The homogeneity of the products and their specialised markets have allowed these linkages to develop mainly in the form of backward vertical integration by the food manufacturers, and as such, the industry is dominated by manufacturers of tin cans who are also directly involved in the food and beverage industries.

Going one step further, the inter industry linkage extends to the only tin plate manufacturer, Perstima, whose output goes almost wholly into this industry. The domestic orientation of the linkages ends here, however, because Perstima is entirely dependent on imported sheet steel for plating. The dependence of the industry on a single supplier of tin plate does, however, make it vulnerable to the obvious dangers of irregular supplies, high prices and even inconsistent quality. The tariff protection given to locally manufactured tin plate has already enabled Perstima to sell its tin plate at M$1,500 per tonne, which is M$100 higher than the c.i.f. price of imported tin plate.

Although the local tin can industry is experiencing a decline in profitability, it has not been as adversely affected by product substitution in the form of plastic containers and aluminium two-piece cans as has the industry world-wide. As such, even though the alternative products have succeeded in securing a share of the packaging industry, the actual market for tin cans has not been shrinking in absolute terms. The general growth of food manufacturing and the unique composition of the products (like edible oils and dried powdered foods) has actually allowed the size of the market to increase.

Reinvestment by the larger firms in modern, mass production lines has allowed them to produce very high quality tin cans with welded instead of soldered seams. Technological improvements are therefore not difficult to make in this industry and this is not seen to be a problem area.

In fact, this industry is the only one in the manufacture of fabricated metal products which is well developed, mature and economically viable, although catering to an almost entirely domestic market. The further development of this industry will therefore depend primarily on the ability of the ubiquitous tin can to withstand the threat of substitution by other types of containers.

7.6.2 Major Issues

With little export potential since the costs of transporting empty tin cans being likely to be higher than is justifiable, the major developmental issues are necessarily related to the likely developments in the domestic market. These include the following:

1. Product Substitution

   There is now widespread use of plastic containers in the food manufacturing industry, especially for the storage of liquid products like edible oils and beverages. The impact of this has, however, probably been greater on the glass bottling rather than the tin canning industry since the substitution in the latter has been limited. The main reason for this is that over a certain size, the plastic container becomes more expensive than a tin can.

The advent of the 2-piece aluminium can represents a greater threat to the tin plate manufacturer than the tin can manufacturers. Although the existing producers would need to retool and upgrade production technology and processes to manufacture this product, there would naturally be encouragement to do so if the 2-piece can could be manufactured and sold competitively. At present, the beverage can market is not large enough to justify the capital investment required.

Industry sources indicate that the 2-piece aluminium can is not seen to be a real threat as the volume of demand for the general purpose food can is considerably higher in the domestic market.

2. Raw Materials

The possibility of substitution by the 2-piece can raises the question of the viability of a local tin plate manufacturing industry. It does seem logical that such an industry is well suited to Malaysia, given its position as the world's largest supplier of tin. However, the tin coating only represents the smaller of the two major components of tin plate, the other being sheet steel. The dependence of the industry entirely on imported sheet steel does not afford it any comparative advantage over those in steel-manufacturing countries.

Although it will serve the national interest to use the tin and increase value-added in the process of tin plate manufacturing, the long term efficacy of the tin can manufacturing industry will depend on the ability of Perstima to manufacture high-grade tin plate at world competitive prices. Being highly protected, Perstima runs the risk of becoming even less competitive and close monitoring will be necessary to prevent this from happening.

VIII. WIRE AND WIRE PRODUCTS

8.1 CURRENT INDUSTY POSITION

8.1.1 Industry Background

The wire and wire products industry in Malaysia is relatively young, with most manufacturers establishing themselves between 1965 and 1975. Since then, the industry has gradually diversified its product lines from low-technology items like wire mesh to high-technology fabrications such as wire ropes, which are drawn from high carbon wire rods.

The 1981 Census of Manufacturing Industries identified 120 manufacturers of wire and wire products. Companies in this sector earned an average pre-tax return on sales of 1.8% and an average pre-tax return on fixed assets of 6.1% during the census year.

Table 55 relates the number of manufacturers to the broad products groups of the industry.

TABLE 55
WIRE AND WIRE PRODUCTS:
PRODUCT PROFILE

Product Groups	No. of Companies	%
Category 1- Common wires, galvanized wires, nails, reinforcement mesh	101	78.9
Category 2- Bolts, nuts and screws	25	19.5
Category 3- Ropes and stranded products	2	1.6
Total	128	100.0%

Source: MIDA Listing

Almost 80% of the companies in this industry manufacture low-technology products. Most of these items are mass-produced and sold through hardware dealers. Competition is quite severe since it is estimated that aggregate productive capacity in this sector is 2.0 to 2.5 times larger than what is necessary to satisfy current market demand. Quite understandably, rivalry among high-technology manufacturers is noticeably less pronounced than competition in the lower range of the product spectrum.

The geographical dispersion of the manufacturers of wire and wire products is shown in Table 56

TABLE 56
WIRE AND WIRE PRODUCTS:
GEOGRAPHICAL DISTRIBUTION OF MANUFACTURERS

State	Number	%
Kedah	1	0.8
Penang	12	9.4
Perak	11	8.6
Selangor/Federal Territory	47	36.7
Negri Sembilan	4	3.1
Malacca	2	1.6
Johore	11	8.6
Pahang	3	2.3
Kelantan	2	1.6
Sabah	11	8.6
Sarawak	22	17.2
Unclassified	2	1.5
Total	128	100.0

Source: MIDA Listing

Over one-third (36.7%) of the country's wire and wire product manufacturers is located in the heavily industrialized Federal Territory/Selangor region. Curiously enough, Sarawak has the second highest concentration of enterprises with 17.2% of the total.

8.1.2 Current Problems

The Consultants confined their study of the wire and wire products sub-sector to the manufacture of wire ropes, nuts and bolts. As reflected in Table 57, a significant number of respondent companies in this sub-sector did not seem to perceive any significant industry problems. Among those who submitted positive responses, limited financing is considered to require immediate action. The lack of skilled labour, shortage of land and heavy government regulations are the three areas that require very serious consideration.

TABLE 57
WIRE AND WIRE PRODUCTS:
PERCEIVED INDUSTRY PROBLEMS

Problem	No Response	Not Serious	Serious	Very Serious	Immediate Action	Total
Shortage of Land	42.8%	28.6%	14.3%	14.3%	-	100.0%
Lack of Labour	42.8	14.3	14.3	28.6	-	100.0
Heavy Govt. Reg.	71.4	14.3	-	14.3	-	100.0
Lack of Mgmt. Skills	85.7	14.3	-	-	-	100.0
Low Technology	62.5	12.5	25.0	-	-	100.0
Limited Finance	57.1	28.6	-	-	14.3	100.0

Source: SGV-KC Field Survey

8.1.3 Perceived Future Threats

A majority of respondents identified a shrinking market as the most important threat to their sub-sector although none of them felt that this merits immediate action. It should be qualified, however, that this perception applies only to those companies serving the tin mining and logging industries, which are the predominant customers of the manufacturers surveyed.

Over 50% of the respondents did not comment about the other possible threats, but among those that did, the restrictive impact of government regulation is considered most critical, requiring immediate attention. Relevant survey results are found in Table 58.

TABLE 58
WIRE AND WIRE PRODUCTS:
PERCEIVED INDUSTRY THREATS

Threats	No Response	Not Serious	Serious	Very Serious	Immediate Action	Total
Supply of Raw Materials	71.4%	14.3%	-	14.3%	-	100.0%
Excessive Government Regulation	71.4	-	-	14.3	14.3	100.0
Shrinking Market	42.8	-	28.6	28.6	-	100.0
Emergence of Product Substitutes	71.4	28.6	-	-	-	100.0
Price Competition	85.7	-	14.3	-	-	100.0

Source: SGV-KC Field Survey

8.1.4 Key Success Factors

In the opinion of the manufacturers surveyed, skilled labour, high technology and market development are the most critical success variables in the domestic market (Table 59). There was, however, a significant difference in their relative importance. Market development and high technology are considered very important or absolutely necessary by 42.9% and 28.6% of the respondents respectively. In contrast, all of those who perceived skilled labour as a key success factor rated it as important.

Effective operation in the international market depends primarily on skilled labour and high technology. Although high technology is perceived to be very important to absolutely essential by 42.9% of all respondents, skilled labour is considered important by all who identified it as a relevant concern. On the other hand, 57.2% of all respondents listed market development as being very important or absolutely necessary even though this factor is not as frequently cited as skilled labour.

TABLE 59
WIRE AND WIRE PRODUCTS:
KEY SUCCESS FACTORS

Domestic Market	No Response	Not Important	Important	Very Important	Absolutely Essential	Total
Available Land	28.6%	14.3%	42.8%	14.3%	-	100.0%
Skilled Labour	14.3	-	85.7	-	-	100.0
Management Skills	28.6	-	57.1	14.3	-	100.0
High Technology	14.3	14.3	42.8	14.3	14.3	100.0
Available Financing	28.6	14.2	28.6	14.3	14.3	100.0
Product Development	42.9	42.9	14.2	-	-	100.0
Market Development	14.3	-	42.8	28.6	14.3	100.0

International Market	No Response	Not Important	Important	Very Important	Absolutely Essential	Total
Available Land	28.6%	14.3%	42.8%	14.3%	-	100.0%
Skilled Labour	14.3	-	85.7	-	-	100.0
Management Skills	28.6	-	42.8	28.6	-	100.0
High Technology	14.3	-	42.8	28.6	14.3	100.0
Available Financing	28.6	-	42.8	14.3	14.3	100.0
Product Development	28.6	14.3	42.8	14.3	-	100.0
Market Development	28.6	-	14.2	28.6	28.6	100.0

Source: SGV-KC Field Survey

8.2 MARKETING ASPECTS

The marketing characteristics of manufacturers of wire ropes, nuts and bolts are described in this portion of the Report.

8.2.1 Market Segments

The market segments that purchase a significant proportion of the wire ropes are the timber logging industry, construction, tin mining and engineering workshops involved in mechanical handling equipment. About 75% of the products are sold directly to the end-users (these are usually made to order) and the balance is through hardware shops.

The market segments that use the fasteners i.e., bolts, nuts and screws, are numerous and a distinct inter-industry inkage is not possible. It is estimated that 90% of these products which are standardised bolts and nu' are sold via hardware shops. Only two companies have bee identified to be able to manufacture specialised bolts for the Original Equipment Manufacturers (OEM) such as fasteners for automobile and machinery manufacturers.

Exports of wire ropes, nuts and bolts are minimal.

8.2.2 Key Marketing Variables

Price competitiveness is rega d as the lead variable in successful marketing efforts among local clients. This was followed by personal contacts, a well-established market position and an efficient distribution network. Of even lesser importance are product quality, good location and experienced sales personnel.

Price competitiveness and a good distribution network are the two most crucial variables in export activities. Domestic manufacturers admit that it is the lack of price competitiveness that restricts their operations to the domestic market. It may well be that attractive product prices facilitate the cultivation of long-term relationships between local producers and their overseas clients.

8.2.3 Product Pricing

Over 70% of the companies surveyed adopt competitive pricing policies, with the remainder using a mixture of cost plus and competitive pricing procedures. The intense competition that prevails in this sub-sector is reflected in the comparable prices of domestic output and imported substitutes. Locally produced wire ropes, for instance, are priced at M$1,700 to M$2,100 per tonne compared with the price range of M$1,700 to M$1,800 per tonne for imported wire ropes. The prices of domestically manufactured nuts and bolts fluctuate between M$1,600 and M$1,700 per tonne, which approximates the prices of comparable foreign substitutes, mainly from China. This sort of pricing has forced the local manufacturers to operate at near break-even levels, with the finest of margins.

8.2.4 Distribution Methods

Companies belonging to this sub-sector manufacture both standardized as well as customized products, with the former predominating. Not surprisingly, mass-produced items are distributed to hardware shops for eventual sale to end-users. On the other hand, customized products are delivered directly to customers. Occasional exports are usually handled by trade agents.

Survey results show that 86% of the respondent enterprises employ a modest sales force mainly to take charge of listing down the orders of the numerous hardware shops. Surveyed companies also commented that these distribution outlets often enjoy a negotiating advantage because of the competitiveness of these standardized products.

8.2.5 Advertising and Promotion

Manufacturers of wire ropes, nuts and bolts do not normally view advertising and promotion as major marketing variable. As such, there is rarely any provision for a formal advertising or promotion budget. The occasional advertisements that do appear are not directed at any industry or market segments in particular.

8.3 PRODUCTION ASPECTS

The respondent enterprises in this sub-sector typically fabricate standardized products. Around 70% of the companies surveyed reported that custom-made items comprise less than one-half of their respective output levels. A large majority (85.7%) manufacture their own product brands.

8.3.1 Input Profile

The principal raw material used in the fabrication of wire ropes, nuts and bolts are high-carbon wire rods, which have to be imported. Some of the manufacturers interviewed do purchase low-carbon wire rods from domestic sources, but these are used for the manufacture of other wire products such as wire mesh or galvanized wire products.

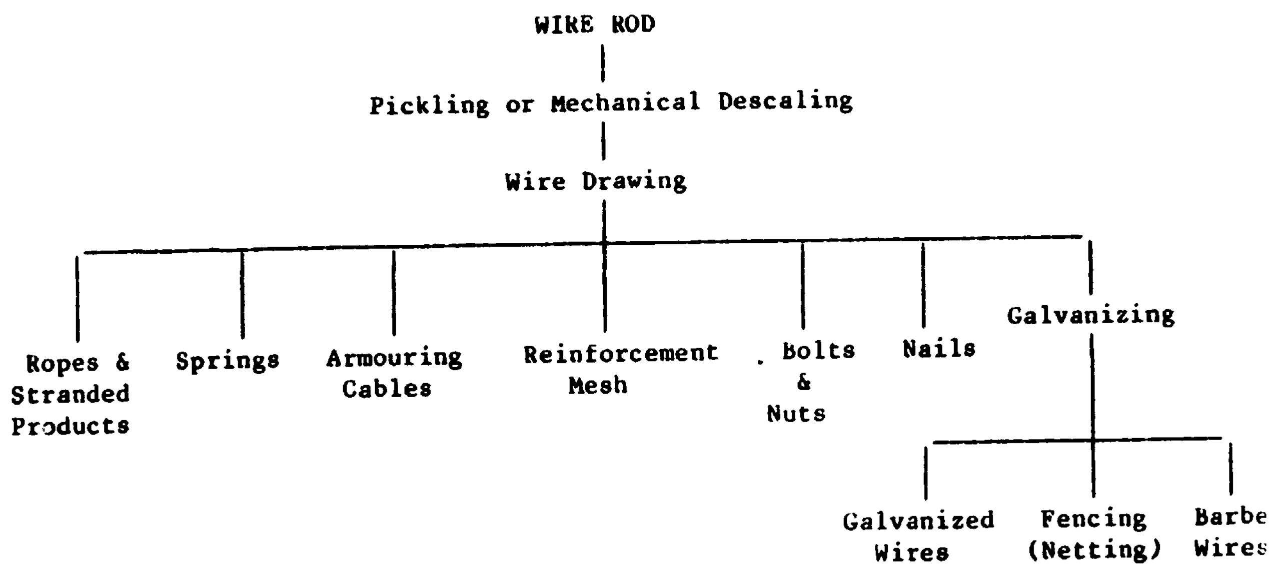
The major problem with the supply of imported raw materials (e.g. high carbon wire rods) is excessive price fluctuation. For domestically manufactured inputs such as low-carbon wire rods, the main concern of respondents is quality assurance. It should be noted that an import ban exists on low-carbon wire rods of most commercial grades.

Although the companies in this sub-sector have organized themselves into the Malaysian Steel Wire Products Manufacturers Association, no entity comparable to FOMFEIA Sdn. Bhd., exists to help alleviate the percieved difficulties of member establishments.

8.3.2 Evaluation of Production Technology

A typical product flow chart for the wire and wire products sub-sector is outlined below:

WIRE AND WIRE PRODUCTS:
REPRESENTATIVE PRODUCT FLOW CHART



On the basis of evaluation criteria specified by the Consultants (Exhibit 11), an assessment was undertaken of the technology prevailing among producers of r ts and bolts. Table 60 indicates that although 60% of the equipment currently in use may be described as embodying low-level technology, a similar percentage of the nuts and bolts manufactured reflect medium-level technology.

TABLE 60
WIRE AND WIRE PRODUCTS:
TECHNOLOGY ASSESMENT (NUTS AND BOLTS)

	Technology Level		
Item	Low	Medium	High
Product	20.0%	60.0%	20.0%
Machinery	60.0%	----------40.0%---------	

Source: SGV-KC Field Survey

In the case of wire rope production, only two companies in Malaysia are engaged in the manufacture of this item. Both are capable of satisfying engineering criteria specified by BS and ASTM . Although both enterprises have similar production processes (e.g. they can manufacture up to 37 strands), the manufacturer with the Lloyds certification is able to fabricate bigger diameters.

Other fastener products which can be made with prevailing technology by the nut and bolt manufacturers include special fastenings, wheel nuts and bolts and cold form automotive parts. However, the companies visited by the Consultants, except for two manufacturers who possess the technology, showed no interest in manufacturing these high-technology goods. Respondents cited two basic reasons for this attitude i.e. the absence of ancillary equipment and limited market size. Inadequate research and development as well as lack of financing were the other factors mentioned. It is of interest to note that cold form automotive parts seem to be experiencing the most difficulties. Ironically, this is also the product with the highest future potential considering that the Malaysia Car is scheduled to be introduced in 1985.

8.3.3 Product Standards

The manufacture of wire ropes, nuts and bolts is subject to the various domestic and international technical standards. Local producers of wire ropes conform to BS, JIS, ASTM, ASME, SIRIM, American Petroleum Institute (API) and Australian Standards (AS). Domestic manufacturers of nuts and bolts adhere to the German Standards (DIN), BS, JIS, ASTM and ASME.

8.3.4 Capacity Utilization

Among the respondent companies in this sub-sector, 71.0% reported capacity utilization in excess of 50.0% while 28.0% claimed capacity utilization levels exceeding 70.0%. These survey results represent the best production performance among all sub-sectors in the engineering/machinery industries.

8.3.5 Production Cost Structure

On the basis of data submitted by respondents, the Consultants were able to derive the following manufacturing cost profile for this sub-sector:

TABLE 61
WIRE AND WIRE PRODUCTS:
PRODUCTION COST STRUCTURE

Production Cost Components	Percentage of Manufacturing Cost		
	Wire Ropes	Nut/Bolt	Average
Direct Labour	4.7 - 10.0	5.0 - 24.0	13.4%
Direct Material			
Imported	) 72.0 - 85.0	45.0 - 68.0	50.0
Domestic	)	5.0 - 11.0	12.6
Energy	)	3.0 - 5.0	6.6
Depreciation	) 5.0 - 17.9	7.0 - 13.0	9.1
Overhead	)	13.0 - 30.0	8.3
Total			100.0%

Source: SGV-KC Field Survey

It is readily evident from the data above that the manufacture of wire ropes, nuts and bolts is a heavily import dependent activity. Around 70% of direct raw material inputs such as high-carbon wire rods and coils are purchased from abroad and the sum of these imported inputs represents 50% of total manufacturing outlays. This strongly suggests that appropriate measures are necessary to facilitate the acquisition of these principal items at fairly stable prices.

It is also observed that the large companies with a higher volume of sales have a ratio of labour component to total manufacturing cost of around 4-5% whereas the medium size companies have this cost component at around 15-24%, reflecting higher productivity resulting from economies of scale and the use of modern machinery utilising less manpower in the larger firms.

8.4 FINANCIAL ASPECTS

8.4.1 Ownership Structure

Unlike most other sub-sectors in the engineering/machinery industries, Bumiputras contributed a hefty 39.7% of the total equity among respondent companies. Ethnic Chinese account for 49.9% while investors ot other nationalities account for the remaining 10.4%.

8.4.2 Sources of Funds

The most frequently utilized sources of funds for this sub-sector's capital and operating expenditures are term loans and overdrafts respectively (Table 62).

TABLE 62
WIRE AND WIRE PRODUCTS:
SOURCES OF FUNDS

Sources of Funds Most Frequently Used	% of Sample
1. Capital Expenditure	
Overdraft	43%
Leasing	29
Term Loan	57
Equity	14
Retained Earnings	14
2. Operating Expenditure	
Overdraft	100%
Retained Earnings	14
Suppliers Credit	43

Source: SGV-KC Field Survey

Some respondents admitted suffering from cash flow difficulties. The suppliers credits that they avail of are usually for 60 days, but they are often compelled to extend credit accomodations of 60 to 90 days to hardware shops. It is clear that the hardware shops negotiate from a position of considerable advantage since they are not exclusive dealers of particular brands of wire ropes, nuts and bolts. Consequently, manufacturers of these products have no alternative but to induce distributors to carry their products by means of very generous credit terms.

The survey revealed that the nuts/bolts manufacturers generally sufferred losses during the 1981/83 period with only the company which is exporting and another one which manufacture multi-products for different markets reported a net profit before tax (NPBT) return in the range of 7.0% to 15.0% per annum.

In the case of the wire ropes manufacturers, only one company recorded a NPBT of 1.6-5.1% in the 1981/83 period while the other recorded a straight loss.

The current bleak market prospect is likely to continue for a year or two in view of the world and domestic economic situations and the tremendous price competition with foreign imports especially from China in the case of bolts and nuts.

8.5 MANPOWER ASPECTS

8.5.1 Employment Structure

On the basis of survey data, the proportion of direct skilled labour to direct unskilled labour was estimated to be 0.93:1.0 in the manufacture of wire rope, nuts and bolts. General labourers comprise 40.6% of the total work force of respondent companies while various categories of skilled production workers account for 37.3%. The balance of 22.1% consists of management, supervisory and administrative personnel. (Table 63).

TABLE 63
WIRE AND WIRE PRODUCTS:
LABOUR FORCE COMPOSITION BY SKILLS CATEGORY

Category	% of Work Force
1. Management	4.0%
2. Supervisory	9.7
3. Administrative	8.4
4. Direct Labour	77.9
4a. Skilled	
Welders	2.0
Metal Benders	-
Machinists	2.8
Fitters	2.2
Chargemen	0.6
Operators	26.5
Others	3.2
4b. Unskilled:	
General Labour	40.6
Total	100.0%

Source: SGV-KC Field Survey

8.5.2 Wage Structure

Table 64 focusses on the average monthly wages of production workers employed by the companies interviewed by the Consultants in this sub-sector.

TABLE 64
WIRE AND WIRE PRODUCTS:
WAGE STRUCTURE

Job Category	Average	Range
1. Skilled		
Welders	M$480	$416 - 500
Fitters	720	450 - 1000
Machinists	763	450 - 1000
Chargemen	855	600 - 1000
Operators	607	390 - 800
2. Unskilled		
General Labour	M$302	

Note : Wages are expressed on a monthly basis

Sources: SGV-KC Field Survey

8.5.3 Labour Supply Situation

The short supply of skilled labour is perceived to be an area of concern by 57% of the surveyed companies. Aside from this, absenteeism and rapid personnel turnover were mentioned as other labour-related problems.

As is generally the case, on-the-job training and in-house instruction are favoured by respondents in developing the technical skill of their employees. Overseas training is occasionally arranged for promising personnel.

The succeeding table attempts to quantify the perceived magnitude of labour shortage among different job categories.

TABLE 65
WIRE AND WIRE PRODUCTS:
PERCEIVED MAGNITUDE OF LABOUR SHORTAGE

Job Category	Shortage Index
Welders	2.00
Machinists	1.43
Fitters	1.07
Chargemen	1.08
Operators	1.03

Note: Shortage index is defined to be ideal number of workers/existing number of workers. Estimates were based on interviews.

Source: SGV-KC Field Survey

The shortage of welders seems to be more acute followed by machinists, chargemen, fitters and operators.

8.6 DEVELOPMENT ISSUES

8.6.1 Industry Characteristics

Although the wire and wire products industry is relatively young in Malaysia, with the first firms having been established in the mid-sixties, the absence of any serious barriers to entry, technological or otherwise, has allowed a proliferation of manufacturers since then, resulting in the establishment of a total of 120 firms by 1981. Of these, about 79% are involved in the manufacture of low technology wire products such as galvanised wire, wire mesh, fencing and nails. Of the 21% remaining, about 19% are represented by firms manufacturing the higher technology products like bolts, nuts and screws and 2% by those manufacturing wire ropes and stranded products.

Using mass-production techniques, economies of scale are achieved only when plant size and capacity are fairly large, resulting in this industry having a high average number of full-time employees of 30 per establishment, the second highest in the machinery and engineering sector. The large production capacity of the industry and a limited domestic market has led to a situation in which aggregate capacity utilization is currently only about 50%, a situation more serious among the highly competitive low-technology manufacturers than among the others.

An apparent paradox exists in that although the industry is faced with an excess of capacity, about 25% of total apparent domestic consumption is met by imports. This situation is probably the result of two factors; firstly, the availability and influx of cheap imports from China and secondly, the unavailability of specialist, high-technology products locally. Whereas the latter situation may be overcome by initiating the local production of those products that need to be imported currently, the former represents a problem, if not a threat, that is difficult to overcome except by introducing prohibitive tariff barriers. These cheap imports, however, do raise the question about the competitiveness of the local wire product manufacturing industry.

Using high carbon steel wire and wire rods as the main raw material inputs, the industry is dependent to a great extent on imports especially in the absence of a well developed local basic iron and steel industry. This dependence on foreign suppliers may be considered to be the major factor limiting the comparative advantage Malaysian manufacturers of these products may have over the other exporting countries.

The wire product industry is therefore faced by a dilemma in that on one hand, as an ancillary industry, it is required to produce a wide range of goods to act as inputs for other industries, and as these industries develop, the range and quality of wire goods will need to be improved. These improvements will require reinvestment in better production technology, resulting in an increase in production capability. On the other hand, it is felt that the Malaysian industrialisation process will not be rapid enough to increase local demand to levels sufficient to absorb the anticipated increase in supply. Goods for export must therefore be produced to utilize the available capacity.

The viability of Malaysian wire products in the export market, however, will depend on their competitiveness, which in turn, will depend on the availability and cost of inputs. In the absence of an economically efficient local steel industry, the necessity to import raw materials may already place the industry at a comparative disadvantage.

8.6.2 Major Issues

The major isues to be scrutinized and on which developmental strategies should be devised are therefore the following:

1. Market

   In the domestic market, successful import subsitution would effectively increase local production by more than a third, as imports currently account for at least 25% of domestic consumption. In order to increase their share of the domestic market, local producers of wire products will need to be price competitive, particularly with regard to the low technology wire products. This may be achieved if productivity is improved or if tariff barriers are raised to prevent unfair competition from unusually cheap imports. This measure has already been taken with the increase in import duty on such wire products as nuts, bolts and screws from 35% or M$300 per tonne, whichever is the higher, to 35% or M$550 per tonne, whichever is the higher, in October 1984. An additional 10% in sales tax is also payable. This rate of duty effectively reduces the attractiveness of importing the low value, high volume wire products of low technology, and will therefore reduce the competition from this source.

The substitution of imports of higher technology wire products like wire ropes and specialist fasteners may represent an even greater area of growth since a significant volume of such products as automobile fasteners are imported as part of completely knocked down (CKD) kits for assembly locally and therefore not added to the direct imports. To exploit this market, local producers will need to adopt new technology to improve product quality. Local manufacturers of finished goods requiring wire products will, however, need to be educated about the suitability and quality of Malaysian products by the producers as part of their market development efforts.

The need to export is beyond question in the face of the small size of the domestic market; however, the viability of Malaysian products in the export markets will depend on the ability of local manufacturers to sell those products competitively in terms of price, quality and quantity. In order to do so, the cost of inputs like material, capital and labour will have to be sufficiently low to enable the producers to export cheaply and still make a profit.

2. Production

With regard to raw material inputs, the lack of local production places the wire product manufacturers at the mercy of foreign suppliers, in which case, even export incentives, like import duty exemption on raw materials, may not be sufficient to ensure that the cost of raw material inputs is low enough for the local producers to compete. Should the local basic iron and steel industry decide to produce these inputs, like high carbon wire-rods, the question will be whether or not it can do so cheaply in the absence of any apparent comparative advantage in this industry. This raises the question about the viability of a well developed local basic iron and steel industry.

3. Technology

The historical development of the industry, its products and local markets has led to the widespread use of low technology. As already discussed, in considering the need to develop new domestic and export markets, newer and higher technology will need to be developed or procured in the form of capital goods as well as production processes and skills. Whereas modern plant and machinery may be purchased quite easily, the supply of skilled labour is another area that requires attention.

It is apparent that an import substitution approach is appropriate in the short term but the local manufacturers have to become more competitive in order to export. To do thus, they need to avail themselves of price competitive local high carbon wire rods as well as upgrade their plant and manufacturing processes. Hence, this industry depends on the efficient development of the 'ocal basic iron and stell industry.

IX. SPECIAL INDUSTRIAL EQUIPMENT

9.1 PALM OIL PROCESSING EQUIPMENT

9.1.1 Overview

There are numerous fabricating and machine workshops that supply various components to the country's palm oil processors. However, the Consultants identified only five companies that possess the technical capability to handle the fabrication of a complete mill. Three consented to be interviewed while the other two declined. Of this number, only one may be considered medium-sized, with paid-up capital in the range of M$1.0 million to M$3.0 million. The other two have paid-up equity of less than M$250,000 each.

As summarized in Table 66, the market for palm oil processing equipment is very competitive, with profit margins between 3% and 10%. Ownership of fabrication facilities is predominantly Chinese. Most of the government incentives enumerated in an earlier section of this Report are either not applicable or are considered to be overly cumbersome and ineffective (e.g. the Import Duty Drawback/Exemption System).

TABLE 66
PALM OIL PROCESSING EQUIPMENT
COMPANY PROFILES

	Company 1	Company 2	Company 3
Paid Up Capital	M$1.0M-M$3.0M	Less than M$250,000	Less than M$250,000
Average Annual Sales (1981-1983)	M$15.0M	M$4.0M	M$2.0M
Average Annual Exports (1981-1983)	M$4.0M	-	-
Ownership	100% Chinese	100% Chinese	100% Chinese
Profit Margin	3-5%	7%	5-10%
Pricing Method	Competitive	Competitive	Competitive

Source: SGV-KC Field Survey

Fiscal incentives extended by the Government to encourage equity restructuring are also perceived to be ineffective. Low financial returns in this sector have not encouraged Bumiputra investors. On the other hand, owners of the respondent firms are not keen about encouraging equity participation from prospective Bumiputra associates at preferential terms since no incremental benefits of any significance are expected.

On the basis of discussions with the three manufacturers, the Consultants estimate that the market for palm oil processing equipment, including maintenance and repair, has averaged around M$50.0 million per annum during the past three years. Of this magnitude, approximately M$10.0 million per annum represents export sales.

9.1.2 Marketing Aspects

The respondents sell their products directly to end-users in the domestic market and rely on agents for exports. Most of the business transactions are conducted by the owners with the help of some clerks. The sample firms identified the key success factors as long-established personal contacts with clients, product quality, reliable servicing and general competitiveness.

In the domestic market, the principal threat is perceived to be the entry of small manufacturers into an already saturated market. This is followed by shortage of skilled labour, lack of land, shortage of management skills, inadequate financing, and poor technology. The absence of business contacts, limited financing and inadequate manpower are the most frequently cited reasons for not venturing into overseas markets. The factors identified as prerequisites for successful operations in both local and foreign markets are availability of skilled labour, aggressive marketing efforts, improved technology and availability of financing.

9.1.3 Production Aspects

In terms of cost structure, there is only a slight difference between the medium-sized respondent (Company 1) and the two smaller manufacturers (Table 67). Direct material cost is relatively higher while depreciation charges are relatively lower in the medium-sized firm. This may be due to the fact that capacity utilization is higher in Company 1. Consequently, fixed overhead expenses are distributed over a larger output level.

TABLE 67
PALM OIL PROCESSING EQUIPMENT:
COST STRUCTURES

Production Cost Components	Company 1	Company 2	Company 3
Direct Labour	27.5%	25.0%	30.0%
Direct Raw Materials	65.0	60.0	55.0-60.0
Overhead			
Energy	2.5	15.0	10.0-15.0
Depreciation	5.0		
Total	100.0%	100.0%	100.0%

Source: SGV-KC Field Survey

Most of the raw materials used (e.g. steel plates, steel sheets, bars and rods) are purchased from local distributors of iron and steel components. These distributors in turn acquire their stocks mainly from Japan.

9.1.4 Financial Aspects

Although adequate financing is considered to be an important ingredient in the continued success of an enterprise in this sector, none of the three companies interviewed feel that this is a short-term problem. Because of the currently depressed state of the local and world market for palm oil processing equipment, no expansion plans are being contemplated.

9.1.5 Manpower Aspects

The shortage of skilled labour that afflicts Malaysia's engineering/machinery industries at large is also felt by fabricators of palm oil processing equipment. This situation has compelled manufacturers in this sector to subcontract portions of their major projects to smaller fabricators, many of whom are former employees. Survey respondents admitted that they are unable to offer compensation comparable with those of construction and special turnkey projects.

Table 68 presents the wage structure of production workers in this sector:

TABLE 68
PALM OIL PROCESSING EQUIPMENT:
WAGE STRUCTURE

Job Category	Range
Skilled	
Welders	M$570 - M$1000
Fitters	380 - 800
Machinists	520 - 780
Boiler Makers	520 - 780
Unskilled:	
Apprentices	312 - 416
General Labour	300 - 480

Note: Wages are expressed on a monthly basis

Source: SGV-KC Field Survey

It is observed that the wage rates above do not differ substantially from those prevailing in other engineering/machinery industries.

9.2 RUBBER PROCESSING EQUIPMENT

9.2.1 Overview

There are many local companies capable of manufacturing and servicing rubber processing equipment. However, only three enterprises are identified to possess the technical capability to construct an entire rubber processing mill.

Only two of these three companies agreed to be interviewed. One has a paid-up capital base in excess of M$3.0 million and is the wholly-owned subsidiary of a major public company. The other possesses a paid up capital of less than M$250,000.

Table 69 compares the two respondents on the basis of various financial indicators:

TABLE 69
RUBBER PROCESSING EQUIPMENT:
COMPANY PROFILES

	Company 1	Company 2
Paid Up Capital	More than $3.0M	Less than M$250,000
Average Annual Sales (1981-1983)	M$6.0M - M$7.0M	M$2.0M
Average Annual Exports (1981-1983)	M$3.0M - M$3.5M	M$400,000
Ownership	100% Bumiputra	100% Chinese
Profit Margin	17 - 22%	n.a.
Pricing Method	Competitive or Cost Plus depending on the situation	Cost Plus

Source: SGV-KC Field Survey

The large company's profit margin of 17% to 22% over the past three years reflects the relative healthy state of the market. Unfortunately, the small company declined to disclose its profit performance during this period.

As expected, the dominant respondent avails of various government incentives such as Investment Tax Credit, Accelerated Depreciation Allowance, Export Credit Allowance and Deduction for Export Promotion. However, its management was critical of the numerous delays and bureaucratic obstacles encountered in obtaining reimbursement of eligible expenses. The small manufacturer surveyed does not enjoy any government incentives.

The Consultants estimate the market for rubber processing equipment to be around M$10.0 million annually for the past three years, of which 60% to 70% constitute domestic demand. The two respondent companies account for approximately 80% of the total market.

9.2.2 Marketing Aspects

Domestic sales of rubber processing equipment are delivered directly to end-users. Exports are either negotiated directly with final customers or through agents. Indonesia, Papua New Guinea, Philippines and some African nations have purchased local rubber processing equipment in recent years.

Both respondents attributed their established market positions to a combination of elements such as superior product quality, price competitiveness and reliable repair/maintenance record. Both marketed their own product brands and employed formal sales personnel.

According to the two sampled firms, the market for rubber processing equipment is fast approaching saturation level. Furthermore, exports of these equipment may become more difficult because of increased protectionist trends in oversea markets. In anticipation of these developments, the large company has already diversified into the manufacture of other related as well as non-related types of machinery.

9.2.3 Production Aspects

Table 70 shows that the large company is significantly more capital-intensive in production since its labour cost component is half that of the small component.

TABLE 70
RUBBER PROCESSING EQUIPMENT:
COST STRUCTURES

Production Cost Components	Company 1	Company 2
Direct Labour	15.0%	30.0%
Direct Raw Materials	50.0	40.0
Overhead		
Energy	2.0	)
Depreciation	2.0	) 30.0
Other Overhead	31.0	)
Total	100.0%	100.0%

Source: SGV-KC Field Survey

Since copying of new equipment designs is prevalent in the rubber processing sector, the large company has had to engage in sustained research and development to maintain its dominant position. It is estimated that research and development outlays comprise 3% to 4% of the total manufacturing cost in this dominant firm.

9.2.4 Financial Aspects

Financing is not regarded as a major problem by the two enterprises because no expansion plans are being considered at present. The large company indicated that it could draw on the substantial resources of its parent corporation should expansion prove feasible. Such is not the case for the small respondent firm.

9.2.5 Manpower Aspects

Prevailing wage levels in the rubber processing equipment sector are comparable with those in other engineering/machinery industries (Table 71)

TABLE 71
RUBBER PROCESSING EQUIPMENT:
WAGE STRUCTURE

Job Category	Range
Skilled	
Welders	M$600 - M$800
Fitters	M$600 - M$800
Machinists	M$700 - M$900
Metal Benders	M$500 - M$600
Chargemen/Wiremen	M$600 - M$700
Unskilled	
General Labour	M$300 - M$400

Note : Wages are expressed on a monthly basis
Source: SGV-KC Field Survey

In similar fashion, the shortage of skill labour is a serious concern in this sector. The dominant respondent employs its own production personnel as much as possible in order to guarantee consistent product quality. The small firm, however, subcontracts 50% of its production needs among smaller manufacturers.

9.3 TIMBER PROCESSING EQUIPMENT

9.3.1 Overview

There is hardly a distinctive difference between a timber-processing equipment manufacturer and a wood-working equipment manufacturer in Malaysia. Companies typically fabricate both types of equipment in different proportions depending on the current state of market demand.

The total domestic demand for timber-processing and wood-working equipment has averaged around M$60.0 million during the past three years, of which an estimated M$10.0 million is accounted for by local manufacturers. Six companies contributed around 70% of the local output of these machinery in 1983. Only one agreed to be interviewed by the Consultants.

The sole respondent is Penang-based, has a paid-up capital of M$1.7 million, a sale turnover of M$1.4 million and a gross profit margin of 10-12%. It is Chinese-owned and does not currently enjoy any government incentives because of its relatively small size, lack of a well-developed accounting systems and inability to satisfy the equity ownership criteria of the NEP. The company has experienced difficulty attracting Bumiputra investors because of the comparatively modest returns available in the industry.

9.3.2 Marketing Aspects

Since domestic sales are carried out through machinery traders, the respondent does not maintain a sale force. Exports are minimal, averaging around 10% of the company's total sales and are undertaken on a direct basis. Brunei, Indonesia and Philippines have purchased the company's products in recent years.

9.3.3 Production Aspects

The breakdown of the company's manufacturing cost structure is direct labour (23.0%), direct materials (50.0%) and overheads (27.0%). Around 60% of the respondent's raw material requirements is imported. Raw materials were valued at M$700,000 in 1983, of which mild steel bars accounted for 15.0%, followed by electric motors (9.1%), and ball bearings (3.8%).

According to the respondent, local manufacturers of timber-processing and wood-working machinery can be competitive internationally if they are not burdened with customs duties and related taxes. Presented in Table 72 below is a listing of relevant tariffs on some major components used in this industry.

TABLE 72
TIMBER PROCESSING EQUIPMENT
CUSTOMS DUTIES AND TAXES ON IMPORTS
AS FROM 20 OCTOBER 1984

Inputs	Customs Duties	Surtax	Sales Tax
Low-Carbon Steel Plate	3%	-	-
High-Carbon Steel Plate	3%	-	-
Ball bearings	5%	-	10%
V-belting	50%	-	10%
Electric motors	55%	-	10%
High-tensile screw and cap	35% or $550 per tonne whichever is the higher	-	10%

Source: Royal Customs and Excise Department
SGV-KC Field Survey

Imported equipment are currently brought into Malaysia on a duty-free basis while foreign inputs used on the local fabrication of such equipment are penalized. The survey respondent cited instances when domestic manufacturers preferred to ship equipment to Singapore for the installation of electric motors rather than having to pay duties and taxes on imported components.

9.3.4 Financial Aspects

This company does not have financial problems as the business is still profitable with profit margins of 10-12%.

9.3.5 Manpower Aspects

The company has had no problems with labour. It claims that its skilled workers are relatively well-compensated and that labour turnover is low. The respondent has had the opportunity to employ trainees from the Industrial Training Centre in Penang, but has found them to be deficient in terms of technical skills. Furthermore, the turnover rate among these trainees is quite high because of the following reasons:

(1) high expectations regarding ranks and wages, and
(2) the great demand by Government and quasi-Government institutions for Bumiputra technical personnel.

The respondent's wage structure is presented on Table 73 below:

TABLE 73
TIMBER PROCESSING EQUIPMENT
WAGE STRUCTURE

Job. Category	Average
1. Skilled	
Welders	M$550
Fitters	850
Machinists	650
Operators	450
2. Unskilled	
General Labour	350

Note: Wages are expressed on a monthly basis

Source: SGV-KC Field Survey

9.4 DEVELOPMENT ISSUES

9.4.1 Industry Characteristics

The special industrial machinery industry started as engineering workshops which provided replacement parts and maintenance services for resource-based manufacturers. In recent years, a few have developed the technical and financial capabilities to design and build integrated mills/machinery both for both local and foreign markets.

The estimated local production of special industrial machinery used in palm oil, rubber and timber processing, was M$67.0 million or 32.3% of total apparent consumption in 1981 as compared with total imports of M$160.6 million and an export of only M$8.7 million in the same year. The imports and exports of these equipment in 1973 were only M$19.8 million and M$1.29 million respectively indicating that imports grew at an average rate of 29.9% per annum as compared to exports growth rate of 20.9% during the 1973 - 1981 period.

The local market is very competitive as a result of the proliferation of many small establishments producing standardised items cheaply and the availability of cheap foreign products. The situation is exacerbated by a shrinking local market because of depressed commodity prices and logging restrictions. Some of the locally produced equipment is not competitive because imports of machinery, eg. wood making machinery, are not subject to duties while certain imported components, eg. motors and gear boxes, for the locally manufactured products are. Faced with such unfavourable distortions the special industrial equipment manufacturers have to put up with higher costs that make them uncompetitive.

Experiencing declining profits and non-competitiveness, this industry will need to become more efficient by upgrading and expanding its share of the capital goods market. This will also provide the necessary spin-offs to the foundry and engineering sectors. Moreover, savings in foreign exchange would be substantial as imports of these products accounted for some 9.7% of total equipment/machinery imports in 1981.

The industry has developed production skills, experience and technology sufficient to manufacture fairly high quality products. This has partly been the reason for the fairly successful exports of palm oil and rubber processing machinery. In the domestic market, local manufacturers of timber processing machinery have succeeded in manufacturing sawmilling and wood-working equipment of a quality comparable to imports from Taiwan.

9.4.2 Major Issues

In order to encourage the manufacture of capital goods, the following issues have to be resolved:

1. Material Inputs

The local manufacturers of special industrial equipment like wood-working machinery are faced with a problem of price competition in both the domestic and export markets. One reason for this is the high cost of inputs in the form of components such as motors, pulleys and v-belts as a result of an anomaly in the tariff structure which imposes duties on components but not the finished products. This situation arose when tariff barriers were imposed to profect the fledzling machinery component industries, but may have resulted in allowing an inefficient industry to develop.

The situation could be rectified by imposing temporary tariffs on the importation of specific equipment while designing a method whereby duties on imported components required by the local manufacturers of equipment are removed. For example, the locally manufactured electric motors are more expensive and of poorer quality than others. Motor "burnt'out" is common which deters the special industrial equipment manufacturers from purchasing locally-made motors as these sort of failures are be costly and detrimental to their reputation and business.

2. Market

Although the domestic market for palm oil and rubber processing machinery is nearly saturated, the wood-working machinery market is seen to be still expanding. As imports accounted for M$160.6 million or 77.4% of local consumption in 1981, an import substitution policy could be adopted to accelerate growth in this sector. The local producers must in turn be more competitive in terms of price and quality, by increasing their productivity with more cost-efficient manufacturing processes as well as better trained and disciplined skilled workers. More research and development effort should be directed improving existing product quality as well as finding new products and markets.

The industry suffers from poor foreign market development. Besides the importance of price and non-price competitiveness, to export, a strong marketing and distribution network has to be established. The industry is comprised mainly of small engineering workshops and, with the exception of a handful of larger companies, do not have the necessary resources and capabilities to export. The export promotion or sales strategy, if any, is reactive, responding only to tenders or enquiries from agents/original buyers.

The products of the industry are also of fairly low technology, and although some local manufacturers have successfully exported machinery for oil palm and rubber processing to developing countries in Asia and Africa, it is envisaged that these export markets will shrink as import substitution is achieved by the importing countries over the next few years.

Hence, an aggressive effective marketing network should be set up, similar to the Japanese trading houses in order to break into the oversea markets. Related to this, concerted effort and finance should be allocated to research and development projects so that new markets can be found for existing products, and new and better quality products may be developed.

3. Manpower

As in the case of the manufacture of structural metal products, this industry faces an acute shortage of machinists, boilermakers, welders and fitters due to the recent construction boom and the apparent lack of school-leavers taking up apprenticeships in these trades.

The students from the Industrial Training Institutions were found to be deficient in practical aspects and often were not willing to start as trainees in the private establishments as they expected to be appointed as supervisors or foremen. Moreover, as these trainees are mostly Bumiputras, they envisage that opportunities in other sectors such as semi-government and government bodies are always better in terms of pay and working environment, aggravating the manpower shortage.

This industry is faced with problems symptomatic of a market for products that have already attained a level of maturity beyond which no further growth is anticipated. This is especially true in the case of the palm oil and rubber processing machinery market in Malaysia. The experience of the local manufacturers in these markets have, however, allowed them to develop this type of processing machinery for export to those countries with a slightly less developed palm oil and rubber industry, like Indonesia, Papua New Guinea and some African countries. This export market, however, is not expected to grow indefinitely as the design and production technology employed is not as high as to prevent its development in these countries over the next few years. As such, as many export incentives as possible should be given to this industry to capitalise on the current export possibilities.

Timber processing machinery in general appears to be still in demand although specific sawmilling equipment may not be in the light of declining domestic logging activity.

In particular, domestic demand for wood-working machinery is expected to grow from about M$58 million in 1982 to about M$71 million by 1985 and M$100 million by 1990, in line with the anticipated growth in secondary processing activity, like planning, moulding and furniture making. Successful import substitution in this industry will not only be beneficial to the machinery manufacturers, but will also benefit the ancillary industries that will supply the major inputs like steel castings, motors and gear mechanisms. However, to do so, the industry has to become competitive in terms of price and quality. This will require something to be done about the cost of material and component inputs.

X. INTERNATIONAL ASPECTS

10.1 GLOBAL TRENDS

This section of the report reviews global imports and exports trends in the following engineering and machinery products:

1. Foundry Parts
2. Structural Metal Products
3. Wire and Wire Products
4. Metal Tanks and Boxes
5. Base Metal Manufactures
6. Nails and Nuts

As indicated in Table 74, exports of selected engineering/machinery products by developing nations have grown at a much faster pace than corresponding exports of developed nations. On the other hand, imports of such items by industrialized nations have increased much more rapidly than corresponding imports of developing countries. International trade in foundry parts appears to be the only exception to this trend.

TABLE 74
ENGINEERING/MACHINERY INDUSTRIES:
IMPORT, EXPORT GROWTH TRENDS
IN
DEVELOPED AND DEVELOPING COUNTRIES
(1975 - 1980)

Products	Developing[1] Countries		Developed[2] Countries	
	Imports	Exports	Imports	Exports
Foundry Parts	0.01%p.a.	0.3%p.a.	20.9%p.a.	8.0%p.a.
Structural Metal Products	10.6	46.3	16.5	17.5
Wire and Wire Products	7.9	24.1	25.4	9.4
Metal Tanks and Boxes	3.2	27.6	26.6	18.2
Base Metal Manufactures	12.5	36.6	22.1	11.1
Nails and Nuts	13.3	30.4	21.2	15.7

Note: 1 Developing countries: Indonesia, Philippines, Thailand, Singapore, Brazil, Korea, India

2 Developed countries : Australia, Canada, United Kingdom Germany, Japan, USA

Source: MIDA

The shifting international trade patterns captured by the data above strongly indicate that developing countries are gaining some degree of comparative advantage in the manufacture of engineering/machinery products. This seems consistent with the product life-cycle hypothesis expounded upon by Raymond Vernon and other specialists in international economics.

10.1.1 Foundry Parts

Table 75 summarizes international economic data pertaining to foundry parts in selected countries. As of 1980, the bulk of trade flows involving these products occurred among selected developed nations, which accounted for 64.3% of global exports and 24.2% of global imports. During the same period, exports and imports of selected developing countries constituted only 1.4% and 4.3% respectively of global exports and imports of foundry parts.

TABLE 75
FOUNDRY PARTS:
ANALYSIS OF GLOBAL TRENDS

Countries	Compound Growth Rate Per Annum (1975 - 1980)		% Share of World Trade (1980)	
	Imports	Exports	Imports	Exports
Developing	0.01	0.3	4.3	1.4
Indonesia	41.5	n.a.	1.9	n.a.
Philippines	n.a.	54.5	n.a.	0.2
Thailand	n.a.	n.a.	n.a.	n.a.
Singapore	25.2	-4.9	2.1	0.1
Brazil	-30.7	21.6	0.2	0.2
Korea	13.1	1.8	0.2	0.1
India	-22.4	-1.0	n.a.	n.a.
Malaysia	4.3	31.5	4.6	1.7
Developed	20.9	0.8	24.2	64.3
Australia	13.0	6.3	0.2	0.8
Canada	30.2	-3.3	11.1	14.0
U.K.	1.4	18.5	3.6	16.6
Germany	23.1	12.9	5.7	18.8
Japan	-4.0	27.2	0.3	3.3
USA	-1.3	-15.3	3.3	10.8

Sources: Exhibits 12 and 13

On the basis of 1980 data, most developing countries are generally net importers of foundry parts. Brazil is a notable exception. Between 1975 and 1980, Brazil's imports of foundry parts declined at an average rate of 30.7% per annum whereas its exports of the same items registered an average annual increase of 21.6%. Brazil's ability to compete effectively on the international market may be due to the fact that a basic input, pig iron, is produced locally with efficient technology.

Developed countries, on the average, experienced much higher growth in their exports and imports of foundry parts during the 1975 - 1980 period compared with their Third World counterparts. United States recorded the poorest performance as its exports and imports of these items declined by 15.3% per annum and 1.3% per annum respectively. Japan suffered a 4.0% annual decrease in its foundry parts imports while Canada's exports of these products fell by 3.3% per annum on the average. Among the developing nations for which relevant data are available, the rate of decline of India's imports of foundry parts is second to that of Brazil. Both Singapore and India experienced reductions in their exports of these products between 1975 and 1980.

10.1.2 Structural Metal Products

In 1980, the selected sample of developed countries had a 49.9% market share of world exports of structural metal products and a 12.6% market share of world imports of the same commodities (Table 76). Although the corresponding shares of selected developing nations totalled only 2.9% and 4.4% respectively, the export growth of Third World nations was more impressive than that of industrialized nations. Conversely, the import expansion of developed nations in this product category was higher than that of the developing countries.

TABLE 76
STRUCTURAL METAL PRODUCTS:
ANALYSIS OF GLOBAL TRENDS

Countries	Compound Growth Rate Per Annum (1975 - 1980) Imports	Exports	% Share of World Trade (1980) Imports	Exports
Developing	10.6	46.3	4.4	2.9
Indonesia	10.5	n.a.	2.1	-
Philippines	0.6	113.0	0.3	0.1
Thailand	8.3	40.1	0.1	0.1
Singapore	23.8	29.4	1.0	0.4
Brazil	4.4	36.0	0.6	0.3
Korea	21.4	109.2	0.3	1.9
India	19.1	32.9	n.a.	n.a.
Malaysia	25.7	43.2	0.8	0.1
Developed	16.5	17.5	12.6	49.9
Australia	18.8	-13.2	0.2	0.2
Canada	-14.3	11.9	0.6	2.8
U.K.	6.1	18.9	2.1	9.5
Germany	19.4	14.9	7.0	14.4
Japan	-4.2	17.6	0.2	13.1
USA	16.7	14.9	2.5	10.0

Sources: Exhibits 14 and 15

Among the developing nations for which relevant trade statistics are available, Philippines, South Korea and Thailand have recorded the most vigorous percentage increases in exports of structural metal products. The nominal growth of structural metal products imports in Philippines, Brazil and Thailand possibly reflects the impact of import-substitution policies in these nations.

10.1.3 Wire and Wire Products

The global market for wire and wire products appears to be undergoing the same structural changes as in the case of structural metal fabrications. Table 77 shows that selected developed countries accounted for 48.9% and 60.2% respectively of total world exports and imports of this product group in 1980. However, the relative increase in exports of selected developing nations has easily outpaced that of industrial societies since 1975. Conversely, the percentage growth in imports of developed countries was over three times as high as that of developing nations during this interval. These developments suggest that the relative share of the Third World in global exports of wire and wire products will rise dramatically in the ensuring decades.

TABLE 77
WIRE AND WIRE PRODUCTS:
ANALYSIS OF GLOBAL TRENDS

	Compound Growth Rate Per Annum (1975 - 1980)		% Share of World Trade (1980)	
Countries	Imports	Exports	Imports	Exports
Developing	7.9	24.1	5.3	6.8
Indonesia	10.3	181.5	1.1	n.a.
Philippines	4.9	47.0	1.0	0.1
Thailand	13.9	13.1	0.5	0.6
Singapore	12.5	16.6	1.6	0.5
Brazil	-9.6	57.7	0.6	1.0
Korea	35.5	32.5	0.6	2.2
India	11.6	5.9	n.a.	n.a.
Malaysia	26.1	-0.5	2.1	0.1
Developed	25.4	9.4	60.2	48.9
Australia	17.4	-1.6	1.1	0.4
Canada	-2.7	-59.6	1.5	5.0
U.K.	13.5	5.6	3.4	6.6
Germany	12.8	8.0	7.9	14.5
Japan	143.8	6.3	27.1	15.6
USA	9.0	9.1	19.2	6.8

Sources: Exhibits 16 and 17

Among the selected developing countries, Indonesia exhibited the strongest export expansion in relative terms, followed by Brazil and Philippines. During the same period, Brazil was the only developing country in the sample to reduce its importations of wire and wire products. The sharpest decline in exports among developed nations was recorded by Canada. Australian exports of these items declined marginally between 1975 and 1980. The average annual increase in imports of selected developed countries during this five-year period ranged from 9.0% (United States) to 143.8% (Japan). Canada was the only nation in this group to reduce its imports of wire and wire products.

10.1.4 Metal Tanks and Boxes

The dynamics of the product-life cycle is also readily evident in the international market for metal tanks and boxes. In 1980 selected developed countries purchased 22.6% of global imports of these products and sold 46.7% of global exports of the same items (Table 78). However, their formidable share in the export market is expected to contract steadily in the future since exports of metal tanks and boxes by developing nations have expanded more rapidly since 1975. Conversely, the share of industrialized nations in world imports of metal tanks and boxes is likely to rise as comparative advantage in these manufactures continues to shift in the direction of the Third World.

TABLE 78
METAL TANKS AND BOXES:
ANALYSIS OF GLOBAL TRENDS

Countries	Compound Growth Rate Per Annum (1975 - 1980) Imports	Compound Growth Rate Per Annum (1975 - 1980) Exports	% Share of World Trade (1980) Imports	% Share of World Trade (1980) Exports
Developing	3.2	27.6	3.8	2.6
Indonesia	-9.7	n.a.	0.7	-
Philippines	10.5	5.4	0.4	-
Thailand	29.6	65.6	0.4	0.5
Singapore	14.3	18.0	1.0	1.0
Brazil	-14.7	48.1	0.2	0.9
Korea	29.0	26.7	1.0	2.2
India	3.2	43.5	n.a.	n.a.
Malaysia	17.8	18.0	0.4	0.3
Developed	26.6	18.2	22.6	46.7
Australia	13.4	-1.6	0.6	0.3
Canada	18.9	22.4	2.5	1.3
U.K.	29.6	19.9	7.4	11.5
Germany	23.1	15.7	8.2	15.8
Japan	2.3	15.0	0.3	6.9
USA	20.2	20.9	3.5	10.8

Sources: Exhibits 18 and 19

Thailand, Brazil and India have registered the most impressive export expansion during the 1975 - 1980 period. Among the sample of developing nations, however, only Indonesia and Brazil have managed to reduced their imports of metal tanks and boxes during this interval. In relative terms, imports of these fabrications have registered the most substantial growth in Canada (22.4%), United States (20.9%) and United Kingdom (19.9%).

10.1.5 Base Metal Manufactures

An examination of global trade patterns in base metal manufactures reveals the same structural changes experienced by the other engineering/machinery products (except foundries). The proportion of exports originated from selected developed countries was 39.7% in 1980, but this should decline steadily as the Third World continues to outstrip industrial nations in export growth (Table 79). On the other hand, imports of base metal manufactures by developed societies will rise progressively due to the influx of cheaper products from the developing areas of the world.

TABLE 79
BASE METAL MANUFACTURES:
ANALYSIS OF GLOBAL TRENDS

Countries	Compound Growth Rate Per Annum (1975 - 1980) Imports	Exports	% Share of World Trade (1980) Imports	Exports
Developing	12.5	36.6	4.16	2.84
Indonesia	18.4	-21.1	0.4	-
Philippines	5.5	75.0	0.4	-
Thailand	14.1	98.0	0.6	0.7
Singapore	19.5	32.5	1.6	0.6
Brazil	-3.9	30.4	0.4	0.3
Korea	19.4	49.5	0.8	1.2
India	21.8	n.a.	n.a.	n.a.
Malaysia	n.a.	n.a.	n.a.	n.a.
Developed	22.1	11.1	35.01	39.7
Australia	-7.2	-10.9	1.6	0.7
Canada	21.1	20.4	6.4	2.5
U.K.	28.1	19.4	6.2	8.7
Germany	24.1	16.9	9.2	19.6
Japan	32.2	14.0	2.6	8.2
USA	13.0	64.3	10.0	-

Sources: Exhibits 20 and 21

The statistics presented above highlight the strong export performances of the following developing countries between 1975 and 1980: Thailand, Philippines and South Korea. On the other hand, Indonesia's exports of base metal manufactures appears to have suffered from various problems. Brazil's imports of these products declined at an average rate of 3.9% during the latter half of the 1970s. Among the developed countries in the sample, American exports of these manufactures felt very abruptly during these five years. With the exception of United States and Australia, imports of base metal products by industrial nations expanded by over 20% per annum from 1975 to 1980.

10.1.6 Nails and Nuts

The observations made earlier regarding other engineering/machinery products also hold true for the manufacture of nails and nuts. In 1980, selected developed countries dominated the world export market for these products with 55.5% of all nails and nuts sold overseas (Table 80). However, the market share of developing nations promises to grow continuously because the average rate of export expansion in these countries (30.4% per annum) is almost twice as high as the export growth in industrial societies (15.7% per annum). On the other hand, imports of nails and nuts by developed nations as a group are expanding at a more rapid pace than imports of the same products by developing countries.

TABLE 80
NAILS AND NUTS:
ANALYSIS OF GLOBAL TRENDS

Countries	Compound Growth Rate Per Annum (1975 - 1980) Imports	Exports	% Share of World Trade (1980) Imports	Exports
Developing	13.3	30.4	4.1	4.0
Indonesia	26.5	n.a.	0.8	n.a.
Philippines	6.3	n.a.	0.4	n.a.
Thailand	15.8	114.3	0.3	0.4
Singapore	23.5	28.9	1.5	0.5
Brazil	-3.4	22.7	0.6	0.3
Korea	22.2	39.2	0.4	2.8
India	10.5	27.3	n.a.	n.a.
Malaysia	n.a.	n.a.	n.a.	n.a.
Developed	21.2	15.7	46.0	55.5
Australia	22.2	6.2	1.7	0.5
Canada	7.7	5.9	5.8	4.3
U.K.	20.8	18.5	5.7	5.8
Germany	26.4	14.5	10.3	18.5
Japan	-12.4	13.7	0.2	17.9
USA	14.8	10.8	22.7	8.6

Sources: Exhibits 22 and 23

Between 1975 and 1980, the most impressive export performance among selected Third World nations was exhibited by Thailand. Brazil, which reduced its imports of these manufactures by an average rate of 3.4% per annum, expanded its exports of nuts and nails by 22.7% per annum during the same interval. Among the other developing countries, Indonesia, Singapore and South Korea continued to expand their imports of these commodities at rates exceeding 20% per annum. Among developed nations, Australia, United Kingdom and West Germany are the most promising markets for these commodities. Japan's imports, on the other hand, have decreased during the 1975 - 1980 period.

10.2 IMPORTS AND EXPORTS

10.2.1 Imports

The importation of engineering/machinery products as mentioned in Chapter 2.3.2 has continuously risen from M$157.2 million in 1973 to M$526.0 million in 1981 with the exception of a temporary downturn in 1975.

Imports of iron and steel castings totalled only M$1.2 million in 1973, but rose to M$10.2 million by 1981. Table 81 shows that although United Kingdom has remained Malaysia's largest source of imports during this interval, Japan has dislodged erstwhile second-ranked Australia.

TABLE 81
IMPORTS: IRON AND STEEL CASTINGS
(1973 AND 1981)

	1973			1981	
Country of Origin	Value (M$'000)	% Share	Country of Origin	Value (M$'000)	% Share
United Kingdom	392	33.0	United Kingdom	4,040	39.5
Australia	173	14.5	Japan	2,276	22.3
Japan	140	11.8	India	1,028	10.1
China	107	9.0	Singapore	620	6.1
Singapore	95	8.0	Belgium	554	5.4
Others	282	23.7	Others	1,707	16.6
Total	1,189	100.0	Total	10,225	100.0

Source: Department of Statistics

The three principal product groups within the fabricated metal products category are: (a) cutlery, hand tools, and general hardware, (b) structural metal products, and (c) wire and wire products.

Importations of cutlery, hand tools and general hardware expanded from M$71.1 million in 1973 to M$140.2 million in 1981. Imports declined in 1974 and 1975, but steady growth characterized the other years during this period. Table 82 compares the major sources of imports in this product group between 1973 and 1981.

TABLE 82
IMPORTS: CUTLERY, HAND TOOLS AND GENERAL HARDWARE
(1973 AND 1981)

	1973			1981	
Country of Origin	Value (M$Million)	% Share	Country of Origin	Value (M$Million)	% Share
Japan	16.9	23.8	Japan	32.3	23.0
United Kingdom	11.7	16.5	United States	17.2	12.3
West Germany	9.3	13.1	China	16.0	11.4
China	7.2	10.1	United Kingdom	13.3	9.5
United States	4.8	6.8	West Germany	12.1	8.6
Others	21.2	29.7	Others	49.3	35.2
Total	71.1	100.0	Total	140.2	100.0

Source: Department of Statistics

In the case of structural metal products, imports increased from M$28.0 million in 1973 to M$40.0 million in 1975, but fell successively in 1976 and 1977. Importations remained below 1975 level until 1980, when purchases from abroad expanded more than three-fold from M$36.1 million in 1979 to M$114.0 million. Table 83 shows that Japan has considerably enhanced its position as the foremost supplier of structural metal products to Malaysia between 1973 and 1981. Singapore, United Kingdom and Australia continue to be major sources of imports, but India has been displaced by Italy.

TABLE 83
IMPORTS: STRUCTURAL METAL PRODUCTS
(1973 AND 1981)

	1973			1981	
Country of Origin	Value (M$Million)	% Share	Country of Origin	Value (M$Million)	% Share
Japan	6.5	23.2	Japan	110.2	60.3
Singapore	5.1	18.2	Italy	21.8	11.9
United Kingdom	5.0	17.9	Singapore	11.6	6.4
Australia	3.8	13.6	United Kingdom	10.8	5.9
India	2.8	10.0	Australia	7.4	4.0
Others	4.8	17.1	Others	21.1	11.5
Total	28.0	100.0	Total	182.9	100.0

Source: Department of Statistics

Malaysia's foreign purchases of wire and wire products have risen from M$32.2 million in 1973 to M$108.7 million in 1981. However, the value of imports fluctuated erratically between 1973 and 1977. As indicated in Table 84, the same five countries (Japan, United Kingdom, China, Singapore and United States) accounted for the bulk of Malaysia's imports of this product group between 1973 and 1981.

TABLE 84
IMPORTS: WIRE AND WIRE PRODUCTS
(1973 AND 1981)

	1973			1981	
Country of Origin	Value (M$Million)	% Share	Country of Origin	Value (M$Million)	% Share
Japan	11.6	36.0	Japan	40.0	36.8
United Kingdom	4.9	15.2	China	17.2	15.8
China	3.0	9.3	United Kingdom	8.1	7.5
Singapore	2.8	8.7	Singapore	7.3	6.7
United States	2.2	6.8	United States	7.2	6.6
Others	7.7	24.0	Others	28.9	26.6
Total	32.2	100.0	Total	108.7	100.0

Source: Department of Statistics

Taking imports of fabricated metal products as a whole, the biggest source of these commodities in 1973 was Japan, followed by United Kingdom, Singapore, West Germany and China. Japan maintained its first-place ranking in 1981, but Italy and United States have supplanted Singapore and West Germany among the top five countries of origin (Table 85).

TABLE 85
TOTAL IMPORTS: FABRICATED METAL PRODUCTS

1973			1981		
Country of Origin	Value (M$Million)	% Share	Country of Origin	Value (M$Million)	% Share
Japan	37.5	24.0	Japan	187.3	36.3
United Kingdom	23.2	14.9	China	36.6	7.1
Singapore	16.8	10.8	United Kingdom	33.1	6.4
West Germany	11.2	7.2	Italy	29.9	5.8
China	10.2	6.5	United States	29.2	5.7
Others	57.1	36.6	Others	199.7	38.7
Total	156.0	100.0	Total	515.8	100.0

Source: Department of Statistics

The data above indicate that Malaysia's preference for Japanese fabricated metal products has increased during this interval. Conversely, the relative market shares of most traditional suppliers (e.g. United Kingdom, Singapore and West Germany) have receded considerably.

The importation of resource based equipment into Malaysia as mentioned in Chapter 2.4.2 rose from M$19.8 million in 1973 to M$160.6 million in 1981. As shown in Table 86, imports of rubber processing machinery increased significantly from 2.3 million in 1973 to M$53.4 million by 1981. Japan is the largest supplier, increasing its share from a more 13.1% in 1973 to 50.3% in 1981.

TABLE 86
IMPORTS: RUBBER PROCESSING MACHINERY
(1973 AND 1981)

1973			1981		
Country of Origin	Value (M$ '000)	% Share	Country of Origin	Value (M$ '000)	% Share
China	583	25.4	Japan	26,857	50.3
Singapore	492	21.4	Germany	4,798	9.0
Japan	300	13.1	United Kingdom	4,051	7.6
Italy	212	9.2	Taiwan	3,051	5.7
Hong Kong	193	8.4	Italy	1,895	3.5
Others	517	22.5	Others	12,741	23.9
Total	2,297	100.0	Total	53,393	100.0

Similarly, palm oil equipment imports also rose in the same period from M$4.4 million to M$54.3 million with Germany being the main source accounting for approximately 36.5% of total palm oil equipment imports. (See Table 87).

TABLE 87
IMPORTS: PALM OIL PROCESSING MACHINERY
(1973 AND 1981)

1973			1981		
Country of Origin	Value (M$ '000)	% Share	Country of Origin	Value (M$ '000)	% Share
Sweden	3,464	78.6	Germany	19,816	36.5
Italy	461	10.5	Sweden	11,722	21.6
Netherlands	164	3.7	Belgium	4,131	7.6
United Kingdom	110	2.5	Italy	3,820	7.0
India	96	2.2	Switzerland	3,534	6.5
Others	111	2.5	Others	11,312	20.8
Total	4,406	100.0	Total	54,335	100.0

Likewise, timber processing equipment imports also increased from M$13.1 million reaching M$52.9 million in 1981. The main sources of imports have remained very much the same as shown in Table 88. These individual countries have also maintained a fairly constant percentage share of the palm oil equipment imports.

TABLE 88
IMPORTS: TIMBER PROCESSING MACHINERY
(1973 AND 1981)

	1973			1981	
Country of Origin	Value (M$ '000)	% Share	Country of Origin	Value (M$ '000)	% Share
Japan	6,533	49.7	Japan	25,147	47.5
Germany	1,966	15.0	Germany	8,911	16.6
Italy	1,148	8.7	Taiwan	5,126	9.7
Taiwan	856	6.5	U.S.A.	3,551	6.7
United Kingdom	685	5.2	United Kingdom	3,322	6.3
Others	1,954	14.9	Others	6,964	13.2
Total	13,142	100.0	Total	52,921	100.0

Source: Department of Statistics

10.2.2 Exports

Malaysia's exports of engineering/machinery products covered by this study totalled M$18.8 million in 1973. By 1981, the exports value has risen to M$68.6 million. The export growth accelerated dramatically after 1973 but this sector experienced a marked deceleration in export expansion since 1981.

In 1973, the following countries purchased Malaysia's iron and steel castings: Brunei (M$100,000), Indonesia (M$70,000) and Sri Lanka (M$16,000). Indonesia was the largest importer of these products in 1981, with purchases valued at M$3.8 million. The other importing countries were: Singapore (M$1.3 million) Thailand (M$33,000) and Australia (M$20,000).

Exports of cutlery, hand tools and general hardware increased steadily from M$2.0 million in 1973 to M$5.1 million in 1977. There was, however, a sharp reversal of trend in 1978 when exports of this product group dropped to M$3.4 million. Growth resumed in 1979 and 1980, but registered another steep decline in 1981. As indicated in Table 89, Singapore and Philippines were the most important buyers of Malaysian cutlery, hand tools and general hardware in 1973 and 1981. However, of the other major customers in 1973, only Indonesia retained its ranking. Erstwhile leaders Thailand and Hong Kong were replaced by Nigeria and United States.

TABLE 89
EXPORTS: CUTLERY, HAND TOOLS AND GENERAL HARDWARE
(1973 AND 1981)

	1973			1981	
Destination	Value (M$ '000)	% Share	Destination	Value (M$ '000)	% Share
Singapore	1,150	58.4	Singapore	1,170	17.5
Philippines	302	15.3	Philippines	957	14.3
Thailand	23	1.2	United States	710	10.6
Indonesia	19	1.0	Nigeria	380	5.7
Hong Kong	13	0.7	Indonesia	340	5.1
Others	463	23.4	Others	3,137	46.8
Total	1,970	100.0	Total	6,694	100.0

Source: Department of Statistics

It is evident from the data above that Malaysia has undertaken considerable market diversification in its overseas sales of cutlery, hand tools and general hardware.

Table 90, shows that almost half of the country's exports of structural metal products went to Brunei in 1973, with Singapore and Indonesia accounting for 13.0% and 7.0% respectively. In 1981, however, Singapore and Nigeria purchased 80.0% of structural metal products sold abroad by Malaysian manufacturers. Saudi Arabia, Kuwait and Papua New Guinea emerged as important export markets.

TABLE 90
EXPORTS: STRUCTURAL METAL PRODUCTS
(1973 AND 1981)

	1973			1981	
Destination	Value ($ '000)	% Share	Destination	Value ($ '000)	% Share
Brunei	4,800	47.9	Singapore	11,700	47.5
Singapore	1,300	13.0	Nigeria	8,000	32.5
Indonesia	700	7.0	Saudi Arabia	1,800	7.3
Thailand	300	3.0	Kuwait	700	2.8
Bahrain	200	2.0	Papua New Guinea	600	2.4
Others	2,731	27.1	Others	1,834	7.5
Total	10,031	100.0	Total	24,634	100.0

Source: Department of Statistics

The export markets for tin cans and metal boxes appear to be much more heavily concentrated than those of other fabricated metal products. It is observed from Table 91 that Singapore claimed 85.0% and 65.2% of Malaysia's foreign sales of tin cans and metal boxes in 1973 and 1981 respectively. In 1973, five nations (Singapore, Hong Kong, Mauritius, United Kingdom and West Germany) accounted for 95.6% of the country's exports in this product category. In 1981, a comparable situation prevailed. The collective share of the five largest overseas markets for tin cans and metal boxes (Singapore, Thailand, United Arab Emirates, Saudi Arabia and Hong Kong) was 99.2%.

TABLE 91
EXPORTS: TIN CANS AND METAL BOXES
(1973 AND 1981)

	1973			1981	
Destination	Value (M$ '000)	% Share	Destination	Value (M$ '000)	% Share
Singapore	2,805	85.0	Singapore	9,507	65.2
Hong Kong	154	4.7	Thailand	2,245	15.4
Mauritius	96	2.9	United Arab Emirates	2,038	14.0
United Kingdom	69	2.1	Saudi Arabia	526	3.6
West Germany	30	0.9	Hong Kong	138	1.0
Others	147	4.4	Others	117	0.8
Total	3,301	100.0	Total	14,571	100.0

Source: Department of Statistics

With respect to wire and wire products, Singapore was again the most important overseas market for the country's output. However, its market share declined from 49.5% to 29.9% between 1973 and 1981. As presented in Table 92, Indonesia, Thailand, Australia and Mauritius were the other principal clients of Malaysia in 1973 while Brunei, Papua New Guinea, Bahrain and Hong Kong rose to the forefront in 1981.

TABLE 92
EXPORTS: WIRE AND WIRE PRODUCTS
(1973 AND 1981)

	1973			1981	
Destination	Value (M$ '000)	% Share	Destination	Value (M$ '000)	% Share
Singapore	1,000	49.5	Singapore	2,600	29.9
Indonesia	300	14.9	United Kingdom	2,000	23.0
Thailand	200	9.9	France	1,300	14.9
Australia	200	9.9	West Germany	1,200	13.8
Mauritius	100	5.0	Australia	700	8.0
Others	220	10.8	Others	910	10.4
Total	2,020	100.0	Total	8,710	100.0

Source: Department of Statistics

It was noted earlier that miscellaneous fabricated products are among the fastest growing exports in the engineering/machinery sector. Between 1973 and 1981, Singapore purchased 54.0% and 84.0% of all exports in this category. As indicated in Table 93, Mauritius, Indonesia, Brunei and Vietnam were the other importers of some significance in 1973. In 1981 Singapore was followed by Brunei, Papua New Guinea, Bahrain and Hong Kong.

TABLE 93
EXPORTS: OTHER FABRICATED METAL PRODUCTS
(1973 AND 1981)

	1973			1981	
Destination	Value (M$ '000)	% Share	Destination	Value (M$ '000)	% Share
Singapore	414	54.0	Singapore	6,750	84.0
Mauritius	45	5.9	Brunei	440	5.5
Indonesia	40	5.2	Papua New Guinea	238	3.0
Brunei	17	2.2	Bahrain	148	1.8
Vietnam	12	1.6	Hong Kong	94	1.2
Others	239	31.1	Others	367	4.5
Total	767	100.0	Total	8,037	100.0

Source: Department of Statistics

Taking exports of fabricated metal products on an aggregate basis, it is not surprising that Singapore emerges as Malaysia's most significant foreign market. As tabulated in Table 94, Singapore absorbed 36.0% of all fabricated metal products exported by the country in 1973. In 1981, this proportion rose to 50%. Brunei, Indonesia, Thailand and Australia were the other principal overseas markets in 1973, but they were supplanted by Nigeria, Saudi Arabia, Brunei and United Arab Emirates in 1981.

TABLE 94
TOTAL EXPORTS: FABRICATED METAL PRODUCTS
(1973 AND 1981)

	1973			1981	
Destination	Value (M$Million)	% Share	Destination	Value (M$Million)	% Share
Singapore	6.7	36.0	Singapore	31.7	50.0
Brunei	4.9	26.3	Nigeria	8.4	13.2
Indonesia	1.1	5.9	Saudi Arabia	2.3	3.6
Thailand	0.5	2.7	Brunei	2.2	3.5
Australia	0.4	2.2	U.A.E.	2.0	3.2
Others	5.0	26.9	Others	16.8	26.5
Total	18.6	100.0	Total	63.4	100.0

Source: Department of Statistics

Malaysia's exports of special industrial equipment totalled M$21.7 million in 1973 and gradually increased to a high of M$89.6 million in 1981. Of this, resource based equipment only accounted for M$1.9 million in 1973 increasing to M$8.7 million in 1981.

Rubber processing equipment were mainly exported to Singapore which accounted for 39% of these exports. Over the years, from 1973 to 1981, this category of exports rose from M$1.1 million to M$3.8 million respectively (See Table 95).

TABLE 95
EXPORTS: RUBBER PROCESSING MACHINERY
(1973 AND 1981)

	1973			1981	
Destination	Value (M$'000)	% Share	Destination	Value (M$'000)	% Share
Thailand	385	34.0	Singapore	1,472	39.0
Sri Lanka	215	19.0	Liberia	661	17.5
Cambodia	117	10.3	Papua New Guinea	380	10.1
Liberia	113	9.9	Indonesia	296	7.8
Singapore	84	7.4	Philippines	162	4.3
Others	220	19.4	Others	805	21.3
Total	1,134	100.0	Total	3,776	100.0

On the other hand, palm oil processing equipment showed a dramatic increase from a mere M$16,000 in 1973 to M$4.3 million by 1981, with Indonesia being the largest buyer as exhibited in Table 96.

TABLE 96
EXPORTS: PALM OIL PROCESSING MACHINERY
(1973 AND 1981)

1973 Destination	1973 Value (M$'000)	1973 % Share	1981 Destination	1981 Value (M$'000)	1981 % Share
Cambodia	12	75.0	Indonesia	3,817	89.2
Pakistan	4	25.0	Singapore	291	6.8
Others	-	-	Others	171	4.0
Total	16	100.0	Total	4,279	100.0

Timber processing equipment was the only resource based equipment that showed a decline in exports over the same period of time. In 1981, exports totalled only M$617,000 compared with M$717,000 in 1973. The major countries that were exported to were Singapore and Indonesia with the former accounting for most of the sales (approximately 87.0%) as indicated in Table 97.

TABLE 97
EXPORTS: TIMBER PROCESSING MACHINERY
(1973 AND 1981)

1973 Destination	1973 Value (M$'000)	1973 % Share	1981 Destination	1981 Value (M$'000)	1981 % Share
Singapore	632	88.1	Singapore	537	87.0
Sumatra	42	5.9	Indonesia	41	6.6
Indonesia n.e.s.	21	2.9	Brunei	19	3.1
Brunei	8	1.1	U.S.A.	12	1.9
Thailand	5	0.7	Germany	4	0.7
Others	9	1.3	Others	4	0.7
Total	717	100.0	Total	617	100.0

Source: Department of Statistics

10.3 INTERNATIONAL COST COMPARISONS

10.3.1 Iron/Steel Castings

Despite the presence of significant protection in the form import duty (M$246.05 per tonne), sales tax (10%), and surtax (5%), the product of local foundries continue to experience substantial competition from imported substitutes. While this may be due to a combination of price and non-price factors, the Consultants have chosen to focus on the price/cost aspects in this sector of the Report.

Table 98 presents price/cost comparisons between: (1) Malaysia and Thailand for foundry products using low/medium technology, and (2) Malaysia, Thailand, and Taiwan for foundry products embodying medium/high technology.

In the former case Malaysian castings appear to enjoy a district price advantage over their Thai substitutes. The selling price of local castings (M$1.32 - $1.43/kg) is subtantially lower that the selling prices of corresponding products in Thailand (M$2.81 - $10.00/kg). With respect to production cost structure, relatively more direct labour, direct material and energy are employed by Thai foundries. The proportion of overhead to total manufacturing cost is higher among local establishments.

In the latter case, however, Thai and Taiwanese foundries possess a price advantage over their local counterparts. The price range of medium/high technology foundry output in Thailand and Taiwan are M$1.98 - 3.96/kg and M$2.19 - 2.30/kg respectively. In Malaysia, prices of comparable items fluctuated between M$3.41/kg and M$3.89/kg.

The production cost structures reveal several notable differences. Direct labour in Taiwan (30.0%) is a much more important element than in Thailand (15.0%) or Malaysia (15.5%). The relative contribution of direct raw materials is significantly higher in Thailand (50.0%) compared to Taiwan (30.0%) and Malaysia (33.3%). Taiwanese foundries have the largest energy cost in relative terms (25.0%). The corresponding proportion for Thailand and Malaysia are 20.0% and 20.5% respectively. In percentage terms, overhead charges are similar in Taiwan and Thailand (15.0% each), but considerably more important in Malaysia (30.7%).

TABLE 98
IRON/STEEL CASTINGS:
COMPARATIVE COST STRUCTURE

Cost Items as Percentage of Total Cost	Malaysia Low/Med Tech.	Malaysia Med/High Tech.	Taiwan Med/High Tech.	Thailand Low/Med Tech.	Thailand Med/High Tech.
Direct Labour	24.8	15.5	30.0	30.0	15.0
Direct Material	45.1	33.3	30.0	52.5	50.0
Energy	3.7	20.5	25.0	7.5	20.0
Depreciation	8.7	13.4	5.0	5.0)	) 15.0
Other Overheads	17.7	17.3	10.0	5.0)	
	100.0	100.0	100.0	100.0	100.0
Major Melting Process	Cupola	Arc/ Induction	Arc/ Induction	Cupola	Arc/ Induction
Profit Margin	------5.0-8.0%------		5.0-10.0%	9.0-14.0%	5.0%
Selling Price/kg (M$)	1.32-1.43*	3.41-3.89	2.19-2.30	2.81-10.0*	1.98-3.96

*Iron casting only

Sources: Local data from SGV-KC Field Survey
Taiwan data from SGV-Soong
Thai data from SGV-Na Thalang

When absolute value terms are examined, however, the cost/kg of Taiwan labour is only marginally above that of Malaysia (M$0.62 vs M$0.53) (Table 99). Thai labour is cheapest, contributing only M$0.42 to the average production of M$2.82/kg of steel castings. With respect to all the other cost components, Taiwanese foundries are much cheaper than their Thai and Malaysian counterparts.

TABLE 99
IRON/STEEL CASTINGS:
MANUFACTURING COST COMPONENTS
(M$)

	Malaysia	Taiwan		Thailand
Average Cost per Kg.	3.41	2.08		2.82
Direct Labour	0.53	0.62		0.42
Direct Material	1.14	0.62		1.41
Energy	0.70	0.52		0.56
Depreciation	0.46	0.11	)	0.43
Overheads	0.58	0.21	)	

Sources: Table 98

The foregoing analysis can be amplified further by referring to direct material and energy costs in the three countries (Table 100). The average cost of pig iron in Taiwan is only M$334-426/tonne, but is M$500-530/tonne in Malaysia. Energy cost is highest in Malaysia (M$0.21/kwh), followed by Thailand (M$0.18/kwh) and Taiwan (M$0.14/kwh). Since pig iron and energy are major elements in the manufacture of medium/high technology foundry products, it is not surprising that domestic foundries find it very difficult to offer competitive prices.

TABLE 100
IRON/STEEL CASTINGS:
COMPARATIVE RAW MATERIAL AND ELECTRICITY COSTS
(M$)

	Malaysia	Taiwan	Thailand
Pig Iron/tonne	500 - 530	334 - 426	n.a.
Mild Steel Scrap/tonne	120 - 140	276 - 299	n.a.
Cast Iron Scrap/tonne	350 - 450		
Average Cost of Electricity/kwh	0.21	0.14	0.18

Sources: Local data from SGV-KC Field Survey
Taiwan data from SGV-Soong
Thai data from SGV-Na Thalang
National Electricity Board, Malaysia

Table 101 outline the comparative monthly wages of various categories of foundry workers.

TABLE 101
IRON/STEEL CASTINGS:
COMPARATIVE WAGE STRUCTURES
(M$ PER MONTH)

	Malaysia	Taiwan	Thailand
Moulder/Pattern Designer	340 - 910	1,150 - 1,725	350
Melting/Pouring Operators	450 - 655	690 - 1,150	350
General Operators	240 - 540	690 - 1,150	350
Others		517 - 863	172

Sources: Local data from SGV-KC Field Survey
Taiwan data from SGV-Soong
Thai data from SGV-Na Thalang

It is interesting to note that although wage rates of Taiwanese foundry workers exceed those of corresponding domestic employees by 50% to 100%, Taiwanese labour contributes only 17.0% more in absolute value terms to the average cost/kg of output (M$0.62 vs M$0.53). This strongly implies that Taiwanese foundry workers are considerably more productive than their Malaysian counterparts.

The Consultants noted earlier that overhead charges comprise a much larger segment of manufacturing cost in local foundries. This may be due to the fact that many local establishments operate well below maximum capacity because of the intensely competitive market environment. Survey results showed that 43.0% of the foundries interviewed have capacity utilization rates of between 25% to 50% while 20.0% operated in the range of 50% to 70%. Only 36.0% of the respondents claim to exceed the 70% capacity utilization level.

10.3.2 Nuts and Bolts

Compared with local foundries, the local manufacturers of nuts and bolts appear to be in a worse financial position. Nearly all the companies interviewed reported losses during the last three years due to very stiff competition from imports, especially those from the People's Republic of China. Despite the presence of protective measures such as the import duty (35% or M$0.55/kg whichever is higher) and sales tax (10%), imported substitutes remain comparatively cheaper.

Since information related to production costs are not accessible from the People's Republic of China, the Consultants have concentrated on the comparative cost structure of Taiwan and Thailand (Table 102).

TABLE 102
NUTS AND BOLTS:
COMPARATIVE COST STRUCTURE

	Malaysia	Taiwan	Thailand
Cost Items as Percentage of Total Cost			
Direct Labour	5.0 - 24.0	35.0	15.0 - 30.0
Direct Material	50.0 - 69.0	55.0	50.0 - 60.0
Energy	3.0 - 5.0	5.0	5.0
Depreciation	7.0 - 15.0	4.0	5.0
Overhead	13.0 - 30.0	1.0	25.0
Type of Heading Machine	1 die 2 blows- 4 dies 4 blows	3 dies 3 blows	1 die 2 blows
Profit Margin	Losses	2.5 - 5.0%	1.0 - 5.0%
Selling Price (M$ per tonne)	1,600 - 2,153	1,380 - 1,840	2,001 - 2,990

Sources: Local data from SGV-KC Field Survey
Taiwan data from SGV-Soong
Thai data from SGV-Na Thalang

The above data show that direct labour cost accounts for a more significant percentage of total manufacturing cost in Taiwan. In relative terms, all three countries exhibit similar expenditure patterns with respect to direct materials and energy. Depreciation and related overhead charges are relatively more important in Malaysia. Although local manufacturers are saddled with losses, the profit margins reported by Taiwanese and Thai respondents have not been impressive either. This strongly suggests that manufacturers of bolts and nuts in these two nations face similar difficulties in market competition.

On the basis of information presented in Table 103, Taiwan has the lowest average cost (M$1,610/tonne), followed by Malaysia (M$1,877/tonne) and Thailand (M$2,496/tonne). Compared with Malaysia, Taiwanese labour cost is almost twice as high in absolute terms (M$564/tonne vs M$297/tonne). However, this initial cost disadvantage is more than offset by lower expenses in all the other cost categories except energy charges.

TABLE 103
NUTS AND BOLTS:
MANUFACTURING COST COMPONENTS
(M$)

	Malaysia	Taiwan	Thailand
Average Cost per tonne	1,877	1,610	2.496
Direct Labour	297	564	562
Direct Material	1,055	886	1,373
Energy	75	81	125
Depreciation	188	64	125
Overheads	262	15	311

Source: Local data from SGV-KC Field Survey
Taiwan data from SGV-Soong
Thai data from SGV-Na Thalang

As presented in Table 104, wage levels of Taiwanese workers are substantially higher than those prevailing in Thailand and Malaysia.

TABLE 104
NUTS AND BOLTS:
COMPARATIVE WAGE STRUCTURE
(M$ PER MONTH)

	Malaysia	Taiwan	Thailand
Skilled Labour (e.g. Machine Setters)	650 - 800	1,265 - 1,380	286 - 390
Technicians (e.g. Fitters, Chargemen)	728 - 832	920 - 1,150	286 - 390
Unskilled	208 - 390	575 - 690	172 - 208

Source: Local data from SGV-KC Field Survey
Taiwan data from SGV-Soong
Thai data from SGV-Na Thalang

This disparity largely explains why the absolute contribution of Taiwanese direct labour to the average production cost of nuts and bolts is almost twice as high compared with the Malaysian case. At the same time, the apparently low productivity of Thai workers can be deduced from the observation that Taiwanese and Thai production workers contribute approximately the same absolute amount to the average cost of their respective products.

The cost disadvantage of Malaysian nuts and bolts relative to their Taiwan subtitutes is further aggravated by the higher cost of basic inputs such as wire rods. The cost of wire rods to Malaysian manufacturers ranges from M$980/tonne to M$1,080/tonne. In Taiwan, wire rods, used in the manufacture of products for domestic consumption are priced at M$831/tonne whereas those used for products to be exported may be purchased at M$705/tonne.

Finally, overhead charges are more substantial in both relative and absolute terms in Malaysia because of the poor utilization of plant capacity by domestic producers. Because of the highly competitive market, the average capacity utilization rate of the enterprises interviewed is only 57%, with virtually all respondents operating only one work-shift daily.

XI. DEMAND ANALYSIS

11.1 APPARENT LOCAL DEMAND/CONSUMPTION

Apparent local consumption of or demand for foundry and fabricated metal products in Malaysia is taken to be the difference between the sum of imports and local production output and exports. Accurate import and export figures are available for the products under study, but apart from 1973 and 1981 in which censuses of the manufacturing industries were conducted, exact measures of production output are unavailable. For the years of 1974, 1975, 1976, 1978 and 1979, industrial surveys conducted by the Department of Statistics Malaysia, produced only sample statistics of the manufacturing industries in Peninsular Malaysia.

In order to estimate the total production output of the industries under study, the survey data for the years between the census years of 1973 and 1981 need to be adjusted or inflated. The adjustment is done by first deflating all output values to constant 1972 prices and then determining the average difference between the survey values and estimated total output values, calculated by using production indices for basic metal products (for projecting foundry output during those years) and fabricated metal products (for projecting the output of structural metal products, wire and wire products, tin cans and metal boxes and other fabricated metal products).

The survey data is then adjusted for each industry by using the average difference as an inflator. The adjusted output figures are then used with external trade figures, also adjusted to constant prices, in the calculation of apparent demand. In this way, the adjusted survey data for each industry may be used with the census data for determining the correlation between output and the activity of one or more sectors of the economy.

This method of inflating sample data to obtain estimates of total output assumes that the performance of any industry under study is, on the whole, adequately reflected by the performance of the industry group of which it is a member, as measured by the production index of that group. For example, the output of the foundry industry during the years between 1973 and 1981 would therefore be assumed to be closely related to that of the basic metal industry as a whole, and output of structural metal products to that of the fabricated metal product group.

11.1.1 Foundry Products

Table 105 shows that the apparent consumption of foundry products fluctuated between M$75.2 and M$91.7 million (1981 constant prices) over the years from 1973 to 1976. However, after 1977, the apparent consumption of these products rose rapidly to M$139.8 million in 1978, fell again to M$102.0 million in 1979 before rising back to M$145.6 million by 1981.

TABLE 105
FOUNDRY PRODUCTS:
APPARENT CONSUMPTION (1973-1981)
(M$ MILLION IN 1981 CONSTANT PRICES)

Year	Imports[1]	Exports[2]	Local Production[2] Census/Survey[3]	Local Production[2] Adjusted	Apparent Consumption
1973	2.0	0.6	80.4	80.4	81.8
1974	4.0	-	59.9	71.2	75.2
1975	6.0	3.3	74.7	89.0	91.7
1976	5.3	3.6	67.0	79.8	81.5
1977	n.a.	n.a.	n.a.	n.a.	n.a.
1978	2.7	2.9	117.6	140.0	139.8
1979	5.8	5.1	85.2	101.3	102.0
1980	n.a.	n.a.	n.a.	n.a.	n.a.
1981	10.2	5.1	140.5	140.5	145.6

Notes: 1 Imports of foundry products are in current prices adjusted to 1981 constant prices with the producer price index for imports of basic metal products.

2 Exports and local production are current prices adjusted to 1981 constant prices with the producer price index for basic metal industries.

3 Except for 1973 and 1981, for which census production data is available, all data is from the annual industrial surveys performed by the Department of Statistics.

Sources: Annual Statistics of External Trade, Department of Statistics
Census and Survey of Manufacturing Industries, Department of Statistics.
Exhibits 24, 25 & 26

As the major consumers of foundry products, such as gravel pump casings and impellers, housings and screw presses and other iron and steel castings, have traditionally been the tin mining and palm oil processing industries, the output of the foundries may be expected to reflect the activity of those industries. Table 106 below compares the apparent consumption of foundry products and the production output of tin, palm oil and manufacturing over the period 1973 to 1981.

TABLE 106
COMPARISON OF CONSUMPTION OF FOUNDRY PRODUCTS
WITH TIN, PALM OIL AND MANUFACTURING OUTPUTS
(1973 - 1981)

Year	Apparent Consumption of Foundry Products (M$ million)	Tin Production ('000 tonnes)	Palm Oil Production ('000 tonnes)	Manufacturing Output (M$ billion)
1973	81.8	72.3	739.3	2.5
1974	75.2	68.1	938.6	2.8
1975	91.7	64.4	1136.7	2.9
1976	81.5	63.4	1252.8	3.4
1977	n.a.	58.7	1483.6	3.7
1978	139.8	62.7	1640.0	4.1
1979	102.0	63.0	2032.9	4.5
1980	n.a.	61.4	2396.7	4.9
1981	145.6	59.9	2645.2	5.1

Note : Apparent consumption of foundry products is in 1981 constant prices and manufacturing output in 1970 constant prices.

Sources: Monthly Statistical Bulletin, Nov. 1977 and Dec. 1982, Department of Statistics.
Census and Survey of Manufacturing Industries (adjusted by SGV-KC), 1973 - 1981, Department of Statistics.
Economic Reports, Ministry of Finance, Malaysia.

The demand for a consumption of foundry products since 1973 appears to be divided into 2 distinct phases. The first, from 1973 to 1976, is characterised by an apparent plateauing of demand (apart from a rise in 1975), whereas the second, after 1977, shows an increase in demand. This appears to match the combination of tin and palm oil production activity over the corresponding periods. Tin mining output fell gradually from about 72,260 tonnes in 1973 to 58,700 tonnes by 1977, at an average rate of 5% per annum, partially explaining the fall in demand for foundry products. This was, however, probably counteracted by increasing palm oil processing activity, as evidenced by the continually rising production of palm oil, at about 19% per annum, from 739,260 tonnes in 1973 to 1,483,600 tonnes by 1977. The decreasing mining activity and increasing palm oil output were probably the main causes of the fluctuation of demand for foundry products over that period.

After 1977, tin production increased in 1978 and 1979 to about 63,000 tonnes anually, before falling again slightly by 2.5% per annum, to 61,400 tonnes in 1980 and 59,940 tonnes in 1981. Palm oil production continued to increase, particularly in 1979 and 1980, when palm oil output grew at 23.9% and 17.9% respectively. Again, the growth and fluctuation in demand for foundry products during this period, from 1977 onwards is a reflection of the activity of the two other industries.

Referring to Table 107, it can be seen that the market for foundry products is one in which local production plays a major role. Imports as a percentage of apparent consumption have averaged only 7.8% over the years between 1973 and 1981. This is not suprising, given the historical development of the foundry industry, which grew with the tin mining industry by providing essential replacement wear parts used in the gravel pumps. Standardisation of these parts has allowed even the local low-technology manufacturers to make them in sufficient quantities and of a sufficient quality to meet demand in Malaysia.

TABLE 107
FOUNDRY PRODUCTS:
ANALYSIS OF APPARENT CONSUMPTION
(1973 - 1981)

Year	% of Apparent Consumption		Exports as % of Local Production
	Imports	Local Production	
1973	2.4%	98.3%	0.6%
1974	5.3	94.7	-
1975	6.5	97.1	3.6
1976	6.5	96.8	4.6
1977	n.a.	n.a.	n.a.
1978	1.9	100.0	2.1
1979	5.7	99.3	4.8
1980	n.a.	n.a.	n.a.
1981	7.0	96.5	3.7

Source: Table 105

Imports of iron and steel castings totalled only M$2.0 million in 1973, but rose to M$10.2 million by 1981 in constant prices. Table 108 shows that although United Kingdom has remained Malaysia's largest source of imports during this interval, Japan has dislodged erstwhile second-ranked Australia.

TABLE 108
IMPORTS: IRON AND STEEL CASTINGS (1973 and 1981)
(1981 CONSTANT PRICES)

	1973			1981	
Country of Origin	Value (M$'000)	% Share	Country of Origin	Value (M$'000)	% Share
United Kingdom	662.9	33.0	United Kingdom	4,039.6	39.5
Australia	293.0	14.5	Japan	2,276.1	22.3
Japan	236.6	11.8	India	1,027.3	10.1
China	180.3	9.0	Singapore	619.7	6.1
Singapore	161.5	8.0	Belgium	554.0	5.4
Others	477.0	23.7	Others	1,707.1	16.6
Total	2,011.3	100.0	Total	10,223.8	100.0

Source: Department of Statistics

Table 107 also shows that exports of foundry products have, since 1975, fluctuated between 2.1% and 4.8% of local production output. it appears that exports of foundry products grew significantly after 1974, but in absolute terms, the value of these exports of iron and steel castings has been low, increasing from M$0.4 million in 1973 to only M$3.2 million in 1981 (in 1981 constant prices).

In 1973, the following countries purchased Malaysia's iron and steel castings: Brunei (M$185,000), Indonesia (M$119,000) and Sri Lanka (M$26,000). Indonesia was the largest importer of these products by 1981, with purchases valued at M$2.5 million. The other importing countries were: Singapore (M$0.8 million), Thailand (M$21,000) and Australia (M$13,000).

11.1.2 Structural Metal Products

The apparent consumption of structural metal products since 1973 is shown in Table 109 below. The table shows that demand for these products of structural metal components, such as tanks, doors and window frames, boiler shop products, architectural metal work and metal staircases, has fluctuated between the years 1973 and 1981.

TABLE 109
STRUCTURAL METAL PRODUCTS:
APPARENT CONSUMPTION (1981 CONSTANT PRICES)
(M$ MILLION)

Year	Imports[1]	Exports[2]	Local Production[2] Census/Survey[3]	Local Production[2] Adjusted	Apparent Consumption
1973	47.5	17.6	210.0	210.0	239.9
1974	54.9	14.0	190.2	274.3	315.2
1975	56.7	6.1	137.3	198.1	248.7
1976	41.0	12.9	91.9	132.6	160.7
1977	n.a.	n.a.	n.a.	n.a.	n.a.
1978	32.5	20.6	138.3	199.4	211.3
1979	39.0	17.8	187.7	270.8	292.0
1980	n.a.	n.a.	n.a.	n.a.	n.a.
1981	182.9	24.6	409.1	409.1	567.4

Notes: 1 Imports of structural metal products are in current prices adjusted to 1981 constant prices with the producer price index for imports of fabricated metal products.

2 Exports and local production are current prices adjusted to 1981 constant prices with the producer price index for fabricated metal products.

3 Except for 1973 and 1981, for which census production data is avaialble, all data is from the annual industrial surveys performed by the Department of Statistics.

Sources: Annual Statistics of External Trade, Department of Statistics
Census and Survey of Manufacturing Industries, Department of Statisitics
Exhibits 24, 25 & 26.

After growing by 31.4% to M$315.2 million in 1974, the apparent consumption of structural metal products fell in 1975 and 1976 to only M$248.7 and M$160.7 million in those years respectively. However, the demand for these products rose rapidly in the second half of the decade, reaching M$567.4 million by 1981. That this demand is closely related to construction activity in Malaysia over that period is demonstrated in Table 110 below, which compares the apparent consumption of structural metal products with output of the construction industry.

TABLE 110
COMPARISON OF CONSUMPTION OF STRUCTURAL METAL PRODUCTS WITH CONSTRUCTION OUTPUT (1973 - 1981)

Year	Apparent Consumption of Structural Metal Products (M$ million)	Output of the Construction Industry (M$ million)
1973	239.9	651
1974	315.2	729
1975	248.7	654
1976	160.7	713
1977	n.a.	800
1978	211.3	919
1979	292.0	1,027
1980	n.a.	1,209
1981	567.4	1,391

Note : Apparent consumption of structural metal products is in 1981 constant prices and construction output in 1970 constant prices.

Sources: Economic Reports, Ministry of Finance, Malaysia
Census and Survey of Manufacturing Industries (Adjusted by SGV-KC), 1973 - 1981, Department of Statistics.

The table shows a marked correlation between the demand for structural metal products and the level of construction activity as measured by output. This is only as expected since most of the structural metal products are used in the construction industry. As such, the historical demand for structural metal products may be explained by the developments in the construction industry over the period 1973 to 1981.

During the first half of the seventies, construction activity appeared to stagnate, probably as a result of the global recession caused by the 1973 - 1974 oil crisis. This is reflected by the fall in apparent consumption of structural metal products in the mid-seventies. However, the second half of that decade saw a tremendous growth of construction activity which reached a peak in 1980. This rise in construction activity explains the rapid increase in apparent consumption of structural metal products. In fact, in 1981, about 80% of the value of imports of structural steel was accounted for by the steel structural components used in the construction of the steel-frame tower of the Dayabumi Complex in Kuala Lumpur, boosting the apparent consumption of these products in that year to M$567.4 million (1981 constant prices).

Imports of structural metal products, increased from M$47.5 million in 1973 to M$56.7 million in 1975, but fell successively in 1976 and 1977. Importations remained below the 1975 level until 1980, when purchases from abroad expanded more than three-fold from M$39.0 million in 1979 to M$118.8 million. Table 111 shows that Japan has considerably enhanced its position as the foremost supplier of structural metal products to Malaysia between 1973 and 1981. Singapore, United Kingdom and Australia continue to be major sources of imports, but India has been displaced by Italy.

TABLE 111
IMPORTS: STRUCTURAL METAL PRODUCTS (1973 AND 1981)
(1981 CONSTANT PRICES)

	1973			1981	
Country of Origin	Value (M$Million)	% Share	Country of Origin	Value (M$Million)	% Share
Japan	11.0	23.2	Japan	110.2	60.3
Singapore	8.7	18.2	Italy	21.9	11.9
United Kingdom	8.5	17.9	Singapore	11.6	6.4
Australia	6.5	13.6	United Kingdom	10.8	5.9
India	4.7	10.0	Australia	7.4	4.0
Others	8.1	17.1	Others	21.1	11.5
Total	47.5	100.0	Total	182.9	100.0

Source: Department of Statistics

From Table 112 it is interesting to note that the level of imports as a percentage of total apparent consumption fell from about 19.8% in 1973 to about 13.4% by 1979, indicating a greater self-sufficiency in structural metal products as the decade progressed. However, this was sharply reversed in 1981 when work on the first all-steel frame high-rise building, the tower of the Dayabumi Complex, was initiated. In that year, imports of structural metal products amounted to 32.2% of total consumption.

TABLE 112
STRUCTURAL METAL PRODUCTS:
ANALYSIS OF APPARENT CONSUMPTION (1973 - 1981)

Year	% of Apparent Consumption: Imports	% of Apparent Consumption: Local Production	Exports as % of Local Production
1973	19.8%	87.5%	8.4%
1974	17.4	87.0	5.1
1975	22.8	79.7	3.0
1976	25.5	82.5	9.7
1977	n.a.	n.a.	n.a.
1978	15.3	94.4	10.3
1979	13.4	92.7	6.5
1980	n.a.	n.a.	n.a.
1981	32.2	72.1	6.0

Source: Table 109

The consumption of structural metal products in 1981 was therefore unique in that it was dramatically affected by a single large project, using new construction methods and materials. The long term effects on the construction industry of this development will determine the size and nature of demand for structural metal products. For example, the choice of a steel frame over a more conventional reinforced-concrete frame structure will directly affect the demand for structural steel. Furthermore, the use of local or foreign contractors who would also use imported structural steel, would alter the nature of supply if not the volume of demand for structural metal products.

Table 113, shows that almost half of the country's exports of structural metal products went to Brunei in 1973, with Singapore and Indonesia accounting for 13.0% and 7.0% respectively. In 1981, however, Singapore and Nigeria purchased 80.0% of structural metal products sold abroad by Malaysian manufacturers. Saudi Arabia, Kuwait and Papua New Guinea emerged as important export markets.

TABLE 113
EXPORTS: STRUCTURAL METAL PRODUCTS (1973 and 1981)
(1981 CONSTANT PRICES)

	1973			1981	
Destination	Value (M$ million)	% Share	Destination	Value (M$ million)	% Share
Brunei	8.5	47.9	Singapore	11.7	47.5
Singapore	2.3	13.0	Nigeria	8.0	32.5
Indonesia	1.3	7.0	Saudi Arabia	1.9	7.3
Thailand	0.6	3.0	Kuwait	0.8	2.8
Bahrain	0.4	2.0	Papua New Guinea	0.6	2.4
Others	4.7	27.1	Others	1.9	7.5
Total	17.8	100.0	Total	24.9	100.0

Source: Department of Statistics

11.1.3 Tin Cans and Metal Boxes

The apparent consumption of tin cans and metal boxes has exhibited a fluctuating but generally increasing trend as shown in Table 114 below. From M$146.1 million in 1973, apparent consumption increased gradually to M$218.2 million (1981 constant prices) by 1981, averaging 5.1% growth per annum.

TABLE 114
TIN CANS AND METAL BOXES:
APPARENT CONSUMPTION (1973 - 1981)
(M$ MILLION IN 1981 CONSTANT PRICES)

Year	Imports[1]	Exports[2]	Local Production[2]	Apparent Consumption
1973[3]	20.2	5.9	131.8	146.1
1974	17.5	6.3	144.7	155.9
1975	12.1	10.4	139.0	140.7
1976	16.4	8.1	161.6	169.9
1977	n.a.	n.a.	n.a.	n.a.
1978	14.8	12.7	219.9	222.0
1979	19.1	16.1	182.8	185.8
1980	n.a.	n.a.	n.a.	n.a.
1981[3]	26.4	14.6	206.4	218.2

Notes: 1 Imports of tin cans and metal boxes are in current prices adjusted to 1981 prices with the producer price index for imports of fabricated metal products.

2 Exports and local production are current prices adjusted to 1981 constant prices with the producer price index for fabricated metal industries.

3 Except for 1973 and 1981, for which census production data is avaialble, all data is from the annual industrial surveys performed by the Department of Statistics.

Sources: Annual Statistics of External Trade, Department of Statistics
Census and Survey of Manufacturing Industries, Department of Statistics
Exhibits 24, 25 & 26.

Catering mainly to the food and beverage manufacturing and packaging industry as well as the chemical industry, the demand for the cans and metal boxes is expected to be related to the activity of these industries. Table 115 below compares the apparent consumption of these products with the output of food manufacturing and the entire manufacturing industry. As the food and beverage industries together accounted for 26.2% and 27.9% of total manufacturing output in 1973 and 1981 respectively, they represent the single largest contributor to manufacturing output. As such, it is likely that the demand for tin cans and metal boxes will show a positive and strong correlation with food manufacturing output specifically or with total manufacturing output generally.

TABLE 115
COMPARISON OF CONSUMPTION OF TIN CANS AND
METAL BOXES WITH FOOD AND TOTAL MANUFACTURING OUTPUTS
(1973 - 1981)

Year	Apparent Consumption of Tin Cans and metal Boxes (M$ million)	Food Manufacturing Production Index (1968 = 100)	Manufacturing Output (M$ billion)
1973	146.1	130.3	2.5
1974	155.9	128.5	2.8
1975	140.7	136.2	2.9
1976	169.9	156.5	3.4
1977	n.a.	162.0	3.7
1978	222	171.7	4.1
1979	185.8	177.9	4.5
1980	n.a.	185.8	4.9
1981	218.2	182.0	5.1

Note : Apparent consumption of tin cans and metal boxes and manufacturing output are in 1972 and 1981 constant prices respectively.

Sources: Census and Survey of Manufacturing Industries, 1973 - 1981, Department of Statistics.
Monthly Industrial Statistics, Department of Statistics
Economic Reports, Ministry of Finance, Malaysia.

A comparison of the apparent consumption of tin cans and metal boxes with food manufacturing output or total manufacturing output, as in Table 115, shows a strong correlation between them, allowing the historical demand for tin cans and metal boxes to be explained by the activity of the food or manufacturing industries. In fact, there appears to be a closer relationship between demand for tin cans and metal boxes and total manufacturing output than food production output in terms of the magnitude of changes. As such the respective demand and output curves show similar patterns of movement, dipping in 1975 before rising sharply in 1976 and then entering a period of steady growth in the second half of the seventies.

Table 116 below analyses the apparent consumption of tin cans and metal boxes in terms of the magnitude of contribution of imports, local production and exports. It can be seen that since 1973, between 6.7% and 13.8% of total consumption is satisfied by imports and that these appear to be slowly declining, with imports averaging 11.2% of apparent consumption in the years up to 1975 and 9.7% in the later years, from 1976 to 1981.

TABLE 116
TIN CANS AND METAL BOXES:
ANALYSIS OF APPARENT CONSUMPTION (1973 - 1981)

Year	% of Apparent Consumption: Imports	% of Apparent Consumption: Local Production	Exports as % of Local Production
1973	13.8%	90.2%	4.4%
1974	11.2	92.8	4.3
1975	8.6	98.8	7.5
1976	9.7	95.1	5.0
1977	n.a.	n.a.	n.a.
1978	6.7	99.1	5.8
1979	10.3	98.4	8.8
1980	n.a.	n.a.	n.a.
1981	12.1	94.6	7.1

Source: Table 114

The value of imports of tin cans and metal boxes decreased slightly between 1973 and 1978 in real terms, before increasing again from 1979 awards. Table 117 below shows the changes in the sources and volume of imports between 1973 and 1981.

TABLE 117
IMPORTS: TIN CANS AND METAL BOXES (1973 AND 1981)
(1981 CONSTANT PRICES)

	1973			1981	
Country of Origin	Value (M$ million)	% Share	Country of Origin	Value (M$ million)	% Share
Singapore	12.3	60.7	Singapore	20.9	79.5
West Germany	3.3	16.1	United States	1.1	4.1
Japan	1.1	5.4	Belgium	0.9	3.4
Australia	0.4	1.8	United Kingdom	0.9	3.4
United Kingdom	0.4	1.7	Japan	0.5	2.1
Others	2.9	14.3	Others	2.0	7.5
Total	20.4	100.0	Total	26.3	100.0

Source: Department of Statistics

Imports of tin cans and metal boxes amounted to M$20.4 million in 1973 and M$26.3 million in 1981, after falling to M$12.1 million in 1975. Over the years, Singapore strengthened its position as the leading foreign supplier of these products, accounting for 60.7% of imports in 1973 and 79.5% in 1981. Of the other four major sources of imports in 1973, only Japan and the United Kingdom remained with significant shares in 1981, with West Germany and Australia displaced by the United States of America and Belgium.

Further analysis of the import statistics shows that the bulk of imports of tin cans and metal boxes are of small containers of tin-plated iron or steel sheets or aluminium, used in the food or pharmaceutical industries, with a capacity of up to 2 litres. In 1973, these small containers accounted for 43.1% of all imports of tin cans and metal boxes, increasing to 59.3% by 1981. On the other hand, drums (steel or otherwise) of capacities greater than 135 litres (30 gallons) accounted for only 3.3% of imports in 1973 increasing to 13.6% by 1981. This latter development is probably reflective of the increase in the activity of the petrochemical, chemical and related sectors since the middle of the seventies.

In line with the decreasing dependence on imports, exports of tin cans and metal boxes as a percentage of annual local production has been increasing since 1973. Over the years 1973 to 1975, the average amounted to 5.4%, but between 1976 and 1981, exports increased to 6.7% of total production.

Like the imports, the export markets for tin cans and metal boxes also appeared to be heavily concentrated. It is observed from Table 118 that Singapore claimed 85.0% and 65.2% of Malaysia's foreign sales of tin cans and metal boxes in 1973 and 1981 respectively. In 1973, five nations (Singapore, Hong Kong, Mauritius, United Kingdom and West Germany) accounted for 95.6% of the country's exports in this product category. In 1981, a comparable situation prevailed. The collective share of the five largest overseas markets for tin cans and metal boxes (Singapore, Thailand, United Arab Emirates, Saudi Arabia, and Hong Kong) was 99.2%.

TABLE 118
EXPORTS: TIN CANS AND METAL BOXES (1973 AND 1981)
(1981 CONSTANT PRICES)

	1973			1981	
Destination	Value (M$ '000)	% Share	Destination	Value (M$ '000)	% Share
Singapore	4,928.2	85.0	Singapore	9,507.9	65.2
Hong Kong	270.8	4.7	Thailand	2,244.4	15.4
Mauritius	168.6	2.9	United Arab Emirates	2,037.9	14.0
United Kingdom	121.2	2.1	Saudi Arabia	526.5	3.6
West Germany	53.0	0.9	Hong Kong	138.3	1.0
Others	257.6	4.4	Others	117.4	0.8
Total	5,799.4	100.0	Total	14,572.4	100.0

Source: Department of Statistics

A breakdown of the tin cans and metal boxes exported in 1973 shows that 34.3% of exports were made up of small containers of capacities less than 2 litres. Larger drums of capacities greater than 135 litres (30 gallons), but less than 300 liters (66 gallons) accounted for only 2.0% of exports that year. By 1981, the smaller containers only accounted for 25.7% of total exports, but the larger drums increased their share of exports to 17.2%.

11. .4 Wire and Wire Products

The apparent consumption of wire and wire products over the years since 1973 is shown in Table 119. Like several other products of the machinery and engineering sector, the demand for these products has shown a generally increasing if fluctuating trend between 1973 and 1981. This pattern is characterised by growth in 1974 followed by a sharp decline in 1975 before increasing again in 1976 and thereafter. Over this period, the apparent consumption of wire and wire products almost doubled, from M$184.6 million in 1973 to M$342.6 million in 1981.

TABLE 119
WIRE AND WIRE PRODUCTS:
APPARENT CONSUMPTION (1981 CONSTANT PRICES)
(M$ MILLION)

Year	Imports[1]	Exports[2]	Local Production[2]	Apparent Consumption
1973[3]	54.5	3.6	133.7	184.6
1974	84.3	4.7	132.8	212.4
1975	44.8	7.6	108.1	145.3
1976	53.5	3.6	120.5	170.4
1977	n.a.	n.a.	n.a.	n.a.
1978	57.6	3.8	179.7	233.5
1979	74.4	5.9	248.3	316.8
1980	n.a.	n.a.	n.a.	n.a.
1981[3]	108.7	8.7	242.6	342.6

Notes: 1 Imports of wire and wire products are in current prices adjusted to 1981 prices with the producer price index for imports of fabricated metal products.

2 Exports and local production are current prices adjusted to 1981 constant prices with the producer price index for fabricated metal products.

3 Except for 1973 and 1981, for which census production data is avaialble, all data is from the annual industrial survey performed by the Department of Statistics.

Sources: Annual Statistics of External Trade, Department of Statistics
Census and Survey of Manufacturing Industries, Department of Statisitics
Exhibits 24, 25 & 26.

The end-users of wire and wire products are diverse, ranging from those in shipping, logging and mechanical handling, the major users of stranded wires and cables, to those in manufacturing and construction who use fasteners such as nails, staples, tacks, screws, bolts and nuts. The construction sector is probably the largest user of wire and wire products ranging from wire and bars to steel wire mesh and also fasteners.

Table 120 below compares the apparent consumption of wire and wire products in Malaysia with output of the construction industry since 1973.

TABLE 120
COMPARISON OF CONSUMPTION OF WIRE AND WIRE PRODUCTS WITH CONSTRUCTION OUTPUT (1973 - 1981)
(1981 AND 1972 CONSTANT PRICES)

Year	Apparent Consumption of Wire and Wire Products (M$ million)	Output of the Construction Industry (M$ million)
1973	184.6	651
1974	212.4	729
1975	145.3	654
1976	170.4	713
1977	n.a.	800
1978	233.5	919
1979	316.8	1,027
1980	n.a.	1,209
1981	342.6	1,391

Note : Apparent consumption of wire and wire products and construction output are in 1981 and 1972 constant prices respectively.

Sources: Census and Survey of Manufacturing Induties, 1973 - 1981, Department of Statistics.
Economic Reports, Ministry of Finance, Malaysia

Inspection of the table suggests the existence of a correlation between the apparent consumption of wire and wire products and construction output over the period 1973 to 1981. This is not surprising since it is estimated that up to 70% of these products are used in the construction and other related industries. In line with construction activity during the seventies, the demand for wire and wire products fell in the middle of the decade before rising rapidly during the second half as the construction industry experienced a boom.

To determine the contribution of imports in the satisfaction of apparent demand, a breakdown of the components of apparent consumption is performed and shown in Table 121 below. As was the case of the other fabricated metal products like tin cans and metal boxes, the analysis shows a definite decrease in the contribution of imports towards satisfying local demand for wire and wire products. Over the 3 years to 1975, the value of imports averaged 33.3% of apparent consumption. From 1976 to 1981, this average decreased to 27.8%, demonstrating the growing importance of local production, which accounted for about 69.7% of apparent demand between 1973 and 1975 and 74.2% between 1976 and 1981.

TABLE 121
WIRE AND WIRE PRODUCTS:
ANALYSIS OF APPARENT CONSUMPTION (1973 - 1981)

Year	% of Apparent Consumption		Exports as % of Local Production
	Imports	Local Production	
1973	29.5%	72.4%	2.6%
1974	39.7	62.5	3.6
1975	30.8	74.3	6.9
1976	31.4	70.7	3.0
1977	n.a.	n.a.	n.a.
1978	24.7	77.0	2.1
1979	23.5	78.4	2.4
1980	n.a.	n.a.	n.a.
1981	31.7	70.8	3.6

Source: Table 119

There appeared to be a reversal of this trend towards greater self-sufficiency in 1981 when the ratio of imports to apparent consumption rose to 31.7%. This was probably due to the availability of competitively priced wire products in the international market, mainly from Japan and China. These products took the form of fasteners of iron or steel, like bolts and nuts, nails, screws and staples. Other imports included wire ropes, bars, cables and cords. These imports led to a highly competitive local market situation, reducing the demand for local products and consequently, their output. This situation has continued into the early eighties, resulting in a fiercely competitive market in which the producers are forced to accept very fine margins.

TABLE 122
IMPORTS: WIRE AND WIRE PRODUCTS (1973 AND 1981)
(1981 CONSTANT PRICES)

	1973			1981	
Country of Origin	Value (M$Million)	% Share	Country of Origin	Value (M$Million)	% Share
Japan	19.7	36.0	Japan	39.9	36.8
United Kingdom	8.3	15.2	China	17.2	15.8
China	5.1	9.3	United Kingdom	8.1	7.5
Singapore	4.7	8.7	Singapore	7.2	6.7
United States	3.8	6.8	United States	7.2	6.6
Others	13.0	24.0	Others	28.9	26.6
Total	54.6	100.0	Total	108.5	100.0

Source: Department of Statistics

Table 122 analyses the imports by the main countries of origin. In 1973, the 5 major exporters of wire and wire products to Malaysia, Japan, United Kingdom, China, Singapore and the United States accounted for 76.0% of total imports of these products. Japan and the United Kingdom accounted for 54.6% while the others contributed 24.8% of the total, valued at M$30.2 million in 1981 constant prices. By 1981, China had increased its share of these imports to 15.8%, from 9.3% in 1973, displacing the United Kingdom from its second position. Japan, however, managed to maintain its leading position as a supplier of wire and wire products, increasing its share slightly, from 36.0% in 1973 to 36.8% in 1981.

The type of wire products imported has also altered over the years. In 1973, the largest group of imported wire products included stranded wires, cables, cords and ropes of iron and steel, which accounted for 23.8% of total imports of wire products. The other major imports were of bolts and nuts (20.9%) and wire nails and staples (9.9%) of iron and steel. By 1981, bolts and nuts had displaced stranded wires, cables, cords and ropes as the single largest import, accounting for 26.7% of the total. The latter group accounted for 18.0% as the second largest, with wire nails and staples still in third position, albeit with a larger share of 14.4%. The growth in the imports of Chinese bolts and nuts has been a major contributor to the competition now experienced by the local producers in the market, forcing a certain reduction in production output.

In the face of stiff competition from imports, the efficacy, if not the survival, of local producers of wire and wire products will depend on how the structure of supply changes over the next few years. Faced with eroding margins, the industry can only combat the threat of imports and change the structure of supply to favour itself by either improving productivity internally or lowering its costs with the help of external agents such as a lifting of import duties on the raw materials used. So, although the nature and volume of demand will be determined mainly by the activity of the constructioin industry, the structure or source of supply will depend on how the local manufacturers meet the current external threats.

On the other side of the coin, the value of Malaysia's exports of wire and wire products have fluctuated between 2.1% and 6.9% of local production. In real terms, the value of exports has risen from M$3.6 million in 1973 to M$8.7 million by 1981, as shown in Table 123 below.

TABLE 123
EXPORTS: WIRE AND WIRE PRODUCTS (1973 AND 1981)
(1981 CONSTANT PRICES)

	1973			1981	
Destination	Value (M$ '000)	% Share	Destination	Value (M$ '000)	% Share
Singapore	1,757.6	49.5	Singapore	2,600.5	29.9
Indonesia	526.5	14.9	United Kingdom	2,000.1	23.0
Thailand	352.3	9.9	France	1,299.3	14.9
Australia	350.4	9.9	West Germany	1,200.8	13.8
Mauritius	176.1	5.0	Australia	700.8	8.0
Others	386.4	10.8	Others	909.1	10.4
Total	3,549.4	100.0	Total	8,710.6	100.0

Source: Department of Statistics

Inspection of the table shows that the export markets have not only grown, but there has also been a diversification. From a concentration of exports to Singapore (49.5%) and Indonesia (14.9%) in 1973, the Malaysian wire products have been sent to new European markets, including the United Kingdom, France and West Germany, which accounted for 23.0, 14.9% and 13.8% of total exports of these products in 1981. Although Singapore was still the largest buyer of Malaysian wire products, its share of exports only amounted to 29.9%. The countries of Indonesia, Thailand and Mauritius had, by 1981, been displaced by the United Kingdom, France and West Germany.

Together with a change in the markets served, the types of wire products exported have also altered since 1973. In that year, stranded wires, cables, cords and ropes and iron and steel bolts and nuts accounted for 39.2% and 35.5% of exports of wire products respectively. By 1981, although these two groups remained the most important, exports of bolts and nuts had become much more important, accounting for 67.4% of the total for that year. In contrast, the share of stranded wires, cables, cords and ropes fell to only 21.6%.

It is useful to note that the exports of bolts and nuts are expected to grow even more, as evidenced by the 1982 trade figures which showed a 55% increase in the value of the exports of these (in real terms). The bulk of this increase comes from the output of one firm in Shah Alam, Selangor, which started production in 1980. The conditions of the manufacturing licence awarded to this firm include one which requires the company to export at least 90% of its production. By 1984, the exports from this firm alone are expected to be about M$10 million annually in current prices.

11.2 PROJECTIONS OF DEMAND

Based on the results of the previous section analysing the nature of demand for each of the products and industries under study, correlation and regression analyses were performed to determine the relationship that may exist between the demand for any one product and the activity of one or more industries (or some other factors) in the context of the Malaysian economy. By performing the correlation analysis first on the relationship between demand (measured by apparent consumption) as the dependent variable and a combination of industrial outputs (like manufacturing, mining and/or construction) as the independent variables, the strength of any relatioship that exists is measured.

Having established a set of possible relationships with one or more independent variables, described by simple or multiple linear regression lines, the significance of the regressions are then further tested by using an analysis-of-variance approach (the f-test). Once a regression is deemed to be significant, the significance of each independent variable is tested by using the t-statistic to test hypotheses about the regression coefficients or beta values. The regression lines that fail this test are discarded.

The remaining regression lines with the strongest correlation coefficients (r-values) are then chosen for use in the projection of domestic demand, based on forecasts of the independent variables (macroeconomic indicators of industrial output) made by the Economic Planning Unit (EPU) of the Prime Minister's Department, Government of Malaysia. These forecasts of Gross Domestic Product (GDP) by industrial origin, are made on the basis of low, medium and high growth rates, allowing in turn, projections of demand to be made at different rates of growth.

The regression equations used to project the demand for each product are included as exhibits (See Exhibits 27 to 30).

11.2.1 Foundry Products

Based on the significant correlation between apparent consumption of foundry products and manufacturing output, projections of the domestic demand for these products are made based on the EPU forecasted growth rates. The results of these projections are shown in Table 124 below.

TABLE 124
FOUNDRY PRODUCTS:
PROJECTED DOMESTIC DEMAND (1984 - 1995)
(M$ MILLION IN 1981 CONSTANT PRICES)

	Projected Domestic Demand		
Year	Low Manuf. Growth	Medium Manuf. Growth	High Manuf. Growth
1984	164.6	164.6	164.6
1985	176.8	180.2	183.4
1986	190.2	197.3	204.7
1987	204.7	216.4	228.7
1988	220.1	237.5	255.8
1989	237.0	260.7	286.4
1990	255.3	289.4	320.7
1991	276.4	313.8	355.4
1992	299.1	344.2	394.6
1993	323.9	377.4	437.9
1994	351.0	414.1	486.1
1995	380.1	440.5	539.9

Source: Exhibit 27

From the projections above, the rates of growth of domestic demand under each forecasted rate of manufacturing growth are calculated and tabulated below:

TABLE 125
FOUNDRY PRODUCTS:
PROJECTED DEMAND GROWTH RATES (1984 - 1995)

Years	Low Growth	Medium Growth	High Growth
1984 - 1990	7.6%	9.7%	11.8%
1990 - 1995	8.3%	9.0%	11.0%

Source: Table 124

11.2.2 Structural Metal Products

Based on the significant correlation between apparent consumption of structural metal products and construction output, projections of the domestic demand for these products are made based on the EPU forecasted growth rates. The results of these projections are shown in Table 126 below.

TABLE 126
STRUCTURAL METAL PRODUCTS:
PROJECTED DOMESTIC DEMAND (1984 - 1995)
(M$ MILLION IN 1981 CONSTANT PRICES)

	Projected Domestic Demand		
Year	Low Const. Growth	Medium Const. Growth	High Const. Growth
1984	684.2	684.2	684.2
1985	749.8	762.1	770.3
1986	819.5	844.1	860.5
1987	893.3	934.3	963.0
1988	975.3	1,032.7	1,073.7
1989	1,061.4	1,143.4	1,196.7
1990	1,159.8	1,262.3	1,336.1
1991	1,258.2	1,393.5	1,491.9
1992	1,377.1	1,541.1	1,664.1
1993	1,496.0	1,701.0	1,852.7
1994	1,627.2	1,877.3	2,061.8
1995	1,774.8	2,070.0	2,295.5

Source: Exhibit 28

From the projections above, the rates of growth of domestic demand under each forecasted rate of construction growth are calculated and tabulated below:

TABLE 127
STRUCTURAL METAL PRODUCTS:
PROJECTED DEMAND GROWTH RATES (1984 - 1995)

Years	Low Growth	Medium Growth	High Growth
1984 - 1990	9.2%	10.7%	11.8%
1990 - 1995	8.9%	10.4%	11.4%

Source: Table 126

11.2.3 Tin Cans and Metal Boxes

Based on the significant correlation between apparent consumption of tin cans and metal boxes and manufacturing output, projections of the domestic demand for these products are made based on the EPU forecasted growth rates. The results of these projections are shown in Table 128 below.

TABLE 128
TIN CANS AND METAL BOXES:
PROJECTED DOMESTIC DEMAND (1984 - 1995)
(M$ MILLION IN 1981 CONSTANT PRICES)

	Projected Domestic Demand		
Year	Low Manuf. Growth	Medium Manuf. Growth	High Manuf. Growth
1984	252.7	252.7	252.7
1985	267.6	271.8	275.7
1986	284.0	292.7	301.7
1987	301.7	316.0	330.9
1988	320.5	341.7	364.1
1989	341.1	370.1	401.4
1990	363.5	401.4	443.3
1991	389.2	434.9	485.7
1992	417.0	471.9	533.5
1993	447.1	512.6	586.3
1994	480.3	557.4	645.2
1995	515.8	606.6	710.9

Source: Exhibit 29

From the projections above, the rates of growth of domestic demand under each forecasted rate of manufacturing growth are calculated and tabulated below:

TABLE 129
TIN CANS AND METAL BOXES:
PROJECTED DEMAND GROWTH RATES (1984 - 1995)

Years	Low Growth	Medium Growth	High Growth
1984 - 1990	6.2%	8.0%	9.7%
1990 - 1995	7.2%	8.6%	9.9%

Source: Table 128

11.2.4 Wire and Wire Products

Based on the significant correlation between apparent consumption of wire and wire products and construction output, projections of the domestic demand for these products are made based on the EPU forecasted growth rates. The results of these projections are shown in Table 130 below.

TABLE 130
WIRE AND WIRE PRODUCTS:
PROJECTED DOMESTIC DEMAND (1984 - 1995)
(M$ MILLION IN 1981 CONSTANT PRICES)

	Projected Domestic Demand		
Year	Low Const. Growth	Medium Const. Growth	High Const. Growth
1984	479.1	479.1	479.1
1985	520.7	528.5	533.7
1986	564.9	580.5	590.9
1987	611.7	637.7	655.9
1988	663.7	700.1	726.1
1989	718.3	770.3	804.1
1990	780.7	845.7	892.5
1991	845.7	928.9	991.3
1992	918.5	1,022.5	1,100.5
1993	993.9	1,123.9	1,220.1
1994	1,077.1	1,235.7	1,352.7
1995	1,170.7	1,357.9	1,500.9

Source: Exhibit 30

From the projections above, the rates of growth of domestic demand under each forecasted rate of manufacturing growth are calculated and tabulated below:

TABLE 131
WIRE AND WIRE PRODUCTS:
PROJECTED DEMAND GROWTH RATES (1984 - 1995)

Years	Low Growth	Medium Growth	High Growth
1984 - 1990	8.5%	9.9%	10.9%
1990 - 1995	8.5%	9.9%	11.0%

Source: Table 130

XII. DEVELOPMENT STRATEGY AND INVESTMENT CRITERIA

12.1 INTRODUCTION

In formulating a development strategy, it is necessary to identify products or product groups that Malaysia should manufacture on the basis of economic viability. More precisely, the products to be considered for investment would have to show potential comparative advantage when locally produced. Quantitatively, comparative advantage is reflected by having cost of local production less than world market price, with quality meeting internationally acceptable standards. If the shortfall of production cost from world market price is large enough to offset transport costs, there are opportunities not only for import subsititution but also for export. Without a quantitative economic model to identify such products, the process of selection rests mainly on the expert professional judgement of engineers, businessmen and economists with experience of and insight into the socio-politico-economic environment of the sector concerned, aided by the observations on industrial development experiences of other countries.

12.2 APPROACH AND METHODOLOGY

The approach adopted here has two-phases. First, a list of products is generated by the project team using multi-dimensional investment criteria that require good knowledge of the characteristics or features of the products; no attempt, however, is made to score the products for purposes of ranking. The products are therefore chosen by using collective judgement.

It becomes evident during the process of product selection that the engineering/machinery industries under study, namely, foundry products, structural metal products, tin cans and metal boxes, wire and wire products, and special industrial equipment (palm oil processing, rubber processing and timber processing), comprise only a portion of the entire metal-working sector, so much so that benefits from the linkages and opportunities for sharing of capacities of production facilities, which are especially critical for the relatively small Malaysian market, would not be fully realized if the analysis was confined to only these subsectors. Thus, it is decided to enlarge the set of products for further analysis.

In the second phase, the coverage is increased to further include the manufacture of machinery except electrical, the manufacture of electrical machinery, apparatus, applicances and supplies (not including electronic components and communication equipment) and the manufacture of transport equipment (not including shipbuilding). The enlarged group of industries is described in this study by the collective term of "metal-working industries".

Representative products of these other industries such as power-generating equipment, transport, agricultural machineries, electrical equipment, machine tools, and some appliances and consumer metal products are therefore included in an enlarged list. Drawing from knowledge and experience gained by the project consultant from sector planning in the Philippines and his familiarity with similar efforts made in South Korea, but taking note of the size of the market, wage structure, and other pertinent factors affecting their production costs, only products that have potential for viable local production in Malaysia are selected.

It is hoped that doubts about comparative advantage of some of these products would be cleared by using a planning model to confirm test the the validity of the products selected. The model is a mixed-integer programming model developed and successfully used by the project consultant in the Philippines to identify metal-working products that could be produced profitably locally. More precisely, the objective function that is minimized is the aggregate cost of meeting exogenous demands for metal-working products from local production, imports or both. The model is adapted for use in Malaysia by changing all assumptions and contraints to reflect local conditions.

The timing and magnitude of investments in physical facilities and manpower requirements by skill over time are subsequently estimated by the planning model, using assumed equipment configuration and manpower complement of various metal-working reference shops.

12.3 CRITERIA FOR PRODUCT SELECTION

The factors considered in selecting economically viable products that Malaysia should develop for local production are outlined below:

a. Market Demand

- o Domestic Demand

  Downstream product development of resource-based industries
  Import substitution

- o Export Potential

b. Linkages

- o Demand-side Interdependence (derived demand resulting from forward linkage with other products)

- o Supply-side Interdependence (due to backward linkage)

- o Process Interdependence (capacity sharing)

- o Economies of Scale

c. Production

- o Value Added Relative to Cost of Factor Inputs

- o Employment

  Employment generation
  Skill upgrading effect

- o Technical/Production Requirements Vis-a-Vis Capabilities

  Product complexity
  Number and type of production operations
  Precision
  Skill (management and technical)
  Volume needed to achieve cost economies

d. Technology

- o Cost of Technology

- o Technical Adaptation Required

- o Spin-off Effects (in breeding related technologies and disseminating technology)

e. Timing Considerations

- o HICOM-PROTON Project

- o Asean Complementation

Not all of these factors may be pertinent for a particular product or product group. It may be that for certain projects, one or two of these factors will dominate. Suffice to say that such a list serves as a guide on questions asked in the process of evaluating products and selecting those to be recommended for local production.

12.4 PHASE I: INITIAL SET OF PRODUCTS FOR EVALUATION

To identify production activities that have potential for profitable local production within the subsectors originally studied, twenty three products, typical of these subsectors, are chosen for evaluation. Listed by industry group categories, these products are:

- Wire and Wire Products

  screws
  bolts and nuts
  fasteners
  fittings

- Tin Cans and Metal Boxes

  tin cans
  LPG cylinder

- Structural Metal Products

  water tank
  steam boiler
  structural parts (fire door)

- Foundry Products

  valves
  centrifugal pumps (gravel pumps)
  flat iron (sole)
  electric fan
  plough harrow
  jaw crusher (buckets)
  hinges (hardware)

- Palm Oil Processing

  hydraulic press
  screw conveyor
  juice/oil extractor

- Rubber Processing

  banbury mixer

- Timber Processing

  trailer

- Wood Working

  belt sander
  circular saw

It may be observed that jaw crusher, as a complete product, would be considered as an item of mining equipment rather than just a foundry product, similarly, plough harrow would belong to the agricultural machinery subsector, and flat iron and electric fan would be considered as electrical appliances. They are, however, categorized here by the type of their major components.

An assessment of these products, as summarized in Table 131, is then made on the basis of linkage factors of demand-side and supply-side interdependence and possibilities for capacity sharing as well as their level of material intensity (share of cost of raw materials and other intermediate inputs in the production cost), labour skill requirement and the technology level required for production. Except for banbury mixer (which is used to crush or prepare the raw materials for rubber, asphalt or plastics processing), trailer and juice or oil extractor (for extracting oil from nuts, grinding beans, crushing sugar cane), the technological spin-off effects of these products are not significant.

With respect to market demand, the volume and value of imports of these products were compiled and estimates of local production obtained wherever available. Using the demand growth rates of the subsectors studied, namely, foundry products, structural metal products, wire and wire products and tin cans and metal boxes (Chapter 10), projections of demand volume for each product were made. A number of these products have been exported in the past; those with significant exports include centrifugal pumps, tin cans, steam boilers and structural parts of buildings.

TABLE 131
ASSESSMENT OF INITIAL SET OF REPRESENTATIVE PRODUCTS

Representative Product	Demand Interdependence	Supply Interdependence	Capacity Sharing	Material Intensity	Labour Skill Requirement	Technology Level
1. Screws	Strong	None	Strong	High	Low	Low
2. Bolts & Nuts	Strong	None	Strong	High	Low	High
3. Fasteners	Strong	None	Strong	High	Low	Low
4. Fittings	Weak	None	Strong	High	Low	High
5. Hinges	Weak	None	Strong	High	Low	Low
6. Valve	Weak	Strong	Weak	Low	Medium	Medium
7. Centrifugal Pump	Weak	Strong	Strong	Low	Medium	Medium
8. Tin Can	None	None	Weak	Low	Low	Low
9. LPG Cylinder	None	Strong	Mild	Medium	Medium	Medium
10. Flat Iron	None	Weak	Strong	Medium	Low	Low
11. Electric Fan	None	Weak	Strong	Medium	Medium	Low
12. Steam Boiler	None	Weak	Strong	High	High	High
13. Water Tank	None	Weak	Strong	High	Medium	Low
14. Structural Parts	None	Weak	Mild	Medium	Medium	Medium
15. Plough Harrow	None	Strong	Strong	Low	Medium	Low
16. Jaw Crusher	None	Weak	Weak	Low	Medium	Medium
17. Belt Sander	None	Strong	Mild	Low	Medium	Medium
18. Circular Saw	None	Weak	Mild	Medium	Medium	High
19. Juice/Oil Extractor	None	Strong	Mild	Low	Medium	Medium
20. Trailer	None	Weak	Weak	Medium	Medium	Medium
21. Banbury Mixer	None	Weak	Weak	Medium	Medium	High
22. Hydraulic Press	None	Weak	Strong	Medium	High	High
23. Screw Conveyor	None	Strong	Strong	High	Medium	Low

Based on the criteria as stated with regard to linkages, market potential technology, production and timing considerations, it is felt that fifteen of the products appear to have strong comparative advantage. These are:

1. bolts and nuts
2. fasteners (including wood screws)
3. fittings
4. gate valve
5. centrifugal pump
6. tin can
7. LPG cylinder
8. flat iron
9. electric fan
10. steam boiler
11. water tank
12. plough harrow
13. structural parts
14. trailer
15. belt sander

Although not included in the list above, there may also be a comparative advantage in producing high quality machine screws and hinges with proper tooling which is a critical production factor for both products. In the case of hinges, high-speed stamping capability is needed, which may not be warranted by the volume of demand and furthermore, high material costs of steel strips may make it costly to produce. The high technology level requirement for circular saw, hydraulic press and banbury mixer, the material cost of screw conveyors, the precision and heavy machining required for juice/oil extractors, and the requirement for heavy steel castings for jaw crushers place these products as doubtful candidates for viable local production. However, parts of such machineries and equipment may turn out to be profitable to produce. These parts may be common components or subassemblies that are also used in other products, or their processing requirements may be met by process shops products, thus enabling cost economies to be realized.

It should be noted that most of the products identified as having strong comparative advantage are either simple tools and stamped parts, light fabricated products (both medium-volume standard types and low volume non-standard types), light assemblies (both medium-volume standard types and low-volume non-standard types), heavy fabricated products of standard type and common machinery subassemblies with medium-volume. Two of the fifteen products, belt sander and trailer, are complex fabricated products, but the technology is not very high and can be adapted for local production. Furthermore, both are needed for timber and wood processing.

12.5 PHASE II: EXPANDING THE SET OF REPRESENTATIVE PRODUCTS

It is evident that confining the evaluation of comparative advantage within the subsectors mentioned constrains the analysis. Linkages with products in other sectors, through use of common components and subassemblies as well as through sharing of facilities, should be explored. The high cost of tooling and investment in facilities to make heavy fabricated products, heavy machinery and complex assemblies may be justified if utilization can be maximized. Possibilities for joint production or capacity sharing should be considered to increase shop loadings.

As an aid to the largely subjective evaluation and selection procedure, a more quantitative approach is followed in the second phase. This requires a parts breakdown of each machinery or product to identify common components and subassemblies which may be analyzed as products apart from the end product. The parts breakdown also helps identify intermediate inputs that have a high share of product cost, as well as special raw material and processing requirements. The types of processing required by each product are also identified and the dominant or critical production process is determined. The specification of processing requirements is essential for exploring capacity sharing possibilities.

Before proceeding to discuss the results of the second phase in the product selection, the key concepts essential to the approach used are briefly explained below.

12.5.1 Representative Products

Because of the large number and wide diversity of products in the metal-working sector, in terms of uses, sizes and shapes, material specifications, processing requirements and technological requirements, it would be necessary, for a more accurate analysis of comparative advantage, to group similar products and to select one from each group to be a "representative product". In this way, the number of products to be analyzed is reduced and the analysis can be more thorough. Regardless of size, shape or other physical apperances, if products have similar processing requirements and comparable material specifications as well as intermediate input costs per unit weight, they may be grouped together in the same product group. It is expected that the manufacturing cost per unit weight of products belonging to the same class would be approximately the same. From among the products in the group, one product can be selected to represent the group, thus the term "representative product"

12.5.2 Reference Shop

Another concept that is useful in decribing processing requirements and in estimating processing costs is the concept of "reference shop". For each mechanical engineering or metal-working process, reference shops are defined in terms of the production capacities or maximum weight or size of the work piece. A reference shop can be described in more detail in terms of major equipment and manpower requirements by level of skill. The technology judged to be appropriate for the various products to be processed in the shop determine to a large extent the design of the reference shop. The appropriate scale of production and lot sizes are therefore essential factors to be considered.

12.5.3 Capacity Sharing

In a small market, economies of scale of production can still be achieved through sharing of capacity or facilities. It is typical for metal-working products to undergo several metal-working processes, and in one or more of the processing shops used, other products may have the same requirements for processing. Thus, these products can share the use of the facilities and benefit from the lower processing costs resulting from spreading fixed costs over a larger volume.

12.5.4 Material and Process Interdependence

The "product component tree" for products in the metal-working sector is a parts and components breakdown of the product. To show the material linkages among products, common components and subassemblies have to be identified. To draw a "technology tree" for metal-working products, the parts of the product to be considered for local processing must be differentiated from parts to be imported, and then the processes required to make those parts will have to be determined. To complete the technology tree, the appropriate or best-practice technology to be used in the processing shops will have to be specified in terms of equipment, tooling, and manpower skill requirements. The "appropriateness" of the technology depends on the product specifications, materials to be worked on, economic lot size and cost considerations. Very often, there are alternative technologies that can be adopted. Engineering judgement is exercised in choosing the appropriate or best-practice technology. From the product component and technology trees respectively, the material and process interdependence of the representative products selected may be established. In this study, the equivalent of these trees are drawn up in the form of a breakdown of the representative assemblies and products into their components and subassemblies, and as a list of the capacity sharing possibilities respectively.

12.6 THE EXPANDED SET OF REPRESENTATIVE PRODUCTS

In the second phase, the number of representative products is increased to cover metal-working products in other subsectors. As a whole, the metal-working sector consists of industries producing a diversity of products made of metal, or with significant metal part content, whereby metal is transformed into finished product using mechanical engineering processes such as casting, forging, machining, metal forming, welding, heat treatment, assembly and metal finishing. Altogether, 66 products are included in the expanded set of representative products which accounts for 69.2% of total apparent demand of the metal-working sector, as shown in Table 132 below.

TABLE 132
MALAYSIAN METAL-WORKING SECTOR:
TOTAL APPARENT DEMAND IN 1981
(M$ MILLION IN 1981 CONSTANT PRICES))

	Sector As a Whole	As Covered by Representative Products	Percent Covered
Imports	M$ 9,381.7	M$ 6,017.5	64%
Local Production	M$ 4,030.6	M$ 3,261.0	81%
Total Apparent Demand	M$13,412.3	M$ 9,278.5	69.2%

Source: Department of Statistics, Malaysia
SGV-KC Estimates

All the 66 representative products in the expanded set are listed in Table 133. The products represented by each representative product are described in Exhibit 31 (Profile of Representative Products). The weights and estimated prices of these products are listed in Appendix 1 and the types of processing required by each of the representative products are cross-tabulated in Appendix 2. From this list, a selection of those products which enjoy a comparative advantage will be chosen by using the selection criteria as described and the results of the planning model. The planning model takes into consideration the interdependence of investment decisions in terms of the materials and processes used in production. These are described in greater detail below.

Note that some locally manufactured products have been omitted because it is believed that they would retain their comparative advantage even if considered separately from the other products and that the products subject to analysis would not benefit significantly from any linkages with them. Among these products are filing cabinets, cutlery and ovens (range). Also omitted from the expanded set of representative products are those which in our judgement could not be profitably produced in Malaysia because of their technical sophistication, high cost to acquire the technology, lack of demand, competitive edge of traditional suppliers or absence of the infrastructure required to support their local production. These include bearings, diesel engine, industrial processing equipment, steel rolling mills, electric and water meters, precision instruments, ships, and armaments/miliary wares. Other omissions have been made because of data and time constraints.

TABLE 133
EXPANDED SET OF REPRESENTATIVE PRODUCTS

Initial Set	Additional Products	
1. Screws	24. Gear	46. Calendering Machine
2. Bolts	25. Shaft	47. Power Tiller
3. Fasteners	26. Pulley	48. Manual Hoist
4. Fittings	27. Bushing	49. Electric Hoist
5. Hinges	28. Coil Spring	50. Concrete Mixer
6. Valve	29. Leaf Spring	51. Guillotine Shear
7. Centrifugal Pump	30. Roller Chain	52. Pliers
8. Tin can	31. Alternator	53. Pneumatic
9. LPG Cylinder	32. Compressor (sealed)	54. Welding Equipment
10. Flat Iron		55. Bench Lathe
11. Electric Fan	33. Screw Compressor	56. Meat Grinder
12. Steam Boiler	34. Fractional HP Motor	57. Refrigerator
13. Water Tank		58. Automobile
14. Structural Parts	35. Electic Motor 5 HP	59. Tractor
15. Plough Harrow	36. Industrial Blower	60. Bicycle
16. Jaw Crusher	37. Hydraulic System	61. Motorcycle
17. Belt Sander	38. Gasoline Engine Single Cylinder	62. Tugboat
18. Circular Saw		63. Bulldozer
19. Juice/Oil Extractor	39. Gasoline Engine 1600cc	64. Weaving Machine
20. Trailer		65. Plastic Mould
21. Banbury Mixer	40. Speed Reducer	66. Progressive Die
22. Hydraulic Press	41. Transmission	
23. Screw Conveyor	42. Heavy Structurals	
	43. 15kw Generator	
	44. Distribution Transformer	
	45. Air Conditioner	

12.6.1 Material Interdependence

There are twenty seven common components and subassemblies among the representative products in the expanded set. These are listed in Table 134.

TABLE 134
REPRESENTATIVE COMMON
COMPONENTS AND SUBASSEMBLIES
IN THE EXPANDED SET

Initial Set	Additional Products	
1. screws	9. gear	19. fractional HP motor
2. bolts	10. shaft	20. industrial blower
3. fasteners	11. pulley	21. hydraulic system
4. fittings	12. bushing	22. gasoline engine single cylinder
5. hinges	13. coil spring	23. gasoline engine 1600cc
6. valve	14. leaf spring	24. speed reducer
7. centrifugal pump	15. roller chain	25. transmission
8. LPG cylinder	16. alternator	26. heavy structurals
	17. compressor (sealed)	27. 15kw generator
	18. screw compressor	

Appendix 3 gives a partial parts breakdown of each representative product. Only the representative common components and subassemblies are shown in the parts breakdown. It is also important to identify major parts that are expected to account for a large percentage of the product cost (whether imported or locally processed) as well as parts that are critical in production. Appendix 4 details, for each representative component and subassembly, the products which use them.

12.6.2 Process Interdependence

Forty reference shops are defined. The general specifications of these reference shops are detailed in Appendix 5. For each shop, rough estimates of cost of equipment, required area and cost of land and building, cost of ancillary facilities, number and wage costs of production workers by skill type, number of maintenance workers, and other overhead costs are made. These estimates are used to derive crude estimates of shop processing costs for purposes of domestic resource cost calculations, investment and manpower requirements to manufacture products selected for development.

The breakdown of the reference shops by type is shown in Table 135. Knowing the types of processing required by each representative product, appropriate reference shops are assigned to meet the processing requirements. In Appendix 6, the shops assigned to process representative products and the possibilities for capacity sharing with other representative products are illustrated.

TABLE 135
NUMBER OF REFERENCE PROCESSING SHOPS
BY TYPE

Processing Shop	Number of Types
Cost Iron Foundry	4
Steel Foundry	3
Non-ferrous Foundry	3
Die Casting	2
Forging	3
Machine Shop	5
Gear Making Shop	1
Fabrication	4
Assembly	5
Press working	4
Tool & Die Shop	1
Metal Finishing	1
Heat Treatment	4
	40

12.7 THE SET OF REPRESENTATIVE PRODUCTS SELECTED

By using the projections of exogenous and total demand for the 66 representative prducts in the years 1985, 1990 and 1995 in the model, solutions in the form of products that my be locally produced in each of those years is obtained. As mentioned previously, volume of demand in tonnage was crudely approximated to obtain rough orders of magnitude of demand in physical terms (metric tonnes). Note that the products grouped together and represented by the representative product have varying sizes, weights and costs. But it is expected that since they have similar processing and material requirements on a per ton basis, then the demand for the products in the groups, expressed in number of metric tons, could be aggregated and assigned, so to speak, to the representative product. At higher volumes of demand, the average cost of production is expected to decrease as average fixed costs declines with scale of production and as benefits from material and process interdependence are realized.

Appendix 7 shows the assessment of the strength of linkages, material intensity, skill requirement and technology level for the products added to the original set of 23 products.

The 45 representative products selected from the expanded set as having potential for viable local production corresponding to levels of demand in 1985 are shown in Table 136.

TABLE 136
REPRESENTATIVE PRODUCTS WITH
POTENTIAL FOR VIABLE
LOCAL PRODUCTION IN 1985

Common Components And Subassemblies	Final Products	
1. Pulley	1. Tin Can	15. Distribution Transformer
2. Bushing	2. LPG Cylinder	16. Air Conditioner
3. Fasteners	3. Flat Iron	17. Calendering Machine
4. Fittings	4. Electric Fan	18. Power Tiller
5. Coil Spring	5. Steam Boiler	19. Manual Hoist
6. Leaf Spring	6. Water Tank	20. Concrete Mixer
7. Valve	7. Structural Parts	21. Guillotine Shear
8. Centrifugal Pump	8. Plough Harrow	22. Pliers
9. Compressor (sealed)	9. Jaw Crusher	23. Pneumatic Grinder
10. Fractional HP Motor	10. Belt Sander	24. Welding Equipment
11. Electric Motor 5 HP	11. Circular Saw	25. Bench Lathe
12. Industrial Blower	12. Hydraulic Press	26. Meat Grinder
13. Gasoline Engine, 1600cc	13. Trailer	27. Refrigerator
14. Speed Reducer	14. Banbury Mixer	28. Bicycle
15. Transmission		29. Weaving Machine
16. Heavy Structurals		

Additional products that can potentially be produced profitably at demand levels in 1990 and 1995 are identified in Table 137.

TABLE 137
ADDITIONAL REPRESENTATIVE PRODUCTS WITH POTENTIAL FOR VIABLE LOCAL PRODUCTION IN 1990 AND 1995

Year	Common Components And Subassemblies	Final Products
1990	1. shafts	-
	2. bolts	-
1995	-	1. screw conveyor
	-	2. electric hoist

Beyond 1995 it is expected that gears, special machine screws, tugboat and automobile will be viable as shown in Table 138 below.

TABLE 138
REPRESENTATIVE PRODUCTS WITH LONG-RUN POTENTIAL FOR LOCAL PRODUCTION BEYOND 1995

Common Components And Subassemblies	Final Products
gears	tugboat
screws	automobile

Domestic resource cost (DRC) coefficients, defined as the value of domestic resources used per unit of foreign exchange saved from import replacement, were computed using 1981 import prices and estimates of major intermediate input costs and local content. The calculated DRC's and their rank are shown in Table 139. By and large, the DRC values reinforced the judgements made on comparative advantage of the products in the expanded set.

TABLE 139
DOMESTIC RESOURCE COST ESTIMATES

Rank		DRC	Rank		DRC
1.	Fasteners	0.13	34.	Tin Can	0.88
2.	Concrete Mixer		35.	Tugboat	0.89
3.	Centrifugal Pump	0.20	36.	Belt Sander	0.89
4.	Electric Fan	0.26	37.	Electric Motor, 5 HP	0.92
5.	Water Tank	0.29	38.	Gears	0.93
6.	Bushing	0.32	39.	Air Conditioner	0.93
7.	Welding Equipment	0.32	40.	Bicycle	0.94
8.	Hydraulic Press	0.33	41.	Jaw Crusher	0.94
9.	Fractional Motor	0.36	42.	LPG Tank	0.96
10.	Meat Grinder	0.36	43.	Gasoline Engine, 1600cc	0.99
11.	Manual Hoist	0.38	44.	Bolt	1.00
12.	Distribution Transformer	0.39	45.	Heavy Structurals	1.00
13.	Banbury Mixer	0.41	46.	Shaft	1.00
14.	Valve	0.41	47.	Industrial Blower	1.02
15.	Guillotine Shear	0.41	48.	Electric Hoist	1.05
16.	Weaving Machine	0.45	49.	Automobile	1.08
17.	Flat Iron	0.46	50.	Transmission	1.08
18.	Pliers	0.51	51.	Bulldozer	1.10
19.	Pulley	0.52	52.	Calendering Machine	1.16
20.	Boiler	0.54	53.	Speed Reducer	1.16
21.	Fittings	0.56	54.	Screw Conveyor	1.23
22.	Refrigerator	0.60	55.	12v Alternator	1.28
23.	Circular Saw	0.61	56.	Plastic Mould	1.39
24.	Trailer	0.62	57.	Hydraulic System	1.41
25.	Structural Parts	0.62	58.	Juice/Oil Extractor	1.56
26.	Gasoline Engine, Single Cylinder	0.69	59.	Motorcycle	1.89
			60.	4 Wheel Tractor	2.17
27.	Plough Harrow	0.72	61.	Progressive Die	2.22
28.	Leaf Spring	0.75	62.	Screw Compressor	3.45
29.	Compressor	0.75	63.	Hinges	4.00
30.	Power Hiller	0.76	64.	Machine Screw	7.69
31.	Pneumatic Grinder	0.76	65.	15kw Generator	8.33
32.	Coil Spring	0.78	66.	Roller Chain	50.00
33.	Bench Lathe	0.88			

The products which were chosen for development on account of their potential economic viability for local production in 1995 are categorized in Table 140 depending on the complexity of the product (simple, intermediate, complex), weight (light or heavy), amount of fabricaton or assembly, and volume (high, medium, low). It may be observed that although most of the products fall into the simple and intermediate level assemblies, there were five complex fabricated products, two complex machinery products of standard type and four complex heavy machinery products. Many factors, including demand, technical sophistication, cost of technology, economies of scale, material and process interdependencies, value added, come into play and were considered in the process of selection.

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TABLE 140
CATEGORIZATION OF PRODUCTS BY VOLUME, COMPLEXITY AND TYPE SELECTED

Product Complexity	High Volume	Medium Volume	Low Volume
Simple	-	Light Fabricated Product of Standard Type tin can LPG cylinder shaft pulley bushing	Light Fabricated Products water tank structural parts
	Simple Tools & Stamped Parts fasteners bolts & nuts fittings coil spring leaf spring pliers	Light Assembly Products of Standard Type flat iron electric fan circular saw fractional HP motor pneumatic grinder welding equipment bicycle	Light Assembly Products plough harrow manual hoist
Intermediate	-	Heavy Fabricated Products of Standard Type centrifugal pumps steam boiler industrial blower speed reducer heavy structurals	Heavy Fabricated Products jaw crusher

Cont'd

Product Complexity	High Volume	Medium Volume	Low Volume
	Common Machinery, Subassemblies of Standard Type	Common Machinery, Subassemblies and Assemblies	Simple Heavy Machinery
	-	gate valve	hydraulic press screw conveyor
	electric motor 5 HP gasoline engine, single cylinder gasoline engine, 1600cc transmission air conditioner distribution transformer refrigerator		meat grinder
Complex	-	-	Complex Fabricated Products
			belt sander trailer
			calendering machine power tiller guillotine shear
	-	Complex Machinery of Standard Type	Complex Heavy Machinery
		-	banbury mixer
		compressor (sealed) bench lathe	electric hoist concrete mixer weaving machine

12.8 FORECAST OF VALUE OF PRODUCTION

From the results of the planning model, the value of production of the representative products and of the products they represent, deemed viable for local production is forecast to increase to M$7.3 billion by 1995, as shown in Table 141. The average compounded real growth rate from 1985 to 1990 is projected at 10.6% per annum, from 1990 to 1995, a slight deceleration to 8.7% per annum is expected.

TABLE 141
METAL-WORKING SECTOR:
FORECASTS OF AGGREGATE VALUE OF LOCAL PRODUCTION
(M$ BILLION IN 1981 CONSTANT PRICES)

	1985	1990	1995
Aggregate Value of Local Production	M$2.9	M$4.8	M$7.3
Aggregate Value (Revised for Undercoverage)	3.6	5.9	9.0

	1985 - 1990	1990 - 1995
Average Annual Growth Rates at Constant Prices	10.6%	8.7%

Source: SGV-KC Estimates

The value of local production of the subsectors covered in the study was estimated at M$3.3 billion in 1981 (refer to Table 132). However, this figure overstates the value of local production because some products whose components or intermediate inputs are largely imported, with little or no processing except at the final assembly stage, are reported as locally produced. The same may be said of the value of local production of M$4.0 billion of the entire metal-working sector (Table 132).

Conversely the value of local output of the entire metal-working sector would be larger than what the forecast figures indicate because of the undercoverage by the representative products. As shown in Table 132, the representative products only cover 81% of the total production of the sector. As such, the actual value of local production will be higher after adjustments to take into account the undercoverage (Table 132). Compared to 1981, the value of local production in the metal-working sector in 1995 would be at least 2.5 to 3 times as large.

These forecasts do not include the value of cars to be locally made in Malaysia under the HICOM-PROTON program. Automobile, as a representative product, was deemed not economically viable to produce even though major subassemblies such as the engine, transmission and speed reducers were assessed to have good potential for local production. It is difficult to assess the spin-off effects and other external economies that might result from the HICOM-PROTON. As the DRC of the automobile is only slightly greater than unity, the disadvantage in producing it locally is marginal and depending on the valuation given to such effects and external economies, the automible may be selected.

Notwithstanding the above, it appears that full implementation of the HICOM-PROTON program will be pursued. In view of this, revised forecasts are made to include the value of automobile production, as shown in Table 142.

TABLE 142
METAL-WORKING SECTOR:
FORECASTS OF AGGREGATE VALUE OF LOCAL PRODUCTION
INCLUDING PROTON AUTOMOBILE PRODUCTION
(M$ BILLION IN CONSTANT PRICES)

	1990	1995
Aggregate Value of Production with HICOM-PROTON (Not Revised)	M$6.8	M$9.8
Increase in Value due to HICOM-PROTON	2.0	2.5
Value of Produced Automobiles	1.2	1.4
Multiplier Effect	1.7	1.8

Source: SGV-KC Estimates

From the table, it can be seen that the multiplier effect of producing automobiles is 1.7 in 1990 and 1.8 in 1995. The aggregate value of local production is projected to increase by M$2 billion in 1990 and M$2.5 billion in 1995, as a consequence of the direct and indirect effects of the automobile program.

12.9 AGGREGATE GAIN FROM LOCAL PRODUCTION

The aggregate gain from domestic production defined as the aggregate savings from import substitution and net export earnings is estimated at M$0.7 billion in 1985, M$1.1 billion in 1990 and M$1.7 billion in 1995. Table 143 presents the aggregate gain from domestic production in absolute and in relative terms.

TABLE 143
METAL-WORKING SECTOR:
AGGREGATE GAIN FROM LOCAL PRODUCTION

	1985	1990	1995
Aggregate Gain (M$ billion)	M$0.7	M$1.1	M$1.7
Aggregate Value of Local Production	2.9	4.8	7.3
Relative to Aggregate Value of Production	22%	23%	23%

Note : Results do not take into account the PROTON automobile project.

Source: SGV-KC Estimates

The above indicates that local production of the selected products will result in aggregate savings amounting to 22% to 23% of the total value of local production in the metal-working sector, in the absence of tariffs, taxes, and other distortions to costs that may lead to inefficient allocation of resources.

XIII. INVESTMENT PLANS

13.1 INTRODUCTION

Aggregate demand would be met by domestic production and imports. The first section of this chapter presents these components of aggregate demand for 1985, 1990 and 1995. The second section presents the investment requirements to meet demand through local production. The third section shows the manpower requirements for production workers in metal-working shops as well as estimates of their wage bill.

13.2 FORECASTS OF APPARENT DEMAND

The apparent demand for the metal-working sector (in 1981 constant prices) was about M$13.4 billion, with imports accounting for 70% and local production 30% (Table 144). A detailed breakdown by major subsector is shown in Appendix 8.

TABLE 144
METAL-WORKING SECTOR:
TOTAL APPARENT DEMAND, 1981 ACTUAL
(M$ BILLION 1981 CONSTANT PRICES)

	Value	Percent
Imports	M$ 9.4	70%
Local Production	4.0	30%
Total Apparent Demand	M$13.4	100%

Source: Table 132

In Table 145, forecasts of apparent demand are presented. If the representative and represented products chosen as having potential for economically viable domestic production are in fact produced, their share of apparent demand would increase from 30% in 1981 to 46% in 1985 and would increase further to 51% and 53% in 1990 and 1995 respectively. These forecasts of production output appear to be low, but as already noted in Section 12.5, the representative products in the expanded set of products included in the study cover only 69.2% of total apparent demand. As such, a similar increasing share of actual local production would be expected as a consequence of selecting potentially viable products for domestic production.

TABLE 145
METAL-WORKING SECTOR:
FORECASTS OF APPARENT DEMAND
1985, 1990 AND 1995
(M$ BILLION IN 1981 CONSTANT PRICES)

	1985		1990		1995	
	Value	%	Value	%	Value	%
Imports	M$3.4	54	M$4.6	49	M$ 6.6	47
Local Production	2.9	46	4.8	51	7.3	53
Apparent Demand	M$6.3	100%	M$9.4	100%	M$13.9	100%

Source: SGV-KC Estimates

13.3 INVESTMENT REQUIREMENTS

The capital costs of installed production equipment, ancillary equipment, land and buildings are calculated based on the estimated costs of these fixed assets per reference shop and the estimated number of shops required, by type, to handle the volume of processing required to meet the demand for the selected representative products (and the products they represent).
Table 146 shows the breakdown by type of fixed asset. A more detailed breakdown by type of shop is shown in Appendix 9.

TABLE 146
METAL-WORKING SECTOR:
CAPITAL COSTS FOR LOCAL PRODUCTION
(M$ BILLION IN 1981 CONSTANT PRICES)

	1985	1990	1995
Production Equipment	M$1.43	M$2.24	M$3.27
Ancillary Equipment	0.29	0.45	0.66
Land & Building	0.53	0.82	1.20
Total Capital Costs	M$2.25	M$3.51	M$5.13

Source: SGV-KC Estimates

These figures are the estimated value of fixed assets needed for local production. To obtain the amount of investments required, the incremental capital costs are computed. For the years between 1981 and 1985, the value of fixed assets in 1981 is needed. In the absence of data on market value of fixed assets existing in 1981 (ideally an assessment of their worth for producing the products selected as viable would have to be made), the book value of net fixed assets of metal-working industries of M$1.05 billion, as reported in the 1981 Census of Manufacturing Industries, was used. Table 147 presents estimates of investments requirement for the period 1981 to 1985, 1985 to 1990 and 1990 to 1995.

TABLE 147
METAL-WORKING SECTOR:
INVESTMENT REQUIREMENTS FOR LOCAL PRODUCTION
(M$ BILLION IN 1981 CONSTANT PRICES)

	1981 - 1985	1985 - 1990	1990 - 1995
Investment	M$1.20	M$1.26	M$1.62
Increase in Aggregate Value of Local Production	n.a.	1.90	2.50
ICOR	-	.67	.65

Source: Tables 141 and 146

The implied incremental capital-output ratio (ICOR) is about 0.66 for the metal-working sector, as shown.

The additional capital investment required, over and above that for the metal-working sector, to meet local production of automobiles, according to the HICOM-PROTON program, and domestic and components used in car manufacturing, was estimated at M$0.6 billion by 1990 and another M$0.1 billion between 1990 and 95. Table 148 shows the breakdown of capital investments to be made by 1990 according to type of processing shop. Appendix 10 gives a further breakdown by type of fixed assets.

TABLE 148
CAPITAL INVESTMENTS FOR CAR MANUFACTURING BY 1990
(M$ MILLION IN 1981 CONSTANT PRICES)

Iron Foundry	M$ 25
Steel Foundry	9
Non-ferrous Foundry	6
Die Casting	3
Forging	123
Machining	209
Gear Making	48
Fabrication	20
Assembly	67
Pressworking	52
Metal Finishing	22
Heat Treatment	12
	M$596

Source: SGC-KC Estimates

13.4 MANPOWER REQUIREMENTS

The number of direct production workers required to operate the metal-working shop facilities are projected in Table 149. For purposes of estimating the training needs, the required number of skilled and semi-skilled workers is the relevant figure.

Total employment in metal-working establishments in 1981 is reported to be 81,906 workers. It is likely that less than 30% of these workers are skilled or semi-skilled whose workmanship can pass international standards. Assuming that there were about 25,000 skilled or semi-skilled workers in 1981, an additional 17,000 trained workers would have to be added to the workforce between 1981 and 1985. On the average, 4,300 trained workers would be needed annually during the 1981 - 1985 period. Between 1985 and 1990, the additional requirement for trained production workers would be 27,000, or 5,400 per year, and during 1990-1995, another 34,000 would be needed, or 6,800 workers per year, thus from 1981 to 1990, a total of 83,000 skilled and semi-skilled production workers would be needed. This translates to an annual training need of 10,000 to 12,000 skilled workers per year, including the upgrading or workers already in the workforce and allowing for replacement needs.

TABLE 149
METAL-WORKING SECTOR:
MANPOWER REQUIREMENTS
(THOUSAND WORKERS)

	1985	1990	1995
Skilled Worker	23	39	59
Semi-Skilled Workers	19	30	44
Subtotal	42	69	103
Unskilled Workers	18	28	43
Total	60	97	146

Source: SGV-KC Estimates

Table 150 summarizes the projected annual wage bill of direct production workers in the metal-working sector. Appendix 11 gives a more detailed breakdown by shop type.

TABLE 150
METAL-WORKING SECTOR:
WAGE BILL PROJECTED FOR DIRECT PRODUCTION WORKERS
(M$ MILLION IN 1981 CONSTANT PRICES)

	1985	1990	1995
Skilled Worker	M$209	M$350	M$532
Semi-Skilled Workers	94	150	222
Unskilled Workers	45	73	109
	M$348	M$573	M$863

Source: SGV-KC Estimates

XIV. POLICIES AND PROGRAMMES

14.1 BACKGROUND OF EXISTING POLICIES

14.1.1 The New Economic Policy

Entering the last quarter of the 20 year Outline Perspective Plan (OPP), 1971 - 90, during which the major objectives of the New Economic Policy (NEP) of poverty eradication and society restructuring to eliminate the identification of race with economic functions are to be realised, a retrospective view of the achievements of the first 13 years shows that although fair progress has been made in both areas, adverse global economic conditions externally and persisting structural problems internally have made it unlikely that these objectives will be realised by the end of the current decade. Acknowledging this in the mid-term review of the Fourth Malaysia Plan (FMP), the Government has stated that new directions in development strategies and policies will be required, whilst still working for the attainment of the NEP objectives which are seen to be the means to building national unity. As such, emphasis will still be placed on raising the rate of growth of the economy, as growth is a necessary condition for making further progress on the NEP objectives.

14.1.2 The Role of the Manufacturing Sector

In the light of the above, the growth of the manufacturing sector will be very important in alleviating poverty by increasing output and providing greater employment. The Government is therefore prepared to take active steps to accelerate the rate of growth, especially of exports from the manufacturing sector. However, in order to play its key role in the attainment of NEP targets, structural features or weaknesses of the sector will need to be adjusted. These include:

- a need to increase the manufacturing base, presently concentrated mainly an electronics, textiles and garments,

- a need to expand the range and volume of exports of manufactured goods, not just from the Free Trade Zone (FTZs) and Licensed Manufacturing Warehouses (LMWS),

- a revision of the tariff and incentive structure which may have negatively affected the sector in terms of efficiency and competitiveness,

- an integration of small-scale industries in the overall industrialization strategy or plan.

14.1.3 The Industrialization Strategy

The main objectives of the Government's industrialization plans are to accelerate the pace of industrialization and to overcome the structural problems of the manufacturing sector. This outward looking strategy contains the following major elements.

(i) the promotion of manufactured exports on a large scale

(ii) a selective second-round import subsitution

(iii) the continued development of resource-based industries

(iv) the development of heavy industries

The rationale for this strategy and its main elements is discussed further below.

The promotion of manufactured exports on a large scale will be necessary in view of the size limitation of the Malaysian domestic market which does not afford local industry any of the advantages that may be gained from large scale mass production. Furthermore, the first-round of import substitution manufacturing now faces saturation and those industries which have been heavily protected have not demonstrated any competitiveness nor, for that matter, any orientation to export in their production and sales strategy.

This shift towards export-led growth will require a change in the approach of both the public and private sectors towards the promotion of manufactured exports. This will involve the Government taking a more active role in promoting exports by providing support services to assist in the growth of trade and developing new channels for promoting exports through the Ministry of Trade and Industry and foreign missions. The private sector will need to be more aggressive in developing export markets and become less dependent on fiscal incentives and tariff protection. An overdependence on these incentives does not encourage innovation and competitiveness.

A continuing dependence on imported capital goods, particularly of machinery and equipment, indicates the possibility of selectively promoting second-round import substitution industries. Success in this area by the private sector will help the balance of payments position. In addition, the Government will also continue to promote the development of resource-based industries, particularly of wood, rubber, palm oil and petroleum based products.

Recognising the importance of the development of heavy industries in the industrialization strategy, and acknowledging the natural reluctance or incapability of the private sector to raise and commit the large capital investments required, the Government has committed itself to the initiation of projects in this sector. To do this, it has incorporated HICOM as the implementing agent for such projects as a sponge iron plant, a methanol plant, cement plants and an automobile plant as well as energy projects to service these industries.

The heavy industries are expected to develop linkages within the domestic economy, to utilize available natural resources and save on foreign exchange. It is also hoped that the development of heavy industries, particularly of the basic metal and engineering industries with their wide linkages throughout the manufacturing sector, will benefit industry and the economy as a whole through "spill-over" effects such as the development of indigenous technology and the acquisition of skills which can be used in other industries. Furthermore, the Government also sees the possibilities of reducing inter-state or regional economic discrepanies by locating some of these high growth industries in less developed states to help raise their income.

14.2 RECOMMENDED POLICY OBJECTIVES AND DIRECTIONS

Given the development objectives of the Government of Malaysia, broadly defined in the NEP/OPP and expressed as general industrialization policy objectives in the mid-term review of the Fourth Malaysia Plan, as discussed in the foregoing section, and taking into consideration the development issues identified in the first phase of this study by SGV-Kassim Chan, the following sections contain recommendations of policies and programmes to meet them.

Although this study relates particularly to the machinery and engineering industries, when addressing general policy issues, the discussion cannot be limited to them in view of the ultimate aim to devise a cohesive and relevant plan for the entire manufacturing sector. For this reason, the discussion here will first put forth recommendations for basic policy objectives that need not apply specifically to the engineering and machinery industries, and then suggest policy directions and select instruments aimed more directly at the metal-working industries as defined in Chapters 12 and 13.

14.2.1 Basic Policy Objectives

The basic policy objectives of the Industrialization Plan are:

(i) To strengthen the structure and expand the base of the manufacturing sector

(ii) To greatly expand the volume and range of manufactured goods in the export market

(iii) To selectively continue on a second round of import substitution

(iv) To futher develop resource-based industries

(v) To develop heavy industries

It is felt that the five objectives as stated adequately cover the range of issues raised by both the Government and private sectors, integrating the needs of the private sector and the stated objectives of the Government. The attainment of each objective will require a host of strategies and programmes with far-reaching consequences. For example, in overcoming the structural weaknesses of the manufacturing sector, the causal problems will need to be addressed with the correct policy directions and instruments of change. The issues here range from the size of the domestic market, the need for technological changes, problems in the supply and training of manpower to the effects of tariff protection and fiscal incentives on the efficiency of industry.

14.2.2 General Policy Directions

(i) Rationalize and upgrade the foundry, engineering and machinery industries.

Although these industries are vital to the industrialization of the country as essential ancillary or supporting industries, they have been neglected and allowed to develop on their own accord. Although some sub-sectors and products of these industries have been awarded priority status, these have mainly been to producers of consumer goods. Given the importance and potential of these industries in the production of capital goods, priority status should be awarded to them as a whole. Only then can the industrial "backbone" be strengthened sufficiently to support the accelerated growth of the manufacturing sector.

(ii) Reorient the foundry, engineering and machinery sector towards supporting manufacturing industries.

With their roots placed firmly in the historical development of the resource-based industries of tin mining, palm oil and rubber processing, the foundry, engineering and machinery industries have now reached, if not passed, a point of saturation in the domestic situation as reflected by declining productivity and only small increases in value added. If they do not reorient themselves to support new users in the manufacturing sector, they will ultimately perish in a technological and economic dead-end. These industries must therefore be encouraged to adapt their existing skills and adopt new ones to widen their product and market base. The immediately obvious new market is that of transport equipment, particularly the newly established automobile industry, which will require a wide range of products, from steel castings and forgings to tools, moulds and dies used in the manufacture of equipment and machinery.

(iii) Encourage investment in larger capacity and improving the capability of plant and equipment to meet the demands of the new markets.

It follows from the first two recommendations that it will be necessary to install new plant capacities not just to meet the volume demand of the manufacturing sector, especially of the transport equipment manufacturers, but also to supply those products made to the quality and complexity demanded.

Care must be taken here, especially in the choice of the establishments that will be encouraged to install new capacities and capabilities in the foundry and forging industry to support the transport industry, as this raises the question about the role of PROTON/HICOM in the industrialization programme. Although it may make sense to develop an in-house capability to facilitate production planning and efficiency as well as control the cost of inputs, and perhaps, even to satisfy the corporate objectives of HICOM, the setting up of a new foundry and forging plant in the proposed HICOM Engineering Complex in Shah Alam may well limit the extent of technological and other spill-over effects that would benefit existing industry. Furthermore, such action may lead to the eventual establishment of a Government sponsored foundry and forging industry that would not complement but instead compete with the existing private sector industry. This need not occur if due consideration is given to these issues in developing or installing new capacities, both by the Private Sector and by Government.

(iv) Promote rationalization of products and services of small scale enterprises or expansion to larger scale operations.

The foundry, engineering and machinery industries are presently characterised by the large number of small firms. Where their products or services may be offered at competitive rates, as in several cases in which work is done on a jobbing basis, this situation is fine. However, a shift in the orientation of these industries away from their saturated traditional markets may require them to rationalize their operations as a whole in order to more efficiently produce or offer a narrower, more specialised range of products and services. Alternatively, they may also improve efficiency by forming larger entities that will enable them to benefit from production scale economies. This sort of trend should improve the productivity of these industries which has been declining, while still according a place and function to the small firm in the revamped machinery and engineering sector.

(v) Actively promote productivity improvements in the foundry, engineering and machinery industries.

It has been shown that productivity in these industries has declined over the past decade. The factors that have affected productivity, like a lack of standardization, a lack of specialization, a general lack of quality control, poor capacity utilization and poor labour productivity, need to be overcome. This would require active measures to improve both technical and management skills and increase investment or reinvestment in modern plant and machinery. The current productivity improvement drive initiated by the Government should be given futher impetus in the private sector, perhaps through institutional channels like SIRIM or MITEC, to emphasize the benefits of adopting higher technologies.

(vi) Accord a minimal level of protection to industry uniformly.

The selective granting of tariff protection on a case-to-case basis, although governed by an explicit set of selection criteria, has led to anomalies in the tariff structure. Where these anomalies have been identified, the application again, of specific correctional procedures has proven to be ineffective or cumbersome at best. A more uniform application of tariff rates throughout industry, albeit at relatively low levels, with selective assistance awarded only by using clear criteria, will encourage domestic production, perhaps even to a greater level than fiscal incentives. In the engineering and machinery sector, this kind of action would benefit the fabricated metal product and machinery (capital goods) manufacturers especially, since they have been faced with such anomalies as tariffs on imported intermidiate inputs but none on finished goods. These anomalies are not completely rectified by such measures as duty drawbacks which prove cumbersome in operation.

(vii) Liberalize measures to facilitate exports.

Having awarded minimal but nevertheless blanket tariff protection to industry, domestic price distortions place cost-penalties on exports in the form of direct and indirect costs such as higher costs of locally produced inputs and inefficient use of domestic resources, making them less price competitive in the international markets. Exports can be allowed to become competitive by compensating for the cost-penalties imposed through liberalized export incentives. This would require a reform of the present export incentive structure to perhaps include a subsidy scheme.

(viii) Encourage the industry to manufacture more capital goods.

Apart from the manufacturers of some machinery for use in resource-based industries like sawmilling, woodworking, primary rubber processing and palm oil extraction machinery, the industry does not manufacture a wide range of capital goods. The Malaysian manufacturing sector is still highly dependent on imported machinery and equipment, and this situation is expected to continue over the plan period. The move towards greater self-sufficiency in specialist machinery will therefore occur over a long term.

Encouragement should be given to those manufacturers of machinery for use in the resource-based industries who have already demonstrated their ability to successfully produce and even export their products. These industries will form the base to be built upon. It will be necessary for machinery manufacturers to specialize in order to ensure technological advancement of both product and production process as the industry develops. For example, the manufacturers of woodworking machinery now produce simple machines of relatively low levels of complexity and accuracy. Improvement in production processes will lead to higher standards and greater sophistication of design, sufficient to build newer types of woodworking machinery. The production skills developed here may even be used in the eventual manufacture of metal working machinery which is even more sophisticated, requiring greater precision production.

This sort of development will help expand the manufacturing base and contribute to the range of manufactured exports, reduce the dependence on imports of capital goods (import subsititution) and further develop the resource-based industries, thus promoting the achievement of four of the five objectives of the Industrialization Plan.

(ix) Improve and promote the image of blue-collar vocations.

Although the skill levels of some categories of production workers in the engineering and machinery industries is high, there is a general shortage of skilled workers, especially in those areas of high industrial concentration. This has partially been the result of an educational and social system that actively encourages the development of clerical rather than technical skills, and instills aspirations of white-collar rather than blue-collar vocations in the products of that system.

What is required will be more than just the provision of technical/skill training through both government and private institutions or programmes, it will necessarily include active programmes formulated to inculcate a greater awareness of these vocations amongst the schooling population. This will create an attitude more appropriate for the promotion of industrial activity in the country.

A greater awareness and appreciation of the technical vocations will also depend on the revision of the wage or compensation structure of the industry. To this end, there should be a review of the wage structure of the industry and changes made so as to provide rewards commensurate with expected labour performance. It is hoped that the revised reward structure will attract workers of greater skill to the industry.

(x) Increase the availability of industrial land and infrastructure.

Although working out of premises located in non-industrial areas has proven to be adequate in the past, the lack of available land is now proving to be an important factor limiting the growth of the engineering and machinery industries. This is especially severe in the case of the smaller establishments. The demand for suitable industrial land, especially in the Kelang Valley, has led to very high, if not prohibitive prices.

As land-use planning and approval is done at a state and local authority level, relevant agencies or governments would need to give consideration to the growing importance of industrial activity at a national level while making decisions about the allocation of land for industrial use at state or district level. Making more industrial land available would certainly help to lower and also stabilize prices and therefore enable or encourage investment.

Although the plan to effect dispersal of industries throughout the country by the provision of locational incentives has been less than successful, it is felt that this kind of dispersal should still be encouraged as it will not only help to even out inter-state economic differentials, but will also lessen the demand for industrial land in the traditional industrial areas. This is of particular relevance to the resource-based industries which may find it more advantageous to be close to the supply of raw materials, or those energy-intensive industries which may be located near the major sources of fuel. This kind of movement would be encouraged not just by the provision of locational incentives but also by the availability of essential infrastructure and services.

(xi) Encourage the adoption of new technology and the development of indigenous technology.

Technology transfer from the tecnologically advanced countries should continue to be actively encouraged as this will rejuvenate some of the stagnating industries and also create a greater awareness of the advantages and the availability of that technology. Although the present study has not been able to determine the actual success of the various forms in which technology may be transferred, it does seem that the large joint-venture companies have been successful, primarily because of the availability of capital for investment and the actual presence of foreign technical advisors in the plants. This type of cooperation should enable the local partners to gain new skills and also help them to set up basic research and development facilities to eventually develop indigenous technology. At any rate, the exposure of local manufacturers to foreign technology will increase their awareness of the need to be competitive and the importance of product quality measurable by internationally recognised standards.

The development issues and problems of the industry identified earlier and the development objectives of the Government have already been discussed and analysed earlier and will not be repeated here. The following policy directions recommended relate to these issues in the engineering and machinery industries more specifically, but remain within the constraints of the 5 overall policy objectives stated above.

14.3 RECOMMENDED POLICY INSTRUMENTS AND PROMOTION PROGRAMMES

The following policy instruments and promotion programmes are recommended for implementation in order to achieve the policy objectives mentioned while keeping with the directions as indicated.

12.4.1 Recommendations

(i) To upgrade the industries and accord them priority status.

- The products of the foundry, engineering and machinery industries should be accorded full priority status under the existing or revised Investment Incentives :t by Government Gazette. The existing policies here are correct in that most of the products selected in this study have already been accorded priority status. These include hardware tools, industrial machinery, motor vehicle components and parts, air- conditioners, steel and ferro-alloy castings, fractional horsepower motors, refrigerators, machine tools and agricultural machinery. To these should be added structural metal products (especially heavy structurals) and the gasoline engine.

  The policy with regard to the promotion of these industries should be made known and actively pursued by the statutory agencies concerned, like MIDA and the Ministry of Trade and Industry, as well as other relevant institutions, like SIRIM, MITEC, MIRDC and MIDF, which will largely be instrumental in promoting them.

- Larger budget allocations need to be made to SIRIM, MITEC AND MIRDC to enable them to provide advisory services, set up internationally recognised standards and acquire more advanced and sophisticated equipment for testing and research to be carried out for these industries. Cooperative programmes of research and development between these bodies and the manufcturing sector should also be initiated, with funding to come from both the public and private sectors. The funds from the private sector should be allowable as deductions against chargeable income.

- As priority industries, additional assistance in the form of investment incentives, should be awarded selectively, especially when the large capital investments or reinvestments required for upgrading are taken into consideration. (See recommendations on encouraging investment and according tariff protection).

- The upgrading and promotion programme of ancillary industries with high linkage activities should be initiated immediately and maintained until the end of the plan period in 1995. In the short and medium term (1 to 5 years), the programme should be aimed at upgrading the technology of the industries in terms of production processes and standards using the instruments as recommended above. A 5-year productivity improvement programme aimed specifically at the metal-working sector should also be implemented. In order to overcome the reluctance of the older manufacturers in seeking the services of external consultants, productivity improvement studies may be offered at no cost to them initially. As such, the services will need to be subsidized or sponsored, preferably by both the industry associations and the public sector institutions.

  In the long term (5 to 10 years), the programme should shift its emphasis to increasing production capacities and extending the capabilities of the industries further, if the short and medium term objectives have been successfully attained.

(ii) To encourage investment in new plant and equipment.

- As the industries will need to invest heavily in new plant and equipment to replace the outmoded items now in existence, a programme for the promotion of these investments should be implemented as part of the push to upgrade them as priority industries.

- The incentives may take the form of tax-related fiscal incentives akin to the existing investment tax credit (ITC), reinvestment allowance and accelerated depreciation allowance (ADA) or in the form of a reduced tax rate. Although ITC, RA and ADA relate the fiscal incentives directly to the amount of investment made, the actual benefits that accrue to the investors may be less than expected, depending on their ability to absorb the tax credits and allowances over and above the normal capital allowances available. As such, the more profitable companies would realize greater benefits from such incentives than those with investments requiring longer payback periods. On the other hand, a reduction in the overall tax rate would not reflect the amount of investment made although it would provide immediate benefit to the investor.

- Financing should be made avilable at low interest rates to these industries to encourage investment. The funds could be made available directly through MIDF and also through the commercial lending institutions, particularly the banks. Lending to these industries may be encouraged through Bank Negara (Central Bank) directives or guidelines on lending policies with regard to the loan portfolios of the commercial banks. This will fit with the general guidelines already in existence that encourage lending to the manufactruing sector.

(iii) To accord local production a minimal but effective level of protection.

- Recognising the dangers inherent in high levels of tariff protection, the present tariff regime may need to be reformed to provide local production just enough effective protection consistent with the requirements of infant-industries or other economic or strategic conditions. The newly-prioritized products of the foundries, engineering and machinery industries would fall into the latter category and be given selective tariff protection accordingly. Care should be taken to ensure that this protection be given with the view to its eventual removal and after consideration of its effects on the overall tariff regime for manufacturing industries, to ensure proper resource allocation in the long run by preventing a diversion of resources into industries without comparative advantage.

- Anomalies in the tariff structure with regard to duties on essential raw materials not locally produced need to be removed. This may be achieved by revising or refining the product classification system to distinguish between different products which fall under the same general heading for which a blanket tariff rate applies although some of them are not manufactured locally. A reform of the existing tariff regime which will optimally allocate resources within the domestic (import-competing) manufacturing sector may already remove these anomalies.

- The effective protection rates are increased when industries are exempted from duties on imports of raw material or intermediate inputs. Although duty exemptions or drawbacks will benefit the manufacturers, these tariff incentives tend to encourage the use of imports over locally produced inputs. As such, a clear set of criteria must be established in order to grant duty exemptions or drawbacks only to the exporting manufacturers (exporters) or those supplying intermediate goods to them (indirect exporters).

(iv) To promote exports of selected products.

- Products of these industries which have been identified to have comparative advantage when transport costs are considered should be promoted for export. These include:

  - Special industrial machinery, especially palm oil, rubber processing and wood working machinery (calendering machine, banbury mixer, circular saw, belt sander)

  - Agricultural machinery and parts (power tiller)

  - Structural metal products (structural parts)

  - Iron and steel castings (flat iron, valve, centrifugal pump)

  - Wire products (coil spring, bolts and nuts, fasteners)

  - Tin cans and LPG cylinders

  - Other metal-working products (refrigerator, air conditioner, steam boiler and industrial blower)

The analysis of global trends has shown that the developed countries have increased their share of imports of these products from the developing nations as the latter gain some degree of comparative advantage in the manufacture of engineering and machinery products.

o The main determinants of competitiveness in the international market are production costs and product quality. To a large extent, these issues have already been addressed in the consideration of tariff incentives in the reduction of export prices and the programmes for upgrading and establishing standards in these industries. The export promotion programme will also need to encourage manufacturers to export by providing greater export incentives and to establish avenues overseas to exploit markets hitherto untapped by Malaysian manufacturers. These would take the form of the following specific actitives:

- Institutions like MIDA, MIRDC, SIRIM and private sector asociations should organize and conduct specialized export training siminars or workshops on how to export machinery and metal products. This will develop greater export awareness and orientation. To ensure that the training is effective, the workshops should contain practical information an aspects of exporting like costing and pricing, quality control for exports, procedures and documentation, export market reseach and also the availment of export incentives.

- Establish internationally acceptable national standards for machinery and fabricated metal products as already discussed. The adoption of a set of recognized standards will go a long way in helping to develop the image and reputation of quality in Malaysian products. Before the development of a complete set of standards for these industries, manufacturers should be made aware of the quality requirements of potential buyers such as standards preferred by each target market for specific machinery and metal products. These activities will require the assistance of SIRIM, MITEC, MIRDC and also private sector industry associations.

- Fiscal incentives for promoting exports are present in the form of a 5% export allowance (EA), accelerated depreciation allowance (ADA) given in respect of capital expenditure incurred on modernization, and deductions for overseas promotion expenses. As criticism in the past has not been of the lack of incentives so much as the difficulty in availing of them, it is recommended that the incentives be made more attractive and more streamlined procedures be devised for their delivery.

- In export markets which are becoming increasingly competitive, export financing can be important in giving exporters an edge over their foreign competitors or in neutralizing the advantage foreign competitors have as a result of their own export financing schemes. The financial institutions should be encouraged to provide this service.

- To protect exporters against defaults in payment and to allow them to be more aggresive in export promotion, export insurance should be made available at reasonable premium. The Malaysia Export Credit Insurance Berhad (MECIB) should review its premium structure to encourage the use of its services.

- Improve communications between manufacturers and commercial attaches in countries where Malaysian products have high market potential. Exporters, grouped according to product lines, should prepare relevant information about their products that potential buyers normally ask for. This would be distributed by the commercial attaches. On their part, the attaches should gather data on local market conditions for those products, to enable Malaysian exporters to prepare themselves and adopt the correct approaches to best exploit those markets.

(v) To improve practical skills in the industries

- The provision of facilities for training which is part of the industrial training programme of the Ministry of Labour and Manpower should be continued. The expansion plan calls for the construction of another 5 industrial training institues within the next 4 years, thereby increasing the total to 10 institutes throughout the country. This programme should also be extended to include the Centre for Instructor and Advanced Skill Training (CIAST), the National Industrial Training and Trade Certification Board (NITTCB) and other industrial training institutes run by the Government and the private sector.

- Review the training curriculum to place more emphasis on taining aimed at providing or improving practical skills. Although the projected output from all industrial training institutes is expected to rise to about 20,000 per annum from 1985, the majority of them will not achieve skill levels sufficient to meet internationally recognised standards unless the training schemes are revised. It is therefore essential to upgrade the training to upgrade the practical knowledge imparted to the trainees. This may be achieved by "streaming" students into specialist trades if they want to acquire greater skill levels. This will effectively remove the need to spend more time to train or familiarize the trainees with equipment when they are placed in actual industrial environments, as is the case now. The general training provided on the schemes offered is usually little more than the introduction to various skills or trades without allowing enough time for the trainees to become adept in any particular area. Consultations between training institutes and industry would help in drawing up a practical curriculum.

- Apprenticeship programmes should be devised and run by the industry through its trade associations like FOMFEIA. This is of significance especially to the small-scale industries which depend a great deal on the particular skills of their limited labour force. In this way, on-the-job training can be better structured to maximize its effectiveness.

(iv) To promote the general development of the industries through the provision of fiscal incentives.

- o Tax-related rewards in the form of tax credits or allowances should be the form in which most of the incentives for the general development of the industries and their exports are to be delivered. Some of these have already been discussed, and others should include:

  - Incentives for research and development in the form of generous (up to 150%) allowable deductions of expenditure incurred in research and development.

  - Incentives for manpower training should be increased to include full (100%) deduction of expenditue incurred on training as well as the Industrial Building Allowance (IBA) for buildings used for training purposes.

  - Incentives for export promotion should take the form of an allowable deduction of all (100%) expenditure for overseas promoton. Furthermore, EA should be awarded at a more generous rate than the 5% of the f.o.b. value of export sales now given. The rate and the products to which the allowance should be awarded need to be determined carefully to ensure that inefficient industries are not being heavily subsidized in order for them to export.

  - Incentives for externalities, such as the diadvantages of location in less developed areas and expenditures likely to yield economic or social benefits that may not accrue directly to the firm (e.g. pollution control), may be given in the form of tax credits or tax holidays.

APPENDICES

Appendix 1

WEIGHTS AND PRICES OF REPRESENTATIVE PRODUCTS

	Within Sector	Weight (kg/pc)	CIF Import Price (M$/pc)	CIF Import Price (M$/tonne)
1.	Machine Screws	0.0600	0.435	7250
2.	Machine Bolts & Nuts	0.1022	0.687	6722
3.	Fasteners	0.0080	0.025	3125
4.	Fittings	0.4120	1.673	4060
5.	Hinges	0.3600	0.530	1470
6.	Valve	88.0000	543.86	6180
7.	Centrifugal Pump	250.0000	1253.90	5016
8.	Tin Can	0.0250	0.15	6000
9.	LPG Cylinder	12.5000	29.10	2328
10.	Flat Iron	1.5000	23.45	15634
11.	Electric Fan	3.6000	80.40	22334
12.	Steam Boiler	6818.0000	70955.23	10407
13.	Water Tank	17000.0000	50087.13	2946
14.	Structural Parts	85.0000	379.95	4470
15.	Plough Harrow	1032.0000	5956.17	5771
16.	Jaw Crusher	83000.0000	995958.89	12000
17.	Belt Sander	730.0000	3463.22	5061
18.	Circular Saw	3.0000	150.00	50000
19.	Juice/oil Extractor	34000.0000	3769.35	11086
20.	Trailer	16630.0000	98853.25	5944
21.	Banbury Mixer	31000.0000	1488828.00	48027
22.	Hydraulic Press	700.0000	4221.05	6030
23.	Screw Conveyor	1250.0000	7289.00	5831

Cont'd

	Other Sectors	Weight (kg/pc)	CIF Import Price (M$/pc)	CIF Import Price (M$/tonne)
24.	Gears	6.950	123.73	17803
25.	Shaft	8.250	51.47	6239
26.	Pulley	1.030	12.15	11788
27.	Bushing	1.200	23.03	19191
28.	Coil Spring	0.946	10.34	10932
29.	Leaf Spring	4.230	17.83	4216
30.	Roller Chain	0.680	15.72	23117
31.	Alternator	5.000	38.00	7600
32.	Compressor (sealed)	9.500	106.17	11176
33.	Compressor (screw)	670.000	10139.00	15133
34.	Fractional hp Motor	13.500	160.00	11852
35.	Electric Motor 5hp	36.000	833.19	23144
36.	Industrial Blower	87.500	1390.00	15885
37.	Hydraulic System	170.000	1166.07	6859
38.	Gasoline Engine, Single-Cylinder	44.000	604.00	13727
39.	Gasoline Engine, 1600cc	150.000	2575.85	17172
40.	Speed Reducer	63.600	560.85	8818
41.	Transmission	65.000	1210.00	18615
42.	Heavy Structurals	14730.000	55274.05	3753
43.	15kw Generator	500.000	6319.85	12640
44.	Distribution Transformer	360.000	5230.95	14530
45.	Airconditioner	100.000	907.78	9078
46.	Calendering Machine	31000.000	337440.00	10885
47.	Power Tiller	253.000	3585.05	14170
48.	Manual Hoist	37.000	540.94	14620
49.	Electric Hoist	325.000	6090.60	18740
50.	Concrete Mixer	6540.000	163137.25	24945
51.	Guillotine Shear	883.000	9914.38	11228
52.	Pliers	0.730	8.00	10959
53.	Pneumatic Grinder	1.150	281.29	244600
54.	Welding Equipment	2.500	416.43	166572
55.	Bench Lathe	440.000	8718.27	19814
56.	Meat Grinder	190.000	4502.13	23695
57.	Refrigerator	73.000	821.64	11255
58.	Automobile	975.000	11448.00	11742
59.	Tractor	1100.000	16070.00	14609
60.	Bicycle	20.000	217.00	10850
61.	Motorcycle	100.000	2020.00	20200
62.	Tugboat	110000.000	815339.50	7412
63.	Bulldozer	8000.000	123451.92	15432
64.	Weaving Machine	600.000	17971.08	29952
65.	Plastic Mould	430.000	8353.58	19427
66.	Progressive Die	45.000	3306.95	73488

Appendix 2

SGV-Kassim Chan Sdn. Bhd.

PRODUCTS AND PROCESSING SHOPS REQUIRED

Representative Products	Iron Foundry	Steel Foundry	Non-Ferrous Foundry	Die Casting	Forging	Machine Shop	Fabrication	Assembly	Press Working	Metal Finishing	Heat Treatment	Gear Making	Tool & Die Shop
Machine Screws								x	x	x			
Bolts & Nuts									x	x	x		
Fasteners									x				
Fittings					x	x							
Hinges					x			x	x				
Gate Valve	x		x			x		x					
Certrifugal Pump	x					x		x					
Tin Can							x	x	x				
LPG Cylinder					x	x	x	x	x				
Flat Iron	x					x		x	x	x			
Electric Fan	x			x			x	x	x	x			
Steam Boiler						x	x	x					
Water Tank						x	x	x					
Structural Parts							x	x		x			
Plough Harrow	x				x	x	x	x					
Jaw Crusher		x	x		x	x	x	x			x		
Belt Sander	x					x		x		x			
Circular Saw				x		x		x					
Juice/oil Extractor	x	x	x			x	x	x					
Trailer	x				x	x	x	x					
Banbury Mixer	x	x	x			x	x	x			x		
Hydraulic Press	x					x	x	x		x			
Screw Conveyor						x	x	x					

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Representative Products	Iron Foundry	Steel Foundry	Non-Ferrous Foundry	Die Casting	Forging	Machine Shop	Fabrication	Assembly	Press Working	Metal Finishing	Heat Treatment	Gear Making	Tool & Die Shop
Gears					x	x					x	x	
Shaft						x					x		
Pulley	x					x							
Bushing			x			x							
Coil Spring						x	x				x		
Leaf Spring						x		x	x		x		
Roller Chain						x		x	x	x	x		
Alternator		x		x		x	x	x	x				
Compressor (sealed)	x			x		x	x	x	x				
Screw Compressor	x					x	x	x	x		x		
Fractional hp Motor				x		x	x	x	x		x		
Electric Motor 5hp				x		x		x	x		x		
Industrial Blower			x			x	x	x					
Hydraulic System	x				x	x	x	x	x	x			x
Gasoline Engine, Single Cylinder	x				x	x	x	x	x		x	x	
Gasoline Engine 1600cc	x	x	x	x	x	x	x	x	x		x	x	
Speed Reducer	x					x		x					
Transmission	x		x		x	x		x	x	x	x	x	
Heavy Structurals						x	x	x					
15kw Generator						x	x	x	x		x		

SGV-Kassim Chan Sdn. Bhd.

Cont'd

Representative Products	Iron Foundry	Steel Foundry	Non-Ferrous Foundry	Die Casting	Forging	Machine Shop	Fabrication	Assembly	Press Working	Metal Finishing	Heat Treatment	Gear Making	Tool & Die Shop
Distribution Transformer						x	x	x	x		x		
Air Conditioner						x	x	x					
Calendering Machine	x	x			x	x		x			x	x	
Power Tiller						x	x	x					
Manual Hoist		x		x	x	x							
Electric Hoist	x	x			x	x	x	x	x			x	
Concrete Mixer	x					x	x	x					
Guillotine Shear	x	x				x	x	x			x		
Pliers						x	x		x		x	x	
Pneumatic Grinder		x		x	x	x	x	x	x		x	x	
Welding Equipment					x	x		x	x	x			
Bench Lathe	x	x	x			x	x	x	x	x		x	
Meat Grinder	x	x				x	x	x		x	x	x	
Refrigerator				x			x	x					
Automobile	x	x		x	x	x	x	x	x	x	x	x	
Tractor	x	x			x	x	x	x	x		x	x	
Bicycle						x	x	x	x				
Motorcycle		x		x	x	x	x	x	x				
Bulldozer	x	x	x		x	x	x	x	x		x		
Weaving Machine	x		x		x	x	x	x	x		x	x	
Plastic Mould		x				x				x	x		x
Progressive Die											x		x

Appendix 3

BREAKDOWN OF ASSEMBLIES & FINAL PRODUCTS INTO REPRESENTATIVE COMPONENTS & SUBASSEMBLIES

		Common Components & Subassemblies		Other Parts
		Within Subsector	of Other Subsectors	
1.	Machine Screws	-	-	-
2.	Bolts	-	-	-
3.	Fasteners	-	-	-
4.	Fittings	-	-	-
5.	Hinges	screws	-	-
6.	Valve	bolts	shaft bushing	-
7.	Centrifugal Pump	screws bolts fasteners fittings	shaft bushing	bearings
8.	Tin Can	-	-	-
9.	LPG Cylinder	valve	-	-
10.	Flat Iron	screws bolts fasteners	-	-
11.	Electric Fan	screws bolts fasteners	coil spring fractional hp motor	-
12.	Steam Boiler	bolts fasteners fittings valve	industrial blower	-
13.	Water Tank	bolts fasteners fittings valve	pulley	-
14.	Structural Parts	bolts fasteners	-	-

Cont'd

		Common Components & Subassemblies Within Subsector	Common Components & Subassemblies of Other Subsectors	Other Parts
15.	Plough Harrow	screws bolts fasteners fittings	shaft leaf spring	bearings
16.	Jaw Crusher	screws bolts fasteners fittings centrifugal pump	coil spring electric motor 5hp hydraulic system	bearings
17.	Belt Sander	screws fasteners fittings	shaft pulley electric motor 5hp	bearings
18.	Circular Saw	screws bolts	gears bushing fractional hp motor	bearings
19.	Juice/oil Extractor	screws bolts fasteners	gears shaft bushing roller chain coil spring hydraulic system	bearings
20.	Trailer	bolts fasteners	shaft bushing coil spring leaf spring speed reducer	bearings
21.	Banbury Mixer	bolts fasteners	bushing electric motor 5hp speed reducer	
22.	Hydraulic Press	screws bolts fasteners	shaft pulley bushing hydraulic system	bearings
23.	Screw Conveyor	bolts fasteners	shaft pulley electric motor 5hp speed reducer	bearings

Cont'd

		Common Components & Subassemblies		Other Parts
		Within Subsector	of Other Subsectors	
24.	Gears	-	-	-
25.	Shafts	-	-	-
26.	Pulley	-	-	-
27.	Bushing	-	-	-
28.	Coil Spring	-	-	-
29.	Leaf Spring	screws bolts	-	-
30.	Roller Chain	-	-	-
31.	Alternator	bolts fasteners	shaft pulley coil spring	bearings
32.	Compressor (sealed)	screws fasteners	bushing fractional hp motor	-
33.	Screw Compressor	screws bolts fasteners fittings	gears shaft bushing electric motor 5hp LPG tank	bearings
34.	Fractional hp Motor	screws bolts	shaft coil spring	bearings
35.	Electric Motor 5hp	screws bolts fasteners	shaft	bearings
36.	Industrial Blower	screws bolts fasteners	shaft pulley electric motor 5hp	bearings
37.	Hydraulic System	screws bolts fasteners fittings	bushing	-

Cont'd

		Common Components & Subassemblies Within Subsector	of Other Subsectors	Other Parts
38.	Gasoline Engine Single Cylinder	bolts	bushing coil spring	bearings
39.	Gasoline Engine 1600cc	screws bolts fasteners fittings centrifugal pump	gears pulley bushings roller chain coil spring alternator fractional hp motor	-
40.	Speed Reducer	screws bolts fittings fasteners	gears shaft	bearings
41.	Transmission	bolts fasteners	gears shaft bushing coil spring	bearings
42.	Heavy Structurals	bolts fasteners	-	-
43.	15kw Generator	bolts	shafts industrial blower heavy structurals	bearings diesel engine
44.	Distribution Transformer	screws bolts	-	-
45.	Air Conditioner	screws bolts fasteners	compressor fractional hp motor	-
46.	Calendering	bolts fittings	gears electric motor 5hp	bearings
47.	Power Tiller	bolts fasteners	shaft pulley coil spring gasoline engine, single cylinder	bearings

Cont'd

		Common Components & Subassemblies Within Subsector	of Other Subsectors	Other Parts
48.	Manual Hoist	screws bolts fasteners	gears shaft coil spring	welded chains bearings
49.	Electric Hoist	screws bolts	gears shaft pulley bushing coil spring fractional motor electric motor 5hp speed reducer	bearings
50.	Concrete Mixer	bolts fasteners valve centrifugal pump	gears roller chain speed reducer heavy structurals	bearings
51.	Guillotine Shear	screws bolts fasteners	gears shaft pulley bushing coil spring electric motor, 5hp	
52.	Pliers	fasteners	-	-
53.	Pneumatic Grinder	bolts fasteners	coil spring	bearings
54.	Welding Equipment	bolts fittings	coil spring	-
55.	Bench Lathe	screws bolts fasteners	gears shafts pulley bushing coil spring electric motor, 5hp	bearings

11.2.2 Input Profile

The major raw materials used in the local production of soaps, detergents and selected toilet preparations are summarized in Table 11.5. Only toilet soap and laundry soap have a high local input content (80 - 100%). In contrast, the bulk of raw materials for detergent products, shampoo and toothpaste are imported (80 - 95%) since these are not available locally. Although no specific data on raw inputs was generated for cosmetic and perfume products such as facial creams, lotions and colognes, one company engaged in contract manufacturing revealed that this product category has a high imported input content. As mentioned earlier, only the packaging materials for shampoo, powder, cream, lotion, and deodorant products as well as alcohol for alcoholic perfume products are locally sourced. Active ingredients, other raw materials and glass bottles for perfumes are purchased abroad.

As gathered from the interviewed firms, the only major problems related to the supply of raw materials are the port congestion and delays in container haulage experienced at Port Kelang. There are no problems encountered in connection with regularity of supply, consistency of quality and excessive price fluctuations of raw materials.

Table 11.6 summarizes the import duties and taxes levied on major raw materials used by the industry. The highest import duty is imposed on perfume oils and dental cream flavours (30%). According to respondent companies, the high tariff on perfume oils has eroded the competitiveness of locally made toilet soaps.

TABLE 11.5
COSMETICS, SOAPS AND DETERGENTS:
RAW MATERIAL INPUTS

Product	Raw Materials	Source: Local	Source: Imported/Country of Origin
1. Toilet soap	Palm oil	100%	-
	Palm kernel oil	100%	-
	Palm stearin	100%	-
	Caustic soda	100%	-
	Soap chips[1]	100%	-
	Perfume	-	100% - USA, UK, Japan, Hong Kong, Switzerland
2. Laundry soap	Palm oil soap stock	100%	-
	Palm fatty acid distillate	100%	-
3. Detergent powder and detergent bar	Tridecylbenzene	-	100% - USA
	Sodium tripoly-phosphate (STPP)	-	100% - Japan
	Sodium sulphate	-	100% - Taiwan
	Perfume	-	100% - USA, UK, Japan, Hong Kong, Switzerland
	Caustic soda	100%	-
	Oleum	100%	-
4. Liquid dishwashing detergent	Sulphuric acid	-	100% - Japan
	C_{12}-C_{13} ethoxylated alcohol	-	100% - Holland
5. Shampoo	C_{12}-C_{14} ethoxylated alcohol	-	100% - Germany
6. Toothpaste	Dicalcium phosphate	-	) 100% - UK, USA
	Dental cream flavours	-	)
	Glycerine	60%	40% - USA

Note : 1. Soap chips represent the basic soap component without perfume, colour or additives.

Source: SGV-KC Field Survey

TABLE 11.6
COSMETICS, SOAPS AND DETERGENTS:
DUTIES AND TAXES ON MAJOR RAW MATERIALS

	Raw Material	Import Duty	Sales Tax	Surtax
1.	Perfume	35%	-	-
2.	Tridecylbenzene	3%	-	-
3.	STPP	3%	-	-
4.	Sodium sulphate	3%	-	-
5.	Sulfonic acid	15%	10	-
6.	C_{12}-C_{13} and C_{12}-C_{14} ethoxylated alcohols[1]	$1.06/kg	-	5
7.	Dicalcium phosphate	3%	-	-
8.	Dental cream flavours[1]	30%	10	5
9.	Glycerine	5%	-	-

Note : 1. Import duty and tax rates for these raw materials as gathered from SGV-KC Field Survey

Source: Customs Duties Order, Ministry of Finance

11.2.3 Production Technology

Technological improvements in the industry are effected through licensing agreements. Multinational firms which dominate the industry are highly dependent on their parent companies for technology development, R & D, technical engineering support, as well as regular information on latest trends in technology, suitable equipment and techniques used in more sophisticated plants. An office is normally established to oversee operations of subsidiaries within the region.

There is virtually no R & D performed on the domestic level. Local activity is confined to proposing changes in the formula (largely just a change of perfume) or in the packaging design to suit the local market. Such changes require the approval of designated heads in the local and regional offices and finally the head office. The local engineering department conducts studies and prepares designs for new capacity equipment as well as plant-related changes.

11.2.4 Production Cost Structure

Table 11.7 presents the production cost structure for soaps, detergents and toothpaste. The following observations can be inferred from the survey results presented:

- Soaps

    1. For soap products, direct material is the most significant component of total production cost (73 - 76%). About 80-100% of direct materials is sourced locally.

    2. Packaging, mainly cost of cartons and cases, is the second major cost item in soap production (9 - 11%).

    3. Direct labour and energy follow closely with a share of 5 - 6% and 4 - 9%, respectively, of total manufacturing cost.

o Detergents

1. Direct material is the biggest cost component for detergent powder and detergent bar (60 - 70% and 68%, respectively) while direct material and packaging are the two major components in the total production cost for liquid dishwashing detergents. About 80 - 95% of direct materials for detergent production is imported. The share of packaging to total manufacturing cost and the main components of packaging for the various detergent products are shown below:

	% Share	Major Components
Detergent bar	7	wrappers and cases
Detergent powder	10 - 20	polybags, cartons and corrugated cases
Liquid dishwashing detergent	35 - 45	plastic bottles and cases

For detergent powder and liquid dishwashing detergents, the share of direct material and packaging to total production cost varies with the size of the product. As the size increases, the relative share of direct material increases while that of packaging decreases.

2. Fixed factory overhead, which covers salaries and benefits, repair and maintenance, and depreciation is also a significant cost item in detergent production (10 - 16%).

3. Direct labour is a minor cost item and accounts for only 1 - 2% of total manufacturing cost.

o Toothpaste

1. Direct material is the most significant cost item in toothpaste production (40 - 70%) followed by packaging which accounts for 30 - 40% of total manufacturing cost. The relative shares of these two cost items vary with the size of the product in the same manner as with liquid and powder detergents. About 85% of raw materials used in toothpaste production is sourced overseas. For packaging materials, the major components are aluminium chips and cartons.

2. Fixed factory overhead is the next major cost item in toothpaste production (5 - 15%).

3. Direct labour and variable factory overhead are the least significant components of total production cost.

TABLE 11.7
COSMETICS, SOAPS AND DETERGENTS:
PRODUCTION COST STRUCTURE

1. Soaps

	Toilet Soap	Laundry Soap
Direct labour	6.1%	5.3%
Direct materials	75.9	73.0
- Local	60.7	73.0
- Imported	15.2	-
Factory overhead	18.0	21.7
- Energy	4.5	9.1
- Depreciation	1.1	0.6
- Repair and maintenance	1.3	2.6
- Packaging	11.1	9.4

2. Detergents

	Detergent Powder	Liquid Dishwashing Detergent	Detergent Bar
Direct labour	1 - 2%	1 - 2%	2%
Direct materials	60 - 70	40 - 50	68
- Local	12 - 14	2 - 2.5	
- Imported	48 - 56	38 - 47.5	n.a.
Factory overhead	28 - 39	46 - 57	30
- Variable	4 - 5	1	7
- Fixed	10 - 15	10 - 11	16
- Packaging	10 - 20	35 - 45	7

3. Toilet Preparations

	Toothpaste
Direct labour	1%
Direct materials	40 - 70
- Local	6 - 10
- Imported	34 - 60
Factory overhead	36 - 56
- Variable	1
- Fixed	5 - 15
- Packaging	30 - 40

Notes: 1. Variable factory overhead includes energy, water and labour benefits.
2. Fixed factory overhead includes salaries and benefits, repair and maintenance, and depreciation.

Source: SGV-KC Field Survey

11.3 MARKETING ASPECTS

11.3.1 Apparent Domestic Consumption

The apparent demand for cosmetics, soaps and detergents in Malaysia is estimated at M$352.2 million in 1981. Industry estimates of the domestic consumption for 1984 of selected products in volume terms together with anticipated growth rates in the next ten years are outlined in Table 11.8 below.

TABLE 11.8
COSMETICS, SOAPS AND DETERGENTS:
DOMESTIC CONSUMPTION OF SELECTED PRODUCTS
1984

Product	Apparent Domestic Consumption (In MT)	Local Production as a % of Consumption	Average Annual Growth Rate 1984-1990	1991-1995
1. Toilet soap	7,800	70 - 80%	6%	4%
2. Laundry soap	12,000	almost 100	stagnant growth or decline	
3. Detergent powder	34,500	80 - 85	5	3
4. Detergent bar	8,000	97	3	3
5. Liquid dishwashing detergent	3,800	60	15	6
6. Fabric softener	650	38	20	10
7. Toothpaste	3,000	85	4	4

Source: SGV-KC Field Survey

Newly developed products, such as liquid dishwashing detergents and fabric softeners, are expected to experience high growth in the next decade with the development of new users and natural population growth. The rest of the soap and detergent products, with the exception of laundry soap (palm-oil based), are expected to increase in varying degrees in relation with growth of population and per capita consumption. Laundry soaps are not expected to register any improvement in consumption in the next decade as this product has reached the end of its life cycle.

11.3.2 Export Market

Based on MIDA estimates, exports of cosmetics, soaps and detergents ranged from 8 - 14% of local production in the past decade. Singapore, Brunei and Hong Kong have been the major export markets for products of the industry during this period. Multinational companies have been largely responsible for exports and have exported to areas which were not covered by other subsidiaries with plants in the region, such as Hong Kong, Singapore and Brunei. Hong Kong has been used as a trade center for toilet soap exports to the People's Republic of China.

Survey respondents pointed out that prospects for exporting Malaysian made products, particularly toilet soap, soap chips and soap noodles, are highly dependent on the competitiveness of palm oil prices with prices of other abundantly available natural oils (primarily tallow) and freight costs. At present, the high price of palm oil and the 35% import duty on perfume oils have substantially reduced the international competitiveness of locally made toilet soap. Moreover, the development of new markets such as the Middle East (which has limited soap manufacturing facilities) will entail substantial marketing efforts to convince consumers to switch from long accepted Western brands to Asian products. Another possible market is Japan which may decide to import soap chips or soap noodles instead of undertaking the entire soap production process locally.

11.3.3 Product Pricing

Respondent firms in the industry adopt a combination of competitive pricing and customer/demand-oriented pricing for local sales and competitive pricing for export sales. For the domestic scene, credit terms are provided on the basis of sales turnover of outlets.

Table 11.9 presents a comparison of prevailing prices of local products and their imported substitutes. For powder detergents, retail prices of imported products from the People's Republic of China are 26-40% lower than local brands. U.K. powder detergents which are sold in packet form are about 19% cheaper than local products on the retail level. Because of the lower prices of P.R.O.C. detergents, a significant number of industrial users which purchase in bulk and lower income households have switched to imported products.

11.3.4 Distribution Methods

Among the interviewed firms, the predominant pattern of marketing as far as domestic sales is concerned is direct selling to retail outlets. However, one respondent company courses its marketing through a distributor which in turn supplies goods to wholesalers, supermarkets and retailers.

Figure 2

COSMETICS, SOAPS AND DETERGENTS:
DISTRIBUTION CHANNELS
FOR DOMESTIC SALES

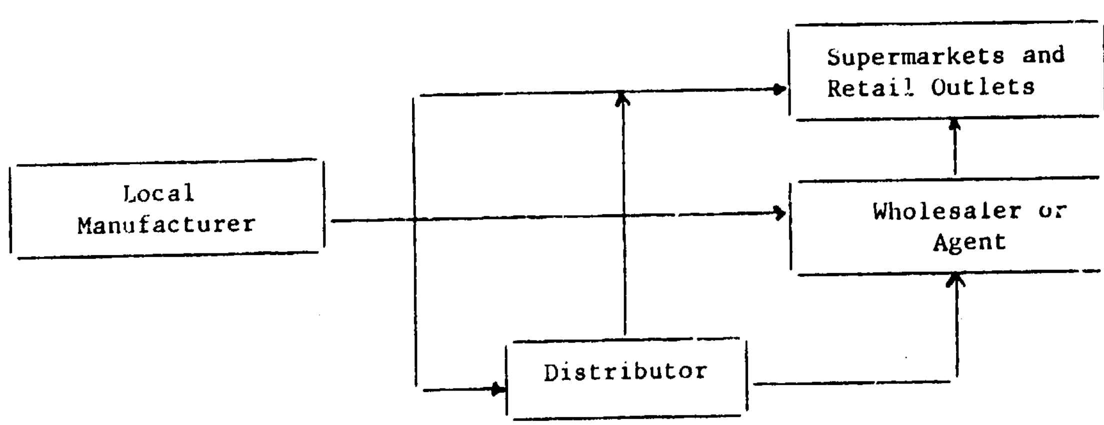


TABLE 11.9
COSMETICS, SOAPS AND DETERGENTS:
COMPARATIVE OUTPUT PRICES
1984
(In M$)

Product	Price of Local Output		Retail Prices of Imported Substitutes
	Production Cost	Retail	
1. Toilet soap 100 g	$0.33 - 0.40	$0.53 - 0.65	P.R.O.C. -$0.60 Japan and Europe- 0.67 - 0.75
2. Laundry soap 750 g	0.75	1.20	*[1]
100 g	0.11	0.20	*[1]
3. Powder detergent - Packet 1.5kg	4.08	6.80	U.K. - 5.50[2]
500g	1.44	2.40	-
- Polybag 1 kg	2.47	3.80	P.R.O.C. - 2.80 - 3.20[3]
- Bulk 15 kg	n.a.	40.00	P.R.O.C. - 24.00
4. Detergent bar 200 g	0.42	0.80	Philippines - 0.75 - 0.80
5. Dishwashing liquid detergent 1,000 ml	2.33	4.40	*[1]

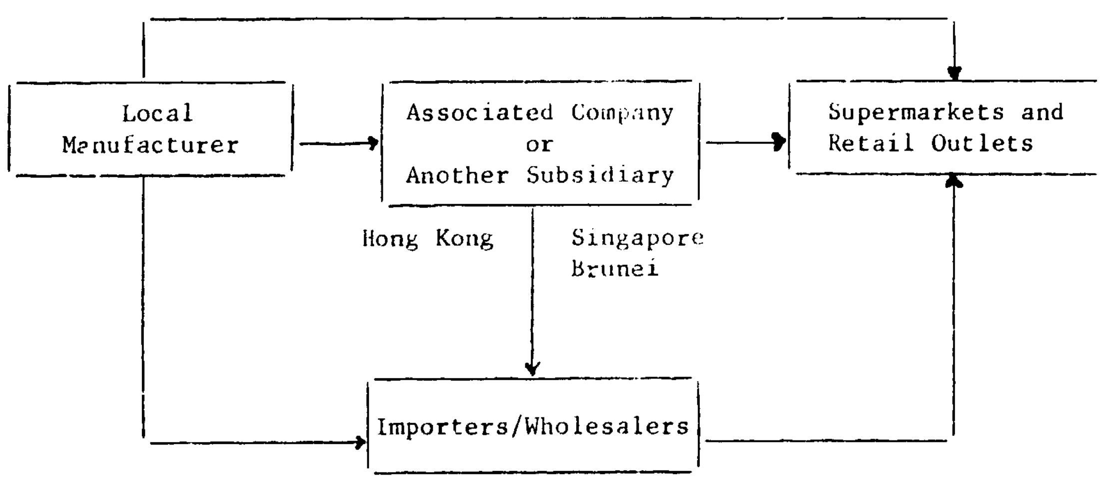
Notes :
1. * - insignificant imports
2. Sold largely in 3 kg packets at $11.00
3. Sold in 750 g polybags at $2.10 - 2.40
4. n.a. - not available

Source: SGV-KC Field Survey

Export sales of the industry have been largely generated by the multinational companies. As gathered from the interviewed firms, exports were mostly intercompany arrangements wherein the local company or subsidiary is assigned to supply an associate company or another subsidiary in Singapore, Brunei or Hong Kong which does not have manufacturing facilities. This associate company or sudsidiary in turn sells to the supermarkets and retail outlets or re-exports to other countries such as P.R.O.C. In addition to intercompany arrangements, local manufacturers also course the marketing of their products abroad through importers or wholesalers or direct to supermarkets and retail outlets.

Figure 3

COSMETICS, SOAPS AND DETERGENTS:
DISTRIBUTION CHANNELS
FOR EXPORT SALES



11.4 FINANCIAL ASPECTS

11.4.1 Ownership Structure and Capital Structure

The ownership profile and capital structure of the surveyed companies are shown below:

Respondent	% to Total Paid-up Capital: Malaysian B	N-B	G	Foreign	(In M$ Million) Paid-up Capital	Total Loans
A	15.0%	-	-	85.0%	$37.5	$0.96
B	.03	8.41	-	91.56	45.7[1]	6.3

Note : 1. Data represents paid-up capital for the whole company which is also engaged in the manufacture of products other than soaps and detergents.
2. B - Bumiputra shareholders; N-B - non-Bumiputra; G - Government

Source: SGV-KC Field Survey

One multinational respondent company has recently restructured, increasing its Bumiputra shareholding to 15% of total paid-up capital this year.

11.4.2 Profitability

Only one respondent firm provided financial information required for profitability analysis. Profitability ratios for this company are shown below:

	1981	1982	1983
Return on sales	13.2%	7.3%	9.2%
Return on assets	21.1	10.3	14.3

The effects of world recession were first felt by the cosmetic, soap and detergent industry in 1981 with the slowdown of turnover. The industry, in general, was hardest hit in 1982 -- companies were not able to meet their sales targets, money was very tight and collections from trade were very difficult. Profitability indicators of the respondent company showed a sharp decline in profitability in 1982 as the company decided to cut down on its sales volume. The company as well as the industry in general recovered in 1983; however, profit margins still did not reach 1981 levels.

11.5 EMPLOYMENT ASPECTS

11.5.1 Racial Composition of Work Force

Survey findings show that the following job categories are predominantly composed of non-Bumiputras: 1)administrative, finance and managerial staff, with an average share of 85.4%; 2) professional, technical and related workers, 68.3%; 3) sales, clerical and related workers, 73.8%; 4) service workers, 60.7%; and 5) transport equipment operators, 89.5%. On the other hand, the majority of labourers employed by respondent companies are Bumiputras (63.1% average share) while racial employment in the production worker category is almost equally distributed between Bumiputras (48.1%) and non-Bumiputras (51.9%). Overall, non-Bumiputras represent a slightly higher average share (59.3%) of total employment of the interviewed firms. Relevant statistics are presented in Table 11.10

TABLE 11.10
COSMETICS, SOAPS AND DETERGENTS:
LABOUR FORCE COMPOSITION
BY RACE

Category	% of Work Force			
	Bumiputra	Non-Bumiputra	Foreigner	Total
Administrative, Finance and Managerial Staff	14.6%	85.4%	-	100.0%
Professional, Technical and Related Workers	28.0	68.3	3.7	100.0
Production and Related Workers	48.1	51.9	-	100.0
Labourers	63.1	36.9	-	100.0
Sales, Clerical and Related Workers	26.2	73.8	-	100.0
Service Workers	35.7	60.7	3.6	100.0
Transport Equipment Operators	10.5	89.5	-	100.0
Overall	40.2	59.3	0.5	100.0

Source: Data provided by two respondent firms, SGV-KC Field Survey

11.5.2 Technical Job Classification and Wage Structure

The technical job classifications of the surveyed firms and corresponding wage structure are outlined in Table 11.11.

TABLE 11.11
COSMETICS, SOAPS AND DETERGENTS:
TYPICAL JOB CATEGORIES AND WAGE STRUCTURE
(MONTHLY WAGE IN M$)

Job Category	Monthly Wage[1] Low	High
A. Production		
1. Production Manager	M$5,590	
2. Assistant Production Manager	2,600	3,350
3. Supervisor/Chief Process Operator	865	1,875
4. Production Operator	515	1,510
5. Line Helper/General Worker	270	1,100
B. Utility		
1. Powerhouse Supervisor	2,510	
2. Boiler Operator	1,180	
C. R & D/Quality Control		
1. Chief Chemist	6,000	
2. R & D Chemist	4,500	
3. Quality Control Chemist	3,390	
4. QC Supervisor	2,220	
5. Laboratory Technician	1,060	1,880
6. QC Inspector	970	1,755
D. Maintenance		
1. Maintenance, Engineer	4,095	
2. Workshop Manager	2,900	
3. Electrical Chargeman/Wireman/Instrument Technician	1,060	1,875
4. Mechanical Fitter	830	1,755

Note : 1. Monthly wage includes benefits.

Source: SGV-KC Field Survey

11.5.3 Labour Supply Situation

Survey findings indicate that there is an acute shortage of electrical chargemen/wiremen, instrument technicians and mechanical fitters. The shortage of such skills is responsible for the high turnover of workers in this category as existing staff are offered more attractive employment opportunities in the electronics industry as well as in other industries.

There is also an apparent shortage of Bumiputra engineers. According to respondent firms, Bumiputra engineers are mostly employed by Petronas and other companies in the oil industry. Moreover, the majority of Bumiputra engineering graduates availed of government scholarships and are therefore legally required to serve out their service contract with the Government. As such, only a few Bumiputra engineers are available for employment in the private sector.

11.5.4 Labour Training

Respondent companies generally provide in-house and on-the-job training for skilled workers. One respondent claimed that the quality of local schooling for technicians and fitters is insufficient. Engineers and management staff of multinational companies are normally sent to the head office for training.

11.6 DEMAND ANALYSIS

11.6.1 Historical Demand

- Domestic Market

  Total apparent domestic demand for cosmetics, soaps and detergents was estimated at M$352.2 million in 1981. This reflects an average annual growth of 7.6% from its 1973 level of M$195.9 million (See Table 11.12). The growth in demand for these products is closely linked to population growth and increase in per capita consumption as consumers become more affluent and improve their cleaning and grooming habits.

  Domestic production of cosmetics, soaps and detergents accounted for about 72 - 81% of apparent consumption from 1973 to 1981. Local production rose from M$ 158.2 million in 1973 to M$255.2 million in 1981, exhibiting an average annual growth of 6.2%. Temporary declines were registered in 1975 as an aftermath of the oil price increase and in 1981 as well as 1982 as a consequence of world recession.

  Imports registered a faster pace of growth (12.2% per annum on the average) and increased its relative importance from 27% of apparent consumption in 1973 to 38% in 1981. Foreign purchases of cosmetics, soaps and detergents reached M$133.0 million in 1981, which is more than twice its 1973 level of M$53.1 million. With the relaxation of the import duty on these product categories, the industry anticipates the continued expansion of imports within the next few years.

- Export Market

  Exports and re-exports of cosmetics, soaps and detergents reflected a determined climb during the past decade. Export earnings in 1981 were estimated at M$36.0 million, representing an average annual growth of 11.2% from its 1973 level of M$15.4 million. About 8 - 14% of local production is sold to overseas customers.

TABLE 11.12
COSMETICS, SOAPS AND DETERGENTS:
APPARENT CONSUMPTION, 1973 - 1981
(M$ '000 AT CONSTANT 1981 PRICES)

Year	Imports	Local Production	Exports and Re-Exports	Apparent Consumption	% of Apparent Consumption: Local Production	% of Apparent Consumption: Imports	Exports and Re-Exports as a % of Local Production
1973	53,076	158,162	15,360	195,878	81	27	10
1974	70,894	178,466	14,133	235,227	76	30	8
1975	71,109	146,116	19,118	198,107	74	36	13
1976	65,652	167,817	21,783	211,686	79	31	13
1977	83,844	190,871	25,725	248,990	77	34	13
1978	99,374	215,709	19,734	295,349	73	34	9
1979	109,707	243,688	30,550	322,845	75	34	13
1980	125,176	265,201	28,968	361,409	73	35	11
1981	132,984	255,250	36,007	352,227	72	38	14
Average Annual Growth Rate 1973 - 1981	12.2%	6.2%	11.2%	7.6%			

Note : Apparent consumption data expressed in current prices are presented in Appendix 26.

Source: Department of Statistics
MIDA

11.6.2 Projected Demand

Domestic demand projections are based on the following linear regression equation:

$$Y = -196.09 + 0.4977X$$
$$R^2 = 0.9812, \quad t = 30.24, \quad D.F. = 8$$

Where: Y = domestic demand for cosmetics, soaps and detergents in 198[illegible] constant prices

X = per capita private consumption expenditure in 1970 constant prices

Forecasts of per capita private consumption expenditure were derived from projections of gross domestic product and population (See Appendix 29).

The above linear regression equation yielded an R^2 value of 0.9812. Furthermore, the t value indicated that the postulated econometric relationship is statistically significant at the 99% of confidence level.

Projections yielded the following growth rates of domestic demand:

Period	Low Growth	Medium Growth	High Growth
1985 - 1990	4.8%	6.2%	7.5%
1991 - 1995	4.8	5.9	7.1

Because export trading activities largely undertaken by multinational companies are expected to continue in the future, it is reasonable to assume that future growth rates with closely follow the past decade's export performance (11.2% on the average from 1973 to 1981). For this study, exports are projected to grow at 8%, 10% and 12%, representing low, medium and high growth cases, respectively.

Table 11.13 presents the results of the demand projections for cosmetics, soaps and detergents.

TABLE 11.13
COSMETICS, SOAPS AND DETERGENTS:
PROJECTED DEMAND
1985 - 1995
(IN M$ MILLION IN 1981 CONSTANT PRICES)

Year	Domestic			Export			Total		
	Low	Medium	High	Low	Medium	High	Low	Medium	High
1985	446.9	446.9	446.9	52.7	52.7	52.7	499.6	499.6	499.6
1986	468.3	474.8	480.8	56.9	58.0	59.0	525.2	532.8	539.8
1987	490.7	504.2	517.1	61.5	63.8	66.1	552.2	568.0	583.2
1988	514.6	535.0	555.9	66.4	70.2	74.0	581.0	605.2	629.9
1989	539.5	567.9	597.7	71.7	77.2	82.9	611.2	645.1	680.6
1990	565.9	602.7	640.5	77.4	84.9	92.9	643.3	687.6	733.4
1991	589.3	635.1	682.4	83.6	93.4	104.0	672.9	728.5	786.4
1992	618.1	673.9	732.1	90.3	102.7	116.5	708.4	776.6	848.6
1993	649.0	714.7	785.4	97.6	113.0	130.5	746.6	827.7	915.9
1994	676.4	753.0	836.1	105.4	124.3	146.2	781.8	877.3	982.3
1995	709.7	799.3	896.4	113.8	136.7	163.7	823.5	936.0	1,060.1
Average Annual Growth Rate									
1985-1990	4.8%	6.2%	7.5%	8.0%	10.0%	12.0%	5.2%	6.6%	8.0%
1990-1995	4.6	5.8	7.0	8.0	10.0	12.0	5.1	6.4	7.6

11.7 INTERNATIONAL ASPECTS

11.7.1 World Trade Patterns

The discussion of international trade patterns involving cosmetic, soap and detergent products will focus on soaps, cleansing and polishing preparations (SITC No. 554) as Malaysia has some degree of competitiveness only in soap products.

- Imports

As may be seen in Table 11.14, imports of soap, cleansing and polishing preparations by the world market economies expanded at an annual average rate of 17.1% between 1977 and 1981, rising from US$1,574 million to US$2,964 million. Europe accounted for 54.1% of total imports in 1977 and 49.7% in 1981. However, the most significant growth in imports was registered by Africa (27.8%p.a.), Oceania (23.9%p.a.) and Asia (19.0%p.a.). Within Asia, the Middle East countries exhibited the most impressive expansion in imports (27.2%p.a.) during this period.

The largest Asian imports of this product group in 1981 were: Saudi Arabia (with a 1.9% share of total imports), Hong Kong (1.6%), Japan (1.5%), Malaysia and Singapore (1.3% each), United Arab Emirates (1.1%), Republic of Korea (1.0%), Iran (1.0%), and Kuwait (0.9%). Among the major importing countries, the following Middle East countries together with Malaysia recorded the highest expansion rates between 1977 and 1981: Saudi Arabia (39.0%p.a.); United Arab Emirates (29.7%p.a.); Iran (29.6%p.a.); Syria (27.8%p.a.); and Malaysia (23.8%p.a.). Due to the absence of soap and detergent manufacturing facilities and the unavailability of indigenous natural oils in the Middle East, it is not surprising that countries in this region have had to increase their importations of soap, cleansing and polishing preparations so dramatically in response to rapidly improving living standards.

- Exports

Aggregate exports of this product group by market economies have risen from US$1,660 million in 1973 to US$3,172 million in 1981. This is equivalent to an average expansion rate of 17.6% per annum. Europe and the Americas have maintained their relative importance in the global exports of this product group as they recorded a consistent aggregate share of 90 - 92% of total exports of the world market economies from 1977 to 1981. Asia was a far third with its US$0.3 million worth of exports in 1981, or only 9.0% of total global exports. All regions exhibited fairly high growth rates for exports during the period, ranging from 16.4%p.a. (Europe) to 23.6%p.a. (Oceania).

Among Asian countries, Japan and Singapore were the only outstanding exporters of soaps, cleansing and polishing preparations during this interval although the exports of some countries such as Republic of Korea, Hong Kong, Jordan, Lebanon, and Saudi Arabia have expanded by over 30%p.a. on the average. Malaysia's relative contribution to exports of the world market economies declined from a share of 0.4% in 1977 to 0.2% in 1981. In value terms, exports of soaps, cleansing and polishing preparations from Malaysia slightly rose from US$6 million in 1977 to US$8 million in 1981.

TABLE 11.14
SOAP, CLEANSING AND POLISHING PREPARATIONS (SITC 554):
INTERNATIONAL TRADE PATTERNS
1977 - 1981
(IN US$ MILLION)

	IMPORTS 1977		IMPORTS 1981		
	Imports	% Share	Imports	% Share	Average Annual Growth Rate 1977 - 1981
World Market Economy	US$1,574	100.0%	US$2,964	100.0%	17.1%
Region					
Africa	171	10.8	456	15.4	27.8
Americas	251	16.0	424	14.3	14.0
Asia	268	17.0	537	18.1	19.0
Middle East	94	6.0	246	8.3	27.2
Europe	852	54.1	1,474	49.7	14.7
Oceania	31	2.0	73	2.4	23.9
Major Importing Countries, Asia					
Japan	45	2.8	45	1.5	-
Hong Kong	25	1.6	48	1.6	17.7
Saudi Arabia	15	1.0	56	1.9	39.0
Singapore	20	1.3	39	1.3	18.2
Malaysia	17	1.1	40	1.3	23.8
Rep. of Korea	15	1.0	31	1.0	19.9
United Arab Emirates	12	0.8	34	1.1	29.7
Kuwait	16	1.0	27	0.9	14.0
Indonesia	13	0.8	16	0.5	5.3
Iran	11	0.7	31	1.0	29.6
Thailand	12	0.8	20	0.7	13.6
Israel	9	0.6	15	0.5	13.6
Yemen A R	6	0.4	8	0.3	7.4
Syria	6	0.4	16	0.5	27.8

	EXPORTS 1977		EXPORTS 1981		
	Exports	% Share	Exports	% Share	Average Annual Growth Rate 1977 - 1981
World Market Economy	US$1,660	100.0%	US$3,172	100.0%	17.6%
Region					
Africa	10	0.6	23	0.7	23.1
Americas	246	14.9	525	16.5	20.9
Asia	134	8.1	284	9.0	20.7
Europe	1,261	75.9	2,319	73.1	16.4
Oceania	9	0.5	21	0.6	23.6
Major Exporting Countries, Asia					
Japan	68	4.1	116	3.7	14.3
Singapore	16	1.0	37	1.2	23.3
Iran	16	1.0	10	0.3	(11.1)
Jordan	2	0.1	19	0.6	75.6
Hong Kong	4	0.2	13	0.4	34.3
Rep. of Korea	4	0.2	28	0.9	62.6
Saudi Arabia	1	*	10	0.3	77.8
Malaysia	6	0.4	8	0.2	7.5
India	7	0.4	7	0.2	-
Lebanon	1	*	6	0.2	56.5

Note : World aggregates presented in the Yearbook generally do not include trade statistics of the following countries: Albania, Bulgaria, P.R.O.C. Taiwan, Czechoslovakia, German Democratic Republic, Hungary, Mongolia, Democratic People's Republic of Korea, Poland, Romania, and the U.S.S.R.

Source: Yearbook of International Trade Statistics, United Nations

11.7.2 Malaysia - Imports and Exports

o Imports

Malaysia's imports of cosmetics, soaps and detergents have expanded at an average rate of 19.0% per annum between 1973 and 1981, rising from M$33.0 million to M$133.0 million within this span of time. In 1973, overseas purchases of perfumes, cosmetics and toilet preparations accounted for M$21.7 million (65.7%) of total imports in this category, followed by organic surface active agents and preparations (M$5.8 million or 17.7%), soaps (M$4.7 million or 14.3%), polishes, creams and scouring powder (M$0.7 million or 2.3%). By 1981, imports of organic surface active agents and preparations had emerged as the most important product group with M$53.1 million (39.9%) of total imports of cosmetics, soaps and detergents. Foreign acquisition of perfumes, cosmetics and toilet preparations were valued at M$46.8 million (35.2%) and had been relegated to second position. The trends and components of imports in the category are summarized in Table 11.15.

TABLE 11.15
IMPORTS: COSMETICS, SOAPS AND DETERGENTS
1973 AND 1981
(M$ '000)

		1973		1981	
SITC	Chemical Group	Value	% Share	Value	% Share
5530	Perfumes, cosmetics and toilet preparations	M$21,670.4	65.7%	M$ 46,802.8	35.2%
5541	Soaps	4,698.3	14.3	26,236.5	19.7
5542	Organic surface active agents and preparations	5,841.3	17.7	53,126.0	39.9
5543	Polishes and creams, scouring powder	750.3	2.3	6,819.0	5.2
553 & 554	Total	M$32,960.3	100.0%	M$132,984.3	100.0%

Source: Department of Statistics

In 1973, imports of beauty creams, cold creams, make-up, cleansing cream totalled M$4.7 million or 21.9% of all overseas purchases of perfumes, cosmetics and toilet preparations. The three foremost suppliers of beauty aids belonging to this product group were: United States, Australia and Taiwan (Table 11.16). In 1981, United States (M$2.8 million), Taiwan (M$1.0 million), and Japan (M$0.9 million) accounted for 69.9% of Malaysia's imports of this product group (M$6.7 million).

Dental paste and shampoos are the two other well defined product groups under this category. Imports of dental paste were valued at only M$0.3 million in 1973, but accelerated to M$9.4 million in 1981. Hong Kong, which sold M$0.2 million to Malaysia in the earlier period, continued to dominate Malaysia's dental paste imports with M$7.3 million or 77.5% of total value in the latter year. Overseas purchases of shampoos increased from M$0.9 million to M$3.5 million between 1973 and 1981, with United States (M$1.2 million), Japan (M$0.8 million), and Singapore (M$0.6 million) supplying the country with 75.4% of its imports in 1981.

TABLE 11.16
IMPORTS: PERFUMES, COSMETICS AND TOILET PREPARATIONS
1973 AND 1981
(M$ '000)

SITC	Chemical Group	1973	1981
55300251	1. Dental paste		
	Hong Kong	M$ 164.2	M$ 7,291.5
	UK	95.4	872.0
	P.R. of China	*	804.7
	Others	51.2	444.0
	Sub-Total	310.8	9,412.2
55300213	2. Beauty creams, cold creams, make-up, and cleansing cream		
	USA	[illegible]	2,758.9
	Taiwan	925.6	1,045.0
	Japan	*	862.1
	Australia	944.6	*
	Others	[illegible]	2,008.0
	Sub-Total	4,745.4	6,674.0
[illegible]	3. Shampoos		
	USA	128.9	1,240.3
	Japan	189.4	765.1
	Singapore	*	619.9
	UK	236.9	*
	Others	357.4	855.8
	Sub-Total	911.6	3,481.1
55300229	4. Other cosmetics and products for the care of skin, n.e.s.		
	Japan	*	1,364.7
	USA	134.8	1,303.7
	UK	227.1	670.0
	Australia	141.9	*
	Others	339.3	1,858.8
	Sub-Total	843.1	5,197.2
	5. Others	14,[illegible]9.5	22,038.3
553	Total	M$21,67[illegible]	M$46,802.8

Note :
* Imports from this country were classified under "Others".
Source: Department of Statistics

Soap importations increased from M$4.7 million (14.3% of total imports of cosmetics, soaps, detergents) to M$26.2 million (19.7%) in 1981. Within this category, toilet soaps comprised 76.7% and 71.0% respectively of all purchases from abroad (Table 11.17). Australia, People's Republic of China, and United Kingdom were the principal sources of Malaysia's imports of toilet soaps in 1973. Eight years later, United Kingdom overtook all other suppliers with M$4.5 million (24.3%), followed by Singapore (M$4.2 million or 22.6%), People's Republic of China (M$3.6 million or 19.1%), and United States (M$3.0 million or 16.3%). The country's imports of hard soaps came chiefly from People's Republic of China, United Kingdom and United States in 1981.

TABLE 11.17
IMPORTS: SOAPS
1973 AND 1981
(M$ '000)

SITC	Chemical Group		1973	1981
55410200	1.	Toilet Soap		
		Singapore	*	M$ 4,210.6
		P.R. of China	M$ 918.5	3,558.6
		UK	509.3	4,517.7
		USA	*	3,045.3
		Australia	1,432.1	*
		Others	745.3	3,289.7
		Sub-Total	3,605.2	18,621.9
55410100	2.	Hard soap in bars or tablets		
		P.R. of China	241.8	1,554.8
		UK	*	838.9
		USA	*	570.4
		Others	31.	336.3
		Sub-Total	273.3	3,300.4
	3.	Others	819.8	4,314.2
5541		Total	M$4,698.3	M$26,236.5

Note :
* Imports from this country were classified under "Others".

Source: Department of Statistics

The country's imports of organic surface active agents and preparations registered the most impressive growth during the period under review, expanding from M$5.8 million in 1973 to M$53.1 million in 1981. In 1973, the largest product group in this category was non-liquid surface active preparations, with Singapore and Denmark identified as the two major countries of origin (Table 11.18). However, this particular product group registered only very marginal growth in the next eight years, increasing from M$3.1 million to M$3.3 million. Imports of other washing preparations for retail sale, which consist largely of detergent powder, had become the largest single product group in this category by 1981. Malaysia's foreign purchases of this product group were valued at M$26.3 million, representing 49.4% of the country's imports of organic surface active agents and preparations for the year. The People's Republic of China (M$11.1 million), United States (M$8.0 million), and Singapore (M$4.1 million) accounted for 88.1% of the nation's imports of this product group.

The other product groups classified under organic surface active agents and preparations are as follows:

1. other organic surface active agents consisting of single subtances (M$8.1 million imports in 1981);

2. other washing preparations not for retail sale (M$7.4 million imports in 1981);

3. surface active preparations in liquid form for other uses (M$4.7 million imports in 1981).

Japan and United States were the two most significant suppliers of imported items belonging to these three product groups although Singapore, Federal Republic of Germany, Australia, and United Kingdom were also significant sources.

TABLE 11.18
IMPORTS: ORGANIC SURFACE ACTIVE AGENTS
AND PREPARATIONS
1973 AND 1981
(M$ '000)

SITC	Chemical Group	1973	1981
55420700	1. Other washing preparations for retail sale		
	USA	M$ 31.4	M$ 7,977.3
	Singapore	*	4,069.6
	P.R. of China	272.7	11,081.9
	Others	37.4	3,128.1
	Sub-Total	341.5	26,256.9
55420100	2. Other organic surface active agents consisting of single substances		
	Japan	93.2	3,652.3
	F.R. of Germany	53.8	1,320.5
	USA	*	1,050.3
	UK	101.2	907.4
	Others	83.2	1,194.6
	Sub-Total	331.4	8,125.1
	3. Other washing preparations not for retail sale		
	USA	41.3	3,799.3
	Singapore	*	1,438.3
	Taiwan	*	669.7
	Japan	62.6	*
	Switzerland	63.5	*
	Others	80.3	1,468.3
	Sub-Total	247.7	7,375.6

Cont'd

SITC	Chemical Group	1973	1981
55420400	4. Surface active preps. in liquid form for other use		
	Japan	735.0	1,153.9
	Australia	*	1,222.2
	USA	*	513.1
	UK	214.4	497.1
	F.R. of Germany	173.1	*
	Others	269.0	1,342.3
	Sub-Total	1,411.5	4,728.6
55420500	5. Non-liquid surface active preps.		
	Singapore	1,208.4	795.7
	Denmark excl. Greenland	1,120.6	*
	USA	268.1	778.7
	F.R. of Germany	*	356.0
	Others	536.5	1,395.0
	Sub-Total	3,133.6	3,325.4
	6. Others	375.6	3,314.4
5542	Total	M$5,841.3	M$53,126.0

Note :
* Imports from this country were classified under "Others".

Source: Department of Statistics

c Exports

In 1973, Malaysia's exports of cosmetics, soaps and detergents were valued at M$9.9 million. Perfumes, cosmetics and toilet preparations constituted the largest product group (41.5%), followed by organic surface active agents, preparations (38.6%) and soaps (12.8%) (See Table 11.19). Eight years later, the country's foreign sales of these products had reached M$36.0 million. In value terms, perfumes, cosmetics and toilet preparations remained the most important product group (38.2%), but soaps (31.9%) had displaced organic surface active agents and preparations (29.2%) as the second largest set of products in this category.

TABLE 11.19
EXPORTS: COSMETICS, SOAPS AND DETERGENTS
1973 AND 1981
(M$ '000)

		1973		1981	
SITC	Chemical Group	Value	% Share	Value	% Share
553	Perfumes, cosmetics & toilet preparations	M$4,122.2	41.5%	M$13,769.9	38.2%
5541	Soaps	1,272.7	12.8	11,470.3	31.9
5542	Organic surface active agents & preparations	3,834.7	38.6	10,508.8	29.2
	Others	708.7	7.1	257.7	0.7
553 & 554	Total	M$9,938.3	100.0%	M$36,006.7	100.0%

Source: Department of Statistics

Table 11.20 classifies the country's exports of perfumes, cosmetics and toilet preparations into four fundamental types of products: (1) dental paste, (2) perfumery containing spirits for domestic use, (3) talcum powder, and (4) other related products. Only the first three groups registered significant export volumes during the 1973 - 1981 interval.

Exports of dental paste increased from M$1.9 million (45.3%) to M$4.5 million (32.5%) during this period. Singapore (M$1.3 million) was by far the largest foreign market in 1973, followed by Brunei (M$0.4 million) and Thailand (M$0.2 million). In 1981, however, the principal foreign buyers were Republic of Korea (M$1.3 million), Philippines (M$1.1 million), and Brunei (M$1.0 million).

Perfumery exports expanded by an average rate of 32.1% per annum during this period, rising from M$0.2 million to M$2.0 million. In 1981, Singapore (M$1.5 million) was the principal destination of these products, followed by Philippines (M$0.3 million) and Hong Kong (M$0.2 million).

Malaysia's sales of talcum powder to other countries registered an average annual growth of 19.3% between 1973 and 1981. Singapore, Brunei and Philippines were the most prominent purchasers during this interval.

TABLE 11.20
EXPORTS: PERFUMES, COSMETICS AND TOILET PREPARATIONS
1973 AND 1981
(M$ '000)

SITC	Chemical Group		1973	1981
55300251	1.	Dental paste		
		Rep. of Korea	-	M$ 1,260.6
		Philippines	-	1,059.5
		Brunei	M$ 356.3	1,027.0
		Singapore	1,326.7	-
		Thailand	179.5	-
		Others	3.4	1,127.8
		Sub-Total	1,865.9	4,474.9
55300201	2.	Perfumery containing spirits for domestic use		
		Singapore	52.7	1,516.7
		Philippines	68.0	288.8
		Hong Kong	-	215.1
		Australia	44.3	-
		Others	56.3	23.7
		Sub-Total	221.3	2,044.3
55300211	3.	Talcum powder		
		Singapore	92.6	790.5
		Brunei	109.0	182.4
		Philippines	29.8	62.0
		Others	41.1	85.0
		Sub-Total	272.5	1,119.9
	4.	Others	1,762.5	6,130.8
553		Total	M$4,122.2	M$13,769.9

Source: Department of Statistics

The country's exports of soaps were valued at M$1.3 million in 1973 and M$11.5 million in 1981. Table 11.21 clearly indicates that toilet soap and hard soap in bars or tablets have consistently maintained a collective share of 98% in the total export value of this category. The primary overseas markets for toilet soap were Brunei and Singapore in 1973 and Singapore, Hong Kong and Philippines in 1981. Hard soap in bars or tablets were sold chiefly to the same neighbouring countries.

TABLE 11.21
EXPORTS: SOAPS
1973 AND 1981
(M$ '000)

SITC	Chemical Group	1973	1981
55410200	1. Toilet soap		
	Singapore	M$ 54.5	M$4,152.9
	Hong Kong	322.3	2,874.1
	Philippines	77.2	2,786.5
	Brunei	346.9	-
	Others	71.3	1,050.9
	Sub-Total	872.2	10,864.4
55410100	2. Hard soap in bars or tablets		
	Hong Kong	36.1	190.7
	Brunei	65.2	127.3
	Philippines	-	68.9
	Singapore	276.0	-
	Others	1.6	37.1
	Sub-Total	378.9	424.0
55410700	3. Industrial soaps		
	Singapore	-	65.9
	Hong Kong	-	51.1
	Brunei	0.5	28.5
	Others	-	-
	Sub-Total	0.5	145.5

Table 11.21 (Cont'd)

SITC	Chemical Group	1973	1981
	4. Soap powder		
	Indonesia	M$ 18.6	M$ 6.0
	Others	0.1	-
	Sub-Total	18.7	6.0
	5. Others	2.4	30.4
5541	Total	M$1,272.7	M$11,470.3

Source: Department of Statistics

Malaysia exported M$3.8 million worth of organic surface active agents and preparations in 1973. Virtually all of the exports in this category consisted of other surface-active preparations and most of these products were sold in Hong Kong (Table 11.22). In 1981, however, the two dominant product groups were: (1) other washing preparations for retail sale (M$6.9 million or 65.6% of total exports under this classification) and (2) other washing preparations not for retail sale (M$3.0 million or 28.3%). Foreign sales of other surface-active preparations had become insignificant in relative as well as in absolute terms. Hong Kong (M$3.3 million), Brunei (M$2.1 million) and Singapore (M$1.2 million) were the three principal destinations for the country's exports of other washing preparations for retail sale. On the other hand, virtually all of Malaysia's exports of other washing preparations not for retail sale went to Singapore.

Overall, the prominent role played by Singapore, Hong Kong, Brunei, and the Philippines in the country's exports of cosmetics, soaps and detergents may be attributed to the existence of inter-company supply agreements among subsidiaries or associates of multinational enterprises operating in the region.

TABLE 11.22
EXPORTS: ORGANIC SURFACE ACTIVE AGENTS AND PREPARATIONS
1973 AND 1981
(M$ '000)

SITC		Chemical Group	1973	1981
55420700	1.	Other, washing preparations for retail sale		
		Hong Kong	-	M$3,267.1
		Brunei	-	2,090.2
		Singapore	M$ 0.7	1,227.0
		Indonesia	1.7	-
		Thailand	0.7	-
		Others	0.4	313.5
		Sub-Total	3.5	6,897.8
55420900	2.	Other washing preparations not for retail sale		
		Singapore	5.9	2,957.8
		Brunei	-	5.4
		Indonesia	-	1.4
		Others	-	0.2
		Sub-Total	5.9	2,964.8
55420500	3.	Other surface-active preparations		
		Singapore	-	143.5
		Brunei	462.9	96.0
		Philippines	-	13.3
		Hong Kong	3,192.6	-
		Indonesia	43.2	-
		Others	32.9	2.9
		Sub-Total	3,731.6	255.7

Table 11.22 (Cont'd))

SITC		Chemical Group	1973	1981
55420600	4.	Liquid bleaches for retail sale		
		Brunei	M$ 29.9	M$ 0.5
		Singapore	-	3.6
		Others	0.1	-
		Sub-Total	30.0	4.1
	5.	Others	63.7	386.4
5542		Total	M$3,834.7	M$10,508.8

Source : Department of Statistics

11.7.3 International Cost Comparison

This section evaluates the cost competitiveness of a representative product of the cosmetics, soaps and detergents group -- toilet soap. Relevant cost data for toilet soap production in the Philippines were generated through interviews at two multinational companies in the industry.

Production cost structures of toilet soap production in Malaysia and the Philippines are outlined in Table 11.23. The following observations can be inferred from the comparative data presented in this Table:

1. Direct material is the biggest component in the total manufacturing cost of toilet soap for both Malaysia (75.9%) and the Philippines (80 - 85%). Toilet soap produced in Malaysia has a high local content, with 80% of direct materials sourced locally. In contrast, about 80% of raw materials utilized for toilet soap production in the Philippines is imported.

2. The ratio of factory overhead to total production cost is roughly comparable between Malaysia and the Philippines. Energy is just as significant in total production cost in Malaysia as in the Philippines.

3. Direct labour is relatively more important in the total manufacturing cost of toilet soap companies in Malaysia. In the Philippines, direct labour is the least important component of total production cost.

TABLE 11.23
TOILET SOAP:
COMPARATIVE PRODUCTION COST STRUCTURE

	Malaysia	Philippines
Direct Labour	6.1%	1 - 2%
Direct Material	75.9	80 - 85
- Local	60.7	16 - 17
- Imported	15.2	64 - 68
Factory Overhead	18.0	13 - 19
- Energy	4.5	4 - 5
- Depreciation	1.1	)
- Repair and Maintenance	1.3	)9 - 14
- Packaging	11.1	)
- Others	-	)

Source: Local data from SGV-KC Field Survey
Philippine data from SGV & Co.

A comparison of raw material cost, utility rates and production cost of representative firms engaged in toilet soap production in both countries highlights the competitive advantage of Malaysia in this field (See Table 11.24). At present, ex-factory price of toilet soap in Malaysia is roughly 35 - 40% lower than comparable Philippine prices.

Lower cost and high local content of direct materials used in Malaysian plants have offset the labour cost advantage of toilet soap producers in the Philippines. Table 11.25 presents comparative wage levels for direct production workers as well as indirect workers of respondent firms in both countries.

TABLE 11.24
TOILET SOAP:
COMPARATIVE COST OF INPUTS AND SELLING PRICE

	Malaysia		Philippines	
1. Raw materials				
- Local	Palm oil	M$1,485/MT	Coconut oil	M$1,022-2,811/MT
	Palm kernel oil	2,354/MT		
	Palm stearin	850/MT		
	Caustic soda, 50%	610.80/MT		
- Imported	Perfume	37.70/kg	Palm oil	1,533-2,555/MT
			Tallow	1,533-2,555/MT
			Colorant	38- 128/kg
			Perfume	46- 69/kg
2. Electricity rates	0.195 - 0.2315/kwh		0.204 - 0.253/kwh	
3. Cost of bunker fuel	0.46/liter		0.60/liter	
4. Production cost	0.33 - 0.40/100g		0.497/100g	
5. Ex-factory price	0.40 - 0.45/100g		0.68 - 0.69/100g	

Exchange rate used : M$2.30 = US$1.00 = ₱ 18.00

Source: Local data from SGV-KC Field Survey
Philippine data from SGV & Co.

TABLE 11.25
TOILET SOAP:
COMPARATIVE MONTHLY WAGE STRUCTURE

Job Category	Malaysia	Philippines
A. Production		
1. Supervisor/Chief Process Operator	M$ 865 - 1,875	M$ 575
2. Production and Finishing Operator	515 - 1,510	409
3. General Worker	270 - 1,100	409
B. R & D/Quality Control		
1. Laboratory Analyst/ Technician/Assistant	1,060 - 1,880	575
2. QC Tester/Technician	1,060 - 1,880	492
3. QC Inspector	970 - 1,755	492
C. Maintenance		
1. Electrical Chargeman/ Wireman/Electrician	1,060 - 1,875	450
2. Mechanical Fitter/ Welders/Craftsman	830 - 1,755	450

Note : Monthly wage includes benefits.

Source: Local data from SGV-KC Field Survey
Philippine data from SGV & Co.

15085 (1 of 3)

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

Vienna, Austria

MALAYSIAN INDUSTRIAL MASTER PLAN

FINAL REPORT: VOLUME IIIA

CHEMICAL INDUSTRY - CURRENT STATUS AND DEMAND ANALYSIS

December 1984

THE SGV GROUP

SGV-KASSIM CHAN SDN. BHD.

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MANAGEMENT SERVICES

TABLE OF CONTENTS

Page

LIST OF FIGURES

LIST OF TABLES

I. INTRODUCTION

1.1 STUDY BACKGROUND

The basic national strategy for the industrial development of Malaysia is succinctly outlined in the National Economic Plan (NEP) as elaborated in the Second Malaysia Plan. This was reiterated in the Outline Perspective Plan (OPP) of the Third Malaysia Plan.

The strategy's two fundamental objectives are:

1. Poverty redressal.

2. Restructuring of society by correcting the economic imbalance between different groups of people and between different regions.

The redressal of poverty is proposed to be implemented by improving the income earning capacity of the poorer sections of people in economic activities such as agriculture, industry, and services. Several institutional facilities are provided for the purpose. Restructuring of society is expected to be implemented by reducing the market imbalances and disparities in income, employment, ownership of assets among different groups of people and races, and among different regions. Institutional support and financial facilities are also provided for this purpose.

The manufacturing sector is a rapid growth sector in the Malaysian economy. Its contribution to national output was 20.5% in 1980 and is projected to increase to 26.6% by 1990. In constant 1970 prices, the sector's contribution to the nation's GDP is expected to increase from M$5.4 billion in 1980 to M$15.1 billion in 1990. The magnitude of growth in this sector would necessitate a substantial amount of new investment during the next decade. These investments would mostly emanate from the private sector as the Government follows a liberal economic policy of encouraging the private sector to play a predominant role in initiating and implementing investment decisions. This policy orientation of the Government is fully reflected in the Fourth Malaysia Plan.

However, the Government has to strike a balance between national socio-economic policies as embodied in the NEP and the direction as well as the structure of growth in the manufacturing sector. Since Malaysia is a predominantly private sector economy, investment decisions are undertaken mostly by private individuals and entities on the basis of commercial profitability. The sum total of such commercial decisions is not likely to reflect the national socio-economic priorities embodied in the NEP, particularly with respect to rapid poverty alleviation and restructuring of society. It is for this reason that the Government has felt the need to prepare an Industrial Master Plan for the country.

Industrial planning in Malaysia has in the past been done at a macroeconomic level with emphasis on long-term policies, strategies and incentives. This has so far served the country well. However, during the next phase of Malaysia's economic development, the scope for continued industrialization by means of import substitution is expected to narrow and relatively cheap industrial labor may become scarce. Consequently, the country will be faced with a number of hard options. Important among these are the planning of investment requirements in export-oriented industries, resource-based industries, heavy industries and skills-intensive industries. To reflect the Government's national socio-economic policies, it is also necessary to plan for the development of small-scale industries as well as to reduce regional imbalance in industrial development.

Viewed in this context, an Industrial Master Plan incorporating detailed industry plans and programmes is an essential ingredient in the implementation of the NEP. Currently the Five Year Plan for the manufacturing sector is prepared at various levels without the support of detailed plans and programmes from component industries and industry sub-groups. As a result of this lacuna, the developmental and financial institutions set up by the Government to support industrial programmes find it operationally difficult to effectively undertake the tasks assigned to them. There is no comprehensive set of guidelines for allocating scarce development resources among competing needs.

1.2 STUDY OBJECTIVE

In the light of foregoing discussion, the objective of the Project is to prepare an Industrial Master Plan to assist the Government of Malaysia in identifying priorities for industrial development. These priorities are to be determined on the basis of each manufacturing sub-sector's actual and prospective contribution to the Malaysian economy. The Project is expected to generate considerable data for monitoring the economic performance of each industry. On the basis of this information, present strategies, policies, and incentives can be revised and modified to accomplish the goals of the NEP as delineated in the OPP.

1.3 SCOPE OF STUDY

The Consultants' direct involvement in the Project is limited to the following sectors:

1. Engineering and Machinery

   a. Foundries

   b. Manufacture of Fabricated Metal Products

      - manufacture of cutlery, hand tools, and general hardware excluding tinsmithing and blacksmithing
      - manufacture of furniture and fixtures primarily of metals
      - manufacture of structural metal products
      - manufacture of tin cans and and metal boxes
      - manufacture of wire and wire products
      - manufacture of other fabricated metal products n.e.s.

   c. Manufacture of Machinery except Electrical

      - manufacture of special industrial machinery and equipment

2. Chemicals

   a. Base Products and Intermediates

      - inorganic products and intermediates
      - fertilizers
      - petrochemical building blocks and intermediates
      - plastics and resins

   b. End Products

      - paints, varnishes, inks, pigments and dyes
      - pharmaceuticals
      - pesticides
      - cosmetics, soaps and detergents
      - miscellaneous end products

3. Transport Equipment

   a. shipbuilding

   b. railroad equipment

Focusing on these three sectors, the Consultants have undertaken to accomplish the following tasks as stipulated in the Terms of Reference:

1. Assessment of each sector's current status and development issues

2. Evaluation of each sector's future market potentials

3. Conceptualization of sectoral development strategies and investment criteria

4. Articulation of sectoral investment plans

5. Formulation of integrated sectoral development policies and programmes

Assessment of a sector's current status entails a full consid:ration of the following principal areas:

1. Current Status: macrceconomic contributions, inter-industry linkages, industry problems and opportunities, price and non-price competitiveness in the international market.

2. Technology: existing state of embodied technology, potential for indigenous research and development, priority areas for technological advancement, other technology-related issues

3. Factor Endowments: input structure in production, availability and cost of relevant major inputs, input productivity, facilities for expanding or upgrading input base

4. Promotional Policies and Issues: general and specific government incentives, perceived effectiveness of various promotional measures, areas for policy improvement

The following steps are necessary in the evaluation of a sector's future market prospects:

1. Survey of global market trends

2. Forecasting of domestic market demand

3. Forecasting of aggregate (domestic and export) market demand

Market projections are premised on the Consultants' ability to identify relevant causal relationships among domestic and international economic variables. Whenever feasible, econometric analysis is employed. The forecasting period is defined to be from 1985 to 1995.

The conceptualization of sectoral development strategy and investment criteria immediately follows the evaluation of a sector's current status and future potentials. In this connection, the following basic questions have to be addressed: (a) what criteria should be used to establish product priorities in each sector? (b) what products or product groups in each sector should receive top priority in terms of Government support, investment, and schedule of development? and (c) what sectoral strategies will enable Malaysia to develop its priority products and product groups in the most effective and efficient manner?

Given the forecasts of future market demand, the Consultants will subsequently direct their attention to the supply side. General investment and import requirements of each sector will be estimated in accordance with the schedule of development for priority products.

On the basis of the foregoing analysis, the Consultants will submit a set of coordinated policies and programmes aimed at fostering the rational, long-term development of the three sectors concerned. Revisions or modifications in the following aspects of current public policies will be examined:

1. tariff structure

2. exchange rate policy

3. manpower development programmes

4. export promotion policies

5. fiscal and financial incentives

6. wage/price stabilization measures

7. technology transfer mechanisms

The Consultants will ascertain that resultant recommendations are consistent with the overall objectives of the NEP and the OPP.

The sectoral assessment of the current status as well as future market potentials of the engineering and machinery, chemical, and transport equipment (shipbuilding, railway equipment) industries constitute the Consultants' Interim Report. The articulation of integrated sectoral policies and programmes as well as recommended changes in the current public policy framework will be incorporated into the Final Report.

1.4 ORGANIZATION OF RESEARCH

Because of the very specific data requirements stipulated in the Terms of Reference, a large proportion of the information contained in this Interim Report was generated from a field survey of the three sectors which the Consultants conducted over a three-week period (July 30, 1984 - August 19, 1984). Respondent firms were selected from MIDA listings and from the membership of various industry associations such as the Chemical Industries Council of Malaysia (CICM) and the Federation of Malaysian Foundry and Engineering Industries Associations (FOMFEIA). During this interval, a total of 89 respondent firms located in various districts of the country was interviewed.

A decomposition of the respondent base according to sectoral and sub-sectoral classifications is presented below:

Sector/Sub-Sector	No of Respondents
1. Engineering and Machinery	49
o Foundries	14
o Manufacturers of structural metal products	7
o Manufacturers of tin cans and metal boxes	4
o Manufacturers of wire and wire products	7
o Manufacturers of other fabricated metal products n.e.s.	11
o Manufacturers of special industrial machinery and equipment	6
2. Chemicals	33
o inorganic products and intermediates	5
o fertilizers	6
o petrochemical building blocks and intermediates	1
o plastics and resins	9
o paints, varnishes, inks, pigments and dyes	3
o pharmaceuticals	3
o pesticides	4
o cosmetics, soaps and detergents	2
3. Transport Equipment	7
o shipbuilding	7

In the case of railway transport equipment, the Consultants interviewed officials from the Malayan Railway (Keretapi Tanah Melayu or KTM), the Ministry of Transport, and the Rolling Stock Division of Malaysia Shipyard and Engineering Sdn. Bhd. (MSE).

Published reports and statistics were obtained from the MIDA, EPU, Department of Statistics, and various industry sources. The Consultants also held regular discussions with UNIDO industry specialists.

A copy of the survey questionnaire used by the Consultants in the chemical industries forms Appendix 1 of this volume.

1.5 REPORT FORMAT

The Consultants' Report is presented in three separate volumes. Each volume covers one of the industrial sectors specified in the contract. This volume (Volume IIIA) discusses the current status and future prospects of Malaysia's chemical industries. The recommended strategies and developmental policies for this industry are in Volume IIIB with all Appendices in Volume IIIC.

II. OVERVIEW OF THE CHEMICAL INDUSTRY

2.1 INDUSTRY BACKGROUND

Malaysia's known natural resources for the manufacture of chemicals are limited to limestone, natural gas, crude oil, xenotime, monazite, and oil palm products. It was only fairly recently that the country began to study extensively the utilization of indigenous oil and gas resources in the production of "newer" chemicals. Consequently, Malaysia remains a net importer of chemicals with its local production capability confined largely to the manufacture of chemical products from imported raw materials and intermediates.

The chemical industry, as discussed in this Report, is composed of the following sub-sectors:

1. Inorganic chemicals and chemical elements
2. Fertilizers
3. Petrochemical building blocks and intermediates
4. Plastics and resins
5. Paints and inks
6. Pharmaceuticals
7. Pesticides
8. Cosmetics, soaps and detergents
9. Other chemical products

2.2 GROWTH OF THE CHEMICAL INDUSTRY

The growth of the chemical industry and its relative importance in the manufacturing sector may be discussed by referring to selected economic indicators obtained from the 1973 and 1981 Censuses of Manufacturing Industries for Peninsular Malaysia (Table 2.1). The number of establishments increased at an average rate of 4% per annum from 337 companies in 1973 to 467 companies in 1981. The average annual growth rates for employment (7%), output (17%), and value added (13%) outpaced the expansion in the number of establishments in the industry. This suggests an increase in the average size and level of activity of individual enterprises. Industry output per employee more than doubled from M$41,680 to M$88,750 while value added per employee rose from M$17,150 to M$26,640 during this interval.

In terms of relative contribution to the manufacturing sector, the chemical industry appeared to have lost some ground between 1973 and 1981. In output terms, the chemical industry's share declined from 5.5% in 1973 to 4.4% in 1981. In similar fashion, the industry's share in manufacturing value added decreased from 7.5% to 5.1% during this period as the increase in cost of intermediate inputs outpaced output expansion.

TABLE 2.1
CHEMICAL INDUSTRY:
SELECTED ECONOMIC INDICATORS
1973 AND 1981

	Peninsular Malaysia			Total Malaysia
	1973	1981	Average Annual Growth Rate 1973-1981 (%)	1981
Number of Establishments				
Chemical Industry	337	467	4.2%	479
Total Manufacturing	11,060	17,780	6.1	20,431
% of Total Manufacturing	3.0%	2.6%		2.3%
Employment				
Chemical Industry	10,209	17,058	6.6	17,433
Total Manufacturing	297,934	534,145	7.6	580,039
% of Total Manufacturing	3.4%	3.2%		3.0%
Value of Output (M$ million)				
Chemical Industry	425.5	1,513.9	17.2	1,529.3
Total Manufacturing	7,677.7	34,486.5	20.6	38,277.7
% of Total Manufacturing	5.5%	4.4%		4.0%
Cost of Input (M$ million)				
Chemical Industry	250.4	1,059.5	19.8	1,067.6
Total Manufacturing	5,350.8	25,591.2	21.6	28,788.4
% of Total Manufacturing	4.7%	4.1%		3.7%
Value Added (M$ million)				
Chemical Industry	175.1	454.4	12.7	461.7
Total Manufacturing	2,326.9	8,895.3	18.2	9,489.3
% of Total Manufacturing	7.5%	5.1%		4.9%
Output per Employee, Chemical Industry (M$)	41,680	88,750		87,720
Value Added per Employee, Chemical Industry (M$)	17,150	26,640		26,480

Source of Basic Data: Census of Manufacturing Industries, Peninsular Malaysia 1973 and 1981.
Census of Manufacturing Industries, Malaysia, 1981.

In Table 2.2, the two sub-sectors which contributed most significantly to both gross output value and value added of the chemical industry in 1973 and 1981 are: (1) fertilizers and pesticides and (2) cosmetics, soaps and detergents.

The output value of the fertilizers and pesticides sub-sector increased at an average annual rate of 18.7% from M$117.4 million to M$461.5 million in 1981. In relative terms, this sub-sector expanded its share in the gross output value of the chemical industry from 27.6% to 30.2% during this period. This trend may be attributed to a number of factors such as: the faster pace of land development, generally good agricultural commodity prices, and increased fertilizer/pesticide application. Value added of fertilizers and pesticides rose by only 9.5% annually on the average, increasing from M$36.6 million to M$75.5 million between 1973 and 1981. The slow rise in value added of this sub-sector is understandable considering that a significant portion of manufacturing activity consists of mere physical mixing or formulation. The number of establishments producing fertilizers and pesticides almost trebled from 24 to 67 during this period.

Growth of the cosmetics, soaps and detergents sub-sector lagged behind the rest of the chemical sub-sectors. Consumption of these products, particularly soaps and detergents, is related to the population growth and per capita private consumption expenditure and is not markedly influenced by economic forces. Gross output value of this sub-sector registered an average growth of 9.5% per year, increasing from M$122.0 million in 1973 to M$252.7 million in 1981. In relative terms, this sub-sector's contribution to the total output of the chemical industry dropped sharply from 28.7% to 16.5%. Value added grew at a slower pace (6.3% per annum) from M$69.4 million to M$112.8 during this period. This caused the sub-sector's share in the total value-added of the chemical industry to fall from 39.6% in 1973 to 24.4% in 1981. The cost of inputs, primarily imported raw materials for detergents, toilet preparations and cosmetics, increased more rapidly than the value of output during this interval. Unlike the other chemical sub-sectors, the number of companies engaged in the production of soaps and detergents declined marginally from 68 to 66 between these two years.

Growth of basic industrial chemicals, which in Malaysia is composed mainly of inorganic chemicals and technical gas products, is dependent on the performance on its end-user industries. The output value of this sub-sector increased from M$51.5 million in 1973 to M$208.6 million in 1981, reflecting a 19.1% average yearly growth. There was no substantial change in its share of the gross output value of the chemical industry during this period. Value added of basic industrial chemicals rose by 16.8% per annum on the average, from M$19.5 million in 1973 to M$67.6 million in 1981.

On the basis of gross output value, one of the most impressive expansions during the 1973-1981 period was recorded by the plastics and resins sub-sector, which experienced an average annual growth of 22.8%. The derived demand for plastics and resins improved substantially during the past decade as manufacturers of industrial and consumer plastic products upgraded their technology in response to attractive market opportunities. In terms of value added performance, plastics and resins was second only to pharmaceuticals with a 21.2% average annual expansion rate between 1973 and 1981. This occurred despite a 23.6% average yearly increment in the input costs during this interval. From 1973 to 1981, the contribution of this sub-sector to output and value added of the chemical industry increased from 3.5% to 5.0% and 2.9% to 5.1% respectively. As a reflection of its vigorous growth, the sub-sector had 17 manufacturers in 1981, compared with only six establishments in 1973.

Domestic demand for paints, varnishes and lacquers is met primarily by local production. In 1981, there were 37 paint manufacturers in Peninsular Malaysia, employing 1,508 workers. Gross output value of this sub-sector increased from M$48.1 million in 1973 to M$184.6 million in 1981 at an average annual rate of 18.3%. The sub-sector's contribution to the total output of the chemical industry increased from 11.3% to 12.1% during the period and a corresponding increase of 9.9% to 13.2% was also registered in its contribution to total value added of the chemical industry.

The Census of Manufacturing Industries (Peninsular Malaysia) indicate that there were 83 establishments manufacturing drugs and medicines with a gross output value of M$83.5 million in 1981. However, excluding traditional medical preparations, there were 16 major manufacturers with a substantial share of the gross output value of the pharmaceuticals sub-sector. The contribution of this sub-sector to the total output of the chemical industry is small, that is, 5.4% in 1973 and 5.5% in 1981. However, with cost of inputs increasing at a slower pace, its contribution to value-added in the chemical industry increased significantly from 5.0% in 1973 to 8.8% in 1981. Growth in value added was the highest among all the sub-sectors, at an average of 21.3% per annum over the period.

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TABLE 2.2
CHEMICAL INDUSTRY
ECONOMIC CONTRIBUTIONS OF SUB-SECTORS
1973 TO 1981
(VALUE IN M$ MILLION IN 1981 CONSTANT PRICES)

Malaysian Industrial Classification	Chemical Sub-Sector	1973	1974	1975	1976	1978	1979	1981
35110	Basic industrial chemicals except fertilizers (organic and inorganic chemicals)							
	o Industrial gases, whether compound, liquefied or in solid state							
	o Other basic industrial chemicals, except fertilizers							
	No. of Establishments	24	24	27	34	36	40	64
	Employment	1,369	1,729	1,647	2,213	1,578	2,096	2,350
	Gross Value of Output	97.2	133.8	209.1	212.4	178.5	210.1	202.1
	Cost of Input	60.4	77.8	138.8	118.4	104.0	128.0	139.1
	Value Added	36.8	55.9	70.3	94.0	74.5	82.0	63.0
	Value Added as a % of Output	37.9%	41.8%	33.6%	44.3%	41.7%	39.0%	31.2%
35120	Fertilizers and pesticides							
	No. of Establishments	24	25	23	25	31	32	40
	Employment	1,076	1,375	1,229	1,371	1,715	1,871	2,142
	Gross Value of Output	246.6	197.7	197.0	279.3	342.2	474.2	454.6
	Cost of Input	169.7	158.4	141.5	200.2	250.7	356.4	381.3
	Value Added	76.9	39.3	55.6	100.6	91.5	117.8	73.3
	Value Added as a % of Output	31.2%	19.9%	28.2%	36.0%	26.7%	24.8%	16.1%
35130	Synthetic resins, plastic materials and man-made fibres except glass							
	No. of Establishments	6	10	11	11	13	12	15
	Employment	436	362	505	589	489	444	495
	Gross Value of Output	23.5	23.6	30.6	48.1	67.1	69.7	75.8
	Cost of Input	15.4	16.4	22.3	40.2	46.7	48.5	52.3
	Value Added	8.1	7.3	8.3	8.0	20.3	21.2	23.5
	Value Added as a % of Output	34.5%	30.9%	27.1%	16.6%	30.3	30.4%	31.0%

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Table 2.2 (Cont'd)

Malaysian Industrial Classification	Chemical Sub-Sector	1973	1974	1975	1976	1978	1979	1981
35210	Paints, varnishes and lacquers							
	No. of Establishments	16	22	26	25	31	34	37
	Employment	867	701	1,004	1,021	1,246	1,365	1,508
	Gross Value of Output	94.1	92.0	103.4	115.5	139.8	168.5	184.6
	Cost of Input	60.3	63.7	67.6	76.9	91.7	112.2	123.7
	Value Added	33.9	28.3	35.9	38.6	48.1	56.3	60.9
	Value Added as a % of Output	36.0%	30.8%	34.7%	33.4%	34.4%	33.4%	33.0%
35220	Drugs and medicines							
	No. of Establishments	70	30	20	22	25	33	83
	Employment	1,507	1,451	1,199	1,394	1,787	2,196	2,609
	Gross Value of Output	36.5	35.9	30.1	33.2	46.6	78.1	83.5
	Cost of Input	22.6	22.3	15.7	20.7	25.0	41.6	42.7
	Value Added	13.9	13.6	14.4	12.5	21.5	36.4	40.8
	Value Added as a % of Output	38.1%	37.9%	47.8%	37.7%	46.1%	46.6%	48.9%
35231 35239	Soaps, cleaning preparations perfumes, cosmetics, and other toilet preparations							
	No. of Establishments	68	29	24	20	26	30	65
	Employment	2,100	1,970	2,003	1,782	2,236	2,399	2,503
	Gross Value of Output	188.6	170.0	114.7	157.2	188.5	259.2	252.5
	Cost of Input	81.3	85.1	75.5	98.6	103.2	138.6	139.8
	Value Added	107.3	81.8	39.3	58.6	85.3	120.6	112.7
	Value Added as a % of Output	56.9%	48.1%	34.3%	37.3%	45.3%	46.5%	44.6%
35290	Chemical products, n.e.c.							
	No. of Establishments	129	130	42	46	55	62	163
	Employment	2,856	2,832	2,481	3,070	3,425	3,528	5,451
	Gross Value of Output	94.9	101.8	85.3	98.6	144.3	154.4	260.7
	Cost of Input	58.9	71.9	60.4	73.6	92.2	102.0	180.5
	Value Added	36.0	29.8	24.8	25.0	52.0	52.4	80.2
	Value Added as a % of Output	37.9%	29.3%	29.1%	25.4%	36.0%	33.9%	30.8%

Table 2.2 (Cont'd)

Malaysian Industrial Classification	Chemical Sub-Sector	1973	1974	1975	1976	1978	1979	1981
	Total Chemical Industry							
	No. of Establishments	337	270	173	183	217	243	467
	Employment	10,209	10,420	10,068	11,440	12,476	13,899	17,058
	Gross Value of Output	775.0	731.0	745.6	928.5	1,096.0	1,398.3	1,513.8
	Cost of Input	456.1	487.8	506.4	616.5	702.7	913.7	1,059.4
	Value Added	318.9	243.2	239.2	331.1	393.2	484.6	454.4
	Value Added as a % of Output	41.1%	33.3%	32.1%	35.7%	35.9%	34.7%	30.0%

Notes:

1. Data refer to Peninsular Malaysia only.
2. Data for 1973 and 1981 are census data while data for 1974-1979 are survey data.

Source: Department of Statistics.

As mentioned earlier, Malaysia is a net importer of chemicals. Export of chemicals and chemical products has been insignificant, accounting for less than 1% of the total value of exports throughout the period 1973 to 1981 (Table 2.3). The ratio of chemical exports to gross output value of the chemical industry was 15.7% in 1973 and 12.7% in 1981, reflecting the industry's dependence on the domestic market.

Exports increased at an average rate of 14.6% per annum while imports grew at a higher rate of 21.3% per annum over 1973 to 1981. Imports of chemicals and chemical products accounted for an average of 8.9% of total value of imports during the period. The ratio of chemical imports to gross output value of the chemical industry was 124% in 1973 and 138% in 1981.

TABLE 2.3
CHEMICAL INDUSTRY:
EXPORT AND IMPORT OF CHEMICALS AND CHEMICAL PRODUCTS
1973 - 1981

	Value, M$ million		Share of Total		Annual Growth Rate	
Year	Export	Import	Export	Import	Export	Import
1973	67	526	0.9%	8.9%		
					19.4%	67.1%
1974	80	879	0.8	8.9		
					(1.3)	(19.0)
1975	79	712	0.8	8.3		
					3.8	29.1
1976	82	919	0.6	9.5		
					6.1	17.4
1977	87	1079	0.6	9.3		
					17.2	12.9
1978	102	1218	0.6	8.9		
					28.4	43.0
1979	131	1742	0.5	10.2		
					31.3	16.1
1980	172	2022	0.6	8.6		
					11.6	3.7
1981	192	2096	0.7	7.9		
Average per annum			0.7%	8.9%	14.6%	21.3%

Source of Basic Data: Economic Report, Ministry of Finance Malaysia, various years

III. DEVELOPMENT ISSUES

3.1 MARKETS

A common problem shared by local chemical firms is the small domestic market which can be traced back to the undeveloped state of end-user markets, largely manufacturing industries including the chemical industry itself. This problem is particularly made evident by: (1) low capacity utilization as local chemical plants are constrained to conform to economic size plant capacity specifications of foreign process designs, such as in pesticides, sulphuric acid, phosphoric acid, compound fertilizers, soaps, and toilet preparations, and (2) the presence of small plants operating at high costs such as in ammonia and chlorine plants, plastics and resins and pharmaceuticals.

Exports of locally produced chemicals are limited for the following reasons: (1) products are generally uncompetitive because of their high import content and/or the absence of economies of scale in production, and (2) neighbouring Asian countries protect their local production through tariff and non-tariff barriers.

3.1.1 Inorganic Chemicals

Locally produced inorganic chemicals account for approximately 25 - 38% of apparent domestic consumption. Firms producing major inorganic chemicals such as chlorine and sulphuric acid have low capacity utilization because of the undeveloped state of end-user manufacturing industries.

Inorganic chemicals are sold almost entirely to industrial markets such that expansion of demand for these products hinges on the development and performance of end-user industries. Chlorine in Malaysia is used solely for water treatment while sulphuric acid is mainly utilized in the production of aluminium sulphate also for water treatment. In contrast, industrialized countries use chlorine for plastics and resins, pulp and paper and synthesis of various organic chemicals (such as vinyl chloride monomer), the sales of which depend heavily on the housing/construction and automotive industries. Sulphuric acid, on the other hand, is largely used in the manufacture of phosphatic fertilizers and other chemicals.

Domestic demand for inorganic chemicals and chemical elements, which is closely linked to performance of manufacturing industries, is projected to grow at the following rates during the next decade:

Year	Average Annual Growth Rate		
	Low	Medium	High
1985 - 1990	7.8%	9.9%	12.0%
1991 - 1995	8.4	9.8	11.1

On the whole, exports of inorganic chemicals are expected to remain at insignificant levels for the following reasons: (1) cost of production is high because of the high proportion of imported raw materials used, poor economies of scale and high electricity cost, and (2) there is heavy tariff protection in neighbouring countries for exportable products such as phosphoric acid and carbon black.

3.1.2 Fertilizers

The expansion of fertilizer demand is not expected to parallel the 10.3% growth recorded during the period 1973 to 1981. With the anticipated rapid expansion of land cultivated to cocoa, the slowdown in development of land devoted to oil palm, and the marginal improvement in usage rate of fertilizers for rubber and padi, fertilizer consumption in the next decade is projected to grow at the following rates:

Year	Average Annual Growth in Volume	
	Low	High
1985 - 1990	2.5%	4.4%
1991 - 1995	2.4	4.4

Urea will most likely displace ammonium nitrate as the nitrogen nutrient source for oil palm once the ASEAN Bintulu plant starts production by late 1985. The Bintulu plant will therefore pose a threat to Esso's naphtha-based ammonia plant and Chemical Company of Malaysia's ammonium nitrate plant, both of which may have to be shut down with the erosion of their markets.

Domestic demand for urea and export prospects to nitrogen-deficient countries in Asia can support the worldscale ammonia-urea plant of ASEAN Bintulu. Utilization of indigenous low cost natural gas and nearness to prospective export markets will provide ASEAN Bintulu's urea with a competitive edge in the international market. On the basis of projected domestic demand for urea during the next ten years, rated capacity of the Bintulu plant can sufficiently cover Malaysia's urea requirements until 1995.

Phosphate and potash fertilizers will continue to be imported. Growth in demand for soluble phosphates is not expected to reach a level which would warrant the establishment of a phosphoric acid plant by 1995.

3.1.3 Petrochemicals

The development of Malaysia's petrochemical industry hinges heavily on the size of the domestic market. Because of high investment requirements, it may not be prudent for planned investments to be anchored solely on the basis of export markets which are unreliable and the battleground of major international firms.

The domestic market for petrochemicals is small but fast growing. The bulk of domestic demand for petrochemicals is met by importation and local production is limited primarily to some plastics and resins for the domestic market. Exports are insignificant. However, Malaysia will be exporting substantial amounts of methanol in the near future when the Labuan plant comes onstream in late 1984. The availability of locally produced methanol also presents possibilities for production of methanol derivatives for domestic use as well as export.

A key issue in the development strategy for petrochemical products is the development of a petrochemical complex to produce the basic building blocks, notably ethylene and propylene, and intermediates such as polyolefines and other petrochemical products. Because these products are fed into other industries, market development in the petrochemical area depends on a large number of small to medium sized plants which must fabricate petrochemicals such as plastics and resins into finished products that are usable by the final consumers. The market potential for petrochemical products is thus dependent on the development of downstream industries particularly the plastics products industry.

Based on expected performance of the various end-user industries, domestic demand for the major petrochemicals over the next decade is projected as follows:

Product	Average Annual Growth in Volume, 1985 - 1995 Low	High
Methanol	5.5%	9.0%
Vinyl Chloride	6.0	9.0
Styrene	10.0	13.0
Ethylene Glycol	0.0	2.3
Vinyl Acetate	7.0	10.0
Low Density Polyethylene	5.5	8.5
High Desinty Polyethylene	7.0	11.0
Polypropylene	6.0	10.0
Polyvinyl Chloride	6.0	9.0
Polystyrene	10.0	13.0
Polyvinyl Acetate	7.0	10.0

It is generally accepted that the minimum capacity of an ethane cracker should be in the region of 250,000 - 300,000 tonnes of ethylene a year to be economically viable. Based on this, demand forecasts indicate that the domestic market for ethylene derivatives would not justify the production of ethylene until 1995 or after.

World market conditions for the major commodity petrochemicals have been poor in the 1980s and the prese oversupply situation is expected to continue up to 1990. On the other hand, within the ASEAN region, there is still a supply gap even with the operation of the petrochemical complex in Singapore and the establishment of a complex in Thailand. Producers in this region, however, are expected to face strong competition from Saudi Arabia and Canada.

3.1.4 Paints and Inks

Locally produced paints and inks account for about 85% of apparent domestic consumption, such that imports are comparatively small. The market is dominated by a few large companies but there are numerous small manufacturers. There is substantial surplus capacity and price competition is intense. This may force the weaker firms out of the market.

Domestic consumption of paints and inks increased at an average rate of 8.3% per annum from 1973 to 1981 to reach 45.5 million litres in 1981. The major markets for paints and inks have traditionally been the construction and manufacturing industries. Demand for these products is therefore dependent on construction and manufacturing activities which are closely related to overall economic performance (GDP).

Domestic demand for paints and inks is projected to grow at the following rates:

Year	Annual Growth in Volume		
	Low	Medium	High
1985 - 1990	7.0%	8.1%	9.2%
1991 - 1995	6.6	7.7	8.8

Exports of paints and inks are insignificant. Export markets are limited as most countries have achieved high levels of self-sufficiency in paint production. This is because transportation costs are high for the finished products and there are significant differences in taste and climatic conditions in each country.

3.1.5 Pharmaceuticals

Pharmaceuticals cover an extremely diverse range of products and include modern pharmaceutical products as well as traditional medicines and preparations. Domestic consumption of pharmaceuticals grew at an average rate of 8.0% per annum over the period 1973 to 1981. Imported products account for a large proportion of domestic demand, valued at about M$185 million in 1981. Locally produced products account for less than 30% of apparent consumption. Increased import substitution is difficult since there is no import duty on final products.

Demand for pharmaceuticals is expected to increase in line with growth in population and income at the following rates:

Year	Average Annual Growth Rate		
	Low	Medium	High
1985 - 1990	5.3%	6.7%	8.1%
1991 - 1995	5.1	6.3	7.4

Exports of pharmaceuticals are small. Malaysian products are generally uncompetitive in export markets, primarily due to lack of economies of scale and dependence on imported raw materials.

3.1.6 Pesticides

Locally produced pesticides account for about 60% of apparent domestic consumption. Despite the greater reliance on pesticides now, demand for these products is projected to expand at a slower pace during the next ten years. The sub-sector will therefore continue to have surplus capacity as utilization levels of local plants are not expected to improve significantly in the next decade. This trend is mainly attributed to the slowdown in opening of government lands. Growth of domestic demand for pesticides is projected at the following rates:

Year	Average Annual Growth Rate		
	Low	Medium	High
1985 - 1990	6.8%	7.5%	8.2%
1991 - 1995	5.2	5.7	6.4

About 50% of pesticide exports represent shipments among subsidiaries of multinational firms within Asia and Oceania, while the balance represents foreign sales to nearby small countries without production facilities such as Brunei and Singapore. Export trading activities are expected to follow the same pattern in the next decade with growth of exports most likely outpacing growth of domestic demand. Prospects of developing new foreign markets do not appear promising because of tariff barriers and registration rules in neighbouring countries.

3.1.7 Cosmetics, Soaps and Detergents

Local production of cosmetics, soaps and detergents accounts for at least 70% of apparent domestic consumption. On the whole, the domestic market for cosmetics, soaps and detergents has reached the maturity stage. Only newly developed products, such as liquid dishwashing detergents and fabric softeners, are expected to experience high growth in the next decade.

Projected domestic demand for products of this sub-sector will closely follow the increase in per capita private consumption expenditure. Growth rates of domestic demand are as follows:

Year	Average Annual Growth Rate		
	Low	Medium	High
1985 - 1990	4.8%	6.2%	7.5%
1991 - 1995	4.8	5.9	7.1

Exports of this sub-sector largely consist of intercompany arrangements of multinational companies wherein products are exported to other subsidiaries or associated companies in the region which do not have production facilities. This practice is expected to continue in the future.

Leading soap firms in the industry, which have excess capacity, are attempting to penetrate the Middle East and Japanese markets for toilet soap and soap chips or noodles. However, prospects for tapping these markets are not very encouraging and will depend heavily on: (1) competitive pricing of the base raw material, which is palm oil for Malaysian soaps and tallow for Western brands; (2) freight costs; and (3) overcoming of Middle East consumer brand loyalty to Western brands. Removal of tariff disincentives such as the 35% import duty on perfume oils and lowering of electricity rates will enhance the international competitiveness of Malaysia's soap products.

3.2 FACTOR ENDOWMENTS

3.2.1 Raw Materials

The manufacture of chemicals is highly dependent on imported raw material inputs. Over 80% of the raw materials required for the production of plastics and resins, paints, pharmaceuticals, major inorganic chemicals (chlorine, sulphuric acid and phosphoric acid), pesticides, cosmetics, and detergents are imported. Soaps and urea (by late 1985) are the only products with significant local content.

Malaysia has limited known mineral resources and raw materials available for the manufacture of chemicals. The only identified primary resources currently used and potentially available for chemical production are as follows: a) natural gas and crude oil for nitrogen fertilizers and petrochemicals; b) limestone for lime and lime products; c) xenotime and monazite for rare earth chemicals; and d) palm oil and related products for soap.

Malaysia's petroleum reserves, particularly natural gas, provide the resources necessary for further development of the petrochemical industry. Recoverable reserves of crude oil and natural gas, located offshore Terengganu, Sabah and Sarawak, are shown in Table 3.1.

TABLE 3.1
MALAYSIAN CRUDE OIL AND NATURAL GAS RESERVES
1983

	Peninsular Malaysia	East Malaysia	Total
Crude Oil (billion barrels)	1.61	0.96	2.57
Associated Gas (billion S.C.F.)	6,100	3,800	9,900
Non Associated Gas (billion S.C.F.)	19,700	20,400	40,100

Source: Petronas

Malaysia is a net exporter of crude oil. Current production is about 440,000 barrels per day and is expected to increase to 450,000 barrels per day in 1985. At the present rate of production, existing reserves will be depleted in 16 - 17 years.

Recoverable reserves of natural gas amounted to 50 TCF in 1983. Demand for natural gas by major projects in production and under construction is summarized below:

Gas Utilization Project	Gas Required	Project Status
1. LNG Plant at Bintulu	1,250 MMSCFD	Onstream
2. ASEAN Bintulu Fertilizer Project	50	Late 1985
3. Sabah Gas Utilization Project	82	
Methanol Plant (54 MMSCFD)		Onstream
HBI Plant (20 MMSCFD)		Onstream
Power Plant (8 MMSCFD)		Onstream
4. Gas Processing Plant in Kerteh	250	End 1984
5. HBI Plant in Telok Kalong	22	1985
	1,654 MMSCFD	

In addition, a gas pipeline bringing gas from Terengganu to the West coast of Peninsular Malaysia is being planned.

Based on projects already onstream and under construction, total reserves of non-associated gas will not be depleted for at least 65 - 70 years. Gas reserves are sufficient to support the development of a petrochemical complex in Malaysia and a major issue will be the price of the feedstock which is the main determinant of price competitiveness of the end-products.

Other primary resources necessary for the manufacture of chemicals such as solar salt, sulphur, phosphorus, phosphate rock and potash are not known to be available locally.

3.2.2 Labour

The Malaysian chemical industry is highly automated and is therefore not labor intensive. As a rule, the conduct of chemical plants requires skilled labour with limited assistance from general labourers. A large proportion of the labour force consists of highly skilled workers, technical staff and professionals who can control, maintain and repair the various units of equipment and instruments necessary to carry out chemical conversions and physical operations. With improvement of technology, a wider use of instruments and greater complexity of equipment, the industry will require more and more highly skilled labour.

On the basis of survey findings, serious labour shortages were reported in the following categories:

Chemical Sub-sector	Job Category
Inorganic Chemicals and Chemical Elements	Electrical Engineer Engineer (Bumiputra) Instruments Artificer Electrical Chargeman
Fertilizers	Production Executive Mechanical Engineer Mechanic Instrument Artificer Electrical Chargeman
Plastics and Resins	Manager (Bumiputra) Engineer (Bumiputra) Maintenance Technician
Cosmetics, Soaps and Detergents	Engineer (Bumiputra) Electrical Chargeman Mechanic Instrument Technician
Paints and Inks	Colour Matcher Production Supervisor Laboratory Technician
Pharmaceuticals	Laboratory Technician Mechanic/Fitter
Pesticides	Manager (Bumiputra) Electrical Chargeman

The immediate shortage of skilled labour particularly in the areas of instrumentation, process control and maintenance is a result of the lack of such manpower in Malaysia. With the implementation of government industrial projects, continued expansion of electronic firms, chemical and other manufacturing concerns, and the anticipated set-up/commencement of production of technologically intensive chemical plants in the petrochemical and fertilizer sub-sectors, labour shortage in these skilled categories as well as in management, professional and technical categories will become more pronounced. The NEP target on restructuring of employment at all occupational levels will complicate the issue as the number of Bumiputra engineers, chemists and technicians still appears to be low judging from survey responses. Available data from the Board of Engineers provides an indication of the output per year of engineering graduates in the past six years and the share of Bumiputra output (See Table 3.2). For graduates of Chemical, Mechanical and Electrical Engineering courses, the average share of Bumiputra output from 1981 to 1983 is approximately 31% or about 130 Bumiputras out of 418 graduate engineers per year in these fields.

TABLE 3.2
REGISTERED GRADUATE ENGINEERS OF SELECTED COURSES
1978 - 1983

Course/Race	1978	1979	1980	1981	1982	1983
Chemical Engineering						
Bumiputra	2	5	28	19	7	14
Chinese and Indian	4	30	66	64	29	29
Others	0	0	0	0	0	1
Sub-Total	6	35	94	83	36	44
Mechanical Engineering						
Bumiputra	13	42	173	104	72	63
Chinese and Indian	74	172	306	225	151	141
Others	0	0	0	1	0	1
Sub-Total	87	214	479	330	223	205
Electrical Engineering						
Bumiputra	8	28	87	45	32	33
Chinese and Indian	42	56	119	93	70	59
Others	0	1	0	0	0	1
Sub-Total	50	85	206	138	102	93
Production Engineering						
Bumiputra	1	0	6	7	6	4
Chinese and Indian	3	2	10	14	11	12
Others	0	0	0	0	0	0
Sub-Total	4	2	16	21	17	16
Petroleum Engineering						
Bumiputra	0	0	11	8	6	2
Chinese and Indian	0	0	0	3	3	1
Others	0	0	0	0	0	0
Sub-Total	0	0	11	11	9	3
Industrial Engineering						
Bumiputra	0	1	0	0	1	1
Chinese and Indian	1	2	4	3	5	2
Others	0	0	0	0	0	0
Sub-Total	1	3	4	3	6	3
Instrumentation and Control Engineering						
Bumiputra	0	0	0	3	3	1
Chinese and Indian	0	4	6	1	5	12
Others	0	0	0	0	0	0
Sub-Total	0	4	6	4	8	13

Source: Board of Engineers

3.2.3 Energy

The chemical industry may be characterized as highly energy dependent and capital intensive. Electric power, in particular, is the main source of energy. As such, electric power cost is considered an important component of total manufacturing cost which may enhance or erode the international competitiveness of locally produced chemicals. For chemical products such as chlorine, technical gases and ammonia, energy (mostly electricity) represents 36 - 48% of total product cost.

There is a consensus among all respondent companies that electricity cost in Malaysia is very expensive and is, in fact, among the highest in South East Asia and the Far East. Supporting data for selected Asian countries are presented in Table 3.3. As shown in this Table, average electricity rates for the newly industrialized countries of Singapore, Korea and Taiwan are generally lower than for developing ASEAN countries. Among the developing nations of ASEAN, Malaysia's electricity rates for industrial consumers stand out as one of the highest.

TABLE 3.3
COMPARATIVE AVERAGE ELECTRICITY RATES
IN SELECTED ASIAN COUNTRIES
(IN M$ PER KWH)

Country	Tariff Category	
	Low Voltage Industrial	High Voltage Industrial
Malaysia (February 1984)	0.2312	0.1925
Reference Group I:		
Indonesia (February 1983)	0.2392	0.1874
Philippines (June 1984)	0.1919	0.1919
Thailand (May 1984)	0.1864	0.1723
Reference Group II:		
Singapore (July 1984)	0.1715	0.1715
Taiwan (June 1984)	0.1429	0.1429
Korea (June 1984)	0.1610	0.1610

Source: Lembaga Letrik Negara (National Electricity Board)

3.2.4 Infrastructure

A well-developed infrastructure is of particular importance to the chemical industry due to the variety and physical properties of its raw materials and finished products as well as the different markets served. The adequacy of the existing infrastructure in Malaysia with respect to the chemical industry is discussed below:

- Efficient port facilities are essential as the industry is highly dependent on imported inputs. Companies have expressed dissatisfaction over existing facilities, particularly in the areas of bulk storage facilites and delays encountered in unloading and clearance. Many companies prefer to use the Singapore port.

- The road system in Peninsular Malaysia is generally considered adequate. In East Malaysia, the road transportation system is poor.

- The railway system is inadequate throughout Malaysia. It is poorly developed in the east coast states of the Peninsula and virtually non-existent in East Malaysia.

- Air transportation is seldom used and not critical to the chemical industry.

- Electric power supply is considered reliable in most areas. However, electricity costs are high (see discussion on Energy) and some industrial sites have no electric power supply.

- Water supply is adequate except in some areas. There were no problems encountered with water supply among respondent companies.

- Domestic telecommunications systems are well-developed although international communications are less satisfactory, resulting in delays.

- Residential, commercial and social infrastructure is lacking in most industrial areas outside the Klang Valley.

3.3 TECHNOLOGY

The Malaysian chemical industry is entirely dependent on foreign technology acquired through licensing agreements, turnkey projects and foreign consulting companies. Indigenous research and development efforts are therefore minimal. Basic research is not performed and activities have historically been confined to modifying and adapting products to suit local conditions and markets such as: (1) adapting soap and detergent formulations (mostly just the perfume) to suit the domestic market; and (2) studying the bio-efficacy of pesticides under local conditions, ascertaining its effects on local crops or the environment in terms of crop tolerance or crop residue, and developing new uses and methods of application of existing pesticides.

The industry, however, has expressed the need for the establishment of a research center where Government, research institutions, academia and chemical enterprises can collaborate to undertake research on relevant themes such as small-scale chemical plant design concept appropriate to the size of the Malaysian market.

3.4 GOVERNMENT REGULATIONS AND POLICIES

The following statutory instruments and Government policies are of significance to the industry:

	Regulation/Policy	Chemical Products Affected
1.	Enviromental Quality Act, 1984	All products
2.	Petroleum Development Act, 1974	Petrochemicals
3.	Trade Descriptions Act, 1972	All products
4.	Pesticides Act, 1974	Pesticides
5.	Control of Drugs and Cosmetics Regulations, 1984	Pharmaceuticals, cosmetics and soaps
6.	Patents Act, 1983	All products, particularly pesticides and pharmaceuticals
7.	Industrial Coordination Act, 1975	All products
8.	Investment Incentives Act, 1968	All products
9.	Export Incentives	All products
10.	New Economic Policy	All products
11.	Tariff protection and concessions	Selected products

3.4.1 Environmental Quality Act, 1974

Environmental protection becomes an increasingly important issue with further development of the chemical industry. There is a general consensus within the industry that conditions imposed by the Department of Environment are reasonable and necessary.

3.4.2 Petroleum Development Act, 1974

The Act regulates all upstream and downstream petroleum activities, thereby affecting the manufacture of petrochemical products. In practice, the Act has little impact on the existing industry in that it does not promote nor hamper its development. Although licensing from PETRONAS is no longer required for downstream activites, the role of PETRONAS in the future development of the petrochemical industry remains unclear.

3.4.3 Trade Descriptions Act, 1972

Enforcement of existing legislation is considered inadequate in preventing imitation and adulteration of products. The problem is particularly pronounced in the paints, pharmaceuticals, cosmetics, soaps and detergents industries.

3.4.4 Pesticides Act, 1974

The Pesticides Act is beneficial to consumers and the environment. However, current practices adopted in line with its implementation are deemed to have adverse effects on the development of the local pesticide industry. Common complaints raised by industry are:

- long processing time for registration of pesticides
- overcautious stance with regard to new formulations
- difficulty to appeal rejected applications as no reasons are given for the rejection

Penalty for imitation and adulteration offenses is also considered inadequte.

3.4.5 Control of Drugs and Cosmetics Regulations, 1984

The Regulations, requiring registration and licensing of all drugs and cosmetics manufactured, imported or sold, has yet to be implemented. Manufacturers of high-quality products welcome the enforcement of the Regulations since it provides protection against imitation and low-quality products. Imports and, to a lesser extent, local production is expected to be restricted.

3.4.6 Patents Act, 1983

The Act remains to be implemented and its strict enforcement will encourage entry of new technology into the country.

3.4.7 Industrial Coordination Act, 1975

The Industrial Coordination Act is generally viewed as being ineffective in regulating or promoting the industry. For example, in the paints and mixed fertilizer industries which are characterized by overcapacity and proliferation of small-scale operations requiring low investments, the Act has not been effective in controlling surplus capacity. On the other hand, delays involved in obtaining licenses, approved projects not implemented and restrictive conditions imposed (especially with respect to Bumiputra participation) have inhibited investment growth in some areas.

3.4.8 Investment Incentives Act, 1968

Investment incentives are desirable but are rarely considered a critical factor in investment decisions, particularly by foreign investors.

3.4.9 Export Incentives

Export incentives have little effect on the chemical industry at present as it caters primarily to the domestic market with limited export activity. Moreover, application procedures for these incentives are complicated and time-consuming. Many companies do not consider it worthwhile applying for the incentives when export quantities are small.

3.4.10 New Economic Policy

Fulfilment of the New Economic Policy (NEP) is subject to a few constraints in the chemical industry:

- the industry is heavily dependent on foreign technology and the NEP could discourage technology transfer.
- the industry is capital intensive, usually requiring substantial outlays. Such resources are not readily available locally.
- the industry requires a high level of technical skills which may not be available among Malaysians, particularly Bumiputra.

3.4.11 Tariff Protection and Concessions

With the exception of pharmaceuticals, soaps and detergents, some pesticides and formaldehyde resins, the domestic industry is well-protected by tariffs. Protective tariffs are granted because domestic production plant costs are usually comparatively high due to uneconomic sizes and dependence on imported raw materials such that local products are unable to compete with imports.

The consequence of tariff protection, however, is higher costs for downstreamers as well as other industries dependent on the output of the chemical industry. Therefore, downstreamers and dependent industries could become uncompetitive, particularly in export markets. In addition, protection of local industries for extended periods may result in inefficiencies and employment of obsclete technology.

Most of the raw materials and equipment required by the industry are not available locally and have to be imported. However, import duties have been imposed on some materials and equipment. In addition, import duty is also levied on raw materials while final products are exempted or subject to low import duty as in the case of pharmaceuticals, insecticides, fungicides, and soaps.

IV. REGULATORY AND PROMOTIONAL FRAMEWORK

The objectives of this section are to discuss briefly government laws and regulations as well as industrial and investment policies which affect the chemical industry, and to assess their impact on the development of the industry.

4.1 GOVERNMENT LAWS AND REGULATIONS

The Consultants identified the following statutory instruments that govern or regulate the industry:

	Title	Chemical Product Affected
1.	Environmental Quality Act, 1974	All products
2.	Petroleum Development Act, 1974	Petrochemicals
3.	Trade Descriptions Act, 1972	All Products
4.	Pesticides Act, 1974	Pesticides
5.	Control of Drugs and Cosmetics Regulations, 1984[1]	Pharmaceuticals, cosmetics and soaps
6.	Patents Act, 1983[1]	All particularly pesticides and pharmaceuticals

Note: 1. As yet to be implemented

4.1.1 Environmental Quality Act, 1974

The Environmental Quality Act of 1974 provides for the creation of an Environmental Quality Council (EQC) under the jurisdiction of the Ministry of Science, Technology and Environment. This piece of legislation empowers the Director General of the EQC to evaluate applications for licenses and to stipulate conditions under which licenses are granted. It also authorizes the EQC to issue implementing guidelines with respect to the prevention or control of pollution and enhancement of environmental quality.

The detailed regulations aimed at limiting the various types of pollutants emanating from any plant, process, equipment or installation of the chemical industries as well as other local industries or trade are contained in the following articles:

	Type of Pollution
1. Environmental Quality (Clean Air) Regulations 1978	Air
2. Environmental Quality (Sewage and Industrial Effluents) Regulations 1979	Water, Solid Waste

These implementation guidelines prescribe the permissible limits of wastes, discharges, emissions or deposits in specific areas of industry or trade.

4.1.2 Petroleum Development Act, 1974

The Petroleum Development Act of 1974 places the entire ownership, rights, powers, liberties, and privileges of exploiting petroleum resources on land offshore Malaysia in Petroliam Nasional Berhad (PETRONAS). The purpose of this Act is to enable Government through PETRONAS to ensure that the development of the petroleum industry is fully in line with national interests and objectives.

The Petroleum Regulations 1974, issued under the terms of the Petroleum Development Act 1974, requires all organizations dealing in oil and petroleum products to obtain a licence from PETRONAS. The regulations cover companies undertaking exploitation or exploration activities; mining petroleum, in particular those involving the provision of services and the supply and use of rigs, derricks, ocean tankers, and barges; and processing or refining petroleum, or manufacturing petrochemical products. The latest amendment with respect to regulations, the Petroleum (Amendment) Regulations 1981 which is effective from October 1, 1978, transfers the licensing powers in downstream petroleum activities from PETRONAS to the Ministry of Trade and Industry. PETRONAS will continue to be responsible for the processing and enforcement of licenses relating to business and activities connected with all upstream petroleum operations. Upstreams activities cover only exploration and production of petroleum.

4.1.3 Trade Descriptions Act, 1972

The Trade Descriptions Act of 1972 consolidates and amends the laws relating to merchandise marks. The Act is primarily aimed to protect end-users from imitation or adulterated products by ensuring that manufacturers do not apply a false trade description to any goods, or that any person involved in trade or business does not supply or offer to supply any goods to which a false trade description is applied. A trade description covers any direct or indirect indication of the following:

- nature of designation;
- quantity, size or gauge;
- method of manufacture, production, processing or reconditioning;
- composition;
- fitness for purpose, strength, performance, behaviour or accuracy;
- the degree of fineness of gold and silver goods;
- any physical characteristics not included in the preceding paragraphs;
- testing by any person and results thereof;
- quality otherwise than as specified in the preceding paragraphs;
- approval by any person or conformity with a type approved by any person;
- place or date of manufacture, production, processing or reconditioning;
- person by whom manufactured, produced, processed or reconditioned;
- other history, including previous ownership or use.

A Controller of Trade Descriptions, who is subject to the general direction and control of the Minister of Trade and Industry, has supervision in all matters relating to the enforcement of the Trade Descriptions Act.

This Act is particularly applicable to chemical end-products such as pharmaceuticals, paints, pesticides, cosmetics, soaps, and detergents.

4.1.4 Pesticides Act, 1974

The Pesticides Act of 1974 regulates the supply, distribution and usage of pesticides in Malaysia to ensure the safety and protection of consumers and the environment. It provides for the establishment of the Pesticides Board which is responsible for the enforcement of this Act.

At present, the Pesticides Act is only in its first stage of implementation. Any person who intends to manufacture, import, formulate, and distribute pesticides is required to apply for the registration of the product with the Pesticides Board. Any person or organization desiring to import pesticides for educational or research purposes is required to apply to the Board for a permit to import the pesticide.

4.1.5 Control of Drugs and Cosmetics Regulations, 1984

The Control of Drugs and Cosmetics Regulations of 1984, issued under the terms of the Sale of Food and Drugs Ordinance of 1952, requires all organizations engaged in the manufacture, sale, supply or import of any drug or cosmetic to register the product and to obtain the appropriate license required under these regulations. The purpose of these regulations is to protect consumers and to ensure that drugs and cosmetics available in Malaysia are of good quality, safe and effective. The Drug Control Authority has been established specifically to enforce these regulations.

Existing pharmaceutical and cosmetic factories as well as firms which intend to manufacture these products are required to fulfill certain conditions before the Authority issues their manufacturer's license. Key conditions include:

- employment of experienced and technically qualified personnel;
- adherence of factory premises to standards set by the Authority;
- use of suitable manufacturing and testing equipment; and
- provision of a quality control department

As of this writing, the Control of Drugs and Cosmetics Regulations has yet to be implemented.

4.1.6 Patents Act, 1983

The Patents Act was enacted only in 1983 and remains to be implemented. The Act provides for the establishment of a Patents Board and the appointment of a Registrar of Patents who shall be conferred with powers and functions for the proper administration of this Act. This long-awaited statutory instrument is expected to provide protection to patentable local inventions which may either be a product or a process. Government's strict enforcement of the Patents Act will encourage the entry of new technology into the country.

At present, trademarks and patents are registered under the provision of the Trade Marks Ordinance and the United Kingdom Patents Ordinance, respectively. Prescribed application forms for registration are submitted to the Registry of Trade Marks and Patents which handles applications for Malaysia.

There are 34 classes of commodities for patent purposes based on the International Classification of Goods. An application must be submitted for each trademark in each class. Registration of the mark is effective for seven years, renewable for periods of 14 years each and a further period of 14 years thereafter.

Under the provisions of the United Kingdom Patents Ordinance, patents which have previously been registered in the United Kingdom may be registered in Malaysia within three years from the date the patent was approved. Applications for registration with the local registry have to be accompanied by a Certificate of Registration issued by the Comptroller-General of Trade Marks, Patents, and Designs in the United Kingdom and a certified copy of the specifications relating to the invention.

4.2 INDUSTRIAL AND INVESTMENT REGULATIONS AND POLICIES

The industrial and investment regulations and policies of Malaysia are not designed exclusively for the chemical industry but apply to all industries in the manufacturing sector. Regulations and policies which are of general significance to the chemical industry are as follows:

1. Industrial Coordination Act, 1975 (As Amended)
2. Investment Incentives Act, 1968
3. Duty Drawback under the Customs Act, 1967
4. Export Incentive under the Sales Tax Act, 1972
5. New Economic Policy
6. Tariff Protection and Concessions

4.2.1 Industrial Coordination Act, 1975 (as Amended)

The Industrial Coordination Act, which came into force on May 1, 1976, seeks to ensure the orderly development and growth of the country's manufacturing sector. This legislation requires a licence for all manufacturing activities, whether for existing projects, expansion of projects, or new proposals. Only industrial projects which involve 25 or more full-time paid employees or M$250,000 or more in shareholders' funds are covered under this Act. Applications for licences are submitted to the Ministry of Trade and Industry through the Malaysian Industrial Development Authority (MIDA), a statutory body responsible for the promotion and coordination of the country's industrial development.

4.2.2 Investment Incentives Act, 1968

Malaysia offers attractive incentives under the Investment Incentives Act of 1968 to both foreign and local companies which undertake investments consistent with the Government's industrialization program. These incentives are designed to provide companies which are investing in new enterprises or expanding existing ones, with total or partial relief from the payment of income and development tax. The tax relief is granted in various forms and investors may select the type of incentives most beneficial to them. Basically, Malaysia offers nine major forms of tax incentives which are relevant to the chemical industry; namely: (1) pioneer status, (2) investment tax credit, (3) labour utilization relief, (4) export incentives, (5) increased capital allowance, (6) locational incentives, (7) tax incentives for restructuring, (8) export refinancing facility, and (9) incentives for research and development.

The following manufactured chemicals or chemical products are included in the list of priority products approved by the Minister of Trade and Industry and the Minister of Finance:

- titanium dioxide
- upgrading of ilmenite and rutile
- palm oil derivatives in finished products
- sorbitol
- carboxy methyl cellulose
- yttrium oxide and other rare earths
- urea and triple superphosphate fertilizers
- phosphoric acid and phosphate salts
- derivatives obtained from hydrochloric acid where hydrochloric acid is utilized to produce: (1) chlorides and oxychlorides of tin ore by-products e.g. stannous chloride, cerium chloride, xenotine oxychloride etc.; and (2) chlorides of inorganic salts, e.g. ammonium chloride, calcium oxychloride, etc.
- derivatives obtained from sulphuric acid where sulphuric acid is used to produce salts of sulphates and sulphites.

Effective from year of assessment 1984, the Minister of Finance has approved the following incentives for companies incurring expenditure on approved research and development:

- One and one third deduction of revenue expenditure incurred for research and development. The research can be carried out by the taxpayer himself or on his behalf by any scientific association, university or college or research institution.

- Buildings for research and development will be deemed as industrial buildings and will be eligible for the industrial building allowance which will be in the form of an initial allowance of 10% and an annual allowance of 2%.

4.2.3 Duty Drawback under Customs Act, 1967

In addition to the export incentives provided in the form of income tax concessions under the Investment Incentives Act of 1968, the Government provides exporters with an additional form of fiscal incentive -- the drawback of import duties and surtax on imported raw materials and components used in the manufacture of finished export products which are included in the 1977 Customs Regulations schedule of commodities eligible for drawback.

4.2.4 Export Incentive under Sales Tax Act, 1972

Under the Sales Tax Act, there is a special provision for exemption of Sales Tax on export of taxable goods.

4.2.5 New Economic Policy

The objectives of the New Economic Policy (NEP) are formulated in the Outline Perspective Plan, 1971 to 1990, of Malaysia. The two-pronged objectives of the NEP are the eradication of poverty irrespective of race and the restructuring of society to eliminate the identification of race with economic functions. The latter objective reflects the Government's policy to increase the representation of Bumiputera in all sectors of the Malaysian economy. Two of the goals of the NEP are:

- Creation of commercial and industrial community among Bumiputera in order that by 1990, they may own and manage at least 30 percent of the total economic, commercial and industrial activities of the country in all categories and scales of operation; and

- Restructuring of sectoral and occupational employment patterns in the various sectors of the economy so that by 1990, they may reflect the racial composition of the country.

4.2.6 Tariff Protection and Concessions

Where the Government considers appropriate, the following may be granted to companies catering the domestic market as well as export-oriented enterprises:

- protection of local industries either by way of quota/licensing or by the imposition of protective tariffs or both

- exemption form import duty on raw materials and machinery required by manufacturing industries

Appendix 1 summarizes the applicable import duties, sales tax and surtax rates for locally produced chemicals.

4.3 PERCEIVED EFFECTIVENESS OF GOVERNMENT REGULATIONS AND POLICIES

Responses of the companies surveyed with regard to the impact of the regulatory framework on the development of the industry are summarized in Table 4.1.

TABLE 4.1
CHEMICAL INDUSTRY:
EFFECTIVENESS OF REGULATORY FRAMEWORK

Regulation/Policy	No Response	No Effect	Favourable	Adverse
Industrial Coordination Act, 1975	10%	45%	25%	20%
New Economic Policy	10	45	10	35
Petroleum Development Act, 1974	15	80	-	5
Environmental Quality Act, 1974	5	25	25	45
Investment Incentives	10	60	30	-
Export Incentives	-	64	36	-

Source: SGV-KC Field Survey

4.3.1 Industrial Coordination Act, 1975

About 45% of respondents viewed the Industrial Coordination Act of 1975 as having little or no impact on the industry. For the paint and mixed fertilizer sub-sectors which are characterized by overcapacity and proliferation of small-scale operations requiring low investments, the Act has not had any positive effect with respect to controlling surplus capacity. This is because licensing exemptions are given to projects which employ less than 25 full time paid employees or have shareholders-funds of less than $250,000.

Favourable responses cited the effectiveness of the Industrial Coordination Act in minimizing the risk of overcapacity and protecting existing manufacturers against undue competition. Unfavourable responses emphasized the delays involved and restrictive conditions imposed by the manufacturing license, especially with respect to Bumiputra participation, which have inhibited investment growth in some industries.

4.3.2 Petroleum Development Act, 1974

A large majority of respondents are not affected by the Petroleum Development Act. Some respondents, however, expressed concern and uncertainty over the role and authority of PETRONAS with regard to the future development of the petrochemical industry.

4.3.3 New Economic Policy

Wholly Malaysian-owned companies and companies already complying with the New Economic Policy (NEP) generally regard the policy as favourable or having no effect on the industry. About 35% of respondents consider the NEP as having adverse effects on the development of the industry, which is heavily dependent on foreign technology. Respondents disclosed that the NEP puts restrictions on foreign investment, technology transfer and capacity expansion.

Some respondent companies are seeking consideration from the Government with respect to ownership restructuring as well as restructuring of employment pattern. Companies required to restructure should be given time to do so, particularly if the equity involved is substantial. Government should exercise consideration with regard to achievement of the targetted racial composition of work force in the industry. On the whole, the interviewed firms are experiencing considerable difficulty in recruiting qualified Bumiputras for certain levels, namely, executive, professional and technical positions.

4.3.4 Environmental Quality Act, 1974

Although majority of the respondents view the Environmental Quality Act of 1974 unfavourably in that additional costs have to be incurred in meeting the requirements of the Department of Environment, there is a general consensus that the conditions imposed are reasonable and necessary.

4.3.5 Investment Incentives

A high proportion (60%) of respondent firms signified that the investment incentives had no effect on them as they were either not eligible for incentives or already well past the tax holiday period. However, most qualified that the tax concessions derived from these incentives were beneficial to the companies concerned.

4.3.6 Export Incentives

As the industry caters primarily to the domestic market, it is not surprising that most of the interviewed firms (64%) regarded export incentives as having little or no effect on them. Respondent companies with significant export activity consider the export incentives, particularly the drawback of import duties and surtax on imported raw materials, as favourable only "in principle". However, most qualified that the positive impact of this incentive is not realized because it takes too long before the import duties and surtax are paid back to the exporter. Some respondents also indicated that it is too costly and time-consuming to go through an application for export incentives because of the amount of paperwork and information requirements involved.

4.3.7 Pesticides Act, 1974

Respondents in the pesticide industry expressed dissatisfaction in the implementation of the Pesticides Act and the inadequacy of measures to protect the industry against imitation and adulteration malpractices. There is a general consensus that the processing time for registration of a pesticide product (normally two years) is too long and too costly for suppliers and, ultimately, consumers as well. Moreover, the Pesticides Board appears to be overcautious and is reluctant to take a lead in the registration of new products, in particular, pesticides used in oil palm and rubber plantations, which are not used in developed countries. In the case of rejections of application for registration, applicants are not given the specific reason or cause for rejection such that the entities concerned find it difficult to appeal or follow up their case. This translates into considerable waste of time and money spent on R & D.

The Board should also address the problem of increasing incidence of adulterated or imitation products by providing heavier penalty for such offenses.

4.3.8 Trade Descriptions Act, 1972

The problem of imitation and adulteration of products has also been raised by interviewed firms in the paints as well as the pharmaceuticals, cosmetics, soaps and detergents sub-sectors. The Government is requested to provide the necessary assurance and commitment to reduce imitation and adulteration by strictly enforcing the Act.

4.3.9 Tariff Protection and Concessions

With the exception of pharmaceuticals, soaps and detergents, some pesticides and formaldehyde resins, the domestic industry is well protected by tariffs. Tariff protection is considered necessary as domestic production costs are often comparatively high such that local products are unable to compete with imports.

Duty exemptions are usually granted on imported raw materials not locally produced. However, application for duty exemptions are considered tedious and may be subject to restructuring conditions.

Import duty is also levied on raw materials while final products are exempted or subject to low import duty as in the case of pharmaceuticals and soaps. This is considered unfair.

Respondents are of the opinion that import duty should not be imposed on products not locally manufactured. In addition, import duty on chemical equipment, its components and spare parts, and pollution control equipment should also be removed since local fabricators do not have the capability to meet the high technical specifications of equipment needed by the chemical industry. Finally, where final products are not subject to import duty, raw materials should also be exempt.

V. INORGANIC CHEMICALS AND CHEMICAL ELEMENTS

5.1 CURRENT INDUSTRY POSITION

5.1.1 Industry Structure and Characteristics

The major inorganic chemicals and chemical elements produced in Malaysia are:

1. caustic soda and chlorine
2. hydrochloric acid
3. sulphuric acid/oleum/battery acid
4. aluminium sulphate
5. sodium silicate
6. hydrated lime
7. phosphoric acid
8. technical gases (chiefly oxygen, nitrogen, carbon dioxide)*
9. carbon black
10. zinc oxide

Locally produced chemicals constitute roughly 25-38% of total inorganic chemicals and chemical elements consumed in Malaysia. The rest are imported from the industrialized countries of Europe, the Americas, and Japan as well as from other chemical mineral-rich nations such as the People's Republic of China, Kenya and Australia.

Inorganic chemicals and chemical elements are, in turn, used as inputs in a diverse range of industries. Among them are:

1. steel mills
2. foundries
3. metal works
4. palm oil refineries
5. rubber processing mills
6. textile mills
7. adhesives manufacture
8. water works
9. food and beverage processing

These products are also employed by the chemical industry itself as inputs in the manufacture of other chemical products such as soaps and detergents, paints, fertilizers, and pesticides.

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* Acetylene gas is covered under organic building blocks and intermediates.

At present, around 21 companies of the estimated 42 firms in production account for the bulk of inorganic chemicals and chemical elements produced in the country. They are distributed as follows:

Product Group	No. of Companies
Chlor-alkali and related products	2
Sulphuric acid and its salts; sodium silicate	2
Phosphoric acid	1
Lime and lime products	5
Calcium carbide	1
Technical gases	7
Carbon black	1
Zinc oxide	3

The major manufacturers of these products, their size in terms of paid-up capital, plant locations, and product lines are outlined in Table 5.1. Other products currently being manufactured on a small scale include copper sulphate.

During the course of the Consultants' field survey, respondent companies identified several projects which are awaiting approval or have already been approved by MIDA. These projects involve the production of the following products: (1) titanium dioxide from ilmenite; (2) dicalcium phosphate, dental grade; (3) acid clay; and (4) stannic chloride. A chlorine plant is expected to be included in the turnkey pulp and paper project in Sabah.

TABLE 5.1
INORGANIC CHEMICALS AND CHEMICAL ELEMENTS:
LIST OF DOMESTIC MANUFACTURERS
1984

	Company	Paid Up Capital (In Million M$)	Plant Location	Products Manufactured
1.	Chemical Company of Malaysia Berhad	$30.0	Kelang, Selangor	Chlor-alkali products Caustic soda Liquid chlorine Hydrochloric acid Hydrogen Sodium hypochlorite Calcium chloride Other products - Granulated compound fertilizers Weedkiller Animal feed supplements
2.	Malay - Sino Chemical Industries Sdn. Bhd.	9.5	Ipoh, Perak	Chlor-alkali products Caustic soda Hydrochloric acid Hydrogen Sodium hypochlorite Calcium hypochlorite Subsidiary's product Methyl chloride
3.	Malaya Acid Works Berhad	12.6	Petaling Jaya, Selangor Prai	Sulphuric acid, oleum battery acid Aluminium sulphate Hydrated lime Sodium silicate
4.	See Sen Chemical Bhd.	6.0	Johor Bahru	Sulphuric acid, oleum battery acid Aluminium sulphate Sodium silicate Copper sulphate

Table 5.1 (Cont'd

	Company	Paid Up Capital (In Million M$)	Plant Location	Products Manufactured
5.	Lime and Lime Products Sdn. Bhd.	n.a.	Kedah	Hydrated lime Agricultural lime Quicklime
6.	Malaysian Resources Corporation Berhad	26.8	Perak	Calcium carbide Quicklime Slake lime Ferrosilicon Acetylene gas
7.	Albright & Wilson (Malaysia) Sdn. Bhd.	2.0	Port Kelang, Selangor	Phosphoric acid Metal polishing solutions Pickling solutions
8.	Malaysian Oxygen Berhad	46.1	Petaling Jaya, Selangor Prai Pasir Gudang, Johor Bahru Penang Port Dickson	ASU gases * Argon Acetylene Carbon dioxide Specialty gases and gas mixtures Arc welding electrodes
9.	Super Oxygen Sdn. Bhd.	3.7	Kuala Lumpur Penang	ASU gases Acetylene Gas mixtures
10.	Industrial Oxygen Inc. Bhd.	8.5	Shah Alam, Selangor	ASU gases Argon Acetylene Gas mixtures
11.	Gas Pantai Timur Sdn. Bhd.	1.9	Kota Bharu, Kelantan	ASU gases Acetylene

* ASU gases, which are produced from an air separation unit (ASU), include oxygen and nitrogen.

Table 5.1 (Cont'

	Company	Paid Up Capital (In Million M$)	Plant Location	Products Manufactured
12.	Sabah Oxygen Sdn. Bhd	1.0	Kota Kinabalu, Labuan and Tawau in Sabah	ASU gases Acetylene
13.	Eastern Oxygen Sdn. Bhd.	1.2	Kuching, Sarawak	ASU gases Acetylene
14.	Bintulu Industrial Gases	n.a.	Miri, Sarawak	ASU gases
15.	Malaysian Carbon Sdn. Bhd.	n.a.	Port Dickson	Carbon black
16.	Metakem Sdn. Bhd.	0.5	Nilai, Negeri Sembilan	Zinc oxide

n.a. - not available

Source: SGV-KC Field Survey

The general characteristics of this industry can be inferred from the following observations:

1. The industry is dominated by a few large firms with capitalization of over M$2.0 million each. These firms are well-established and some have been operating in Malaysia for the past two or three decades.

2. Foreign equity ownership in leading firms ranges from 55% to 95% of total paid-up capital.

3. The industry is entirely dependent on foreign technology and does not undertake any indigenous R & D.

4. Almost all production of this industry is sold domestically because the products are not competitive in the international market. This lack of international competitiveness is generally traced to any or all of the following factors: (a) high imported raw material content, (b) high energy cost, and (c) freight disadvantage.

5. The bulk of locally produced inorganic chemicals is accorded government protection in the form of high customs duties on imported substitutes.

5.1.2 Current Industry Problems

Survey respondents consider the following to be major problems faced by the industry:

1. Small domestic market and limited prospects for export of existing products. Local producers cannot achieve economies of scale because of the small domestic market requirements. The majority of existing products are not price-competitive in the international market.

2. High cost of electric power and fuel. All respondents indicated that energy cost in Malaysia, which is one of the highest in this part of the world, contributes to the high prices of local output in this industry. One respondent stated that there is a need to improve the electricity distribution system in Petaling Jaya.

3. Tariffs imposed on imported chemical equipment, its components and spare parts, and pollution control equipment. Survey respondents pointed out that the import duties on these equipment should be removed since local fabricators do not have the capability to meet the high technical specifications of equipment needed by the chemical industry. Examples cited are membrane plant equipment, refrigeration equipment, pollution control equipment, components of air separation plant, vaporizers, filters, and pumps.

4. Shortage of labour skills, notably, experienced instrument technicians, artificers and electrical chargemen with certificates, as well as competent electrical engineers with certificates. There is a consensus among respondents that a shortage of these skills exists and may have been brought about by the industrialization program. Some companies have been experiencing a high turnover of artificers and chargemen since these companies are not able to meet the salary demands of such workers. In addition, three of the six respondents commented that while there is no real shortage of chemical and mechanical engineers in Malaysia, the rapid turnover of Bumiputra engineers in the industry is a source of concern. The movement of Bumiputra engineers mostly to Petronas and other government industrial projects has made it difficult for some chemical companies to comply with the Government's policy of restructuring the racial composition of the workforce, particularly in the professional and technical categories. One respondent requested the authorities to review the system of granting certificates to electrical chargemen since the present system appears to favour issuance of new certificates to Malays.

5. Implementation of the incentive system. Only two of the six companies interviewed submitted remarks on the implementation of the present incentive system as the rest were already past the period for enjoying incentives. One respondent stated that there is a need to streamline the processing of applications for incentives - there are too many requirements for the application itself and too much red tape involved during its processing. With regard to export incentives, one exporter respondent indicated that export incentives lose their impact as incentives because of the lengthy waiting period entailed in securing reimbursements of taxes and duties paid to the Government.

6. Infrastructure. A majority of respondents indicated that existing infrastructure generally satisfies the requirements of the industry although one respondent underscored congestion problems experienced at Port Kelang and Pasir Gudang.

7. Tariff barriers in foreign markets. One respondent whose company is engaged in substantial exports of inorganic acids pointed to the difficulty of developing overseas markets. The suggestion was made for the Government to negotiate with other ASEAN nations regarding the reduction, if not abolition, of applicable duties on inorganic chemicals and intermediates.

The following areas are not considered as serious threats to the industry: increasing competition, dumping from foreign countries, availability of local financing. The Government provides local firms with adequate protection from foreign competition in the form of high import duties levied on imported substitutes. Inorganic chemical firms cannot survive without this protection because of the absence of economies of scale for their plants and the unavailability of local raw materials for most products. Existing local producers of the same product do not engage in price competition in the domestic market since cost of inputs such as raw materials, labour, electricity, fuel, and taxes and duties paid, do not vary markedly with the site location of plants. Non-price competition in terms of quality, distribution and R & D is also virtually non-existent.

Survey respondents indicated that their companies do not experience any major problems with raw material supply and government regulations. One respondent, however, felt that there are too many licences required by various Government authorities and agencies.

5.2 PRODUCTION ASPECTS

As indicated in Table 5.1, most of the companies in the industry have multi-product lines, some of which fall under other sub-sectors of the chemical industry. According to survey respondents, inorganic chemicals are characteristically sold without any brand name.

5.2.1 Production Capacity and Utilization

Total production capacity of selected inorganic chemicals and chemical elements as at October 1984 is shown in Table 5.2.

TABLE 5.2
INORGANIC CHEMICALS AND CHEMICAL ELEMENTS:
TOTAL PRODUCTION CAPACITY
1984

Product	Rated Capacity[1] (In MT per annum)
Chlorine	10,000
Caustic soda, 100% basis	18,200
Sulphuric acid	85,800[2]
Phosphoric acid	10,000

Notes : 1. Rated capacity is based on three shifts.

2. An additional sulphuric acid plant with a 66,000MT per annum capacity is under construction in Prai and will be completed by mid 1985.

Source: SGV-KC Field Survey

MIDA statistics on total production and overall capacity utilization of the industry show a modest increase in utilization level over the past decade (See Table 5.3). Ex-factory sales value expressed in 1981 constant prices increased at an average annual rate of 11.8%, from M$47.6 million in 1973 to M$115.8 million in 1981. On the whole, the industry was operating well below capacity with utilization levels remaining at 44-47% at the end of the decade.

TABLE 5.3
INORGANIC CHEMICALS AND CHEMICAL ELEMENTS:
PRODUCTION AND CAPACITY UTILIZATION
1973 TO 1981

Year	Ex-Factory Sales Value (In M$ '000)	Capacity Utilization
1973	$ 47,608	30%
1974	57,334	30
1975	60,110	32
1976	74,866	35
1977	71,972	38
1978	89,755	39
1979	109,065	44
1980	125,100	47
1981	115,793	45
Average Annual Growth Rate 1973 - 1981	11.8%	

1 Expressed in 1981 constant prices

Source: MIDA

The utilization levels of selected production facilities among respondent companies are shown in Table 5.4.

TABLE 5.4
INORGANIC CHEMICALS AND CHEMICAL ELEMENTS:
UTILIZATION LEVEL OF SELECTED COMPANIES
1984

Product	Utilization Level
Chlorine	44
Caustic soda	73 - 94
Sulphuric acid	18 - 42
Oleum	44
Battery acid	36
Aluminium sulphate	27 - 90
Sodium silicate	86
Phosphoric acid	60

Source: SGV-KC Field Survey

Chlorine and caustic soda are coproducts. In Malaysia, demand for caustic soda has historically been greater than demand for chlorine, which is used solely for water treatment. Since the beginning of the local chlor-alkali industry, the operating rate for caustic soda and chlorine production has been dependent on chlorine demand because of the difficulty in disposing chlorine. Caustic soda requirements which cannot be met by local production are imported mostly from Europe. The chlor-alkali industry in Malaysia has been operating below capacity in the past years as evidenced by its low utilization level expressed in chlorine equivalent (44%).

Malaysia has more than sufficient capacity to meet local requirements for sulphuric acid, oleum, and battery acid. Utilization levels for these products range from 36% to 44% of rated capacity.

The technical gas company interviewed for this study declined to divulge information on its capacity and utilization level as well as for the industry at large. The respondent claimed that there is sufficient capacity to meet the technical gas requirements of local industries, utilities and services since there are seven companies (six operating and one scheduled to operate by the end of 1984) operating about 13 air separation plants, one nitrogen generator, and one carbon dioxide plant located all over Malaysia.

Input Profile

As gathered from survey findings, the major raw material inputs of locally produced inorganic chemicals and chemical elements are summarized in Table 5.5.

TABLE 5.5
SELECTED INORGANIC CHEMICALS AND CHEMICAL ELEMENTS: RAW MATERIAL INPUTS

		Source		
Product	**Raw Materials**	**Local**	**Imported/Country of Origin**	**Price (In M$ per MT)**
1. Chlorine and caustic soda	Solar salt	-	100% - Western Australia	$100 - 128
2. Sulphuric acid, oleum, battery acid	Sulphur	-	100% - Singapore	330
3. Aluminium sulphate	Sulphuric acid	(Own production)	-	
	Aluminium hydroxide	-	100% - Japan, Taiwan, People's Republic of China	345
4. Copper sulphate	Scrap copper	100%	-	1,000
	Sulphuric acid	(Own production)		
5. Sodium silicate	Soda ash	-	100% - U.S.A., Africa	400
6. Hydrated lime	Sand	100%	-	38
	Quicklime	100%	-	130
7. Phosphoric acid	Yellow phosphorus	-	100% - Canada, U.K.	3,680
8. Technical gases - oxygen, nitrogen, argon and gas mixtures	Air	100%	-	

Source: SGV-KC Field Survey

The bulk of the respondents' raw material requirements is imported because Malaysia is inadequately endowed with the basic natural inputs needed to produce inorganic chemicals.

All respondents indicated that they did not experience any problems with the regularity of supply, consistency of quality and excessive price fluctuations of their raw materials.

Import duties and taxes levied on major raw materials used by the industry are summarized in Table 5.6.

TABLE 5.6
INORGANIC CHEMICALS AND CHEMICAL ELEMENTS:
DUTIES AND TAXES ON MAJOR RAW MATERIALS

Raw Material	Import Duty	Surtax	Sales Tax
1. Salt	-	-	-
2. Sulphur	3%	-	-
3. Aluminium hydroxide	3%	-	-
4. Soda ash	3%	-	-
5. Yellow phosphorus	3%	-	-

Source: SGV-KC Field Survey

5.2.3 Production Technology

According to survey respondents, the major means of technology development in the inorganic chemicals and chemical elements industry are: (1) licensing agreements, (2) turnkey projects and (3) technical assistance from foreign consultants. Two of the three respondents with majority foreign ownership rely heavily on their holding company and/or overseas associates for technology transfers through licensing agreements, process improvement, other forms of technical support, and a regular update on technology trends in the world market. The rest of the respondents either engage foreign consultants/contractors to undertake turnkey projects which include provision of new technology and training of local staff, or engage foreign consultants to assist them in setting up new plants as well as expanding and/or upgrading old ones.

Three of the six respondents recently improved their production capability in chlor-alkali, sulphuric acid or technical gas production by adopting new processes or installing more efficient equipment which will substantially reduce electric power requirements. The other two respondents engaged in either chlor-alkali or sulphuric acid production are studying proposals to employ new processes and may consider upgrading their technology at a later stage.

Survey findings indicate that local producers in the industry generally do not undertake any R & D activities. One respondent stated that it would be too expensive to conduct local R & D even with government incentives since the industry lacks the facilities and the capable manpower for this activity. Companies simply purchase foreign technology which are readily available from holding companies, overseas associates or foreign consultants.

5.2.4 Production Cost Structure

Table 5.7 summarizes the production cost structure for selected inorganic chemicals and chemical elements. The following observations can be inferred from the survey results presented:

1. About 90 - 100% of direct materials for chlor-alkali and sulphuric acid production are imported. On the other hand, technical gases and sodium silicate have high local content. Direct material cost accounts for the biggest share of total manufacturing cost for sulphuric acid, aluminium sulphate and sodium silicate.

2 Energy is the biggest cost item for chlor-alkali and technical gas plants. It is also a major cost item in sodium silicate production.

3. Depreciation, repair and maintenance expenses are significant cost items in chlor-alkali, sulphuric acid and technical gas plants.

4. In general, direct labour cost accounts for less than 15% of total manufacturing cost. For major products such as chlor-alkali, sulphuric acid and technical gases, direct labour cost has a share of 5 - 14%. For minor products such as aluminium sulphate and sodium silicate, direct labour accounts for 1.5 - 5% of total manufacturing cost.

TABLE 5.7
INORGANIC CHEMICALS AND CHEMICAL ELEMENTS:
PRODUCTION COST STRUCTURE

Cost Item	Caustic Soda-Chlorine	Caustic Soda-Hydrochloric Acid	Sulphuric Acid	Aluminium Sulphate	Sodium Silicate	Technical Gases
Direct Labour	14%	10%	5%	1.5%	4.8%	10%
Direct materials	10	20	53	88.0	56.4	29
- Local	1	2	-	50.2	50.2	29
- Imported	9	18	53	37.8	6.2	-
Factory overhead	76	70	42	10.5	38.8	61
- Energy	40	48	10	0.5	28.7	39
- Depreciation	14	13	13	0.2	0.6	13
- Repair and maintenance	10	9	19	2.0	7.1	6
- Packaging	6	-	-	7.8	2.4	n.a.
- Others	6	-		-	-	n.a.
	100%	100%	100%	100%	100%	100%

Notes : 1. Percentages refer to proportions of total manufacturing cost
2. n.a. - not available

Source: SGV-KC Field Survey

5.3 MARKETING ASPECTS

The marketing dimensions of respondent firms are discussed in this section. Aspects covered are as follows: apparent domestic consumption, market segments, key marketing variables, product pricing and credit terms, and distribution methods.

5.3.1 Apparent Domestic Consumption

The apparent demand for inorganic chemicals and chemical elements is estimated at M$326.7 million in 1981. Industry estimates of the domestic consumption of selected inorganic chemicals and chemical elements which are produced in Malaysia are summarized in Table 5.8.

TABLE 5.8
INORGANIC CHEMICALS AND CHEMICAL ELEMENTS:
DOMESTIC CONSUMPTION
1984
(IN MT)

Product	Consumption	Local Production as a % of Consumption
1. Liquid chlorine	5,000MT	100%
2. Caustic soda (100% basis)	26,000	54
3. Hydrochloric acid (32-33%)	20,000	100
4. Sodium hypochlorite	4,000	100[2]
5. Calcium chloride	2,000	50
6. Sulphuric acid (97-98%)	20,000[1]	100
7. Oleum (25%)	7,000	100
8. Battery acid (97%)	400	100
9. Aluminium sulphate	25,000	100[2]
10. Hydrated lime	7,000	100[2]
11. Sodium silicate (various grades)	14,000	100[2]
12. Phosphoric acid	2,500	99
13. Calcium carbide	9,300	100[2]
14. Zinc oxide	34,000-36,000	100[2]
15. Carbon black	24,000	n.a.

Note : 1. Excludes own consumption of sulphuric acid
2. Nearly 100%. Imports are insignificant.

Source: SGV-KC Field Survey

5.3.2 Market Segments

The major domestic end-users of locally produced inorganic chemicals and chemical elements are summarized in Table 5.9. The bulk of these chemicals are sold to industrial markets. As such, growth of consumption of inorganic chemicals and chemical elements hinges on the performance and growth of these end-user industries, mostly manufacturing concerns including the chemical industry itself. Non-industrial users include water works, health institutions, vocational schools, and Government institutions.

TABLE 5.9
INORGANIC CHEMICALS AND CHEMICAL ELEMENTS:
INTER-INDUSTRY LINKAGES

Product	Market Segments		% to Total Sales Volume
1. Caustic soda	Domestic :	Soaps and detergents	20 - 25%
		Palm oil refining	20 - 25
		Weedicides	8 - 9
		Textile, adhesives, chemicals, bottling, food additives, and others	balance
	International:	No sales	-
			100%
2. Chlorine	Domestic :	Water treatment	60%
		Others e.g. glove making	32
	International:	n.a. (Singapore)	8
			100%
3. Hydrochloric acid	Domestic :	Metals	20%
		Electronics	17
		Agropesticides	13
		Mining	10
		Chemicals	3
		Others	17
	International:	n.a. (Singapore)	20
			100%
4. Sodium hypochlorite	Domestic :	Paper milling	n.a.
		Glove-making	
		Others e.g. household bleach	
	International:	No sales	

Table 5.9 (Cont'd)

	Product	Market Segments		% to Total Sales Volume
5.	Calcium chloride	Domestic :	Rubber processing Iceworks	n.a.
		International:	No sales	
6.	Sulphuric acid	Domestic :	Own oleum production Aluminium sulphate Rubber processing Food additives Metal processing Palm oil refining	n.a.
		International:	No sales	
7.	Aluminium sulphate	Domestic :	Water treatment	100%
		International:	No sales	
8.	Sodium silicate	Domestic :	Soaps and detergents Cement Iron and steel Adhesives	n.a.
		International:	No sales	
9.	Hydrated lime	Domestic :	Water treatment	100%
		International:	No sales	
10.	Phosphoric acid	Domestic :	Palm oil refining) Rubber processing) Metal finishing) Food industry) Textile)	40%
		International:	Taiwan) Korea) Japan) ASEAN)	60%
11.	Technical gases	Domestic :	Iron and steel, metal works	45 - 50% on all gases
			Electronics	30% on ASU gases
			Others e.g. food and beverage, health, government institutions	

n.a. - not available
Source: SGV-KC Field Survey

Survey respondents identified the following potential domestic market segments for their products:

	Product	Potential Market	Estimated Annual Consumption (In MT)
1.	Chlorine	Stannic chloride	400
		Vinyl chloride monomer	n.a.
2.	Sulphuric acid	Titanium dioxide	42,000 - 50,000
		Acid clay	30,000
		Cold rolling steel mill project under study (HICOM)	n.a.
		Ammonium sulphate fertilizers using ammonia from Bintulu plant	n.a.
3.	Electronic grade chemicals e.g. sulphuric acid and nitric acid	Electronics	n.a.
4.	Copper sulphate	Fertilizer for pineapples	n.a.
5.	ASU gases	Effluent treatment Construction Food freezing Rubber	n.a.
6.	Aluminium sulphate	Paper works	n.a.

The pulp and paper mill HICOM project in Sabah is expected to consume from 3,000 MT to 6,000 MT of chlorine annually. This mill will likely have its own chlorine plant.

Export sales of inorganic chemicals are anticipated to remain at insignificant levels. Local producers generally do not intend to venture into exports of existing products for any or all of the following reasons:

1. Domestic products are not competitive in the world market because of high costs of production and freight charges. Products presently exported to Singapore, such as chlorine and hydrochloric acid, are sold at prevailing world prices which are very much lower than local market prices.

2. Neighbouring countries such as Indonesia and Thailand have their own plants and have set up tariff barriers to protect their local producers.

3. Inorganic chemicals are heavy and require sizeable investments in special shipment and storage facilities. Consequently, it becomes impractical to export these products.

5.3.3 Product Pricing and Credit Terms

Survey findings indicate that chlor-alkali producers adopt cost - plus pricing for local sales and competitive pricing for exports. The rest of the respondents use competitive pricing. Credit terms extended to customers range from 30 - 90 days. Table 5.10 presents a comparison of selling prices for selected locally produced inorganic chemicals and their imported substitutes.

TABLE 5.10
INORGANIC CHEMICALS AND CHEMICAL ELEMENTS:
COMPARATIVE PRICES
(IN M$ PER MT)

Product	Prices of Local Output		Prices of Imported Substitutes (C & F)
	Ex-factory	Retail	
1. Chlorine - local	$1,500	$1,600	No imports
- export	600		
2. Caustic soda, 50% basis	500 - 540	550 - 600	$391
3. Hydrochloric acid, 33% basis			
- local	100 - 190	140 - 250	No imports
- export	80		
4. Sulphuric acid	360	390	No imports

Source: SGV-KC Field Survey

5.3.4 Distribution Methods

Respondent companies employ different distribution methods. There is no predominant pattern of marketing among respondents as far as their domestic sales are concerned. Relevant survey findings are shown below:

Product	Respondent	% to Total Domestic Sales: Direct to End-users	Distributors	Dealers
Chlor-alkali products	A	85%	-	15%
Caustic soda	B	35	65	-
Hydrochloric acid	B	80	20	-
Sulphuric acid and its salts	C	-	75	25
	D	80	20	-
Technical gases	E	96	-	4
Phosphoric acid	F	100	-	-

Source: SGV-KC Field Survey

Almost all respondents indicated that the local distribution network for their products is adequate. Only one respondent representing a company with 98% local ownership expressed dissatisfaction in the performance of his company's sales force. In this instance, lack of aggressiveness was identified as the reason for poor performance.

For phosphoric acid, close to 100% of export sales is coursed through overseas branches of the company.

5.4 FINANCIAL ASPECTS

This section of the Report analyses the ownership structure, capital structure, sources of funds, and profitability of the interviewed firms.

5.4.1 Ownership and Capital Structure

The ownership profile and capital structure of the surveyed firms are shown below:

		% to Total Paid-Up Capital				(In Million M$)	
		Malaysian				Paid-Up	Total
Product	Respondent	B	N - B	G	Foreign	Capital	Loans
Chlor-alkali	A	1.0%	21.0%	12.0%	66.0%	$30.0*	-nil-
	B	30.5	67.0	-	2.5	9.5	$2.0
Sulphuric acid	C	-	0.5	-	95.5	12.6	-nil-
	D	30.0	69.0	-	1.0	6.0	-nil-
Phosphoric acid	E	-	-	-	100.0	2.0	-nil-
Technical gases	F	9.0	13.0	23.0	55.0	46.1	9.1

Note :

1. * Data represents paid-up capital for the whole company which is also engaged in the manufacture of products other than inorganic chemicals.

2. B - Bumiputra shareholders; N-B - non-Bumiputra; G - Government.

Source: SGV-KC Field Survey

Four of the six respondent firms have majority foreign ownership. Of these four, two companies have restructured and have some equity participation from the Government, while the third expects to have 40% Malaysian equity participation by 1985. The two respondent companies owned predominantly by Malaysians have the same holding company. Non-Bumiputra participation for these two firms is 67 - 69% while Bumiputra participation is about 30%.

The dominant firms in the industry are the firms with majority foreign ownership. This is not surprising because their foreign holding companies provide invaluable technical, marketing and management support.

5.4.2 Sources of Funds

Respondents normally utilize term loans, equity and retained earnings for capital expenditures. Suppliers' credit and earnings from sales are the most commonly used types of financing for operating expenses while bank overdrafts are sometimes used by respondent firms.

5.4.3 Profitability

In the absence of published financial data as well as some of the surveyed firms' refusal to provide financial information considered as confidential, the only indicator of profitability used for this Report is return on sales. The individual and average return on sales of four respondent firms in the industry are summarized below:

	Return on Sales (%)				
	Respondent				
Year	A	B	C	D	Average
1981	5.6	15.0	6.0	10.0	11.8
1982	16.4	16.4	6.4	12.5	14.4
1983	15.5	19.2	7.6	12.5	16.8

The above figures reveal a modest improvement in the overall performance of the industry. The bulk of inorganic chemicals produced in Malaysia is highly protected from competition posed by lower priced imported substitutes through tariff barriers. Domestic consumers hardly have any other choice but to purchase locally made products. This tariff protection partly explains the continued satisfactory level of profits generated by the industry during the last three years. In addition, some of the respondents expect to improve profitability by increasing plant productivity.

5.5 EMPLOYMENT ASPECTS

This section elaborates on the employment aspects of the inorganic chemicals and chemical elements industry. Discussion centers on the following topics: functional and racial composition of work force, technical job classification, wage structure, labour supply situation, and availability of training institutions.

5.5.1 Functional and Racial Composition of Work Force

Survey findings on the functional and racial composition of the work force of respondent firms are summarized in Tables 5.11 and 5.12. Production and related workers account for 37.9% of total work force on the average; labourers, 16.8%; and professional, technical and related workers, 11.1%. Administrative, finance and managerial personnel represent 5.7% of total labour force of respondent firms.

In terms of racial composition, Bumiputras account for a major share in the following job categories: production, related workers and labourers, with an average share of 60.0%; service workers, 81.0%; and transport equipment workers, 56.2%. On the other hand, the administrative, finance and managerial groups as well as the professional, technical and related workers categories are occupied mostly by non-Bumiputras (75.3% and 72.3% average shares, respectively). Overall, non-Bumiputras represent a slightly higher average share (55.7%) of total employment of respondent companies. Bumiputras closely follow with a 43.9% average share.

TABLE 5.11
INORGANIC CHEMICALS AND CHEMICAL ELEMENTS:
LABOUR FORCE COMPOSITION
BY FUNCTIONAL CATEGORY

Category	% of Work Force		
	Low	High	Average
Administrative, Finance and Managerial Staff	1.2%	9.9%	5.7%
Professional, Technical and Related Workers	5.1	22.1	11.1
Production and Related Workers	27.3	46.3	37.9
Labourers	0.6	36.2	16.8
Sales, Clerical and Related Workers	9.8	28.1	18.2
Service Workers	0.8	13.6	3.3
Transport Equipment Workers	-	14.8	7.0

Note : Only four of the six surveyed firms provided data for this section

Source: SGV-KC Field Survey

TABLE 5.12
INORGANIC CHEMICALS AND CHEMICAL ELEMENTS:
LABOUR FORCE COMPOSITION
BY RACE

Category	% of Work Force			
	Bumiputra	Non-Bumiputra	Foreigner	Total
Administrative, Finance and Managerial Staff	19.2%	75.3%	5.5%	100.0%
Professional, Technical and Related Workers	26.3	72.3	1.4	100.0
Production, Related Workers and Labourers	60.0	39.7	0.3	100.0
Sales Clerical and Related Workers	31.9	68.1	-	100.0
Service Workers	81.0	19.0	-	100.0
Transport Equipment Workers	56.2	43.8	-	100.0
Overall	43.7	55.7	0.6	100.0

Note : Only four of the six surveyed firms provided data for this section

Source: SGV-KC Field Survey

5.5.2 Technical Job Classification

The technical job classifications commonly found in the surveyed firms and the corresponding qualifications for each job category are as follows:

Job Category	Qualification
1. Production	
a. Technical Director/Works Manager	Engineer
b. Plant Engineer/Plant Supervisor/Plant Superintendent	Engineer or with experience
c. Shift Supervisor	HSC/MCE/SPM or with experience
d. Operator	MCE/SPM/LCE or with experience
e. General Labourer	With or without LCE/MCE/SPM
2. Utility	
a. Boiler Operator	1st Class Boilerman's Certificate
3. Laboratory	
a. Laboratory Superintendent/ Chief Chemist	Chemist
b. Laboratory Assistant/ Laboratory Technician	HSC/MCE/SPM
4. Maintenance	
a. Maintenance Engineer	Mechanical or electrical engineer
b. Chargeman/Wireman	Chargeman/wireman certificate (medium/high pressure/nil)
c. Mechanic/Fitter	MCE/SPM/vocational school
d. Instrument Technician/ Artificer	MCE/SPM/vocational school

Source: SGV-KC Field Survey

5.5.3 Wage Structure

Data on average labour cost were obtained from four respondent firms. Table 5.13 presents a comparative summary of monthly wages of production and related workers among the surveyed firms.

TABLE 5.13
INORGANIC CHEMICALS AND CHEMICAL ELEMENTS:
WAGE STRUCTURE

Job Category	Monthly Wage [1] Low	Monthly Wage [1] High
1. Production		
Shift Supervisor	M$ 780	M$2,000
Operator, Skilled	506	1,112
Labourer	325	706
2. Utility		
Boiler Operator	780	1,319
3. Maintenance		
Chargeman/Wireman/ Electrician	506	1,538
Mechanic/Fitter	450	1,112
Instrument Technician/ Artificer	506	891
4. Laboratory		
Laboratory Assistant/ Technician	338	1,538

Note:

[1] Includes benefits.

Source: SGV-KC Field Survey

Fitters, chargemen, boiler operators, and instrument technicians/ artificers are among the highly paid non-supervisory workers. These positions require technical training and considerable skills acquired from experience on the job.

5.5.4 Labour Supply Situation

According to the interviewed firms in the industry, there is an acute nationwide shortage of instrument artificers and electrical chargemen/wiremen with certificates. The shortage of the skills may have stemmed from the expansion of industries in consonance with the country's industrialization program. Some of the respondent companies which have not been able to meet the salary demands of their artificers and electrical chargemen/wiremen are presently experiencing a high turnover of employees occupying these particular positions. Another job category considered to be in short supply, but to a less serious degree, is that of electrical engineer with certificate.

A number of the interviewed firms expressed concern over the high turnover of Bumiputra engineers qualifying, however, that there is no real shortage of chemical and mechanical engineers in the country. The resignation of Bumiputra engineers in response to better employment opportunities mainly in Petronas and other government industrial projects has made if difficult for the companies concerned to comply with the NEP policy of restructuring the racial composition of work force particularly in the professional and technical categories. The concerned companies suggested that the Government provide incentives to private companies for training and developing staff for government projects.

Survey results reveal that there is a surplus of general labourers and an adequate supply of personnel in the following job categories: (1) production engineers, (2) operators, (3) mechanics, and (4) laboratory technicians.

5.5.5 Availability of Training Institutions

According to survey respondents, there are sufficient local training institutions in Malaysia. They have employed graduates of technical courses in universities and polytechnic institutes, most of whom are mechanics, electricians and instrument technicians. Because of new graduates' lack of experience in industry, chemical companies generally provide additional in-house and on-the-job training during the initial period of employment. One respondent proposed that local institutes incorporate a course on materials science which is intended to impart knowledge on the properties and uses of various materials used in industry.

Because of the highly specialized nature of the chemical industry, new staff generally have to undergo additional training relevant to the scope of their jobs. Smaller companies provide in-house courses as well as on-the-job training to newly employed plant operators and supervisors. On the other hand, large firms send their engineers and managers for training in local or foreign institutions or, at times, to their foreign principals. This training serves to enhance the in-house and on-the-job training provided by the local company.

5.5.6 Labour Productivity

Table 5.14 estimates employee productivity in the inorganic chemicals industry on the basis of data obtained from MIDA.

TABLE 5.14
INORGANIC CHEMICALS AND CHEMICAL ELEMENTS:
LABOUR PRODUCTIVITY

Year	Output[1] (In M$ '000)	Number of Employees	Output per Employee (In M$ '000)
1973	$ 47,608	1,362	$34.95
1974	57,334	1,712	33.49
1975	60,110	1,643	36.59
1976	74,866	2,139	35.00
1977	71,972	2,140	33.63
1978	89,755	1,563	57.42
1979	109,065	2,096	52.03
1980	125,100	2,571	48.66
1981	115,793	2,476	46.77

Note:
[1] Output is expressed as ex-factory sales volume in 1981 constant prices.

Source of basic data: MIDA

5.6 DEMAND ANALYSIS

5.6.1 Historical Demand

- Domestic Market

Table 5.15 shows that the apparent domestic consumption of inorganic chemicals and chemical elements reached M$326.7 million in 1981. This represents an average annual growth of 7.8% from its 1973 level of M$178.5 million in 1973. Growth of the industry is closely linked to the performance of the manufacturing industries, which are the major consumers of these chemical products.

Imports consistently accounted for 69 - 82% apparent demand for these chemicals as the lack of chemical mineral inputs in Malaysia confined local production to a limited range of products. Imports increased from M$154.3 million in 1973 to M$229.8 million in 1981, reflecting on average annual growth of 5.9%. Temporary declines occurred in 1975 and 1980. The relative importance of imports declined from 81% of apparent consumption in 1973 to 70% in 1981. This may be attributed to the faster pace of growth of the locally produced chemicals such as chlor-alkalis, inorganic acids, carbon black, and technical gases during the decade.

Domestic production of inorganic chemicals and chemical elements accounted for about 25 - 38% of apparent consumption from 1973 to 1981. As mentioned earlier, local production rose much faster than imports from M$47.6 million in 1973 to M$115.8 million in 1981 (11.8% average growth per annum). Lower levels of domestic production were registered in 1977 and 1981.

- Export Market

Exports and re-exports of inorganic chemicals and chemical elements have fluctuated between M$5.9 million and M$23.1 million during the 1973 - 1981 period. Surplus production which could not be absorbed by the domestic market comprised the bulk of the industry's exports and re-exports. In recent years, only hydrochloric acid and phosphoric acid had significant regular export markets located within Asia.

TABLE 5.15
INORGANIC CHEMICALS AND CHEMICAL ELEMENTS:
APPARENT CONSUMPTION, 1973 - 1981
(M$ '000 AT CONSTANT 1981 PRICES)

Year	Imports	Local Production	Exports and Re-exports	Apparent Consumption	% of Apparent Consumption		Exports and Re-exports as a % of Local Production
					Local Production	Imports	
1973	145,279	47,608	14,428	178,459	27	81	30
1974	186,220	57,334	16,395	227,159	25	82	29
1975	129,814	60,110	9,987	179,937	33	72	17
1976	157,307	74,866	6,446	225,727	33	70	9
1977	165,397	71,972	5,857	231,512	31	71	8
1978	188,229	89,755	10,261	267,723	34	70	11
1979	235,461	109,065	16,575	327,951	33	72	15
1980	228,603	125,100	23,120	330,583	38	69	18
1981	229,816	115,793	18,925	326,684	35	70	16
Average Annual Growth Rate 1973 - 1981	5.9%	11.8%	erratic	7.8%			

Note : Apparent consumption expressed in current prices is presented in Appendix 2.

Sources: Department of Statistics
MIDA

5.6.2 Projected Demand

Domestic demand projections are based on the following linear regression equation:

$$Y = 25.66 + 0.161X$$
$$R^2 = 0.8975, \quad t = 11.77, \quad D.F. = 8$$

Where: Y = domestic demand for inorganic chemicals and chemical elements in 1981 constant prices

X = manufacturing value-added in 1970 constant prices

Forecasts of manufacturing value-added, which are presented in Appendix 28, were obtained from the Economic Planning Unit (EPU) of the Prime Minister's Department.

The results of the demand projections for inorganic chemicals and chemical elements are presented in Table 5.16. The above linear regression equation yielded an R^2 value of 0.8975. Furthermore, the t value indicated that the postulated econometric relationship is statistically significant at the 99% confidence level.

The following growth rates of domestic demand are obtained from the projections in Table 5.16:

Period	Low Growth	Medium Growth	High Growth
1985 - 1990	7.8%	9.9%	12.0%
1991 - 1995	8.4	9.8	11.1

Exports are not expected to pick up in the next ten years because of the lack of raw materials and the uncompetitiveness of most Malaysian inorganic chemicals. For purposes of this report, exports are assumed to grow at the same rate as total GDP from 1985-1995, that is, 6.0% for low growth, 7.0% for medium growth and 8.0% for high growth.

Demand projections for inorganic chemicals and chemical elements covering domestic, export and total demand are presented in Table 5.16

TABLE 5.16
INORGANIC CHEMICALS AND CHEMICAL ELEMENTS:
PROJECTED DEMAND
1985 - 1995
(M$ MILLION IN 1981 CONSTANT PRICES)

Year	Domestic			Export			Total		
	Low	Medium	High	Low	Medium	High	Low	Medium	High
1985	424.2	424.2	424.2	23.9	23.9	23.9	448.1	448.1	448.[illegible]
1986	456.9	465.6	474.4	25.3	25.6	25.8	482.2	491.2	500.[illegible]
1987	492.2	511.3	530.9	26.8	27.4	27.9	519.0	538.7	558.[illegible]
1988	530.5	561.9	594.6	28.4	29.3	30.1	558.9	591.2	624.[illegible]
1989	571.9	617.6	666.3	30.2	31.3	32.5	602.1	648.9	698.[illegible]
1990	616.7	679.2	747.0	32.0	33.5	35.1	648.7	712.7	782.[illegible]
1991	668.1	745.2	829.2	33.9	35.9	37.9	702.0	781.1	867.[illegible]
1992	724.0	817.8	920.8	35.9	38.4	40.9	759.9	856.2	961.[illegible]
1993	784.7	897.8	1,022.9	38.1	41.0	44.2	822.8	938.8	1,067.[illegible]
1994	850.8	985.9	1,136.6	40.4	43.9	47.8	891.2	1,029.8	1,184.[illegible]
1995	922.6	1,082.9	1,263.2	42.8	47.0	51.6	965.4	1,129.9	1,314.[illegible]
Average Annual Growth Rate									
1985-1990	7.8%	9.9%	12.0%	6.0%	7.0%	8.0%	7.7%	9.7%	11.[illegible]
1990-1995	8.4	9.8	11.1	6.0	7.0	8.0	8.3	9.6	10.[illegible]

5.7 INTERNATIONAL ASPECTS

5.7.1 World Trade Patterns

International trading activities for inorganic chemicals and chemical elements are concentrated in Europe, the Americas and Asia. From 1977 to 1981, Europe and the Americas were the dominant exporters of this chemical group. In addition to Asia, both these regions also registered the most active involvement in importations during this interval (See Table 5.17).

The bulk of trade flows involving inorganic chemical elements, oxides, acids, basis, etc. (SITC No. 522) occurred in Europe, the Americas and Asia. These three regions accounted for an aggregate share of 89.2% of total imports of the world market economies in 1981 and 94.3% of total exports. Because of the availability of substantial chemical mineral deposits in Europe and the Americas, it it not surprising that foreign sales of these two regions constituted 87.3% of total exports in 1981. Asia, Africa and Oceania recorded rapid expansion of imports from 1977 to 1981 while the Americas exhibited the most impressive export growth (39.4% p.a.) during this interval.

Developed countries generally outranked developing countries in term of relative size of imports and exports in 1977 and 1981. The United States, Federal Republic of Germany, France, United Kingdom, Italy, Japan, and the Netherlands maintained their relative importance in the global imports of these products during this period. Among the major importing countries, developing nations such as India, Indonesia and Turkey recorded higher growth rates ranging from 52.7% p.a. to 74.8% p.a.

Japan has been the only Asian country with significant export activity in this category during the 1977 - 1981 period. However, expansion of its exports (13.4% annual growth on the average) was not as impressive as the dominant exporting countries outside Asia, namely: France (39.1% p.a.), Canada (29.0% p.a.), U.S.-Puerto Rico (28.0% p.a.), and Federal Republic of Germany (13.9% p.a.). A few developing nations emerged as significant export trading partners in 1981, namely, Mexico, Suriname, Morocco, and Chile.

For other inorganic chemicals covering the nitrates, phosphates, carbonates, metallic salts and peroxy salts of inorganic acids, etc. (SITC No. 523), trade flows also centered around the regions of Europe, the Americas and Asia.

Industrialized nations led by the Federal Republic of Germany, United States-Puerto Rico, France, United Kingdom, Italy, and Netherlands were the largest importers of these chemicals. From Asia, only Japan and Hong Kong were importers of some significance, comprising 3.7% and 2.2% respectively of total imports in 1981. Among the major importing countries, the following countries recorded high expansion rates between 1977 and 1981: Hong Kong (29.8% p.a.), United States-Puerto Rico (24.5% p.a.), South Africa (23.0% p.a.), Japan (23.3% p.a.), and France (18.3%).

The United States-Puerto Rico and the Federal Republic of Germany are the traditional exporters of other inorganic chemicals. Only industrialized nations in Europe and the Americas plus Japan from Asia occupied dominant positions in the world export trade of these chemical products. Among these leading exporters, the following countries exhibited marked export growth: Italy (44.2% p.a.), United States-Puerto Rico (22.5% p.a.), United Kingdom (19.8% p.a.), Canada (14.6% p.a.), and Sweden (13.0% p.a.).

TABLE 5.17
INORGANIC CHEMICALS AND CHEMICAL ELEMENTS: INTERNATIONAL TRADE PATTERNS
1977 - 1981
(IN US$ MILLION)

SITC 522 **INORGANIC CHEMICAL ELEMENTS, OXIDES, ACIDS, BASES, ETC.**

IMPORTS

	1977 Imports	1977 % Share	1981 Imports	1981 % Share	Average Annual Growth Rate 1977 - 1981
World Market Economy	US$3,542	100.0%	US$7,642	100.0%	21.2%
Region					
Africa	198	5.6	592	7.7	31.5
Americas	1,004	28.3	2,067	27.0	19.8
Asia	468	13.2	1,628	21.3	36.6
Europe	1,766	49.9	3,129	40.9	15.4
Oceania	107	3.0	227	3.0	20.7
Major Importing Countries					
United States-Puerto Rico	462	13.0	1,030	13.5	22.2
Fed. Rep. of Germany	326	9.2	509	6.7	11.8
Brazil	220	6.2	244	3.2	2.6
France	224	6.3	349	4.6	11.7
United Kingdom	206	5.8	331	4.3	12.6
Italy	209	5.9	368	4.8	15.2
Japan	117	3.3	325	4.3	29.1
Netherlands	140	4.0	292	3.8	20.2
Belgium-Luxembourg	105	3.0	185	2.4	15.2
Canada	102	2.9	174	2.3	14.3
Turkey	57	1.6	310	4.1	5[illegible].7
India	30	0.8	280	3.7	74.8
Indonesia	35	1.0	198	2.6	54.2
Australia	85	2.4	183	2.4	21.1
Spain	71	2.0	176	2.3	25.5

EXPORTS

	1977 Exports	1977 % Share	1981 Exports	1981 % Share	Average Annual Growth Rate 1977 - 1981
World Market Economy	US$3,264	100.0%	US$7,761	100.0%	24.2%
Region					
Africa	206	6.3	409	5.2	18.7
Americas	827	25.3	3,121	40.2	39.4
Asia	286	8.7	539	7.0	17.2
Europe	1,915	58.7	3,653	47.1	17.5
Oceania	29	0.9	39	0.5	7.7
Major Importing Countries					
Fed. Rep. of Germany	634	19.4	1,066	13.7	13.9
United States-Puerto Rico	478	14.6	1,284	16.5	28.0
France	199	6.1	746	9.6	39.[illegible]
Netherlands	286	8.8	374	4.8	6.9
Canada	160	4.9	443	5.7	29.0
Japan	204	6.3	337	4.3	13.4
U.K.	187	5.7	293	3.8	11.9
South Africa	108	3.3	112	1.4	0.9
Belgium-Luxembourg	148	4.5	235	3.0	12.2
Italy	107	3.3	339	4.4	33.4
Mexico	79	2.4	255	3.3	34.0
Suriname	n.a.	n.a.	240	3.1	-
Morocco	50	1.5	185	2.4	38.7
Chile	39	1.2	132	1.7	35.6
Spain	80	2.4	117	1.5	10.0

SITC		IMPORTS 1977 Imports	1977 % Share	1981 Imports	1981 % Share	Average Annual Growth Rate 1977 - 1981
523	**OTHER ORGANICS CHEMICALS**					
	World Market Economy	US$2,845	100.0%	US$4,884	100.0%	14.5%
	Region					
	Africa	240	8.5	377	[illegible].7	12.0
	Americas	610	21.5	1,147	23.5	17.1
	Asia	548	19.3	1,108	22.6	19.2
	Europe	1,373	48.3	2,127	43.5	11.6
	Oceania	73	2.6	125	2.5	14.4
	Major Importing Countries					
	Fed. Rep. of Germany	251	8.8	342	7.0	8.0
	United States-Puerto Rico	158	5.6	380	7.8	24.5
	France	131	4.6	257	5.3	18.3
	U.K.	150	5.3	237	4.8	12.1
	Italy	135	4.7	208	4.2	11.4
	Netherlands	139	4.9	209	4.3	10.7
	Canada	102	3.6	163	3.3	12.4
	Brazil	92	3.2	120	2.5	6.9
	Switzerland	73	2.6	119	2.4	13.0
	Belgium-Luxembourg	82	2.9	120	2.5	10.0
	Japan	80	2.8	179	3.7	22.3
	Hong Kong	43	1.5	122	2.5	29.8
	South Africa	48	1.7	110	2.2	23.0
	Sweden	69	2.4	109	2.2	12.1
	Venezuela	84	3.0	101	2.1	4.7
522 & 523	**TOTAL INORGANIC CHEMICALS**	US$6,387		US$12,526		18.3%

	EXPORTS 1977 Exports	1977 % Share	1981 Exports	1981 % Share	Average Annual Growth Rate 1977 - 1981
World Market Economy	US$2,410	100.0%	US$4,377	100.0%	16.1%
Region					
Africa	32	1.4	42	1.0	7.0
Americas	548	22.7	1,241	28.3	22.7
Asia	312	12.9	504	11.5	12.7
Europe	1,512	62.7	2,575	58.8	14.2
Oceania	6	0.2	15	0.3	25.7
Major Importing Countries					
United States-Puerto Rico	417	17.3	939	21.5	22.5
Fed. Rep. of Germany	493	20.4	781	17.8	12.2
U.K.	201	8.3	414	9.5	19.8
Netherlands	191	7.9	283	6.5	10.3
Japan	201	8.3	313	7.2	11.7
France	198	8.2	198	4.5	0
Italy	85	3.5	3 8	8.4	44.2
Canada	83	3.4	143	3.3	14.6
Belgium-Luxembourg	78	3.2	82	1.9	1.2
Sweden	60	2.5	98	2.2	13.0
TOTAL INORGANIC CHEMICALS	US$5,674		US$12,138		20.9%

Note : World aggregates presented in the Yearbook generally do not include trade statistics of the following countries: Albania, Bulgaria, P.R.O.C., Taiwan, Czechoslovakia, German Democratic Republic, Hungary, Mongolia, Democratic People's Republic of Korea, Poland, Romania, and the U.S.S.R.

Source: Yearbook of International Trade Statistics, United Nations

5.7.2 Malaysia - Imports and Exports

o Imports

Malaysia remains a net importer of inorganic chemicals and chemical elements with more than 60% of its consumption in the past decade sourced abroad. Imports of this product group rose very sharply from M$54.8 million in 1973 to M$103.9 million the following year before dropping to M$83.1 million in 1975. Since then purchases of these chemicals from abroad have increased steadily, reaching M$229.8 million in 1981.

A comparative summary of the major inorganic chemical and chemical element groups imported into Malaysia in 1973 and 1981 is shown in Table 5.18.

TABLE 5.18
IMPORTS: INORGANIC CHEMICALS AND CHEMICAL ELEMENTS
1973 AND 1981
(M$'000)

SITC	Chemical Group	1973 Value	1973 % Share	1981 Value	1981 % Share
5232	Nitrates, phosphates, carbonates, cyanides, silicates, salts and acids	M$13,639.6	24.9%	M$ 49,529.3	21.6%
5231	Metallic salts and peroxy salts of inorganic acids	11,169.1	20.4	44,252.5	19.3
5224	Zinc oxide, peroxide, other oxides	7,983.0	14.6	27,424.6	11.9
5225	Inorganic bases and metallic oxides, hydroxides and peroxides	7,787.1	14.2	11,116.0	4.8
522120	Selenium, tellurium, phosphorus, arsenic, silicon and boron	*	*	47,419.8	20.6
	Others	14,190.8	25.9	50,073.8	21.8
522 and 523	Total	M$54,769.9	100.0%	M$229,816.0	100.0%

Note :
* Imports of these products were included in "Others" in 1973.
Source: Department of Statistics

Nitrates, phosphates, carbonates, cyanides, silicates, salts and acids constituted the biggest single group of inorganic products imported into Malaysia in 1973, comprising 24.9% of the value of inorganic chemical imports. This was followed by metallic salts and peroxy salts of inorganic acids (20.4%), zinc oxide, peroxide, other oxides (14.6%) and inorganic bases, metallic oxides, hydroxides, peroxides (14.2%). Miscellaneous inorganic chemicals accounted for 25.9% of the total value of inorganic imports.

In 1981, nitrates, phosphates, carbonates, cyanides, salts and acids remained the principal product group among inorganic chemicals imported into Malaysia with M$49.5 million or 21.6% by import value. This was followed by selenium, tellurium, phosphorus, arsenic, silicon, and boron, with M$47.4 million (20.6%), and metallic salts and peroxy salts of inorganic acids with M$44.3 million (19.3%).

Growth of imports of inorganic bases, metallic oxides, hydroxides and peroxides fell behind the rest of the major product groups, accounting for only 4.8% of total inorganic chemical imports in 1981 compared to a 14.2% share in 1973. Its slower growth is attributed to increased local production of caustic soda, the single biggest item imported for this group, and the tariff protection given to this particular product.

The two most important product groups under the heading "nitrates, phosphates, carbonates, cyanides, silicates, salts, and acids" are: (1) phosphites, hypophosphites and phosphates and (2) neutral sodium carbonate. In 1973 and 1981, these two product groups comprised an aggregate share of 67.9% and 63.4% respectively of all importations under this heading. United States remained Malaysia's principal supplier of phosphites, hypophosphites, and phosphates during this period, but USSR had dislodged Japan from second position by 1981 (Table 5.19).

Neutral sodium carbonate was principally sourced from Kenya (M$2.3 million) and UK (M$1.1 million) in 1973. Malaysia retained Kenya as its chief supplier of sodium carbonate in 1981(M$5.6 million) but developed two other sources, namely, United States (M$3.0 million) and Japan (M$2.2 million).

TABLE 5.19
IMPORTS: NITRATES, PHOSPHATES,
CARBONATES, CYANIDES, SALTS AND ACIDS
1973 AND 1981
(M$'000)

SITC		Chemical Group	1973	1981
52322	1.	Phosphites, hypophosphites, and phosphates		
		USA	M$ 2,793.2	M$ 4,205.6
		USSR	*	3,128.7
		Japan	1,660.0	2,585.6
		Netherlands	259.0	*
		Others	701.7	7,768.3
		Sub-Total	5,413.9	17,688.2
52323	2.	Neutral sodium carbonate		
		Kenya	2,281.0	5,590.4
		USA	*	3,008.4
		F.R. of Germany	159.9	*
		Japan	*	2,152.8
		UK	1,060.0	*
		Others	343.5	2,965.3
		Sub-Total	3,844.4	13,716.9
52324	3.	Other carbonates and percarbonates		
		Japan	490.7	2,449.1
		P. R. of China	149.5	*
		Kenya	*	879.3
		F. R. of Germany	*	749.6
		UK	173.5	*
		Others	337.9	2,965.8
		Sub-Total	1,151.6	7,043.8
	4.	Others	3,229.7	11,080.4
5232		Total	M$13,639.6	M$49,529.3

Note :
* Imports from these countries were included in "Others" for the specific product group.

Source: Department of Statistics

Under the classification of "metallic salts and peroxy salts of inorganic acids", the three principal groups of imported products are: (1) natural magnesium sulphate, (2) ammonium chloride, and (3) sodium sulphate, sodium hydrogen sulphate, sodium pyrosulphate (Table 5.20). Most of Malaysia's imports of natural magnesium sulphate came from West Germany in 1981. Japan readily outranked all other suppliers in importance in the two other product groups during the same year. In 1981, these three product groups accounted for 57.8% of the country's imports of metallic salts and peroxy salts of inorganic acids.

In 1981, the group of chemical elements covering selenium, tellurium, phosphorus, arsenic, silicon, and boron was the third largest category of inorganic chemical imports with a total value of M$47.4 million (20.6% of total). Japan (M$23.0 million) and United States (M$20.2 million) were the principal sources of Malaysia's foreign purchases of these products (Table 5.21). Under the international trade classification used in 1973, these inorganic chemicals were not identified as a separate group.

Under the heading "zinc oxide, peroxide, other oxides", the single most dominant product group is titanium oxides, which accounted for 62.4% of all imports under this heading in 1973 and 67.0% in 1981 (Table 5.22). The chief suppliers of titanium oxide were Australia and Japan in 1973. Australia was followed closely by United Kingdom, Japan, and West Germany in 1981.

"Inorganic bases, metallic oxides, hydroxides and peroxides" comprised only 4.8% of total inorganic chemical imports in 1981 although its relative share was substantially larger (14.2%) in 1973 (Table 5.23). In this category, sodium hydroxide was the largest item, with 56.9% of total imports in 1973 and 53.3% in 1981. In the earlier period, Malaysia bought the bulk of its sodium hydroxide imports from Netherlands (M$1.5 million), West Germany (M$1.4 million), and United Kingdom (M$0.6 million). By 1981, West Germany had outpaced all other suppliers with 47.9% of the country's importations valued at M$5.9 million. The People's Republic of China and Gibraltar emerged as significant sources of this item during this period. Most of the imports of sodium hydroxide are acquired by textile manufactures located in the Free Trade Zone.

TABLE 5.20
IMPORTS: METALLIC SALTS AND PEROXY SALTS
OF INORGANIC ACIDS
1973 AND 1981
(M$'000)

SITC		Chemical Group	1973	1981
523194	1.	Natural magnesium sulphate		
		F. R. of Germany		M$11,124.1
		Dem. Rep. of Germany		511.3
		Taiwan		76.5
		Others		167.3
		Sub-Total	*	11,879.2
523121	2.	Ammonium chloride		
		Japan	M$1,034.2	8,491.0
		R. of Singapore	*	24.3
		USA	*	22.3
		UK	32.9	*
		Others	13.0	43.7
		Sub-Total	1,080.1	8,581.3
523180	3.	Sodium sulphate, sodium hydrogen sulphate and sodium pyrosulphate		
		Japan	343.2	3,139.3
		USA	245.3	835.9
		P.R. of China	*	646.0
		UK	177.2	*
		Others	248.2	474.4
		Sub-Total	1,013.9	5,095.6

Table 5.20 (Cont'd)

SITC		Chemical Group	1973	1981
523129	4.	Other chlorides, bromides and iodides		
		UK	M$ 200.0	
		Japan	439.2	M$ 1,465.9
		P.R. of China	106.6	*
		R. of Singapore	*	1,116.1
		F. R. of Germany	*	691.3
		Others	431.7	1,698.4
		Sub-Total	1,177.5	4,971.7
	5.	Others	7,897.6	13,724.7
5231		Total	M$11,169.1	M$44,252.5

Note :
* Imports from these countries were included in "Others" for the specific product group.

Source: Department of Statistics

TABLE 5.21
IMPORTS: SELENIUM, TELLURIUM, PHOSPHORUS, ARSENIC, SILICON, AND BORON
1973 AND 1981
(M$'000)

SITC	Chemical Group	1973	1981
522120	Selenium, tellurium, phosphorus, arsenic, silicon, and boron		
	Japan		M$23,054.8
	USA		20,161.0
	Canada		2,926.9
	Others		1,277.1
	Total	*	M$47,419.8

Note :
* No breakdown for this product group in 1983.

Source: Department of Statistics

TABLE 5.22
IMPORTS: ZINC OXIDE, ZINC PEROXIDE AND OTHER OXIDES
1973 AND 1981
(M$'000)

SITC		Chemical Group	1973	1981
52246	1.	Titanium oxides		
		Australia	M$1,786.4	M$ 4,606.6
		UK	371.2	4,004.8
		Japan	1,434.5	3,754.4
		F. R. of Germany	483.4	2,423.1
		Others	851.7	3,595.5
		Sub-Total	4,927.2	18,384.4
52243	2.	Manganese oxide		
		Irish Republic	*	1,668.5
		Belgium	305.3	*
		Japan	93.1	1,118.9
		R. of Singapore	*	596.7
		Others	66.8	439.7
		Sub-Total	465.2	3,823.8
52244	3.	Iron oxides and hydroxides		
		F.R. of Germany	609.8	1,534.3
		UK	87.3	547.9
		Japan	55.2	327.2
		Others	132.4	294.2
		Sub-Total	884.7	2,704.3
	4.	Others	1,705.9	2,512.1
5224		Total	M$7,983.0	M$27,424.6

Note :
* Imports from this country were included in "Others" for the specific product group.

Source: Department of Statistics

TABLE 5.23
IMPORTS: INORGANIC BASES
AND METALLIC OXIDES, HYDROXIDES AND PEROXIDES
1973 AND 1981
(M$'000)

SITC		Chemical Group	1973	1981
52252	1.	Sodium hydroxide (caustic soda) solid		
		F. R. of Germany	M$1,387.1	M$ 2,835.0
		P. R. of China	*	566.0
		Netherlands	1,498.7	*
		Gibraltar	*	519.5
		UK	646.4	*
		Others	899.1	2,001.5
		Sub-Total	4,431.3	5,922.0
52256	2.	Aluminium hydroxide		
		Japan	748.2	1,179.0
		P. R. of China	228.6	*
		R. of Singapore	*	1,016.4
		USA	*	162.5
		Others	109.8	49.2
		Sub-Total	1,086.6	2,407.1
52259	3.	Hydrazine, hydroxylamine and their inorganic salts		
		Japan	361.6	750.3
		F. R. of Germany	316.1	338.7
		UK	224.1	*
		Norway	*	262.7
		Others	414.4	370.8
		Sub-Total	1,316.2	1,722.5
	4.	Others	953.0	1,064.4
		Total	M$7,787.1	M$11,116.0

Note:
* Imports from this country were included in "Others"

Source: Department of Statistics

o Exports

Historically, Malaysia's exports of inorganic chemicals and chemical elements have remained relatively insignificant. The country exported M$7.6 million worth of these products in 1973 and M$18.9 million in 1981 (See Table 5.24). These amounts were equivalent to 30.3% and 16.3% of the domestic production of these chemicals during the respective years.

TABLE 5.24
EXPORTS: INORGANIC CHEMICALS AND CHEMICAL ELEMENTS
1973 AND 1981
(M$ '000)

		1973		1981	
SITC	Chemical Group	Value	% Share	Value	% Share
5222	Inorganic acids & oxygen compounds of non-metals	M$ 403.3	5.3%	M$ 8,415.8	44.5%
5221	Technical gases, halogens, sulphur, mercury and other elements	1,477.2	19.3	7,023.9	37.1
5232	Nitrates, phosphates, carbonates, cyanides, silicates, salts and acids	655.9	8.6	1,034.8	5.4
5224	Zinc oxide and zinc peroxide, other oxides	617.9	8.1	998.3	5.3
5239	Hydrogen peroxide, phosphides, carbides, other inorganic compounds	3,916.3	51.2	356.6	1.9
	Others	576.5	7.5	1,095.1	5.8
	Total	M$7,647.1	100.0%	M$18,924.5	100.0%

Source: Department of Statistics

In 1973, hydrogen peroxide, phosphides, carbides, and other inorganic compounds formed the principal product group in this category, contributing M$3.9 million (51.2%) of the country's total exports of inorganic products and intermediates. By 1981, however, the relative share of this product group had fallen to only 1.9%, or the equivalent of only M$0.4 million.

Two other groups of chemicals rose to the forefront during this period: (1) inorganic acids, oxygen compounds of non-metals and (2) chemical elements. The former group improved its relative export contribution from 5.3% (M$0.4 million) to 44.5% (M$8.4 million). The latter group's export performance was somewhat less impressive, but its relative export share increased nevertheless from 19.3% (M$1.9 million) to 37.1% (M$7.0 million) during the same interval. The export performance of other types of inorganic chemicals and chemical elements paled by comparison and is reflected in their smaller relative contributions in 1981.

It can be observed from Table 5.25 that inorganic acids and oxygen compounds of non-metals comprised the fastest growing category in Malaysia's exports of inorganic products and intermediates. Between 1973 and 1981, foreign sales of these chemical products soared from M$0.4 million to M$8.4 million on an average annual growth rate of 46.2%.

In 1981, exports of hydrochloric acid and chlorosulphuric acid totalled M$3.2 million. Virtually all of these exports were absorbed by Singapore (M$1.3 million), Hong Kong (M$1.1 million), and United States (M$0.8 million). Eight years earlier, exports of these acids were valued at only M$0.2 million and virtually all of this sum represented minor sales to Tanzania, Kenya and Singapore. Overseas sales of phosphorous pentoxide and phosphoric acids were virtually non-existent in 1973, but had reached M$5.0 million by 1981. The bulk of 1981 exports of these items was accounted for by Taiwan (M$2.4 million), Thailand (M$1.1 million) and Singapore (M$0.9 million). The export value of other inorganic acids and oxygen compounds of non-metal have remained relatively unchanged.

The Consultants were informed by industrial sources that local producers of hydrochloric acid have had to peg their export price at a level approximately 20% lower than the domestic price in order to be competitive internationally. It was further explained that Albright and Wilson's acquisition of a local phosphoric acid plant in 1977 may have precipitated an upsurge in the country's exports of inorganic acids in recent years. Albright and Wilson, however, indicated that its phosphoric acid can only be competitive within the ASEAN as well as in Hong Kong, Taiwan, Korea, and Japan. Moreover, Australia, Thailand and the Philippines cannot be considered prospective export markets because of the existence of phosphoric acid plants in these countries.

TABLE 5.25
EXPORTS: INORGANIC ACIDS AND OXYGEN COMPOUNDS OF NON-METALS
1973 AND 1981
(M$ '000)

SITC		Chemical Group	1973	1981
52221	1.	Hydrochloric acid & chlorosulphuric acid		
		Singapore	M$ 46.3	M$1,282.3
		Hong Kong	-	1,129.2
		USA	-	763.2
		Kenya	53.5	-
		Tanzania	63.6	-
		Others	3.5	12.1
		Sub-Total	166.9	3,186.8
52224	2.	Phosphorous pentoxide & phosphoric acids		
		Taiwan	-	2,453.0
		Thailand	0.1	1,076.5
		Singapore	-	861.5
		Others	-	599.8
		Sub-Total	0.1	4,990.8
	3.	Other inorganic acids & oxygen compounds of non-metals	236.3	238.2
5222		Total	M$403.3	M$8,415.8

Source: Department of Statistics

Exports of technical gases, halogens and elements (hydrogen, oxygen, nitrogen, noble gases, carbon black, etc.) constituted the second largest group of inorganic chemicals and chemical elements in 1973 and 1981. Purchases of carbon black by foreigners were estimated at less than M$0.1 million in 1973, but had greatly increased to M$6.9 million by 1981 (See Table 5.26). Indonesia (M$4.6 million) and Singapore (M$1.9 million) were the two principal overseas markets during the latter period. It should be noted, however, that the formidable increase in carbon black exports was partially offset by a marked decline in exports of chlorine and other chemical elements.

TABLE 5.26
EXPORTS: TECHNICAL GASES, HALOGENS AND ELEMENTS
1973 AND 1981
(M$ '000)

SITC		Chemical Group	1973	1981
522181	1.	Carbon black		
		Rep. of Indonesia	M$ 40.3	M$4,581.1
		Rep. of Singapore	2.8	1,892.0
		Others	-	389.1
		Sub-Total	43.1	6,862.2
	2.	Others		
		Chlorine	666.3	120.1
		Others	767.8	41.6
		Sub-Total	1,434.1	161.7
5221		Total	M$1,477.2	M$7,023.9

Source: Department of Statistics

The relative importance of nitrates, phosphates, carbonates, cyanides, silicates, salts and acids in total exports of inorganic chemicals and chemical elements fell slightly from 8.6% in 1973 to 5.4% in 1981. Chemical products classified under this heterogenous category can be segregated into two basic groups: (1) phosphites, hypophosphites, phosphates and (2) sodium silicate (See Table 5.27). Singapore was the primary destination for Malaysia s exports of these two product groups in 1981, followed by Indonesia and Taiwan.

TABLE 5.27
EXPORTS: NITRATES, PHOSPHATES, CARBONATES, CYANIDES, SILICATES, SALTS, AND ACIDS
1973 AND 1981
(M$ '000)

SITC		Chemical Group	1973	1981
52322	1.	Phosphites, hypophosphites phosphates		
		Singapore	M$112.2	M$ 576.8
		Indonesia	-	81.5
		Taiwan	-	72.2
		Others	4.5	0.1
		Sub-Total	116.7	730.6
523271	2.	Sodium Silicate		
		Singapore	35.0	181.4
		Indonesia	153.1	-
		Others	21.3	-
		Sub-Total	209.4	181.4
	3.	Others	329.8	122.8
5232		Total	M$655.9	M$1,034.8

Source: Department of Statistics

Malaysia's exports of various oxides were valued at M$0.6 million in 1973 and M$1.0 million in 1981. Zinc oxide retained its paramount position in both instances, contributing M$0.4 million (62.9%) and M$0.6 million (65.5%) respectively. In 1973, Singapore and Thailand were the country's principal customers for zinc oxide, but Japan had relegated Singapore to second place in 1981 (See Table 5.28).

Titanium oxide occupied second place in total exports of various oxides in 1973, but faster growth in exports of lead oxide, red lead and orange lead enabled the latter group to move ahead in 1981. Singapore was the only market for the country's titanium oxide during this period. An overwhelming proportion (92.3%) of Malaysia's exports of lead oxide, red lead and orange lead went to Indonesia in 1981.

TABLE 5.28
EXPORTS: ZINC OXIDE, ZINC PEROXIDE AND OTHER OXIDES
1973 AND 1981
(M$ '000)

SITC		Chemical Group	1973	1981
522411	1.	Zinc oxide		
		Japan	-	M$374.9
		Singapore	M$336.1	205.7
		Thailand	45.2	39.7
		Others	7.3	33.7
			388.6	654.0
52247	2.	Lead oxides; red lead & orange lead		
		Indonesia	-	172.8
		Singapore	20.9	14.4
		Others	12.3	-
			33.2	187.2
52246	3.	Titanium oxides		
		Singapore	78.2	99.4
		Others	-	-
			78.2	99.4
	4.	Others	117.9	57.7
5224		Total	M$617.9	M$998.3

Source: Department of Statistics

The severe contraction in exports of hydrogen peroxide, phosphides, carbides, and other inorganic compounds from M$3.9 million in 1973 to only M$0.4 million in 1981 was caused by the exceedingly disappointing performance of calcium carbide and other carbides. In 1973, this product group contributed 99.1% of the total value of exports under this category (See Table 5.29). The proportion was 73.7% in 1981.

Malaysia's exports of calcium carbide and other carbides went chiefly to Thailand (M$1.4 million), Singapore (M$1.2 million) and Indonesia (M$1.1 million) in 1973. Eight years later, however, exports of these chemical compounds had shrunk to a mere M$0.3 million, of which 93.1% was accounted for by Burma.

TABLE 5.29
EXPORTS: HYDROGEN PEROXIDE, PHOSPHIDES, CARBIDES, OTHER INORGANIC COMPOUNDS
1973 AND 1981
(M$ '000)

SITC		Chemical Group	1973	1981
52393 & 52394	1.	Calcium carbide & other carbides		
		Singapore	M$1,190.3	M$ 18.2
		Burma	-	244.6
		Indonesia	1,108.2	-
		Thailand	1,451.5	-
		Others	130.2	-
		Sub-Total	3,880.2	262.8
52392	2.	Phosphides		
		Singapore	-	70.3
		Others	-	-
		Sub-Total	-	70.3
	3.	Others	36.1	23.5
5239		Total	M$3,916.3	M$356.6

Source: Department of Statistics

5.7.3 International Cost Comparison

The purpose of this section is to evaluate the cost competitiveness of two representative products of the inorganic chemicals and chemical elements group, namely, caustic soda and sulphuric acid. Relevant cost data for caustic soda and sulphuric acid operations in Taiwan and the Philippines were generated through field interviews.

- Caustic Soda

Respondent companies in Malaysia and Taiwan are presently utilizing the mercury process in the production of caustic soda (NaOH) while the Philippine plant employs the diaphragm process. One company in Malaysia will be shifting to the ion-exchange process by the end of October 1984. Similarly, one of the two Taiwanese respondent companies is replacing its mercury cells with ion-exchange membranes. According to the interviewed firms, the ion-exchange membrane process requires less electric energy than the mercury process to produce caustic soda of high purity. Comparative rated capacities and production cost structures of caustic soda plants in Malaysia, the Philippines and Taiwan are shown in Table 5.30. The following similarities and differences can be inferred from the comparative data:

1. Energy is the most significant cost component for chlor-alkali plants in the three countries.

2. Direct material is the next important component in the total production cost of caustic soda in the Philippines (30.8%) and in Taiwan (31%). On the other hand, direct material cost is not as significant in Malaysia (10-20%). At least 90% of direct materials utilized for caustic soda production in the three reference countries is imported.

3. Direct labour cost is nearly as significant as direct material cost in Malaysia's caustic soda operations. In contrast, direct labour is not a major cost item in the total production cost of caustic soda in the Philippines (1.6% of total cost) and in Taiwan (4%).

TABLE 5.30
CAUSTIC SODA:
COMPARATIVE PRODUCTION PROCESS, RATED CAPACITY
AND COST STRUCTURE

	Malaysia	Taiwan	Philippines
Process Utilized	Mercury process (Ion-exchange membrane process for one plant will be operational by end of October 1984.)	Mercury process (One of the two respondent companies in Taiwan is presently shifting to ion-exchange membrane process. The plant is expected to beoperational by end of 1985.)	Diaphragm process
Rated Capacity (in MT per annum of NaOH, 100%)	6,700 - 11,500	21,600	32,400
Production Cost Structure			
Direct Labour	10 - 14%	4%	1.6
Direct Material	10 - 20	31	30.8
Local	1 - 2		2.3
Imported	9 - 18	31 (mainly imported)	28.5
Factory Overhead	70 - 76	65	67.6
Energy	40 - 48	50	50.6
Depreciation	13 - 14	)	)
Repair and Maintenance	9 - 10	)15	)17.0
Others	0 - 12	)	)

Source: Local data from SGV-KC Field Survey
Philippine data from SGV & Co.
Taiwanese data from SGV-Soong

A closer examination of raw material sourcing reveals that the major raw material for chlor-alkali production, solar salt, is imported by all three countries from Australia. Electric energy consumption varies among these countries, with Taiwan registering more efficient utilization of electricity at 3,000 kwh per MT of caustic soda, 100% basis. Malaysia follows with an electricity consumption level of 4,280 kwh/MT of caustic soda, 100% basis. The diaphragm process of the Philippine plant, which typically utilizes about 2,593 kwh of electric power to produce 1 MT of caustic soda, is actually the least economical compared to the mercury and ion-exchange membrane processes. According to industry sources, the caustic soda derived from the diaphragm process is of poor quality and consumes additional electric power in concentrating the caustic soda. Electricity rates are highest in Malaysia at M$0.15 - 0.17/kwh and lowest in the Philippines at M$0.05/kwh.

A comparative summary of raw material cost, electric energy consumption, electricity rates, and prevailing selling prices of caustic soda for Malaysia, the Philippines and Taiwan is outlined below:

	Malaysia	Taiwan	Philippines
1. Raw Material-solar salt			
- Source/cost	Australia- M$100-128/MT	Australia- M$71-74/MT Local (minimal) - M$74.19/MT	Australia- M$76.24/MT
2. Electric Energy Consumption (kwh/MT of NaOH, 100%)	4,280	3,000	2,593
3. Electricity Rates (M$/kwh)	0.15 - 0.17	0.114	0.05
4. Selling Price			
- Ex-factory, domestic	M$500-550/MT of NaOH, 50%	n.a.	M$1,124/DMT of NaOH, 100%
- Retail, domestic	M$540-600/MT of NaOH, 50%	M$798.61/MT of NaOH, 98%	n.a.
- FOB, export	(no exports)	M$701.50/MT of NaOH, 100%	(no exports)

Exchange rate used: M$2.30 = US$1.00 = P18.00 = NT $40.30

Sources : Local data from SGV-KC Field Survey
Philippine data from SGV & Co.
Taiwan data from SGV-Soong

The greater importance of labour cost in Malaysia may be traced to the lower labour productivity of local operations compared with their Taiwanese counterparts since the wage rates of direct production workers in these two countries are not significantly different. Among the three countries, the Philippines registered the lowest wage rates (See Table 5.31).

TABLE 5.31
CAUSTIC SODA:
COMPARATIVE WAGE STRUCTURE

	Malaysia		Taiwan		Philippine
Job Category	No. of Employees	Monthly Wage	No. of Employees	Monthly Wage	Monthly Wa
1. Supervisor/ Foreman	4-5	M$975-2,000	1	M$ 1,879	M$369-60
2. Process Operator	28-31	325-1,112	24	752-1,127	218-31
3. General Worker	0-8	425-706	-	-	-
Production Volume, 1983 (In MT of NaOH, 100%)	6,300-7,500		21,600		10,08
Labour Productivity (In MT/direct employee)	170-197		864		n.a.

Note : Monthly wage includes benefits.

Sources: Local data from SGV-KC Field Survey
Philippine data from SGV & Co.
Taiwan data from SGV-Soong

o. Sulphuric Acid

Respondent companies engaged in the production of sulphuric acid (H_2SO_4) use either the single absorption system or the double-contact, double absorption (DC/DA) process. Taiwan has the DC/DA system; the Philippines, the single absorption system; and Malaysia, a mixture of the two. Comparative rated capacities and production cost structures of sulphuric acid plants in these three countries are outlined in Table 5.32. The following observations can be inferred from the data presented:

1. Direct material cost is the most significant component in the total manufacturing cost of sulphuric acid plants in all three countries. In Taiwan, direct material cost accounts for 79.9% of total manufacturing cost; in the Philippines, 65.9%; and Malaysia, 52.9%. All elemental sulphur utilized as the basic input for acid production in these countries is imported.

2. Overhead charges are relatively more important in Malaysian and Philippine sulphuric acid plants. Relative shares of energy, depreciation, repair and maintenance are considerably higher in these two countries.

3. Direct labour is of very little significance (1.2%) in the total production cost of the Philippine sulphuric acid plant.

TABLE 5.32
SULPHURIC ACID:
COMPARATIVE PRODUCTION PROCESS, RATED CAPACITY AND COST STRUCTURE

	Malaysia	Taiwan	Philippines
Process Utilized	Single absorption process (One of the two existing companies has just installed the double-contact, double absorption system)	Double-contact, double absorption process	Single absorption process
Rated Capacity (in MT of H_2SO_4 per annum)	66,000	23,100	72,000
Production Cost Structure			
Direct Labour	5.0%	5.5%	1.2%
Direct Material	52.9	79.9	65.9
Local	-	-	-
Imported	52.9	79.9	65.9
Factory Overhead	42.1	14.6	32.9
Energy	10.0	4.7	13.2
Depreciation	13.2	1.5	)
Repair and Maintenance	18.9	1.3	)19.7
Indirect Labour	-	3.0	)
Others	-	4.1	)

Sources: Local data from SGV-KC Field Survey
Philippine data from SGV & Co.
Taiwan data from SGV-Soong

Survey findings pertaining to raw material cost, electricity rates and current selling prices of sulphuric acid are presented in Table 5.33 below:

TABLE 5.33
SULPHURIC ACID:
SELECTED COST AND PRICE INDICATORS

	Malaysia	Philippines	Taiwan
1. Raw Material-elemental sulphur			
- Source	Singapore	Canada and Singapore	Canada and Japan
- Cost (M$/MT)	330 - 360	424.35	342
2. Electricity Rates (M$/kwh)	0.19	0.19 - 0.26	0.115
3. Selling Price (M$/MT)			
- Ex-factory, domestic	360	246.48	108.44
- Retail, domestic	390	n.a.	136.97
- Import substitute (Japan)	n.a.	n.a.	87.40

Exchange rate used: M$2.30 = US$1.00 = P18.00 = NT $40.30

Sources : Local data from SGV-KC Field Survey
Philippine data from SGV & Co.
Taiwan data from SGV-Soong

The following observations may be gleaned from the data above:

1. Cost of elemental sulphur is comparable in Malaysia and Taiwan but significantly higher in the Philippines.

2. Electricity rates are considerable lower in Taiwan.

3. Competitive cost of raw materials, lower energy charges, and higher labour productivity explain why the selling price of sulphuric acid in Taiwan is decidedly lower than in the other two countries.

Wage levels in Taiwan are considerably higher relative to Philippine and Malaysian wages. However, comparing production output and size of direct labour force of respondent companies in these three countries, it can be deduced that labour productivity in Taiwan is higher than in Malaysia and the Philippines. Relevant wage and output statistics are shown in Table 5.34.

TABLE 5.34
SULPHURIC ACID:
COMPARATIVE WAGE STRUCTURE

	Malaysia		Taiwan		Philippines	
Job Category	No. of Employees	Monthly Wage	No. of Employees	Monthly Wage	No. of Employees	Monthly Wag
1. Supervisor/ Foreman	3	M$780	1	M$ 2,990	4	M$511-767
2. Process Operator	1	520	)6	2,242	19	295-337
3. General Worker	4	390	)	897-1,495	-	
Production Volume, 1983 (In MT of H_2SO_4)	11,932		14,280		35,351	
Labour Productivity (In MT/direct employee)	1,492		2,040		1,537	

Note : Monthl, wage includes benefits.

Sources: Local data from SGV-KC Field Survey
Philippine data from SGV & Co.
Taiwan data from SGV-Soong

VI. FERTILIZERS

6.1 CURRENT INDUSTRY POSITION

6.1.1 Industry Background

The three major crop nutrients are nitrogen (N), phosphate (P_2O_5), and potash (K_2O). Malaysia is not endowed with any significant deposits of phosphate and potash but currently has one small ammonia plant and sufficient reserves of natural gas from which nitrogenous fertilizers can be made. Not suprisingly, the country is entirely dependent on imports of phosphates and potash. The small ammonia plant is currently able to supply less than a third of the country's nitrogen requirements. However, Malaysia is well on its way to being self-sufficient in urea fertilizers with the expected commissioning of the ASEAN plant in Bintulu by the end of 1985.

The fertilizers produced in Malaysia consist of the following:

1. Synthesized nitrogenous fertilizers (straight fertilizers)

   a. Ammonium nitrate from ammonia
   b. Granulated urea from natural gas (by 1985)

2. Granulated compound fertilizers

3. Fertilizer mixtures

A third type of nitrogen fertilizer, ammonium sulphate, used to be produced from ammonia by Federal Fertilizer Co. Bhd. However, the company stopped commercial production of this fertilizer in mid 1981 because it could not compete with very cheap imported ammonium sulphate despite the tariff protection accorded by the Government.

The local fertilizer industry is composed of the following:

1. An ammonium nitrate synthesizer which produces this nitrogen fertilizer from ammonia obtained from the Esso distillation plant using naphtha feedstock;

2. One upcoming ammonia-urea synthesizer using natural gas feedstock;

3. Two companies engaged in the production of granulated compound fertilizers, one of which is the same company synthesizing ammonium nitrate; and

4. An estimated 80 fertilizer mixing plants undertaking the very low value added activity of physical blending of imported fertilizers into NPK mixtures. Six major fertilizer firms have mixing plants with a total annual capacity in the region of three million tons based on three shifts and account for at least 80% of available mixing capacity in Malaysia.

The fertilizer companies, their plant locations, and size in terms of production capacity are outlined in Table 6.1. With the exception of the ASEAN plant in Bintulu, Sarawak and one mixing plant at Kuching, the rest of the firms in the industry are located in Peninsular Malaysia near the ports of Kelang, Penang and Pasir Gudang. The ASEAN plant is beside its source of feedstock, which is the Central Luconia gas field offshore Bintulu. During the course of the interviews, only Peladang Kimia Sdn. Bhd. expressed interest in going into production of granulated NPK fertilizers.

Among the companies presented in Table 6.1, only FPM Sdn. Bhd. (FPM) and Peladang Kimia Sdn. Bhd. (Peladang Kimia) have some direct linkage with local plantations. FPM is a joint venture of the Federal Land Development Authority (FELDA), KPM Niaga and Behn Meyer & Co. (M) Sdn. Bhd. FPM is committed to sell at least 40% of its produce to FELDA which is directly involved in agricultural development with projects devoted to oil palm, newly-planted rubber, cocoa, sugarcane, and coffee. Peladang Kimia, on the other hand, is associated with Dunlop and Malaysian Plantation, both of which are engaged in multicrop estate plantation, primarily, rubber, oil palm and cocoa.

TABLE 6.1
FERTILIZERS:
LIST OF FERTILIZER COMPANIES, PLANT LOCATION AND PRODUCTION CAPACITY
1984

	Product	Plant Location: Kuala Lumpur/ Selangor/ Negeri Sembilan	Butterworth/ Prai	Pasir Gudang/ Johor	Sarawak	Total Capacity
1. Synthesized Nitrogenous Fertilizers/ Nitrogen Fertilizer Input						
a. Federal Fertilizer Co. Bhd.	Ammonium Sulphate	120MT/day	120MT/day	-	-	240MT/day[1]
b. ASEAN Bintulu Fertilizer Sdn. Bhd.	Ammonia	-	-	-	1,000MT/day	1,000MT/day[2&3]
	Granulated Urea	-	-	-	1,500MT/day	1,500MT/day[3]
c. Esso Malaysia Berhad	Ammonia	162MT/day	-	-	-	162MT/day
d. Chemical Company of Malaysia Bhd.	Ammonium Nitrate	80,000MT of nitric acid/annum	-	-	-	80,000MT of nitric acid/annum[4]
2. Granulated Compound Fertilizers						
a. Chemical Company of Malaysia Bhd.	NPK compounds	250,000MT/annum	-	-	-	250,000MT/annum[4]
b. FPM Sdn. Bhd.	NPK compounds	180,000MT/annum	-	-	-	180,000MT/annum[4]
3. Mixed Fertilizers						
a. ICI Agriculture (Malaysia) Sdn. Bhd.	Mixed fertilizers	300MT/8hrs	100MT/8hrs	100MT/8hrs	100MT/8hrs	600MT/8hrs
b. Peladang Kimia Sdn. Bhd.	Mixed fertilizers	-	200MT/8hrs	400MT/8hrs	-	600MT/8hrs
c. Bumi Woodward Sdn. Bhd.	Mixed fertilizers	150MT/8hrs	100MT/8hrs	-	-	250MT/8hrs
d. Behn Meyer & Co. (Malaysia) Sdn. Bhd.	Mixed fertilizers	60MT/8hrs	120MT/8hrs	120MT/8hrs	-	300MT/8hrs
e. Pengedar Bahan Sdn. Bhd.	Mixed fertilizers	420MT/8hrs	240MT/8hrs	180MT/8hrs	-	840MT/8hrs
f. Federal Fertilizer Co. Bhd.	Mixed fertilizers	-	160MT/8hrs	320MT/8hrs	-	480MT/8hrs

Notes :

1 Stopped commercial operations in mid 1981.

2 Ammonia produced from natural gas is in turn used to produce urea.

3 Expected completion of plant is in October 1985.

4 Capacity based on three shifts

6.1.2 Current Industry Problems

The firms interviewed consider the following to be major problems of the industry:

1. Competition from cheap alternative nitrogen fertilizers. There is a consensus among the respondent companies involved in the synthesis of nitrogen fertilizers that the following low cost imported substitutes will pose stiff competition against the ASEAN plant's urea: (a) Japan's ammonium sulphate, which is a by-product of its steel and synthetic fiber industries and which therefore has no cost considerations; and (b) urea from Eastern Europe where cost considerations are of secondary importance.

2. The bias of end-users against urea-based granulated compound fertilizers. The ASEAN plant and FPM have to overcome the prejudice against urea which, according to some agronomists, volatilizes in inland soil and loses its nitrogen nutrient.

3. Port congestion, slow discharge of cargo and slow customs clearance. According to survey respondents, there is insufficient berthing space in the ports of Malaysia. The respondents also noted that the slow discharge of cargo is due to the frequent breakdown of handling equipment and too much red tape involved in tender procedures for repair of such equipment. In addition, respondents indicated that the speed of clearance of commodities through customs should be improved.

4. Surplus capacity for mixed fertilizers. There is excessive surplus capacity for fertilizer mixing which involves low investment and capital requirements.

5. Shortage of some labour skills. Survey findings reveal that the supply of experienced mechanical engineers, mechanics, artificers, granulation experts and electrical chargemen (with medium pressure excluding power station certificate) is also a critical concern of local fertilizer plants engaged in synthesis and granulation. This problem is felt nationwide. Some respondents indicated that the Government should address this issue by giving incentives to private firms who can assist in training prospective employees of new fertilizer companies.

6. High energy cost. Respondents indicated that the Government should study how electric power and fuel costs in Malaysia can be reduced so that local products can become more competitive.

The establishment of the world-scale ammonia-urea plant in Bintulu poses a serious threat to the viability of Esso's small ammonia plant, which uses expensive naphtha feedstock. During the course of the Consultants' interviews, it was suggested that existing domestic plants such as Esso's, be provided with indigenous economic source of gas feedstock and fuel from natural gas development in order that such plants can remain economically viable.

The following areas are not considered as serious threats to the industry: fluctuating prices of imported raw materials and availability of local financing.

6.2 PRODUCTION ASPECTS

The discussion on production aspects will focus on a definition of the fertilizer product groups, production capacity and utilization level, input profile, production technology, and production cost structure.

6.2.1 Products

Imported and locally produced fertilizers are either applied directly to the soil as straight fertilizers or blended into mixed or granulated compound fertilizers according to market specifications. The three fertilizer product groups available in the market are briefly defined as follows:

1. Straight fertilizers contain a single plant nutrient. Nitrogenous straight fertilizers include ammonium sulphate, ammonium nitrate, ammonium chloride, and urea. Rock phosphate is the most popular form of straight phosphatic fertilizers used in Malaysian soil while muriate of potash is the most common form of potassic straights.

2. Fertilizer mixtures are products derived from simple dry mixing of two or more straight fertilizers of different particle size, shape and specific gravity. The physical mixing is done through a screw type or drum mixer with no chemical interaction.

3. Granulated compound fertilizers are complex homogeneous products containing two or more plant nutrients that have undergone chemical reaction during the manufacturing process. There are various ways of achieving this chemical combination. CCM employs the single liquid phase process where hot liquid ammonia is reacted with dry powdered rock phosphate, muriate of potash and calcined magnesite. The chemical compounding is followed by granulation with the addition of anti-caking agents to form free-flowing compound granules.

6.2.2 Production Capacity and Utilization

The production capacities of individual firms in the industry were previously presented in Table 6.2. A summary of the nationwide capacity by type of product and utilization level follows:

TABLE 6.2
FERTILIZERS:
NATIONWIDE PRODUCTION CAPACITY AND UTILIZATION LEVELS
1984

Product	Rated Annual Capacity[1] Total Malaysia (In Metric Tons)	Utilization Level
1. Ammonia from naphtha	55,000MT	64%
2a. Ammonia input for urea using natural gas	330,000[2]	Operations will commence in late 1985
b. Urea	495,000[2]	
3. Ammonium nitrate	80,000 (nitric acid)	n.a.
4. Ammonium sulphate	79,200[2]	Not operating
5. Granulated compound fertilizers	430,000	63
6. NPK fertilizer mixtures	3,039,000[2 & 3]	13 - 16

Notes :
1 Capacities represent three shift capacity for each product.
2 Annual capacity was computed on the basis of 330 operating days per year.
3 Total capacity of 3.0 million tons represents the mixing capacity of six major fertilizer importers.
n.a. - not available

Source: SGV-KC Field Survey

The output of the world-scale granular urea plant of ASEAN is expected to replace current urea imports. The exportable surplus will be sold on a priority basis to the other ASEAN shareholders in the project: the Philippines, Thailand, Indonesia, and to a lesser extent, Singapore.

It is worth noting that the fertilizer industry has built up a mixing capacity which is seven to eight times larger than its capacity for granulated NPK compound fertilizers. The low investment and short time required to set up a mixing plant has attracted a sizeable number of entrepreneurs to import fertilizers and invest in such plants. With M$10,000, one can set up and start operating a mixing plant within a fortnight. With excess capacity in this product category, utilization level of mixing plants is at a low 13 - 16%.

Granulated compound fertilizer production capacity of the industry increased with the commencement of FPM's operations in May 1983. Capacity of the first NPK compound producer, Chemical Company of Malaysia (CCM), is 250,000MT per year. In the 1980s its actual production reached near full capacity during years of good commodity prices and sank to as low as 58% during bad times for export commodity crops. FPM, on the other hand, is steadily improving its granulation techniques to increase its initial utilization level of 44%.

6.2.3 Input Profile

The major raw material inputs used in the local production of various fertilizers and their respective sources are summarized in Table 6.3. Some salient observations on the main sources of the three important fertilizer nutrients, namely, nitrogen, potash and phosphate, are as follows:

1. Nitrogen fertilizers used in the production of granulated NPK compounds are at present sourced locally by CCM from its own production of ammonium nitrate, and imported by FPM in the form of urea prills. However, FPM will also source its urea locally as soon as the ASEAN plant in Bintulu starts operating.

2. Nitrogen fertilizers used in NPK mixtures are mostly imported in the form of ammonium sulphate from Japan, Federal Republic of Germany and Republic of Korea.

3. Potassic fertilizers are entirely imported and originate largely from Canada, Europe and U.S.S.R.

TABLE 6.3
FERTILIZERS:
RAW MATERIAL INPUTS

	Product	Raw Materials	Source	
			Local	Imported/ Country of Origin
1.	Ammonia	Naphtha	100% - own refinery	-
2.	Ammonium nitrate	Ammonia	100% - Esso	-
3.	Ammonia/Urea	Natural gas	100% - Central Luconia gas field	-
4.	Granulated NPK Compounds and NPK mixtures	Nitrogen fertilizers:		
		- Ammonium nitrate	100% - own production	-
		- Urea prills	-	100% - Qatar, U.S.S.R., Romania, Indonesia, USA
		- Ammonium sulphate	-	100% - Japan,
		Potassic fertilizers:		
		- Muriate of potash	-	100% - Canada, Europe, U.S.S.R.
		Phosphatic fertilizers:		
		- Rock phosphate	-	100% - Christmas Island, Jordan, Morocco, Egypt
		- Ammonium phosphates	-	100% - USA
		Others:		
		- Calcined magnesite	-	100% - UK
		- Kieserite	-	100% - F. R. of Germany
		- Sul-Po-Mag (18.5% MgO and 22% K_2O)	-	100% - n.a.
		- Clay fillers	100%	-

n.a. - not available

Source: SGV-KC Field Survey

4. The bulk of phosphatic fertilizers used in Malaysia is in the form of natural rock phosphate applied directly (without additional processing) to the soil. Soil conditions, the predominance of tree crops and relative prices of manufactured and natural phosphates have made the use of ground rock phosphate more economical than that of manufactured phosphates. All phosphatic fertilizers are imported with Christmas Island as the leading source of ground rock phosphate. CCM mentioned that there is some indication of a growing demand for soluble phosphates in the form of ammonium phosphates primarily for vegetable crops and some smallholdings.

A schedule on import duties and taxes levied on these raw materials is shown in Table 6.4.

TABLE 6.4
FERTILIZERS:
DUTIES AND TAXES ON MAJOR RAW MATERIALS

	Raw Material	Import Duty	Sales Tax	Surtax
1.	Naphtha feedstock	(Exempted from excise duty and sales tax)		
2.	Urea	-	-	-
3.	Ammonium nitrate	M$44.29/MT	-	5%
4.	Ammonium sulphate	$44.29/MT	-	5%
5.	Muriate of potash	-	-	-
6.	Rock phosphate	2%	-	-
7.	Ammonium phosphates	$44.29/MT	-	5%
8.	Calcined magnesite	3%	-	-
9.	Kieserite	3%	-	-
10.	Sul-Po-Mag	-	-	-

Source: SGV-KC Field Survey

6.2.4 Production Technology

Local fertilizer companies acquired the technology for the synthesis of nitrogen fertilizers and the production of granulated NPK fertilizers through technical agreements and turnkey projects. CCM, which set up the first granulated compound fertilizer plant together with a nitric acid plant in 1966, obtained its process capability together with other forms of technical assistance from its holding company, Imperial Chemical Industries PLC of U.K. On the other hand, FPM built its granulated compound fertilizer plant with the assistance of consultants from the International Fertilizer Development Center (IFDC), U.S.A. FPM has a five year Technical Agreement with IFDC which covers: (1) development of the process to produce granulated compound fertilizers from granular urea, rock phosphate and/or soluble phosphates, and muriate of potash; (2) testing of the process through a pilot plant in IFDC, Alabama; and (3) regular consultations on problems encountered and further improvement of technology for a period of five years.

The ASEAN urea joint-venture project in Bintulu, Sarawak is a turnkey project which includes transfer of technology. In 1982, ASEAN Bintulu Fertilizer Sdn. Bhd. awarded the main contract to Kobe Steel, Ltd. of Japan in cooperation with Uhde GmbH of the Federal Republic of Germany to undertake the development of the ammonia/urea complex using natural gas feedstock. The ammonia process was developed by Uhde GmbH the urea synthesis process by Stamicarbon, and the granulation process by NSM.

Because the technology involved in the synthesis of the various nitrogen fertilizers is highly sophisticated, already developed and tested by dominant foreign firms or consultant groups in the international fertilizer market, local fertilizer companies simply avail of such technology and do not undertake any R & D. For FPM's granulated compound fertilizer plant which is the first to use urea as the basic nitrogen source, all R & D activities are handled by IFDC consultants who developed the process. Malaysia does not have the technical expertise and facilities required for such R & D.

6.2.5 Production Cost Structure

Survey respondents revealed that granulated NPK compounds produced locally from naphtha-based ammonia are not cost competitive overseas. The noncompetitiveness of Malaysian fertilizers is better understood upon examination of the production cost structure of granulated compound fertilizers and its major input, ammonia (See Table 6.5). Principal findings on cost components are as follows:

1. Direct material cost for granulated compound fertilizers is the largest component of production cost, accounting for 67% of product cost. Imported inputs represent 46% of total direct material cost while locally sourced ammonia, together with clay fillers, account for a significant 54%. As gathered from interviewed firms, naphtha feedstock presently used in the synthesis of ammonia is much more expensive than natural gas feedstock which is the more common raw input in other countries' ammonia plants. Thus the high cost of ammonia and substantial import content leads to a very expensive product.

2. For ammonia, the two biggest cost items are direct material cost (33%) and energy (36%). Both feedstock and fuel used in local ammonia production are petroleum products while other countries such as Indonesia and Taiwan use low cost natural gas.

3. Ammonia production of Esso is on a small scale (maximum of 162MT per day) while the majority of new ammonia plants built in the last decade have been designed for three capacities -- 550, 900 to 1,040, and 1,360MT per day. The high volume of production in world-scale plants helps to lower the fixed cost components relative to the other cost items.

4. Direct labour is the third major cost item for granulated compound fertilizers, representing 10% of total production cost. For ammonia, indirect labour is a significant cost item.

5. Aggregate variable cost of granulated compound fertilizer represents about 89% of total product cost. Variable expenses include direct labour, direct material, energy and packaging. For ammonia, variable cost items account for 78% of total manufacturing cost.

TABLE 6.5
FERTILIZERS:
PRODUCTION COST STRUCTURE

	Granulated Compound Fertilizer		Ammonia from Naphtha	
Cost Item	% of Total Manufacturing Cost	Remarks	% of Total Manufacturing Cost	Remarks
Direct Labour	[illegible]		[illegible]	
Direct Material			[illegible]	
- Local	[illegible]	[illegible]	[illegible]	[illegible]
- Imported	[illegible]	[illegible]	-	
Factory Overhead	[illegible]		51	
- Energy	[illegible]	Electricity, water and fuel	36	[illegible] fuel and [illegible] electricity
- Depreciation	2		4	
- Repair and maintenance	6		3 *	
- Packaging	4	Polyethylene bags, woven bags and paper bags	3	
- Others	3		15	Mainly indirect salaries, wages and benefits
	100%		100%	

Note :

* Excludes cost of plant turnaround which is a major repair and maintenance (R & M) program carried out at 18 - 24 month intervals. The last plant turnaround was in 1982. Prorating the cost of turnaround over the interval would have increased R & M to 8% with a corresponding 5% reduction in all other cost items.

Source: SGV-KC Field Survey

6.3 MARKETING ASPECTS

6.3.1 Product Mix

Survey results indicate the following product group composition in Malaysia's fertilizer market as of 1983 and 1984:

Product Group	Estimated Consumption (In '000 MT) 1983	1984
1. NPK compound fertilizers		
a. Locally produced granulated NPK compound fertilizers	194	240
b. Imported NPK compound fertilizers	100	110
Sub-Total	294	350
2. NPK mixtures	420	475
3. Straight fertilizers		
a. Nitrogenous fertilizers		
- Urea		90
- Ammonium sulphate		80
- Ammonium nitrate		20
- Ammonium chloride		15
b. Rock phosphate		50
c. Muriate of potash		150
d. Others (TSP, DAP, Sul-Po-Mag, etc.)		20
Sub-Total	400	425
Total Fertilizers	1,114	1,250

Notes:

1. TSP - Trisodium phosphate
2. DAP - Diammonium phosphate
3. Sul-Po-Mag - Sulphate of potash magnesia

6.3.2 Market Segments and Consumption Patterns

- Domestic Market

Land-use in Malaysia is characterized by the predominance of hectarage devoted to rubber, oil palm, padi, and cocoa. Rubber has the largest hectarage with 2,018,000 hectares in 1983 followed by oil palm which occupied about 1,288,000 hectares. Cultivated land devoted to food crops are lesser in proportion with padi occupying 655,000 hectares in the 1982/83 crop year and 168,000 hectares devoted to cocoa in 1983.

These four major crops are also the largest consumers of fertilizers in the country. Industry sources place total fertilizer tonnage consumption in 1984 at 1.25 million MT. Oil palm is the heaviest user of all three crop nutrients and accounted for approximately 50-55% of total tonnage of fertilizers consumed during the year. The respective shares of rubber, padi and cocoa are estimated at 16-21%, 14% and 3%. Table 6.6 summarizes industry estimates of fertilizer consumption by main crops in Malaysia for 1984.

TABLE 6.6
FERTILIZERS:
ESTIMATED FERTILIZER CONSUMPTION BY CROP
1984

Crop	Consumption (In '000 MT of fertilizer product)	% To Total Consumption
Oil palm	630 - 690	50.4 - 55.2%
Rubber	200 - 260	16.0 - 20.8
Padi	170	13.6
Cocoa	42	3.4
Others:		
- Vegetables	60	4.8
- Tobacco	15	1.2
- Pepper	10	0.8
- Sugarcane	25	2.0
- Pineapple	10	0.8
- Others	28	2.2
Total	1,250	100.0%

Source: SGV-KC Field Survey

In terms of crop nutrients, the quantities of nitrogen, phosphate and potash used in these crops are shown in Table 6.7 while nutrient consumption per hectare by major crop is outlined in Table 6.8. The common sources of crop nutrients applied to the four major crops are as follows:

		N	P_2O_5	K_2O
1.	Oil Palm	Urea Ammonium sulphate Ammonium nitrate	Rock phosphate	Muriate of potash
2.	Rubber	Ammonium sulphate Ammonium nitrate	Rock phosphate	Muriate of potash
3.	Padi	Urea	Rock phosphate	Muriate of potash
4.	Cocoa	Ammonium nitrate	Rock phosphate	Muriate of potash

1. Oil Palm

On a unit area basis, fertilizer use is highest for oil palm at 207kg. of nutrients per hectare. The heavy usage of all three nutrients is understandable considering that about 93% of oil palm hectarage in Malaysia is either under estate management or government land settlement scheme management (See Appendix 3). Because of the presence of a large estate industry and substantial participation of the Government in land development, there is maximum investment in agricultural inputs such as fertilizers. Interviewed firms place current fertilizer usage of palm oil at 70 - 80% of optimal rate of fertilizer application for this crop.

SGV-Kassim Chan Sdn. Bhd.

TABLE 6.7
FERTILIZERS:
NUTRIENT CONSUMPTION BY MAJOR CROP
1984

Crop	Hectarage (In '000 Hectares)	Consumption in '000 MT Nutrient: N	P_2O_5	K_2O	Total NPK Nutrients	Estimated Tonnage of Fertilizer Product (In '000 MT)
Oil Palm	1,352[1]	55.3	61.1	163.5	279.9	670
Rubber	2,018	27.2	27.2	29.3	83.7	260
Padi	655	51.8	16.0	6.2	74.0	170
Cocoa	195[2]	4.6	2.6	4.6	11.8	42
Vegetables, fruits and others	n.a.	7.2	14.3	6.2	27.7	110
Total		146.1	121.2	209.8	477.1	1,252

Notes:
1. Increase of hectarage cultivated to palm oil is assumed at 5%.

2. Increase of hectarage cultivated to cocoa is assumed at 16%.

Source: SGV-KC Trade Interviews
Paper on Fertilizer Manufacture by Mr. J.R. Dunkley, CCM, April 1984

TABLE 6.8
FERTILIZERS:
AVERAGE NUTRIENT CONSUMPTION PER HECTARE
1984

Crop	Hectarage (In '000 Hectares)	Average Kilograms of Nutrient Per Hecta[re]			
		N	P_2O_5	K_2O	Total NP[K] Nutrient[s]
Oil Palm	1,352	40.9	45.2	120.9	207.0
Rubber	2,018	13.5	13.5	14.5	41.5
Padi	655	79.1	24.4	9.5	113.0
Cocoa	195	24.4	14.0	24.4	62.8
Coconut	n.a.	2.9	-	2.9	5.9
Vegetables, fruits and others	n.a.	28.6	66.7	23.8	119.0
AVERAGE, ALL CROPS		30.5	25.2	43.0	95.6

Source: SGV-KC Trade Interviews
Paper on Fertilizer Manufacture by Mr. J.R. Dunkley, CCM, April 1984

2. Rubber

Area devoted to rubber, which occupies the largest hectarage among all crops planted in Malaysia, has already leveled off and is expected to decline slightly in the future. Rubber is not a heavy user of fertilizers. In average terms, fertilizer usage of rubber is estimated at 42kg. of nutrients per hectare, which represents 60% of the recommended rate of fertilizer application for this crop.

While fertilizer consumption of rubber remains very important and significant to the fertilizer industry in Malaysia, industry sources do not anticipate any dramatic growth in fertilizer usage of this crop in the next decade for the following reasons:

a. Rubber hectarage in Peninsular Malaysia is characterized by the predominance of smallholders who apply fertilizers below standard levels. The Government subsidizes the fertilizer purchase of the smallholding industry since smallholders do not have the funds to invest in agricultural inputs. Total smallholding area in Peninsular Malaysia is estimated at 1.2 million hectares in 1983 or 72.7% of total rubber land in this region.

b. The estate industry, which accounts for 27.3% of rubber land in Peninsular Malaysia in 1983, has been exercising voluntary restraint in rubber production because of the sluggish demand in the industrialized countries for this commodity. Total estate hectarage devoted to rubber has been steadily declining and, correspondingly, fertilizer usage has decreased.

3. Padi

Area devoted to padi is small compared to total hectarage of rubber and palm oil. However, fertilizer usage of padi at 113kg. of nutrient per hectare is more than double that of rubber. Among all Malaysian crops, padi is the heaviest user of nitrogen fertilizers and accounts for about 30% of all nitrogen consumed in Malaysia.

Survey respondents indicated that growth in fertilizer consumption of padi is heavily dependent on Government's continued subsidy of agricultural inputs. Like rubber, padi is a smallholder crop and padi farmers generally lack the funds to purchase fertilizers. At present, the Government is giving out 160,000 tons of fertilizers to padi farmers. A small minority purchases additional fertilizers in the region of 10,000 - 20,000 tons. According to survey respondents, average fertilizer usage of padi is only about 40% of recommended rate of fertilizer application for this crop.

4. Cocoa

Cocoa is a high growth export crop which is third to palm oil in the usage of all three major crop nutrients. The average fertilizer application rate of cocoa at 63kg. of nutrient per hectare is 83% of optimal usage for this crop. Total area devoted to cocoa reached 168,000 ha. in 1983.

o Export Market

Exports of fertilizers in the past decade were negligible compared with total output. Prices of locally produced granulated compound fertilizers are not competitive with prevailing world market prices mainly due to the high cost of raw materials. Respondents revealed that South Thailand, which has the same crops (oil palm and rubber), climate and soil conditions as Malaysia, is the nearest and most logical market for local NPK compound fertilizers. However, CCM has always lost in fertilizer supply tenders submitted to South Thailand because of its high prices.

6.3.3 Market Prospects

Increased local sales of granulated compound fertilizers using ammonium nitrate as nitrogen source is expected to be realized from substitution of compound fertilizers imported from Europe which contain water soluble phosphate. Vegetable crops and nursery crops are the main users of these fertilizers. Interviewed firms do not anticipate any improvement in compound fertilizer usage by rubber smallholdings despite the substandard level of fertilizer application by this sector.

Prospects for locally produced urea straights appear to be promising as it will replace current urea imports which amounted to about 145,000MT in 1981 and 172,000MT in 1982. In addition, urea from the ASEAN plant in Bintulu will be used as an input to the local production of granulated compound fertilizers by FPM. Potential export markets for surplus urea are the other ASEAN shareholders -- Philippines, Thailand and Indonesia. Excess ammonia, on the other hand, can be exported to the Philippines, Thailand, Taiwan, and Republic of Korea.

For urea-based granulated compound fertilizers, FPM will have to resolve the urea volatilization issue to break down consumers' bias against urea-based compound or mixed fertilizers. Once this problem is resolved, and assuming Bintulu's urea prices are competitive with foreign nitrogenous fertilizers, industry sources expect urea to replace some of the ammonium sulphate and ammonium nitrate used in compound and mixed fertilizers. Prospective export markets for urea-based granulated compound fertilizers are Sri Lanka, Thailand and Indonesia.

Soluble phosphate consumption, which accounts for about 16 -20% of total domestic phosphate nutrient consumption, is projected to increase at about 3% yearly on the average following the expected growth of vegetable and tobacco crop output.

6.3.4 Key Marketing Variables

As perceived by survey respondents, key success factors in the fertilizer industry are the following:

1. price competitiveness
2. good product quality
3. good location
4. good distribution network and experienced sales force
5. long established relationship
6. well established market position

Because of prevailing low prices of nitrogen fertilizers from Japan and Eastern Europe, the local urea plant will continually face the challenge of maintaining its international competitiveness. The volatilization of ammonia from urea is presently perceived to be akin to poor product quality and will have to be resolved before usage of urea-based compounds and mixtures can be accepted by the local market.

Another important factor is the proximity of plants to ports in order to minimize transport time of imported fertilizer inputs. At the same time, this will allow domestic manufacturers to be responsive to the needs of potential export markets within the Asian region.

Other key success factors identified by interviewed firms are good distribution network and experienced sales force, harmonious personal relationship between end-user and the fertilizer firm, and well established position in the market.

6.3.5 Product Pricing and Credit Terms

Granulated compound fertilizer firms presently adopt cost plus pricing methods while the ASEAN urea plant will determine its prices on the basis of international market prices for urea and alternative nitrogen fertilizers. Table 6.9 summarizes the prevailing prices of locally produced fertilizers and their imported substitutes.

TABLE 6.9
FERTILIZERS:
COMPARATIVE PRICES
(IN M$ PER MT)

Product	Trade Level	Retail
1. Local compound fertilizers	$480 - 530 ex-factory	$490 - 550
2. Imported compound fertilizers	595 - 600 C & F	605 - 610
3. Imported urea (46%N)	379.50 FOB in bulk	n.a.
4. Imported ammonium sulphate (21%N)	172.50 - 184 FOB in bulk	n.a.

n.a. - not available

Source: SGV-KC Field Survey

The naphtha-based ammonia input used in the synthesis of ammonium nitrate is currently priced at M$800 per MT. In comparison, the prevailing international market price for ammonia commonly made from natural gas is US$180 per MT FOB in bulk or M$414 per MT.

Ammonia, ammonium nitrate, ammonium sulphate, ammonium phosphates, mixed fertilizers, and granulated compound fertilizers are protected products. At present, an import tariff of M$44/MT and a surcharge of 5% are levied on their imported substitutes.

Credit terms extended to customers normally range from 45 - 90 days.

6.3.6 Distribution Structure

o Domestic Sales

The domestic marketing of fertilizers is mainly in the hands of the private sector. The Malaysian Government participates directly or indirectly to strengthen certain identified areas of weaknesses in the market channels or in conjunction with government land settlement, replanting and credit schemes. Thus, a number of major firms undertake the import and retail of fertilizers through their own established sources of supply and distribution outlets in competition with each other. The government's role in fertilizer distribution is limited to:

1. organizing fertilizer supply in government organized land development and replanting schemes;

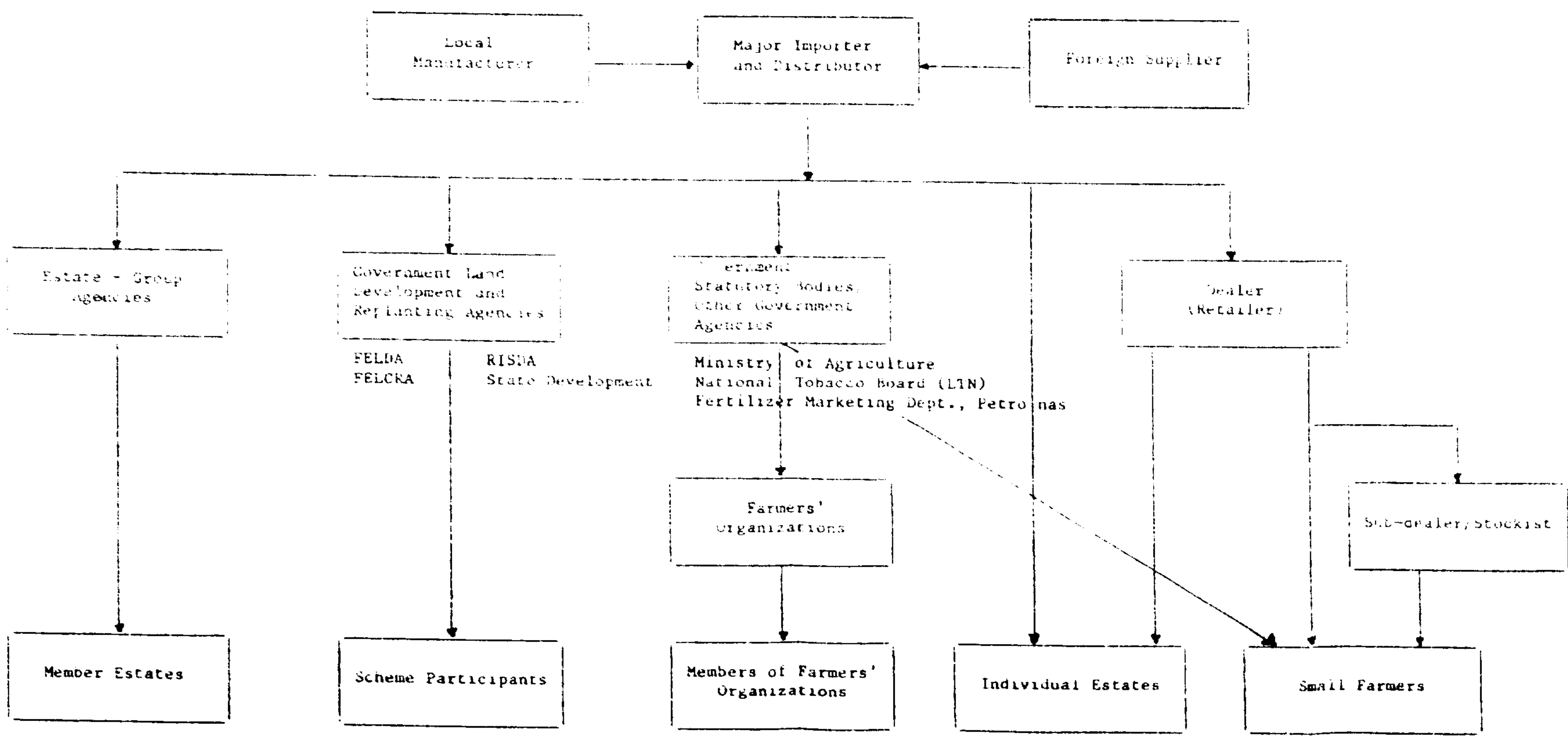
2. increasing the number of retail outlets by establishing farmers' cooperatives;

3. extending assistance to the poorer farmer communities through fertilizer price subsidies, grants and extension of credit;

4. importing and storing fertilizers through government sponsored business organization in times of expected scarcity.

The distribution system for fertilizers in Malaysia is shown in Figure 1. There are about six major importing and distributing firms at the wholesale level with their respective wholesale departments and retail networks. They are ICI, Peladang Kimia, Pengedar Bahan, Bumi Woodward, Petronas, and Behn Meyer.

FERTILIZERS:
DISTRIBUTION FLOW OF FERTILIZERS IN MALAYSIA



Source: Trade interviews

At the field distribution or retail level, there are four categories of retail outlets and field distribution centers, namely:

1. estate - group agencies

2. government land development and replanting agencies

3. government statutory bodies

4. private retailers or dealers

The estate-group management agency represents a number of estates in order to realize benefits from economies of scale in management as well as in the purchasing of agricultural inputs. These agencies usually obtain fertilizers direct from the main distributors or their subsidiaries.

Government land development and replanting agencies include the following: (1) Federal Land Development Authority (FELDA); (2) Federal Land Consolidation and Rehabilitation Authority (FELCRA); (3) Rubber Industry Smallholders Development Authority (RISDA); and (4) State Development Schemes. Each of these agencies has its own procurement department and network of distribution centres either based on the land development project itself (such as in FELDA and FELCRA) or on demarcated development regions as in RISDA. The distribution outlets provided by these government centres is important because of the substantial number of participants and the large areas involved.

Other government agencies, such as the Ministry of Agriculture, National Tobacco Board (Lembaga Tembakau Negara, LTN) and the Fertilizer Marketing Department of Petronas, procure fertilizers for farmers' organizations or cooperatives. A major function of these farmers' cooperatives is to supply agricultural inputs to members as well as non-members within the organic areas they operate. The profits generated from the fertilizer supply business of these cooperatives are for the benefit of their members.

Private dealers retail fertilizers to all small farmers and estate owners. These dealers are usually based in the main towns of the districts. The larger ones have their sub-dealers or stockists at the village level. Most of these dealers generally retail for all the competing importers and distributors.

The respondent firms believe that Malaysia has a fairly good distribution network for fertilizer. In particular, member estates of the estate-group agencies, settlers and participants of government land development and replanting programmes, and members of farmers' organizations have easy access to fertilizers. Smallholders who do not belong to any of these organized farming groups generally have limited access to quality fertilizers and pay higher prices for their inputs.

o Export Sales

Urea exports of the ASEAN Bintulu plant (ABF) will be coursed through two channels. Sales to ASEAN countries will be handled directly by ASEAN Bintulu while export trade with non-ASEAN countries will be undertaken by the Malaysian International Trading Company (MITCO). For ASEAN countries, ABF will be dealing only with the state trading companies or with the national fertilizer company, such as the National Fertilizer Corp. of Thailand and the Philippine International Trading Corp. of the Philippines.

6.4 FINANCIAL ASPECTS

6.4.1 Ownership Structure

There is substantial Malaysian equity participation in companies producing nitrogen fertilizers and granulated compound fertilizers. The Malaysian Government, in particular, is investing heavily in the fertilizer industry primarily to tap the country's natural gas resources and to ensure the regular supply of urea in Malaysia as well as other ASEAN agri-based nations. As shown in Table 6.10, the Government's shareholdings in two new fertilizer projects, namely, the ASEAN urea joint-venture project and FPM Sdn. Bhd., represent 60% and 40% of total paid-up capital, respectively.

The two pioneers in the industry, Chemical Company of Malaysia Berhad and Esso Malaysia Berhad, have 65-66% foreign equity ownership. CCM's holding company is Imperial Chemical Industry PLC of the United Kingdom. The largest shareholder of Esso is Esso Eastern Inc. of the United States. Malaysian equity participation in CCM is predominantly non-Bumiputra (21%) although the Government has a significant share (12%) in the company's shareholdings.

TABLE 6.10
FERTILIZERS:
OWNERSHIP STRUCTURE

Product	Respondent	Paid-up Capital (In Million M$)	% to Total Paid-Up Capital Malaysian B	N-B	G	Foreig
Granulated compound fertilizers	A	$ 30.0*	1.0%	21.0%	12.0%	66.C
	B	10.0	30.0	-	40.0	30.C
Ammonia-urea	C	200.0	-	-	60.0	40.C
Ammonia	D	62.0*		n.a.		65.C

Notes : 1. * Data represents paid-up capital for the whole company which is also engaged in the manufacture of products other than fertilizers.
2. n.a. - Not available.
3. B - Bumiputra shareholders; N-B - non-Bumiputra; G - Government.

Source: SGV-KC Field Survey.

6.4.2 Sources of Funds

The interviewed firms generally use terms loans, equity and retained earnings for capital expenditures. Bank overdrafts, earnings from sales and suppliers' credit are the usual sources of funds for operations. Some respondent firms utilize bankers' acceptances and trust receipts to finance the purchase of imported inputs.

6.4.3 Sales Performance

The effects of world recession on plantation crops as well as on the fertilizer industry in Malaysia were first felt in 1981. The weakened demand for rubber and palm oil had an adverse effect on fertilizer usage in 1981 as the plantation industry sought to reduce costs to improve their cash flows. The reduced demand for fertilizers and the move towards the use of cheaper materials was felt even more markedly in 1982 and 1983. Compound fertilizers, in particular, faced severe competition from cheaper fertilizer mixtures which used low cost imported nitrogen materials. This situation led to a reduction in tonnage sales of compound fertilizers as well as depressed prices and lower profit margins for this product.

CCM was the sole local producer of compound fertilizers in 1981 and 1982 and remained the dominant producer in 1983. The Company's volume of fertilizer sales from 1981 to 1983, which is presented below, illustrates the poor performance of its compound fertilizer sales during this period:

VOLUME OF FERTILIZER SALES
(IN '000 MT)

	1981	1982	1983
Compound fertilizers	200MT	165MT	144MT
Fertilizer mixtures	60	70	99
Straights	140	115	146
Fertilizer Turnover (In Million M$)	M$250	M$150	M$140

6.5 EMPLOYMENT ASPECTS

6.5.1 Racial Composition of Work Force

On the basis of survey findings, professional and technical workers on the average account for 8.5% of total work force involved in direct plant operations. Production workers represent the majority (54.0% on the average) and labourers account for 37.5%. The racial distribution of employment among these three job categories is summarized in Table 6.11.

TABLE 6.11
FERTILIZERS:
LABOUR FORCE COMPOSITION BY RACE

Job Category	Bumiputra	Non-Bumiputra	Foreign	Total
Professional and Technical Workers	33.3%	60.0	6.7%	100.0%
Production Workers	49.8	49.8	0.4	100.0
Labourers	78.3	21.2	0.5	100.0
Overall	59.1	40.0	0.9	100.0

Note : Maintenance and laboratory workers are not included in plant labour force
Source: SGV-KC Field Survey

Survey findings indicate that the professional and technical worker category is predominantly composed of non-Bumiputras, with an average share of 60.0%. It should be noted, however, that Bumiputras account for a significant 33.3% average share in this category. Racial employment in the production worker category is equally distributed between Bumiputras (49.8%) and non-Bumiputras (49.8%) in average terms. On the other hand, the majority of labourers employed by respondent fertilizer firms are Bumiputras (78.3% average share). Overall, the majority of total work force involved in direct plant operations of respondent firms consists of Bumiputras (59.1% on the average). Non-Bumiputras follow with a 40.0% share.

6.5.2 Technical Job Classification

The typical composition of technical workers in the industry and the corresponding qualifications for each job category are as follows:

Job Category	Qualifications
A. Production	
1. Plant Manager/Chemical Operations Superintendent	Engineer
2. Production Section Head/ Production Executive	Engineer or granulation expert
3. Shift Manager/Shift Engineer/Production Supervisor	Engineer/HSC/MCE/SPM
4. Shift Supervisor	HSC/MCE/SPM
5. Panel Operator	MCE/SPM
6. Process Worker	LCE/MCE/SPM
7. Labourer	With or without LCE
B. Utility	
1. Boilerhouse Chargeman	1st Class Boilerman's Certificate
C. Laboratory	
1. Chief Chemist	Chemist
2. Laboratory Analyst/ Technician	HSC/MCE/SPM with science background
3. Laboratory Assistant	With or without LCE

Cont'd

	Job Category	Qualifications
D.	Maintenance	
1.	Maintenance Manager	Engineer
2.	Mechanical and Electrical Engineer	Engineer
3.	Maintenance Superintendent	HSC/MCE/SPM/vocational school
4.	Electrical Chargeman	With medium pressure excluding power station certificate
5.	Mechanical and Electrical Fitter	MCE/vocational school
6.	Instrument Artificer	MCE/SPM/vocational school

Source: SGV-KC Field Survey

6.5.3 Wage Structure

The monthly wages of production and related workers as gathered from the field survey are as follows:

TABLE 6.12
FERTILIZERS:
WAGE STRUCTURE

Job Category	Monthly Wage Low	High
A. Production		
1. Production Section Head/ Production Executive	M$4,000	M$6,500
2. Shift Engineer/Production Supervisor	2,200	5,850
3. Shift Supervisor	780	2,000
4. Panel Operator	663	1,300
5. Process Worker	425	1,014
6. Labourer	425	1,000
B. Utility		
1. Boilerhouse Chargeman	715	1,319
C. Laboratory		
1. Laboratory Analyst/Technician	650	1,538
2. Laboratory Assistant	425	706
D. Maintenance		
1. Mechanical and Electrical Engineers	2,600	6,500
2. Maintenance Superintendent	1,062	2,000
3. Electrical Chargeman	506	1,538
4. Electrical and Mechanical Fitters	450	1,112
5. Instrument Artificer	506	891

Source: SGV-KC Field Survey

6.5.4 Labour Turnover

Respondent firms reported a labour turnover of 7 - 18 workers per annum in the skilled workers category. For plant engineers, one company reported a significant turnover rate of 4 engineers per annum while another respondent company indicated that they were able to retain all their engineers in the past three years.

6.5.5 Labour Supply Situation

The fertilizer firms interviewed pointed to an acute shortage of electrical chargemen, artificers, experienced mechanics, and mechanical engineers. They believe that this problem is felt nationwide by all manufacturing concerns. FPM also cited that Malaysia presently has no granulation experts for fertilizer granulation plants like their own.

6.5.6 Labour Training

Respondent companies generally provide new recruits with adequate in-house and on-the-job training to meet specific job requirements. For engineering and certain technical positions, some firms provide additional training to their employees by sending them to local or foreign technical institutions or to their foreign principals for on-the-job training.

6.6 DEMAND ANALYSIS

6.6.1 Historical Demand

- Domestic Market

Total apparent domestic demand for fertilizers in 1981 is estimated at M$587.5 million. This represents an average annual growth of 10.3% from its 1973 level of M$267.7 million (See Table 6.13). On the whole, fertilizer consumption in Malaysia is closely linked to the development of agricultural land, government efforts to promote the application of fertilizers through various subsidy and credit schemes, and the level of prices enjoyed by export commodity crops in the international market.

An unusually large volume of imports was made in 1974 when the first major oil price increase fueled speculations about an impending shortage of fertilizers. A substantial portion of these imports was accumulated as carry-over stocks and distributed in 1975. Apparent consumption consequently dropped in 1975 as the level of imports fell drastically during that year. Normal growth in demand resumed from 1976 to 1978. The following year (1979) saw another sharp rise in fertilizer consumption as the Government introduced the padi subsidy which represented an additional 160,000MT of fertilizers made available to padi farmers.

Between 1981 and 1983, depressed commodity prices resulting from the weakened demand for rubber and palm oil adversely affected fertilizer usage. Apparent consumption in 1981 declined to M$587.5 million and registered further reductions in the two succeeding years.

TABLE 6.13
FERTILIZERS:
APPARENT CONSUMPTION, 1973 - 1981
(M$ '000 AT CONSTANT 1981 PRICES)

Year	Imports	Local Production	Exports and Re-Exports	Apparent Consumption	% of Apparent Consumption: Local Production	% of Apparent Consumption: Imports	Exports and Re-exports as a % of Local Production
1973	172,942	108,662	13,918	267,686	41	65	13
1974	222,262	75,486	3,852	293,896	26	76	5
1975	126,111	95,017	4,522	216,606	44	58	5
1976	193,049	124,587	75	317,561	39	61	Negligible
1977	236,971	152,255	5,853	383,373	40	62	4
1978	249,005	168,038	706	416,337	40	60	Negligible
1979	381,724	210,793	496	592,021	36	64	Negligible
1980	472,106	223,115	3,804	691,417	32	68	2
1981	375,045	219,001	6,528	587,518	37	64	3
Average Annual Growth Rate 1973 - 1981	10.2%	9.2%	Erratic	10.3%			

Note : Apparent consumption data expressed in current prices are presented in Appendix 4.

Source: Department of Statistics
MIDA

Imports consistently accounted for more than 58% of fertilizer consumption during the past decade as the industry had no alternative but to purchase all fertilizers other than ammonium nitrate from foreign suppliers. Imports rose at an average annual rate of 10.2% from M$172.9 million in 1973 to M$375.0 million in 1981.

Domestic production of fertilizers represented less than 44% of apparent consumption from 1973 to 1981. This share should even be lower if double counting of imports and local production could be avoided in the course of collecting official trade and production statistics of domestic fertilizer companies. Output data in Table 6.13 describes domestic production of ammonium nitrate, ammonium sulphate and granulated fertilizers utilizing local as well as imported straight fertilizers.

Local production of fertilizers increased an average rate of 9.2% per annum from M$108.7 million in 1973 reaching M$219.0 million in 1981. The general trend of domestic output closely followed the growth of hectarage devoted to rubber and oil palm crops and the price behaviour of these commodities in the international market. It should be noted that a significant portion of local production consists of granulated compound fertilizers formulated for these two plantation crops.

As gathered from interviewed firms, the compound fertilizer market is a fairly captive market consisting mostly of RISDA, rubber smallholders, other government schemes (except FELDA), and the smaller estates. The estimated size of this market is 350,000MT per year with about 250,000MT being processed locally. There was a marked decline in local production of compound fertilizers from 1981 to 1983 because of reduced demand arising from depressed commodity prices.

- Export Market

During the past decade, exports and re-exports of fertilizers from Malaysia were negligible compared with total output (2.9% on the average). With locally produced compound fertilizers priced significantly higher than imported substitutes, it is not surprising that there were no regular fertilizer exports from Malaysia during this period. Moveover, export markets were confined to nearby countries such as Singapore and Burma.

6.6.2 Projected Demand

The Consultants projected domestic demand for fertilizers (expressed in tonnage of nitrogen, phosphate and potash nutrient consumption) on the basis of usage rates by crop and expected land development by major crop. Two sets of demand forecasts have been prepared: (1) the first set assumes a moderate growth in development of land cultivated to oil palm, high growth in land development for cocoa, and no growth in rubber and padi usage rates; and (2) the second set assumes continued high growth in development of land cultivated to oil palm, high growth in land development for cocoa and slow growth in rubber and padi fertilizer usage rates. A more detailed discussion of the assumptions used is given in Appendix 5. Details on projected nutrient consumption by crop are presented in Appendices 6 and 7. Table 6.15 summarizes the results of th projections in nutrient volume terms based on these two alternatives. This study assumes that the volatilization problem of urea will be solved.

Under Alternative A, the average annual growth of total NPK nutrient consumption is 2.5% from 1984-1990 and 2.4% during the period 1990-1995. Domestic nitrogen nutrient consumption and corresponding urea consumption are shown below for two cases: (1) Case A_1 where all crops are assumed to utilize urea fertilizers, and (2) Case A_2 where only oil palm and padi crops will utilize urea as the source of nitrogen nutrient.[1/]

	Consumption in '000 MT 1990	1995
Case A_1		
o Nitrogen nutrient consumption of all crops	164	180
o Equivalent urea consumption of all crops	357	391
Case A_2		
o Nitrogen nutrient consumption of oil palm and padi crops	117	127
o Equivalent urea consumption of oil palm and padi crops	254	276

1/ At present, only palm oil in coastal soil and padi utilize urea fertilizers. Oil palm in inland soil generally use ammonium sulphate and ammonium nitrate fertilizers as the source of nitrogen nutrient. Once the volatilization problem is solved, inland oil palm crops may be able to use urea. Urea is not recommended for use in rubber and cocoa crops.

Under Alternative B, which is more likely to occur, the average annual growth of total domestic NPK nutrient consumption is 4.4% for the two periods 1984-1990 and 1991-1995. Nitrogen nutrient consumption and corresponding urea consumption for years 1990 and 1995 are shown below for the same two cases: (1) Case B_1 where all crops are assumed to utilize urea fertilizers, and (2) Case B_2 where only oil palm and padi crops will utilize urea as the source of nitrogen nutrient.

	Consu[illegible]on in '000 MT	
	199[illegible]	1995
Case B_1		
o Nitrogen nutrient consumption of all crops	188	232
o Equivalent urea consumption of all crops	409	504
Case B_2		
o Nitrogen nutrient consumption of oil palm and padi crops	127	175
o Equivalent urea consumption of oil palm and padi crops	276	380

At present, about three-fourths of the nitrogen nutrients used in Malaysia are imported. When the Bintulu plant comes on stream, it is anticipated that domestic production will replace nitrogen imports. The capacity of the Bintulu plant is 330,000 MT of ammonia or about 270,000 MT of nitrogen. Assuming that the plant will be able to produce at capacity starting 1986, domestic demand in the low growth case (Alternative A, Case A_1) and high growth case (Alternative B, Case B_1) and surplus nitrogen available for export mainly in the form of urea are projected as follows:

(In '000 MT of Nitrogen Nutrient)

Year	Low Growth Domestic	Low Growth Export	High Growth Domestic	High Growth Export
1986	150	120	157	113
1987	153	117	164	106
1988	157	113	171	99
1989	160	110	179	91
1990	164	106	188	82
1991	167	103	196	74
1992	170	100	204	66
1993	173	97	213	57
1994	177	93	222	48
1995	180	90	232	38

For the high growth case, only surplus ammonia will be available from this plant for export by 1995. Its entire urea production is expected to be utilized for domestic demand by that year.

Industry estimates of soluble phosphate fertilizer consumption in Malaysia are about 20,000 - 25,000 MT of P_2O_5 nutrients in 1984. This represents approximately 16-20% of total P_2O_5 consumption. In Malaysia, soluble phosphate fertilizers are utilized mostly for vegetables, tobacco and young plantation crops. Demand for soluble phosphates is projected to grow at about 3% per year in the next decade reaching a level of approximately 34,600 MT of P_2O_5 by 1995 as shown below:

	Soluble P_2O_5 Consumption
1984	25,000
1985	25,750
1990	29,850
1995	34,600

Table 6.16 summarizes total fertilizer demand projections in dollar terms. Projected nitrogen fertilizer exports using the estimates given above are priced at M$622 per MT of nitrogen (1981 price).

TABLE 6.14
FERTILIZERS:
PROJECTED DOMESTIC CONSUMPTION OF NITROGEN, PHOSPHATE AND POTASH NUTRIENTS
1984 - 1995
(IN '000 MT OF NUTRIENT)

Year	Alternative A				Alternative B			
	N	P_2O_5	K_2O	Total NPK	N	P_2O_5	K_2O	Total N
1984	145	120	207	472	147	122	210	479
1985	148	123	212	483	150	126	220	496
1986	150	126	219	495	157	131	230	518
1987	153	128	225	506	164	136	241	541
1988	157	131	231	519	171	142	252	565
1989	160	135	238	533	179	148	264	591
1990	164	138	246	548	188	154	277	619
1991	167	141	253	561	196	160	290	646
1992	170	144	260	574	204	167	303	674
1993	173	148	267	588	213	174	317	704
1994	177	151	275	603	222	181	332	735
1995	180	155	283	618	232	189	347	768
Average Annual Growth Rate (%)								
1984 - 1990	2.1	2.4	2.9	2.5	4.2	4.0	4.7	4.4
1990 - 1995	1.9	2.4	2.8	2.4	4.3	4.3	4.6	4.4

TABLE 6.15
FERTILIZERS:
PROJECTED DEMAND
1985-1995
(M$ MILLION IN CONSTANT 1981 PRICES)

Year	Domestic		Export		Total	
	Low	High	High	Low	Low	High
1985	685.2	697.9	6.5	6.5	691.7	704.4
1986	702.4	728.6	74.6	70.3	777.0	798.9
1987	719.9	760.7	72.8	65.9	792.7	826.6
1988	737.9	794.2	70.3	61.6	808.2	855.8
1989	756.4	829.1	68.4	56.6	824.8	885.7
1990	775.3	865.6	65.9	51.0	841.2	916.6
1991	793.9	903.7	64.1	46.0	858.0	949.7
1992	813.0	943.5	62.2	41.0	875.2	984.5
1993	832.5	985.0	60.3	35.4	892.8	1,020.4
1994	852.4	1,028.3	57.8	29.8	910.2	1,058.2
1995	872.9	1,073.6	56.0	23.6	928.9	1,097.2
Average Annual Growth Rate						
1985-1990	2.5%	4.4%	58.9%	51.0%	4.0%	5.4%
1990-1995	2.4	4.4	(3.2)	(14.3)	2.0	3.7

6.7 INTERNATIONAL ASPECTS

6.7.1 World Supply

Additional fertilizer capacities are being built all over the world to supply the growing demand for the basic crop nutrients. The development of capacity has been more extensive in developing countries where several new fertilizer production centers have emerged. In as much as Malaysia is capable of supplying only nitrogen fertilizers, the discussion of trends in world fertilizer development will focus on this fertilizer group.

- World Ammonia Capacity

  The increase of supply capabilities of nitrogenous fertilizers worldwide can be illustrated by ongoing anhydrous ammonia capacity development, which is the basic input for nearly 100% of nitrogenous fertilizers. Results of the Tennessee Valley Authority study on regional ammonia capacity from 1970 to 1985 show that world nitrogen capacity may reach nearly 120 million MT of nitrogen in 1985 (See Table 6.16). Asia's relative contribution to world ammonia capacity has improved tremendously from 18.7% in 1970 to 33.4% in 1985. Likewise, the U.S.S.R., Latin America, Africa, and Eastern Europe have become increasingly important sources of ammonia and nitrogen supply.

TABLE 6.16
FERTILIZERS:
WORLD AMMONIA CAPACITY
1970 - 1985
(CAPACITY IN '000 MT OF N)

Region	1970 Capacity	1970 % Share	1980 Capacity	1980 % Share	1984 Capacity	1984 % Share	1985 Capacity	1985 % Share
North America	13,828	27.4%	17,548	18.3%	16,009	15.1%	16,450	13.8%
Latin America	1,311	2.6	3,976	4.1	5,640	5.3	6,741	5.6
West Europe	11,808	23.4	15,009	15.7	14,443	13.6	14,733	12.3
East Europe	5,383	10.7	9,787	10.2	10,942	10.3	12,193	10.2
U.S.S.R.	7,471	14.8	17,902	18.7	23,324	22.1	24,730	20.7
Africa	683	1.4	1,961	2.0	2,780	2.6	4,311	3.6
Asia	9,424	18.7	29,179	30.5	32,228	30.5	39,920	33.4
Oceania	526	1.0	449	0.5	525	0.5	549	0.4
Total World	50,434	100.0%	95,811	100.0%	105,891	100.0%	119,627	100.0%

Source: Tennessee Valley Authority, March 1984.

The expansion of ammonia capacity is underway in Latin Africa, Near and Far East, as well as in the U.S.S.R. and Eastern Europe. For example, Algeria is making large investments to expand its ammonia capacity, which is expected to reach about 815,000MT of N by 1985/86. New plants, each with a capacity of 1,000MT of ammonia per day, are being constructed or planned in Morocco, Libya, Nigeria, Tanzania, and Tunesia. These production facilities are expected to start operations after 1986.

Similar developments are also occurring in Latin America, the Near East and Far East, specifically in the following countries:

Latin America

1. Brazil
2. Mexico

Near East

1. Bahrain
2. Kuwait
3. Saudi Arabia
4. Turkey

Far East

1. Bangladesh
2. Burma
3. China
4. India
5. Indonesia
6. Malaysia
7. Pakistan
8. Thailand

Large-scale ammonia plants of at least 1,000MT per day capacity are being built in these nations using low cost natural gas as feedstock. Ammonia capacity development of each country in Asia is depicted in Table 6.17. New ammonia capacity in the U.S.S.R. and in China will add over 5 million and 2 million MT of nitrogen, respectively between 1981 and 1986.

During the 1980s, very little additional ammonia capacity has been introduced in developed market economies. In fact, some ammonia capacities in the United States, Western Europe and Japan have been shut down or idled because of increasing prices of feedstock (naphtha), erosion of international competitive position, and subsequent loss of export markets. Nevertheless, nitrogen production in these countries is not declining because they have resorted to substitution of locally produced inputs with ammonia imports.

TABLE 6.17
FERTILIZERS:
AMMONIA CAPACITY OF ASIAN COUNTRIES
1970 - 1990
(IN '000MT OF N)

Country	1970	1976	1980	1984	1990
Afghanistan	0	0	58	58	58
Bahrain	0	0	0	0	272
Bangladesh	54	220	233	505	1,098
Burma	0	66	66	115	213
China	3,471	6,433	15,021	16,068	16,884
India	1,418	2,808	4,053	5,774	8,286
Indonesia	49	285	1,104	1,733	2,815
Iran	32	304	576	32	358
Iraq	0	54	272	41	41
Israel	33	66	68	68	68
Japan	2,400	3,621	2,733	2,299	2,299
N. Korea	454	607	871	871	871
Rep. of Korea	420	635	1,059	406	406
Kuwait	109	543	543	543	814
Malaysia	43	43	43	43	315
Pakistan	175	344	817	1,134	1,422
Philippines	109	101	82	0	0
Qatar	0	244	488	488	488
Saudi Arabia	163	162	163	435	805
Sri Lanka	0	0	0	142	0
Syria	0	41	41	313	313
Taiwan	339	303	437	437	437
Thailand	30	30	0	0	270
Turkey	125	125	397	397	696
United Arab Emirates	0	0	0	272	637
Vietnam	0	0	54	54	54
ASIA	9,424	17,035	29,179	32,228	39,920

Source: Tennesee Valley Authority, March 1984.

o Phosphoric Acid Capacity

According to the FAO/UNIDO/World Bank Working Group on Fertilizers, phosphoric acid capacities will develop substantially in the 1980s. The capacity of this product in 1987/88 will reach 37.7 million MT P_2O_5 compared to 29.7 million MT in 1981/82. The share of the developing countries in phosphoric acid capacity which is about 19% in 1981/82 will be about 29% in 1987/88.

Phosphoric acid is the intermediate for all types of high analysis phosphate fertilizers, such as triple superphosphate (TSP) and ammonium phosphates (DAP and MAP). Production of single superphosphate (SSP) and some marginal product (e.g. ground phosphate rock, basic slag, etc.), which accounts for about 10-12% of the total phosphate fertilizer, is complementary to phosphoric acid based fertilizers. The production of phosphate fertilizers has been increasing because of their cost advantage. In 1977, approximately 60% of all P_2O_5 was applied in high analysis fertilizers. This will increase to 70% by 1990, particularly if phosphoric acid and its derivatives are taking momentum in several developing countries. New large scale capacities are being erected or planned in Morocco, Tunisia, Senegal, Togo, Jordan, Peru, Iraq, and Indonesia. Assuming favourable economic conditions, they will be sufficient to cover the world demand up to the year 1988/89.

The export availability of phosphate fertilizers is expected to grow as these new capacities are located near phosphate rock supplies. World trade in phosphoric fertilizers will be expected to increase from 4 million MT in 1979 to 10 million MT in 1990. North America will continue to be the leading exporter but Africa will increase its share in total world exports.

o Potash Capacity

The bulk of potash is obtained from underground deposits situated mainly in North America, Western and Eastern Europe. These regions will continue to be the main potash centers in the world.

In particular, the following countries which have rich natural deposits of this mineral will continue the development of potash production:

1. Canada
2. U.S.A.
3. U.S.S.R.
4. Spain
5. Israel
6. German Democratic Republic

New countries in the producer list with investments being underway are Jordan and Brazil. In Asia, the discovery of hugh deposits of potash in Thailand may transform this country into a major supplier of potash, that is, provided the mining of its potash deposits proves to be commercially viable.

In some countries, such as France, Federal Republic of Germany and U.S.A., old potash mines will be closed such that total capacity of the country will be diminished.

6.7.2 World Demand

According to FAO statistics, world consumption of the three main nutrients -- nitrogen, phosphate and potash -- reached 113.7 million MT in fiscal year 1982/83. This represents a compounded annual growth of 4.0% from its 1972/73 level of 77.0 million MT (See Table 6.18). Fertilizer consumption of developing countries exhibited a compounded growth of 9.0% per annum while growth of developed countries consumption lagged behind at 2.1% per annum during the period. Nevertheless, developed countries accounted for 65% of total world consumption of fertilizers and their usage rate per hectare was far ahead that of developing countries.

Among all the regions in the world, Asia had the highest compounded growth in demand at 9.0%. Moreover, the Asian region registered the highest total nutrient consumption in 1982/83 (32.9 million MT) and had the largest requirements for nitrogen and phosphate nutrients for that year (22.8 million MT and 7.6 million MT, respectively).

SGV-Kassim Chan Sdn. Bhd.

TABLE 6.18
FERTILIZERS: WORLD FERTILIZER CONSUMPTION BY REGION
1972/73 AND 1982/83

Area	1972/73 Million Nutrient N	1972/73 Million Nutrient P_2O_5	1972/73 Million Nutrient K_2O	1972/73 Million Nutrient Total	1982/83 Million Nutrient N	1982/83 Million Nutrient P_2O_5	1982/83 Million Nutrient K_2O	1982/83 Million Nutrient Total	Compounded Annual Growth Rate of Total Nutrient Consumption, 1972/73 - 1982/83
North America	7.9	5.0	4.4	17.3	9.4	4.4	4.8	18.5	0.7%
Latin America	1.6	1.2	0.8	13.6	2.9	2.2	1.4	6.4	(7.3)
Western Europe	7.0	5.8	5.1	17.9	9.7	5.0	5.2	19.8	1.0
Eastern Europe	3.7	2.4	3.0	9.1	5.1	3.2	3.3	11.6	2.5
U.S.S.R.	5.6	2.6	3.2	11.5	9.0	5.3	5.0	19.4	5.4
Asia	9.0	3.5	1.4	13.9	22.8	7.6	2.5	32.9	9.0
Africa	1.1	0.7	0.3	2.0	1.9	1.1	0.4	3.4	5.4
Oceania	0.2	1.2	0.2	1.2	0.3	1.1	0.2	1.6	(0.6)
TOTAL WORLD	36.0	22.5	18.5	77.0	61.0	29.9	22.8	113.7	4.0
Developed Countries	25.4	18.2	16.7	60.3	34.6	20.2	19.2	74.1	2.1
Developing Counrties	10.6	4.3	1.8	16.7	26.4	9.6	3.6	39.7	9.0
TOTAL WORLD	36.0	22.5	18.5	77.0	61.0	29.9	22.8	113.7	

Note:
1. Does not include ground phosphate rock for direct application.

2. Calendar year data for 1982 is included with 1982/83. Totals may not add-up to rounding.

Source: FAO

6.7.3 Asia-Historical Demand

Considering that Asia is the most logical export market for Malaysia's growing fertilizer industry, it is noteworthy to focus on the development of nutrient consumption of the various Asian countries from 1972 to 1982. Table 6.19 depicts the region's consumption of nitrogen, phosphate and potash nutrients from 1972 to 1982.

Total NPK consumption increased from 13.9 million MT in 1972 to 32.9 million MT in 1981, representing an average annual growth rate of 9.0%. Nitrogenous fertilizers consistently accounted for the bulk of consumed fertilizer nutrients white phosphatic fertilizers ranked second in importance.

In terms of growth rate, the consumption of nitrogenous fertilizers increased at a slightly faster pace (9.8% per annum) compared with phosphatic fertilizers (8.0% per annum) and potassic fertilizers (6.0% per annum). On the basis of 1982 FAO statistics, the ten largest fertilizer consuming countries in Asia by type of nutrient are presented in Table 6.20. Details on each country's usage of NPK fertilizers during the decade (1972 - 1982) are shown in Appendix 8, 9 and 10.

TABLE 6.19
FERTILIZERS:
NITROGEN, PHOSPHATE AND POTASH CONSUMPTION OF ASIA
1972 - 1982
(IN '000 MT of NUTRIENT)

Year	N	P_2O_5	K_2O	Total NPK
1972	8,954	3,495	1,425	13,874
1973	9,708	3,938	1,852	15,498
1974	9,075	3,976	1,871	14,922
1975	10,683	4,096	1,515	16,294
1976	11,349	4,626	1,761	17,736
1977	14,630	5,242	1,904	21,776
1978	17,459	5,104	2.291	24,854
1979	19,609	5,988	2,520	28,117
1980	21,276	6,568	2,442	30,286
1981	21,526	6,967	2,772	31,265
1982	22,819	7,582	2,545	32,946
Average Annual Growth Rate 1972 - 1981	9.8%	8.0%	6.0%	9.0%

Source: FAO data compiled by the Tennessee Valley Authority (TVA)

TABLE 6.20
FERTILIZERS: TEN LARGEST FERTILIZER CONSUMING COUNTRIES OF ASIA
1982/83
(CONSUMPTION IN ' 000MT OF NUTRIENT)

N I T R O G E N

Country	Consumption	% to Total Consumption	Average Annual Growth Rate 1972-1982
China	11,969	52.4%	12.5%
India	4,043	17.7	8.8
Indonesia	981	4.3	11.0
Pakistan	959	4.2	9.5
Turkey	863	3.8	8.9
Japan	687	3.0	(0.6)
N. Korea	592	2.6	10.2
Iran	493	2.2	14.8
Rep. of Korea	309	1.4	(1.9)
Bangladesh	306	1.3	9.0
Total Asia	22,819	100.0%	9.8

P H O S P H A T E[1]

Country	Consumption	% to Total Consumption	Average Annual Growth Rate 1972-1982
China	3,137	41.4%	10.7%
India	1,184	15.6	8.3
Japan	721	9.5	(0.1)
Turkey	565	7.4	9.1
Iran	400	5.3	18.1
Indonesia	340	4.5	17.6
Pakistan	265	3.5	18.4
Rep. of Korea	149	2.0	(1.4)
N. Korea	130	1.7	2.2
Thailand	130	1.7	8.8
Total Asia	7,582	100.0%	8.0

P O T A S H

Country	Consumption	% to Total Consumption	Average Annual Growth Rate 1972-1982
India	622	24.4%	7.1%
Japan	582	22.9	(0.3)
China	393	15.4	32.3
Malaysia	194	7.2	9.1
Rep.of Korea	157	6.2	4.1
Indonesia	133	5.2	16.1
Taiwan	97	3.8	7.7
Philippines	58	2.3	4.0
N. Korea	46	1.8	4.0
Sri Lanka	45	1.8	8.4
Total Asia	2,545	100.0%	6.0

Note:

[1] Does not include ground phosphate rock for direct application

Source: FAO data compiled by TVA

o Imports

The Asian region is inadequately endowed with raw materials for the production of potash and phosphate fertilizers. The outlook is much brighter for nitrogen as natural gas in abundantly available in the region. At present, however, regional nitrogen production is still insufficient to supply the whole of Asia with its very large nitrogen fertilizer requirements. Asian countries will continue to rely on importation of fertilizers for at least another decade to supplement domestic production.

Table 6.21 summarizes Asia's imports of fertilizers from 1972 to 1982 expressed in tonnage of nitrogen, phosphate and potash nutrients. As fertilizer consumption of Asia grew in the past decade, so did imports of the three major types of fertilizers. The volume of fertilizers imported in 1982 totalled 8.9 million MT in nutrient terms, representing about 27% of consumption in the region. Nitrogenous fertilizers remained the biggest nutrient item imported by the region, comprising 47.9% of total imports in 1982. The balance of imported nutrients was about evenly accounted for by potash (29.3%) and phosphate (22.8%).

Growth rates of nutrient imports during the 1972-1982 period varied. Nitrogen nutrients experienced slower growth at only 2.7% per annum on the average while imports of phosphate and potash nutrients registered faster average annual growth at 9.7% and 6.0%, respectively. The slower import expansion of nitrogen nutrients is not surprising because of the considerable increase of supply capabilities of nitrogenous fertilizers in the region during this period.

Imported nitrogen nutrients in 1982 accounted for 18.7% of Asia's total nitrogen consumption, a marked decline from its relative market share of 36% a decade earlier. On the other hand, imports of phosphatic and potassic nutrients continued to rise more rapidly because of limited production of these chemical products in Asia.

The ten largest importing Asian nations in each of the three fertilizer categories as of 1982 are presented in Table 6.22. China, Iran and India are the leading importers of nitrogen nutrients with an aggregate share of 62% of Asia's imports of this product. Between 1972 and 1982, the following countries recorded rapid expansions in nitrogen nutrient imports: Iran (36.4% average annual growth), Philippines (15.8%), Thailand (13.7%), and Malaysia (14.0%).

TABLE 6.21
FERTILIZERS:
NITROGEN, PHOSPHATE AND POTASH IMPORTS OF ASIA
1972 - 1982
(IN '000 MT OF NUTRIENTS)

Year	N	P_2O_5	K_2O	Total NPK
1972	3,263	807	1,452	5,522
1973	3,494	1,184	1,858	6,536
1974	3,559	1,239	2,138	6,936
1975	3,345	997	1,495	5,837
1976	2,948	577	1,566	5,091
1977	3,873	1,112	2,066	7,051
1978	4,701	1,747	2,176	8,624
1979	4,958	1,720	2,464	9,142
1980	5,503	2,457	2,764	10,724
1981	4,312	1,624	2,696	8,632
1982	4,270	2,037	2,613	8,920
Average Annual Growth Rate 1972-1982	2.7%	9.7%	6.0%	4.9%

Source: FAO data compiled by TVA

TABLE 6.22
FERTILIZERS:
MAJOR FERTILIZER IMPORTING COUNTRIES OF ASIA
1982

NITROGEN

Country	Quantity (In '000 MT of N)	% to Total Imports	Average Annual Growth Rate 1972 - 1982
China	1,750	41.0%	3.4%
Iran	472	11.0	36.4
India	425	10.0	(4.8)
Philippines	222	5.2	15.8
Vietnam	210	4.9	0.7
Thailand	199	4.7	13.7
Indonesia	152	3.6	(4.6)
Malaysia	142	3.3	14.0
Pakistan	131	3.1	1.2
Turkey	118	2.8	(10.6)
Total Asia	4,270	100.0%	2.7

PHOSPHATE[1]

Country	Quantity (In '000 MT of P_2O_5)	% to Total Imports	Average Annual Growth Rate 1972 - 1982
China	600	29.4%	42.0%
Iran	394	19.3	56.7
Pakistan	247	12.1	13.1
Japan	160	7.8	18.2
Indonesia	133	6.5	3.3
Thailand	130	6.4	8.8
Bangladesh	96	4.7	5.9
India	63	3.1	(11.4)
Total Asia	2,037	100.0%	9.7

POTASH

Country	Quantity (In' 000 MT of K_2O)	% to Total Imports	Average Annual Growth Rate 1972 - 1982
India	639	24.4%	7.3
Japan	611	23.4	0.1
China	368	14.1	35.2
Rep. of Korea	236	9.0	7.6
Malaysia	187	7.2	8.7
Indonesia	133	5.1	16.1
Taiwan	82	3.1	2.0
Philippines	74	2.8	5.1
Total Asia	2,613	100.0%	6.0

Note : 1. Excludes ground rock phosphate for direct application.

Source: FAO data compiled by TVA

Seven countries led by China, Iran and Pakistan accounted for approximately 89% of Asia's phosphate nutrient imports in 1982. The same three countries, with the addition of Japan, recorded the highest import growth in this category during the 1972-1982 period. Average import growth in these four nations ranged from 13.1% per annum to 56.7% per annum.

For potash nutrient imports, eight countries with India, Japan and China at the forefront held an aggregate share of 89% of foreign purchases of potash fertilizers in 1982. The following nations registered the most impressive import growth in this category between 1972 and 1982: China, Malaysia, Republic of Korea, and India.

Details on the foreign purchases of nitrogen, phosphate and potash nutrients of each country in the Asian region for the period 1972 to 1982 are presented in Appendix 11,12, and 13.

o <u>Intraregional Imports</u>

In Asia, intraregional imports occur on a very moderate scale and is limited to only a few products, mainly urea, ammonium sulphate and DAP. The bulk of intraregional traded fertilizer consists of nitrogenous fertilizers. Statistics gathered by a marketing economist of the Fertilizer Advisory, Development and Information Network for Asia and the Pacific (FADINAP) indicate that nitrogen accounted for 91% of Indonesia's regional fertilizer imports in 1981. In Hong Kong, Sri Lanka and the Philippines, nitrogen represented 79%, 77% and 75%, respectively, of each of these countries' regional fertilizer imports. In all cases, urea was the most favoured products.

Table 6.23 illustrates the share of imported fertilizers originating within the region for selected countries, compared with their total import of fertilizers. Hong Kong, Indonesia, Nepal, the Philippines, and Sri Lanka sourced 20-30% of their import requirements in 1981 from other developing countries in the region, mainly from the Republic of Korea. With the exception of Indonesia, these countries also procured fertilizers from Japan, bringing their intraregional trade share in 1981 to 52.7% (Hong Kong), 45.6% (Nepal), 30.0% (Philippines) and 55.2% (Sri Lanka), respectively. The intraregional imports of Thailand accounted for 22.2% of its total in 1981, with Japan being the main source of fertilizers. The following year saw further expansion of this trade to 42.4% largely because of fertilizer procurements financed under the Japanese yen aid and barter deals with the Republic of Korea.

On the other hand, countries such as India, Japan, Pakistan, the Republic of Korea, and Vietnam concentrated their fertilizer purchases largely from countries outside the region.

TABLE 6.23
FERTILIZERS:
FERTILIZER IMPORTS OF SELECTED ASIAN COUNTRIES
FROM INTRAREGIONAL SOURCES
1981 AND 1982

	Total Imports (In '000 MT of Product)		Intraregional Imports from Developing Countries (%)		Intraregional Imports from Developed and Developing Countries (	
Country	1981	1982	1981	1982	1981	198
Bangladesh	494.5	459.0		5.2		5.2
Brunei	1.5		-		60.0	
Hong Kong	23.7	23.2	29.1	16.8	52.7	31.8
India	3,826.0	2,042.0	1.1	-	1.1	0.8
Indonesia	1,007.3	1,234.5	20.7	1.2	22.6	10.9
Japan	1,508.0	1,720.0	3.2	4.3	3.2	4.3
Malaysia	714.2	800.2	3.9	7.2	9.8	15.1
Nepal	59.0	99.8	25.4	19.3	45.6	19.3
Pakistan	572.2	555.3	3.5	-	4.4	2.9
Philippines	623.5	765.4	23.7		30.0	
Rep. of Korea	273.3	401.6	1.4		2.4	
Singapore	471.2	734.9	2.8	2.3	4.5	2.7
Sri Lanka	282.2	146.5	24.5	-	55.2	31.7
Thailand	770.6	919.6	6.5	20.7	22.2	42.4
Vietnam	900.0	900.0	4.4	-	4.9	5.5

Source: Rein Coster, Marketing Economist, FADINAP, "Intraregional Fertilizer Trade in Asia: an Outlook", 1984.

o **Exports**

Developed market economies have traditionally been the most important exporters of fertilizers. However, in recent years, some developing countries particularly in Asia have demonstrated visible export activity.

Asia's fertilizer exports in 1982 reached only 2.8 million MT in nutrient terms, which was slightly lower than its 1972 level of exports (2.9 million MT). Exports of nitrogen and phosphate materials registered wide fluctuations while potash exports, mainly from Israel, were more stable during the period (See Table 6.24). Nitrogen fertilizers consistently accounted for the bulk of Asia's fertilizer exports. However, its share in the region's total nutrient exports gradually declined from 75% in 1972 to 49% in 1982.

TABLE 6.24
FERTILIZERS:
NITROGEN, PHOSPHATE AND POTASH EXPORTS OF ASIA
1972 - 1982

Year	N	P_2O_5	K_2O	Total NPK
1972	2,166	151	581	2,898
1973	1,739	116	432	2,287
1974	1,857	139	582	2,578
1975	1,229	81	399	1,709
1976	1,234	40	535	1,809
1977	1,739	168	610	2,517
1978	1,977	293	684	2,954
1979	2,045	390	774	3,209
1980	2,080	499	762	3,341
1981	1,329	268	807	2,404
1982	1,378	557	866	2,803
Average Annual Growth Rate 1972-1982	(4.4%)	13.9%	4.1%	(0.3%)

Source: FAO data compiled by TVA

The reduced importance of nitrogen fertilizers in Asia's export trade can be traced to Japan's declining foreign sales of urea due to the erosion of its competitive position. Japan's nitrogen fertilizer industry is almost entirely based on naphtha feedstock and consequently has become increasingly uncompetitive compared to newer natural gas-based facilities. Since the oil price hikes of 1973/74, the cost differential between naphtha- derived ammonia and natural gas-derived ammonia has widened tremendously in favour of the latter.

The major fertilizer exporters in the region are presented in Table 6.25. During the past decade, only Japan, Qatar, Kuwait, Republic of Korea and Saudi Arabia have consistently been exporting nitrogen fertilizers. Collectively, these nations accounted for about 83% of total nitrogen nutrient exports of Asia in 1982. Some countries occasionally appeared in the export market to dispose of limited surpluses from recently installed or expanded nitrogen production capacities (e.g. Bangladesh, Indonesia, Pakistan, and Sri Lanka).

Among the nitrogen exporting countries in Asia, only Qatar recorded a fairly stable and high growth in nitrogen exports during this period at 27.8% per annum on the average. As previously mentioned, Japan's export position in the nitrogen market has steadily deteriorated because of the lack of international competitiveness. The Republic of Korea, which expanded nitrogen nutrient production and exports from 1975 to 1980, has been encountering the same problem as Japan since its nitrogen industry is completely dependent on naphtha as raw material for ammonia production. The sharp decline in world market prices during 1981 and the increasing production costs of Korea's naphtha-based plants reduced this nation's exports of nitrogen nutrients in 1981 and 1982 to about one-half of its 1980 level. On the other hand, Saudi Arabia and Kuwait, whose plants are based on low cost natural gas feedstock, have registered stable nitrogen nutrient exports during the period. Saudi Arabia, in particular, recorded a fairly steady expansion in its nitrogen nutrient exports of 7.5% per annum on the average.

For phosphatic fertilizers, only four countries in Asia have demonstrated significant export capability, namely, Republic of Korea, Turkey, Japan, and Lebanon. Republic of Korea accounted for half of the region's phosphate nutrient exports in 1982 and enjoyed a high average annual growth of 9.5% from 1974 to 1982. Turkey entered Asia's phosphate nutrient export trade only in 1981 but immediately catapulted to second place in the rankings in 1982. Phosphate nutrient exports of Japan and Lebanon have not been as significant as those of Republic of Korea and Turkey.

Only two nations in the region which possess rich natural deposits of potash (Israel and Jordan) have exported potash fertilizers. Israel's potash nutrient exports grew at an average annual rate of 4.1% between 1972 and 1982, increasing from 581,285MT to 868,200MT. Jordan is relatively new in the potash trade as she registered her first foreign sales of 3,300 MT nutrient in 1982. With the recent discovery of potash deposits in Thailand, this country may soon join the small group of potash exporters of Asia.

Fertilizer nutrient export trends of each country in Asia are presented in detail in Appendix 14, 15, and 16.

TABLE 6.25
FERTILIZERS:
MAJOR FERTILIZER EXPORTING COUNTRIES OF ASIA
1982

NITROGEN				PHOSPHATE[5]				POTASH			
Country	Quantity (In '000MT of N)	% To Total Exports	Average Annual Growth Rate 1972 - 1982	Country	Quantity (In '000MT of P_2O_5)	% To Total Exports	Average Annual Growth Rate 1972 - 1982	Country	Quantity (In '000MT of K_2O)	% To Total Exports	Average Annual Growth Rate 1972 - 1982
Japan	332	24.1%	(14.9%)	Rep. of Korea	282	50.6%	9.5%	Israel	868	99.6%	4.1%
Qatar	285	20.7	27.8[1]	Turkey	116	20.8	* [2]	Jordan	3	0.4	* [2]
Kuwait	196	14.2	(3.4)	Japan	71	12.7	1.7				
Rep. of Korea	194	14.1	6.4	Lebanon	53	9.5	4.8				
Saudi Arabia	134	9.7	7.5								
Pakistan	46	3.3	*[2]								
Indonesia	44	3.2	(24.9)[3]								
North Korea	34	2.5	*[4]								
Bangladesh	33	2.4	*[2]								
Sri Lanka	23	1.7	*[2]								
Total Asia	1,378	100.0%	(4.4)	Total Asia	557	100.0%	13.9	Total Asia	872	100.0%	4.1

Notes:
1 Growth rate for 1974 to 1982.
2 Just started exporting.
3 Rate of decline for 1977 to 1982.
4 No regular exports.
5 Excludes ground rock phosphate for direct application.

Source: FAO data compiled by TVA

o Intraregional Exports

Table 6.26 shows that between 66.0% and 100.0% of fertilizer exports of selected Asian countries in 1981 and 1982 consisted of intraregional sales. According to a FADINAP marketing economist, Asian exporters of fertilizers find it very difficult to compete successfully outside the region because of excessive transport costs.

TABLE 6.26
FERTILIZERS:
PERCENTAGE SHARE OF FERTILIZER EXPORTS OF
SELECTED ASIAN COUNTRIES TO REGIONAL DESTINATIONS
1981 AND 1982

Exporters	Volume of Exports to All Destinations (In '000MT of Product)		Exports to Developing Countries in the Asian Region (%)		Exports to Developed and Developing Countrie in the Asian Region (%)	
	1981	1982	1981	1982	1981	1982
Indonesia	16.8	45.0	100.0	100.0	100.0	100.0
Japan	1,554.5	1,248.7	94.0	91.6	94.0	91.6
Malaysia	42.0	46.0	100.0	100.0	100.0	100.0
Singapore	472.3	617.6	99.9	99.8	100.0	100.0
Rep. of Korea	850.9	995.0	87.9	58.4	92.8	66.0
Sri Lanka	-	41.1	-	99.5	-	100.0

Source: Rein Coster, Marketing Economist, FADINAP, "Intraregional Fertilizer Trade in Asia: an Outlook", 1984

Among the developing nations, only the Republic of Korea has consistently been an exporter. In 1980 the country's total fertilizer exports reached 1.3 million MT of product, comprising urea, ammonium sulphate, DAP and NPK's. In 1981 exports declined to 800,000MT but recovered by almost 25% the following year to just below 1 million MT. Exports of urea were hardest hit, whereas sales of DAP continued at a steady level largely because of freight advantages to countries in the region, especially to Iran. Two-thirds of the Republic of Korea's exports found a market in the developing countries of Indonesia, Iran, the Philippines, Singapore, Sri Lanka, and Thailand.

Indonesia occasionally appeared in the export market, selling limited quantities of urea, mainly to the Philippines. Malaysia and Thailand also exported some fertilizer materials. In the case of Malaysia, this was the re-export of phosphate fertilizer to Burma and NPK compounds to Singapore, whereas Thailand exported a small volume of about 900MT of fertilizer to neighbouring and landlocked Laos in 1982.

Fertilizers imported by Hong Kong and Singapore are largely for re-export. Fertilizers arrive in Singapore in bulk, where they are often bagged and subsequently shipped to the smaller ports in the vicinity. A large share of Singapore's trade is also directed to the People's Republic of China.

Japan, as a developed country in the Asian region, stands out as a large exporter. However, the Japanese export position has declined noticeably in the 1980's. From 1981 to 1982 its export volume decreased by 20%, more specifically with regard to exports of urea, ammonium chloride and ammonium phosphate which dropped sharply. Between 1978 and 1981 Japan's exports of urea decreased from 1.2 million MT to 761,000MT. The following year, only 461,000MT urea were exported and in the first nine months of 1983, urea exports declined even further to only 142,000MT. China, traditionally Japan's largest customer, imported 932,700MT of urea in 1978. Its intake dropped to a meager 64,400MT in the first nine months of 1983, despite Japan's unique location and obvious freight advantage.

Although not as drastically affected as its urea exports, Japan's ammonium sulphate sales also dropped, from 750,000MT in 1978 to 642,000MT in 1981, and even further to 588,000MT in 1982.

Despite these data China is still the largest export market for Japan's fertilizers with a share of 43.3%, followed by Thailand with 17.8%. A number of developing countries in Asia, such as Nepal, Sri Lanka and Thailand, enjoy Japanese grants which enable them to procure fertilizers from Japan.

6.7.4 Malaysia - Imports and Exports

- Imports

Malaysia is a net importer of fertilizers with more than 60% of its fertilizer requirements being sourced overseas. In value terms, Malaysia's imports of fertilizers grew from M$86.5 million in 1973 to M$375.0 million in 1981, or at an average rate of 20.1% annually. About 75 to 78% of imports during these years consisted of straight fertilizers containing the major crop nutrients, namely, nitrogen, potassium and phosphorus. These straight fertilizers are either applied directly to crops in their original state or are blended into mixed and granulated fertilizers according to market specifications.

Nitrogenous mineral or chemical fertilizers have held the largest share of fertilizer imports since 1973. Imports of this category totalled M$24.5 million, or 28.3% of the value of all fertilizer imports by Malaysia during this year (Table 6.27). By 1981, overseas purchases of nitrogenous mineral or chemical fertilizers had risen to M$142.0 million, or 37.9% of all fertilizer imports.

Potassic mineral or chemical fertilizers have consistently accounted for around 25% of the country's fertilizer imports between 1973 and 1981. On the other hand, the relative importance of phosphatic natural, mineral, or chemical fertilizers has declined from 20.1% of total fertilizer imports to 15.0% during this interval. Imports of assorted fertilizers in prepared form have also shrunk in relative terms from 24.8% to 21.8%.

Among nitrogenous mineral or chemical fertilizers, urea is by far the most significant, followed by ammonium nitrate and ammonium sulphate (Table 6.28). Urea imports represented 72.4% of the country's overseas purchases in this category in 1973. Its relative share declined to 55.7% by 1981 largely because of the increased importance of ammonium nitrate and ammonium sulphate. These two types of fertilizers accounted for 23.2% and 16.7% respectively of all nitrogenous mineral or chemical fertilizers purchased by the country in 1981.

Japan was the primary supplier of Malaysia's urea imports in 1973, followed by Federal Republic of Germany and Burma. In 1981, however, USSR and United States had supplanted the nation's erstwhile leading suppliers of urea with a combined value of M$65.5 million (82.8% of total value). With respect to imports of ammonium nitrate, Rumania, Yugoslavia, and Japan were the major sources in 1981. Japan, Federal Republic of Germany, and Republic of Korea supplied 78.7% of the country's imports of ammonium sulphate during the same year. International trade statistics did not provide separate classifications for these latter two products in 1973.

TABLE 6.27
IMPORTS: FERTILIZERS
1973 AND 1981
(M$'000)

		1973		1981	
SITC	Chemical Group	Value	% Share	Value	% Share
5621	Nitrogenous mineral or chemical fertilizers	M$24,489.8	28.3%	M$142,030.5	37.9%
5623	Potassic mineral or chemical fertilizers	23,140.8	26.8	95,039.4	25.3
2713 5622	Phosphatic natural, mineral or chemical fertilizers	17,385.5	20.1	56,255.6	15.0
5629	Other fertilizers in prepared form	21,454.8	24.8	81,720.7	21.8
	Total	M$86,470.9	100.0%	M$375,045.1	100.0%

Source: Department of Statistics

Among different types of potassic mineral and chemical fertilizer imports, potassium chloride and potassium sulphate (containing not more than 52% by weight of potassium oxide) are the most prominent (Table 6.29). In 1981, M$28.9 million (30.4%) of total fertilizer imports of M$95.0 million in this category consisted of potassium chloride. The bulk of Malaysia's imports of this item came from three countries: Canada (M$12.2 million), Federal Republic of Germany (M$5.6 million), and USSR (M$4.8 million). During the same year, M$3.0 million of the country's imports of potassium sulphate (M$3.4 million) originated from United States. The balance of imports in this category totalling M$62.8 million (66.0% of total) was accounted for by other potassic mineral or chemical fertilizers. M$32.2 million came from Federal Republic of Germany while another M$23.0 million was supplied by Canada.

As presented in Table 6.30, the nation's imports of phosphatic natural, mineral or chemical fertilizers rose from M$17.4 million in 1973 to M$56.3 million in 1981. In relative terms, however, overseas purchases of phosphate-based fertilizers actually declined from 20.1% of total imports of fertilizers to 15.0% during this interval. The biggest component in this category, natural phosphates, has originated mainly from Christmas Island. In 1973, M$13.8 million (97.6%) of natural phosphates imported by Malaysia came from this source. Eight years later, the corresponding proportion was only 61.1% as sizeable amounts were also supplied by Jordan (M$5.2 million), Egypt (M$3.8 million), and Morocco (M$1.3 million). Imports of ammonium phosphates expanded dramatically from M$0.3 million in 1973 to M$5.1 million in 1981, with United States (M$3.1 million) and South Korea (M$1.9 million) furnishing virtually all of the country's foreign purchases in the latter period. United States was also the principal supplier of superphosphates (M$3.3 million or 96.5% of total) in 1981.

It was noted earlier that imports of other fertilizers in prepared form comprised between 22% and 25% of Malaysian fertilizer imports in 1973 and 1981. In value terms, imports of miscellaneous prepared fertilizers increased from M$21.4 million to M$81.7 million during this period. The two main sources of this product were Federal Republic of Germany (M$14.9 million) and Belgium-Luxembourg (M$4.9 million) in 1973. In 1981, Federal Republic of Germany retained its dominant position by supplying M$49.3 million (60.3%) of the country's fertilizer imports belonging to this category, followed by Belgium-Luxembourg (M$8.0 million or 9.8%) and Finland (M$7.0 million or 8.6%). Relevant statistics are presented in Table 6.31.

On the whole, the Consultants noted that four countries, namely, the Christmas Island, the Federal Republic of Germany, Canada, and Japan supplied the bulk of Malaysian fertilizer imports and were also the most consistent sources. Among these four, the Federal Republic of Germany was the most consistent supplier and provided the widest range of imported fertilizers. Its main exports to Malaysia were NPK compounds, nitrogenous and potassic fertilizers. Imports from the ASEAN countries for these years were negligible.

TABLE 6.28
IMPORTS: NITROGENOUS MINERAL
OR CHEMICAL FERTILIZERS
1973 AND 1981
(M$'000)

SITC	Chemical Group		1973	1981
56216	1.	Urea		
		F. R. of Germany	M$ 3,250.5	M$ 6,589.1
		Japan	7,155.6	*(1)
		USA	*(1)	22,430.4
		Burma	2,526.7	-
		USSR	-	43,141.6
		Others	4,793.4	7,025.3
		Sub-Total	17,726.2	79,186.4
56211	2.	Ammonium nitrate		
		Rumania		12,269.4
		Yugoslavia		5,559.0
		Japan		3,556.5
		Others		11,516.6
		Sub-Total	*(2)	32,901.5
56213	3.	Ammonium sulphate		
		Japan		11,471.4
		F. R. of Germany		4,935.0
		R. of Korea		2,235.3
		Others		5,056.6
		Sub-Total	*(2)	23,698.3
56212 56214 56215 56219	4.	Other nitrogenous fertilizers	6,763.6	6,244.3
5621		Total	M$24,489.8	M$142,030.5

Note:

(1) Urea imports from these countries were included in "Others" for urea.

(2) Imports of ammonium nitrate and ammonium sulphate were included in "Other nitrogenous fertilizers" in 1973.

Source: Department of Statistics

TABLE 6.29
IMPORTS: POTASSIC MINERAL OR
CHEMICAL FERTILIZERS
1973 AND 1981
(M$'000)

SITC	Chemical Group	1973	1981
56231	1. Potassium chloride		
	Canada		M$12,157.6
	F. R. of Germany		5,653.1
	USSR		4,818.6
	Others		6,240.0
	Sub-Total	*(1)	28,869.3
56232	2. Potassium sulphate contg. not more than 52% by weight of potassium oxide		
	USA		3,003.0
	Others		399.5
	Sub-Total	*(1)	3,402.5
56239	3. Other potassic mineral or chemical fertilizers		
	F. R. of Germany	*(2)	32,223.5
	Canada	M$ 8,873.4	23,024.3
	Other countries in Middle East, n.e.s.	8,132.0	*(2)
	USA	3,540.0	*(2)
	Others	2,595.4	7,519.8
	Sub-Total	23,140.8	62,767.6
	Total	M$23,140.8	M$95,039.4

Note :

(1) Imports of potassium chloride and potassium sulphate in 1973 were included in "Other potassic mineral or chemical fertilizers".

(2) Imports from these countries were included in "Others" for this specific group.

Source: Department of Statistics

TABLE 6.30
IMPORTS: PHOSPHATIC NATURAL, MINERAL
OR CHEMICAL FERTILIZERS
1973 AND 1981
(M$'000)

SITC	Chemical Group	1973	1981
2713	1. Natural phosphates		
	Christmas Island	M$13,756.4	M$22,447.2
	Jordan	-	5,249.9
	Egypt	-	3,773.1
	Morocco	-	1,334.5
	USA, etc.	140.8	*(1)
	Others	204.5	3,901.7
	Sub-Total	14,101.7	36,706.4
562921	2. Ammonium phosphate		
	Canada	80.4	-
	Japan	67.4	* (1)
	Netherlands	32.9	-
	Rep. of Korea	-	1,875.4
	USA	105.4	3,150.9
	Others	16.2	59.1
	Sub-Total	302.3	5,085.4
56222	3. Superphosphates		
	USA		3,280.8
	Others		118.8
	Sub-Total	*(2)	3,399.6
56229	4. Other phosphatic mineral or chemical fertilizers	2,981.5	11,064.2
	Total	M$17,385.5	M$56,255.6

Note :
Imports from these countries were included in "Others" for the specific product.

(2) Imports of superphosphates in 1973 were included in "Other mineral or chemical phosphatic fertilizers".

Source: Department of Statistics

TABLE 6.31
IMPORTS: OTHER FERTILIZERS IN PREPARED FORM
1973 AND 1981
(M$'000)

SITC		Chemical Group	1973	1981
561901 (Old classification)	1.	Composite, complex, compound fertilizers, gross wt. not exceeding 22 lbs.		
		F. R. of Germany	M$14,871.5	
		Belgium - Luxembourg	4,893.1	
		Others	862.6	
		Sub-Total	20,627.2	
56291 (New classification)	2.	Fertilizers n.e.s. containing nitrogen, phosphorus and potassium		
		F. R. of Germany		M$49,315.1
		Belgium - Luxembourg		7,994.1
		Finland		7,022.5
		Others		6,119.6
		Sub-Total		70,451.3
56292 56293 56299	3.	Others	827.6	11,269.4
562		Total	M$21,454.8	M$81,720.7

Source: Department of Statistics

o Exports

From 1973 to 1981, fertilizer exports/re-exports of Malaysia were negligible compared with total local production. Exports/re-exports totalled M$6.6 million in 1973 and remained at approximately the same level (M$6.5 million) in 1981 (See Table 6.32). Foreign sales of other fertilizers in prepared form (mainly NPK compounds) dropped sharply from M$5.6 million to M$3.1 million during this period. As a consequence, the relative share of this product group also decreased from 84.6% to 47.3%. On the other hand, the country's exports/re-exports of phosphatic mineral of chemical fertilizers expanded significantly from M$0.5 million (7.2%) in 1973 to M$2.6 million (40.6%) in 1981.

TABLE 6.32
EXPORTS AND RE-EXPORTS: FERTILIZERS
1973 AND 1981
(M$ '000)

		1973		1981	
SITC	Chemical Group	Value	% Share	Value	% Share
5629	Other fertilizers in prepared form	M$5,605.1	84.6%	M$3,086.5	47.3%
5622	Phosphatic mineral or chemical fertilizers	476.0	7.2	2,652.3	40.6
5621	Nitrogenous mineral or chemical fertilizers	540.7	8.2	673.6	10.3
5623	Potassic mineral or chemical fertilizers	3.2	*	115.3	1.8
	Total	M$6,625.0	100.0%	M$6,527.7	100.0%

Note:
* Less than 0.1%

Source: Department of Statistics

The bulk of these marginal foreign sales of fertilizers consisted largely of re-exports of NPK compounds, which were purchased mainly by Thailand in 1973 and by Singapore in 1981 (See Table 6.33). Phosphatic natural, mineral or chemical fertilizer exports, which occupied second rank in 1981, were also just re-exports since there is no local production nor any indigenous source of rock phosphate in Malaysia. In 1981, Burma purchased 82.2% of the country's re-exports of this type of fertilizer (See Table 6.34). Likewise, almost all of Malaysia's exports of nitrogenous fertilizers in 1973 and 1981 were composed of re-exports of urea to Singapore (See Table 6.35). The same is true for overseas sales of potassic mineral or chemical fertilizers.

Malaysia is currently building up its ammonia and urea capacity and is expected to export surplus urea when the ASEAN fertilizer plant at Bintulu starts operations in October 1985.

TABLE 6.33
EXPORTS AND RE-EXPORTS: OTHER FERTILIZERS IN PREPARED FORM
1973 AND 1981
(M$ '000)

SITC	Chemical Group	1973	1981
56291	1. Fertilizers, n.e.s. containing nitrogen, phosphorus and potassium		
	Singapore	M$ 84.3	M$2,068.4
	Hong Kong	-	19.0
	Kampuchea	-	6.0
	Thailand	5,464.6	-
	Brunei	3.7	-
	Others	0.5	0.5
	Sub-Total	5,553.1	2,093.9
5629	Total	M$5,605.1	M$3,086.5

Source: Department of Statistics

TABLE 6.34
EXPORTS AND RE-EXPORTS: PHOSPHATIC NATURAL, MINERAL OR CHEMICAL FERTILIZERS
1973 AND 1981
(M$ '000)

SITC	Chemical Group	1973	1981
5622	1. Phosphatic mineral or chemical fertilizers		
	Burma	-	M$2,180.4
	Singapore	M$ 7.6	17.7
	Saudi Arabia	-	5.3
	Others	1.0	0.8
	Sub-Total	8.6	2,204.2
2713	2. Natural phosphates		
	Hong Kong	-	371.7
	Singapore	36.5	71.4
	Thailand	430.9	1.7
	Others	-	3.3
	Sub-Total	467.4	448.1
	Total	M$476.0	M$2,652.3

Source: Department of Statistics

TABLE 6.35
EXPORTS AND RE-EXPORTS: NITROGENOUS MINERAL OR CHEMICAL FERTILIZERS
1973 AND 1981
(M$ '000)

SITC	Chemical Group	1973	1981
56216000	Urea		
	Singapore	M$123.2	M$672.1
	Taiwan	190.0	-
	Thailand	220.6	-
	Others	-	0.2
	Sub-Total	533.8	672.3
56219900	Other mineral or chemical fertilizers, nitrogenous		
	Singapore	6.9	1.2
	Others	-	0.1
	Sub-Total	6.9	1.3
5621	Total	M$540.7	M$673.6

Source: Department of Statistics

6.7.5 Prospects for Intraregional Trade

Asia will continue to import substantial quantities of fertilizers in the coming years. However, recent developments involving the construction or restructuring of ammonia-urea, phosphate and potash capacities in various Asian countries suggest possible shifts in intraregional trade patterns. It is very probable that some of the net importers of fertilizers in the region may begin to sell their surplus production to other countries in Asia in the near future.

A brief survey of prevailing trends in fertilizer production and consumption in selected Asian nations may help identify future changes in the structure of intraregional trade. Historical trends of nitrogen nutrient balance of each country in Asia, which represents the difference between consumption and local production, are summarized in Appendix 17.

- Bangladesh

  Four fertilizer plants produced 402,000MT of urea in 1980/81. This volume could have been substantially higher had the plants been operating at fuller capacity. In December 1983, the Zia Fertilizer Plant went into operation, with a rated capacity of 480,000MT per annum of urea. Three more urea plants based on natural gas are scheduled to become operational between 1984 and 1986, adding 1.22 million MT per annum to the existing capacity. One plant with an annual capacity of 560,000MT is slated to produce solely for export purposes. Its geographical location vis-a-vis the countries of the sub-continent could give Bangladesh the edge over other regional and non-regional urea producers/traders. However, the availability of surplus urea for export will depend, to a large extent, on the production performance of the country's fertilizer industry.

- Burma

  Burma presently has two urea plants located at Sale and Kyunchaung. A third urea plant is scheduled to come on-stream in 1984/85, with an annual production capacity of 200,000MT. This addition to the already existing urea production capacity of 130,000MT per annum in Burma will reduce the country's dependence on imported nitrogen. Other chemical fertilizers will, however, continue to be entirely imported. In 1982/83 146,500MT of urea were imported. Urea requirements for 1987/88 are projected to reach 156,500MT.

- China

According to the Ministry of Chemical Industry, China has met its 1983 fertilizer production target and achieved a total output of 13.7 million MT in that year, an increase of 7.4% over 1982.

Despite the continued rapid development of its fertilizer industry, China will remain a large fertilizer importer. The Ministry of Commerce in China estimates that approximately 10 million MT of fertilizer material will be imported annually.

- India

The Fertilizer Association of India (FAI) anticipates a higher growth rate of production between 1982/83 and 1987/88 compared with the annual percentage increase in fertilizer consumption for nitrogen and phosphate during this period. The estimated nutrient balance for India in 1987/88 is shown below:

	In '000MT of Nutrient		
	N	P_2O_5	K_2O
Consumption	6,109	2,104	1,045
Production	6,060	2,101	-
Balance	(49)	(3)	(1,045)

Based on these projections, India expects to dramatically reduce its nitrogen and phosphate nutrient imports to 49,000MT of N and 3,000MT of P_2O_5 by 1987/88. Imports of potash will probably total 1.04 million MT of K_2O nutrient for that same year.

- Indonesia

Indonesia will not become a major exporter of nitrogen. The latest projections estimate that the country will remain dependent on imported nitrogen up to 1986, in spite of a steadily expanding industry based on natural gas. A small surplus of 131,000MT of N may become available by 1987. The following year, a positive balance between domestic production and consumption of 336,000MT of N is anticipated. As in the past this surplus will find its way to countries in the region with insufficient fertilizer production, such as China and the Philippines.

The most recent additions to Indonesia's fertilizer capacity are four new world-scale nitrogen complexes and the expansion of an existing one as follows:

Project	Annual Production Capacity (In MT of Nutrient)
PT Pupuk Kalimantan Timur (KALTIM I)	460,000 N ammonia 258,000 N urea
KALTIM II	406,000 N ammonia 258,000 N urea
Iskandar Muda Fertilizer Corp.	272,000 N ammonia 262,000 N urea
PT ASEAN Aceh Fertilizer Corp.	272,000 N ammonia 262,000 N urea
PT Petrokimia Gresik (Pusri)	53,000 N ammonium sulphate 230,000 P_2O_5 triple superphosphate (TSP)

- Iran

The ongoing war with Iraq compelled Iran to close its fertilizer plants and to import 95% of its consumption in 1982/83. The maintenance of the idle plants and the undamaged survival of such installations will decide the future of Iranian production and trade. The potential production capacity of Iran per annum was estimated to reach 1.27 million MT urea, 280,000MT ammonium nitrate and 220,000MT DAP. The actual import of urea in 1982/83 amounted to 667,049MT. Although the annual application of fertilizers in Iran is growing fast, it is not foreseen that consumption of nitrogen fertilizers will outpace domestic production. A prerequisite for such an assumption is, of course, the speedy resumption of production. A different situation exists for the production-consumption balance for the main source of phosphate, DAP. Iran's demand for this product will, to a large extent, be met from steadily increasing imports.

o Japan

The fertilizer industry in Japan imports all raw materials for the production of fertilizers, except sulphur. It has become more difficult for Japan to produce competitively for export markets. As it was pointed out earlier, the volume of fertilizer exports declined considerably in the early 1980s. To compound the situation further, the domestic market had also reached saturation level and cannot offset the unfavourable export situation. The Government had no alternative but to cut back on excess capacity. By 1985, upon restructuring the industry, the following annual capacities should become available: ammonia 2.7 million MT, urea 1.5 million MT, phosphoric acid 630,000MT, fused magnesium phosphate 500,000MT and granulation facilities 5.37 million MT. In short, Japan is gradually phasing out the export of finished fertilizers, except for its commitment to fertilizer aid programmes.

o Republic of Korea

As an exporter of finished fertilizer, the Republic of Korea is in a similar position to Japan. All raw materials, such as crude oil, sulphur and rock phosphate, are imported. An additional constraint has been its outdated production processes, hindering an efficient and competitive industry. During the 1970s the Korean government built up an extensive fertilizer industry, with a total capacity of 3.15 million MT per annum.

A rationalization plan for the fertilizer industry was launched in January 1983. The plan seeks a restructuring of urea and DAP capacities to give a better balance to the domestic suppl and demand situation, which will mean a reduced exportable surplus of fertilizers in the coming years. The adjusted annual capacities will allow for 825,000MT urea, 164,000MT ammonium sulphate, 120,000MT fused superphosphates and 953,000MT compounds and DAP. It is expected that Korean consumption will grow at a moderate pace. This means that there will still be sufficient installed capacity to export, especially DAP, ammonium sulphate and urea. Consumption of the major products during 1982/83 was 350,000MT urea, 780,000MT compounds/DAP and 11,000MT ammonium sulphate.

- Nepal

  No production of fertilizers takes place in Nepal. There are some prospects for the installation of mini nitrogen fertilizer plants. In the 1982/83 season 64,250MT urea and 35,550MT 20-20-0 were imported. Steadily increasing imports are anticipated for the years ahead.

- Pakistan

  Pakistan has long-standing experience in the production of fertilizers. The boost in local nitrogen production capacity during the beginning of the 1980s resulted in a sizeable reduction in the country's imports, from almost 400,000MT N in 1980/81 to 131,000MT N in 1982/83. Pakistan has recently been a successful bidder in urea tenders announced in other countries of the region. Pakistan does, however, import DAP to satisfy its phosphate requirements and thereby brings nitrogen into the country. With the construction of additional plants which will be on-stream after 1978/88, 900,000MT DAP are expected to become available, making Pakistan self-sufficient in phosphates.

- The Philippines

  The supply of phosphates is not intended to be a problem in the Philippines when the Philippines Phosphate Fertilizer Corp. (Philiphos) becomes operative in 1985. Philphos will produce 70-80% for the export market. On the other hand, imports of urea and potash will continue and are expected to grow in the years ahead, as the application level in the Philippines increases. Imports of urea are estimated to reach almost 400,000MT and potassium chloride 80,000MT in 1986.

  Together with the Republic of Korea, the Philippines will be the only country in Asia with an exportable surplus of ammonium phosphates: 340,000MT DAP, 140,000MT MAP and 200,000MT 16-20-0. In addition 90,000MT of compounds will be exported. Markets should be sought within this region; outside the Asian region the competition may become too strong, particularly when freight rates become an important cost factor.

- Thailand

Major developments are going to take place in Thailand's fertilizer supply situation during the 1980s. From being a traditional importer of fertilizers, Thailand may become largely self-sufficient, based on discoveries of huge deposits of natural gas and potash. Potash resources have been estimated to total 270 billion MT (in terms of ore). The World Bank has financed a pilot project to assess the economic viability of mining and producing potash. If successful, production of 200,000 MT K_2O can be expected, of which one-third may be consumed within the country and the balance exported. Phosphate rock production takes place on a limited scale only, and is below 20,000MT per annum.

The plants of the National Fertilizer Corp. (NFC) for the fertilizer complex are expected to source about 90% 88 raw materials locally. Imported raw materials for the project will comprise sulphur and, initially, phosphate rock, although demand from the complex may promote local exploitation of the latter.

Expected annual capacities will provide for 244,000MT of N ammonia, 152,000MT of N urea, 719,000MT sulphuric acid, 238,000MT P_2O_5 phosphoric acid, and 924,000MT DAP/MAP/NPK fertilizer. A 63,000MT per annum powdered MAP plant will also be built, bringing total design output from the complex to over 1.2 million MT per annum of fertilizer.

Construction is expected to start by the third quarter of 1985. At the earliest, the complex may commence operations towards the end of 1987 or early 1988.

- Sri Lanka

During the 1982/83 fertilizer year, the State Fertilizer Manufacturing Corp. produced 196,727MT of urea, which was sufficient for domestic consumption, leaving a surplus of 49,500MT for export to Burma. Because its production is based on naphtha, it can only compete with imported urea at current world market prices when heavily subsidized. Sri Lanka has recently begun importing urea again.

The country also produces small quantities of ground apatite, which is used as a substitute for imported rock phosphate. Otherwise Sri Lanka imports most of its fertilizer requirements and is expected to remain dependent on imports.

o Summary

Reviewing recent developments in these selected Asian countries, it becomes obvious that a considerable expansion of nitrogen production is scheduled to take place in Bangladesh, Burma, China, India, Indonesia, Iran, Pakistan, Thailand, and Malaysia. These countries will either become less dependent on imported nitrogen sources or even reach a state of self-sufficiency with a (small) surplus, as in Bangladesh, Indonesia and Malaysia. In all instances natural gas is the preferred feedstock. Since the application of fertilizers is steadily increasing, it can be assumed that this surplus will gradually dwindle if no additional plants are installed.

In Japan and Korea the reverse has taken place. On the governments' initiative, nitrogen fertilizer capacity has been dismantled and exports gradually reduced. This process has been more rapid in Japan than in Korea. Both countries will remain exporters but on a much smaller scale than previously.

Another notable development will take place in the Philippines where the Philphos complex is scheduled to produce MAP, DAP and NP/NPK compounds, largely for the export market.

In the somewhat more distant future, the fertilizer industry will emerge in Thailand. According to current plans, the project will become operational towards the end of 1987, reaching a peak in 1992. An unknown factor is the exploitation of Thailand's potash reserves. If the mining is commercially viable, then the country could become one of the world's major potash suppliers.

6.7.6 International Cost Comparison

The purpose of this section is to evaluate the cost competitiveness of a representative product of the fertilizer industry -- anhydrous ammonia. As previously mentioned, existing ammonia capacity in Malaysia is naphtha-based and is therefore no longer competitive compared with natural gas-based ammonia. An analysis of the production cost structure and the cost components of existing ammonia production in Malaysia, Taiwan and Indonesia follows. In the Philippines, the only company capable of producing anhydrous ammonia, Maria Cristina Fertilizer Corp. (MCFC), stopped operations in 1976, a few years after the oil crisis in November 1973. With naphtha prices jumping tremendously from US$2.25 per barrel in 1976 to US$39 - 40 per barrel in 1977, MCFC decided instead to import rather than produce its own ammonia.

Comparative production cost structures of ammonia production in Malaysia, Taiwan and Indonesia are outlined in Table 6.36.

TABLE 6.36
AMMONIA:
COMPARATIVE PRODUCTION COST STRUCTURE

Production Cost Components	Malaysia (Naphtha-based)	Taiwan (Natural gas-based)	Indonesia (Natural gas-based)
Direct Labour	6%	15%	4.8%
Feedstock and energy	69	65	74.1
- Local	69	65	74.1
- Imported	-	-	-
Overhead	25	18 - 22	21.1
- Depreciation	4	6 - 7	
- Repair and maintenance	3	2 - 3	n.a.
- Packaging	3	-	
- Others	15*	10 - 12	

* Mainly indirect salaries, wages and benefits

Source: Local data from SGV-KC Field Survey
Taiwan data from SGV-Soong
Indonesian data from SGV-Utomo

The following observations can be inferred from the above data:

1. Feedstock and energy are the most important components in the total production cost of ammonia in the three countries. The contribution of feedstock and energy costs to total manufacturing cost is highest in Indonesia (74.1%). Feedstock and energy cost in Malaysia and Taiwan account for 69% and 65%, respectively, of total production cost.

2. Direct labour is a considerably more significant component in the total production cost of Taiwan compared with Malaysia and Indonesia.

3. Overhead charges are slightly more important in the total cost of ammonia production in Malaysia. Indirect salaries, wages and benefits represent a major share of these overhead charges.

While feedstock and energy contribution to total manufacturing cost is not significantly different in Malaysia, Taiwan and Indonesia, an examination of current feedstock price and prevailing selling price for ammonia in these countries is more than enough support to the claim that naphtha-based ammonia has become increasingly uncompetitive compared to natural gas-based ammonia:

	Malaysia	Taiwan	Indonesia
Feedstock	Naphtha	Natural gas	Natural gas
Price of feedstock	M$14.38/MMBTU[1]	M$6.9/MMBTU[1]	M$1.27-1.38/MMBTU[1]
Selling price	M$800/MT	M$598-644/MT	M$477.86/MT[2]

Note : 1. MMBTU - million British thermal units
2. Retail selling price of liquified ammonia (25%)

Source: Local data from SGV-KC Field Survey
Taiwan data from SGV-Soong
Indonesian data from SGV-Utomo

The greater importance of direct labour in Taiwan may be explained by its higher wage levels, particularly in the process operator and general worker categories (See Table 6.37).

Comparing anhydrous ammonia output and size of direct production workers in Malaysia and Taiwan, it can be deduced that labour productivity in Taiwan at 6,312MT per employee is almost nine times higher than in Malaysia (745MT per employee). It should be noted that Taiwan has a world-scale ammonia plant (1,000 short tons per day capacity) while Malaysia's existing plant is designed for only 162MT ammonia output per day.

TABLE 6.37
AMMONIA:
COMPARATIVE WAGE STRUCTURE

Job Category	Malaysia No. of Employees	Malaysia Monthly Wage	Taiwan No. of Employees	Taiwan Monthly Wage	Indonesia No. of Employees	Indonesia Monthly Wage
1. Production Section Head/Superintendent	1	M$4,000	1	M$4,485	3	M$1,535
2. Supervisor	5	4,000	4	4,235	12	1,225
3. Foreman/Shift Engineer	-	-	4	3,115	32	920
4. Process Operator/ Technician	31	1,300	)50	2,490	1,000	730
5. General Worker	10	1,000	)		500	220
Production Volume, 1983		35,000 MT		372,397 MT		937,200 MT[1]

Note : 1. Represents production of liquified ammonia (25%).
2. Monthly wage includes benefits.

Source: Local data from SGV-KC Field Survey
Taiwan data from SGV-Soong
Indonesian data from SGV-Utomo

VII. PETROCHEMICAL PRODUCTS

7.1 OVERVIEW

Petrochemicals are those chemical materials that use hydrocarbons as raw materials or feedstocks. Petrochemicals include primary petrochemicals or basic building blocks, which are first-order materials produced directly from a hydrocarbon feedstock; intermediate petrochemicals, which are second-order materials produced by further chemical processing of primary materials; and petrochemical end-products, which are derived from primary and/or intermediate materials and represent industrially useful materials such as plastics, synthetic fibres and synthetic rubbers. The classification of petrochemical products is shown in Table 7.1.

This chapter will focus on the basic building blocks and intermediates as well as plastics and resins, the major end-products of the petrochemical industry. The major products falling under these categories which are locally produced or imported into Malaysia are:

A. Petrochemical Building Blocks and Intermediates[1]:

1. Methanol
2. Formaldehyde
3. Vinyl chloride
4. Styrene
5. Ethylene glycol
6. Vinyl acetate

B. Plastics and Resins:

1. Low density polyethylene (LDPE)
2. High density polyethylene (HDPE)
3. Polypropylene (PP)
4. Polyvinyl chloride (PVC)
5. Polystyrene (PS)
6. Amino and phenolic resins
7. Polyvinyl acetate and acrylic emulsions (synthetic emulsions)
8. Alkyd resins

1. Ammonia is discussed under the Fertilizer Industry

SGV-Kassim Chan Sdn. BHd.

TABLE 7.1
CLASSIFICATION OF PETROCHEMICAL PRODUCTS

Primary Resources	Feedstocks or Raw Materials	Building Blocks	Intermediates	Petrochemical End-Products
Crude oil	Petroleum Liquids:	Aromatics:	Aromatic/cyclic:	Plastic materials
	Naphtha	Benzene	Ethylbenzene	e.g.-polystyrene
	Reformate	Toluene	Styrene	
Natural gas	Raffinate	Xylenes (mixed)	Phenol	Synthetic rubber
	Gas oil	o-Xylene	Phthalic anhydride	e.g.-polybutadiene
	Carbon black oil	m-Xylene	Terephthalic acid	
	Crude oil	p-Xylene	Aniline	Synthetic fibers
	LNG	Naphthalene		e.g.-nylon
	Natural Gas Liquids:	Olefins- Unsaturates:	Aliphatic/acyclic:	Sufactants
	Ethane	Ethylene	Acetic acid	e.g.-arylsulfonates
	Propane	Propylene	Ethylene oxide	
	Butanes	Butylene	Ethylene glycol	Nitrogenous
	LPG	Butadiene	Ethylene dichloride	fertilizer
	Natural gasoline	Acetylene	Vinyl chloride	e.g.-ammonium
			Formaldehyde	nitrate
			Butanol	
				Phosphatic
	Gases:			fertilizer
	Methane	Methanol		e.g.-ammonium
	Synthesis gas	Ammonia		phosphate
	Still gas			
		Carbon black		Pesticides
				e.g.-malathion

194

These products are primarily used as inputs in other industries as shown below:

Product Group	Major Industries Served
Methanol	Formaldehyde (used in amino and phenolic resins)
Vinyl chloride	PVC manufacture
Styrene	PS manufacture
Ethylene glycol	Manufacture of polyester staple fibre
Vinyl acetate	Manufacture of synthetic emulsions
LDPE	Plastic film manufacture Wire and cable manufacture
HDPE	Plastic film manufacture Injection moulding Blow moulding
PP	Manufacture of woven bags Plastic film manufacture Injection moulding
PVC resins and compounds	PVC pipe manufacture Wire and cable manufacture Packaging industry
PS resins	Electrical appliance manufacture Housewares, cassettes and other plastic products
Amino and phenolic resins	Plywood mills Chipboard, blockboard and particle board mills Furniture industry Foundries
Synthetic emulsions	Paints manufacture Adhesives manufacture Textile mills
Alkyd resins	Paints and inks manufacture

Only six of the above products are produced in Malaysia:

1. Formaldehyde
2. Polyvinyl chloride
3. Polystyrene
4. Amino and phenolic resins
5. Synthetic emulsions
6. Alkyd resins

In addition, methanol production is expected to commence in October/November, 1984.

The bulk of Malaysia's requirements for petrochemicals is met by importation. Except for formaldehyde, all the basic and intermediate petrochemicals as well as the major plastics, polyethylene and polypropylene are entirely imported. Local production is confined to some plastics and resins.

For the purpose of this study, petrochemical products are confined to the following product groups:

1. Petrochemical Building Blocks and Intermediates

SITC	Product Group
511	Hydrocarbons and their derivatives
512	Alcohols, phenols, phenol-alchols and their derivatives
513	Carboxylic acids and their derivatives
516	Esters, alcohol peroxides, ether peroxides and their derivatives, aldehydes and ketones

2. Plastics and Resins

SITC	Product Group
582	Condensation, polycondensation and polyaddition products
583	Polymerization and copolymerization products
584	Regenerated cellulose and their derivatives
585	Natural resins, hardened proteins, high polymers and other resins and plastic materials

7.2 PETROCHEMICAL BUILDING BLOCKS AND INTERMEDIATES - SECTORAL STRUCTURE AND CHARACTERISTICS

Apart from formaldehyde and methanol manufacture, Malaysia has no production capability in basic and intermediate petrochemicals. Although acetylene is produced locally, it is derived from calcium carbide and as such is not a petrochemical derivative. In addition, domestic formic acid production ceased in 1981. Malaya Acid Works Bhd., the only manufacturer, indicated that locally produced formic acid was unable to compete with imports.

Formaldehyde is used solely in the production of formaldehyde resins and as such, is discussed under plastics and resins. Methanol manufacture is discussed below.

7.2.1 Methanol Manufacture

Malaysia is a new participant in the methanol field. The only methanol plant, located in Labuan, Sabah will commence production only in October/November, 1984. A brief profile of the project is given below:

Company	Sabah Gas Industries Sdn. BHd.
Capacity	660,000 tonnes per annum
Gas Consumption	54 MMSCFD
Contractor	Lurgi Klockner Consortium, Germany
Process	Lurgi low pressure process with combined reforming
Total Investment	M$ 628 million[1]
Principal Markets	Japan, Korea, Taiwan, Asean, Europe
Marketing Agents	Borden Chemicals, USA (international markets), SAMA Industrial Products Sdn. Bhd., (domestic market)
Ownership	Sabah State Government

1. Excludes investment in the gas grid and marine facilities.

The project is undertaken by the Sabah State Government as part of a gas utilization complex which includes a 2000 tonnes per day hot briquitted iron palnt and a 47MW power plant.

Associated gas produced in the Semarang and Erb-West oilfields, offshore Sabah, will be used to feed the methanol plant. Gas consumption will be about 54 million cubic feet per day.

The bulk of the methanol produced will be exported. Domestic demand is insignificant relative to production capacity, as can be seen from Table 7.2.

TABLE 7.2
PETROCHEMICAL BUILDING BLOCKS AND INTERMEDIATES
DOMESTIC DEMAND FOR METHANOL
1979 - 1983

Year	Demand (MT)
1979	15,000
1980	14,000
1981	15,000
1982	18,000
1983	19,000

Source: SGV-KC Field Survey

The Consultants' field survey indicated that domestic demand for methanol was in the region of 19,000 tonnes in 1983, equivalent to only 3% of available production capacity. Import of methanol is principally for the manufacture of plywood adhesive and other formaldehyde resins.

There is also local production of methyl ester from methanol and palm oil. At present, there is only one manufacturer, Henkel Oleochemicals (M) Sdn. Bhd., whose methanol requirement is about 2,000 - 2,500MT per annum. Production commenced only in 1984 and the entire output will be exported. The company is also considering the manufacture of fatty alcohols for export and the project is estimated to requ 50,000MT of methanol per annum.

With the availability of locally produced methanol, other new uses are expected to be developed. The following have been identified by Petronas as potential methanol derivatives for local manufacture:

1. Acetic acid - a raw material for acetates, such as vinyl acetate and cellulose acetate.

2. Methyl tertiary butyl ether - a high octane gasoline blending component.

3. Single-cell protein - for animal feed protein.

7.3 PLASTICS AND RESINS - SECTORAL STRUCTURE AND CHARACTERISTICS

According to the Censuses of Manufacturing Industries, 1973 and 1981 (See Table 7.3), there were 17 establishments involved in the manufacture of synthetic resins, plastic materials and man-made fibres except glass, in Malaysia in 1981, compared with only six in 1973. This sub-sector recorded one of the most impressive growth rates in the chemical industry over the past decade, with output growth averaging 14.0% per annum and growth in value added averaging 12.5% per annum from 1973 to 1981.

TABLE 7.3
PLASTICS AND RESINS:
ECONOMIC CONTRIBUTIONS
(VALUE IN M$ MILLION IN 1981 CONSTANT PRICES)

	Plastics and Resins[1]		Total Chemical Industry[2]	
	1973	1981	1973	1981
Number of establishments	6	17	337	479
Employment	436	512	10,209	17,433
Gross value of output (M$ million)	27.0	76.8	775.0	1,529.3
Value added (M$ million)	9.3	23.8	318.9	461.7
Average annual growth rate of gross output value, 1973 - 81	14.0%		8.9%	
Average annual growth rate of value added, 1973 - 81	12.5%		4.7%	

1. Industry classification 35130, includes man-made fibres except glass
2. Industry classification 35110, 35120, 35130, 35210, 35220, 35231, 35239, 35290

Source of Basic Data: Census of Manufacturing Industries, Peninsular Malaysia, 1973
Census of Manufacturing Industries, Malaysia, 1981

The number of manufacturing establishments operating in the plastics is small. The Consultants' field survey identified 10 companies which account for the bulk of the sub-sector's output. They are distributed as follows:

Product Group	Number of Companies
PVC resins	2
PS resins	2
Amino and phenolic resins	3
Synthetic emulsions	2
Alkyd resins	2

Polyvinyl chloride and polystyrene are the only thermoplastics produced in Malaysia. Polyvinyl chloride resins were first produced in 1972. Currently, there are two producers, also engaged in the compounding activities together with numerous other compounders.

Until 1984, there was only one polystyrene manufacturer in the country, producing general-purpose and high-impact polystyrene resins. Another company has just commenced production of general-purpose polystyrene in August 1984.

There are three companies involved in the production of amino and phenolic resins. Urea-formaldehyde and phenol-formaldehyde for the plywood industry are the main products, but melanine-formaldehyde and resorcinol-formaldehyde resins are also produced on a much smaller scale.

The production of polyvinyl acetate and acrylic emulsions, primarily for latex paint manufacture, is dominated by two companies. Other producers are comparatively small, producing primarily for their internal use. A small amount of silicone emulsions is also produced locally.

Alkyd resins are also used in the domestic manufacture of surface coatings. There are two major producers of alkyds, one also producing a small quantity of unsaturated polyester resins used for glass-fibre reinforced items such as boat hulls, water tanks and car body repair putties.

The major plastic and resin manufacturers, their paid-up capital and product lines are outlined in Table 7.4.

TABLE 7.4
PLASTICS AND RESINS:
LIST OF DOMESTIC MANUFACTURERS
1984

	Company	Paid-Up Capital (In M$ million)	Plant Location	Products Manufactured
1.	Industrial Resins (Malaysia) Sdn. Bhd.	$10.0	Johor Bahru, Johore	PVC resins and compounds
2.	Malayan Electro-Chemical Industry Co. Sdn. Bhd.	4.95	Prai, Province Wellesley	PVC resins and compounds
3.	Petrochemicals (Malaysia) Sdn. Bhd.	2.00	Johor Bahru, Johore	General-purpose polystyrene, high-impact polystyrene
4.	Polystyrene Sdn. Bhd. (commenced production in August, 1984)	3.5	Rembau, Negeri Sembilan	General-purpose polystyrene
5.	Malayan Adhesives & Chemicals Sdn. Bhd.	8.00	Shah Alam, Selangor	Urea-formaldehyde, phenol-formaldehyde foundry resins
6.	Borden Chemicals Sdn. Bhd.	4.3	Prai, Province Wellesley	Urea-formaldehyde, phenol-formaldehyde resorcinol-formaldehyde, melamine-formaldehyde
7.	Norsechem (M) Sdn. Bhd.	16.5	Shah Alam, Selangor Sabah, East Malaysia	Urea-formaldehyde, phenol-formaldehyde, resorcinol-formaldehyde
8.	Revertex Malaysia Sdn. Bhd.	7.15	Kluang, Johore	PVA and acrylic emulsions, alkyd resins, unsaturated polyester resins
9.	ICI Paints (Malaysia) Sdn. Bhd.	10.0	Petaling Jaya, Selangor	Alkyd resins (for own use only)
10.	Union Polymers Sdn. Bhd.	2.465	Seremban, Negeri Sembilan	PVA and acrylic emulsions, silicone emulsions

1. ICI Paints (Malaysia) Sdn. Bhd. is a paints manufacturer producing alkyds solely for its own use. Subsequent discussion on the sub-sector does not include the company unless specifically indicated.

Source: SGV-KC Field Survey

The general characteristics of the sub-sector are highlighted below:

1. In the absence of domestic production of primary petrochemical products, demand for plastics in Malaysia is met primarily by importation. This is reflected in the table below:

TABLE 7.5
PLASTICS AND RESINS:
APPARENT CONSUMPTION, 1973 AND 1981
(M$ MILLION IN 1981 CONSTANT PRICES)

	1973	1981
Imports	$211.9	$375.5
Local production	$ 62.8	182.5
Exports	$ 22.3	25.9
Apparent consumption	$252.4	$532.0
Output as a % of consumption	25%	34%
Imports as a % of consumption	84%	71%
Exports as a % of output	36%	14%

Sources: MIDA
Department of Statistics

2. The local industry is dominated by small to medium-sized establishments with paid-up capital of less than $10.0 million. The distribution of companies by size of paid-up capital is as follows:

Paid-Up Capital	Number of Companies	Paid-Up Capital M$ million	Paid-Up Capital %
Less than M$5,000,000	5	$17.2	29.2%
M$5,000,000 - M$9,999,999	2	15.2	25.8
M$10,000,000 and above	2	26.5	45.0
Total	9	$58.9	100.0%

3. Majority of the companies in the sub-sector have foreign equity participation, ranging from 0.5% to 70% of their paid-up capital. The distribution of companies by ownership is given below:

Ownership	Number of Companies	Paid-Up Capital M$ million	Paid-Up Capital %
Malaysian majority	6	$45.0	76.4%
Foreign majority	3	13.9	23.6
Total	9	$58.9	100.0%

4. The industry is largely dependent on foreign technology, particularly from Japan and the United States. Indigeneous research and development activities, if and when they are undertaken, are confined to product modification to meet customers' requirements. The major sources of technology for each product group are:

Product	Source of Technology
PVC resins	Japan, Taiwan
PS resins	Japan, Taiwan
Amino and phenolic resins	USA, Norway, Japan, Sweden
Synthetic emulsions	USA
Alkyd resins	USA

5. Domestic production is geared primarily for local market demand. Respondent companies reported exporting a small proportion of their output to the following countries:

Product Group	Foreign Sales
PVC resins	Australia Singapore Thailand Philippines
PS resins	Singapore
Urea-formaldehyde and phenolic resins	Indonesia
Synthetic emulsions and alkyd resins	Hong Kong Taiwan Singapore Sri Lanka Middle East

However, downstream manufacturers using the above resins as inputs, notably the electrical, electronic and wood processing industries, may be export-oriented.

6. The sub-sector is highly dependent on imported petrochemical intermediates as raw material inputs. For this reason, majority of the plants are located close to port facilities in Province Wellesley, Selangor and Johore.

The major raw materials and their sources are:

Product Group	Major Raw Materials	Major Sources
PVC resins	VCM	USA, Norway, Japan
	DOP	USA, W. Germany, Japan
PS resins	SM	Japan, Australia
Urea-formaldehyde and phenolic resins	Methanol	Japan, Canada
	Urea	East Europe
	Phenol	Japan
	Caustic Soda	Local
Synthetic emulsions	VAM	USA
	Polyvinyl alcohol	Japan, Taiwan
	Acrylic monomer	W. Germany
Alkyd resins	Phthalic anhydride	Italy, Japan
	Soyabean and Linseed oil	Singapore

7. Domestic industries are protected from foreign competition by import tariffs. Locally manufactured products are generally uncompetitive in the absence of tariff protection because of relatively small plants which are unable to enjoy economies of scale, dependence on imported raw materials on which import duties and/or surtax are levied, and freight disadvantages.

7.4 PLASTICS AND RESINS - PERCEPTIONS OF RESPONDENT FIRMS

7.4.1 Current Industry Problems

General problems perceived by the industry are summarized in Table 7.6. The problems most frequently encountered are related to:

1. Small domestic market which does not justify investment in economic - size plants. Existing plants in Malaysia are relatively small and are unable to compete in the world market with larger plants which enjoy substantial economies of scale.

2. Limited export potential, due to availability of local production facilities in the neighbouring countries as well as high import tariffs imposed by these countries (except Singapore and Hong Kong).

3. Increasing domestic and foreign competition. Due to the size of the domestic market, there is a tendency for intense price competition. Respondents feel that the existing number of producers is adequate and additional licences should not be granted. Local producers are also facing difficulties with imports, particularly in the free trade zones where there is no tariff protection and in export-oriented industries where import duty drawback is granted to the end-user industries but not to the resin manufacturers supplying these industies.

4. Poor infrastructure for imports and exports, particularly port facilities and related services. Problems most frequently encountered are inadequate storage facilities (bulk terminals) and delays and difficulties with customs clearance. As a result, some companies prefer to unload their raw materials in Singapore. Multinational companies with plants located in Singapore also tend to export out of Singapore rather than from Malaysia.

Other problems reported by respondents include the following:

1. Difficulties with applications for import duty exemption and drawback. Most companies find the process too tedious and time-consuming.

2. Importation of VCM is subject to wide price fluctuations as well as higher costs due to relatively small volumes and high freight and storage costs. Local manufacturers face increasing competition from imported PVC, particularly from East Europe.

3. Amino and phenol resin manufacturers are currently faced with slower growth in the declining plywood industry in Malaysia as well as increasing competition in the Indonesian market. In addition, the price of local caustic soda (M$550 - M$600 per MT) used in production is higher than the world market price (about M$391, C & F) because of protection given to the local caustic soda industry. These manufacturers are also uncertain about the price of methanol from Sabah Gas Industries.

4. Shortage of technical and skilled workers, particularly Bumiputra chemists and chemical engineers as well as laboratory workers.

In general, energy costs and financing do not pose serious problems for the industry. However, while respondents considered the existing level of energy costs to be tolerable, a majority also indicated that such costs (particularly electricity) should not be increased as they are already among the highest in the ASEAN countries.

TABLE 7.6
PLASTICS AND RESINS:
PERCEIVED INDUSTRY PROBLEMS
(% OF RESPONDENTS)

Industry Problems	Not a Problem	Not Serious	Serious	Total
Raw Material Supply	62.5%	-	37.5%	100.0%
Government regulation	75.0	-	25.0	100.0
Small domestic market	12.5	25.0%	62.5	100.0
Domestic competition	50.0	-	50.0	100.0
Foreign competition	25.0	37.5	37.5	100.0
Cost of energy	37.5	62.5	-	100.0
Trade barriers in foreign markets	37.5	12.5	50.0	100.0
Shortage of labour/skills	62.5	-	37.5	100.0
Availability of financing	75.0	12.5	12.5	100.0
Infrastructure	37.5	12.5	50.0	100.0

Source: SGV-KC Field Survey

7.4.2 Effectiveness of Regulatory Framework

Responses of the companies surveyed with regard to the impact of the regulatory framework on the development of the industry are summarized in Table 7.7.

TABLE 7.7
PLASTICS AND RESINS:
EFFECTIVENESS OF REGULATORY FRAMEWORK
(% OF RESPONDENTS)

Regulatory Framework	No Response	No Effect	Favourable	Adverse	Total
Industrial Coordination Act, 1975	12.5%	37.5%	25.0%	25.0%	100.0%
New Economic Policy	12.5	37.5	25.0	25.0	100.0
Petroleum Development Act, 1974	12.5	75.0	0.0	12.5	100.0
Environmental Quality Act, 1974	12.5	25.0	12.5	50.0	100.0
Investment Incentives	12.5	37.5	50.0	0.0	100.0

Source: SGV-KC Field Survey

The Industrial Coordination Act, 1975, is viewed by the majority of respondents as having little or no impact on the industry. Favourable responses cited the Act as being effective in minimizing the risk of over-capacity and protecting existing manufacturers against undue competition. Unfavourable responses emphasized the delays involved and restrictive conditions that may be imposed by the manufacturing licence.

Wholly Malaysian-owned companies and companies already complying with the New Economic Policy generally regard the policy as favourable or having no effect in the industry. However, the following points were raised:

1. Companies required to restructure should be given time to do so, particularly if the equity involved is substantial.

2. Implementation of the policy should take into consideration the industry's dependence on foreign technology.

Although majority of the respondents view the Environmental Quality Act, 1974, unfavourably in that additional costs have to be incurred in meeting the requirements of the Department of Environment, there is a general concensus that the conditions imposed are reasonable and necessary.

A high proportion (50%) of the respondent firms were granted pioneer status. However, the industry is generally unable to meet the requirements for other incentives such as labour utilization relief, locational incentives or export incentives.

The Petroleum Development Act, 1984 has no significant impact on the plastics and resins sub-sector.

7.4.3 Industry Prospects

Existing polystyrene resin producers expect domestic demand for their products to be fast growing, expanding at an average rate of 17% to 18% over the next five years. As such, capacity expansion will be undertaken over the period. Polyvinyl chloride resin producers project growth in demand over the next five years to be in the region of 5% to 8% per annum. The industry is expected to remain oriented towards domestic demand with limited export possibilities.

The following market segments and products were identified as potential areas for future development of the plastics industry in Malaysia:

Market Prospects:

1. Plastic parts for the automotive industry
2. Toy manufacture
3. Electronic packaging
4. Building materials

Product Prospects:

1. Expandable polystyrene
2. Polyethylene
3. Polypropylene
4. Melamine
5. Acrylonitrile - butadiene - styrene

Expandable polystyrene is expected to be locally produced by 1986. The production of other resins and backward integration, however, are considered to be largely dependent on the development of the primary petrochemical industry in Malaysia.

Malaysian producers of synthetic emulsions expect a steady growth in demand of 10% per annum over the next five years. The bulk of output will be used for the manufacture of emulsion paints although other potential end-users include the carpet, leather finishing and building materials industries. Exports of synthetic emulsions are expected to remain insignificant.

Respondents project demand for alkyd resins to grow at 10% per annum over the next five years. Quality improvements and production of alkyds for metal coatings and industrial paints are also expected.

Respondents who are producers of amino and phenolic resins indicated that over the next five years, there will be decreasing emphasis on adhesives for plywood and increasing emphasis on phenolic resins for other industrial uses such as foundry moulds, brake lining and grinding wheels.

7.5 PLASTICS AND RESINS - PRODUCTION ASPECTS

7.5.1 Production Capacity and Utilization

Total installed production capacity of the major plastics and resins companies as at August 1984 is shown in Table 7.8.

TABLE 7.8
PLASTICS AND RESINS:
TOTAL PRODUCTION CAPACITY IN MALAYSIA
1984

Product	Rated Capacity (In MT per annum)
PVC resins	30,000
PS resins	15,300
Amino and phenolic resins	44,100 (Formaldehyde) 45,800 (100% resin)
Synthetic emulsions	11,000
Alkyd resins[1]	14,400

[1] Including ICI Paints (Malaysia) Sdn. Bhd.
Source: SGV-KC Field Survey

Total production and overall capacity utilization in the sub-sector have shown steady increase over the past decade (See Table 7.9). Ex-factory sales value (in 1972 constant prices) increased at an average rate of 19.2% per annum to reach M$80.8 million (M$182.4 million at current prices) in 1981. Significant improvement was registered in capacity utilization, which increased from 34% in 1973 to 80% in 1981.

TABLE 7.9
PLASTICS AND RESINS:
PRODUCTION AND CAPACITY UTILIZATION
1973 - 1981

Year	Ex-Factory Sales Value (M$ '000)	Capacity Utilization
1973	$27,832	34%
1974	24,114	31
1975	54,094	50
1976	58,552	57
1977	59,351	62
1978	61,388	72
1979	68,586	82
1980	69,306	78
1981	80,814	80
Average Annual Growth Rate, 1973 - 1981	19.2%	

1 Expressed in 1972 constant prices
Source: MIDA

Output volumes and capacity utilization over the past two years are summarized in Table 7.10.

TABLE 7.10
PLASTICS AND RESINS:
PRODUCTION AND CAPACITY UTILIZATION BY PRODUCT
1982 AND 1983

Product	Production (MT) 1982	Production (MT) 1983	Capacity Utilization 1982	Capacity Utilization 1983
PVC resins	22,100	21,600	92%	90%
PS resins	5,453	7,985	68	86
Amino and phenolic resins	29,500	30,350	66	67
Synthetic emulsions	7,000	7,500	64	68
Alkyd resins[1]	8,300	8,500	80	59

1 Including ICI Paints (Malaysia) Sdn. Bhd.

Source: SGV-KC Field Survey

7.5.2 Raw Materials

The main raw materials used in the local production of plastics and resins as well as major sources and estimated volumes purchased in 1983 are shown in Table 7.11.

TABLE 7.11
PLASTICS AND RESINS:
RAW MATERIAL INPUTS

Product	Raw Material	Source	Estimated Volume Purchased in 1983
PVC resins	VCM	USA, Japan, Norway	22,000MT
	DOP	USA, W. Germany, Japan	1,400MT
PS resins	SM	Japan, Australia	8,000MT
	SBR	Japan	325MT
Amino and phenolic resins	Methanol	Japan, Canada	17,000MT
	Urea	E. Europe	14,000MT
	Phenol	Japan	3,500MT
	Caustic soda (100%)	Local	2,200MT
Synthetic emulsions	Vinyl acetate monomer	USA	4,400MT
	Acrylic monomer	W. Germany)	Small amounts
	Polyvinyl alcohol	Japan, Taiwan)	
Alkyd resins[1]	Phthalic anhydride	Italy, Japan	1,200MT
	Soyabean and linseed oil	Singapore	not available

[1] Including ICI Paints (Malaysia) Sdn. Bhd.

Source: SGV-KC Field Survey

Domestic producers are highly dependent on imported raw materials and intermediates. As such, problems relating to raw material supply are focused on importation. Table 7.12 reflects the opinions of survey respondents on this issue.

TABLE 7.12
PLASTICS AND RESINS:
PERCEIVED RAW MATERIAL SUPPLY PROBLEMS
(% OF RESPONDENTS)

Problem Areas	Domestic Supply	Imported Supply
Excessive price fluctuations	-	50.0%
Irregular supply	-	25.0
Port facilities	-	62.5
Transportation services	12.5%	12.5
Customs clearance	-	37.5
No problems	87.5	12.5

Source: SGV-KC Field Survey

A high proportion of respondents expressed dissatisfaction with existing port facilities in Malaysia. Storage facilities are lacking for vinyl chloride monomer and styrene monomer. In addition, the frequency of vessels calling at Malaysian ports is unsatisfactory and raw material prices quoted for Malaysian ports are higher than for Singapore. Congestion and additional costs incurred due to delays are other problems related to port facilities.

Dependence on imports also subject local producers to price fluctuations in the world market. Oil and gas prices directly affect prices of raw material inputs. As such, the polyvinyl chloride and polystyrene manufacturers reported losses in 1973/74 as a result of the oil crisis.

Some respondents also encounter delays with customs clearance, but problems with regularity of supply and transportation are not common. None of the respondents mentioned problems with product quality or financing of imports.

7.5.3 Production Cost Structure

The domestic production cost structure for selected plastics is presented in Table 7.13.

TABLE 7.13
PLASTICS AND RESINS:
PRODUCTION COST STRUCTURE

Cost Item	PVC Resins	Polystyrene[1]	Urea and Phenol Formaldehyde	Synthetic Emulsion[2]
Direct Labour	6.5%	3.5%	10.0%	4.0%
Direct Material	80.5	87.0	75.0	87.5
Local	1.0	0.9	15.0	4.0
Imported	79.5	86.1	60.0	83.5
Manufacturing Overhead	13.0	9.5	15.0	8.5
Energy	5.7	4.0	5.0	1.8
Depreciation	2.4	2.0	3.2	2.0
Repair and maintenance	2.4	1.0	1.0	1.0
Other	2.5	2.5	5.8	3.7
Total	100.0%	100.0%	100.0%	100.0%

1 General purpose polystyrene
2 Homopolymer

Source: SGV-KC Field Survey

Survey findings indicate that:

1. Raw material outlays are the decisive component in the industry's production cost, representing 80% to 90% of these costs in most cases. Imported materials account for 80% to 100% of direct material cost. Formaldehyde resins have the highest proportion of local raw material content while thermoplastic resins have the lowest. Fluctuations in the prices of major raw materials have significant impact on the overall cost structure presented. Changes in raw material productioin costs are determined basically by the movement of oil and gas prices.

2. Production processes are generally not energy intensive. Energy costs are the lowest for synthetic emulsion production and the highest for polyvinyl chloride resins. The main sources of energy are electricity and fuel oil.

3. Direct labour is not a major cost item in this sub-sector, accounting for less than 10% of total product cost for most products.

4. Depreciation, repair and maintenance, packaging and other costs are insignificant in relation to total production costs.

7.6 PLASTICS AND RESINS - MARKETING ASPECTS

7.6.1 Market Segments

Table 7.14 focuses on sales of the plastics and resins sub-sector to other industries both in the domestic market and abroad.

TABLE 7.14
PLASTICS AND RESINS:
INTER-INDUSTRY LINKAGES

Product	Market Segments	% of Total Sales Volume, 1983
PVC resins	PVC pipe	45
	Wire and cable	25
	Vinyl sheet	10
	Bottles, shoes, other	15
	Export	5
PS resins	Electrical products	60
	Cassettes and cartridges	15
	Housewares, toys, other	20
	Export	5
Amino and phenolic resins	Plywood mills	70
	Particle board, foundries, laminates, other	10
	Export	20
Synthetic emulsions	Paints	75
	Adhesive, textile, other	25
	Export	negligible
Alkyd resins	Paints	90
	Inks, other	5
	Export	5

Source: SGV-KC Field Survey

Most of the companies concentrate their marketing activities on the domestic market, with export sales amounting to 3% to 5% of total sales. Only one of the formaldehyde resin manufacturers is exporting a significant amount of urea formaldehyde to Indonesia.

The fabrication of vinyl pipe is the major end-use for PVC resin in Malaysia, accounting for about 45% of total sales volume in 1983. The second most important use for polyvinyl chloride is wire and cable insulation. Other significant applications are vinyl sheet used in laminations, profiles, blow-moulded vinyl bottles and footwear.

Polystyrene resins are mainly incorporated into television and radio cabinets as well as electrical or industrial housings and parts. About 5% of annual sales volume was exported to Singapore in 1983.

The plywood industry is the major end-user of formaldehyde resins in Malaysia. However, with the expected decline of the plywood industry, manufacturers have gone into production of resins for other industrial uses such as foundries, insulation materials (rockwool), paper and other laminates. Todate, these end-users remain small in relation to the plywood mills. A significant amount of urea-formaldehyde was also exported to Indonesia. However, this market segment is expected to decline in the face of increasing competition from newly established plants in Indonesia.

Synthetic emulsions and alkyd resins are used primarily in paint manufacture. Other end-users are relatively insignificant.

7.6.2 Key Marketing Variables

Key marketing variables indicated by respondents ranked in order of importance are as follows:

TABLE 7.15
PLASTIC AND RESINS:
KEY MARKETING VARIABLES

Key Variables	% of Respondents
1. Direct/personal relationships with customers	75.0
2. High/consistent product quality	62.5
3. Price competitiveness	62.5
4. Experienced sales force	50.0
5. Established market position	37.5
6. Technical back-up capability	37.5
7. Availability of good distributors	12.5
8. Location (proximity to markets)	12.5

Source: SGV-KC Field Survey

Respondents believe that personal relationships with customers, product quality and price competitiveness are the most essential considerations in marketing efforts. As such, all companies in the industry adopt a direct selling approach for their larger domestic and foreign customers. An experienced sales force, well established market position and technical back-up capability are also considered important since products have to meet customer specifications. The need for dual or multiple-sourcing has also been cited as a major factor influencing customer purchases in this sub-sector where the number of companies supplying each product is limited.

The most frequently mentioned reasons for not tapping potential export markets were:

1. Lack of price competitiveness

2. Markets are defined by parent or associated companies as a matter of policy

Location, distributors, advertising and promotion are not considered important marketing variables for products in this sub-sector.

7.6.3 Product Pricing

Survey findings indicate that producers adopt a competitive pricing policy where there are local competitors for their products. Producers also have to keep their prices competitive with those of imported substitutes.

For products where there is only one local producer there is a tendency to apply cost-plus pricing. This is the case with polystyrene, alkyd resins and some of the phenolic and melamine-formaldehyde resins.

Where tariff protection is given, prices are generally maintained just below that of imported substitutes. In some cases, such as polyvinyl chloride resins, producers are able to price their products slightly above that of imported substitutes due to their ability to supply small quantities, reduce lead times and storage costs, as well as to offer more attractive credit terms.

A comparison of selling prices for selected locally produced and imported products is given in Table 7.16.

TABLE 7.16
PLASTICS AND RESINS:
COMPARATIVE PRICES
(IN M$ PER MT)

Product	Prices of Local Output		Prices of Imported Product	
	Domestic	Export	CIF	Landed
PVC resins	$ 1,900	$1,400 - 1,500[2]	$ 1,300	$ 1,700
PS resins				
General purpose polystyrene	2,750	2,250 - 2,350[3]	2,100	2,885
High impact polystyrene	2,950	2,450 - 2,550[3]	2,230	3,051
Amino and phenolic resins				
Urea-formaldehyde (50%)[1]	630 - 700	1,400[4] (100%)	-	-
Phenol-formaldehyde (40%)[1]	940 - 1,100	no exports	-	-
Phenolic resins (100%)	3,600 - 4,800	no exports	3,400 - 4,300	3,600 - 4,500
Synthetic emulsions				
Homopolymer	1,700 - 1,900	1,550 - 1,750[3]	1,440 - 1,600	1,800 - 2,000
Copolymer	1,800 - 2,000	1,530 - 1,700[3]	1,500 - 1,700	1,900 - 2,100
Full acrylic	2,300 - 2,800	2,070 - 2,520[3]	1,900 - 2,350	2,300 - 2,800
Alkyd resins	2,700 - 2,950	2,300 - 2,510[3]	2,160 - 2,400	2,670 - 2,900

1 Refer to adhesives for plywood. Only small amounts are imported (powdered and liquid) at prices similar to domestic prices.
2 CIF Australia
3 To Singapore
4 Fob Indonesia

Source: SGV-KC Field Survey

Export prices depend largely on world market prices for the products, but are generally 10% to 20% lower than domestic prices. Prices of local products for end-users in the free trade zones are also lower than domestic prices in order to remain competitive with imports. For polystyrene resins, prices for free trade zone end-users are about 15% lower than domestic prices.

Landed prices of imported polystyrene resins are generally higher than domestic prices, while landed prices for imported alkyd resins and polyvinyl chloride tend to be lower than domestic prices. For synthetic resins, urea and phenol-formaldehyde, prices of domestic products and imported substitutes are similar.

7.6.4 Distribution Methods

Three-fourths (75%) of the respondents distribute their products directly to end-users while the remaining (25%) channel 10% to 30% of their sales through appointed distributors. This is necessitated by the need to meet customer specifications.

7.7 PLASTICS AND RESINS - FINANCIAL ASPECTS

7.7.1 Ownership and Capital Structure

The ownership profile and capital structure of the major companies in this sub-sector are shown in Table 7.17. Ownership of the major firms in the sub-sector may be summarised as follows:

Ownership	Paid-Up Capital (M$ million)	% Participation in Equity				
		BU	NBU	G	F	Total
100% Malaysian	$ 3.5	1.8%	4.1%	-	-	5.9%
Malaysian majority	41.5	21.7	34.9	-	13.9	70.5
Foreign majority	13.9	2.8	1.4	3.6	15.8	23.6
100% foreign	-	-	-	-	-	-
Total	$58.9	26.3%	40.4%	3.6%	29.7%	100.0%

TABLE 7.17
PLASTICS AND RESINS:
OWNERSHIP AND CAPITAL STRUCTURE

Company	Major Products	% of Total Paid-Up Capital: Malaysian Bumiputra	Malaysian Non-Bumiputra	Malaysian Government	Foreign	(In M$ Million) Paid-Up Capital	Total Loans (1973/84)	Source of Foreign Equity
Industrial Resins (Malaysia) Sdn. Bhd.	PVC resins and compounds	55.0	27.0	-	18.0	$10.0	$10.1	Various
Malayan Electro-Chemical Industry Co. Sdn. Bhd.	PVC resins and compounds	10.0	55.0	-	35.0	4.9	-	Japan
Petrochemicals (Malaysia) Sdn. Bhd.	PS resins	10.0	41.0	-	49.0	2.0	5.5	Japan
Polystyrene Sdn. Bhd.	PS resins	30.0	70.0	-	-	3.5	7.0	-
Malayan Adhesives & Chemicals Sdn. Bhd.	Amino and phenolic resins	10.0	45.0	-	45.0	8.0	-	Japan
Borden Chemicals Sdn. Bhd.	Amino and phenolic resins	18.1	15.9	-	66.0	4.3	7.1	USA
Norsechem (M) Sdn. Bhd.	Amino and phenolic resins	35.6	63.9	-	0.5	16.5	-	Singapore
Revertex Malaysia Sdn. Bhd.	Natural rubber latex Concentrates and compounds, Synthetic emulsions, alkyd resins	-	-	30.0	70.0	7.2	-	United Kingdom
Union Polymers Sdn. Bhd.	Synthetic emulsions	36.0	4.0	-	60.0	2.5	2.1	USA
ICI Paints (Malaysia) Sdn. Bhd.	Paints, Alkyd resins	30.0	-	-	70.0	10.0	6.7	United Kingdom

Source: SGV-KC Field Survey
Financial Statements of Companies

Four of the nine major firms in the industry have majority foreign ownership. Foreign equity participation in these companies range from 60% to 70%, accounting for 15.8% of the total paid-up capital of the nine firms. They are American and British-owned and include one company whose principal activities is natural rubber latex concentrates and compounds rather than resins.

The five companies with majority Malaysian ownership are mainly Malaysian-Japanese joint ventures. Foreign participation in these companies ranges from 0.5% to 49% and account for 13.9% of the total paid-up capital of all the companies. On the whole, foreign equity participation in the industry is about 29.7%.

Bumiputra ownership in the industry is about 26.3%. Eight of the nine companies have some form of Bumiputra equity participation, ranging from 18.1% to 55% of their paid-up capital. Of these, four have Bumiputra shareholdings of 30% and above. Government institutions and agencies have insignificant shareholdings in the industry. Non-Bumiputra Malaysians account for the highest percentage of shareholdings.

7.7.2 Sources of Funds

Respondents indicated that overdrafts, term loans, equity and retained earnings have been used to finance capital expenditures. For operating expenditures, overdrafts, short-term loans (bankers' acceptances), and suppliers' credit are most commonly used.

7.7.3 Sales Turnover and Profitability

Table 7.18 provides an indication of sales trends and profitability of companies in this sub-sector over the past three years for the following major product groups: polyvinyl chloride resins, polystyrene resins, and amino and phenolic resins.

Synthetic emulsions and alkyd resins have not been included in the analysis for the following reasons:

1. The leading producer of emulsions and alkyds has substantial operations in other product lines. Financial data may not adequately reflect performance of the products under study.

2. The only other company producing emulsions commenced operations only in 1980. Financial performance over its initial years was poor and not considered to be indicative of normal operations.

TABLE 7.18
PLASTICS AND RESINS:
SALES TURNOVER AND PROFITABILITY
1981 - 1983

	PVC Resins[1]	PS Resins	Amino and Phenolic Resins
Total Sales Turnover (M$ million)			
1981	$51.8	$18.1	$54.1
1982	39.9	15.1	53.3
1983	47.8	20.0	60.1
Average Return on Sales			
1981	25.7%	0.9%	9.3
1982	18.7	(2.0)	14.7
1983	16.0	5.1	17.8
Average Return on Total Assets			
1981	27.7%	1.6%	15.9
1982	15.5	(2.6)	21.3
1983	13.9	8.0	22.0

[1] Includes compounding operations of the resin manufacturers

Source: SGV-KC Field Survey

Growth in sales value was registered by all product groups except polyvinyl chloride. Consequently, overall profitability of the polyvinyl chloride manufacturers declined severely over 1981 - 83. These manufacturers identified depressed sales prices, increasing raw material cost and competition from imported resins as the main reasons for erosion of profits. Nonetheless, the returns on sales and total assets reported by these companies are among the highest in the industry for the three year period. Average margins earned in 1983 remained at satisfactory levels.

Polystyrene manufacture exhibits one of the lowest profit margins in the industry, with return on sales averaging only 1.6% over the past three years.

7.8 PLASTICS AND RESINS - EMPLOYMENT ASPECTS

7.8.1 Workforce Size and Productivity

Employment and labour productivity in the plastics and resins sub-sector from 1973 to 1981 are presented in Table 7.19.

TABLE 7.19
PLASTICS AND RESINS
WORKFORCE SIZE AND PRODUCTIVITY

Year	Output[1] (M$ '000)	Number of Employees	Output per Employee (M$ '000)
1973	$27,832	433	$ 64.3
1974	24,114	357	67.5
1975	54,094	464	116.6
1976	58,552	580	100.9
1977	59,351	n.a.	n.a.
1978	61,388	476	129.0
1979	68,586	444	154.5
1980	69,306	n.a.	n.a.
1981	80,814	512	157.8

[1] Ex-factory sales value in 1972 constant prices
Source: MIDA

The total number of workers employed in the industry did not increase significantly from 1973 to 1981. However, substantial improvement in labour productivity over the period was brought about by increasing capacity utilisation in the plants.

Total employment by the sub-sector as at August 1984 is estimated to be 728, broken down by product as follows:

Product	Number of Employees
PVC resins[1]	250
PS resins	99
Amino and phenolic resins	300
Synthetic emulsions	55
Alkyd resins	24
Total	728

1 Includes resin producers' compounding operations
Source: SGV-KC Field Survey

7.8.2 Functional and Ethnic Composition of Workforce

An analysis of functional and ethnic composition of the workforce is given in Tables 7.20 and 7.21.

TABLE 7.20
PLASTICS AND RESINS:
LABOUR FORCE COMPOSITION BY FUNCTIONAL CATEGORY

Category	% of Work Force Low	High	Average
Administrative, Finance and Managerial	3.3%	15.5%	8.3%
Professional, Technical and Related Workers	5.2	30.0	12.6
Production and Related Workers	50.9	64.1	59.3
Sales Workers	0.0	6.7	1.6
Clerical and Related Workers	5.7	12.2	7.6
Service Workers and General Labour	6.7	22.6	10.6

Source: SGV-KC Field Survey

TABLE 7.21
PLASTICS AND RESINS:
LABOUR FORCE COMPOSITION BY RACE

Category	% of Work Force			
	Bumiputra	Non-Bumiputra	Foreigner	Total
Administrative, Finance and Managerial	16.0%	80.0%	4.0%	100.0%
Professional, Technical and Related Workers	26.3	69.7	4.0	100.0
Production and Related Workers	65.6	34.4	-	100.0
Sales Workers	10.0	90.0	-	100.0
Clerical and Related Workers	34.8	65.2	-	100.0
Service Workers and General Labour	81.3	18.7	-	100.0
Overall	55.0	44.2	0.8	100.0

Source: SGV-KC Field Survey

About 59.3% of the workers employed are production and related workers, comprising mainly production in shift supervisors and skilled and semi-skilled process operators. The second largest category of workers is the professional and technical category, accounting for 12.6% of total workforce. This category covers the chemists, engineers, laboratory workers and the engineering/maintenance technicians. Service and general workers which include packers, cleaners and security workers account for 10.6% of total workforce while managerial and clerical workers account for 8.3% and 7.6%, respectively. Only a small number of employees is engaged in sales activities in the companies surveyed (average of 2 persons per company).

Overall racial composition of the workforce reflects that of the Malaysian population. Employment of Bumiputra workers, however, is concentrated in two categories:

1. Production and related workers.

2. Service workers and general labour.

Employment of Bumiputra in other categories is generally low.

7.8.3 Technical Job Classification and Wage Structure

Table 7.22 shows the technical jobs most commonly found in the plants and the corresponding qualification requirements and wage structure.

TABLE 7.22
PLASTICS AND RESINS:
TECHNICAL JOB CLASSIFICATION AND WAGE STRUCTURE

Job Category	Qualification	Monthly Wage Range[1]
1. Production		
o Plant/Factory Manager	Degree in Mechanical or Chemical Engineering	$3,250-6,240
o Production/shift Supervisor	Experience only	780-1,300
o Process Operator	MCE or experience	520-780
o Unskilled Workers	None	364-550
2. Engineering/Maintenance		
o Mechanical Engineer	Degree in Mechanical Engineering	1,820-3,770
o Electrical Engineer	Degree in Electrical Rngineering	1,820-3,770
o Boilerman	Skilled	845-1,300
o Fitter	Skilled	910-1,040
o Chargeman/Wireman	Certificate	845-1,690
o Electrician	Semi-skilled	390- 650
3. Laboratory		
o Chemist	Degree in Chemistry	1,300-1,950
o Laboratory Assistant/ Technician	MCE/STP with science background	390-1,040
4. Technical Services		
o Chemical Engineer	Degree in Chemical Engineering	1,820-3,770
o Wood Technologist[2]	Degree in Wood Technology	1,300-2,000

1 Includes benefits
2 Only in the amino and phenolic resins plants

Source: SGV-KC Field Survey

A large proportion of the workforce in this sub-sector is skilled due to a high degree of automation in the production processes. Most of the positions in the production and technical categories require qualified engineers, chemists and skilled workers. However, due to the small number of firms in the industry, companies have to employ process operators without prior experience. Although academic requirements for process workers were low in the past, companies are showing an increasing tendency to employ workers with at least the Malaysian Certificate of Education. No significant differences in wage levels were found among the different plants interviewed in various regions of the country.

7.8.4 Labour Supply Situation

The following labour shortages were reported by survey respondents:

TABLE 7.23
PLASTICS AND RESINS:
LABOUR SHORTAGES

Job Category	% of Respondents	Location
Managers and Engineers (Bumiputra)	75.0%	All
Process Operators	25.0	Seremban, Province Wellesley
Maintenance Technicians (skilled)	25.0	Chembong, Johore Bahru
Laboratory Assistants	25.0	Chembong, Johore Bahru
Engineers	12.5	Chembong, Johore Bahru
Clerical Workers	12.5	Shah Alam

Source: SGV-KC Field Survey

On the whole, the industry does not face serious labour shortages in any job category. Shortages are confined mainly to production and technical workers and are reported mainly by respondents in Chembong and Johore Bahru. However, a shortage of Bumiputra engineers and managers was indicated by most respondents.

The major commonly cited causes of labour shortage are:

1. Poor transportation services
2. Inadequate housing facilities
3. Isolated location

A large majority (87.5%) of the respondent firms indicated having no problems with labour apart from supply.

7.8.5 Training

Most of the respondents indicated providing only on-the-job training for process operators and non-supervisory staff. In-house training programs are seldom used, but supervisors and managers are sent for courses at local institutions. Managers, engineers and technical service personnel are also provided training by foreign principals. Training in foreign institutions is generally not practiced. Table 7.24 summarizes the training provided by the industry.

TABLE 7.24
PLASTICS AND RESINS:
TRAINING PROVIDED BY THE INDUSTRY
(% OF RESPONDENTS)

	Job Category			
Type of Training	Managerial	Technical	Supervisory	Non-Supervisory
On-the-job only	12.5%	62.5%	50.0%	100.0%
In-house	-	-	12.5	-
Local institution	37.5	-	37.5	-
Foreign institution	-	-	-	-
Foreign principal	50.0	37.5	-	-
	100.0%	100.0%	100.0%	100.0%

Source: SGV-KC Field Survey

7.9 DEMAND ANALYSIS

7.9.1 Historical Demand

Apparent demand for petrochemical products based on official statistics is presented in Tables 7.25 and 7.26 for:

1. Petrochemical building blocks and intermediates, and

2. Plastics and resins

In the absence of local production, apparent consumption of petrochemical building blocks and intermediates represent net imports of these products into Malaysia. Apparent consumption increased at an average rate of 9.5% per annum from 1973 to 1981 although it can be seen from Table 7.25 that net imports fluctuate considerably from year to year.

Domestic consumption of plastics and resins is much higher than petrochemical building blocks and intermediates in terms of value. Rate of growth in apparent consumption of plastics and resins over 1973 - 81 is similar to that for petrochemical building blocks and intermediates, at 9.8% per annum on the average.

Table 7.26 indicates that on the whole, steady growth in apparent consumption of plastics and resins was recorded throughout the period, except for a decline in 1974 as a result of the first oil crisis. Slower growth was also experienced from 1979 to 1981 due to recessionary pressures. The bulk of domestic requirements was met by importation although local production of plastics and resins increased at a faster rate than importation over the period. Exports of plastics and resins are relatively insignificant and have not grown appreciably over the period.

TABLE 7.25
PETROCHEMICAL BUILDING BLOCKS AND INTERMEDIATES:
APPARENT CONSUMPTION, 1973 - 1981
(M$ MILLION IN 1981 CONSTANT PRICES)

Year	Imports	Local Production	Re-Exports	Apparent Consumption
1973	$136.9	-	$5.4	$131.5
1974	164.7	-	3.6	161.2
1975	135.7	-	4.3	131.4
1976	202.4	-	3.8	198.6
1977	197.9	-	4.1	193.8
1978	229.3	-	4.6	224.7
1979	277.4	-	4.7	272.7
1980	284.0	-	3.5	280.4
1981	285.7	-	13.0	272.7
Average Annual Growth Rate	9.6%		11.6%	9.5%

Source of basic data: Department of Statistics

TABLE 7.26
PLASTICS AND RESINS:
APPARENT CONSUMPTION, 1973 TO 1981
(M$ MILLION IN 1981 CONSTANT PRICES)

Year	Imports	Local Production	Exports	Apparent Consumption	Output as a % of Consumption	Imports as a % of Consumption	Exports as a % of Output
1973	$211.9	$ 62.8	$22.3	$252.3	25	84	36
1974	186.1	54.4	23.2	217.3	25	86	43
1975	148.7	122.1	16.3	254.5	48	58	13
1976	229.2	132.1	18.4	342.9	39	67	14
1977	264.7	134.0	19.2	379.5	35	70	14
1978	307.9	138.6	21.2	425.2	33	72	15
1979	388.6	154.7	20.6	522.4	30	74	13
1980	399.6	156.5	26.5	529.7	30	75	17
1981	375.5	182.4	25.9	532.0	34	71	14
Average Annual Growth Rate	7.4%	14.2%	1.9%	9.8%			

Sources of basic data: Department of Statistics
MIDA

Malaysian demand for selected petrochemicals over the past five years in terms of volume is summarized in Table 7.27.

TABLE 7.27
PETROCHEMICAL PRODUCTS:
DOMESTIC DEMAND FOR SELECTED PETROCHEMICALS
1979 - 1983

Product	In '000 MT					Average Annual Growth Rate (%)
	1979	1980	1981	1982	1983	
Petrochemical Building Blocks and Intermediates:						
Methanol	15.0	14.0	15.0	18.0	19.0	6.1
Vinyl Chloride	21.0	21.0	22.4	23.4	23.0	2.3
Styrene	8.5	7.5	6.5	5.5	8.0	(1.5)
Ethylene Glycol	10.0	12.0	12.0	12.0	12.0	4.7
Vinyl Acetate	3.0	3.0	3.5	4.0	4.4	10.0
Plastics and Resins:						
LDPE	34.0	29.0	27.0	33.0	39.0	3.5
HDPE	19.0	20.0	20.0	25.0	29.0	11.2
PP	23.5	23.8	23.0	26.0	30.0	6.3
PVC	22.0	22.0	21.0	22.0	27.0	5.3
PS	6.0	7.5	8.4	9.5	13.0	21.3
Polyvinyl Acetate	5.0	5.0	5.5	6.5	7.3	9.9

Source: SGV-KC Field Survey

Domestic demand for most petrochemicals was dampened by worldwide recession over the last several years, particularly during 1979 - 81, following the second oil crisis. In 1983, however, the industry showed signs of an upturn as the demand for most products increased sharply during the year.

Analysis of demand by end-use for the major petrochemical products is presented below.

(a) Methanol

Malaysian methanol demand in the past was keyed primarily to the growth of the forest products industry and its corresponding demand for formaldehyde resins. About 85 - 90% of methanol usage is for formaldehyde production, the balance for solvent and other miscellaneous chemical applications, as can be seen from Table 7.28.

TABLE 7.28
PETROCHEMICAL PRODUCTS:
METHANOL DEMAND BY END-USE SEGMENT
1979 AND 1983

	1979		1983	
End-use Segments	'000MT	% Share	'000MT	% Share
Formaldehyde	13.0	86.7	17.0	89.5
Other	2.0	13.3	2.0	10.5
Total	15.0	100.0	19.0	100.0

Source: SGV-KC Field Survey

(b) Vinyl Chloride

Vinyl chloride monomer is imported solely for the production of polyvinyl chloride resins. Demand for vinyl chloride stagnated at about 21,000 - 23,000MT per annum over the past few years as local production of polyvinyl chloride was affected by poor market conditions as well as the availability of cheap imported resins.

(c) Styrene

Demand for styrene monomer is directly related to domestic production of polystyrene. As such, imports of styrene have declined over 1979 - 82 as a result of declining production volumes.

(d) Ethylene Glycol

The only end-use for ethlylene glycol is as an intermediate in the production of polyester staple fibre by Penfibre (M) Sdn. Bhd. in Penang. The company has been operating at full capacity for the past few years and its demand for ethylene glycol has remained at 12,000MT per annum.

(e) Vinyl Acetate

Malaysian demand for vinyl acetate is small, amounting to 4,400MT in 1983. Essentially, vinyl acetate is used in the production of polyvinyl acetate emulsions for latex paints, adhesives and other coatings, with paints accounting for the bulk of its usage.

(f) Low Density Polyethylene

The composition of low density polyethylene demand in Malaysia is shown in Table 7.29. Low density polyethylene is essentially used to manufacture film products for the domestic market, although a number of the larger producers also manufacture plastic bags for export.

TABLE 7.29
PETROCHEMICAL PRODUCTS:
LDPE DEMAND BY END-USE SEGMENT
1979 AND 1983

	1979		1983	
End-use Segments	'000MT	% Share	'000MT	% Share
Film	30.0	88.2	33.5	85.9
Wire and cable	2.0	5.9	3.0	7.7
Injection moulding and liminating	2.0	5.9	2.5	6.4
Total	34.0	100.0	39.0	100.0

Source: SGV-KC Field Survey

Domestic consumption of low density polyethylene increased only marginally over the past five years as a result of poor market conditions both at home and abroad. In addition, the introduction of linear low density polyethylene in recent years has also enabled film producers to reduce the thickness of the film appreciably.

(g) High Density Polyethylene

The main domestic applications for high density polyethylene are film, blow moulding and injection moulding, which together account for more than 80% of demand for the product. End-products are primarily for domestic consumption.

TABLE 7.30
PETROCHEMICAL PRODUCTS:
HDPE DEMAND BY END-USE SEGMENT
1979 AND 1983

	1979		1983	
End-use Segments	'000MT	% Share	'000MT	% Share
Film	7.0	36.8	11.5	39.6
Blow-moulding	5.0	26.3	7.5	25.9
Injection-moulding	3.0	15.8	6.0	20.7
Netting, pipe and other	4.0	21.1	4.0	13.8
Total	19.0	100.0	29.0	100.0

Source: SGV-KC Field Survey

(h) Polypropylene

Domestic consumption of polypropylene amounted to 30,000MT in 1983. The manufacture of slit film for use in woven shipping bags, film for packaging and injection moulding are the leading applications for polypropylene. Growth in usage of polypropylene for woven bags and film, however, has been low, while moulding has become increasingly important.

TABLE 7.31
PETROCHEMICAL PRODUCTS:
POLYPROPYLENE DEMAND BY END-USE SEGMENT
1979 AND 1983

End-use Segments	1979 '000MT	1979 % Share	1983 '000MT	1983 % Share
Woven bags	9.5	40.5	11.0	36.7
Film	6.0	25.5	6.0	20.0
Injection moulding	4.0	17.0	8.0	26.7
Others	4.0	17.0	5.0	16.6
Total	23.5	100.0	30.0	100.0

Source: SGV-KC Field Survey

(i) Polyvinyl Chloride

Table 7.32 provides a breakdown of the major end-uses for polyvinyl chloride resins. The fabrication of PVC pipe is the major end-use, accounting for about 46% of demand in 1983. The second most important application is wire and cable insulation. Other significant uses are vinyl sheets used in laminations, vinyl bottles and footwear.

TABLE 7.32
PETROCHEMICAL PRODUCTS:
PVC DEMAND BY END-USE SEGMENT
1979 AND 1983

	1979		1983	
End-use Segments	'000MT	% Share	'000MT	% Share
PVC pipe	10.0	45.5	12.5	46.0
Wire and Cable	5.0	22.7	7.0	26.0
Vinyl sheet	3.0	13.6	3.0	11.0
Bottles, shoes and others	4.0	18.2	4.5	17.0
Total	22.0	100.0	27.0	100.0

Source: SGV-KC Field Survey

(j) Polystyrene

Polystyrene resins are mainly fabricated into television and radio cabinets as well as electrical or industrial housings and parts, a large proportion of which are incorporated into finished products and exported. Other end-uses for polystyrene include cassettes and cartridges as well as a wide variety of housewares and toys. A breakdown of polystyrene demand by end-use is given in Table 7.33.

TABLE 7.33
PETROCHEMICAL PRODUCTS:
POLYSTYRENE DEMAND BY END-USE SEGMENT
1979 AND 1983

	1979		1983	
End-use Segments	'000MT	% Share	'000MT	% Share
Electrical Products	3.5	58.3	8.0	61.5
Cassettes and cartridges	1.0	16.7	2.0	15.4
Housewares, toys and others	1.5	25.0	3.0	23.1
Total	6.0	100.0	13.0	100.0

Source: SGV-KC Field Survey

(k) Polyvinyl Acetate

A breakdown of polyvinyl acetate usage in Malaysia is given in Table 7.34. About 85% of the emulsion is used in the production of emulsion paints.

TABLE 7.34
PETROCHEMICAL PRODUCTS:
POLYVINYL ACETATE DEMAND BY END-USE SEGMENT
1979 AND 1983

	1979		1983	
End-use Segments	'000MT	% Share	'000MT	% Share
Emulsion paints	4.2	85.0	6.2	85.0
Adhesives and others	0.8	15.0	1.1	15.0
Total	5.0	100.0	7.3	100.0

Source: SGV-KC Field Survey

7.9.2 Projected Demand

Two approaches were adopted in forecasting domestic demand for petrochemical products:

1. Projection of domestic demand (expressed as apparent consumption in 1981 constant prices) based on a simple linear regression model; and

2. Projection of domestic demand (expressed in tonnage of selected petrochemical products) based on industry estimates of potential growth patterns.

For the first approach the Consultants postulated the following econometric relationship for both petrochemical building blocks and intermediates as well as plastics and resins:

$$Y = a + bX$$

Where: Y = domestic demand expressed as apparent consumption in 1981 constant prices

X = manufacturing value-added in 1970 constant prices

Manufacturing value-added was deemed to be the most appropriate independent variable as petrochemical products serve as inputs to other industries. As such, demand for petrochemicals is directly related to the level of manufacturing activity in the country.

Manufacturing value-added forecasts were obtained from the Economic Planning Unit (EPU) of the Prime Minister's Department. EPU forecasts are made on the basis of low, medium and high growth rates (See Appendix 28) th[illegible] yielding demand projections at varying rates of [illegible]th.

The regression equations of the first forecasting approach are given below:

$Y = 60.38\,X - 19153.7$
$(R^2 = 0.9361,\ t = -10.48))$
Where: Y = domestic demand for petrochemical building blocks and intermediates in 1981 constant prices
X = manufacturing value-added in 1970 constant prices

$Y = 0.13X - 104.26$
$(R^2 + 0.9569,\ t = 12.23)$
Where: Y = domestic demand for plastics and resins in 1981 constant prices
X = manufacturing value-added in 1970 constant prices

The equations confirmed the existence of a strong positive correlation between domestic demand and manufacturing activity. Furthermore, the t-values indicated that the postulated econometric relationships are statistically significant at the 99% confidence level.

In addition to domestic demand, exports of petrochemicals are also projected. Methanol will be the most significant petrochemical export from Malaysia over the plan period. For the purpose of projections, it is assumed that methanol production will increase from 170,000 MT in 1985 to 550,000 MT in 1990 and remain at that level thereafter. Further, it is assumed that the entire output, after meeting domestic requirements, will be exported. Projected methanol export is presented in Table 7.35

As mentioned earlier, proposals have been put forward for the manufacture of methanol derivatives in Malaysia. However, these and other proposed petrochemical projects have not been included in the f[illegible]ecasts as their timing and implementation are still uncertain a[illegible] this stage.

TABLE 7.35
PROJECTED METHANOL EXPORTS
1985 - 1995

Year	Production ('000 MT)	Domestic Demand ('000 MT)[1]			Export Volume ('000 MT)			Export Value (M$ Million)[2]		
		Low	Medium	High	High	Medium	Low	High	Medium	Low
1985	170.0	21.1	21.9	22.6	148.9	148.1	147.4	68.5	68.1	67.8
1986	250.0	22.3	23.5	24.6	227.7	226.5	225.4	104.7	104.2	103.7
1987	350.0	23.5	25.2	26.8	326.5	324.8	323.2	150.2	149.4	148.7
1988	450.0	24.8	27.1	29.2	425.2	442.9	422.9	195.6	203.4	194.5
1989	500.0	26.2	29.2	31.9	473.8	470.8	468.1	217.9	216.6	215.3
1990	550.0	27.6	31.4	34.7	522.4	518.6	515.3	240.3	238.6	237.0
1991	550.0	29.2	33.7	37.8	520.8	516.3	512.2	239.6	237.5	235.6
1992	550.0	30.8	36.2	41.3	519.2	513.8	508.7	238.8	236.0	234.0
1993	550.0	32.5	39.0	45.0	517.5	511.0	505.0	238.0	235.1	232.3
1994	550.0	34.2	41.9	49.0	515.8	508.1	501.0	237.3	233.7	230.5
1995	550.0	36.1	45.0	53.4	513.9	505.0	496.6	236.4	232.3	228.4

1. Projected at the average of high and low growth rates estimated by industry (see Table 7.38).

2. At 1981 average methanol price of M$460 (US$200) per MT.

The pattern of plastics and resins exports is not expected to change over the next ten years. Local production will be anchored primarily on the domestic market and only excess quantities will be exported. As such, exports of plastics and resins are projected to grow at annual rates of 1% (low), 3% (medium) and 5% (high) from 1985 to 1995.

The results of the above forecasting approach are given in Tables 7.36 and 7.37.

TABLE 7.36
PETROCHEMICAL BUILDING BLOCKS AND INTERMEDIATES:
PROJECTED DEMAND, 1985 - 1995
(IN $ MILLION IN 1981 CONSTANT PRICES)

Year	Domestic Demand			Methanol Exports			Total Demand		
	Low	Medium	High	High	Medium	Low	Low	Medium	High
1985	375.3	375.3	375.3	68.5	68.1	67.8	443.8	443.4	443.1
1986	407.7	416.3	425.0	104.7	104.2	103.7	512.4	520.5	528.7
1987	442.7	461.6	481.0	150.2	149.4	148.7	592.9	611.0	629.7
1988	480.5	511.6	544.0	195.6	203.4	194.5	676.1	715.0	738.5
1989	521.5	566.8	615.0	217.9	216.6	215.3	739.4	783.4	830.3
1990	565.9	627.7	694.8	240.3	238.6	237.0	806.2	866.3	931.8
1991	616.8	693.0	776.2	239.6	237.5	235.6	856.4	930.5	1,011.8
1992	672.1	764.9	866.9	238.8	236.0	234.0	910.9	1,000.9	1,100.9
1993	732.2	844.1	967.9	238.0	235.1	232.3	970.2	1,079.2	1,200.2
1994	797.6	931.3	1,080.5	237.3	233.7	230.5	1,034.9	1,165.5	1,311.0
1995	868.7	1,027.3	1,205.8	236.4	232.3	228.4	1,105.1	1,259.6	1,434.2
Average Annual Growth Rate									
1985 - 1990	8.6%	10.8%	13.1%	28.5%	28.5%	28.4%	12.7%	14.3%	16.0%
1990 - 1995	8.9	10.3	11.6	(0.3)	(0.5)	(0.7)	6.5	7.8	9.0

TABLE 7.37
PLASTICS AND RESINS
PROJECTED DEMAND, 1985 - 1995
(IN $ MILLION IN 1981 CONSTANT PRICES)

Year	Domestic Demand			Exports			Total Demand		
	Low	Medium	High	Low	Medium	High	Low	Medium	High
1985	745.0	745.0	745.0	29.1	29.1	29.1	774.1	774.1	774.1
1986	814.7	833.3	852.0	29.4	30.0	30.6	844.1	863.3	882.6
1987	890.1	930.8	972.5	29.7	30.9	32.1	919.8	961.7	1,004.6
1988	971.6	1,038.4	1,108.3	30.0	31.8	33.7	1,001.6	1,070.2	1,142.0
1989	1,059.9	1,157.3	1,261.0	30.3	32.8	35.4	1,090.2	1,190.1	1,296.4
1990	1,155.3	1,288.4	1,433.0	30.6	33.7	37.1	1,185.9	1,322.1	1,470.1
1991	1,264.9	1,429.1	1,608.2	30.9	34.7	39.0	1,295.8	1,463.8	1,647.2
1992	1,384.0	1,583.9	1,803.5	31.2	35.8	40.9	1,415.2	1,619.7	1,844.4
1993	1,513.5	1,754.4	2,021.0	31.5	36.9	43.0	1,545.0	1,791.3	2,064.0
1994	1,654.3	1,942.1	2,263.3	31.9	38.0	45.1	1,686.2	1,980.1	2,308.4
1995	1,807.3	2,148.8	2,533.2	32.2	39.1	47.4	1,839.5	2,187.9	2,508.6
Average Annual Growth Rate									
1985 - 1990	9.2%	11.6%	14.0%	1.0%	3.0%	5.0%	8.9%	11.3%	13.7%
1990 - 1995	9.3	10.7	12.0	1.0	3.0	5.0	9.2	10.6	11.3

The second approach, which forecasts demand for the major petrochemical products, is based on industry estimates of future growth trends for each product.

Demand forecasts, based on high and low growth rates indicated by major producers and end-users, are presented in Table 7.38. The following assumptions were used in deriving the forecasts:

(a) Methanol

Domestic demand for methanol is projected to increase at 5.5% to 9.0% per annum based on existing uses. A 9% annual growth assumes development of a chipboard industry in Peninsular Malaysia as well as rapid expansion of plywood production in Sabah and Sarawak. These developments will partially offset a decline in the plywood industry in Peninsular Malaysia. A lower growth rate of 5.5% per annum is expected assuming slow growth in wood-based industries. Methanol demand for other existing industrial uses is expected to be fast growing, although their usage is small at present.

Exports of methanol will depend on world market conditions and production volumes. Methanol production is expected to increase from 170,000 MT in 1985 to 550,000 MT per annum from 1990 to 1995.

It should be noted that the forecasts do not include potential new uses for methanol such as production of acetic acid, methyl tertiary butyl ether, and fatty alcohols as well as gasoline blending. Demand for methanol would be substantially higher with these new uses.

(b) Vinyl Chloride

Production of polyvinyl chloride resins is expected to keep pace with growth in domestic demand. As such, demand for vinyl chloride monomer is projected to increase by 6% to 9% per annum.

(c) Styrene

With expansion in domestic production capacities, production of polystyrene is expected to account for 90% of domestic demand from 1985 to 1995, compared with 60% in 1983.

(d) Ethylene Glycol

Penfibre (M) Sdn. Bhd. has indicated that no capacity expansion is being planned at the moment. As such, the assumptions used are:

- Low estimate: No capacity expansion will be undertaken for the production of polyester staple fibre in Malaysia.
- High estimate: Some capacity expansion will be undertaken in the 1990s such that ethylene glycol consumption will reach 15,000MT in 1995.

(e) Vinyl Acetate

Consumption of vinyl acetate is expected to be in line with projected growth in demand for polyvinyl acetate emulsions.

(f) Low Density Polyethylene

Low density polyethylene is a mature product with annual growth rates of 3% to 4% in industrialised countries. Malaysian demand for low density polyethylene is projected to increase by 5.5% to 8.5% per annum based on industry estimates. Growth rates for this product are the lowest among the major thermoplastics because of slow growth expected by film producers, the major end-users of low density polyethylene. Increased usage of linear low-density polyethylene will also serve to reduce overall growth in demand.

(g) High Density Polyethylene

Demand for high density polyethylene is projected to increase at an annual rate of 7% to 11%, higher than that for low density polyethylene. Low growth rates projected by film manufacturers are offset by higher growth rates projected by moulding and pipe manufacturers over the period.

(h) Polypropylene

Consumption of polypropylene is projected to increase by 6% - 10% per annum by major end-users. In addition, injection moulding is expected to became an increasingly important end-use for polypropylene while its use in woven bags will decline in importance.

(i) Polyvinyl Chloride

Demand for polyvinyl chloride is dependent on building and construction activity (both public and private) to a large extent. Existing manufacturers expect domestic consumption to grow by 6% to 9% over the next decade.

(j) Polystyrene

Growth in demand for polystyrene is expected to be the highest among the five major thermoplastics in Malaysia. This is mainly due to its existing low level of usage as well as the expected production of expandable polystyrene in 1985/86.

(k) Polyvinyl Acetate

Demand for polyvinyl acetate is directly related to growth in the paint industry. Producers of polyvinyl acetate emulsions expect demand to grow by about 7% to 10% from 1985 to 1995, in line with projected increase in demand for paints.

TABLE 7.38
PETROCHEMICAL PRODUCTS:
PROJECTED DEMAND FOR SELECTED PETROCHEMICALS
1985 - 1995

		Forecast (In '000MT)						Average Annual Growth Rate (%) 1985-1995	
		1985		1990		1995			
Product	1983	Low	High	Low	High	Low	High	Low	High
Petrochemical Building Blocks and Intermediates:									
Methanol - Domestic	19.0	21.1	22.6	27.6	34.7	36.1	53.4	5.5	9.0
- Export	-	148.9	147.4	522.4	515.3	513.9	496.6		
	19.0	170.0	170.0	550.0	550.0	550.0	550.0		
Vinyl Chloride	23.0	25.8	27.3	34.6	42.0	43.7	64.7	6.0	9.0
Styrene	8.0	14.1	14.9	22.8	27.5	36.7	50.7	10.0	13.0
Ethylene Glycol	12.0	12.0	12.0	12.0	12.0	12.0	15.0	0.0	2.3
Vinyl Acetate	4.4	5.0	5.3	7.1	8.6	9.9	13.8	7.0	10.0
Plastics and Resins									
LDPE	39.0	43.4	45.9	56.7	69.0	74.1	103.8	5.5	8.5
HDPE	29.0	33.2	35.7	46.6	66.8	65.3	101.4	7.0	11.0
PP	30.0	33.7	36.3	45.1	58.5	60.4	94.1	6.0	10.0
PVC	27.0	30.3	32.1	40.6	49.3	54.3	75.9	6.0	9.0
PS	13.0	15.7	16.6	25.3	30.6	40.8	56.3	10.0	13.0
Polyvinyl Acetate	7.3	8.4	8.8	11.7	14.2	16.4	22.9	7.0	10.0

Source: SGV-KC Field Survey

7.10 INTERNATIONAL ASPECTS

7.10.1 Trends in International Trade[1]

The chemical industry is one of the most dynamic sectors in the industrialized economies and within this sector the petrochemical industry is the fastest growing sector. This fact is even more apparent in international trade. During the period 1950-1970, the value of world exports of chemicals increased tenfold while total world exports increased by only half the amount during the same period. Among the chemical exports, organic chemicals increased 24-fold in value from 1950 to 1970, of which exports of plastics grew 32 times. Due to the continuous decline in the unit value of organic chemicals - as a result of cheap oil prices, technological development, and increasing economies of scale - the volume of the world export of plastics increased 76 times, synthetic fibres 55 times and synthetic rubber 28 times.

The pattern of trade flow in petrochemicals reflected, to a great deal, the patterns of their production, i.e., high concentration in the developed regions of the world; Japan, the United States and Western Europe (see Appendix 18) the largest amount of trade flow being affected within Western Europe. Only lately have some developing countries realized some exports, mainly fertilizers and natural gas derivatives.

The petrochemical market is closely integrated between oil refineries and olefines and aromatics producers. The movement of basic, intermediate and final petrochemicals are often achieved by short pipelines between the various producers or in a pipeline grid system as in North Western Europe and the Gulf Coast of the United States. However, due to the sheer size of the market there is a merchant market. Ethylene, propylene, butadiene, benzene and para-xylene are products traded mostly between relatively few large producers/sellers under three-to five-year contracts whereas styrene and ortho-xylene trade is more fragmented. Nearly 80% of trade petrochemicals are based on long-to medium-term contracts while the balance is left to the spot market. Long-term supply contracts are essential to chemical producers in order to keep the operation of their huge plants at maximum level, since the lowering of the plant loading factor would drastically increase the unit cost of production.

1 Extracted from UNIDO's "Second World-wide Study on the Petrochemical Industry: Process of Restructuring"

The role of the merchant traders which flourished during the 1960s is continuously shrinking and they are no longer as important in the basic chemicals. However, in some cases and for particular types of companies or commodities, trading companies with experience, know-how and contacts can serve several useful functions. It is important for new suppliers of petrochemical products wishing to enter new markets to recognize this when determining their marketing strategy.

Cross continental trade in ethylene is relatively small and is carried out in refrigerated ships, mainly from non-European developed market economies. However, 22% of the total export to developed regions originate from developing countries, mainly Algeria, Mexico and the Republic of Korea. Other olefines are traded in larger quantities: the United States annually imports some 300,000 of butadiene; both the United States and the EEC import appreciable quantities of propylene, mainly from other developed market economies. Aromatics are more freely traded among all producing regions, particularly xylenes. While the United States is a net exporter of xylenes it is a net importer of benzene. The flow of gas-based derivatives is mainly from developing countries and centrally-planned economies involving the export of methanol and considerable quantities of ammonia. In the case of ammonia the major trend in Japan, the United States and Western Europe is to rely more on imports, a fact which has led to the closure of considerable ammonia producing capacities in these regions.

World trade in intermediate petrochemicals has not been significant and it is concentrated mainly within the developed regions, with styrene monomer being the most widely traded. It is expected, however, that a major shift in intermediate trade will occur during the 1980s when production capacities in Saudi Arabia and other oil producing countries come on stream in the middle of the decade. In the area of polymers, plastic resins, synthetic fibres and synthetic rubber, the developing countries are major importers from the developed regions with little trade occuring among themselves. South East Asian developing countries export small quantities of polymers, mainly PVC, to developed regions. A shift in the historic trade patterns is expected in the 1980s in polymers originating from oil producing developing countries to developed regions and to other developing countries.

Considering the economic recession, the uncertainty due to inflation and feedstocks, a shift in the patterns of world production and trade in petrochemicals is expected to take place during the late 1980s. The United States, which has so far enjoyed a high surplus in petrochemical trade, is expected to lose some ground in the 1980s caused by the lifting of oil and gas price controls. This results in diminishing exports and increasing imports due to increasing competitiveness of other producers, particularly hydrocarbon exporting countries. West European producers will face increasing pressure from East European and Middle East producers in the mid-1980s. Japan will be in the weakest position among the two other developed regions to resist the pressure of cheaper petrochemicals (particularly basics and intermediates) coming from the hydrocarbon producing developing countries. However, except for some producers from Western European countries, the general trend would be for the petrochemical producers in developed regions to seek some form of association (mainly joint ventures) with oil producing developing countries in the field of basic and intermediate petrochemical production facilities. Other trends would be increasing share of newly industrialized countries, Canada, China and the USSR and some East European countries in the world capacities of petrochemicals and its subsequent influence on the shift in the world trade pattern. Other factors influencing trade in petrochemicals are expected to emanate from greater mergers between giant companies, formation of new trading blocs and expected increase in per capita consumption of petrochemicals in East European countries and in some of the developing countries.

Prospects for increasing exports of petrochemicals from developing to developed countries are expected to meet increasing resistance under conditions of reduced demand and over-capacity. However, the rising prices of feedstocks and energy which constitute at present some 80% of overall production cost would force some petrochemical producers to shut down their plants and resort to the import of cheaper basic and intermediate petrochemicals from developing countries.

Examination of the existing structure of tariff barriers in developed countries against petrochemical products shows that the tariffs imposed are so construed as to encourage the import of basic petrochemicals and to discourage the imports of intermediate and final petrochemicals. It would appear that the exporting developing countries have reasonably good access to the market of the developed countries for basic products.

In addition, a number of other restrictions are imposed on imports such as quota, health, safety and environmental standards, import licensing schemes, government purchasing scheme and custom valuation practices. Moreover, developing countries which are moving into the petrochemical field must be aware of the domination of Western markets by a relatively small number of large companies. Another possible problem facing the new suppliers from developing countries may come from competition with suppliers from other developing countries, particularly those linked to traditional suppliers to the developed countries through joint ventures, buy-back agreements, territorial market and other arrangements.

7.10.2 Global Supply and Demand

UNIDO estimates of global capacity, production and demand for selected petrochemicals covering the period 1975 to 1990 are provided in Appendices 19 to 22.

With lower per capita consumption of petrochemicals and expectations of higher GDP growth rates than developed countries, developing countries expect their demand for petrochemicals to continue growing at a fast pace. Demand for basic petrochemicals, projected to grow by 12.3% per annum from 1984 to 1990, will increase faster than for final products. Demand for thermoplastics by the developing countries is projected to reach 22 millions tonnes in 1990, compares to 6.7 million tonnes in 1979. Two-thirds of this volume will be accounted for by the most widely used plastics, low-density polyethylene and polyvinyl chloride. Demand for synthetic fibres and synthetic rubbers will grow by about 6% per annum to reach 5 million tonnes and 2 million tonnes respectively in 1990.

A much slower rate of growth in the demand for petrochemicals is forecasted for industrialized countries in the 1980s compared to the 1970s. The main reasons are as follows:

1. Slower overall economic growth and slower growth of major consuming industries such as automobiles and textiles.

2. Demand for petrochemicals has reached a mature stage where substitution opportunities are largely exhausted.

As a result, demand for most petrochemiclas in the industrialized countries is expected to grow about half as fast as demand in developing countries.

Rates of growth in demand for selected petrochemicals are summarized in Table 7.39.

SGV-Kassim Chan Sdn. Bhd.

TABLE 7.39
PETROCHEMICAL PRODUCTS:
GROWTH OF GLOBAL DEMAND FOR SELECTED
PETROCHEMICALS
(PER ANNUM)

Petrochemical Product	World Total			Industrialized Countries			Developing Countries		
	1975 -1979	1979 -1984	1984 -1990	1975 -1979	1979 -1984	1984 -1990	1975 -1979	1979 -1984	1984 -1990
Basic Petrochemicals									
Ethylene	11.2	6.2	6.0	10.4	5.8	4.3	24.0	17.6	14.9
Propylene	11.8	5.2	6.4	8.7	4.4	5.9	26.0	15.1	10.8
Butadiene	8.8	5.0	4.6	7.8	3.7	3.6	18.9	16.4	10.0
Benzene	11.0	5.7	4.9	10.8	4.7	4.0	12.8	15.6	10.8
Xylenes	11.8	7.1	5.6	9.3	5.1	4.5	41.4	17.6	8.8
Methanol	10.7	9.6	7.0	10.1	11.4	6.3	22.9	17.6	12.0
Average	11.1	6.2	5.9	10.4	5.2	4.9	22.3	16.5	12.3
Thermoplastics									
LDPE	10.3	5.1	5.8	11.3	3.6	3.9	19.1	11.1	10.8
HDPE	17.9	6.5	6.1	16.9	5.5	4.9	24.4	11.4	11.2
PP	20.4	8.5	8.6	19.0	7.7	7.6	28.7	12.3	12.2
PVC	11.4	6.2	6.3	10.6	4.6	4.6	16.1	12.7	11.0
PS	11.9	5.4	5.9	11.2	4.7	4.9	18.1	10.2	10.6
Average	13.6	6.1	6.4	12.6	4.8	5.0	19.6	11.7	11.1
Sythetic Fibres									
Acrylic Fibres	10.3	2.8	3.6	9.4	2.1	4.0	14.1	7.1	6.6
Nylon Fibres	7.2	2.8	2.4	6.6	2.8	1.3	8.2	6.3	5.5
Polyester Fibres	9.9	5.1	3.7	8.7	4.1	2.3	13.0	7.6	6.9
Average	9.0	4.1	3.5	8.1	3.0	3.2	11.9	7.4	6.4
Synthetic Rubber									
SBR	7.2	4.2	3.7	6.6	3.5	3.2	14.3	8.3	6.0
Polybutadiene	7.8	6.3	3.2	7.0	5.6	2.8	13.7	16.7	5.8
Average	7.5	5.8	3.6	6.6	3.9	3.1	14.1	8.7	5.9

Indigenous petrochemical supply in developing countries is expected to grow at a higher rate than demand. The share of developing countries in world production of the major petrochemicals have been increasing since 1975. UNIDO estimates their share in world petrochemical production to be from 15% to 20% by 1990. In spite of this, developing contries will remain partially dependent upon developed countries for intermediate and final product petrochemicals. No major production of specialty and performance petrochemicals is expected to develop in the developing countries up to 1990.

Development of the petrochemical industry in developing countries is best measured by their plans to manufacture basic petrochemicals. As of April 1981, 27 developing countries had announced plans to establish ethylene plants compared to the 13 plants in existence in 1979. Of these 27 producers, 16 also plan to produce propylene and 11 plan to produce butadiene. In addition, 17 developing countries had made plans to establish plants to manufacture aromatics compared to plants in existence in only eight countries at the end of 1979. Methanol, produced in only eight developing countries in 1979, would be produced in 16 countries by 1987. Table 7.41 summarizes the production capabilities of developing countries in six basic petrochemicals.

Local production of petrochemicals in developing countries is expected to stimulate demand in domestic markets. Hence, high rates of growth in demand for petrochemicals can be expected in these countries over the next decade even though prospects for economic growth are less bright than in the 1970s. Developing countries will also be a source of petrochemical exports in the 1980s when export-oriented plants come on stream (See Table 7.40).

TABLE 7.40
PETROCHEMICAL PRODUCTS:
CAPACITY OF EXPORT-ORIENTED PLANTS IN DEVELOPING COUNTRIES
('000MT PER ANNUM)

Country	Completion Date	Ethylene	Propylene	Benzene	Xylene	Methanol
Qatar	1980	280	-	-	-	330
Libya	1984	330	-	-	-	330
Bahrain	1984	-	-	-	-	330
Singapore	1984	300	160	59	29	-
Malaysia	1984	-	-	-	-	660
Kuwait	1985	300	-	280	140	-
Saudi Arabia	1985-86	2,126	-	-	-	1,250
Total		3,336	160	339	169	2,900

Source: Second World-wide Study on the Petrochemical Industry: Process of Restructuring, UNIDO. (Updated with available information by SGV-KC)

TABLE 7.41
PETROCHEMICAL PRODUCTS:
PRODUCTION CAPACITY OF 30 DEVELOPING COUNTRIES
IN SIX BASIC PETROCHEMICALS
('000 MT PER ANNUM)

	Ethylene			Propylene			Butadiene		
	1979	1984	1987	1979	1984	1987	1979	1984	1987
AFRICA									
Nigeria	-	-	280	-	35	35	-	-	-
N. AFRICA									
Algeria	120	120	120	-	-	-	-	-	-
Egypt	-	-	140	-	-	-	-	-	-
Libya	-	330	330	-	50	50	-	60	60
Morocco	-	-	-	-	-	-	-	-	-
W. ASIA									
Bahrain	-	-	-	-	-	-	-	-	-
Iraq	30	160	160	-	-	-	-	-	-
Kuwait	-	-	300	-	-	-	-	-	-
Qatar	-	280	280	-	-	-	-	-	-
Saudi Arabia	-	-	2,126	-	-	-	-	-	-
Turkey	60	360	360	40	100	100	30	30	30
U. Arab Emirates	-	-	-	-	-	-	-	-	-
ASIA									
India	240	240	920	120	120	220	50	50	70
Indonesia	-	-	350[2]	-	-	-	-	-	-
Iran	30	30	300	15	15	125	-	-	25
Malaysia	-	-	-	-	-	-	-	-	-
Pakistan	-	-	100	-	-	-	-	-	-
Philippines	-	-	250[2]	-	-	-	-	-	-
Rep. of Korea	150	505	1,200	80	450	630	25	125	175
Singapore	-	300	300	-	160	160	-	45	45
Thailand	-	-	300	-	-	73	-	-	-
Other Asia	570	920	920	290	410	410	80	120	120
CHINA	540	950	1,810	230	410	950	100	130	220
LATIN AMERICA									
Argentina	170	250	550	80	100	240	40	40	120
Bolivia	-	-	160	-	-	80	-	-	-
Brazil	740	1,220	1,220	410	650	650	170	240	240
Chile	60	180	180	-	-	-	-	-	-
Columbia	20	120	120	10	10	10	-	-	-
Ecuador	-	-	100	-	-	-	-	-	-
Mexico	440	1,440	1,940	150	450	450	150	150	250
Peru	-	-	250	-	-	150	-	-	70
Venezuela	150	150	500	90	90	90	-	-	-

Table 7.41 (Cont'd)

	Xylenes[1] 1979	1984	1987	Benzene 1979	1984	1987	Methanol 1979	1984	1987
AFRICA									
Nigeria	-	-	-	-	20	20	-	-	-
N. AFRICA									
Algeria	-	40	40	-	-	-	110	110	110
Egypt	-	-	-	-	-	-	-	-	-
Libya	-	-	-	-	-	-	330	330	300
W. ASIA									
Bahrain	-	-	-	-	-	-	-	330	300
Iraq	-	-	-	-	-	-	-	330	330
Kuwait	-	-	140	-	-	280	-	-	-
Qatar	-	-	-	-	-	-	-	-	-
Saudi Arabia	-	-	-	-	-	-	-	-	1,250
Turkey	-	200	200	-	150	150	-	100	100
U. Arab Emirates	-	-	-	-	-	-	-	-	-
ASIA									
India	40	100	160	150	210	310	-	60	60
Indonesia	-	-	240[2]	-	-	370[2]	-	330	330
Iran	-	-	120	-	-	350	-	-	100
Malaysia	-	-	-	-	-	-	-	-	660
Pakistan	40	40	40	-	-	-	-	-	-
Philippines	-	-	-	-	-	-	-	-	-
Rep. of Korea	50	400	400	110	250	250	390	390	390
Singapore	-	29	29	-	59	59	-	-	-
Thailand	-	-	-	-	-	-	-	-	-
Other Asia	260	400	400	200	340	440	120	190	190
CHINA	30	210	400	400	500	800	260	400	800
LATIN AMERICA									
Argentina	65	65	65	230	230	290	40	40	40
Bolivia	-	-	-	-	-	100	-	-	-
Brazil	160	230	230	270	390	390	140	140	140
Chile	-	-	-	-	-	-	-	-	-
Columbia	60	60	210	40	40	90	-	-	-
Ecuador	-	-	70	-	-	140	-	-	-
Mexico	110	410	710	120	720	720	180	1,000	1,820
Peru	-	-	20	-	-	120	-	-	-
Venezuela	-	-	50	-	100	-	-	-	330

1 Para-Xylene and Ortho-Xylene
2 Rescheduled indefinitely

Source: Second World-Wide Study in the Petrochemical Industry: Process of Restructuring, UNIDO (Updated with available information by SGV-KC)

In addition to the above plants, Iraq, Iran, South Korea, Brazil, Mexico and Venezuela are likely to have significant quantities of production available for export.

Within the ASEAN countries, the only ethylene complex in Singapore has been completed. Thailand is currently producing low density polyethylene from imported ethylene. Its ethane cracker and other related projects are expected to be onstream by 1987. Overviews of the petrochemical complexes in Singapore and Thailand are provided in Appendices 23 and 24. Meanwhile, Indonesia and the Philippines have rescheduled their petrochemical plans indefinitely. Competition for the ASEAN market will come primarily from Saudi Arabia and Canada.

The current oversupply situation is expected to continue throughout the 1980s and possibly into the 1990s, particularly when the Saudi Arabian plants come onstream in 1985 and 1986. Under these conditions, industrialized countries are planning slower growth for their already high capacities in the 1980s. Over the past two years, Japanese and Western European producers have sought to rationalise their excess production capacities by shutting down and scrapping uncompetitive plants. Japan, for instance, plans to shutdown 36% of its 1982 ethylene capacity and 22% of its polyolefine capacity by 1985.

7.10.3 Growth Trends in Selected Asian Countries

Table 7.42 provides a listing of the leading countries in terms of ethylene capacity.

TABLE 7.42
PETROCHEMICAL PRODUCTS:
ETHYLENE CAPACITY OF LEADING COUNTRIES
1982 AND 1983
(IN '000 MT)

Rank 1983	Country	Capacity 1983	Capacity 1982	Rank 1983	Country	Capacity 1983	Capacity 1982
1	USA	17,543	16,836	11	Taiwan	953	568
2	Japan	6,354	5,777	12	Mexico	932	935
3	W. Germany	4,530	4,165	13	Belgium	520	520
4	France	2,590	2,845	14	S. Korea	505	505
5	U. Kingdom	2,265	2,270	15	Puerto Rico	413	413
6	Netherlands	2,260	2,260	16	Sweden	355	340
7	Italy	1,980	2,070	17	Australia	335	321
8	Canada	1,561	1,791	18	Norway	300	300
9	Brazil	1,347	1,242	19	Portugal	300	300
10	Spain	956	1,031	20	Qatar	280	280

Source: Petrochemical Industry Association of Taiwan

As at 1983, three Asian countries, Japan, Taiwan and South Korea, were among the top 20 countries in terms of ethylene capacity. Ethylene production in these countries over the past decade is shown in Table 7.43.

TABLE 7.43
PETROCHEMICAL PRODUCTS:
ETHYLENE PRODUCTION IN SELECTED ASIAN COUNTRIES
1973 - 1983
(IN '000 MT)

Year	Japan	Taiwan	South Korea
1973	4,171	57	73
1974	4,176	72	85
1975	3,399	93	96
1976	3,803	228	97
1977	3,979	258	87
1978	4,387	373	140
1979	4,784	473	184
1980	4,175	496	373
1981	3,655	475	372
1982	3,590	464	376
1983	3,685	499	489
Average Annual Growth Rate	(0.7%)	29.1%	24.6%

Sources: Petrochemical Industry Association of Japan
Petrochemical Industry Association of Taiwan
Korea Petrochemical Industry Association

Japan is by far the largest ethylene producer in Asia, having built cracking plants as early as 1958. Its production over the past decade, however, has declined as a result of well as the price gap between naptha used in the Japanese plants and natural gas used in the United States and Canada as well as sluggish demand due to worldwide recession. Under these circumstances, the Japanese petrochemical industry is being reorganized through the disposal of excess capacities and the formation of groups for marketing and distribution. Japan is expected to scrap 36% of its 1982 ethylene capacity by 1985 inspite of significant improvement in demand in 1983.

On the other hand, Taiwan and South Korea have increased their ethylene production rapidly over the past decade to feed fast developing downstream projects. Taiwan commenced production of ethylene in 1968 and now has four naptha crackers while South Korea established its first ethylene plant in 1973 and now has two complexes.

The structure of production, import and export of the major thermoplastics in the three countries is shown in Table 7.44.

Taiwan and South Korea have similar production volumes which have been growing steadily over the past decade. Taiwan attained self-sufficiency in thermoplastics in the mid-seventies while South Korea became self-sufficient in 1980. In both countries, exports of thermoplastics grew faster than imports over the past ten years. However, volume of imports and exports fluctuated widely from year to year indicating that external trade in these products is sensitive to changes in general economic performance and oil prices.

TABLE 7.44
PETROCHEMICAL PRODUCTS:
THERMOPLASTICS SUPPLY AND DEMAND
IN TAIWAN AND SOUTH KOREA
1973 - 1983
(IN '000MT)

	TAIWAN			SOUTH KOREA			Self-Sufficiency Rate (%)	
Year	Production	Import	Export	Production	Import	Export	Taiwan	S. Korea
1973	217	76	14	n.a.	n.a.	n.a.	77.8	n.a.
1974	201	86	42	197	36	7	82.0	87.2
1975	264	67	43	206	43	2	91.7	83.3
1976	430	60	76	277	54	4	103.9	84.7
1977	515	56	88	332	154	3	106.6	68.8
1978	646	77	94	426	206	7	102.7	68.2
1979	705	103	32	487	264	18	90.9	66.4
1980	773	95	73	644	66	118	97.2	108.8
1981	771	87	79	716	59	135	99.0	111.8
1982	836	71	103	796	77	193	104.0	117.2
1983	965	116	36	921	105	151	92.3	105.4
Average Annual Growth Rate	17.5%	7.4%	34.7%	19.1%	30.1%	97.5%		

Note : Includes LDPE, HDPE, PP, PVC, PS and ABS
Self-Sufficiency Rate = Production / Apparent Consumption

Sources: Petrochemical Industry Association of Taiwan
Korea Petrochemical Industry Association

Table 7.45 shows comparative per capita consumption of thermoplastics for Malaysia, Taiwan, South Korea and Indonesia. Per capita consumption is the lowest in Indonesia due to its large population base. Consumption of thermoplastics in Malaysia is still relatively low at 9.34 kilograms per person in 1983, compared to 52.41 kilograms for Taiwan and 21.87 kilograms for South Korea. Growth in per capita consumption of thermoplastics in Taiwan and South Korea has been impressive over the past decade, averaging 26.5% and 15.9% per annum, respectively. In Malaysia, this growth averaged 4.4% per annum from 1979 to 1983.

TABLE 7.45
PETROCHEMICAL PRODUCTS:
COMPARATIVE PER CAPITA THERMOPLASTIC CONSUMPTION
1973 - 1983
(KG. PER PERSON)

Year	Taiwan	S. Korea	Malaysia	Indonesia
1973	6.85	6.54	n.a.	n.a.
1974	7.31	6.50	n.a.	n.a.
1975	14.78	7.00	n.a.	n.a.
1976	14.80	9.12	n.a.	n.a.
1977	20.95	13.23	n.a.	1.04
1978	35.62	16.89	n.a.	1.25
1979	42.90	19.53	7.87	1.44
1980	43.32	15.53	7.44	1.56
1981	41.08	16.51	7.06	1.78
1982	41.38	17.26	8.01	1.89
1983	52.41	21.87	9.34	n.a.
Average Annual Growth Rate	26.5%	15.9%	4.4%	12.7%

Note : Includes LDPE, HDPE, PP, PVC, PS (and ABS for South Korea only)

Sources: Petrochemical Industry Association of Taiwan
Korea Petrochemical Industry Association
Indonesian Chemical Industries Club
Department of Statistics
SGV-KC Field Survey

7.10.4 Malaysian Imports

Malaysia's imports of petrochemical products (excluding synthetic fibres and rubber) amounted to M$661.2 million in 1981, of which about 57% were imports of plastics and resins (See Table 7.46). Imports of petrochemical building blocks and intermediates have increased at a faster rate than plastics and resins over the 1973-1981 period, probably due to the existence of local manufacture of plastics and resins as opposed to basic and intermediate petrochemicals.

TABLE 7.46
PETROCHEMICAL PRODUCTS:
TOTAL IMPORTS
1973 AND 1981

SITC	Sub-Sector	M$ '000 1973	M$ '000 1981	Average Annual Growth Rate
511,512 513,516	Petrochemical building blocks and intermediates	68,967	285,705	19.4%
582-585	Plastics and resins	114,630	375,508	16.0
	Total	183,597	661,213	17.4

Source: Department of Statistics

Imports of petrochemical building blocks and intermediates increased from M$69.0 million in 1973 to M$285.7 million in 1981. A breakdown of imports by major product groups is given in Table 7.47.

TABLE 7.47
PETROCHEMICAL BUILDING BLOCKS AND INTERMEDIATES:
IMPORTS BY MAJOR PRODUCT GROUPS
1973 AND 1981

		1973		1981	
SITC	Product Group	M$'000	% Share	M$'000	% Share
511	Hydrocarbons and their derivatives	20,401	29.6	69,263	24.2
512	Alcohols, phenols, phenol-alcohols and their derivatives	9,259	13.4	72,370	25.3
513	Carboxylic acids and their derivatives	34,684	50.3	117,385	41.1
516	Ethers, alcohol peroxides, ether peroxides and their derivatives, aldehydes and ketones	4,623	6.7	26,687	9.4
	Total	68,967	100.0	285,705	100.0

Source: Department of Statistics

Carboxylic acids and their derivatives form the largest group of imports by value. On the whole, value of imports of petrochemical building blocks and intermediates increased at an average rate of 19.4 % per annum from 1973 to 1981. Imports of alcohols, phenols and their derivatives grew at the fastest rate during the period to become the second largest group of imports in 1981.

Table 7.48 shows the major basic and intermediate petrochemicals imported in 1981 by country of origin. Japan is the largest exporter of these petrochemicals to Malaysia, followed by USA and Canada and other Western European countries.

TABLE 7.4.8
PETROCHEMICAL BUILDING BLOCKS AND INTERMEDIATES:
IMPORTS OF MAJOR PRODUCTS
1981

SITC	Major Product	Country of Origin	M$'000	% Share
511	Vinyl chloride	Japan	8,141	39.0
		USA	6,353	30.5
		Norway	6,284	30.1
		Others	76	0.4
		Total	20,854	100.0
511	Styrene	Japan	11,021	68.8
		Republic of Korea	2,499	15.6
		Australia	2,449	15.3
		Others	44	0.3
		Total	16,013	100.0
512	Methanol	USA	6,815	31.4
		Libya	4,410	20.3
		Canada	3,810	17.5
		People's Republic of China	3,443	15.8
		Others	3,259	15.0
		Total	21,737	100.0
512	Ethylene glycol	Japan	12,875	81.1
		Canada	2,938	18.5
		Others	63	0.4
		Total	15,876	100.0
513	Esters and terephthalic acids	Italy	18,750	31.1
		Japan	16,903	28.0
		Others	24,652	40.9
		Total	60,305	100.0

Source: Department of Statistics

Imports of plastics and resins increased from M$114.6 million in 1973 to M$375.5 million in 1981. The major thermoplastics, particularly polyethylene and polypropylene, formed the bulk of imports. Japan is the leading exporter of plastics and resins to Malaysia, followed by the USA. Imports from other countries are relatively small. Composition of imports is presented in Tables 7.49 and 7.50.

TABLE 7.49
PLASTICS AND RESINS:
IMPORTS BY MAJOR PRODUCT GROUPS
1973 AND 1981

SITC	Product Group	1973 M$'000	1973 % Share	1981 M$'000	1981 % Share
582	Condensation, polycondensation and polyaddition products	17,423	15.2	73,293	19.5
583	Polymerization and copolymerization products	82,997	72.4	264,663	70.5
584	Regenerated cellulose and their derivatives	7,694	6.7	18,688	5.0
585	Natural resins, hardened proteins, high polymers and other resins and plastic materials	6,517	5.7	18,864	5.0
	Total	114,631	100.0	375,508	100.0

Source: Department of Statistics

TABLE 7.50
PLASTICS AND RESINS:
IMPORTS OF MAJOR PRODUCTS
1981

SITC	Major Product	Country of Origin	M$'000	% Share
582	Alkyds and other polyesters in primary form	Japan	4,604	26.6
		Singapore	3,712	21.4
		Netherlands	2,365	13.6
		Others	6,660	38.4
		Total	17,341	100.0
583	Polyethylene, in primary form	Japan	38,372	36.2
		USA	24,227	22.9
		Qatar	9,264	8.7
		Others	34,069	32.2
		Total	105,932	100.0
583	Polypropylene, in primary form	Japan	19,895	43.9
		Australia	6,018	13.3
		Fed. Rep. of Germany	5,306	11.7
		USA	4,487	9.9
		Others	9,602	21.2
		Total	45,308	100.0
583	Polyvinyl chloride, in primary form	USA	3,415	26.8
		Singapore	2,708	21.2
		Taiwan	2,157	16.9
		Others	4,479	35.1
		Total	12,759	100.0
583	Polystyrene, in primary form	Japan	5,120	45.2
		Fed. Rep. of Germany	3,006	26.5
		Others	3,204	28.3
		Total	11,330	100.0

Source: Department of Statistics

7.10.6 Malaysian Exports

As can be seen from Table 7.51, exports of petrochemical products are small, comprising mainly exports of some plastic materials and re-exports of other petrochemicals.

TABLE 7.51
PETROCHEMICAL PRODUCTS:
EXPORTS BY MAJOR PRODUCT GROUPS
1973 AND 1981

SITC	Product Group	1973 M$'000	1973 % Share	1981 M$'000	1981 % Share
511	Hydrocarbons and their derivatives	755	4.7	895	2.3
512	Alcohols, phenols, phenol-alcohols and their derivatives	375	2.3	3,241	8.3
513	Carboxylic acids and their derivatives	263	1.6	8,186	21.0
516	Esters, alcohol peroxides, ether peroxides and their derivatives aldehydes and ketones	544	3.4	719	1.8
582	Condensation, polycondensation and polyaddition products	2,103	13.2	7,159	18.4
583	Polymerization and copolymerization products	11,494	72.0	15,389	39.5
584	Regenerated cellulose and their derivatives	207	1.3	339	0.9
585	Natural resins, hardened proteins, high polymers and other resins and plastic materials	233	1.5	3,042	7.8
	Total	15,974	100.0%	38,970	100.0%

Source: Department of Statistics

7.10.7 International Cost Comparison

For the purpose of determining the competitiveness of domestically produced petrochemical products, a comparison of production cost is made between Malaysia, Taiwan, and the Philippines for the manaufacture of general-purpose polystyrene.

The comparative production cost structures are outlined in Table 7.52.

TABLE 7.52
PETROCHEMICAL PRODUCTS:
COMPARATIVE PRODUCTION COST STRUCTURE[1]

Production Cost Components	Malaysia	Taiwan	Philippines
Direct Labour	3.5%	2.0%	2.0%
Direct Materials	87.0	89.0	89.0
Domestic	1.0	88.0	1.0
Imported	86.0	1.2	88.0
Overhead	9.5	8.8	9.0
Utilities	4.0	3.0	3.3
Depreciation	2.0	1.0	2.0
Repair and Maintenance	1.0	0.5	0.5
Other	2.5	4.3	3.2
Production Cost per MT	M$2,200	M$1,840	M$2,820

1. For general-purpose polystyrene

Source: SGV Field Survey

The following may be inferred from the above comparative data:

1. Compared to Malaysia, unit production cost of polystyrene is lower in Taiwan but higher in the Philippines. This is primarily due to raw material cost which is the decisive component of production cost. Styrene monomer, which accounts for more than 85% of total production costs, is locally produced in Taiwan while both Malaysian and Philippine producers import this particular input. Differences in the cost of styrene monomer can be substantial, as can be seen from the following comparison:

Country	Cost per MT (1984)
Malaysia	M$1,850
Taiwan	M$1,619
Philippines	M$2,500

   Currently, Philippine manufacturers are also facing restrictions on raw material importation due to foreign exchange scarcity.

2. Overheads are lowest in Taiwan. This is probably a reflection of larger plant size as well as lower energy cost as indicated in Table 7.53.

TABLE 7.53
PETROCHEMICAL PRODUCTS:
COMPARATIVE CAPACITY AND ELECTRICITY COST

Country	Capacity[1] (MT per annum)	Electricity Consumed per MT	Cost of Electricity per Kwh
Malaysia	9,300	300 kwh	M$0.24
Taiwan	43,200	250 kwh	M$0.12
Philippines	12,400	305 kwh	M$0.30

1. Capacity of respondent firms includes other polystyrenes.

Source: SGV Field Surveys

3. Direct labour cost, although not a major cost component, is the highest in Malaysia. Wage levels in the chemical industry in Malaysia are significantly higher than the Philippines but comparable with Taiwan, as can be seen in Table 7.54.

TABLE 7.54
PETROCHEMICAL PRODUCTS:
COMPARATIVE WAGE STRUCTURE

Job Category	Malaysia	Taiwan	Philippines
Production			
Supervisor/Foreman	M$ 780-1,300	M$1,400-1,750	M$330-500
Process Operators	520- 780	575- 860	170-250
Laboratory			
Supevisor	1,300-1,950	2,000	330-500
Laboratory Analyst	1,300-1,500	1,400	250-330
Laboratory Assistant	390-1,040	865-1,150	155
Repair & Maintenance			
Department Head	3,250-3,770	2,000	500-600
Engineers	1,820-3,250	1,150-1,725	330-500
Electrician/Fitter/ Technician	390-1,300	865-1,150	155

Note : Wages are expressed on a monthly basis inclusive of benefits.

Source: SGV Field Surveys

However, labour productivity is higher in the larger Taiwanese plants as the following output/labour ratios show:

TABLE 7.55
PETROCHEMICAL PRODUCTS:
COMPARATIVE LABOUR PRODUCTIVITY

Country	Labour Productivity (MT per worker) 1981	1982	1983
Malaysia	233	227	333
Taiwan	480	480	533
Philippines	344	n.a.	n.a.

Note : Labour Productivity = $\frac{\text{Annual Production (MT)}}{\text{No. of Direct Workers}}$

Source: SGV Field Surveys

With lower unit production costs, Taiwanese general purpose polystyrene is more competitively priced than the Malaysian product. Table 7.56 reflects price differences among the three countries.

TABLE 7.56
PETROCHEMICAL PRODUCTS:
COMPARATIVE PRICES[1]

(IN M$ PER MT)

	Domestic Price	Export Price	Co-Export[2] Price
Malaysia	$2,750	$2,250 (Singapore)	$2,320-2,350
Taiwan	$2,588	$1,840 (f.o.b.)	$ 1,955
Philippines	$4,470	no exports	-

1. For general-purpose polystyrene
2. Further processed for export

Source: SGV Field Surveys

VIII. PAINTS, INKS AND RELATED PRODUCTS

8.1 SECTORAL STRUCTURE AND CHARACTERISTICS

The study of this sub-sector mainly covers the manufacture of a range of paints and paint related products which may be classified as follows:

1. Bitumenous paints
2. Aluminium paints
3. Primers
4. Distempers and water paints
5. Emulsion paints
6. Gloss paints
7. Undercoats
8. Paint removers and thinners
9. Prepared lacquers, varnishes and shellac
10. Printing inks

It should be noted that other colouring products used in such industries as textiles and food, and intermediate goods used as raw material inputs in the manufacture of paints and inks are not included in the industry study as these are almost wholly imported. They are, however, included in the analysis of demand for purposes of comparison.

Apart from the inks used in the printing industry, the other paint and paint related products are used mainly in the construction and manufacturing industries as well as by homeowners and some other industrial users. Paints for industrial applications include stoving enamels for general industry, plastic coatings and anti-corrosion coatings for steel fabricated structures and tank forms used in the petrochemical industries. In the construction industry, the paints used are mainly decorative, and account for about 80% of the total market.

Local manufacturing of paints started in the 1950s with the establishment of factories by, what are today, the three largest paints manufacturers in the country, namely, ICI Paints, Berger Paints (PAR Malaysian) and Sissons Paints. As shown in Table 8.1, the number of establishments involved in the manufacture of paint products increased to 16 in 1973 and 37 by 1981. In current prices, the value of sectoral output grew at an average rate of 18.3% per annum from M$48.1 million to M$184.6 million over the period. Value added, however, showed an increase of only 17.0% from 1973 to 1981.

TABLE 8.1
PAINTS AND INKS:
ECONOMIC CONTRIBUTIONS
(VALUE IN M$ MILLION IN 1981 CONSTANT PRICES)

	Paints, Inks and Related Products		Total Chemical Industry	
	1973	1981	1973	1981
Number of establishments	16	37	337	479
Employment	867	1,508	10,209	17,433
Gross value of output (M$ million)	87.6	184.6	775.0	1,529.3
Value Added (M$ million)	31.5	60.9	318.9	461.7
Average Annual Growth Rate of Gross Output Value, 1973 - 1981	9.8%		8.9%	
Average Annual Growth Rate of Value Added, 1973 - 1981	8.6%		4.7%	

Source: Census of Manufacturing Industries, 1973 and 1981, Department of Statistics, Malaysia

Although locally produced paints account for about 85% of apparent consumption and imports only 15%, the paint industry is still highly dependent an imported raw material inputs like pigments, extenders, additives and solvents. These has, to date, been little backward integration in the industry in that almost all manufacturers source their raw materials externally. Only one large firm produces its own resins.

As the paint and paint related industry is one in which demand for its goods is dependent on the activity of other industries, especially the construction, automobile, marine and some manufacturing industries, its pattern of growth and development follows that of these other industries, of construction in particular and of GDP in general. The volume of local production increased to about 23.8 million litres in 1976 after a period of stagnation at around 22.0 million litres during the first half of the 1970s. The construction boom which highlighted the second half of the decade led to an increase in demand for decorative paints and a consequent increase in local production volume. By 1978, local production had increased to about 31.4 million litres annually, and 43.3 million by 1981, almost doubling that of 1973.

By the same token, the printing, publishing and allied industries also exhibited growth in the second half of the 1970s, after a period between 1973 and 1975 when activity actually decreased.

Employment in the manufacture of paints and paint related products increased from 867 in 1973 to 1,508 in 1981, reflecting the growth in the number of establishments involved in the industry.

Although there are presently an estimated 40 establishments involved in the manufacture of paints and another 12 in the manufacture of inks, pigments and related products locally, the industry is dominated by only 5 large paint and 2 medium-sized ink manufacturers who account for about 75% of the total annual production. Several of the other companies in the industry are very small operators, a situation reflected by the fact that 90% of total output is actually accounted for by about half of the establishments in operation.

In terms of paid-up capital, there are only 3 large paint firms capitalised at greater than M$3.0 million, 3 medium-size paint firms and 2 ink firms capitalised at between M$1.0 million and M$3.0 million with the remainder of the firms being small and capitalised at less than M$1.0 million. Table 8.2 below shows a breakdown of the 30 firms on the MIDA listing of paint and ink manufacturing companies in terms of their capitalisation. Industry sources indicate that the other firms not listed are small, capitalised at below M$1.0 million.

TABLE 8.2
PAINTS AND INKS:
DISTRIBUTION OF ESTABLISHMENTS BY CAPITALIZATION

	Small		Medium	Large
	(M$250K)	(M$1 million)	(M$3 million)	(M$3 million)
No. of MIDA approved establishments·				
Paint manufacturers	5	9	3	3
Ink manufacturers	5	3	2	-
Total	10	12	5	3
% distribution of MIDA approved establishments	33.3	40.0	16.7	10.0
Estimated % distribution of all establishments	46.0	38.0	10.0	6.0

Source: MIDA
SGV-KC Field Survey

As can be seen, there is a predominance of small firms in this industry, with about 84% of the total number capitalised at under M$1.0 million. In contrast, the largest paint firm in this respect, ICI Paints, has a paid-up capital of M$10.0 million, whereas the second largest, Sissons Paints, is capitalised at M$6.7 million. The largest ink manufacturer, Collie, is capitalised at M$2.2 million.

8.1.1 Current Industry Problems

The responses obtained from interviewees during the field survey indicate that the industry is fairly mature with no significant problems. Although the paint and ink manufacturers still use imported intermediate products, raw material supply is not considered a problem. In the local market, the existence of a relatively large number of small manufacturers and the continuing increase in new entrants is causing the industry some concerns. It is felt that although the situation is as yet not serious, the uncontrolled growth of manufacturing concenrs will lead to overcrowding and competition that would be detrimental to the industry, especially to the smaller companies already in existence.

Another source of competition in the domestic market has been introduced with the use of foreign contractors on turnkey projects, particularly in the construction industry. These foreign contractors invariably source materials from their own suppliers abroad an nationalistic or other grounds rather than for purely economic reasons. In this way, a significant portion of the market is denied to the local paint manufacturers.

For those manufacturers with an eye to exporting their paint products, the high tariff barriers in such countries as the Philippines, Thailand and Indonesia make if difficult for Malaysian products to be competitive. On the other hand, with a relatively low duty imposed an imports of paints into Malaysia (88 sen per litre or 25% ad valorem, whichever is higher), about 12% of total local demand is met by foreign paint products. The percentage of imports to local consumption has fluctuated between 15.6% in 1974 and 10.8% in 1978. In 1981, imports of paints and printing inks amounted to 11.9% of local consumption.

8.2 MARKETING ASPECTS

8.2.1 Products and Markets

Within this industry, the major products are paints and inks, each with its own unique market. The market for paints in Malaysia may be divided into 5 main sectors, namely:

- i) decorative paints
- ii) refinish paints (automobile)
- iii) marine paints
- iv) motor assembler paints
- v) industrial paints

The decorative paints sector is easily the largest, currently accounting for about 75% to 80% of the total paints market. The automobile industry is the next largest consumer of paints, the motor vehicle assemblers and refinishing workshops accounting for another 10% to 15% of the market. The industrial paints and marine paints, being more specialised in their application, have smaller shares of the market, accounting for about 6% and 4% respectively.

The market for printing inks is divided into segments by the type of end-users. These include the following:

i) newspaper printing
ii) books and magazine printing
iii) corrugated printing (carton printing)
iv) paper packaging printing
v) plastic packaging printing (plastic film printing)
vi) metal decorating (sheet metal printing)
vii) security printing
viii) computer form printing
ix) general printing

Apart from the inks used in the printing of corrugated cartons and plastic film packaging which are "liquid inks", the printing inks are mostly "oil inks". Certain manufacturing industries also use solvent-based inks such as those used in the screen printing processes involved in the production of printed circuit boards for the electronics industry.

Apart from the printers in the private sector, the government printers also represent major users of printing inks, particularly those used in publishing and general printing as well as sheet-fed cyclostyling.

Table 8.3 below shows the growth in apparent domestic consumption of paints and ink products from 1973 to 1981. As can be seen, local production has been accounting for about 86% of apparent consumption and exports about 3% of local production. Imports averaged 16.5% of demand over that period. It should be noted that these figures do not include the imports and exports of other products like dyestuffs, tanning extracts, other prepared pigments, colour lakes and glazes.

TABLE 8.3
PAINTS AND INKS:
APPARENT CONSUMPTION, 1973 - 1981
(M$ MILLION, 1981 CONSTANT PRICES)

	In M$ Million				As % of Apparent Consumption		As % of Local Production
Year	Local Production	Imports	Exports	Apparent Consumption	Local Production	Imports	Exports
1973	$89.7	$18.5	$1.8	$106.4	84.3%	17.4%	2.0%
1974	86.6	22.0	1.2	107.4	80.6	20.5	1.4
1975	95.3	16.4	1.9	109.8	86.8	14.9	2.0
1976	106.7	18.9	3.2	122.4	87.2	15.4	3.0
1977	109.8	23.3	3.7	129.4	84.9	18.0	3.4
1978	124.7	20.4	3.7	141.4	88.2	14.4	3.0
1979	141.4	23.9	4.8	160.5	88.1	14.9	3.4
1980	151.2	31.2	4.2	178.2	84.8	17.5	2.8
1981	161.7	29.5	4.5	186.7	86.6	15.8	2.8
Average Annual Growth Rate	7.6%	6.0%	12.1%	7.3%			

Notes : Value of local production, exports and imports adjusted to 1981 constant prices using the producer price indices for local production and imports.

Source: Trade Statistics, Department of Statistics, Malaysia.

8.2.2 Key Marketing Variables

When asked about the factors that contribute to a company's success in the paint industry, most of the repondents indicated that a host of factors were required, ranging from company image and product quality to price competitiveness and good customer and dealer relations.

The larger companies, in particular, place great emphasis on product quality in the marketing of their products. They feel that it is important to establish a good company and product image and as such, adopt a long term approach to marketing. For this, reasonably heavy advertising and a consistent promotional compaign is required to supplement and educate the consumers about the importance of good product quality as offered by the larger companies. The interview respondents also felt that this strategy would become even more important as the D-I-Y (do-it-yourself) market for paints grows over the next five years. Image is also important in the industrial market.

It follows from the above discussion then, that the larger companies also require a good network of distributors with whom they have good relations to ensure widespread availability of their products. The market segment purchasing through these distributors is very large.

The Malaysian consumer market is characterised by the overwhelming emphasis on product price competitiveness. In the industry, this is particularly important, in view of the many small manufacturers that are present. The low technology employed by the small producers allows them to manufacture cheaply, but usually at the expense of quality. The importance of price competition then, especially in the decorative or housing sector of the market is that it allows the small manufacturers to compete.

The preoccupation with pricing has, however, led to developments in the paints market which are ultimately damaging, both to the consumers and the manufacturers. The tendency of developers to buy the cheapest paint, even to the point of forgoing product quality means that the ultimate consumers, the house-buyers are not always getting the best value. Poor quality paints represent false economy in that they do not last for long, especially in the hot and humid local climate, which encourages fungal growth and rapid fading of colour. The larger manufacturers feel it is important then, to educate the consumers about quality.

Unscrupulous contractors also adulterate good paints with cheaper ones. This practice is difficult to control in the absence of a governing body or a professional code of ethics. But again, this practice seems unnecessary in view of the fact that the labour costs are usually 70% of a painting job, making the cost component of paint quite insignificant in comparison.

8.2.3 Product Pricing

Given the present situation in which there are several existing manufacturers and competition is keen, particularly in the decorative market for paints, most manufacturers adopt a competitive pricing policy The larger firms who are already well established, like ICI, Sissons and Berger, quote slightly higher prices than average, but nevertheless, still adopt what is basically a competitive pricing policy.

One company, Nippon Paints, has managed to secure a significant portion of the decorative paint market, becoming one of the four largest manufacturers, by adopting a very competitive pricing policy aimed at the middle and lower end of the market.

The ink manufacturers adopt both cost-plus and competitive pricing, depending on the nature of the market segment they supply. In some instances, when there are orders for specialist inks or other less common inks, cost-plus pricing is used. When submitting quotes or tenders, the suppliers adopt a much softer stance, especially when trying to secure government contracts, and will negotiate a price.

8.2.4. Distribution

Apart from industrial and motor (assemblers) paints which are sold direct to the end-users, paints are generally distributed through wholesalers and agents who in turn, supply to retailers and other dealers respectively. In the decorative, refinish and marine paint sectors, it is estimated that only 30% of sales are direct, the rest going mainly through wholesalers.

Ink manufacturers also employ a network of agents who in turn redistribute their goods. By supplying to a network of wholesalers or agents, the manufacturers minimise their own transport costs by passing that responsibility on to their wholesalers.

8.2.5 Advertising and Promotion

With the intention of creating a good company and product image, the largest paint manufacturers need to advertise and promote their products quite heavily. The larger companies set aside about 2% of their sales for advertising in such media as local newspapers, magazines, trade journals, radio and television. Promotional aids are also used, and there include colour shade cards, calendars and diaries, T-shirts and gift stamps.

The smaller companies, with more modest advertising budgets limit their advertisements to newspapers, trade journals and some promotional campaigns.

8.3. PRODUCTION ASPECTS

8.3.1 Technology Assessment

Essentially, paint production involves the through mixing of the basic ingredients of pigments, resins and solvents in the correct proportions, according to formulae or recipes. The simplicity of the production process partially explains the proliferation of manufactures over the past 20 years.

The 3 basic ingredients of paints are:

i) pigments and various extenders that provide the colour, opacity and also contribute to the durability of the paint film, like titanium dioxide, carbon black and china clay or calcium carbonate,

ii) resins and drying oils which together provide the film forming binder, like alkyds, vinyl and acrylic resins and linseed or soya bean oil,

iii) solvents which help to maintain fluidity, influencing the viscosity, drying time and ease of application, like acetone, isopropanol, xylene or water.

It is in the production of high quality paints that technology plays a major role. The large manufacturers like ICI, Sissons and Berger have automated plants and comprehensive laboratory facilities to continually develop and test new formulations and processing methods. Quality control at each critical stage in the manufacturing process is also employed to ensure consistency of product quality.

The improvement in paint production technology lies not so much in the development of new manufacturing processes as in the development of better products for existing and new applications. Research and development in Malaysia is aimed mainly at the modification or adoptation of paint formulae, devised by foreign parent companies in Europe or Japan, for use in the local environment. As such, no real basic research is presently carried out locally, and the new paint products recently introduced to the market like non-drip gloss and cathodic electrocoat paints, are actually modified versions of new products developed elsewhere.

Some manufacturers feel that the next stage of development in this industry in Malaysia should be aimed at improving local research and development to such an extent as to develop new and original technology. The market as represented by the ASEAN countries, is sufficiently large to support such a development.

However, the dearth of local expertise, like paint technologists and chemists, will mean that to a certain extent, foreign experts will be needed to set up the research facilities. This will require the paint manufacturers to apply for and secure work permits for their foreign personnel, something which is becoming increasingly difficult to do.

8.3.2 Production Cost Structure

Given the fairly simple processes involved in paint and ink manufacturing, the unit fixed costs are relatively low when compared with the variable costs. The field survey interviews produced the following results:

Production Cost Component	% of Total Cost
Direct Labour	7 - 10%
Direct Material (incld. packaging)	
- Imported	20 - 25
- Domestic	50 - 55
Overheads:	
- Energy	1 - 2
- Depreciation	3 - 5
- Repair and Maintenance, etc.	7 - 10

The results show that variable costs are the largest contributors to total cost, with direct materials alone accounting for up to 80%. Of the raw materials used, it is also apparent that imported inputs are still required, particularly in the form of pigments and oils. Although some raw material inputs are now manufactured locally, there has been very little backward integration in the industry. Only one manufacturer, ICI Paints, has its own resin production facilities.

8.3.3 Material Inputs

The paint and ink industry is still highly dependent on imported raw materials. Apart from ICI Paints with their own resins production facilities, there is only one other manufacturer of alkyd resins who supplies the paint companies. There are also two local producers of polyvinyl acetate and acrylic emulsions. The other local inputs include some pigments and extenders like kaolin clay and calcium carbonate. The other major components or ingredients of paints like pigments, drying oils, additives and solvents are mostly imported.

The same is true of the ink manufacturers, who need to import the majority of their inputs such as pigments, varnishes and white spirits. Locally sourced inputs include carbon black, industrial glucose, alkyds, glycerine, vegetable oils and some solvents.

The import duty on inputs not locally produced is generally low, at 3% for pigments, 5% for drying oils like alkali refined soya bean oil and M$0.01 per litre or 5% for solvents like white spirit. Import duty on raw materials locally produced is considerably higher.

8.3.4 Capacity Utilization

Overall production capacity utilization fell to a low of 34% in 1977, but has been slowly rising to reach 39% by 1981. The largest paint companies have reported increases in utilization over the past 3 years and it is estimated that current utilization is about 50 - 55% overall.

8.4 FINANCIAL ASPECTS

8.4.1 Ownership Structure

The paint manufacturing industry is characterised by an ownership structure reflective of its historical development. The four largest and oldest companies were founded by foreign investors who still maintain significant shareholdings in them, as can be seen in Table 8.4 below.

TABLE 8.4
PAINTS AND INKS:
OWNERSHIP STRUCTURE OF SELECTED
MAJOR PAINT MANUFACTURERS

Manufacturer	Paid-up Capital	% Shareholding Bumiputra	Non-Bumiputra	Foreign
ICI Paints (M) Sdn. Bhd.	$10.0m	30%	-	70%
Sissons Paints (East) Sdn. Bhd.	6.7m	25	-	75
Nippon Paints (M) Sdn. Bhd.	3.0m	-	51%	49
Berger Paints (M) Sdn. Bhd.	1.8m	70	-	30
Total	$21.5m	27.6%	7.1%	65.3%

Source: SGV-KC Field Survey

In terms of the amount of shares held in these four companies foreign investors account for 65.3% of the total, Bumiputras 27.6% and non-Bumiputras the remaining 7.1%. The ownership and structure of the other firms in the industry is very different, being characterised by companies capitalized at an average of M$500,000 with an average workforce of 20 employees. These companies are predominantly non-Bumiputra by ownership and when taken as a whole, the estimated share of Bumiputra capital is only about 15% of the total of approximately M$40.0 million. The foreign capital component is likewise reduced to about 35% and the non-Bumiputra share correspondingly increased to 50%.

That the largest paint companies are the only ones with any significant Bumiputra participation, and that these shares are generally held by large Bumiputra institutions like Pernas Sime Darby and the Lembaga Tabung Angkatan Tentera (LTAT) or the Armed Forces Fund Board, are indicative of the moves made by industry to meet the investment guidelines regarding Bumiputra capital paprticipation as set out in the New Economic Policy (NEP).

The larger, well established companies are obviously better investment prospects and therefore more attractive to prospective Bumiputra investors. The smaller firms, run as family concerns, are not only less attractive, but the owners are also reluctant to relinquish even a small part of a business they built. As a result, fairly mature industries such as this are now characterised by the inclusion of Bumiputra capital, especially in the larger firms, in the form of investments made by large Bumiputra institutions or funds, with little entrepreneurial Bumiputra capital participation in the smaller firms.

In the manufacture of printing inks, the percentage shareholding of Bumiputras is higher, with the amount of Bumiputra capital employed amounting to about 35% of the total capital paid up of about M$6.0 million.

8.5. EMPLOYMENT ASPECTS

8.5.1 Employment Structure

According to the 1981 Census of Manufacturing Industries, employment in the industry stood at 1.508, having increased from 867 in 1973. The Consultants' field survey of the larger paint and ink manufacturers indicated that the functional composition of the employees are as shown in Table 8.5 below:

TABLE 8.5
PAINTS AND INKS:
EMPLOYMENT STRUCTURE OF LARGER MANUFACTURERS

Function	% of Total	% Bumiputra	% Non-Bumiputra
Management and Supervisory	18%	30 - 35%	65 - 70%
Clerical and Related	17	15 - 30	70 - 85
Sales	4	15	85
Direct Production Labour	61	45 - 70	30 - 65

Source: SGV-KC Field Survey

As in the rest of the chemical industry, the chemical process workers are generally skilled or semi-skilled, ranging from engineering assistants to engineers. These technical or skilled workers represent about 20% of the production staff generally. The rest of the production personnel are usually unskilled labourers involved in non-chemical production functions. The fairly high volume of output, particularly from the larger plants, requires a large proportion of the unskilled labour to perform routine, packing and other production chores

8.5.2 Wage Structure

The field survey showed the following to be the wage structure within the paint and ink manufacturing industry (Table 8.6). The wages tabulated do no include employee benefits such as EPF and SOCSO contributions and insurance cover. Another 20 to 25% should be added to include these benefits.

TABLE 8.6
PAINTS AND INKS:
WAGE STRUCTURE

	Job Category	Average Monthly Wage
1.	Technical Staff	
	- Chemical Engineers	M$3,000 - 4,000
	- Chemists	1,500 - 3,500
	- Lab. Technicians/Engin. Asst.	450 - 950
2.	Skilled Labour	
	- Production Supervisors	950 - 1,500
	- Chemical Process Workers	850
	- Chargemen	700
	- Colour Matchers	450 - 500
3.	Unskilled Labour	
	- Non-Chemical Workers	350 - 400
	- General Labour	300 - 350

Source: SGV-KC Field Survey

8.5.3 Labour Supply and Turnover

The paint and ink manufacturing companies interviewed reported fairly low labour turnover rates, even among the unskilled workers. On the average, the turnover amounted to about 5% of the skilled and unskilled labour. The reasons given for the mobility of production workers included the limited supply of, and high demand for, factory workers in the Kelang Valley, especially in Shah Alam, and the demand for certain categories of workers like production supervisors and laboratory technicians.

Apart from certain categories of skilled labour as mentioned, the manufacturers felt that there seemed to be a generally adequate supply of labour. This situation is not unique to the chemical industry, and is reflected by the constant call for improved training facilities to alleviate the problem of a chronic shortage of skilled workers.

8.5.4 Labour Training

Most of the production staff in local paint manufacturing companies receive training on-the-job. In the case of technical and sales/marketing personnel, some companies provide in-house training programs. The higher level technical staff are usually graduates or holders of diplomas from foreign educational establishments or local institutaions like the National Productivity Centre (NPC) or the Malaysian Institute of Management (MIM).

A commonly expressed opinion is that there are insufficient vocational training establishments locally and that the training provided by those in existence is insufficient to overcome the shortage of skilled production workers generally.

8.6 MALAYSIAN IMPORTS

Imports of paints and inks as well as other colouring products and intermediates such as pigments, dyes and colour lakes have increased slightly in real terms, from about M$85.5 million in 1973 to M$105.5 million in 1981 (1981 constant prices), growing at only 2.7% per annum. The imports by type of product are listed below in Table 8.7. It should be noted that now included are both intermediate and other products not hitherto covered in the discussion of the industry to facilitate comparison between imports, exports and the local production only of finished goods like paints and inks.

TABLE 8.7
PAINTS, INKS AND RELATED PRODUCTS:
IMPORTS, 1973 AND 1981
(M$'000 IN 1981 CONSTANT PRICES)

		1973		1981	
SITC	Products	Value	% Share	Value	% Share
5334	Paints, varnishes, distempers	M$16,680	19.5	M$ 28,753	27.2
5332	Printing ink	1,805	2.1	763	0.7
5335	Pigments, colours, glazes etc.	7,389	8.6	21,775	20.6
5311	Synthetic organic dyestuffs	44,758	52.3	5,557	5.3
5312	Colour lakes and synthetic organic luminophores	150	0.2	30,612	28.9
5322	Tanning extracts, colouring matter of vegetable or animal origin	1,245	1.5	1,501	1.4
5323	Synthetic tanning extracts	772	0.9	443	0.4
5331	Other colouring matter	8,083	9.5	6,973	6.6
8959	Inks other than printing	4,640	5.4	9,471	8.9
	Total	M$85,522	100.0%	M$105,848	100.0%

Source: Trade Statistics, Department of Statistics, Malaysia

As can be seen, imports of paints and paint related products like varnishes and lacquers, and printing ink accounted for 27.9% of total imports of paints, inks and other colouring matter in 1981, having risen from 21.6% in 1973. The other significant imports are pigments and dyes which accounted for about 61.1% of total imports in 1973 and 54.8% in 1981. These include pigments, colours and glazes used in the ceramics and glass industries, which grew from 8.6% of imports to 20.6% over these years. Imports of synthetic organic dyestuffs, which accounted for 52.3% of the total in 1973, fell drastically to only 5.3% by 1981. On the other hand, colour lakes and synthetic organic luminophores, which amounted to only 0.2% of imports in 1973 accounted for 28.9% of the total in 1981.

These figures appear to show that although local manufacturing capability and capacity has risen over the years, imported paints and varnishes, pigments and colours used in ceramics and basic inputs like colour lakes and organic luminophores are still important in helping to meet the demand for these products in Malaysia. This is especially true of the ceramic colours and glazes as well as colour lakes and synthetic organic luminophores which are intermediate products required by the industry and not available locally.

Of the paint and ink products imported, the major exporters to Malaysia are shown in Table 8.8 below.

TABLE 8.8
PAINTS, INKS, PIGMENTS AND DYESTUFFS:
IMPORTS, 1973 AND 1981
(M$'000 IN 1981 CONSTANT PRICES)

SITC	Products/Countries of Origin	1973 M$'000	1973 % Share	1981 M$'000	1981 % Share
5332 & 5334	Paints and Printing Ink:				
	Japan	M$ 4,076	22.0	M$10,370	35.2
	Singapore	3,098	16.8	8,230	27.9
	United Kingdom	4,190	22.7	2,774	9.4
	West Germany	1,930	10.4	957	3.2
	Others	4,245	23.0	4,444	15.1
	Total	M$18,485	100.0%	M$29,516	100.0%
5335 & 5311	Pigments, colours, glazes and dyestuffs:				
	Japan	M$12,669	24.3	M$ 6,013	22.0
	United Kingdom	11,041	21.1	8,784	32.1
	U.S. of America	1,759	3.4	1,983	7.3
	Australia	789	1.5	1,748	6.4
	Hong Kong	504	1.0	756	2.8
	Others	25,348	48.6	8,048	29.4
	Total	52,146	100.0%	27,332	100.0%

Source: Trade Statistics, Department of Statistics, Malaysia

The table shows that Malaysia has traditionally imported a lot of paint and ink products from Japan, which accounted for 22.0% of such imports in 1973 and 35.1% in 1981. Singapore also increased its exports of there products to Malaysia, from 16.8% to 27.9% of the totals in 1973 and 1981 respectively. The United Kingdom has become less important as an exporter of paints and inks to Malaysia, reducing its 22.7% share in 1973 to only 9.4 by 1981. West Germany has also lost its share of the market to the United States, declining from 10.4% in 1973 to 3.5% in 1981.

8.7 MALAYSIAN EXPORTS

Exports of paints, inks, varnishes and all related products and intermediates have increased at an average of 7.6% per annum between 1973 and 1981. The volume and value of exports, however, is small in both absolute and relative terms when compared with the size of imports and local consumption. In 1983, the exports of these products amounted to only M$3.1 million (1981 constant prices), compared with imports of M$82.4 million. By 1981, the value of there exports had increased to M$5.5 million, but imports had also increased to M$97.2 million. Table 8.9 below lists there imports by type of product, and allows a comparison of the main items exported.

TABLE 8.9
PAINTS, INKS AND RELATED PRODUCTS:
EXPORTS, 1973 AND 1981
(M$ '000 IN 1981 CONSTANT PRICES)

SITC	Products	1973 Value	1973 % Share	1981 Value	1981 % Share
5334	Paints, varnishes, distempers	M$1,670	54.6	M$3,616	66.0
5332	Printing ink	153	5.0	814	14.9
5335	Pigments, colours, glases etc	286	9.3	328	6.0
5311	Synthetic organic dyestuffs	608	19.9	86	1.6
5312	Colour inks and synthetic organic luminophores	1	-	103	1.9
5322	Tanning extracts, colouring matter of vegetable or animal origin	23	0.8	112	2.0
5331	Other colouring matter	159	5.2	78	1.4
8959	Inks other than printing	161	5.3	344	6.3
	Total	M$3,061	100.0%	M$5,481	100.0%

Source: Trade Statistics, Department of Statistics, Malaysia.

As can be seen from the table, the largest exports have been of finished products of paints, varnishes, lacquers and inks, which accounted for about 60% of total exports in 1973 and 81% in 1981. The next largest group of exports of colouring products have been pigments, colours and glazes used in the ceramics industry as well as synthetic organic dyestuffs used in good and other industries, which together accounted for 29% of total exports in 1973 and about 8% in 1981. The countries of destination of these products are listed in Table 8.10 below.

TABLE 8.10
PAINTS, INKS, PIGMENTS AND DYESTUFFS:
EXPORTS, 1973 AND 1981
(M$ '000 IN 1981 CONSTANT PRICES)

SITC	Products/Countries of Origin	1973		1981	
		M$'000	% Share	M$'000	% Share
5332 & 5334	Paints and printing ink:				
	Singapore	266	14.6	1,380	30.5
	Brunei	506	27.8	1,286	28.4
	Hong Kong	128	7.0	392	8.7
	Thailand	100	5.5	-	-
	Taiwan	65	3.5	-	-
	Others	758	41.6	1,466	32.4
	Total	1,823	100.0%	4,524	100.0%
5335 & 5311	Pigments, colours glazes and dyestuffs:				
	Singapore	609	68.1	339	60.5
	Philippines	-	-	64	11.4
	New Zealand	90	10.1	-	-
	United Kingdom	-	-	44	7.9
	Indonesia	38	4.3	39	7.0
	Others	157	17	74	13.2
	Total	894	100.	560	100.0%

Source: Trade Statistics, Department of Statistics, Malaysia

It can be seen that between 1973 and 1981 Brunei was displaced by Singapore as the main importer of Malaysian paints and printing ink. The main bulk of the increase in the exports of these products went to Singapore who was also the major importer of pigments, colours and glazes used in the ceramics industry and also dyestuffs used in the food and other industries.

It is also interesting to note that the structure of these exports has changed since 1973, towards a greater demand for finished products like paints, varnishes and inks and a corresponding fall in the demand for intermediate products like pigments and dyestuffs. This may be reflective of the lack of tariff barriers in Singapore, as well as indicative of the implicit policies of the Singapore government to especially encourage the development of high technology industries there, resulting in a movement of medium and low technology industries, like paint manufacturing, across the causeway to Malaysia.

8.8 DEMAND ANALYSIS

8.8.1 Historical Demand

The analysis of demand and the estimation of apparent consumption will be confined to paints, varnishes, lacquers and printing ink as these represent the major products of the industry in terms of local demand and production. It is also necessary to remove the imports of intermediate products from the consumption figures as these act as inputs to the industry for use in the manufacture of paints and inks, and their inclusion would result in an over estimation of the size of local demand for the finished goods.

It has already been shown in Table 8.3 that the apparent consumption of paints and printing inks has risen from M$106.4 million in 1973 to M$186.7 million in 1981 constant prices. It is estimated that this represented an increase in the volume of consumption from 24.1 million litres in 1973 to 45.5 million litres by 1981, equivalent to an annual increase of about 8.3%. Table 8.11 below compares the value and volume of apparent consumption in terms of local production, imports and exports.

TABLE 8.11
PAINTS AND INKS:
VOLUME AND VALUE OF APPARENT CONSUMPTION, 1973 - 1981
(IN 1981 CONSTANT PRICES)

Year	Local Production		Imports		Exports		Apparent Consumption	
	Volume (Million l)	Value (M$ Million)	Volume (Million l)	Value (M$ Million)	Volume (Million l)	Value (M$ Million)	Volume (Million l)	Value (M$ Million
1973	22.5	89.7	2.0	18.5	0.4	1.8	24.1	106.4
1974	21.0	86.6	2.4	22.0	0.3	1.2	23.1	107.4
1975	21.1	95.3	1.8	16.4	0.5	1.9	22.4	109.8
1976	23.8	106.7	2.1	18.9	0.8	3.2	25.1	122.4
1977	27.1	109.8	2.6	23.3	0.9	3.7	28.8	129.4
1978	31.4	124.7	2.2	20.4	0.9	3.7	32.7	141.4
1979	35.5	141.4	2.6	23.9	1.2	4.8	36.9	160.5
1980	38.7	151.2	3.4	31.2	1.0	4.2	41.1	178.2
1981	43.3	161.7	3.2	29.5	1.0	4.5	45.5	186.7
Average Annual Growth Rate	8.5%	7.6%	6.1	6.0%	12.1%	12.1%	8.3%	7.3%

Sources: Trade Statistics, Department of Statistics, Malaysia
Monthly Statistical Bulletin, Department of Statistics, Malaysia

It may be interesting to note that whereas the majority of paint products have doubled with regard to the volume of local production between 1973 and 1981, emulsion paints used for decorative purposes in the construction industry have trebled over the same period. In 1973, the volume of local production of emulsion paints stood at about 15.2 million litres, having grown at an average rate of about 15.5% per annum. This is reflective of the increase in construction activity over that period. Table 8.12 below compares the local production of the various paint and ink products by type in 1973 and 1981.

TABLE 8.12
PAINTS AND INKS:
LOCAL PRODUCTION, 1973 AND 1981
(IN 1981 CONSTANT PRICES)

Products	1973 (Million Litres)	1973 (M$ Million)	1981 (Million Litres)	1981 (M$ Million)
Paint removers and thinners	2.12	2.89	1.82	5.36
Bituminous paints	0.05	0.12	0.09	0.20
Aluminium paints	0.37	1.03	0.72	2.08
Primers	0.99	5.04	1.79	8.74
Distempers and water paints	3.77	4.51	4.81	6.95
Emulsion paints	4.78	17.84	15.21	41.31
Gloss paints	6.49	34.24	11.88	67.24
Undercoats	1.84	5.99	3.67	11.34
Prepared lacquers, varnishes and shellac	0.99	6.49	1.48	7.07
Printing ink	1.12	11.55	1.81	11.44
Total	22.52	89.71	43.27	161.72

Source: Monthly Statistical Bulletin, Department of Statistics, Malaysia

As the major users of paint products have traditionally been the construction and manufacturing industries (to a much smaller extent), the output of the paint manufacturers may be expected to reflect the activity of those industries. As construction activity is in turn dependent on the economic condition of the country, a correlation between paint demand and GDP as well as per capita GDP is expected to exist. Table 8.13 below compares the apparent consumption of paints, inks and related products with output of the construction industry, GDP and per capita GDP over the years from 1973 to 1981.

TABLE 8.13
PAINTS AND INKS:
COMPARISON OF CONSUMPTION OF PAINTS AND INKS
WITH CONSTRUCTION OUTPUT, GDP AND PER CAPITA GDP

Year	Apparent Consumption of Paints and Inks		Construction Output	GDP	Per Capita GDP
	(Million l)	(M$ Million)	(M$ Billion)	(M$ Billion)	(M$'000)
1973	24.1	106.4	0.65	15.90	1.41
1974	23.1	107.4	0.73	17.22	1.48
1975	22.4	109.8	0.65	17.37	1.46
1976	25.1	122.4	0.71	19.37	1.58
1977	28.8	129.4	0.80	20.88	1.66
1978	32.7	141.4	0.92	22.26	1.73
1979	36.9	160.5	1.03	24.32	1.83
1980	41.1	178.2	1.21	26.32	1.96
1981	45.5	186.7	1.39	28.09	2.00

Note : Apparent consumption of paints and inks are in 1981 constant prices, construction output GDP and per capita GDP in 1970 constant prices.

Sources: Monthly Statistical Bulletin, Department of Statistics, Malaysia
Economic Reports, Ministry of Finance, Malaysia

The table shows marked similarities between the level of demand for paints and inks and the output of the construction industry, as well as the GDP figures over the years 1973 to 1981. As discussed earlier, this is only as expected, given the significant dependence of the paints industry on the activity of the construction sector which is in turn dependent on the strength of the economy.

Growth of demand for paints and inks during the 1973 - 1981 period appeared to be divided into 2 distinct phases, the first from 1973 to 1975 during which a very low value growth of 16% per annum was registered, and the second from 1976 to 1981 when demand grew at an average of 9.3% per annum. This two-phase trend is also demonstrated by construction output and the rise in GDP. Given the strength of historical evidence, it is anticipated that the correlation between the demand for paint and ink products and construction output and GDP will remain significant over the next decade at least.

8.8.2 Projected Demand

Based on the results of the previous section analysing the qualitative nature of demand for paint and ink products, correlation and regression analyses were performed to determine the strength of the relationships that were speculated to exist between demand for these products and the activity of the construction or manufacturing industries in the context of the Malaysian economy.

The analyses established the existence of significant correlations between the demand for paint and ink products and construction output, GDP, per capita GDP and per capita private consumption. Multiple regression analysis was also performed using a combination of the economic indicators as the independent variables. However, although apparently acceptable regression models were obtained, tests of the significance of the independent variables showed that the simple linear regression between the demand for paint and ink products and GDP to be the best, with coefficients of determination (r^2) of 0.9845 and 0.9614 for the relationships between the value of demand and the volume of demand with GDP respectively.

The linear regressions obtained are shown below:

$$Y = 1.94X - 10.25$$
$$(R^2 = 0.9614,\ t = 13.21)$$

Where: Y = domestic demand for paints and inks in million litres

X = projected GDP in M$ billion in 1970 constant prices

$$Y = 7.12X - 13.75$$
$$(R^2 = 0.9845, t = 21.11)$$

Where: Y = domestic demand for paints and inks in M$ million in 1981 constant prices

X = projected GDP in M$ billion in 1970 constant prices

Using these relationships, domestic demand for these products was projected, in both volume and value terms, based on forecasts of the growth of the Malaysian economy (expressed as GDP) made by the Economic Planning Unit (EPU) of the Prime Minister's Department (see Appendix 30). These forecasts were made using three bases of economic growth, labelled as low, medium and high, which allowed in turn, projections of domestic demand to be made at different rates of growth.

Exports of paints and inks have been small, maintaining a fairly constant share of about 2% to 3% of local production in the past. Export markets are limited as most countries have achieved high levels of self-sufficiency in paint production. this is primarily due to high transportation costs for the finished products as well as differences in taste and climatic conditions of each country. Therefore, export markets will be confined to neighboring countries.

It is reasonable to assume that exports of paints and inks will maintain its present share of local production over the period 1985 - 1995. Since local production is expected to keep pace with domestic demand, exports will also grow at the same rate as domestic demand.

Projections of demand for domestic consumption as well as export are presented in Tables 8.14 and 8.15. From the projections, growth in demand for paints and inks range from about 6.3% to 9.0% per annum over the next decade.

TABLE 8.14
PAINTS AND INKS:
PROJECTED DEMAND BY VOLUME, 1985 - 1995
(MILLION LITRES)

Year	Domestic Demand			Exports			Total Demand		
	Low	Medium	High	Low	Medium	High	Low	Medium	High
1985	59.1	59.1	59.1	1.4	1.4	1.4	60.5	60.5	60.5
1986	63.3	64.0	64.6	1.5	1.5	1.5	64.8	65.5	66.1
1987	67.7	69.2	70.6	1.6	1.6	1.7	69.3	70.8	72.3
1988	72.4	74.7	77.0	1.7	1.8	1.8	74.1	76.5	78.8
1989	77.3	80.7	84.0	1.8	1.9	2.0	79.1	82.6	86.0
1990	82.6	87.0	91.6	2.0	2.1	2.2	84.6	89.1	93.8
1991	88.2	93.9	99.7	2.1	2.2	2.4	90.3	96.1	102.1
1992	94.1	101.1	108.5	2.2	2.4	2.6	96.3	103.5	111.1
1993	100.3	108.9	118.0	2.4	2.6	2.8	102.7	111.5	120.8
1994	106.9	117.3	128.3	2.5	2.8	3.0	109.4	120.1	131.3
1995	114.0	126.2	139.3	2.7	3.0	3.3	116.7	129.2	142.6
Average Annual Growth Rate									
1985 - 1990	7.0%	8.1%	9.2%	7.0%	8.1%	9.2%	7.0%	8.1%	9.2%
1990 - 1995	6.6	7.7	8.8	6.6	7.7	8.8	6.6	7.7	8.8

TABLE 8.15
PAINTS AND INKS:
PROJECTED DEMAND BY VALUE, 1985 - 1995
(M$ MILLION IN 1981 CONSTANT PRICES)

Year	Domestic Demand			Exports			Total Demand		
	Low	Medium	High	Low	Medium	High	Low	Medium	High
1985	240.8	240.8	240.8	6.0	6.0	6.0	246.8	246.8	246.8
1986	256.1	258.7	261.2	6.4	6.4	6.5	262.5	265.1	267.7
1987	272.3	277.7	283.2	6.8	6.9	7.1	279.1	284.6	290.3
1988	289.5	298.1	307.0	7.2	7.4	7.6	296.7	305.5	314.6
1989	307.7	320.0	332.6	7.7	8.0	8.3	315.4	328.0	340.9
1990	326.9	343.3	360.4	8.1	8.6	9.0	335.0	351.9	369.4
1991	347.4	368.3	390.3	8.6	9.2	9.7	356.0	377.5	400.0
1992	369.1	395.1	422.6	9.2	9.9	10.5	378.3	405.0	433.1
1993	392.0	423.7	457.5	9.8	10.6	11.4	401.8	434.3	468.9
1994	416.4	454.3	495.2	10.4	11.3	12.4	426.8	465.6	507.6
1995	442.2	487.1	535.9	11.0	12.1	13.4	453.2	499.2	549.3
Average Annual Growth Rate									
1985 - 1990	6.3%	7.4%	8.4%	6.3%	7.4%	8.4%	6.3%	7.4%	8.4%
1990 - 1995	6.2	7.2	8.3	6.2	7.2	8.3	6.2	7.2	8.3

IX. PHARMACEUTICAL PRODUCTS

9.1 SECTORAL STRUCTURE AND CHARACTERISTICS

Pharmaceuticals encompass an extremely wide range of products. The following product groups are covered in this study:

SITC	Product Group
5411	Provitamins and vitamins, natural or synthesised, and their derivatives
5413	Antibiotics
5414	Vegetable alkaloids, natural or synthesised, and their derivatives
5415	Hormones, natural or synthesised, and their derivatives
5416	Glycosides, natural or synthesised, and their derivatives; antisera; microbial vaccines, toxins, cultures and similar products
5417	Medicaments, including veterinary medicaments

Apparent consumption of pharmaceutical products grew at an average rate of 8.0% per annum over the period 1973 to 1981, in line with growth in GDP and per capita GDP.

Imported products account for a large proportion of domestic demand. Imports amounted to 93% of apparent consumption in 1973 and 84% in 1981. Domestic production of pharmaceuticals has increased over the past decade but output as a proportion of consumption remained below 30%.

TABLE 9.1
PHARMACEUTICAL PRODUCTS:
APPARENT CONSUMPTION, 1973 AND 1981
(M$ MILLION IN 1981 CONSTANT PRICES)

	1973	1981
Imports	$92.9	$156.1
Local Production	22.1	49.1
Exports	15.2	20.1
Apparent Consumption	99.7	185.0
Output as a % of Consumption	22%	27%
Imports as a % of Consumption	93%	84%

Source: Department of Statistics

Ex-factory sales value of medicines and pharmaceuticals in Peninsular Malaysia from 1973 to 1981 is shown in Table 9.2.

TABLE 9.2
PHARMACEUTICAL PRODUCTS:
LOCAL PRODUCTION , 1973 - 1981
(M$ MILLION IN 1981 CONSTANT PRICES)

Year	Ex-factory Sales Value
1973	$22,068
1974	28,713
1975	22,166
1976	24,932
1977	31,816
1978	46,388
1979	51,651
1980	47,842
1981	49,112
Average Annual Growth Rate	10.5%

Source: Department of Satistics

According to the Censuses of Manufacturing Industries, 1973 and 1981 (See Table 9.3), the number of establishments involved in the manufacture of drugs and medicines in Malaysia increased from 70 in 1973 to 83 in 1981.

TABLE 9.3
PHARMACEUTICAL PRODUCTS:
ECONOMIC CONTRIBUTIONS
(VALUE IN M$ MILLION 1981 CONSTANT PRICES)

	Drugs and Medicines[1]		Total Chemical Industry[2]	
	1973	1981	1973	1981
Number of establishments	70	83	337	479
Employment	1,507	2,609	10,209	17,433
Gross value of output (M$ million)	$ 41.7	$ 83.5	$775.0	$ 1,529.3
Value added (M$ million)	$ 15.8	$ 40.9	$ 18.9	$ 461.7
Average annual growth rate of gross value of output, 1973 - 81	9.1%		8.9%	
Average annual growth rate of value added, 1973 - 81	12.6%		4.7%	

1. Industry classification 35220
2. Industry classification 35110, 35120, 35130, 35210, 35220, 35231, 35239, 35290

Source: Department of Statistics

Total employment in the pharmaceutical industry was about 2,609 in 1981. Average employment per establishment increased from 21.5 in 1973 to 31.4 in 1983, indicating increase in size of producers over the period. The industry grew rapidly in the 1970s. Real output growth averaged 9.1% per annum while growth in value-added averaged 12.6% per annum from 1973 to 1981, higher than those achieved by the chemical industry as a whole.

9.2 LOCAL PRODUCTION

9.2.1 Approved Companies

The pharmaceutical industry in Malaysia may be divided into two major categories:

1. Companies producing modern or western-oriented pharmaceuticals.

2. Companies producing traditional medicines and preparations.

Table 9.4 lists the MIDA approved companies in production at the end of 1982.

TABLE 9.4
PHARMACEUTICAL PRODUCTS:
APPROVED MANUFACTURING COMPANIES IN OPERATION
AS AT DECEMBER 31, 1982

Company	Paid-up Capital (M$ Million)	Location	Products
1. Asia Pharmaceutical Products Sdn. Bhd.	$ 0.98	Mak Mandin, Penang	Modern pharmaceuticals
2. Beecham Products (M) Sdn. Bhd.	20.60	Petaling Jaya, Selangor	Modern pharmaceuticals
3. Chahaya Kilang Makanan Sdn. Bhd.	4.50	Larkin, Johore	Tonic food
4. Depco United Sdn. Bhd.	0.50	Prai, Penang	Veterinary products
5. East Asiatic Co. (M) Bhd.	75.00	Petaling Jaya, Selangor	Modern pharmaceuticals
6. Eagle & Pagoda Brand Teck Aun Medical Factory Sdn. Bhd.	0.46	Bukit Mertajam, Penang	Traditional preparations
7. Glaxo Malaysia Sdn. Bhd.	9.25	Petaling Jaya, Selangor	Modern pharmaceuticals
8. Health Products (M) Sdn. Bhd.	n.a.	Johor Bahru, Johore	Modern pharmaceuticals
9. Ho Poh Onn Medical Hall (M) Sdn. Bhd.	0.20	Johor Bahru, Johore	Traditional preparations
10. Ho Yan Hor (Kausing Brand) Medical Hall	0.50	Ipoh, Perak	Traditional preparations

Table 9.4 (cont'd)

Company	Paid-up Capital (M$ Million)	Location	Products
11. Hudson (M) Sdn. Bhd.	n.a.	Petaling Jaya, Selangor	Modern and Traditional pharmaceuticals
12. Johnson & Johnson Sdn. Bhd.	7.00	Petaling Jaya, Selangor	Modern pharmaceuticals
13. Kontrak Manufacturing Services Sdn. Bhd.	3.00	Petaling Jaya, Selangor	Modern pharmaceuticals
14. Leung Kai Fook Medical Store	0.67	Larkin, Johore	Traditional preparations
15. Malayan Pharmaceutical Factory Sdn. Bhd.	1.50	Petaling Jaya, Selangor	Modern pharmaceuticals, Veterinary products
16. MSJ Industries (M) Sdn. Bhd.	0.07	Petaling Jaya, Selangor	Veterinary products
17. Syarikat M.Y.P. Sdn. Bhd.	0.60	Larkin, Johore	Traditional preparations
18. Pharmalaysia Sdn. Bhd.	2.00	Sungei Petani, Kedah	Modern pharmaceuticals
19. Raza Manufacturing Sdn. Bhd.	1.10	Petaling Jaya, Selangor	Modern pharmaceuticals
20. Stamford Chemical Industries Sdn. Bhd.	2.50	Petaling Jaya, Selangor	Modern pharmaceuticals
21. Sterling Drug (M) Sdn. Bhd.	5.00	Kuala Lumpur	Modern pharmaceuticals
22. Wen Ken Drug Sdn. Bhd.	0.25	Petaling Jaya, Selangor	Traditional preparations
23. Warner-Lambert (Mfg) Sdn. Bhd.	3.30	Petaling Jaya, Selangor	Modern pharmaceuticals
24. Xepa-Soul Pattinson (M) Sdn. Bhd.	2.01	Air Keroh, Malacca	Modern pharmaceuticals

Source: MIDA

A total of 24 approved companies were in production, of which 18 produced modern pharmaceutical products while 6 produced traditional preparations.

Companies producing modern pharmaceuticals are the larger companies with paid-up capital exceeding $1.0 million. Most of these companies are manufacturing under licencing and technical assistance agreements with foreign pharmaceutical companies. Some multinationals have also set up subsidiaries or associated companies in Malaysia, such as Beecham Products (M) Sdn. Bhd., Glaxo Malaysia Sdn. Bhd., Johnson & Johnson Sdn. Bhd. and Sterling Drug (M) Sdn. Bhd.

It should be noted that some of the above companies also manufacture other products, particularly health foods or beverages, toiletries, cosmetics and infant products. A few also manufacture on a contract basis and do not market their own brand.

Only six companies were approved to produce traditional medicines at the end of 1982. However, a large number of companies producing traditional pharmaceuticals are exempted from licencing requirements under the Industrial Coordination Act, 1975. Most of these are small concerns and many are 'backyard' operations.

Local manufacture is confined to Peninsular Malaysia. There is no production of pharmaceuticals in Sabah and Sarawak.

9.2.2 Production Capability and Capacity Utilization

Todate, there is no manufacture of pharmaceutical raw materials in Malaysia. The Malaysian market is considered too small for the production of active ingredients for pharmaceuticals. The industry is essentially engaged in the manufacture of finished products in various dosage forms - capsules, tablets, liquids, powders, creams and to a limited extent, injectibles. As such, production activities are confined to mixing, blending, bottling, tableting and encapsulation.

Indigenous research and development is limited and producers of modern pharmaceuticals are dependent on foreign technology in manufacturing and formulations.

Total production capacity of the industry is difficult to quantify as there are numerous small producers. Moreover, production volumes are expressed in various units and production facilities are also used for other products. However, MIDA statistics indicate that overall capacity utilization has been low.

TABLE 9.5
PHARMACEUTICAL PRODUCTS:
CAPACITY UTILIZATION, 1973 - 1981

Year	Capacity Utilization
1973	20%
1974	23
1975	18
1976	26
1977	30
1978	32
1979	36
1980	35
1981	35

Source: MIDA

The Malaysian Organization of Pharmaceutical Industries (MOPI) estimates that the Malaysian pharmaceutical industry is currently operating at about one-third capacity.

9.2.3 Raw Materials

Domestic prodcution is dependent largely on imported raw materials. A wide range of raw materials is imported, accounting for 80% to 90% of total raw material input (excluding packaging materials). Local raw materials utilized are inert ingredients and include glycerine, glucose, sugar and alcohol. In addition, packaging materials are usually sourced locally.

9.3 MARKETING ASPECTS

The marketing network for pharmaceutical products in Malaysia is well-established. The Malaysian Pharmaceutical Traders and Manufacturers Association (MPTMA) estimates that there are over 500 pharmaceutical importers, traders and distributors throughout the country.

There are three major outlets for pharmaceutical products:

1. The Government sector through the Ministry of Health.

2. Private clinics.

3. Pharmacies and other retail outlets.

The sale and distribution of drugs and medicines in Malaysia is governed by the Food and Drugs Act, 1975. In addition, with the implementation of Control of Drugs and Cosmetics Regulations, 1984, the manufacture, sale or importation of all pharmaceutical products will be subject to registration and licensing by a Drug Control Authority.

9.4 EMPLOYMENT ASPECTS

The pharmaceutical manufacturing industry employed about 2,609 persons in 1981. Of this, about 55% is employed by establishments manufacturing modern pharmaceuticals.

Table 9.6 shows the technical jobs most commonly found in plants manufacturing modern pharmaceuticals as well as the qualification requirements and wage structure.

Respondents interviewed indicated adequate supply of professional workers in the industry. Labour shortages are confined to laboratory technicians, mechanics and other skilled workers. A large number of the pharmaceutical companies operate within the Petaling Jaya, Selangor region which faces keen competition for this type of labour.

TABLE 9.6
PHARMACEUTICAL PRODUCTS:
TECHNICAL JOB CLASSIFICATION AND WAGE STRUCTURE

Job Category	Qualification	Monthly Wage Range[1]
1. Production		
o Pharmacist	Degree in Pharmacy	$1,650 - 3,300
o Production Supervisor	MCE and/or experience	550 - 800
o Production Worker	MCE or experience	300 - 600
2. Engineering/Maintenance		
o Mechanical Engineer	Degree in Mechanical Engineering	$1,750 - 3,400
o Boilerman	Skilled	850 - 1,300
o Fitter/Mechanic	Skilled	700 - 1,000
3. Laboratory		
o Pharmacist	Degree in Pharmacy	$1,650 - 3,300
o Chemist	Degree in Chemistry	1,500 - 2,000
o Laboratory Assistant/ Technician	MCE/STP with science background	500 - 800

1 Includes benefits

Source: SGV-KC Field Survey

9.5 MALAYSIAN IMPORTS

Malaysia's imports of pharmaceutical products amounted to M$156.2 million in 1981. As can be seen from Table 9.7, the bulk of imports falls under the category of medicaments including veterinary medicaments which comprises more than 100 individual product groups.

Imports originate from a large number of countries. However, significant amounts are imported from the United Kingdom, Australia, the Peoples' Republic of China and Western Europe.

TABLE 9.7
PHARMACEUTICAL PRODUCTS:
IMPORTS BY MAJOR PRODUCT GROUP
1973 AND 1981

SITC	Product Group	1973 M$ '000	1973 % Share	1981 M$ '000	1981 % Share
5411	Provitamins and vitamins, natural or sythesised and their derivatives	938	1.4	4,385	2.8
5413	Antibiotics	692	1.0	3,258	2.1
5414	Vegetable alkaloids, natural or synthesised, and their derivatives	385	0.6	1,496	1.0
5415	Hormones, natural or synthesised, and their derivatives	415	0.6	1,736	1.1
5416	Glycosides, natural or synthesised, and their derivatives; antisera; microbial vaccines, toxins, cultures and similar products	1,173	1.8	4,229	2.7
5417	Medicaments, including veterinary medicaments	62,632	94.6	141,072	90.3
	Total	66,235	100.0	156,176	100.0

Source: Departments of Statistics

9.6 MALAYSIAN EXPORTS

Exports of pharmaceutical products are relatively insignificant, amounting to M$20.1 million in 1981. Pharmaceutical products are exported mainly to neighbouring countries particularly Singapore, Hong Kong and Thailand.

TABLE 9.8
PHARMACEUTICAL PRODUCTS:
EXPORTS BY MAJOR PRODUCT GROUP
1973 AND 1981

SITC	Product Group	1973 M$ '000	1973 % Share	1981 M$ '000	1981 % Share
5411	Provitamins and vitamins, natural or sythesised and their derivatives	32	0.3	20	0.1
5416	Glycosides, natural or synthesised, and their derivatives; antisera; microbial vaccines, toxins, cultures and similar products	71	0.7	231	1.1
5417	Medicaments, including veterinary medicaments	9,433	98.8	19,855	98.6
5413, 5414, 5415	Others	15	0.2	38	0.2
	Total	9,551	100.0	20,144	100.0

Source: Departments of Statistics

9.7 CURRENT INDUSTRY PROBLEMS

Current problems perceived by the industry are outlined below:

1. Increased competition from imported products since tariff protection for the industry was removed in 1981. With the lifting of import duties on pharmaceuticals, there has been an influx of imported products in the market. As a result, local production has stagnated and capacity utilization is low. A few manufacturers have discontinued product lines which are uncompetitive.

2. Although duty exemptions are granted on most imported raw materials which are not locally-produced, exempted quantities are sometimes inadequate. In addition, application for duty exemption is regarded as a time-consuming and complicated process. Where duties are paid, local producers are at a disadvantage vis-a-vis imports.

3. Malaysian pharmaceutical products are uncompetitive in export markets, primarily due to the lack of economies of scale and dependence on imported raw materials. Malaysia is unable to compete with industrialised countries which have large and well established pharmaceutical industries or state-owned industries (as in centrally-planned economies).

4. In view of the above factors, the 10% price preference accorded to local products by the Ministry of Health in its tenders is considered insufficient for the local industry to compete with imports.

5. There is inadequate control over the import and sale of pharmaceuticals in Malaysia. Currently, pharmaceutical products may be produced or imported and sold without prior registration or conformance to specified standards. This is perceived as a threat by manufacturers of high-quality pharmaceuticals as cheaper products of uncertain quality may be sold in the market. The implementation of drug registration is expected to address this problem.

6. Patent protection is inadequate under the United Kingdom Patents Ordinance. Until the Patents Act, 1983 is fully implemented, foreign patent holders will be reluctant to transfer technology to local producers.

9.8 DEMAND ANALYSIS

9.8.1 Historical Demand

Apparent demand for pharmaceutical products from 1973 to 1981 is presented in Table 9.9. Apparent demand grew at an average rate of 8.0% per annum over the period. Domestic consumption of pharmaceuticals appears to be sensitive to overall economic performance and growth in per capita income. Apparent demand declined appreciably in 1975 and 1980-81 as a result of slower growth of the economy.

Imports increased at an average rate of 6.7% per annum, slower than growth in apparent consumption. On the other hand, domestic production increased at a faster rate than apparent consumption. As such, imports as a proportion of consumption decreased while output as a proportion of consumption increased over the period. However, imports still form the bulk of pharmaceuticals consumed. Exports of pharmaceuticals have been small and slow growing.

TABLE 9.9
PHARMACEUTICAL PRODUCTS:
APPARENT CONSUMPTION, 1973 - 1981
(M$ MILLION IN 1981 CONSTANT PRICES)

Year	Imports	Local Production	Exports	Apparent Consumption	Output as a % of Consumption	Imports as a % of Consumption
1973	$ 92.9	$22.1	$15.2	$ 99.7	22	93
1974	122.6	28.7	16.2	135.1	21	91
1975	99.3	22.2	15.9	105.6	21	94
1976	98.0	24.9	14.3	108.7	23	90
1977	98.9	31.8	14.4	116.3	27	85
1978	141.1	46.4	14.2	173.3	27	81
1979	175.6	51.6	15.2	212.0	24	83
1980	168.6	47.8	20.4	196.1	24	86
1981	156.1	49.1	20.1	185.0	27	84
Average Annual Growth Rate	6.7%	10.5%	3.5%	8.0%		

Source of Basic Data: Department of Statistics

9.8.2 Projected Demand

The following econometric relationship was postulated in forecasting domestic demand for pharmaceutical products:

$$Y = a + bX$$

where: Y = domestic demand expressed as apparent consumption in 1981 constant prices

X = Per capita GDP in 1970 constant prices

Per capita GDP forecasts are based on GDP forecasts obtained from the Economic Planning Unit (EPU) of the Prime Minister's Department (See Appendix 30).

The resultant linear regression equation is as follows:

$$Y = -154.41 + 0.1808X$$

$$(R^2 = 0.7485, t = 26.5)$$

As can be seen, the regression coefficient is moderately high. Furthermore, the t-value indicated that the portulated econometric relationship is statistically significant at the 99% confidence level. Based on the regression equation, domestic demand is projected to grow at 5.1% (low) to 7.2% (high) per annum from 1985 to 1995.

Exports of pharmaceuticals are not expected to be significant over the next decade, in view of continued dependence on imported raw materials and absence of economies of large-scale production. Export growth averaged 3.5% per annum over 1973 to 1981. For 1985 to 1995, growth rates are projected at 1.0% (low), 3.0% (medium) and 5.0% (high) per annum.

Forecasts of demand for domestic consumption and export using the above approach are presented in Table 9.10. The projections yield average annual growth rates for total demand of 4.9% (low) to 7.6% (high) from 1985 to 1995.

TABLE 9.10
PHARMACEUTICAL PRODUCTS:
PROJECTED DEMAND, 1985 - 1995
(M$ MILLION IN 1981 CONSTANT PRICES)

Year	Domestic Demand			Exports			Total Demand		
	Low	Medium	High	Low	Medium	High	Low	Medium	High
1985	262.7	262.7	262.7	22.6	22.6	22.6	285.3	285.3	285.3
1986	276.6	280.6	284.8	22.8	23.3	23.7	299.4	303.9	308.5
1987	291.3	299.8	308.3	23.1	24.0	24.9	314.4	323.8	333.2
1988	306.6	319.8	333.2	23.3	24.7	26.2	329.9	344.5	359.4
1989	322.9	341.2	360.0	23.5	25.4	27.5	346.4	366.6	387.5
1990	339.9	363.8	388.4	23.8	26.2	28.8	363.7	390.0	417.2
1991	355.1	384.6	415.7	24.0	27.0	30.3	379.1	411.6	446.0
1992	373.9	409.9	447.8	24.2	27.8	31.8	398.1	437.7	479.6
1993	393.6	436.4	482.2	24.5	28.6	33.4	418.1	465.0	515.6
1994	411.5	461.4	515.3	24.7	29.5	35.1	436.2	490.9	550.4
1995	433.4	491.2	554.1	25.0	30.4	36.8	458.4	521.6	590.9
Average Annual Growth Rate									
1985 - 1990	5.3%	6.7%	8.1%	1.0%	3.0%	5.0%	5.0%	6.5%	7.9%
1990 - 1995	5.1	6.3	7.4	1.0	3.0	5.0	4.7	6.0	7.2

X. PESTICIDES

10.1 CURRENT INDUSTRY POSITION

10.1.1 Industry Background

The pesticide industry in Malaysia is still in its infancy. Domestic production began in the early 1970s and is still largely limited to blending, mixing and formulation of imported ingredients for local use. There is backward integration, however, in the production of herbicides. Indigenous research and development efforts are minimal in view of the limited domestic market.

As presented in Table 10.1, the apparent demand for pesticides in the country has risen from M$42.1 million in current prices to M$187.2 million between 1973 and 1981. The average annual rate of expansion was 20.1% during the period and a persistant uptrend was recorded except in 1981.

TABLE 10.1
PESTICIDES:
APPARENT CONSUMPTION
1973 - 1981
(M$ MILLION)

Year	Local Production	Imports	Exports	Apparent Consumption
1973	29.8	14.4	2.1	42.1
1974	35.8	20.0	5.4	50.4
1975	51.9	21.8	3.5	70.3
1976	58.9	37.8	3.4	93.3
1977	65.3	44.0	5.5	103.7
1978	94.7	49.5	7.9	136.3
1979	127.3	76.3	12.3	191.6
1980	124.6	91.9	13.7	202.8
1981	110.0	92.8	15.6	187.2

Note : All values are in current prices.

Sources: Department of Statistics
MIDA

The past bouyant demand for pesticides is largely due to the development process. Although traditionally an agricultural society, Malaysia has begun to nurture its industrial base in a serious, sustained fashion since 1970. With the quickening tempo of industrialization and urbanization, the need to open up new lands and to upgrade agricultural productivity could not be ignored. In this regard, the controlled application of pesticides emerged as an essential means with which to realize these twin objectives.

10.1.2 Industry Structure

Pesticides are normally classified by application objectives into the following categories:

- Insecticides
- Fungicides
- Herbicides
- Rodenticides
- Others (growth regulators, latex stimulants)

Demand for pesticides in Malaysia is largely for herbicides and insecticides. Fungicides, rodenticides and other types of pesticides account for less than 10% of the total pesticide market.

Presently, four firms dominate the pesticide industry in terms of size and market. These are the Chemical Company of Malaysia Berhad, Agricultural Chemicals (M) Sdn. Bhd., Pacific Chemicals Berhad and Monsanto (Malaysia) Sdn. Bhd. A list of the major pesticide manufacturers in Malaysia is presented in Table 10.2. Information pertaining to the location, paid-up equity, and the number of plants of selected local pesticide companies is found in Table 10.3.

TABLE 10.2
MAJOR PESTICIDE FIRMS:
DISTRIBUTION BY APPLICATION

Product	Process	Firms
Herbicides) Fungicides)	Synthesis	Chemical Company of Malaysia Berhad Polytensides Sdn. Bhd. Kenso Corp. (M) Sdn. Bhd. Pacific Chemicals Berhad
Insecticides	Formulation	Agricultural Chemicals (M) Sdn. Bhd. Chemical Company of Malaysia Berhad Pacific Chemicals Berhad Ancom Sdn. Berhad F. S. Zuellig (M) Sdn Bhd.
Rodenticides	Formulation	Chemical Company of Malaysia Berhad

Source: SGV-KC Field Survey

TABLE 10.3
PESTICIDES:
LIST OF MAJOR MANUFACTURERS AND PLANT LOCATION

Company	Paid-up Capital[1] (In M$ Million)	Plant Location	No. of Plants
1. Chemical Company of Malaysia Berhad (CCM)	n.a.	Padang Jawa, Kelang Port Kelang	1
2. Agricultural Chemicals (Malaysia) Sdn. Bhd.	$1.7	962, Lorong Perusahaan 8 Prai Ind. Complex, Penang	1
3. Pacific Chemicals Berhad	2.1	Shah Alam Ind. Est. Sungai Renggam, Batu Tiga Selangor	1
4. Monsanto (Malaysia) Sdn. Bhd.	0.6	116, Jalan Semangat, P.O. Box 1042, P.J.	1
5. Ancom Sdn. Bhd.	n.a.	Jalan Pesiaran Selangor, Shah Alam, Selangor	1
6. Kenso Corporation (M) Sdn. Bhd.	n.a.	6, 6 1/2 ml, Jalan Kepong K.L.	1
7. Supreme Chemicals Sdn. Bhd.	2.4	Lot 9, Solok Hisamuddin Lima, Kawasan 20, Port Kelang	1

Note : 1. Paid-up capital as of 1983.
2. n.a. - not available

Source: SGV-KC Field Survey

The Malaysian Agricultural Chemicals Association was established in December 1971 to look after the interest of the pesticide manufacturing firms in Malaysia and to serve as a channel for voicing opinions held by the industry as a whole to various government authorities concerned. Todate, a few major programmes have been undertaken by MACA, and these include a safety campaign to educate local consumers and seminars to maintain environmental cleanliness.

Almost all pesticide manufacturers and/or traders/importers are members of this Association. A minor weakness of the Association, however, is the fact that not all of its executive committee members are key personnel of their respective firms. This has affected MACA's ability to decide swiftly on major policy issues. Otherwise, the Association is deemed to be performing its stipulated objectives by the pesticides firms in the industry.

The main set of regulations which governs the industry is the Pesticides Act. The Pesticides Act (1974) was enacted to provide for the control of importation, manufacture, sale and storage of pecticides by registration, permit and licensing. By virtue of this Act, the Pesticides Board, with provision of facilities by the Ministry of Health, is empowered to regulate the availibility of pecticides in Malaysia through registration of the product and issuance of permit to import pesticides for education and research purposes.

10.1.3 Current Problems

One of the major difficulties faced by the industry is the increased influx of imitation and adulterated products. Apparently, this is caused by a few unscrupulous businessmen who risk importing adulterated products or manufacturing them locally. Industry sources claim that the penalty for adulteration and imitation offences, as provided for in the Pesticides Act, is very light -- on first conviction, a guilty party is liable to six months imprisonment or a fine of only M$20,000. With absence of adequate protection for registered products, the presence of adulterated or imitation products is expected to increase in proportion to the volume and value increase of pesticides in the market in the next five years.

Another major problem is excessive competition from imported pesticides. The c.i.f. price of imported pesticides is much lower than locally manufactured products. According to some of the companies interviewed, this situation may have been caused partly by "dumping" practices adopted by foreign pesticide producers. The respondents bewail the fact that the Government has not extended more adequate protection to domestic pesticide firms. It was further mentioned that the smaller manufacturers are the ones who suffer disproportionately from excessive competition from abroad.

Excessive regulations and bureaucratic delays were also cited by some respondents as hindrances to the development of the pesticide industry. For instance, applications for the establishment of new plants or the manufacture of new pesticides has sometimes taken a relatively long time to process and entailed the submission of a lot of information. In the past, industry sources revealed that the concerned authorities hesitated to approve the application for registration of a new product if the developed countries had not yet introduced such product in the market. This is fairly common for newly developed pesticides used in oil palm and rubber plantations, wherein Malaysia takes a lead in R & D. Likewise, the authorities suspected applicants of dumping if the product applied for is considered mature in the world market. Local pesticides firms lose both ways and a lot of time and money spent on R & D is wasted.

10.2 PRODUCTION ASPECTS

Domestic demand for pesticides is dominated by herbicides. Insecticides are a distant second while rodenticides, fungicides and other types of pesticides are relatively insignificant. In view of the anticipated deceleration in the pace of land clearing during the next decade, the production of herbicides is not expected to grow vigorously. Consequently, no new pesticide manufacturing facilities are likely to be established in Malaysia since prevailing output levels are still very much below existing production capabilities.

10.2.1 Capacity Utilization Levels

On the basis of MIDA estimates of utilizations levels of pesticides firms, capacity utilization of the industry registered a decline in the later part of the past decade. Capacity utilization was in the region of 34-38% from 1973 to 1977 and dropped to 30% in 1981 (See Table 10.4).

TABLE 10.4
PESTICIDES:
PRODUCTION AND UTILIZATION LEVELS
1973 - 1981

Year	Ex-Factory Sales Value[1] (In M$ '000)	Utilization Level
1973	$79,565	34%
1974	68,[illegible]7	35
1975	88,169	35
1976	127,584	35
1977	141,260	34
1978	180,061	28
1979	[illegible],670	37
1980	216,686	31
1981	187,173	30
Average Annual Growth Rate 1973 - 1981	11.3%	

Note : 1. Expressed in 1981 constant prices.

Source: MIDA

Utilization levels of interviewed firms, based on a 2-shift, 330-day production year, ranged from 10% to 56% in 1984 (See Table 10.5). Due to a steady decrease in the volume of herbicides sold in the past few years, Monsanto has reduced its production volume of 'Round-up' to 115,000 US gallons in 1983, representing only a 10% utilization level for the company. On the other hand, because of the small rated production capacity of Supreme Chemicals for insecticides (72 MT per annum) and fungicides (96 MT per annum), a utilization level of 55.5% and 52.1% respectively was reached with a production volume of 40MT of insecticides and 50MT of fungicides in 1983.

It can be inferred from Table 10.5 that only Supreme Chemicals Sdn. Bhd. is anticipating a slight increase in the utilization level of its plant in 1984, while most of the other firms, at best, can expect no change in their utilization levels in the same year due to anticipated poor performance of pesticide sales. Industry sources claim that there will be very little positive change in the utilization levels of their plants within the next five years due to a saturation of the pesticide market as well as a slight decrease in the opening of government lands.

TABLE 10.5
PESTICIDES:
CAPACITY UTILIZATION LEVELS
1983 AND 1984

	Company	Product	Estimated Production Volume 1983	Estimated Production Volume 1984	Utilization Level 1983	Utilization Level 1984
1.	Monsanto	Herbicides	115,000 US gal.	n.a.	10.0%	n.a.
2.	Pacific Chemicals	Herbicides	1,600 MT	1,550 MT	28.6	26.7
			850 kl	300 kl	58.6	20.7
3.	Supreme Chemicals	Herbicides	600 MT	700 MT	16.2	18.9
		Insecticides	40 MT	40 MT	55.5	55.5
		Fungicides	50 MT	50 MT	52.1	52.1
4.	Agricultural Chemicals	Insecticides, Fungicides, Herbicides, Rodenticides	3,600 MT	[illegible]	13.0	14.1
5.	Chemical Company of Malaysia	Herbicides	1,000 MT	1,000 MT	40.0	40.0
		Rodenticides	500 MT	500 MT	50.0	50.0

Note : Utilization levels are calculated based on a 2-shift, 330-day production year

Source: SGV-FC Field Survey

10.2.2 Production Cost Structure

On the basis of field interviews, the Consultants estimated that direct raw materials accounted for 68-75% of the total production cost of pesticides. Furthermore, imports constitute around 85% of the industry's raw material needs. The cost structures of selected classes of pesticides are shown in Table 10.6 below.

TABLE 10.6
PESTICIDES:
PRODUCTION COST STRUCTURE

Cost Item	Company A Herbicide	Company A Rodenticide	Company B Herbicide	Company C Insecticide
Direct Labour	3%	21%	3%	6%
Direct Material	75	68	77	70
Local	11	14	4	7
Imported	64	54	73	63
Factory Overhead	22	11	20	24
Energy	1	-	3	-
Depreciation	1	1	2	14
Repair and Maintenance	1	-	5	-
Packaging	18	10	3	10
Others	1	-	7	-
Total	100%	100%	100%	100%

Source: SGV-KC Field Survey

It may be inferred from the comparative data presented that factory overhead is the second major cost component in herbicide and insecticide production. In contrast, direct labour cost is more important than overhead charges in the total cost of rodenticide formulation.

10.2.3 Duties and Taxes

Import duties for raw materials which are used in the manufacture of pesticides are in the range of 3 - 15% (See Table 10.7). There is no surtax on these raw materials although a 10% sales tax is imposed on certain raw materials such as surfactants. In contrast, import duties do not exist for the imported finished products except herbicides, which are subject to a 15% ad valorem tariff or a specific duty from M$2.20 to M$3.50 per kg., whichever is higher (Table 10.8). Such a situation promotes the importation of the pesticides in final form (except herbicides) rather than the importation of the technical inputs for subsequent compounding or mixing domestically.

TABLE 10.7
PESTICIDES:
TAXES AND DUTIES ON
IMPORTED RAW MATERIALS
1984

	Raw Material	Import Duty	Sales Tax	Surtax
1.	Surfactant	Nil	10%	Nil
2.	Raw materials for insecticides and fungicides	3 - 5%	Nil	Nil
3.	Raw materials for herbicides (except for monosodium methyl arsenate, diuron, dalapon)	15% or M$2.20-3.50 per kg.	Nil	Nil

Source: Customs Duties Order, Ministry of Finance

TABLE 10.8
PESTICIDES:
TAXES AND DUTIES ON
IMPORTED FINAL PRODUCTS
1984

Pesticide	Import Duty	Sales Tax	Surtax
1. Insecticides	Nil	Nil	Nil
2. Fungicides	Nil	Nil	Nil
3. Herbicides/Weedkillers			
o Liquid herbicides/weedkillers			
- containing monosodium acid methane arsenate, other salts and derivatives of methyl arsenic acid	15%	Nil	Nil
- containing diuron, monuron and linuron	15% or $2.20 per kg. whichever is higher	Nil	Nil
o Other herbicides/weedkillers			
- containing diuron, monuron and linuron	15% or $3.50 per kg. whichever is higher	Nil	Nil
o Other herbicides/weedkillers	15%	Nil	Nil

Source: Customs Duties Order, Ministry of Finance

10.2.4 State of Technology

Because of the limited size of the domestic market and modest prospects of realizing rapid market expansion, indigenous efforts at basic research and development are minimal. R & D is confined to testing of new chemicals and improved formulas for effectiveness againt local pests and diseases, ascertaining its effects on the environment, and development of new uses and methods of application of existing pesticides. Strict standards are adhered to in the formulation and blending of pesticides. Principal local manufacturers invariably have quality control divisions to ensure that the stringent requirements articulated by the Pesticides Board are satisfied.

According to industry sources, the technology employed in Malaysia's pesticide production is comparable with that of Singapore, Taiwan, South Korea, and Japan. These countries are also largely involved in formulation and blending operations as the technology employed in the manufacture of pesticides from first stage components is highly sophisticated and mainly prevalent in the U.S. and U.K. Periodic seminars are organized by the Chemical Industries Council of Malaysia (CICM) and MACA to facilitate the dissemination of latest developments in the pesticide industry.

10.3 MARKETING ASPECTS

10.3.1 Current Market Size

o Domestic Sales

On the basis of discussions with industry sources, the Consultants estimated the domestic demand for pesticides to be around M$200 million in 1984 at the consumer level (Table 10.9). The main type of pesticide consumed locally are herbicides and these account for about M$160 million (78.4%) of the total market for pesticides, with insecticides following a distant second with a demand of M$28 million (14.7%). Demand for the other types of pesticides are rather small accounting for about M$14 million (6.9%) together with a negligible annual rate of growth over the next few years.

TABLE 10.9
PESTICIDES:
INDUSTRY ASSESSMENT OF DOMESTIC MARKET SIZE
1984

Product		Value (In M$ Million)	% to Total Value	Volume	Average Annual Growth Rate 1985-1988
A. Herbicides		M$160	78.4%		
1. Lalang (Weedkiller)					)
- liquid	$ 34			680,000 litres	)
- powder	14			2,500 tonnes	)
	$ 48				)
					) 5.2%
2. General					)
- liquid	$ 92			13,600,000 litres	)
- powder	20			1,100 tonnes	)
	$112				
B. Insecticides		28	14.7		
- granular	$ 8			400 tonnes	5
- sprayable	20				
	$ 28				
C. Fungicides		8	3.9		
- liquid	$ 1			50,000 litres	)negligible
- powder	7			700 tonnes	)
	$ 8				
D. Rodenticides		6	3.0	300 tonnes	negligible
- cubic	$5.5				
- powder	0.5				
	$6.0				
Total		M$202	100%		

Source: SGV-KC Field Survey

About 60-70% of local demand is accounted for by local production while the rest of the demand is fulfilled by imports. Since the early 1970s, local production of pesticides has been in the hands of multinational firms with subsidiaries in Malaysia, such as Dow Chemicals, Imperial Chemical Industries and Monsanto.

o Export Sales

Over the past decade, exports accounted for about 9.6% of local production, on the average, with the largest buyers being Singapore and Australia. Export and re-export of pesticides rose at a faster average annual rate of 19.5% compared to apparent consumption (11.3%).

As previously mentioned, multinational firms typically establish subsidiaries in larger countries and stringently regulate the volume and composition of pesticide production and trade among its various subsidiaries. As a consequence of this practice, 50% of Malaysia's export trade in these chemical products involves regulated transactions among subsidiaries of multinational corporations. The other 50% of foreign sales results from purchases of small countries such as Brunei and Singapore which do not possess domestic production facilities in pesticides.

10.3.2 Distribution Methods

o Domestic Sales

The marketing framework varies from firm to firm but most larger firms do not administer sales directly to end-users. A firm would normally sell to distributors (agents purchasing the pesticides above a certain volume) with conditions that they are to distribute within a certain region in Malaysia. However, dealers within the larger towns would be able to purchase directly from the manufacturers. This channel forms some 50 - 70% of total sales within the firm and thus represents the main channel for distribution for the pesticide industry. About 15 - 20% of total sales are realized through government and other plantation tenders and these are normally very heavily competed for by the major pesticide manufacturers such as ICI (marketing arm of CCM) and ACM. The rest of the domestic sales are direct to end-users although they form a very small percentage only.

o Export Sales

Overseas sales of pesticides are either coursed through other subsidiaries in the region, in the case of Malaysian subsidiaries of multinational firms, or through importers/distributors.

10.3.3 Marketing Strategies

Price competition does not exist within the locally manufactured brands but does exist with imported pesticides especially those in bulk form. (Bulk form pesticides are imported from countries such as Taiwan and China.) The price competitiveness is usually traced to economies of scale, lower labour and finance costs, and lower taxes and duties on the imported pesticides. This form of competition can be minimized with the removal of import duty on raw materials as explained earlier so as to provide the locally manufactured pesticides with some relative competitive advantage.

Non-price competition is more often exhibited by most local manufacturers and these take the form of better product quality and design capability, a more dynamic sales force and a greater adaptability to market changes. This form of competition is endorsed by MACA as a means to avoid possible price wars. Product differentiation thus takes many forms i.e., different packaging (2.5 kg - 50 kg), different bases (liquid or powder, granules or cubes) and different specialty areas (i.e., affecting one particular type of insect versus another, instead of just general).

10.3.4 Market Prospects

Despite the greater reliance on pesticides now compared to ten years ago, industry sources claim that the domestic pesticide market will likely increase by only about 5 - 7% per annum over the next decade. The expected marginal increase in the market for pesticides is mainly attributed to an anticipated slowdown in the opening of government lands. The use of pesticides in newly opened lands will likely not offset the reduction in use of pesticides in developed agricultural lands. For example herbicides are used very heavily during deforestration and the initial planting of crops (such as oil palm and cocoa). However, when the trees are 3-4 years old, there would be enough shade to reduce the use of pesticides to one-fifth the initial amount. Although the market share of some products may actually increase substantially in the near future, this would be done only at the expense of other brands.

10.4 EMPLOYMENT ASPECTS

10.4.1 Employment Structure

Field surveys conducted by the Consultants indicate that the functional composition of the employees in pesticide manufacturing firms is as presented below.

TABLE 10.10
PESTICIDES:
FUNCTIONAL COMPOSITION OF EMPLOYEES

Category	% of Total
Professional, Technical and Related Workers	22.7%
Administrative, Finance and Managerial Workers	13.3
Clerical and Related Workers	20.0
Sales Workers	2.6
Service Workers	3.3
Production and Related Workers	30.9
Transport Equipment Operators	0.7
Labourers	6.5
Total	100%

Source: SGV-KC Field Survey

Production and related workers constitute the largest employment category with 30.9% of the total number of employees. The other important functional classifications are: professional, technical and related workers (22.7%), clerical and related workers (20.0%), and administrative, finance and managerial workers (13.3%).

Table 10.11 describes the racial composition of the work force among respondent enterprises in the industry.

TABLE 10.11
PESTICIDES:
RACIAL COMPOSITION OF EMPLOYEES

Category	Bumi	Non-bumi	Foreign
Professional, Technical and Related Workers	24.3%	65.7%	10.0%
Administrative, Finance and Managerial Workers	26.8	73.2	-
Clerical and Related Workers	27.4	72.6	-
Sales Workers	12.5	87.5	-
Service Workers	60.0	40.0	-
Production and Related Workers	74.7	25.3	-
Transport Equipment Workers	100.0	-	-
Labourers	55.0	45.0	-
Total (Average)	45.0%	49.5%	5.5%

Source: SGV-KC Field Survey

The data above shows that non-Bumiputras comprise 49.5% of the total personnel in respondent companies, followed by Bumiputras (45.0%) and foreigners (5.5%). However, non-Bumiputra employees are much more prevalent in the following functional categories: (1) professional, technical and related workers, (2) administrative, finance, and managerial workers, (3) clerical and related workers, and (4) sales workers. On the other hand, the proportion of Bumiputras exceeds 55% on the following employment classifications: (1) service workers, (2) production and related workers, (3) transport equipment workers, and (4) general labourers. Foreigners are employed only as professional, technical and related personnel.

10.4.2 Labour Supply

Currently, there is no serious shortage of any particular type of labour, skilled or otherwise. In view of the limited prospects for market expansion, this situation is unlikely to change in the next few years. A few respondents, however, have been experiencing difficulty in recruiting electrical chargemen and Bumiputra managers as well as professional staff. Survey results suggest that the turnover rate among professionals in the industry is about 5% per annum. This may be attributed to the departure of experienced technical personnel for better opportunities elsewhere in the manufacturing sector.

10.4.3 Training Programmes

All respondents employed on-the-job training and in-house instruction to upgrade the skills of their workers. Employees are not often sent to local institutes because of the perceived insufficiency of their technical training programmes. Among those pesticide manufacturers with multinational applications, promising workers are occasionally posted overseas.

10.4.4 Wage Structure

The effective monthly wages for various employment categories in the industry are outlined below:

TABLE 10.12
PESTICIDES:
WAGE STRUCTURE

Category	Average Basic Wage	Benefits	Total
1. Senior Management	$7,000 - 10,000	12.5-19.0%	$8,330 - 11,250
2. Middle Management	$4,000 - 5,000	12.5-19.0%	$4,500 - 5,950
3. Junior Management	$2,500 - 4,000	12.5-19.0%	$2,800 - 4,800
4. Supervisors	$ 750 - 3,000	12.5-25.0%	$1,450 - 3,570
5. Lab Technician	$ 530 - 1,230	25.0%	$ 663 - 1,538
6. Production	$ 400 - 890	12.5-25%	$ 450 - 1,113
7. Unskilled	$ 200 - 500	12.5-19%	$ 225 - 595

Source: SGV-KC Field Survey

10.5 DEMAND ANALYSIS

10.5.1 Historical Demand

- Domestic Market

Total apparent domestic demand for pesticides in 1981 is estimated at M$187.2 million. This represents an average growth rate of 11.3% from its 1973 value of M$79.6 million (See Table 10.13). Pesticide consumption in Malaysia has been closely linked to the opening of new agricultural lands, growth in output of agricultural crops and export commodity crops, and to a lesser extent, growth in per capita consumption of household pesticides.

The pesticides industry registered a good performance during the 1970s. Imports and local production rose substantially during 1975-76 and 1978-79 leading to sizeable increases in apparent domestic demand. However, negative growth rates were recorded between 1979-80 and 1980-81 and these were the results of depressed commodity prices of certain crops and the slowdown in development of new agricultural lands.

Imports accounted for 37% of pesticide consumption in 1973, increasing to 50% in 1981. Foreign pesticide purchases rose faster than local production, reflecting an average growth of 15.6% per annum from M$29.0 million in 1973 to M$92.8 million in 1981.

Local production of pesticides consistently accounted for more than 58% of pesticide consumption during the last decade, reaching as high as 72% in 1975. The bulk of local production is comprised of herbicides with insecticides following a distant second. The average rate of increase for local production of pesticides was 9.2% between 1973 and 1981.

- Export Market

Exports and re-exports of pesticides from Malaysia were relatively small compared with total output (6.2% on the average). This is to be expected as locally produced pesticides are somewhat higher priced than imported subsitutes. Among the various types of pesticides exported, weedkillers recorded the most rapid growth over the past decade.

TABLE 10.13
PESTICIDES:
APPARENT CONSUMPTION
1973 - 1981
(IN M$ '000 AT CONSTANT 1981 PRICES)

Year	Imports	Local Production	Exports and Re-exports	Apparent Consumption	% of Apparent Consumption: Local Production	% of Apparent Consumption: Imports	Exports and Re-exports as a % of Local Production
1973	29,046	54,277	3,758	79,565	68	37	7
1974	29,138	46,464	7,005	68,597	68	42	15
1975	28,632	63,830	4,293	88,169	72	32	7
1976	51,864	80,349	4,629	127,584	63	41	6
1977	59,636	89,180	7,556	141,260	63	42	8
1978	66,926	123,362	10,227	180,061	69	37	8
1979	91,989	151,238	14,557	228,670	66	40	10
1980	98,585	132,741	14,640	216,686	61	45	11
1981	92,786	110,006	15,619	187,173	59	50	14
Average Annual Growth Rate 1973 - 1981	15.6%	9.2%	19.5%	11.3%			

Note : Apparent consumption data expressed in current prices are presented in Appendix 25.

Source: Department of Statistics
MIDA

10.5.2 Projected Demand

The Consultants derived the projected domestic demand for pesticides (expressed as apparent consumption in 1981 constant prices) based on a multiple regression model of two variables. The following econometric relation was postulated:

$$Z = -287.65 + 0.0457X + 0.1940Y$$
$$R^2 = 0.8388$$

where:

Z = domestic demand for pesticides expressed as apparent consumption in 1981 constant prices.

X = value-added for agriculture, forestry and fishing in 1970 constant prices.

Y = per capita private consumption expenditure in 1970 constant prices expressed in three alternative growth levels -- low, medium and high growth.

Value added forecasts for agriculture, forestry and fishing were obtained from the Economic Planning Unit (EPU) of the Prime Minister's Department. The EPU projected an average annual growth rate for this sector of 4.0% during the 1985-1990 period and a lower growth of 3.0% per annum between 1990 and 1995 (see Appendix 27). Forecasts of per capita private consumption expenditure were derived from projections of gross domestic product and population (see Appendix 29).

Projections yielded the following growth rates of domestic demand:

Period	Low Growth	Medium Growth	High Growth
1985 - 1990	6.8%	7.5%	8.2%
1991 - 1995	5.2	5.7	6.4

Pesticide exports have grown faster than domestic demand in the past decade. For purposes of total demand projections in this study, exports are assumed to grow at the same rate as domestic demand. Table 10.14 summarizes the results of domestic and export demand projections for pesticides.

TABLE 10.14
PESTICIDES:
PROJECTED DEMAND
1985 - 1995
(IN M$ MILLION IN 1981 CONSTANT PRICES)

Year	Domestic			Export			Total		
	Low	Medium	High	Low	Medium	High	Low	Medium	High
1985	313.5	313.5	313.5	22.8	22.8	22.8	336.3	336.3	336.3
1986	335.9	338.4	340.7	24.4	24.5	24.7	360.3	362.9	365.4
1987	359.2	364.5	369.5	26.0	26.3	26.7	385.2	390.8	396.2
1988	383.7	391.7	399.8	27.8	28.3	28.9	411.5	420.0	428.7
1989	409.2	420.3	431.9	29.7	30.4	31.2	438.9	450.7	463.1
1990	435.9	450.3	465.0	31.7	32.7	33.8	467.6	483.0	498.8
1991	457.8	475.7	494.1	33.3	34.6	36.0	491.1	510.3	530.1
1992	482.2	503.9	526.6	35.1	36.6	38.3	517.3	540.5	564.9
1993	507.8	533.4	561.0	36.9	38.6	40.7	544.7	572.0	601.7
1994	532.5	562.4	594.8	38.8	40.8	43.3	571.3	603.2	638.1
1995	559.9	594.8	632.6	40.8	43.2	46.1	600.7	638.0	678.7
Average Annual Growth Rate									
1985-1990	6.8%	7.5%	8.2%	6.8%	7.5%	8.2%	6.8%	7.5%	8.2%
1990-1995	5.1	5.7	6.3	5.2	5.7	6.4	5.1	5.7	6.4

10.6 PESTICIDE TRADE PATTERNS

10.6.1 Imports

Malaysia imported M$14.4 million worth of pesticides in 1973. However, the country's purchases of pesticides increased rapidly to M$92.8 by 1981 as more land was cleared for agricultural and industrial use in the Second and Third Malaysia Plans.

As depicted in Table 10.15, imports of weedkillers expanded by an average rate of 50.1% annually from M$2.1 million in 1973 to M$53.6 million in 1981. Because of its rapid growth, the relative share of weedkillers in the country's pesticide imports rose from 14.4% to 57.8% during the interval. The value of insecticide imports also increased, but at a much more gradual pace. Consequently, the relative share of this product group fell sharply from 66.8% of total pesticide imports to 31.0% between 1973 and 1981. Before the country's international trade classification system was revised in 1978, fungicide imports, which were valued at M$6.5 million in 1981, were placed under the category "other pesticides" so no corresponding statistics for 1973 are available. The share of disinfectants, anti-sprouting products and wood preservatives in total pesticide imports shrank from 18.8% to 4.2% during the period under review although overseas purchases of this product group increased in value terms from M$2.7 million to M$3.9 million.

TABLE 10.15
IMPORTS: PESTICIDES
1973 AND 1981
(M$'000)

		1973		1981	
SITC	Chemical Group	Value	% Share	Value	% Share
5911	Insecticides	M$ 9,630.5	66.8%	M$28,762.1	31.0%
5912	Fungicides	-	-	6,513.3	7.0
5913	Weedkillers	2,072.2	14.4	53,643.8	57.8
5914	Disinfectants, anti-sprouting products, wood preservatives	2,704.8	18.8	3,867.2	4.2
	Others	-	-	-	-
	Total	! $14,407.5	100.0%	M$92,786.4	100.0%

Source: Department of Statistics

Imports of weedkillers experienced the most rapid growth between 1973 and 1981, increasing from M$2.1 million to M$53.6 million. The preference of end users for liquid preparations is evident in Table 10.16, which shows that M$45.8 million (85.4%) of the country's total imports of weedkillers in 1981 was in liquid form. The most important supplier was United States with M$38.7 million (84.6%), followed by United Kingdom (M$3.7 million or 8.0%) and Taiwan (M$1.2 million or 2.6%). Among non-liquid forms of weedkillers, the Federal Republic of Germany was the primary source with M$5.2 million (65.7%) of the country's imports of this particular product group in 1981. Other major suppliers were United Kingdom (M$0.9 million or 11.3%) and France (M$0.6 million or 7.9%).

In the case of insecticide imports, the decided preference of end users for the liquid form is reflected in Table 10.17. Liquid insecticides accounted for M$4.2 million (44.0%) of the country's total imports of insecticides in 1973. By 1981, the proportion had risen to 72.0% (M$20.7 million). The Federal Republic of Germany, Australia and United States were the principal sources of Malaysian imports in the earlier period. However, Singapore and Japan had superseded these three nations by 1981.

Non-liquid forms of fungicides were the more popular imports in 1981, representing 81.3% of the country's total fungicide imports of M$6.5 million (Table 10.18). United States was the most important supplier, followed by the Netherlands and the Federal Republic of Germany. Of the M$1.2 million worth of liquid fungicides imported by Malaysia in 1981, M$0.4 million (34.2%) came from United States, M$0.3 million (27.9%) from Singapore, and $0.2 million (20.5%) from the Federal Republic of Germany.

The country's imports of disinfectants, anti-sprouting products, and wood preservatives were valued at M$2.7 million in 1973 and M$3.9 million in 1981 (Table 10.19). Wood preservatives accounted for 86.6% of total imports in this category in 1973, with major purchases originating from United Kingdom (M$0.8 million) and Sweden (M$0.4 million). By 1981, however, the import value of this product group had declined to only M$0.8 million, with Japan and United Kingdom providing virtually all of Malaysia's overseas purchases.

In contrast to the shrinking value of imports of wood preservatives, rat poisons and herbicides emerged as the most popular imports in this category in 1981. The principal suppliers of Malaysian imports of this product group were: United Kingdom, United States and the People's Republic of China. There were no corresponding statistics for 1973 available for this produced group.

In the case of liquid disinfectants, United Kingdom, Singapore and United States all retained their respective rankings as the country's major sources of liquid disinfectants between 1973 and 1981.

TABLE 10.16
IMPORTS: WEEDKILLERS
1973 AND 1981
(M$'000)

SITC		Chemical Group	1973	1981
59131100	1.	Liquid, cont'g. monosodium acid methane arsenate, other salts and derivatives of methylarsenic acid		
		Taiwan		M$ 5.9
		USA	M$ 540.2	*
		Others	-	0.2
		Sub-Total	540.2	6.1
59131900	2.	Other, liquid		
		USA	53.1	38,717.4
		UK	27.4	3,656.0
		Taiwan	*	1,212.8
		Others	15.2	2,201.7
		Sub-Total	95.7	45,787.9
59139000	3.	Non-liquid		
		F. R. of Germany	78.3	5,155.5
		UK	62.1	885.5
		France	*	622.4
		Switzerland	248.2	-
		Others	173.6	1,186.4
		Sub-Total	562.2	7,849.8
	4.	Others	874.1	-
5913		Total	M$2,072.2	M$53,643.8

Note :* Imports from this country are classified under "Others".

Source: Department of Statistics

TABLE 10.17
IMPORTS: INSECTICIDES
1973 AND 1981
(M$'000)

SITC		Chemical Group	1973	1981
59111000	1.	Liquid		
		Singapore	*	M$ 6,561.9
		Japan	*	6,539.0
		F. R. of Germany	M$1,080.8	3,219.4
		Australia	842.2	-
		USA	789.5	-
		Others	1,522.1	4,386.1
		Sub-Total	4,234.6	20,706.4
59119900	2.	Other insecticides		
		USA	1,487.6	2.604.8
		Japan	325.7	2,022.5
		P. R. of China	*	1,015.1
		F. R. of Germany	964.4	*
		Others	1,151.5	1,895.2
		Sub-Total	3,956.2	7,537.6
	3.	Others	1,439.7	518.1
5911		Total	M$9,630.5	M$28,762.1

Note :* Imports from this country were included in "Others".

Source: Department of Statistics

TABLE 10.18
IMPORTS: FUNGICIDES
1973 AND 1981
(M$ '000)

SITC		Chemical Group	1973	1981
59129000	1.	Non-liquid		
		USA		M$1,769.2
		Netherlands		958.8
		F. R. of Germany		630.6
		Others		1,937.8
		Sub-Total	*	5,296.4
59121000	2.	Liquid		
		USA		416.8
		Singapore		339.2
		F. R. of Germany		249.0
		Others		211.9
		Sub-Total	*	1,216.9
	3.	Others		-
5912		Total	*	M$6,513.3

Note :* Imports of Fungicides were classified under "Other pesticides" in 1973.

Source: Department of Statistics

TABLE 10.19
IMPORTS: DISINFECTANTS, ANTI-SPROUTING PRODUCTS,
WOOD PRESERVATIVES
1973 AND 1981
(M$ '000)

SITC		Chemical Group	1973	1981
591411	1.	Disinfectants, liquid		
		UK	M$ 67.3	M$ 410.5
		Singapore	31.8	118.0
		USA	23.4	69.9
		Others	143.2	150.9
		Sub-Total	265.7	749.3
591492	2.	Wood preservatives		
		UK	767.1	104.0
		Japan	*	705.7
		Sweden	388.6	*
		Others	187.1	32.2
		Sub-Total	2,342.8	841.9
591499	3.	Rat poisons, herbicides		
		UK		360.3
		USA		329.0
		P. R. of China		243.9
		Others		702.5
		Sub-Total	**	1,635.7
	4.	Others	96.3	640.3
5914		Total	M$2,704.8	M$3,867.2

Note : * Imports from this country are classified under "others".
** There was no breakdown of imports for this category in 1973.

Source: Department of Statistics

10.6.2 Exports

Malaysia exported M$2.1 million worth of pesticides in 1973. Of this amount, 60.7% was accounted for by insecticides, 34.6% by weedkillers, and 4.7% by disinfectants, anti-sprouting products and wood preservatives (See Table 10.20). In 1981, the country's pesticide exports totalled M$15.6 million. Weedkillers comprised 56.8% of this sum, followed by insecticides (25.1%), disinfectants, anti-sprouting products and wood preservatives (14.5%), and fungicides (3.6%).

TABLE 10.20
EXPORTS: PESTICIDES
1973 AND 1981
(M$ '000)

		1973		1981	
SITC	Chemical Group	Value	% Share	Value	% Share
5911	Insecticides	M$1,252.7	60.7%	M$ 3,918.5	25.1%
5912	Fungicides	*	*	546.1	3.6
5913	Weedkillers	714.0	34.6	8,874.2	56.8
5914	Disinfectants, anti-sprouting products, wood preservatives	96.7	4.7	2,279.6	14.5
	Total Pesticides	M$2,063.4	100.0%	M$15,618.6	100.0%

Note : * There was no breakdown of statistics for fungicides exports in 1973.

Source: Department of Statistics

Exports of weedkillers experienced a relatively brisk growth of 37.0% per annum between 1973 and 1981. Consequently, its relative share in total exports of pesticides rose to 56.8% from 34.6%. In 1981, exports of weedkillers were classified into three basic product groups: (1) other liquid weedkillers (M$5.5 million), (2) liquid weedkillers containing monosodium and methane arsenate, other salts, and derivatives of methylarsenic acid (M$2.2 million), and (3) non-liquid weedkillers (M$1.1 million). Table 10.21 shows that Singapore is the most significant market for Malaysia's weedkillers exports. Other notable importing nations in 1981 were: Australia and Brunei for other liquid weedkillers, Taiwan and Thailand for non-liquid weedkillers, and Australia and the Netherlands for liquid weedkillers containing monosodium and methane arsenate, other salts, and dervatives of methylarsenic acid.

In contrast to the preceding category, exports of insecticides expanded by only 15.3% per annum during the 1973 - 1981 period. Expectedly, its relative share in total exports of pesticides fell to 25.1% from 60.7%. Over one-half (58.0%) of all insecticides exported by Malaysia in 1981 went to Singapore, (See Table 10.22). Japan and Brunei were other notable overseas clients for liquid insecticides, Australia for mosquito coils, and Thailand for other insecticides.

In 1973, Malaysia's exports of disinfectants, anti-sprouting products, and wood preservatives did not exceed M$0.1 million. During the next eight years, however, foreign sales of these products expanded at an average rate of 48.4% per annum to reach M$2.3 million (See Table 10.23). In 1981, exports of wood preservatives (liquid impregnation type) containing copper and/or chromium salts were valued at M$1.4 million or 63.5% of all exports in this category. The primary markets were Singapore (M$1.0 million), Thailand (M$0.3 million) and Philippines (M$0.1 million). The other important product group under this export classification consisted of rat poisons, herbicides and similar products in other forms. Purchases by Singapore, Nigeria and Saudi Arabia explained 71.9% of the country's export of these chemical mixtures in 1981.

There were no available statistics for exports of fungicides in 1973. In 1981, total foreign sales of fungicides was only M$0.5 million, of which 64.1% was accounted for by non-liquid fungicides sold principally to Singapore and Thailand. (See Table 10.24).

TABLE 10.21
EXPORTS: WEEDKILLERS
1973 AND 1981
(M$ '000)

SITC		Chemical Group	1973	1981
59131100	1.	Weedkillers, liquid, containing monosodium and methane arsenate, other salts, and derivatives of methylarsenic acid		
		Australia	-	M$ 652.8
		Brunei	M$ 5.4	-
		Netherlands	-	506.1
		New Guinea	22.1	-
		Singapore	-	563.2
		Others	-	478.4
		Sub-Total	27.5	2,200.5
59131900	2.	Other weedkillers, liquid		
		Australia	-	210.7
		Brunei	38.4	241.7
		Philippines	122.1	-
		Singapore	265.1	4,627.0
		Others	43.5	448.1
		Sub-Total	469.1	5,527.5
59139000	3.	Weedkillers, non-liquid		
		Indonesia	81.9	-
		Singapore	8.2	335.9
		Taiwan	-	236.9
		Thailand	127.3	339.6
		Others	-	233.8
		Sub-Total	217.4	1,146.2
5913		Total	M$714.0	M$8,874.2

Source: Department of Statistics

TABLE 10.22
EXPORTS: INSECTICIDES
1973 AND 1981
(M$ '000)

SITC	Chemical Group	1973	1981
59111000	1. Insecticides, liquid		
	Singapore	M$ 582.3	M$ 888.9
	Brunei	47.0	116.6
	Thailand	27.6	-
	Japan	-	416.7
	Others	4.9	180.8
	Sub-Total	661.8	1,603.0
59119100	2. Mosquito coils		
	Singapore	294.8	752.3
	Nigeria	18.8	-
	Fiji	7.0	-
	Australia	-	411.4
	Brunei	-	27.0
	Others	10.6	16.6
	Sub-Total	331.2	1,207.3
59119900	3. Other insecticides		
	Singapore	165.9	630.5
	Thailand	45.3	345.0
	Hong Kong	14.2	-
	Brunei	-	97.5
	Others	34.3	35.2
	Sub-Total	259.7	1,108.2
5911	Total	M$1,252.7	M$3,918.5

Source: Department of Statistics

TABLE 10.23
EXPORTS: DISINFECTANTS, ANTI-SPROUTING PRODUCTS, WOOD PRESERVATIVES
1973 AND 1981
(M$ '000)

SITC		Chemical Group	1973	1981
59141990	1.	Disinfectants, non-liquid in packs less than 2.5kg		
		Brunei	-	M$ 18.8
		Singapore	-	14.5
		Burma	-	14.0
		Philippines	M$ 24.3	-
		Others	-	-
		Sub-Total	24.3	47.3
59149190	2.	Anti-sprouting products, non-liquid		
		Singapore	-	76.5
		Thailand	-	1.2
		Others	-	1.1
		Sub-Total	-	78.8
59149211	3.	Wood preservatives, liquid impregnation type, containing copper and/or chromium salts		
		Singapore	-	980.0
		Thailand	-	322.6
		Philippines	-	134.2
		Others	-	11.3
		Sub-Total	-	1,448.1
59149990	4.	Rat poisons, herbicides and similar products in other forms		
		Singapore	-	M$ 185.9
		Nigeria	-	95.4
		Saudi Arabia	-	66.2
		Others	-	135.8
		Sub-Total	-	483.3
	5.	Others	72.4	222.3
5914		Total	M$ 96.7	M$2,279.8

Source: Department of Statistics

TABLE 10.24
EXPORTS: FUNGICIDES
1973 AND 1981
(M$ '000)

SITC		Chemical Group	1973	1981
59121000	1.	Fungicides, liquid		
		Indonesia		M$178.4
		Singapore		12.0
		Thailand		4.8
		Others		1.0
		Sub-Total		196.2
59129000	2.	Fungicides, non-liquid		
		Singapore		217.1
		Thailand		126.6
		Others		6.2
		Sub-Total		349.9
5912		Total	*	M$546.1

Note : * There was no breakdown of statistics for fungicides exports in 1973.

Source: Department of Statistics

XI. COSMETICS, SOAPS AND DETERGENTS

11.1 CURRENT INDUSTRY POSITION

11.1.1 Industry Background

The cosmetic, soap and detergent industry in Malaysia involves the manufacture of the following products:

1. Soaps
   - Toilet soap
   - Laundry soap
   - Medicated, industrial and other soaps
2. Detergents
   - Powder detergent
   - Detergent bar
   - Dishwashing liquid detergent
   - Fabric softener
   - Scouring powder
3. Cosmetics, Perfumes and Toilet Preparations
   - Beauty cream, skin care products, lipstick, and manicure preparations
   - Talcum powder and face powder
   - All types of perfume including deodorants and cologne
   - Hair care products such as shampoos, hair cream/lotion and hair dyes
   - Dental care products such as toothpaste and mouthwash

According to the 1973 and 1981 Censuses of Manufacturing Industries, there were 66 establishments involved in the manufacture of cosmetics, soaps and detergents in Malaysia as of 1981, compared with 66 in 1973 (See Table 11.1). Among the various sub-sectors comprising the chemical industry, cosmetics, soaps and detergents contributed most significantly to value added of the industry during both years. The sub-sector also ranked among the top performers of the industry in terms of gross output value.

TABLE 11.1
COSMETICS, SOAPS AND DETERGENTS:
ECONOMIC CONTRIBUTIONS
1973 AND 1981
(VALUE IN M$ MILLION IN 1981 CONSTANT PRICES)

	Cosmetics, Soaps and Detergents[1]		Total Chemical Industry[2]	
	1973	1981	1973	1981
Number of establishments	68	66	337	479
Employment	2,100	2,518	10,209	17,433
Gross value of output (M$ million)	222.2	252.7	775.0	1,529.3
Value added (M$ million)	126.4	112.8	318.9	461.7
Average Annual Growth Rate of Gross Output Value, 1973 - 1981	1.6%		8.9%	
Average Annual Growth Rate of Value Added, 1973 - 1981	(1.4%)		4.7%	

Note :

1. Covers industry classification 35231 and 35239.
2. Covers industry classification 35110, 35120, 35130, 35210, 35220, 35231, 35239, 35290.

Source: Census of Manufacturing Industries, Peninsular Malaysia, 1973
Census of Manufacturing Industries, Malaysia, 1981

o Soaps

Soap manufacturing is one of the oldest chemical industries in Malaysia. It is also considered as one of the few chemical industries with a high local raw material content. The main raw material for soap making, fatty acid/natural oil, is abundantly available in Malaysia from oil palm products and can be competitive with conventional raw material (such as tallow) in terms of price. Todate, the industry is dominated by three multinational companies:

		Products
1.	Lever Brothers (M) Sdn. Bhd.	toilet soap
2.	Lam Soon Oil & Soap Manufacturing Sdn. Bhd.	toilet soap and laundry soap
3.	Colgate-Palmolive (M) Sdn. Bhd.	toilet soap

Among these three firms, only Lam Soon has established an upstream linkage by going into oil palm plantations in 1974. Dara Lam Soon Sdn. Bhd., a joint venture between the Development Authority for Pahang Tenggara (DARA) and Lam Soon, consists of two oil palm estates and a palm oil processing mill. In addition to this undertaking, Lam Soon is involved in the manufacture of other downstream products of palm oil such as margarine, cooking oil, industrial fats, cocoa butter equivalents, other specialty fats and oils, and oleochemicals.

There is considerable competition in the market for soaps in Malaysia with local demand primarily met by local manufacturers (about 70% in tonnage terms for toilet soap and almost 100% for laundry soap). However, with the recent reduction of import duty on imported soaps, substitutes from China, Japan and Europe have managed to acquire a significant 30% share of the domestic toilet soap market.

o Detergents

There are five major manufacturers of detergents in Malaysia, two of which account for at least 70% of total domestic consumption of detergents. These five companies are as follows:

		Products
1.	Lever Brothers (M) Sdn. Bhd.	detergent powder, liquid dishwashing detergent, fabric softener, scouring powder
2.	Colgate-Palmolive (M) Sdn. Bhd.	detergent powder, detergent bar, liquid dishwashing detergent, fabric softener
3.	United Detergent Industries Sdn. Bhd.	detergent powder
4.	Sin Kheng Lee (M) Industrial Co. Sdn. Bhd.	detergent powder
5.	Lam Soon Oil & Soap Manufacturing Sdn. Bhd.	liquid dishwashing detergent, scouring powder

Local production represents about 80% of Malaysia's apparent consumption of detergents and consists mainly of detergent powder.

o Cosmetics, Perfumes and Toilet Preparations

Industry sources consider the local cosmetic industry as basically involving only formulation, blending and packaging types of operations. The only local content of products under this category consists of packaging materials for shampoo, powder, cream and lotion products, and alcohol for alcoholic perfume products. All active ingredients and other raw materials as well as glass bottles for perfumes are imported.

The industry can be characterized by the predominance of two main groups and the presence of several small scale or backyard operators. The first main group consists of companies which have their own production facilities for cosmetics, perfumes and toilet preparations. The leading firms are as follows:

		Products
1.	Beecham Products (Far East) Sdn. Bhd.	shampoo, talcum powder, deodorant
2.	Lever Brothers (M) Sdn. Bhd.	shampoo, toothpaste
3.	Colgate-Palmolive (M) Sdn. Bhd.	Shampoo, hair cream, anti-dandruff hair dressing, toothpaste
4.	Johnson & Johnson Sdn. Bhd.	shampoo, talcum powder, lotion
5.	Hawley & Hazel Chemicals Sdn. Bhd.	toothpaste

The second major group is composed of enterprises which undertake contract manufacturing of these products. Three companies provide contract manufacturing services to licensees or cosmetic companies without production facilities. Products range from shampoo to talcum powder, cologne, after shave, facial and skin cream, lotion, hair cream and tonic, hair dyes, and even household products such as floor wax and carpet cleaners. These companies are as follows:

1. Kontrak Manufacturing Services Sdn. Bhd.

2. Cosmaceutics Sdn. Bhd.

3. Products Manufacturing Sdn. Bhd.

A summary profile of the dominant firms in the cosmetic, soap and detergent industry is shown in Table 11.2.

SGV-Kassim Chan Sdn. Bhd.

TABLE 11.2
COSMETICS, SOAPS AND DETERGENTS:
LIST OF MAJOR DOMESTIC MANUFACTURERS
1984

Company	Paid-up Capital [1] (In M$ Million)	Plant Location	PRODUCTS: Soaps	PRODUCTS: Detergents	PRODUCTS: Cosmetics, Perfume and Toilet Preparations
A. Companies with Own Manufacturing Facilities					
1. Lever Brothers (Malaysia) Sdn. Bhd.	$50.00	Kuala Lumpur	Toilet soap	Detergent powder Dishwashing liquid detergent Fabric softener Scouring powder	Shampoo Toothpaste
2. Colgate-Palmolive (M) Sdn. Bhd.	37.5	Petaling Jaya, Selangor	Toilet soap	Detergent powder Detergent bar Dishwashing liquid detergent Fabric softener	Shampoo Hair cream Anti-dandruff hair dressing Toothpaste
3. Lam Soon Oil & Soap Manufacturing Sdn. Bhd.	45.7	Petaling Jaya, Selangor	Toilet soap Laundry soap	Dishwashing liquid detergent Scouring powder	-
4. United Detergent Industries Sdn. Bhd.	4.0	Melaka	-	Detergent powder	-
5. Sin Kheng Lee (M) Industrial Co. Sdn. Bhd.	1.0	Johor	-	Detergent powder	-
6. Unitata Bhd.	n.a.	Perak	Toilet soap Laundry soap	-	-
7. Hawley & Hazel Chemicals Sdn. Bhd.	0.5	Johor	-	-	Toothpaste
8. Beecham Products (Far East) Sdn. Bhd.	20.6	Petaling Jaya, Selangor	-	-	Hair care products Talcum powder Deodorants
9. Johnson & Johnson Sdn. Bhd.	7.0	Petaling Jaya, Selangor	Toilet (baby) soap	-	Talcum (baby) powder Shampoo Lotion

Company	Paid-up Capital [1] (In M$ Million)	Plant Location	PRODUCTS: Soaps	PRODUCTS: Detergents	PRODUCTS: Cosmetics, Perfume and Toilet Preparations
B. Contract Manufacturing Companies					
1. Kontrak Manufacturing Services Sdn. Bhd. (KMS)	n.a.	Petaling Jaya, Selangor	-	Multipurpose cleaners such as dishwashing liquid detergents	Hair care products and hair dyes Talcum powder Men's cologne and after shave lotion Skin cream, beauty cream and skin lotion
2. Cosmaceutics Sdn. Bhd.	0.6	Petaling Jaya, Selangor	-	Multipurpose cleaners such as dishwashing liquid detergents	Hair care products and hair dyes Talcum powder Men's cologne and after shave lotion Skin cream, beauty cream and skin lotion
3. Products Manufacturing Sdn. Bhd.	0.2	Kuala Lumpur	-	Multipurpose cleaners such as dishwashing liquid detergents	Hair care products and hair dyes Talcum powder Men's cologne and after shave lotion Skin cream, beauty cream and skin lotion

Note : 1. Data for paid-up capital may not represent updated figures.

Source: Data on paid-up capital from MIDA
Other data from SGV-KC Field Survey

11.1.2 Current Industry Problems

Respondent firms consider the following to be the major problems of the industry:

1. Continuous inflow of Chinese detergents. With the reduction of import duty on soaps, detergents and shampoos, a significant volume of powder detergents from the People's Republic of China is presently being imported into Malaysia in bulk form (15 kg unbranded polybags) and is either sold in bulk or repacked into 1 kg polybags. Chinese detergent products are currently selling at retail prices which are 26-40% cheaper than locally made detergents. This unchecked importation poses a threat to the growth of the local powder detergent industry. According to the interviewed firms, P.R.O.C. detergents can sell at very low prices for the following reasons:

   - these are the products of "backyard operations"

   - products contain less active ingredients and thus cleaning power is not as good

   - products do not require any advertising.

   The companies concerned recommend that some degree of protection be given to local manufacturers in the form of a quota system wherein a ceiling is set for imports of detergent products which are also produced in the country.

   Respondent companies also suggested that the following information be verified prior to granting licenses for certain importations, such as detergents from P.R.O.C.:

   - size of the domestic market

   - level of local production

   - existence of essential facilities required of agents or distributor-importers, i.e., warehouse, outlets and sales force.

2. NEP policy on racial distribution of employment. Survey respondents are seeking consideration from the Government with regard to restructuring of the racial composition of labour force. Uncontrollable factors are deterring companies from achieving the targetted racial composition of work force. These include:

   - shortage of qualified Bumiputras for certain levels, such as executive, professional and technical positions;

- continued employment of existing staff, most of whom have been with the company for several years

- natural attrition.

3. High import duty on perfume oils for soaps and detergents. An import duty of 30%, surtax of 5% and sales tax of 10% are presently levied on imported perfume oils used for soaps and detergents. Ironically, perfume oils for shampoo and fine fragrances for personal use are duty free. Since perfumes oils account for 20% of product cost, a relaxation of tariff on imported perfume oils for soaps and detergents would substantially increase the price competitiveness of these products in the international market. At the same time, locally produced soaps and detergents can be priced competitively with imported substitutes which are being taxed at lower rates (8% import duty and 10% sales tax).

4. Import duty on equipment, components of equipment and spare parts for chemical plants. Survey respondents proposed that import duty on stainless steel equipment, components such as pumps, and spare parts used in chemical plants be reduced if not removed as there is no local capability for the manufacture of these specialized equipment and parts.

5. High cost of electricity. Because of the high cost of electric energy, the interviewed firms proposed that the Government consider piped natural gas as an alternative and cheaper source of energy.

6. Shortage of certain professional, technical and skilled personnel. As gathered from industry sources, there is an acute shortage of electrical chargemen. Companies also expressed concern over the rising turnover of experienced Bumiputra mechanical and chemical engineers as well as experienced Bumiputra technicians who are offered positions in Petronas, other oil companies and electronic firms.

7. Complaints about Port Kelang. Respondents indicated that the Port Authority should try to solve the port congestion at Kelang as well as the delays in the hauling of containers.

11.2 PRODUCTION ASPECTS

11.2.1 Production Capacity and Utilization

Industry estimates of nationwide capacity for selected soap and detergent products are as follows:

Product	Annual Capacity [1] (In MT)
Toilet soap	17,000
Powder detergent	80,000
Detergent bar	10,000
Liquid dishwashing detergent/fabric softener	10,500

Note: 1. Capacity is based on three shifts.

Among the interviewed firms, only Lam Soon communicated its plan to expand toilet soap capacity by another 1.5 MT per hour which is equivalent to an additional 9,360 MT per annum based on three shifts possibly by 1985. The existing toilet soap line is planned to be fully devoted to contract manufacturing to service licensees or other companies without production facilities. The additional capacity will service Lam Soon's own requirements. It should be noted that for multinational companies, expansion or introduction of new products will only be allowed by the Government upon restructuring of ownership of concerned companies.

Utilization levels for the industry, based on MIDA estimates, have not shown any significant improvement over the past decade. Capacity utilization was about 42 - 43% in the mid-1970s and rose to 45% in 1981 (See Table 11.3). Utilization levels of capacity for selected products in 1983 as revealed by respondent firms are shown separately in Table 11.4. Only powder detergents and detergent bars registered utilization levels above 70% for some companies. Utilization levels for the rest of the product lines ranged from 10 - 59%.

TABLE 11.3
COSMETICS, SOAPS AND DETERGENTS:
PRODUCTION AND UTILIZATION LEVELS
1973 - 1981

Year	Ex-Factory Sales Value (In M$ '000) [1]	Utilization Level (%)
1973	$158,162	42%
1974	178,466	43
1975	146,116	39
1976	167,817	43
1977	190,871	43
1978	215,709	40
1979	243,688	46
1980	265,201	46
1981	255,250	45
Average Annual Growth Rate 1973 - 1981	6.2%	

Note : 1. Expressed in 1981 constant prices

Source: MIDA

TABLE 11.4
COSMETICS, SOAPS AND DETERGENTS:
UTILIZATION LEVEL OF SELECTED COMPANIES
1983

Product	Utilization Level
Toilet soap	29 - 59%
Laundry soap	48
Powder detergent	49 - 78
Dishwashing liquid detergent/ fabric softener	20 - 57
Detergent bar	74
Toothpaste	30 - 50
Shampoo	10 - 23

Source: SGV-KC Field Survey

DRAFT

15085 (2 of 3)

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

Vienna, Austria

MALAYSIAN INDUSTRIAL MASTER PLAN

FINAL REPORT: VOLUME IIIB

CHEMICAL INDUSTRY - DEVELOPMENT STRATEGIES AND POLICIES

December 1984

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MANAGEMENT SERVICES

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

I. DEVELOPMENT STRATEGIES

1.1 BASIC STRATEGIES

The chemical industry in Malaysia can be generally categorized into resource-based and non-resource-based products. Broadly speaking, the resource-based products are those which will utilize Malaysia's oil and gas resources and the non-resource-based products are the rest of the chemical industry. The resource-based products offer prospects for development of downstream products and possibilities of tapping export markets. The non-resource-based products, on the other hand, generally would aim towards import substitution.

In general, the characteristics of the chemical industry include the following:

1. There is high capital intensity.

2. There is a high degree of industry linkages which translate to increased value added and high employment.

3. There is strong technology content not only in the product itself but also in manufacturing the product.

While the employment effects in the basic chemical plants are limited, the employment multiplier increases in the downstream sector, particularly in the fabrication and processing industries which are more labor intensive and are expected to be composed of many relatively smaller firms.

It is noted that the technologies for chemical plants can be generally acquired from firms in the developed countries in the United States, Europe, and Japan. Ownership of technologies are now distributed among many international firms so that new chemical firms usually have several choices regarding the most appropriate technology to buy.

The close linkages among various chemical industries is the rationale for creating complexes to concentrate related chemical plants and to take advantage of common infrastructure. This tendency, however, is not incompatible with the Malaysian Government goal of industry dispersal, as some of these self-contained complexes can still be located in areas that are targeted for regional development.

For the resource-based chemical products such as petrochemicals, the main development strategy is that the manufacture of these products should be anchored on a growing domestic market. However, the plant sizes should be so constructed as to be competitive on an international level for it to tap potential export markets. This will not only be important in the early years of production when domestic markets will be limited, but also in the long run should exports be sustained.

For the non-resource-based chemical products, these will be aimed generally towards import substitution. As raw materials for producing these products will still be imported, there will be inherent disadvantages in positioning these plants at the export markets. For non-resource-based products, there may be more need to rationalize tariffs to ensure that enterprises in these sub-sectors are not penalized vis-a-vis imports. There might even be justification for some degree of tariff protection in this case during the early years of the industry.

The basic development strategy that should be adopted for the whole sector is one of orderly planning and systematic development. Industry should be set up only when there is adequate domestic market to support them. This will avoid the risk of constructing costly plants without an assured market base.

Market development is of paramount importance and there should be adequate time to properly phase the establishment of plants so that these are not set up prematurely.

The obtaining of technology from foreign sources is also of prime significance as this is the driving force of the industry. While technologies may be purchased on a "free market" basis, joint venture tie-ups might be the means to assure availability of continuing technology support and development. It may also minimize the risks of obtaining technologies that are not appropriate to the markets of Malaysia. Because of the high capital intensity of the chemical industries, it may also be necessary to involve foreign invesments in order to develop this industry within the time frame that is envisioned. An important legal support will be the adequacy of patent protection in order for foreign technology owners to divulge their proprietary knowledge.

Availability of infrastructure cannot also be overemphasized such as in terms of transportation from plants to markets. The availability of inexpensive electric power is also a critical element as the economics of a number of chemical industries are dependent on this for viability.

The orderly planning of the chemical industry in Malaysia will also allow a gradual build-up of highly skilled manpower required in this industry. Again, developing a pool of technical manpower has to be a long-term process and should be taken into account in the development strategy.

In a nutshell, the important components in building this industry are markets, materials (feedstocks), manpower, and money (capital). All these components have to be present and go hand-in-hand in making a successful chemical industrial sector.

1.2 SECTORAL STRATEGIES

1.2.1 Inorganic Chemicals and Chemical Elements

The performance of the inorganic chemicals sub-sector is a reflection of the limited known supply of local raw materials and the undeveloped state of Malaysia's chemical industry and manufacturing industries in general since inorganic chemicals have many diversified uses in industrial applications. The range of products manufactured locally is not expected to expand significantly within the next decade because of the lack of indigenous raw materials. It can therefore be safely assumed that the product mix for local production, exports and imports will remain the same unless mineral deposits used in the production of inorganic chemicals are discovered in Malaysia. The basic strategies recommended for the development of this sub-sector are as follows:

1. Stimulation of exploration to discover chemical mineral deposits which can be tapped for production of inorganic chemicals for both domestic and export markets.

2. Stimulation of development of the chemical industries and manufacturing industries which utilize inorganic chemicals currently produced.

3. Reduction of electric energy cost in order that products can be priced more competitively and removal of duties on imported chemical and pollution control equipment.

4. Upgrading of old and inefficient plants. Existing chlor-alkali and sulphuric acid plants which have not yet been upgraded should be replaced with more economical, efficient, and less polluting plants as end-user industrial markets are developed within the next decade. Upgrading involves replacement of mercury cells with ion-exchange membranes for chlorine production and replacement of the single-contact process with the double-contact, double-absorption system for sulphuric acid production.

5. Pursuance of negotiations with other ASEAN nations regarding the reduction and, ultimately, abolition of internal duty barriers within ASEAN.

Discussions with industry reveal that attempts to produce solar salt in Malaysia have proved unsuccessful because of the absence of a consistently dry, low humidity climate necessary for the evaporation of sea water. It is therefore expected that domestic chlor-alkali plants will continue to rely on imported solar salt. The Government can, however, rationalize electric energy pricing for chlor-alkali plants in order to make their products (chlorine and caustic soda) more competitive for present end-uses such as in toilet soap and textile manufacturing as well as for future end-user applications such as in VCM production. A discount on the power cost to chlor-alkali plants may be justified on the basis of its relatively fixed load factor which can serve as the base load for the power plants.

1.2.2 Fertilizers

Malaysia has historically been a net importer of fertilizers. This situation, combined with the country's growing nutrient needs and availability of natural gas, provides the impetus for Malaysia to develop its nitrogen fertilizer manufacturing industry and thereby help improve its economy. In planning the development of the industry, the basic objectives that should be emphasized are: (1) to make the best use of the country's natural gas resources; (2) to undertake a thorough exploration of mineral resources used in fertilizer production, particularly rock phosphate and potash; (3) to achieve self-sufficiency in nitrogen and compound fertilizer requirements; (4) to tap the immediate export markets of the ASEAN and Asian region for Malaysia's surplus fertilizer production; and (5) to explore possibilities of integrating fertilizer manufacture with other industries when advantageous. Consideration of the regional market is necessary in the development of the Malaysian fertilizer industry as the domestic market base of Malaysia is too small to support a world-scale plant.

o Nitrogen Fertilizers

1. Ammonia-Urea

Malaysia has recently embarked on ammonia-urea production and marketing on a regional basis. Once the ASEAN plant at Bintulu starts production in October 1985 with a world-scale capacity of 495,000 MT of granular urea, the country will become self-sufficient in nitrogen fertilizers. The exportable surplus nitrogen will be sold on a priority basis to other ASEAN shareholders in the project, namely, the Philippines, Thailand, Indonesia, and Singapore.

Production of the ASEAN Bintulu plant is planned to cater mainly to the Malaysian market as it is the host country of the project. Our estimates of future nitrogen nutrient needs of Malaysia, assuming the high growth case will prevail (refer to discussion in Chapter 6.6.2 of Volume III-A), indicate that the output of the Bintulu plant will be fully utilized for domestic consumption by 1995. We recommend that a second ammonia-urea plant be considered only after 1995 when export demand, particularly within Asia, would justify the substantial investment in additional nitrogen capacity. Investment in a second plant of the same scale would be in the region of M$600 - 700 million. As this second plant would necessarily be export-oriented, it is advisable to undertake a thorough analysis of the world and regional market supply and demand situation near the time of such investment decision. The plans and policies of prospective importing countries should be reviewed possibly at government levels in order to establish if importation is likely to be acceptable to the importing countries or if some sort of trade agreement may prove to be mutually beneficial.

2. Urea vs. Ammonium Nitrate

Urea from the ASEAN Bintulu plant will most likely displace ammonium nitrate as the major nitrogen nutrient source in Malaysia because of urea's lower cost and higher efficiency. The idling of Esso's uneconomical naphtha-based ammonia plant and Chemical Company of Malaysia's ammonium nitrate plant is unavoidable. We agree with the recommendation that CCM consider shifting to urea as the source of nitrogen nutrient in its compound fertilizer production.

o Compound Fertilizers

It is very likely that usage of compound fertilizers will grow substantially in the 1990s for the following reasons:

1. Increasing cost and scarcity of labour in agriculture;

2. Move towards bulk distribution, mechanical application, and application by air; and

3. The domestic market's increasing awareness of compounds' greater precision in fertilizing. From a 28% share of total fertilizers consumed in Malaysia in 1984, compound fertilizers may erode a portion of the mixed fertilizer market and possibly account for about 40-50% of the market by 1995. We recommend

that a third compound fertilizer plant with a 250,000 MT per annum capacity be built in Bintulu during the 1991-1995 period. The plant will primarily supply the compound fertilizer requirements of vegetable crops, oil palm, cocoa, and rubber plantations in Sabah and Sarawak. Surplus production can be exported during the period when domestic demand would still be insufficient to fully utilize installed capacity.

- Manufactured Soluble Phosphates

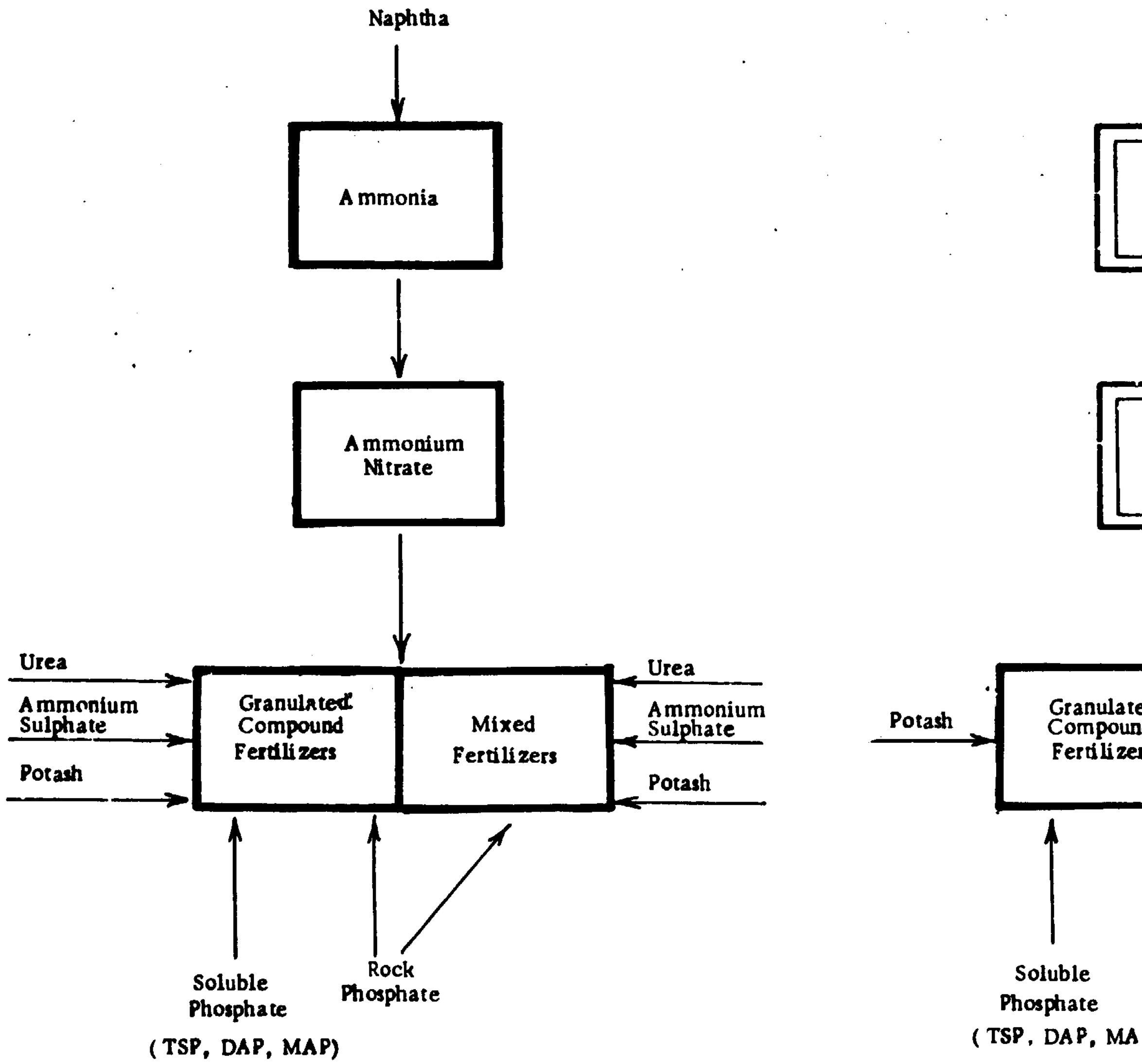
  The bulk of phosphates used in Malaysia is in the form of natural rock phosphate applied directly to the soil. Soil conditions, the predominance of tree crops, and relative prices of manufactured and natural phosphates make it far more economical to use ground rock phosphate in this country. Application of soluble phosphate fertilizers is confined mainly to vegetable crops, tobacco, and young plantation crops.

  Our projections of soluble phosphate demand (refer to discussion in Chapter 6.6.2 of Volume III-A), show that domestic consumption will expand to only about 35,000 MT of P_2O_5 nutrient by 1995. Such a level is way below the minimum economic size of a phosphoric acid plant which is in the vicinity of 100,000 - 120,000 MT of P_2O_5 per year. We therefore do not recommend that a phosphate fertilizer complex be built during the 1985 - 1995 period. It may, however, be considered at a later stage, possibly late 1990s, depending on the size of the domestic market for soluble phosphates at that point in time.

- Product Linkages

  An overview of the product linkages of Malaysia's fertilizer industry before and after the start-up of the ASEAN Bintulu plant is shown in Figure 1.

FERTILIZERS:
PRODUCT LINKAGES



A. Prior to start-up of ASEAN Bintulu plant (1984)

B. Upon ful

LEGEND:

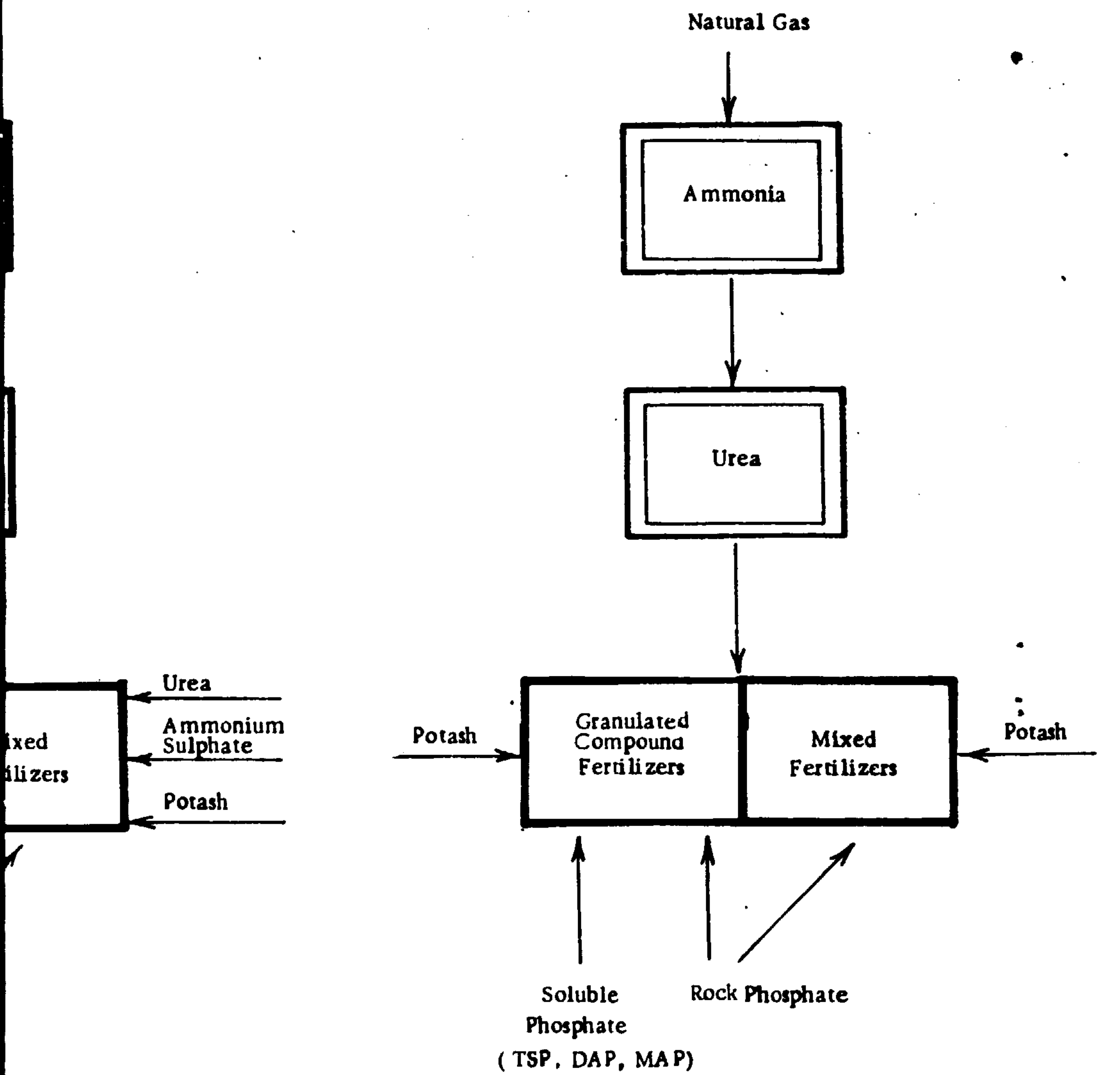
Existing plant

Under implementation

SECTION 1

FIGURE 1

FERTILIZERS:
PRODUCT LINKAGES

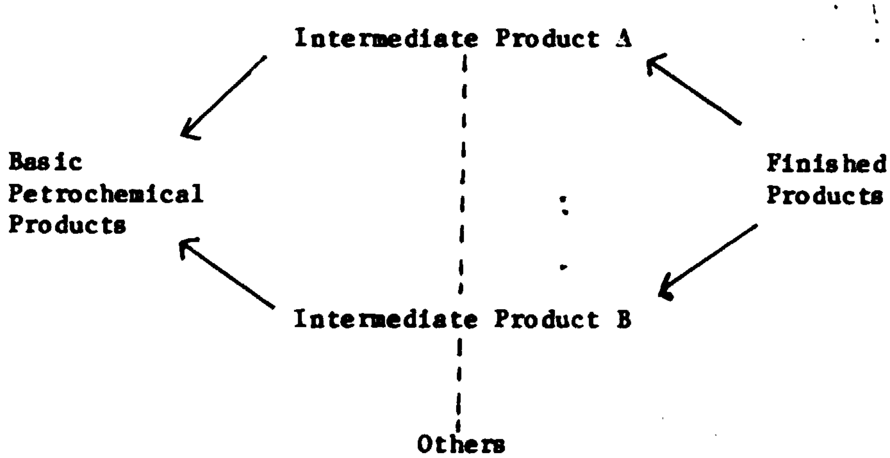


B. Upon full production of ASEAN Bintulu plant (1986)

SECTION 2

1.2.3 Petrochemicals

The basic strategy recommended for the development of the petrochemical industry in Malaysia is one which involves orderly planning and systematic development. The strategy is essentially to set up each unit of the broad range of possible petrochemical products as the market for such unit becomes available. It is a market-oriented approach and underscores the primary importance of market development. We believe this approach will minimize the risk of establishing capital-intensive petrochemical projects which may not be viable due to lack of markets. This strategy can be described as backward integration where each unit of petrochemical building block is established starting from the finished product and proceeding backward to intermediate products, and finally to the basic petrochemical products as markets become sufficient to support manufacture of such products. This approach is illustrated as follows:



The backward integration approach is in contrast to forward integration where plants are set up prior to the development of the markets, whether this be domestic or foreign. This is a high-risk approach, particularly for Malaysia which has a relatively small domestic market base.

Another benefit of a backward integration approach is that it will allow time for the gradual development of skilled manpower needed to run this highly-technical industry. Similarly, it will permit proper phasing of financial resources that will be mobilized and channeled to this capital-intensive industry.

The criteria to be followed in product selection in the petrochemical industry should be along the following lines:

1. The products will be based on the domestic market and will not rely on export markets for viability.

2. They will, however, provide a base from which exports can be developed.

3. The plants will be on an internationally competitive scale for it to enter the export markets.

4. The products will be derived from the available gas and oil resources in the country.

5. The timing of establishment of plants will take into account the available manpower and financial resources that are available for the industry.

o Petrochemical Complex

On the basis of demand projections, we believe that a petrochemical complex to produce ethylene and propylene based on natural gas will be viable only after 1995. The complex envisioned will involve the construction of a 250,000 MT per annum ethane cracker and the production of some 75,000 MT to 100,000 MT per annum of propylene by propane dehydrogenation. In summary, our Malaysian domestic demand projections for selected petrochemical products are as follows:

	Projected Demand*		Projected Ethylene/ Propylene Requirements*	
	1990	1995	1990	1995
Ethylene Derivatives:				
LDPE/LLDPE	63	89	66	93
HDPE	57	83	60	87
Vinyl Chloride	38	54	19	27
Vinyl Acetate	8	12	3	5
Ethylene requirements			148	212
Propylene Derivatives:				
Polypropylene	52	77	54	81
Propylene requirements			54	81

* Based on average demand projections (refer to Table 3.38 in Volume III-A).

In addition to domestic demand, there should also be some export markets that can be tapped, particularly in the ASEAN countries, where a supply-demand gap for the major plastics is forecasted to remain for some years even with the operation of the Singapore and Thailand petrochemical complexes.

o Stages of Development

As emphasized above, there is a need to carefully plan the petrochemical complex to minimize risks for an undertaking of this size. We recommend a development program that can be briefly described in three stages, as follows:

1. First Stage (From the present) - Intensive market development, domestic and exports, starting from the fabrication and processing industries.

2. Second Stage (From 1990 - 1995) - Local manufacture of polyethylene and propylene based on imported ethylene and propylene.

3. Third Stage (After 1995) - Production of ethylene (ethane cracker) and propylene based on natural gas. Set up of other petrochemical units.

To embark on this long-term development program, the first stage is a market development effort which can be started immediately and continuing throughout the program period. The objective of market development will be to enhance the range and quality of fabricated and processed petrochemical products that are manufactured locally in order to increase the domestic usage of petrochemical finished products and to enter export markets. There is a wide variety of applications for which petrochemical products can be used in Malaysia. A few examples are bottle crates for beverages, pipes, flowers, toys, tiles, other agricultural and construction applications, etc.

Strengthening the fabrication industry will be a major development force for the industry. It is also the sector where there are immense multiplier effects in terms of manpower, value added, and development of small-scale industries.

There will be a need to thoroughly review the capabilities of the plastics fabrication sector to determine how it can respond to the new market opportunities. The adequacy of present fabrication equipment and technology in the country should be covered in such a review. For instance, our own survey of some companies in this sector has indicated that additional equipment may be necessary for these processors to fully realize the advantages of using linear low density polyethylene (LLDPE) in lieu of low density polyethylene (LDPE).

The thrust of a proposed research and training institute for plastics should be primarily towards market development. The institute will be in a position to assist the fabrication industry in keeping up with new technology, training its manpower, solving common problems, and developing new products.

In the second stage of the development program, polyethylene and polypropylene plants will be established based on imported raw materials to spur further domestic usage of petrochemical products and sustain emerging export markets. This intermediate program is important as it will provide lower cost petrochemical products to the fabrication and processed industries as well as respond better to growing market needs. Our demand projections indicate that a 100,000 MT polyethylene plant and a 50,000 MT polypropylene plant can be viable by 1990. These plants can be further upgraded to 200,000 MT and almost 100,000 MT, respectively, after 1995.

While requiring special transport facilities, importing ethylene and propylene is feasible provided relatively long term supply sources can be secured. At the present time, there appears to be available supply of propylene and ethylene. As has been pointed out, there may also be some excess of these products from the Singapore petrochemical complex. It is noted that Thailand's present polyethylene plant has been operating based on imported ethylene.

The establishment of a sub-optimal ethane cracker such as the 100,000 MT capacity proposed by Taiwanese investors may be feasible if ethylene and propylene can be produced at costs that are more economical than importing these materials. At this point, it can be said that such a plant is below world-scale size and will definitely not be competitive in the long run.

There are recent processes for the production of high density polyethylene (HDPE) and low linear density polyethylene (LLDPE) in a common plant which will result in substantially lower investment and operating costs, particularly for countries with limited markets. (LLDPE is anticipated to replace at least 50% of the LDPE in the market and 20% of the HDPE.) A polyethylene plant which will manufacture both LLDPE and HDPE should be seriously considered as this will give flexibility for one plant to be set up rather than two. There should be careful consideration of the products of these LLDPE/HDPE plants vis-a-vis the types and varieties of plastics that are anticipated to be consumed in Malaysia.

The third stage of the development program will be to complete the petrochemical complex with the establishment after 1995 of facilities to produce ethylene and propylene. It is noted that the construction period for such facilities will take at least 3 - 4 years, and then another 3 - 4 years for the plants to achieve 100% of rated capacities.

Other units that may be considered for inclusion in the petrochemical complex to be established after 1995 are:

1. Vinyl chloride monomer (VCM)

   There are two polyvinyl chloride (PVC) manufacturers in Malaysia with adequate capacity to meet domestic requirements. PVC production is expected to keep pace with future growth in demand. The availability of VCM locally will reduce exposure to wide price fluctuations and high freight and storage costs currently faced by PVC producers.

   Our demand projections indicate that the domestic markets would be large enough to support a 75,000-100,000 MT VCM plant after 1995.

   In the developed countries, VCM plants of the size of 150,000 - 250,000 MT can be found but there are also smaller plants in the starting markets of the range of 50,000 MT.

While Chem Systems has shown that the production of VCM at capacities even higher than 100,000 MT/year will involve less netbacks for the complex than producing vinyl acetate monomer (VAM), the advantage of VCM production is that it will be more dependent on the domestic market while VAM will need to be substantially exported. It is noted that excess caustic soda from the VCM plant that cannot be absorbed locally will have to be sold in the export markets.

2. Vinyl acetate monomer (VAM)

Domestic consumption of vinyl acetate monomer (VAM) is small compared to the capacity required for a production unit. Domestic demand for vinyl acetate is projected to be less than 15,000 MT by 1995 while the economic plant size recommended is in the range of 50,000 - 100,000 MT.

Nonetheless, the product may be considered because of availability of methanol from Labuan as well as favorable export opportunities within the region.

Other petrochemical products recommended for further evaluation are:

1. Synthetic Rubber

Interest in synthetic rubber production stems from the fact that Malaysia, as a major producer of natural rubber, is actively promoting downstream manufacturing of rubber and latex products such as tyres, gloves, footwear, hoses, belting and other industrial and general goods. We believe that production of synthetic rubber in Malaysia is not inconsistent with the objective of promoting increased natural rubber usage. On the contrary, we consider it complementary since both natural and synthetic rubbers are required in the manufacture of most rubber products.

Of all the synthetic rubbers consumed in Malaysia, only styrene butadiene rubber (SBR) may be considered for local production. Usage of other types of synthetic rubber is minimal. SBR is used largely in the tyre industry and imports over the last few years indicate that domestic demand is in the region of 4,000 - 5,000 MT per annum, as shown below:

Year	Imports of SBR
1980	3,832 MT
1981	5,198
1982	4,550
1983	3,951

The economic size of an SBR plant using the emulsion process should be at least 60,000 MT per annum. Plants using the solution process are generally smaller, some in the region of 20,000 MT per annum. The solution process also produces superior product quality and adds versatility to the plant in that it can easily make other synthetics. Given the size of the domestic market and the excess capacities faced by synthetic rubber producers at this time, the set up of an SBR unit before 1990 is not recommended.

A plant using the solution process should be seriously considered in the 1990s together with the possibility of tapping ASEAN markets. The plant, based on imported styrene and butadiene, could be part of the proposed petrochemical complex but may also be located in Klang near the markets or in Johore Bahru where butadiene will be available from the Singapore cracker.

2. Methanol Derivatives

Methanol is employed principally in the manufacture of formaldehyde resins in Malaysia. Completion of the 660,000 MT per annum plant in 1984 coupled with depressed market conditions necessitates assessment of downstream processing as well as new uses for methanol. These may be broadly classified into fuel and non-fuel uses.

Fuel uses include using neat methanol as fuel in power generation, gasoline blending (up to 5%) and manufacture of methyl tertiary butyl ether (MTBE), a high octane blending component used in low-lead gasolines. Fuel markets are estimated to be growing at a rate of 50% worldwide and should account for 40% of total demand by 1995. These markets appear to have a great potential locally but would depend heavily on government support (for regulating lead content in gasoline, for instance) as well as consumer education and acceptance.

The following products have been put forward as possibilities for non-fuel uses of methanol:

- Acetic acid, a raw material for acetates. Production should be undertaken in conjunction with vinyl acetate production at the same site.
- Single cell protein, for animal feed. Manufacture of single cell protein is relatively new and only a few plants are in existence worldwide. Such a plant will most likely be dependent on export markets.
- Formic acid used in the rubber industry for latex coagulation. Domestic demand, however, is small (presently about 7,000 MT per annum) relative to the 20,000 MT required for a formic acid plant. Part of the output will have to be exported.
- Fatty alcohols for export because of availability of palm oil.

- Location of the Complex

The other element in the development of the petrochemical industry is the location of the petrochemical complex. The options that appear to be more promising are basically the following:

1. Location of the entire petrochemical complex in Terengganu to be near the source of feedstock;
2. Location of the complex in Johore Bahru to be close to the markets as well as the possible feedstock supply from Singapore; and
3. Location of the complex in Klang, close to major markets in the Kuala Lumpur-Klang Valley region.

The base case that should be considered is the location of the entire complex in Terengganu where natural gas is already being brought onshore for other gas utilization projects. This will make it possible to utilize common facilities and infrastructure, and where the output of one unit can be easily transported to another. Moreover, there will be a possibility of integrating the complex with the refinery to develop flexibility in the use of feedstocks for both petrochemical and fuel manufacture. There should be adequate port facilities in Terengganu to accept imported ethylene and propylene during the second stage of the development program, as this is also the base where LPG will be exported. Transportation of finished products to the Kuala Lumpur market area will be mainly by road.

The rationale to locate the polyethylene and polypropylene plants in Johore Bahru will be significant only if ethylene and propylene from Singapore can be piped into Johore Bahru at economic cost and if there is sufficient ethylene and propylene from the Singapore complex by early 1990s. This will depend on a consideration of the pipeline costs as well as on the possibility of drawing a supply contract with Singapore which will involve at least five years. Location of the ethane cracker here also appears to be contingent upon the construction of the proposed gas pipeline from Terengganu to the west coast. The project, however, is still under evaluation and its implementation is uncertain at this stage. These uncertainties have to be resolved in order to analyze the benefits of setting up the complex in Johore Bahru.

The advantage of siting the complex in Klang is its nearness to the markets for petrochemical finished products. However, this location is considered attractive only if natural gas is piped in to the west coast.

- Product Linkages

Linkages between the existing and proposed petrochemical products after the establishment of the petrochemical complex are summarized in Figure 2.

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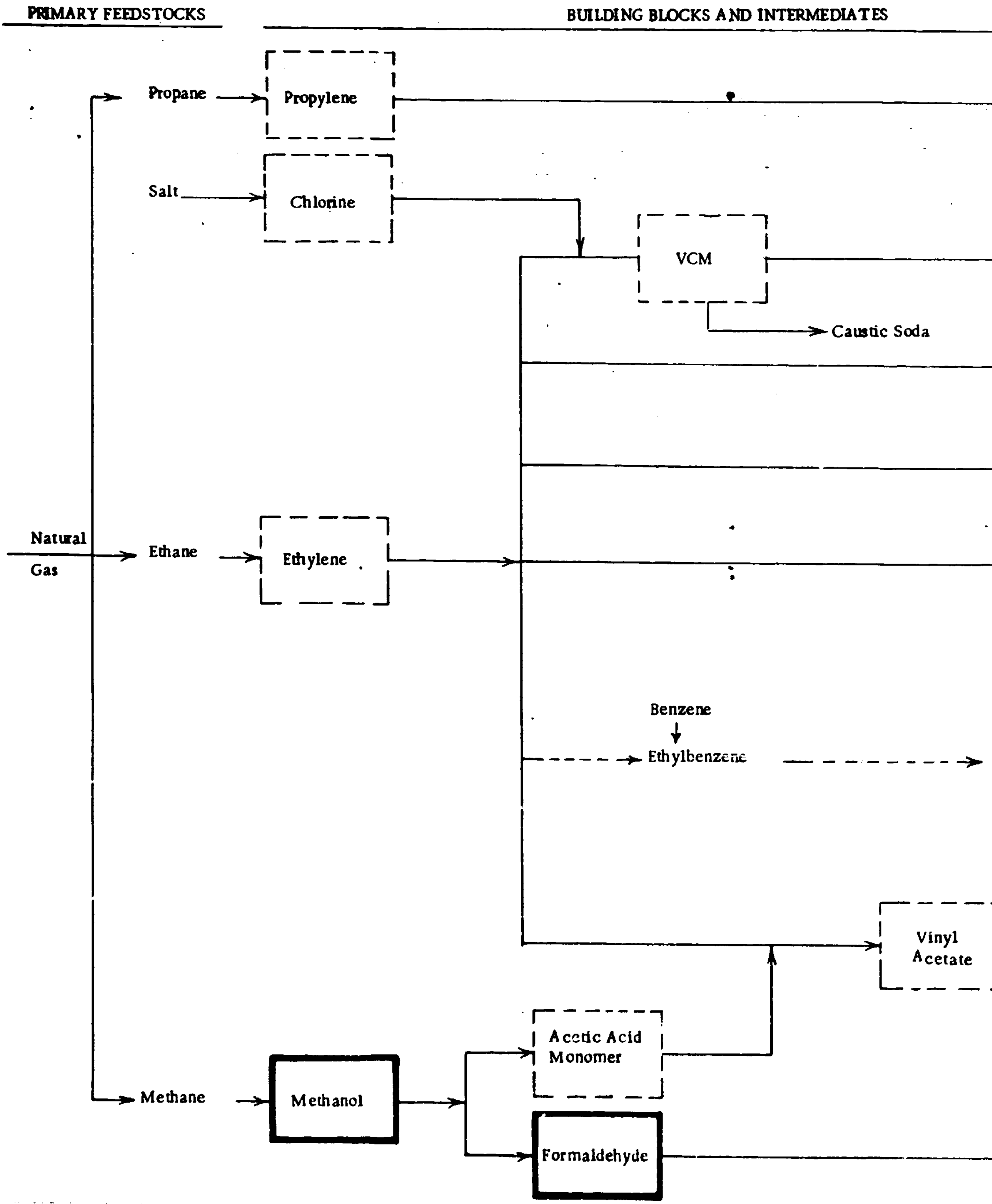
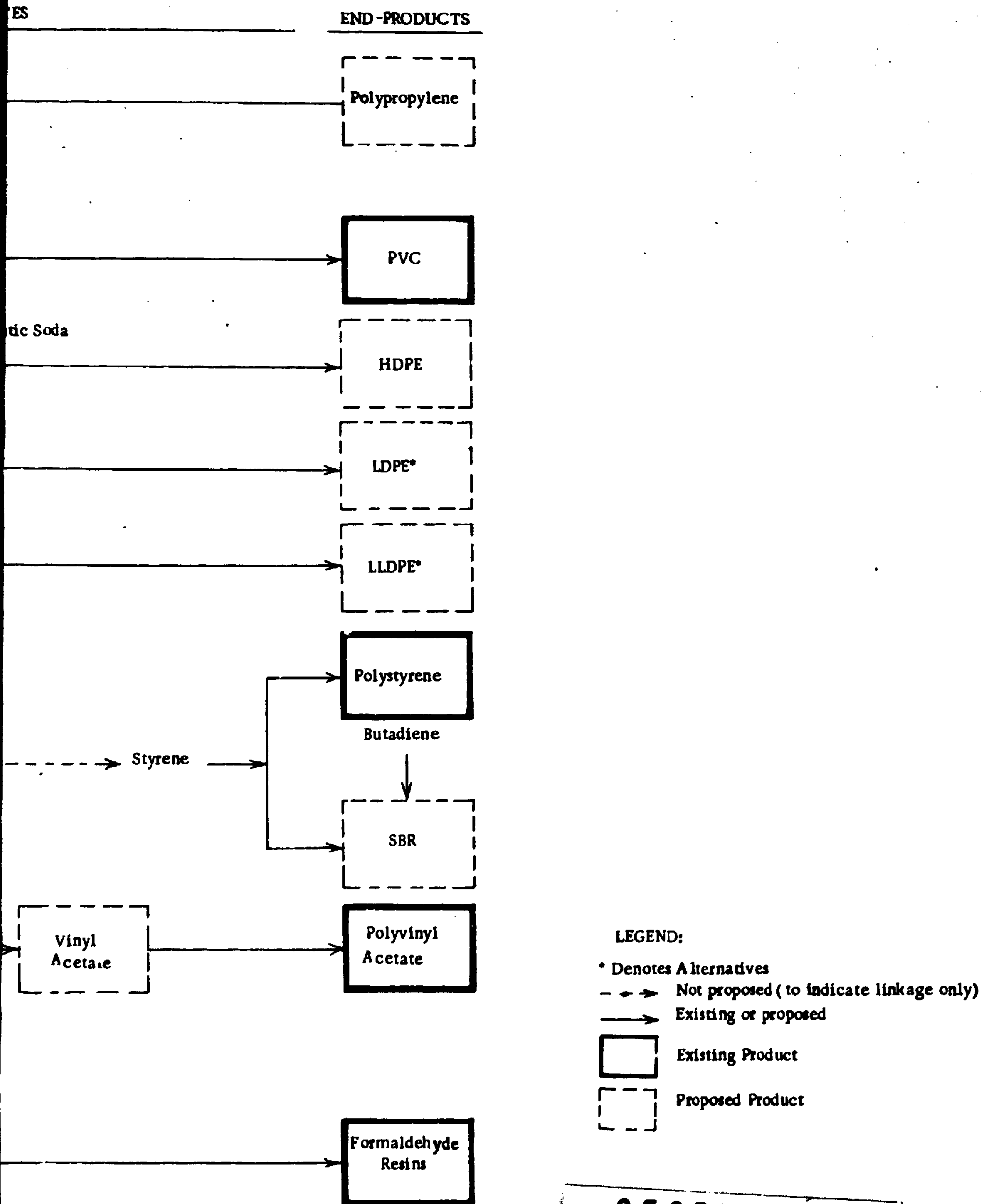


SECTION 1

FIGURE 2



SECTION 2

1.2.4 Paints and Inks

The paints and inks industry should be allowed to grow with minimal interference from the government. This is because the industry is well-developed with sufficient investment in production capacity to meet domestic demand. A wide range of products are already manufactured locally at competitive prices and the private sector is well-positioned to undertake further product and market development.

Although concern has been expressed over the large number of manufacturers in the industry, leading to overcrowding and low capacity utilization, it is felt that if rationalization is necessary, the industry should also be left to do so on its own. Restrictions should not be placed on licensing of new or expansion projects as this will unnecessarily hamper growth and protect inefficient production facilities.

Production will continue to be geared towards the domestic market. Export orientation is not considered to be a suitable strategy for this industry for the following reasons:

1. The relative ease with which production facilities may be set up in any country.

2. Dependence on imported inputs.

3. High transportation costs of the finished products compared with raw materials and intermediates.

4. Tariff barriers imposed by other ASEAN countries.

Malaysia is still highly dependent on imported raw material inputs for paint and ink production. Except for petrochemicals, there is little potential for utilizing local resources through backward integration. Up to 1995, backward integration will still be based primarily on imported raw materials as in the case of synthetic emulsions and alkyd resins. The development of a petrochemical complex after 1995 may make some intermediates, such as vinyl acetate monomer, available locally. In line with the strategy of non-interference, the pace and extent of backward integration should be determined by industry.

The role of the Government is to ensure that intermediates are produced only when such projects are economically viable so that end-products will not be penalized with high raw material inputs. Tariff protection may be offered to encourage local production of new products but this protection should be given for a limited time period only. In the respect, the Government should consider lowering the import duty on paints and inks over the next five years.

There should be no need for policies and incentives to encourage investment in the paints and inks industry over the next decade. Incentives, however, may be provided to stimulate local research and development activities through assistance in setting up a research institute, provision of grants, tax incentives, etc.

1.2.5 Ph :maceutical Products

The pharmaceutical industry is in a difficult position. Local production of pharmaceutical end-products accounts for less than 30% of domestic demand and capacity utilization is low. There is increasing competition from imported products on which no import duty is imposed (since 1981) while local producers have to pay import duty on some raw material inputs. Increased import substitution is difficult and the local industry will most likely diminish in importance in favor of imports if the present policy continues.

In view of the above, a review of the existing policy is recommended. There would be no import duty on raw material inputs not locally produced. Serious consideration should also be given to providing some protection on a limited time basis for the local industry to allow for healthy growth of import substitution without undue competition from imports. This may be in the form of import duties or restrictions.

In recommending increased input substitution, the following factors in particular were taken into consideration:

1. Value added relative to output value in the pharmaceutical sub-sector is among the highest in the chemical industry, based on past data (see Table 2.2). This is probably because a high proportion of the inert ingredients and packaging materials are available locally.

2. Creation of technical and professional jc particularly fcr pharmacists, chemists, a. .oratory technicians.

3. Higher per capita domestic consumption of pharmaceuticals with increasing income.

It is generally agreed that the domestic market is too small for the production of raw materials or active ingredients for pharmaceuticals. As such, backward linkages are not likely to be developed over the plan period.

1.2.6 Pesticides

The pesticide industry is characterized by heavy dependence on imported technical ingredients and foreign product technology. As such, the industry's orientation is generally towards import substitution. Some multinational corporations (MNC's) with a strong presence in the region are engaged in production and market development on a regional basis. Pesticide production in Malaysia is dominated by multinational corporations which possess the expertise, exposure, and finances to develop innovative and technologically superior pesticide products. The dominant presence of MNC's is expected to remain in the future.

The industry is highly capable of selecting which products or product groups to develop in the next decade without government intervention. Government's contribution in promoting the development of the industry should take the form of:

1. Patent protection. Strict enforcement of the Patents Act to safeguard property rights to patented products will encourage MNC's to continually provide Malaysia with their newest and best technology.

2. Removal of import duty on technical raw materials for insecticides and fungicides. Import substitution is difficult to achieve if, on one hand, there is increasing competition from imported fungicides and insecticides on which no import duty is imposed while, on the other hand, local manufacturers have to pay import duty on technical ingredients.

3. Curbing of imitation and adulteration practices by: (a) revising the Pesticides Act to provide stiffer penalties for these offenses; and (b) increased policing by Government enforcement units.

4. Shortening of processing time for registration of pesticides and staffing of the screening unit under the Pesticides Board with specialists and experienced technical personnel who can competently evaluate applications for pesticide registration.

1.2.7 Cosmetics, Soaps, and Detergents

The cosmetic, soap, and detergent industry in Malaysia can be categorized as resource-based (soaps) and non-resource-based (cosmetics, toiletries, and detergents). Soap products of Malaysia, because of their high local content, offer possibilities of tapping export markets. In contrast, production of cosmetics, toiletries, and detergents, which are based on imported raw materials, is aimed towards import substitution. The industry is composed of both foreign and local companies who can capably identify candidate products for investment. Government can, however, stimulate the development of the industry through:

1. Rationalizing of electric energy pricing for chlor-alkali plants in order to lower the cost of caustic soda used in soap production.

2. Removal of import duty on perfumes used in soap and detergent production.

3. Possible assistance to industry in the form of trade negotiations with prospective export-markets for toilet soap, soap chips or noodles, such as Japan and the Middle Eastern countries.

4. Provision of limited protection from the continuous inflow of cheap but lower quality P.R.O.C. detergents. This can take the form of a quota system where a ceiling is set for imports of detergent products which are also produced in Malaysia.

II. INVESTMENT REQUIREMENTS

Due to lack of data on total investment in the chemical industry, investment requirements are estimated for major projects under the development program for the chemical industry. In line with the development strategies formulated for the industry, significant investments are projected to materialize in the fertilizer and petrochemical sub-sectors (see Table 2.1).

2.1 FERTILIZERS

Major efforts are currently being placed in the utilization of indigenous natural gas supplies, these being employed as feedstock for a world-scale ammonia-urea project being built in Bintulu, Sarawak under ASEAN auspices. Investment cost of the ASEAN Bintulu plant with annual capacity of 330,000 MT of ammonia and 495,000 MT of urea is estimated at M$700 million (at 1981 prices). This project will come on stream by October 1985.

A third compound fertilizer plant with capacity of 250,000 MT, which should be considered for construction in Bintulu during the 1991-1995 period, is expected to cost about M$30 million (at 1981 prices).

Substantial investments in phosphate and additional nitrogen fertilizer manufacture are likely to take place after 1995 when domestic and export demand has reached a level which can support an economic size plant. Investment cost for a second ammonia-urea plant in Bintulu with the same capacity as the first plant will be in the region of M$600 million (at 1981 prices). A phosphate complex also in Bintulu, producing sulphuric acid, phosphoric acid and a soluble phosphoric acid derivative such as DAP, DAP-MAP, or TSP, can be expected to cost about M$220 - 250 million (at 1981 prices) at capacity of 400 tons of P_2O_5 per day.

2.2 PETROCHEMICALS

Under the development program for petrochemicals, the investment requirements are estimated as follows:

Stage 1 - for market development, investment will be mainly in upgrading fabrication and processing industries; no estimate is made for this sector, which is outside the scope of this study.

Stage 2 - for initial set up of polyethylene and polypropylene plants at 100,000 MT and 50,000 MT, respectively, based on imported feedstocks, the plant costs are estimated at a total of about M$635 million (at 1981 prices).

Stage 3 - for construction of the ethane cracker and propane dehydrogenation unit, the plant costs are estimated at about M$800 - $900 million (at 1981 prices); for construction of final stages of polyethylene and polypropylene plants to increase capacities to 200,000 MT and 100,000 MT, respectively, the additional plant costs are estimated at a total of M$325 million (at 1981 prices). A VCM plant with a project cost of about M$230 million should also be considered at this stage.

TABLE 2.1
CHEMICAL INDUSTRY: INVESTMENT REQUIREMENTS
(M$ MILLION IN 1981 CONSTANT PRICES)

Project	1985-1990	1991-1995	After 1995
FERTILIZERS			
o ASEAN Bintulu ammonia-urea plant (330,000 MT/annum of ammonia and 495,000 MT/annum of urea)	$700		
o Third compound fertilizer plant at Bintulu (250,000 MT/annum)		$ 30	
o Second ammonia-urea plant at Bintulu (same capacity as first plant)			$ 600
o Phosphate complex (200 - 400 MT of P_2O_5 per day)			220-250
Investment Requirements	$700	$ 30	$820-850
PETROCHEMICALS			
o Stage 1:			
Market development	-		
o Stage 2:			
Polyethylene plant (100,000 MT/annum)		$335	
Polypropylene plant (50,000 MT/annum)		300	
o Stage 3:			
Ethane cracker/propane dehydrogenation (250,000 MT/annum)			$ 850
Expansion of polyethylene plant to 200,000 MT/annum			175
Expansion of polypropylene plant to 100,000 MT/annum			150
VCM plant (75,000 MT/annum)			230
Investment Requirements	-	$635	$ 1,405

III. MANPOWER REQUIREMENTS

Manpower at all levels is a major ingredient for the expansion of the chemical sector. In order to modernize the existing plants as well as implement new projects, the chemical industry will be absorbing a stream of new technologies from the developed countries. The existence of skilled personnel will therefore be of paramount importance not only for transfer of technology to be effective, but more important, for the updated plants to operate productively. The implications of these manpower requirements will be in the upgrading of training and education in the country ranging from general science education to vocational training.

3.1 INORGANIC CHEMICALS AND CHEMICAL ELEMENTS

Domestic output of inorganic chemicals and chemical elements accounted for a fairly consistent share of total demand from 1975 to 1981 (32.6% on the average) and peaked in 1980 at 35.4%. Local production is projected to maintain a 35% share of total demand from 1985 to 1990 as no additional capacity nor new productions are anticipated to be introduced during this period. Expansion of capacity will likely occur starting 1991 such that the share of local production to total demand will increase to 40% by 1995.

Employment by the sub-sector, estimated at 2,476 in 1981, is expected to remain at this level until 1985. During the period 1986 to 1990, employment is projected to increase marginally at 1%, 2% and 3% for low, medium and high growth cases, respectively. Starting 1991 when additional capacity will be introduced, employment will increase at half the rate of output. Table 3.1 summarizes the production and employment forcasts for the inorganic chemicals and chemical elements sub-sector.

TABLE 3.1
INORGANIC CHEMICALS AND CHEMICAL ELEMENTS:
PROJECTED PRODUCTION AND EMPLOYMENT
1985 - 1995
(VALUE IN M$ MILLION IN 1981 CONSTANT PRICES)

Year	Total Demand			Local Production			Total Employment		
	Low	Medium	High	Low	Medium	High	Low	Medium	High
1985	$ 448.1	$ 448.1	$ 448.1	$ 156.8	$ 156.8	$ 156.8	2,480	2,480	2,480
1986	482.2	491.2	500.2	168.8	171.9	175.1	2,505	2,530	2,554
1987	519.0	538.7	558.8	182.0	188.5	195.6	2,530	2,580	2,631
1988	558.9	591.2	624.7	195.6	206.9	218.6	2,555	2,632	2,710
1989	602.1	648.9	698.8	210.7	227.1	244.6	2,581	2,684	2,791
1990	648.7	712.7	782.1	227.0	249.4	273.7	2,606	2,738	2,875
1991	702.0	781.1	867.1	252.4	280.9	311.9	2,752	2,911	3,076
1992	759.9	856.2	961.7	280.8	316.4	355.4	2,907	3,094	3,292
1993	822.8	938.8	1,067.1	312.2	356.3	405.0	3,069	3,289	3,522
1994	891.2	1,029.8	1,184.4	347.2	401.3	461.6	3,241	3,496	3,768
1995	965.4	1,129.9	1,314.8	386.2	452.0	526.0	3,423	3,716	4,032
Average Annual Growth Rate									
1985 - 1990	7.7%	9.7%	11.8%	7.7%	9.7%	11.8%	1.0%	2.0%	3.0%
1990 - 1995	8.3	9.6	10.9	11.2	12.6	14.0	5.6	6.3	7.0

3.2 FERTILIZERS

In the fertilizers sub-sector, share of local production to total demand averaged at 36.2% for the period 1973 to 1981. Domestic output share of total demand will remain at 36% until 1985 prior to the start of operations of the ammonia-urea plant at Bintulu. From 1986 onwards, production will significantly increase in the following manner as installed nitrogen and compound fertilizer capacity at Bintulu is utilized:

Year	Share of Domestic Output to Total Demand
1986	56.1%
1987	55.2
1988	54.4
1989	53.6
1990	52.9
1991 - 1995	55.0

The fertilizers sub-sector employed about 1,240 people in 1981 and will remain at this level until 1986 when the ASEAN Bintulu project is expected to hire about 600 people. By 1991, an additional 80 people are projected to be employed by the sub-sector.

Table 3.2 presents the results of forecasts on domestic output and manpower employed by the sub-sector.

TABLE 3.2
FERTILIZERS:
PROJECTED PRODUCTION AND EMPLOYMENT
1985 - 1995
(VALUE IN M$ MILLION IN 1981 CONSTANT PRICES)

Year	Total Demand		Local Production		Employment
	Low	High	Low	High	
1985	$685.2	$697.9	$246.7	$251.2	1,240
1986	702.4	728.6	394.0	408.7	1,840
1987	719.9	760.7	397.4	419.9	1,840
1988	737.9	794.2	401.4	432.0	1,840
1989	756.4	829.1	405.4	444.4	1,840
1990	775.3	865.6	410.1	457.9	1,840
1991	793.9	903.7	436.6	497.0	1,920
1992	813.0	943.5	447.2	518.9	1,920
1993	832.5	985.0	457.9	541.8	1,920
1994	852.4	1,028.3	468.8	565.6	1,920
1995	872.9	1,073.6	480.1	590.5	1,920
Average Annual Growth Rate					
1985 - 1990	2.5%	4.4%	10.7%	12.8%	8.2%
1990 - 1995	2.4	4.4	3.2	5.2	0.9

3.3 PETROCHEMICALS

Within the petrochemical building blocks and intermediates sub-sector, methanol will be the only significant product locally produced over the plan period. The value of projected methanol production is shown in Table 3.3. When fully operational, the methanol plant is expected to employ about 200 - 300 workers.

In the plastics and resins sub-sector, domestic output accounted for an averge of 28.7% of total demand from 1973 to 1981 and about 33% in 1981. Domestic production is projected to account for 35% of total demand in 1985 increasing to 40% in 1990 and 55% in 1995 with local production of polyethylene and polypropylene. Employment by the sub-sector, estimated at 750 by 1985 (about 700 in 1984), is projected to increase at half the rate of output growth. Forecasts of production and employment in the plastics and resins industry is presented in Table 3.4. About 1,000 - 1,100 workers are expected to be employed by 1990, increasing to 1,500 - 1,750 by 1995.

The direct employment in the petrochemical complex will be relatively small and is estimated to be no more than 1,000 for the upstream as well as downstream plants. Some 60% of these numbers will consist of skilled and unskilled workers and about 20% will be technical and supervisory personnel. The balance of 20% will include managerial and administrative individuals.

It is in the fabrication, processing and other service sectors that the employment multiplier will be significant. It has been estimated that the indirect employment in these industries can be about a multiple of 10 over the direct employment. On this basis, the direct and indirect employment that can result from the set up of the petrochemical complex is estimated to be roughly about 11,000.

TABLE 3.3
PETROCHEMICAL BUILDING BLOCKS AND INTERMEDIATES:
PROJECTED METHANOL PRODUCTION
1985 - 1995

Year	Volume ('000 MT)	Value [1] (M$ Million)
1985	170	78.2
1986	250	115.0
1987	350	161.0
1988	450	207.0
1989	500	230.0
1990	550	253.0
1991	550	253.0
1992	550	253.0
1993	550	253.0
1994	550	253.0
1995	550	253.0

1 At 1981 averge methanol price of M$460 (US$200) per MT

TABLE 3.4
PLASTICS AND RESINS:
PROJECTED PRODUCTION AND EMPLOYMENT
1985 - 1995
(VALUE IN M$ MILLION IN 1981 CONSTANT PRICES)

Year	Total Demand			Local Production			Total Employment		
	Low	Medium	High	Low	Medium	High	Low	Medium	High
1985	$ 774.1	$ 774.1	$ 774.1	$ 270.9	$ 270.9	$ 270.9	750	750	750
1986	844.1	863.3	882.6	303.1	309.6	316.4	795	803	813
1987	919.8	961.7	1,004.6	339.2	353.9	369.6	843	860	881
1988	1,001.6	1,070.2	1,142.0	379.6	404.5	431.7	893	921	955
1989	1,090.2	1,190.1	1,296.4	424.7	462.4	504.2	947	987	1,036
1990	1,185.9	1,322.1	1,470.1	475.3	528.5	588.9	1,004	1,057	1,123
1991	1,295.8	1,463.8	1,647.2	552.8	623.1	698.2	1,085	1,151	1,227
1992	1,415.2	1,619.7	1,844.4	642.9	734.6	827.8	1,173	1,253	1,342
1993	1,545.0	1,791.3	2,064.0	747.7	866.1	981.4	1,268	1,365	1,466
1994	1,686.2	1,980.1	2,308.4	869.5	1,021.2	1,163.6	1,370	1,486	1,603
Average Annual Growth Rate									
1985 - 1990	8.9%	11.3%	13.7%	11.9%	14.3%	16.8%	6.0%	7.1%	8.4%
1990 - 1995	9.2	10.6	11.3	16.3	17.9	18.6	8.1	8.9	9.3

3.4 PAINTS AND INKS

Domestic output of paints and inks has retained a fairly constant share of total demand, averaging 83.8% (by value) from 1973 to 1981. Local production is expected to keep pace with demand growth to retain its share of total demand up to 1995.

With current overall capacity utilization at 50% - 55% no new plants will be required until after 1990. As such, up to 1992 employment in the industry is projected to increase at 2%, 3% and 4% per annum for low, medium and high production growth rates respectively. After 1992, employment will increase at the same rate as output.

Production and manpower forecasts for the paints and inks sub-sector are presented in Table 3.5. Total employment in the industry is projected to increase from 1,700 in 1985 to about 1,900 - 2,100 in 1990 and 2,300 - 2,800 in 1995.

TABLE 3.5
PAINTS AND INKS:
PROJECTED PRODUCTION AND EMPLOYMENT
1985 - 1995
(VALUE IN M$ MILLION IN 1981 CONSTANT PRICES)

Year	Total Demand			Local Production			Total Employment		
	Low	Medium	High	Low	Medium	High	Low	Medium	High
1985	$ 246.8	$ 246.8	$ 246.8	$ 207.3	$ 207.3	$ 207.3	1,700	1,700	1,700
1986	262.5	265.1	267.7	220.5	222.7	224.9	1,734	1,751	1,768
1987	279.1	284.6	290.3	234.4	239.1	243.9	1,769	1,804	1,839
1988	296.7	305.5	314.6	249.2	256.6	264.3	1,804	1,858	1,912
1989	315.4	328.0	340.9	264.9	275.5	286.4	1,840	1,913	1,989
1990	335.0	351.9	369.4	281.4	295.6	310.3	1,877	1,971	2,068
1991	356.0	377.5	400.0	299.0	317.1	336.0	1,914	2,030	2,151
1992	378.3	405.0	433.1	317.8	340.2	363.8	1,953	2,091	2,237
1993	401.8	434.3	468.9	337.5	364.8	393.9	2,074	2,241	2,423
1994	426.8	465.6	507.6	358.5	391.1	426.4	2,202	2,403	2,623
1995	453.2	499.2	549.3	380.7	419.3	461.4	2,339	2,576	2,841
Average Annual Growth Rate									
1985 - 1990	6.3%	7.4%	8.4%	6.3%	7.4%	8.4%	2.0%	3.0%	4.0%
1990 - 1995	6.2	7.2	8.3	6.2	7.2	8.3	4.5	5.5	6.6

3.5 PHARMACEUTICAL PRODUCTS

At present, domestic production of pharmaceuticals account for about 25% of total demand. If policies to encourage increased import substitution are implemented, domestic production can be expected to satisfy 30% of total demand by 1990 and 35% by 1995.

The industry is currently operating at about one-third capacity. Thus, no major investments are required to sustain output growth over the plan period. Total manpower employed in the manufacture of pharmaceutical products is projected to increase at half the rate of output growth over the period.

Production and employment forecasts are presented in Table 3.6. Projections indicate that total employment in the pharmaceutical industry will be 4,000 - 4,300 in 1990 and 4,900 - 5,500 in 1990.

TABLE 3.6
PHARMACEUTICAL PRODUCTS:
PROJECTED PRODUCTION AND EMPLOYMENT
1985 - 1995
(VALUE IN M$ MILLION IN 1981 CONSTANT PRICES)

Year	Total Demand			Local Production			Total Employment		
	Low	Medium	High	Low	Medium	High	Low	Medium	High
1985	$ 285.3	$ 285.3	$ 285.3	$ 71.3	$ 71.3	$ 71.3	3,200	3,200	3,200
1986	299.4	303.9	308.5	77.6	78.7	79.8	3,344	3,366	3,392
1987	314.4	323.8	333.2	84.6	86.9	89.3	3,494	3,541	3,596
1988	329.9	344.5	359.4	92.1	95.9	99.9	3,652	3,726	3,811
1989	346.4	366.6	387.5	100.3	105.9	111.8	3,816	3,919	4,040
1990	363.7	390.0	417.2	109.2	117.0	125.2	3,988	4,123	4,282
1991	379.1	411.6	446.0	117.9	127.8	138.4	4,147	4,317	4,509
1992	398.1	437.7	479.6	127.4	139.6	153.0	4,313	4,520	4,748
1993	418.1	465.0	515.6	137.6	152.6	169.2	4,486	4,732	5,000
1994	436.2	490.9	550.4	148.6	166.8	187.2	4,665	4,955	5,265
1995	458.4	521.6	590.9	160.4	182.4	207.0	4,852	5,188	5,544
Average Annual Growth Rate									
1985 - 1990	5.0%	6.5%	7.9%	8.9%	10.4%	11.9%	4.5%	5.2%	6.0%
1990 - 1995	4.7	6.0	7.2	8.0	9.3	10.6	4.0	4.7	5.3

3.6 PESTICIDES

Domestic output of the pesticides sub-sector accounted for 61.7% of total demand on the average from 1973 to 1981 and registered a 54.2% share in 1981. Local production is assumed to cover 55% of total demand in 1985, growing to 60% by 1995.

Employment in the sub-sector reached about 1,800 in 1981 and is projected to increase at 2%, 3% and 4% for low, medium and high growth cases, respectively, throughout the period.

Results of projections on production and manpower are summarized in Table 3.7.

TABLE 3.7
PESTICIDES:
PROJECTED PRODUCTION AND EMPLOYMENT
1985 - 1995
(VALUE IN M$ MILLION IN 1981 CONSTANT PRICES)

Year	Total Demand			Local Production			Total Employment		
	Low	Medium	High	Low	Medium	High	Low	Medium	High
1985	$ 336.3	$ 336.3	$ 336.3	$ 185.0	$ 185.0	$ 185.0	2,025	2,025	2,025
1986	360.3	362.9	365.4	201.1	202.4	203.7	2,066	2,086	2,106
1987	385.2	390.8	396.2	218.6	221.4	224.3	2,107	2,148	2,190
1988	411.5	420.0	428.7	237.6	242.2	246.9	2,149	2,213	2,278
1989	438.9	450.7	463.1	258.3	265.0	271.8	2,192	2,279	2,369
1990	467.6	483.0	498.8	280.6	289.8	299.3	2,236	2,348	2,464
1991	491.1	510.3	530.1	295.1	306.4	318.5	2,280	2,418	2,562
1992	517.3	540.5	564.9	310.1	323.9	338.8	2,326	2,490	2,665
1993	544.7	572.0	601.7	325.9	342.4	360.5	2,373	2,565	2,771
1994	571.3	603.2	638.1	342.6	361.9	383.6	2,420	2,642	2,882
1995	600.7	638.0	678.7	360.0	382.5	407.2	2,468	2,721	2,997
Average Annual Growth Rate									
1985 - 1990	6.8%	7.5%	8.2%	8.7%	9.4%	10.1%	2.0%	3:0%	4.0%
1990 - 1995	5.1	5.7	6.4	5.1	5.7	6.4	2.0	3.0	4.0

3.7 COSMETICS, SOAPS AND DETERGENTS

Domestic output of the cosmetics, soaps and detergents sub-sector accounted for an average share of 69.2% of total demand from 1973 to 1981 and registered a low 65.7% share in 1981. Local production is expected to return to a 70% share in 1985, growing to 75% by 1990 and maintaining this share throughout 1991 to 1995.

Employment of the sub-sector was 2,518 in 1981 and is estimated at 2,957 in 1985. Manpower is projected to grow at half the rate of output throughout the plan period (See Table 3.8).

TABLE 3.8
COSMETICS, SOAPS AND DETERGENTS:
PROJECTED PRODUCTION AND EMPLOYMENT
1985 - 1995
(VALUE IN M$ MILLION IN 1981 CONSTANT PRICES)

Year	Total Demand			Local Production			Total Employment		
	Low	Medium	High	Low	Medium	High	Low	Medium	High
1985	$ 499.6	$ 499.6	$ 499.6	349.7	$ 349.7	$ 349.7	2,957	2,957	2,957
1986	525.2	532.8	539.8	392.9	378.3	383.3	3,055	3,077	3,097
1987	552.2	568.0	583.2	397.6	409.0	419.9	3,155	3,201	3,245
1988	581.0	605.2	629.9	424.1	441.8	459.8	3,260	3,331	3,399
1989	611.2	645.1	680.6	452.3	477.4	503.6	3,367	3,466	3,560
1990	643.3	687.6	733.4	482.5	515.7	550.0	3,478	3,606	3,729
1991	672.9	728.5	786.4	504.7	546.4	589.8	3,565	3,722	3,874
1992	708.4	776.6	848.6	531.3	582.4	636.4	3,654	3,841	4,018
1993	746.6	827.7	915.9	560.0	620.8	686.9	3,746	3,964	4,171
1994	781.8	877.3	982.3	568.4	658.0	736.7	3,839	4,091	4,329
1995	823.5	936.0	1,060.1	617.6	702.0	795.1	3,936	4,222	4,494
Average Annual Growth Rate									
1985 - 1990	5.2%	6.6%	8.0%	6.6%	8.1%	9.5%	3.3%	4.0%	4.7%
1990 - 1995	5.1	6.4	7.6	5.1	6.4	7.6	2.5	3.2	3.8

IV. POLICIES AND PROGRAMS

Implicit in the development strategy for chemicals is a bias towards a mixture of import-substitution, export growth, and resource-based promotion policies. Indeed, experiences in recent years in Asia have proven that these policies are not necessarily mutually exclusive. There is also a strong emphasis in our proposed development program on dependence on the domestic market as uncertainties in the international market and economic cycles bring undue risks to capital intensive industries in this sector.

Some of the policy issues which we believe should be addressed, particularly with respect to the chemical industry are the following:

4.1 PRIVATE/PUBLIC SECTOR

While the development of the chemical industry should largely be a private sector activity, tnere is need for Government to force the pace of industrialization and direct its pattern. These will essentially be in the form of Governement planning, encouragement through incentives, and infrastructure development.

Moreover, there will be need for direct Government involvement on a joint venture basis with the private sector in key areas of the development program which require large volumes of investment. At present, we have seen Government involvement in the large-scale ammonia-urea and compound fertilizer projects. In the proposed petrochemical complex, it is suggested that the State take a significant role in the ownership and operation of the upstream facilities (ethane cracker). A practical arrangement that has been implemented in a number of cases, including Singapore and Thailand, is for the Government to own, say, 50% of the upstream facilities, and the remaining 50% to be owned by various project proponents in the downstream units. The downstram units will of course be in the hands of the private sector.

4.2 INFRASTRUCTURE DEVELOPMENT

Because of its low commercial returns, the Government will have to take leadership in the development of adequate infrastructure such as transport and communication. Ports have to be specially equipped for handling and bulk storage of chemicals and improvements are required to reduce delays in clearing the goods. Roads and railways linking the east and west coast states of the Peninsula should also be improved.

Likewise, the Government should be involved in providing economic sources of energy. The need for inexpensive power is basic in the chemical industry as dramatized by the effects of power costs in the chlor-alkali industry.

4.3 GEOGRAPHICAL DISPERSAL

Prudent and proper location of chemical plants is largely determined by raw materials, transportation, and markets. As such, the chemical industries are not very flexible in their choice of plant location. Products that are amenable to policies and incentives for dispersal are petrochemical products and fertilizers since complexes manufacturing these products may be located near the natural gas resources in the less developed areas of the country. Other products such as paints, pharmaceuticals and soaps are better off in well-developed industrial areas close to major markets for easy access to customers, packaging materials, and commercial services.

There does not appear to be a need to significantly change the present incentive package to encourage the geographic dispersal of investments as far as the chemical industry is concerned.

4.4 EMPLOYMENT AND SMALL-SCALE INDUSTRIES

As discussed, while direct employment in the chemical plants may be low, there is a large multiplier in the downstream fabrication, processing, and other service industries. In these downstream sectors are also situated the medium-scale and small-scale enterprises which should be encouraged by the Government. State involvement will lie in its efforts to improve efficiency and productivity of these relatively small firms. Assistance in updating its technology will also be important to encourage these enterprises to look outward towards the export markets.

4.5 RESEARCH AND TRAINING

We recommend the formation of a research and training institute where Government, existing research institutions, academia and chemical firms can collaborate to undertake research on relevant themes and to train industry manpower. The objectives of such a proposed institute may be to assist the manufacturers in the following:

- Updating the industry's technological know-how particularly in the various phases of plastics manufacture and development;

- Exploring the possibility of devising competitive small-scale chemical plants appropriate to the size of the Malaysian market;

- Development of new products and new product uses/markets again particularly for the plastics industry;

- Training of industry manpower;

- Providing laboratory testing facilities for research and maintenance of product standards;

- Collection, analysis, evaluation and exchange of information and technical data; and

- Other assistance that may be needed by the industry.

The proposed institute may require initial funding from the government but may eventually be maintained by the industry.

4.6 FOREIGN JOINT VENTURES

Because of the strong technology component in the industry, there is need invariably of participation by international firms with the technological know-how. A joint venture of local and foreign partners is so far still the most appropriate approach for ensuring the continuing availability of appropriate technology. The foreign participants will also be important for their contribution of financial resources which they will be in a position to mobilize, whether in the form of equity or borrowed funds. Participation in equity in the volumes required by this industry will mean that the foreign companies will require substantial involvement in the operation and management of the joint ventures.

4.7 PRICING OF NATURAL GAS

It has been mentioned that an objection to joint ventures with foreign firms is the artificially low natural gas prices set by the government which will ultimately benefit foreign firms. If such is the situation, it is suggested that the gas prices be reviewed for the petrochemical industry so that there will be no excessive subsidy. However, it should also be pointed that for the industry to be internationally competitive, the gas prices should be equal or at least lower than the world market prices e.g. prices in the U.S. Gulf Coast. This has been the successful policy implemented by the Taiwan petrochemical industry over the past decade or so.

4.8 EXPORT GROWTH

While there are presently investment incentives for exports, refining the incentives package to further encourage chemical firms to establish internationally competitive plants and export more manufactured goods may be useful. It is suggested that the Government may consider giving incentives only to certain plants when they have already attained a minimum capacity level which is internationally competitive. These minimum capacities, however, have to be set only after a thorough assessment of industry profiles and trends, and reviewed periodically to ensure that they are not outdated.

4.9 ASEAN REGIONAL ECONOMIC COOPERATION

There is a strong tendency for chemical industries in both developed and developing countries to be protected by substantial tariffs. In addition, the market is essentially served by very few suppliers - the large oil and chemical multinational corporations - which produce and use a major part of basic and intermediate products by virtue of the highly integrated and interlinked production processes. For these reasons, developing countries may encounter considerable trade barriers in exporting chemical products.

In consonance with the above trends, our basic strategy emphasizes dependence on the domestic market over the next decade. However, in the long term, growth and expansion of the industry will require development of a much larger market base. Economic cooperation between the ASEAN countries to eliminate tariff barriers and undertake joint investments and complementary projects will accelerate development and enhance the competitiveness of the industry as a whole.

4.10 PATENT PROTECTION

As the technologies in the petrochemical industries are of immense value, adequate protection of proprietary knowlede should be assured by the government in its legal framework and implementation.

4.11 TARIFF PROTECTION

To sustain an outward promotion policy, the government should see to it that while protection is given to certain deserving industries, they should only be for a limited time period and reviewed periodically to ensure a vigorous and competitive sector.

There should be a review of the existing import duties to remove various inconsistencies that exist such as duties imposed on raw material inputs but not on final products. Although there may be clear-cut divisions between upstream and downstream plants at present, due to non-integrated modes of production, tariff policies formulated must give due consideration to the interdependence that exists within the industry.

4.12 ENFORCEMENT AND ADMINISTRATION

Policies and regulations, once formulated, should be efficiently and consistently administered and enforced. Specifically for the chemical industry, the following are recommended:

- o Early implementation of the recent legislation for patent protection and drug registration.
- o More stringent measures for protection against adulteration and imitation of chemical end-products, especially paints, pesticides and pharmaceuticals.
- o Improved administration of the Pesticides Act in terms of shortening processing time for registration of pesticides and upgrading technical expertise of evaluators.

For the manufacturing industry in general, there is a pressing need to review and simplify procedures relating to manufacturing licenses, incentives, duty exemptions, and duty drawbacks.

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15085 (3 of 3)

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

Vienna, Austria

MALAYSIAN INDUSTRIAL MASTER PLAN

FINAL REPORT: VOLUME IIIC

CHEMICAL INDUSTRY - APPENDICES

December 1984

THE SGV GROUP

SGV-KASSIM CHAN SDN. BHD.

MANAGEMENT SERVICES

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MANAGEMENT SERVICES

LIST OF APPENDICES

No.	Title
1	APPLICABLE IMPORT DUTIES AND TAXES ON LOCALLY PRODUCTED CHEMICALS, AS AT OCTOBER 19, 1984
2	INORGANIC CHEMICALS AND CHEMICAL ELEMENTS: APPARENT CONSUMPTION, 1973 - 1981 (IN CURRENT PRICES)
3	FERTILIZERS: DISTRIBUTION OF OIL PALM CULTIVATED AREA BY SUB-SECTOR, 1983
4	FERTILIZERS: APPARENT CONSUMPTION, 1973 - 1981 (IN CURRENT PRICES)
5	FERTILIZERS: ASSUMPTIONS USED IN DEMAND FORECAST
6	FERTILIZERS: PROJECTED NITROGEN, PHOSPHATE AND POTASH CONSUMPTION, ALTERNATIVE A, 1984 - 1995
7	FERTILIZERS: PROJECTED NITROGEN, PHOSPHATE AND POTASH CONSUMPTION, ALTERNATIVE B, 1984 - 1995
8	FERTILIZERS: NITROGEN CONSUMPTION OF ASIAN COUNTRIES, 1972 - 1982
9	FERTILIZERS: PHOSPHATE CONSUMPTION OF ASIAN COUNTRIES, 1972 - 1982
10	FERTILIZERS: POTASH CONSUMPTION OF ASIAN COUNTRIES, 1972 - 1982
11	FERTILIZERS: NITROGEN IMPORTS OF ASIAN COUNTRIES, 1972 - 1982
12	FERTILIZERS: PHOSPHATE IMPORTS OF ASIAN COUNTRIES, 1972 - 1982
13	FERTILIZERS: POTASH IMPORTS OF ASIAN COUNTRIES, 1972 - 1982
14	FERTILIZERS: NITROGEN EXPORTS OF ASIAN COUNTRIES, 1972 - 1982

Appendix 1

APPLICABLE IMPORT DUTIES AND TAXES ON LOCALLY PRODUCED CHEMICALS AS AT OCTOBER 19, 1984

Sub-sector/Product	Heading No.		Import Duty	Sales Tax	Surtax
A. INORGANIC CHEMICALS AND CHEMICAL ELEMENTS					
1. Chlorine	28.01	100	$0.88/kg	-	5%
2. Carbon black	28.03	100	0.27/kg or	-	5
			20% whichever is higher	-	-
3. Oxygen	28.04	110	25%	-	-
4. Nitrogen	28.04	120	5	-	-
5. Hydrogen and rare gases	28.04	130	5	-	-
6. Rare earth metals, yttrium and scandium and intermixtures or interalloys thereof	28.05	210	5	-	-
7. Hydrochloric acid	28.06	000	$196.84/tonne	-	5
8. Sulphuric acid; oleum	28.08	000	$ 78.74/tonne	-	5
9. Phosphoric acid	28.10	000	30% or $430/tonne whichever is higher	-	5
10. Ammonia, anhydrous or in aqueous solution	28.16	000	3%	-	-
11. Sodium hydroxide					
- caustic soda, solid	28.17	100	)$442.89/tonne	-	5
- in aqueous solution	28.17	200	)		
12. Zinc oxide	28.19	100	)25% or $295.26/tonne		
Zinc peroxide	28.19	200	)whichever is higher	-	5
13. Other chlorides, bromides and iodides	28.30	900	3%	-	-
14. Sodium hypochlorite	28.31	100	$246.05/tonne	-	5
15. Other chlorites, hypochlorites and hypobromites	28.31	900	5%	-	-
16. Copper sulphate	28.38	220	3%	-	-
17. Aluminium sulphate	28.38	230	$ 39.37/tonne	-	5
18. Sodium silicate	28.45	100	$ 39.37/tonne	-	5
19. Calcium carbide	28.56	100	40%	-	-
20. Quicklime, slaked lime and hydrated lime	25.22	000	5%	-	-

Appendix 1 (Cont'd)

Sub-sector/Product	Heading No.		Import Duty	Sales Tax	Surtax
B. PETROCHEMICAL BUILDING BLOCKS AND INTERMEDIATES					
1. Methanol	29.04	100	$ 0.44/litre	-	5%
C. PLASTICS AND RESINS					
1. Phenolic resins	39.01	210	3%	-	-
2. Amino resins	39.01	310	3%	-	-
3. Alkyd and polyester resins	39.01	410	$ 0.40/kg	-	5
4. General purpose and high impact polystyrene	39.02	424-1	35%	-	-
5. Polyvinyl chloride	39.02	521	$246.05/tonne or 25% whichever is higher	-	5
6. Polyvinyl acetate emulsions	39.02	811	$ 0.33/kg	-	5
D. FERTILIZERS					
1. Ammonium nitrate	31.02	200	$ 44.29/tonne	-	5
2. Ammonium sulphate	31.02	300	44.29/tonne	-	5
3. Urea	31.02	700	-	-	-
4. Compound and mixed fertilizers	31.05	100-920	44.29/tonne	-	5
E. PAINTS, VARNISHES, INKS, PIGMENTS AND DYES					
1. Water thinned paints (emulsion paints or dispersion paints)	32.09	110 190	) 25% or $0.88/litre) whichever is higher	10%	-
2. Paints and enamels	32.09	201-209	25% or $0.88/litre whichever is higher	10	-
3. Varnishes and lacquers	32.09	311-390	25% or $0.88/litre whichever is higher	10	-
4. Printing ink	32.13	100	50% or $2.20/kg whichever is higher	-	5
5. Inks for duplicating	32.13	910	$13.27/kg	-	5
6. Writing, drawing, marking, and other inks	32.13	920-990	15%	10	-

Appendix 1 (Cont'd)

Sub-sector/Product	Heading No.		Import Duty	Sales Tax	Surtax
F. COSMETICS, SOAPS AND DETERGENTS					
1. Talcum powder ,	33.06	201	50%	10%	-
2. Face powder	33.06	202	50%	10	-
3. Hair care products	33.06	351-399	50%	10	-
4. Dental paste	33.06	401	5%	10	-
5. Dental powder, dentrifice, denture cleaners, and mouth washes	33.06	402-405	8%	10	-
6. Other dental hygiene products	33.06	499	10%	10	-
7. Soaps	34.01	100-900	8%	10	-
8. Surface active preparations	34.02	501) 502) 590)	-	10	-
9. Washing preparations					
o packed for retail sale:					
- liquid bleaches	34.02	701	$ 0.40/kg	10	5
- other	34.02	709	8%	10	-
o other:					
- liquid bleaches	34.02	791	$ 0.21/kg	10	5
- other	34.02	799	8%	10	-
10. Polishes and creams for footwear, furniture or floor	34.05	100) 200)	10%	10	-
11. Scouring powders and pastes:					
o for domestic use	34.05	310)	8%	10	-
o for other use	34.05	320)			

Appendix 1 (Cont'd)

Sub-sector/Product	Heading No.		Import Duty	Sales Tax	Surtax
G. PESTICIDES					
1. Disinfectants					
o in packs not less than 2.5kg	38.11	110) 191)	5%	10%	-
o in packs less than 2.5kg	38.11	119) 199)	30%	10	-
2. Insecticides					
o mosquito coils	38.11	291)	$ 0.59/kg	-	-
o liquid and others	38.11	210) 299)	-	-	-
3. Fungicides	38.11	310) 390)	-	-	-
4. Weedkillers (herbicides)					
o liquid:					
- containing monosodium acid methane arsenate (MSMA), other salts and derivates of methylarsenic acid	38.11	411	15%	-	-
- containing diuron, monuron and linuron	38.11	412	15% or $2.20 per litre whichever is higher	-	-
- others	38.11	419	15%	-	-
o Others:					
- containing diuron, monuron and linuron	38.11	491	15% or $3.50 per kg whichever is higher	-	-
- others	38.11	499	15%	-	-

Sub-sector/Product	Heading No.		Import Duty	Sales Tax	Surtax
5. Other					
o anti -sprouting products:					
- liquid:					
a) containing MSMA, other salts and derivatives of methylarsenic acid	38.11	911	15%	-	-
b) containing diuron, monuron and linuron	38.11	912	15% or $2.20 per litre whichever is higher	-	-
c) others	38.11	919	15%	-	-
- others:					
a) containing diuron, monuron and linuron	38.11	921	20% or $3.50 per kg whichever is higher	-	-
b) others	38.11	929	20%	-	-
o wood preservatives, containing insecticides or fungicides:					
- liquid:					
a) containing copper and/or chromium salts	38.11	931) 941)	$1.65	10	5
b) other	38.11	939) 949)	25	10	-

Appendix 1 (Cont'd)

Sub-sector/Product	Heading No.		Import Duty	Sales Tax	Surtax
o Other than liquid:					
a) containing copper and/or chromium salts	38.11	951) 961)	$ 0.98	10	5
b) other	38.11	959) 969)	25%	10	-
o deodorants	38.11	970	$5.51	10	5
o other:					
- liquid	38.11	991	-	-	-
- other	38.11	999	-	-	-

H. PHARMACEUTICALS

No duty is levied on importation of those pharmaceuticals also produced locally.

Appendix 2

INORGANIC CHEMICALS AND CHEMICAL ELEMENTS:
APPARENT CONSUMPTION, 1973 - 1981
(M$ '000 IN CURRENT TERMS)

Year	Imports	Local Production	Exports	Apparent Consumption
1973	54,770	25,232	7,647	72,355
1974	103,911	35,662	10,198	129,375
1975	83,081	40,875	6,791	117,165
1976	97,216	52,406	4,512	145,110
1977	98,246	50,740	4,129	144,857
1978	116,137	62,559	7,152	171,544
1979	173,064	82,453	12,531	242,986
1980	204,600	110,213	20,369	294,444
1981	229,816	115,793	18,925	326,684

Source: Department of Statistics
MIDA

Appendix 3

FERTILIZERS:
DISTRIBUTION OF OIL PALM CULTIVATED AREA
BY SUB-SECTOR
1983

Sub-sector	Hectarage[1]	% to Total Hectarage
Private estates	657,000 ha.	51.0%
Public sector:		
FELDA	395,948	
FELCRA	37,369	
RISDA	23,947	
State schemes	89,000	42.4
	546,264	
Smallholders	84,400	6.6
Total	1,287,664 ha.	100.0%

1 Preliminary estimates.

Source: Palm Oil Registration and Licensing Authority (PORLA)

Appendix 4

FERTILIZERS:
APPARENT CONSUMPTION
1973 - 1981
(M$'000 AT CURRENT PRICES)

Year	Imports	Local Production	Exports and Re-Exports	Apparent Consumption
1973	86,471	51,723	6,625	131,569
1974	197,591	69,749	3,559	263,781
1975	132,543	93,022	4,427	221,138
1976	158,107	81,355	49	239,413
1977	180,572	96,073	3,693	272,952
1978	195,967	120,987	508	316,446
1979	332,863	167,370	394	499,839
1980	455,582	201,696	3,439	653,839
1981	375,045	219,001	6,528	587,518
Average Annual Growth Rate 1973 - 1981	20.1%	19.8%	Erratic	20.6%

Source: Department of Statistics
MIDA

Appendix 5

FERTILIZERS: ASSUMPTIONS USED IN DEMAND FORECAST

The two sets of assumptions used in the projections for nitrogen, phosphate and potash nutrient consumption are as follows:

1. Alternative A

	Crop	Growth of Land Development	Growth of Usage Rate per Hectare
a.	Oil palm	3% per annum - this is lower than the 5% growth rate of oil palm hectarage from 1980 - 1985 obtained from the "Mid-Term Review of the Fourth Malaysia Plan, 1981 - 1985"	Nil since usage rate is near optimum level of fertilizer application (70% - 80%)
b.	Rubber	Nil because of stagnant growth of rubber demand in the world market	Nil - historically, no growth
c.	Padi	Nil - historically, no growth	Nil - historically, no growth since 1979
d.	Cocoa	16% per annum from 1984 - 1990 using growth rate of cocoa hectarage from 1980 - 1985 obtained from the "Mid-Term Review of the Fourth Malaysia Plan, 1981 - 1985"; 8% per annum from 1991 - 1995	Nil since usage rate is near optimum level of fertilizer application (83%)
e.	Other crops	Overall nutrient consumption growth of 2.5% per annum	

Appendix 5 (Cont'd)

Crop	Growth of Land Development	Growth of Usage Rate per Hectare
2. Alternative B		
a. Oil palm	5% per annum using growth rate of oil palm hectarage from 1980 - 1985 obtained from the "Mid-Term Review of the Fourth Malaysia Plan, 1981 - 1985"	Nil
b. Rubber	Nil	1% per annum
c. Padi	Nil	No growth from 1984 - 1985; 4.5% growth per annum starting 1986 when the ASEAN Bintulu plant is commissioned. Nutrient consumption by 1995 will represent 60% of optimum level
d. Cocoa	16% per annum from 1984 - 1990; 8% per annum from 1991 - 1995	Nil
e. Other crops	Overall nutrient consumption growth of 2.5% per annum	

FERTILIZERS:
PROJECTED NITROGEN, PHOSPHATE AND POTASH CONSUMPTION
ALTERNATIVE A
1984 - 1995
(IN '000 MT OF NUTRIENT)

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
1. Nitrogen consumption												
Oil palm	54.3	55.9	57.5	59.3	61.1	62.9	64.8	66.7	68.7	70.8	72.9	75.1
Rubber	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2
Padi	51.8	51.8	51.8	51.8	51.8	51.8	51.8	51.8	51.8	51.8	51.8	51.8
Cocoa	4.8	5.5	6.4	7.4	8.6	10.0	11.6	12.5	13.5	14.6	15.8	17.0
Other crops	7.2	7.4	7.5	7.7	7.9	8.1	8.3	8.5	8.7	9.0	9.2	9.4
Total N	145.3	147.8	150.4	153.4	156.6	160.0	163.7	166.7	169.9	173.4	176.9	180.5
2. Phosphate consumption												
Oil palm	60.0	61.7	63.6	65.5	67.5	69.5	71.6	73.8	75.9	78.2	80.6	83.0
Rubber	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2	27.2
Padi	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0
Cocoa	2.7	3.2	3.7	4.3	4.9	5.7	6.6	7.2	7.8	8.4	9.0	9.8
Other crops	14.3	14.7	15.1	15.4	15.8	16.2	16.6	17.1	17.5	17.9	18.4	18.8
Total P_2O_5	120.2	122.8	125.6	128.4	131.4	134.6	138.0	141.3	144.4	147.7	151.2	154.8
3. Potash consumption												
Oil palm	160.4	165.1	170.1	175.3	180.5	185.9	191.5	197.3	203.1	209.3	215.6	222.0
Rubber	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3	29.3
Padi	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2
Cocoa	4.8	5.5	6.4	7.4	8.6	10.0	11.6	12.5	13.5	14.6	15.8	17.0
Other crops	6.2	6.3	6.5	6.6	6.8	7.0	7.1	7.3	7.5	7.7	7.9	8.1
Total K_2O	206.9	212.4	218.5	224.8	231.4	238.0	245.7	252.6	259.6	267.1	274.8	282.6

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FERTILIZERS:
PROJECTED NITROGEN, PHOSPHATE AND POTASH CONSUMPTION
ALTERNATIVE B
1984 - 1995
(IN '000 MT OF NUTRIENT)

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
1. Nitrogen consumption												
Oil palm	55.3	58.1	61.0	64.0	67.2	70.6	74.1	77.8	81.7	85.8	90.1	94.6
Rubber	27.5	27.7	28.0	28.3	28.6	28.9	29.2	29.4	29.7	30.0	30.3	30.6
Padi	51.8	51.8	54.1	56.6	59.1	61.8	64.6	67.5	70.5	73.7	77.0	80.4
Cocoa	4.8	5.5	6.4	7.4	8.6	10.0	11.6	12.5	13.5	14.6	15.8	17.0
Other crops	7.2	7.4	7.5	7.7	7.9	8.1	8.3	8.5	8.7	9.0	9.2	9.4
Total N	146.6	150.5	157.0	164.0	171.4	179.4	187.8	195.7	204.1	213.1	222.4	232.0
2. Phosphate consumption												
Oil palm	61.1	64.2	67.4	70.8	74.3	78.0	81.9	86.0	90.3	94.8	99.6	104.5
Rubber	27.5	27.7	28.0	28.3	28.6	28.9	29.2	29.4	29.7	30.0	30.3	30.6
Padi	16.0	16.0	16.7	17.5	18.3	19.1	19.9	20.8	21.8	22.8	23.8	24.8
Cocoa	2.7	3.2	3.7	4.3	4.9	5.7	6.6	7.2	7.8	8.4	9.0	9.6
Other crops	14.3	14.7	15.1	15.4	15.8	16.2	16.6	17.1	17.5	17.9	18.4	18.8
Total P_2O_5	121.6	125.8	130.9	136.3	141.9	147.9	154.2	160.5	167.1	173.9	181.1	188.5
3. Potash consumption												
Oil palm	163.5	171.7	180.3	189.3	198.8	208.7	219.1	230.1	241.6	253.6	266.3	279.6
Rubber	29.6	29.9	30.2	30.5	30.8	31.1	31.4	31.7	32.0	31.4	32.7	33.0
Padi	6.2	6.2	6.5	6.8	7.1	7.4	7.7	8.1	8.4	8.8	9.2	9.7
Cocoa	4.8	5.5	6.4	7.4	8.6	10.0	11.6	12.5	13.5	14.6	15.8	17.0
Other crops	6.2	6.3	6.5	6.6	6.8	7.0	7.1	7.3	7.5	7.7	7.9	8.1
Total K_2O	210.3	219.6	229.9	240.6	252.1	264.2	276.9	289.7	303.0	317.1	331.9	347.4

Appendix 8

FERTILIZERS:
NITROGEN CONSUMPTION OF ASIAN COUNTRIES
1972 - 1982
(IN MT OF N)

AREA	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
AFGHANISTAN	16000.	17700.	24200.	27668.	30646.	37014.	35497.	33227.	37800.	25600.	31400.
BAHRAIN	6.	16.	20.	23.	0.	0.	23.	13.	0.	300.	0.
BANGLADESH	129291.	126953.	82811.	146723.	165836.	225191.	227785.	260215.	267908.	251600.	306000.
BHUTAN	0.	0.	74.	100.	100.	100.	100.	100.	100.	100.	100.
BURMA	31795.	36471.	38142.	42470.	42931.	49901.	67942.	69700.	66800.	92900.	114700.
CHINA	3692000.	4214000.	3621000.	4809000.	4515000.	6824000.	9060000.	10383000.	11844400.	11272000.	11969000.
TAIWAN	167000.	237000.	228000.	230000.	240000.	249000.	220000.	258000.	267700.	256300.	241000.
CYPRUS	16618.	19645.	7441.	15000.	15000.	8200.	7690.	9136.	8197.	9000.	11600.
INDIA	1742100.	1613000.	1845200.	1908700.	2351700.	2813400.	2986300.	3444200.	3522000.	3881700.	4043000.
INDONESIA	347404.	350000.	345000.	341900.	351200.	465200.	548998.	620419.	850931.	997100.	991000.
IRAN	123799.	194080.	188525.	189980.	220460.	221685.	167237.	237000.	274800.	386600.	492800.
IRAQ	15000.	20139.	27317.	25000.	35000.	45000.	43388.	74200.	64500.	63600.	62100.
ISRAEL	33465.	30340.	32604.	37375.	36495.	38195.	37620.	35717.	39506.	35800.	39200.
JAPAN	733000.	821200.	690800.	653000.	702000.	716000.	723000.	777000.	614000.	643000.	687000.
JORDAN	1380.	1830.	1990.	1900.	3997.	1400.	3173.	6200.	6000.	2900.	7100.
KAMPUCHEA DM	1000.	1000.	900.	100.	100.	0.	0.	0.	7200.	10500.	7300.
KOREA N.	224900.	244000.	251900.	264000.	385800.	442800.	535000.	540000.	550000.	564100.	591600.
KOREA REP	372585.	411236.	447377.	467678.	361289.	387890.	461610.	443900.	447224.	431800.	308600.
KUWAIT	0.	0.	0.	0.	0.	100.	100.	260.	140.	300.	600.
LAOS	100.	100.	100.	100.	100.	100.	52.	87.	4000.	4000.	500.
LEBANON	33000.	38600.	19120.	7000.	17700.	13700.	14400.	16000.	14000.	5900.	17300.
MALAYSIA	80817.	112181.	68878.	77573.	90000.	102000.	109500.	137700.	139300.	127900.	130000.
MONGOLIA	700.	1500.	1600.	1500.	4400.	3700.	4300.	4600.	4500.	9500.	9700.
NEPAL	7713.	9002.	8961.	8421.	10687.	13012.	13746.	15479.	16434.	17400.	23000.
OMAN	0.	131.	177.	254.	130.	200.	182.	808.	667.	1000.	700.
PAKISTAN	386230.	341944.	362900.	443451.	511000.	554100.	684300.	775804.	843574.	832600.	958600.
PHILIPPINES	114500.	151902.	177381.	144100.	177200.	174249.	205400.	226700.	224800.	210700.	231400.
QATAR	0.	0.	0.	200.	300.	300.	414.	600.	800.	800.	1000.
SAUDI ARABIA	1500.	4000.	5000.	5700.	6415.	4708.	7020.	15971.	25168.	41500.	59000.
SINGAPORE	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1800.	1800.	2000.	2000.
SRI LANKA	54792.	51202.	74400.	37800.	52400.	66300.	80900.	77200.	91600.	78500.	79400.
SYRIA	32876.	33255.	36624.	35214.	48099.	55242.	65000.	78940.	79781.	83100.	95900.
THAILAND	62000.	60212.	79845.	78852.	136300.	160100.	153500.	160000.	159000.	162000.	180000.
TURKEY	369300.	429900.	282899.	482204.	590700.	665700.	773800.	769500.	631500.	798900.	863400.
U A EMIRATES	457.	495.	638.	800.	1000.	500.	730.	2100.	2261.	2400.	2900.
VIETNAM	161100.	133300.	121200.	194000.	241500.	288000.	209000.	121000.	156000.	199700.	250000.
YEMEN AR	510.	735.	600.	3372.	2043.	1894.	9000.	11700.	9400.	10600.	10400.
YEMEN DEM	0.	200.	460.	920.	811.	100.	1000.	1100.	1840.	1700.	1800.
ASIA	8953938.	9708269.	9075084.	10683080.	11349340.	14629980.	17458740.	19609410.	21275650.	21526460.	22819170.

SOURCE: FAO DATA COMPILED BY TVA
NOTE: 1982/83 FISCAL YEAR DATA INCLUDED WITH 1982

Appendix 9

FERTILIZERS: PHOSPHATE CONSUMPTION OF ASIAN COUNTRIES

1972 - 1982

(IN MT OF P_2O_5)

AREA	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
AFGHANISTAN	13110.	6900.	9600.	8716.	13590.	17212.	18122.	16430.	13000.	11100.	14100.
BAHRAIN	6.	6.	10.	0.	0.	0.	10.	13.	0.	0.	100.
BANGLADESH	41555.	43848.	35555.	54268.	61128.	90638.	99957.	116940.	119300.	120200.	130400.
BHUTAN	0.	0.	9.	0.	0.	0.	0.	0.	0.	0.	0.
BURMA	14718.	4283.	4199.	10779.	6744.	10147.	14400.	21200.	30300.	29900.	43100.
CHINA	1136000.	1352000.	1412000.	1546000.	1587000.	1762000.	1282500.	1989000.	2671600.	2864100.	3137000.
TAIWAN	49000.	59000.	52000.	60000.	65000.	70700.	64700.	60000.	71400.	67200.	54500.
CYPRUS	11221.	13473.	3567.	8600.	10000.	6000.	7300.	6481.	5701.	5500.	6500.
INDIA	534300.	541100.	497400.	373600.	643500.	773100.	950600.	997900.	1074100.	1154700.	1183900.
INDONESIA	66778.	85000.	114100.	116500.	106800.	104900.	128961.	131929.	209731.	303300.	340200.
IRAN	75824.	133341.	141405.	142500.	161460.	163085.	119433.	197800.	297200.	289400.	400200.
IRAQ	6720.	7269.	6052.	7000.	8000.	8300.	13000.	25800.	23300.	13100.	12100.
ISRAEL	15870.	15035.	16855.	19240.	18709.	19400.	18340.	20805.	16996.	16600.	15800.
JAPAN	729700.	793000.	692400.	623300.	737000.	747000.	775000.	831000.	690000.	701000.	721000.
JORDAN	750.	1250.	2200.	3100.	3158.	3500.	3900.	6200.	7000.	3300.	6300.
KAMPUCHEA DM	1100.	1000.	500.	0.	0.	0.	0.	0.	900.	7500.	3400.
KOREA N.	105000.	83000.	124000.	124800.	127000.	127000.	127000.	127000.	127000.	130000.	130000.
KOREA REP	170945.	196062.	245554.	236422.	142145.	210253.	235617.	215724.	172500.	137800.	149000.
KUWAIT	0.	0.	0.	0.	0.	0.	0.	200.	200.	100.	100.
LAOS	100.	100.	100.	0.	0.	0.	15.	37.	0.	0.	0.
LEBANON	14900.	23705.	12400.	5000.	12000.	8000.	10000.	23000.	6000.	8000.	13400.
MALAYSIA	25576.	35161.	31061.	28255.	36442.	38700.	52400.	52800.	51200.	36000.	45800.
MONGOLIA	2400.	3900.	1700.	700.	1400.	2800.	2700.	3700.	4200.	3600.	3900.
NEPAL	1851.	2453.	2849.	2489.	2768.	3383.	3341.	4284.	4742.	4000.	8200.
OMAN	0.	0.	0.	86.	100.	100.	81.	191.	197.	300.	200.
PAKISTAN	48730.	58066.	60500.	108500.	117900.	157300.	187900.	201086.	226487.	225500.	265300.
PHILIPPINES	39900.	51018.	47774.	34000.	40000.	40414.	49768.	51900.	53400.	47800.	[illegible]
QATAR	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	[illegible]
SAUDI ARABIA	400.	1242.	1890.	2300.	533.	3000.	4573.	5300.	10310.	23600.	33100.
SINGAPORE	1000.	1000.	1000.	1000.	1000.	1000.	1000.	500.	500.	500.	500.
SRI LANKA	7583.	12043.	19400.	10570.	4460.	13400.	11262.	12974.	14061.	16100.	21700.
SYRIA	14914.	7518.	13436.	15568.	20515.	29887.	33000.	43340.	44089.	46400.	55000.
THAILAND	55900.	51381.	70407.	62223.	80300.	90000.	104400.	121355.	101600.	126000.	130000.
TURKEY	236900.	280000.	227003.	388577.	521900.	613500.	654100.	671400.	492200.	544000.	565400.
U A EMIRATES	50.	27.	63.	100.	100.	400.	469.	800.	635.	1000.	1400.
VIETNAM	72365.	74700.	128500.	100200.	95000.	126000.	130000.	30000.	27576.	28200.	38400.
YEMEN AR	100.	140.	190.	1300.	80.	445.	500.	800.	500.	900.	900.
YEMEN DEM	0.	0.	0.	60.	73.	100.	150.	140.	184.	100.	300.
ASIA	3495266.	3938021.	3975679.	4095753.	4625805.	5241664.	5104499.	5908029.	6568109.	6946800.	7582300.

SOURCE: FAO DATA COMPILED BY TVA

DOES NOT INCLUDE GROUND PHOSPHATE ROCK FOR DIRECT APPLICATION

NOTE: 1982/83 FISCAL YEAR DATA INCLUDED WITH 1982

FERTILIZERS: POTASH CONSUMPTION OF ASIAN COUNTRIES 1972 - 1982 (IN MT OF K_2O)

AREA	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
AFGHANISTAN	0.	0.	100.	0.	0.	0.	50.	82.	300.	100.	0.
BAHRAIN	6.	6.	10.	0.	0.	0.	10.	0.	0.	0.	100.
BANGLADESH	11260.	11212.	10745.	14523.	14475.	25100.	27443.	29340.	28700.	28200.	31400.
BHUTAN	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
BURMA	1516.	704.	2345.	1475.	1490.	1916.	3182.	2200.	3100.	2800.	10600.
CHINA	24000.	138000.	153000.	108000.	76000.	88000.	143700.	291000.	382600.	581100.	393000.
TAIWAN	46000.	97000.	101000.	100000.	98000.	96600.	90100.	100800.	95600.	111800.	97100.
CYPRUS	2241.	2167.	2600.	2600.	3100.	3300.	2000.	1496.	971.	1400.	1100.
INDIA	312100.	381000.	317500.	227000.	377300.	482700.	560100.	545500.	617600.	670400.	621700.
INDONESIA	29982.	40300.	33000.	25000.	30000.	38400.	76487.	84200.	91100.	136200.	133100.
IRAN	865.	1066.	2564.	3500.	2670.	3858.	1018.	3049.	0.	2300.	5300.
IRAQ	950.	1261.	1073.	700.	0.	900.	2248.	2000.	4500.	100.	4900.
ISRAEL	13350.	11410.	15080.	17775.	18410.	21700.	21800.	21320.	22750.	23000.	19900.
JAPAN	599600.	684900.	721800.	525000.	647000.	661000.	723000.	736000.	512000.	535000.	582000.
JORDAN	880.	920.	430.	800.	812.	600.	1000.	2100.	1400.	1000.	1000.
KAMPUCHEA DM	200.	0.	0.	0.	0.	0.	0.	0.	0.	1000.	200.
KOREA N.	31300.	44400.	40500.	45000.	37700.	40800.	104700.	82200.	52200.	92000.	46400.
KOREA REP	104172.	149796.	155462.	161398.	139829.	137987.	173674.	191514.	183326.	199200.	156500.
KUWAIT	0.	0.	0.	0.	0.	0.	0.	200.	100.	100.	100.
LAOS	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
LEBANON	7500.	10430.	10400.	1000.	2400.	6200.	7100.	6000.	6600.	10300.	13600.
MALAYSIA	80823.	89305.	102897.	113692.	141104.	147100.	168600.	195800.	194900.	173600.	193900.
MONGOLIA	0.	100.	200.	500.	0.	100.	0.	0.	0.	0.	0.
NEPAL	706.	618.	806.	1350.	1410.	1072.	1456.	1191.	392.	600.	1000.
OMAN	0.	0.	0.	86.	200.	200.	15.	257.	197.	300.	200.
PAKISTAN	1334.	2670.	2100.	1900.	2400.	5800.	7600.	9618.	9643.	21800.	25600.
PHILIPPINES	38800.	55621.	60054.	48800.	51500.	45938.	56584.	63700.	55000.	61100.	57700.
QATAR	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	100.
SAUDI ARABIA	614.	3200.	1115.	1300.	163.	300.	2836.	300.	3400.	2300.	2200.
SINGAPORE	1000.	1000.	1000.	1000.	1000.	1000.	1000.	2000.	2100.	2200.	2200.
SRI LANKA	20063.	31643.	35800.	15900.	29700.	25400.	30324.	34300.	46000.	41300.	45000.
SYRIA	1585.	1797.	1577.	1139.	964.	1540.	1793.	2700.	2500.	5100.	5800.
THAILAND	42000.	38378.	50929.	39074.	20500.	22000.	30000.	44132.	35400.	35600.	37100.
TURKEY	27200.	12700.	12851.	20389.	28907.	19500.	25000.	28300.	49000.	8700.	30900.
U A EMIRATES	50.	8.	18.	0.	0.	0.	315.	600.	158.	300.	400.
VIETNAM	24679.	40400.	34100.	35800.	34200.	24600.	27300.	37200.	39300.	22100.	21500.
YEMEN AR	100.	140.	190.	400.	0.	400.	400.	800.	0.	600.	2900.
YEMEN DEM	0.	0.	0.	10.	45.	0.	50.	100.	0.	0.	200.
ASIA	1424876.	1852152.	1871326.	1515111.	1761279.	1904011.	2290885.	2519999.	2441637.	2771600.	2544600.

SOURCE: FAO DATA COMPILED BY TVA
NOTE: 1982/83 FISCAL YEAR DATA INCLUDED WITH 1982

Appendix 11

FERTILIZERS:
NITROGEN IMPORTS OF ASIAN COUNTRIES
1972 - 1982
(IN [illegible] OF N)

AREA	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
AFGHANISTAN	16000.	40000.	12800.	3173.	5506.	6624.	6660.	7920.	5400.	700.	1700.
BAHRAIN	6.	16.	20.	23.	0.	0.	23.	13.	0.	300.	100.
BANGLADESH	57765.	0.	65447.	33263.	5060.	119758.	176021.	140560.	38800.	124000.	34500.
BHUTAN	0.	0.	74.	100.	100.	100.	100.	100.	100.	100.	100.
BURMA	0.	0.	0.	0.	0.	3847.	9484.	4100.	24800.	46500.	67400.
CHINA	1248000.	1218000.	794000.	1100000.	700000.	1315000.	1421000.	1562000.	1851000.	1414400.	1750000.
TAIWAN	0.	32000.	126000.	88500.	58600.	44200.	3182.	522.	2129.	16200.	17200.
CYPRUS	16618.	19645.	7441.	17600.	12000.	8200.	7690.	12016.	8095.	6400.	11900.
INDIA	691375.	660567.	884751.	996000.	750100.	758100.	1233100.	1295300.	1510400.	1055100.	424600.
INDONESIA	244907.	293000.	611000.	159000.	10300.	9879.	17926.	14356.	124905.	183600.	152300.
IRAN	21252.	64073.	117699.	77650.	96850.	53223.	41110.	157500.	212000.	393400.	472500.
IRAQ	2670.	3380.	4560.	900.	9200.	0.	900.	4000.	7300.	55200.	87700.
ISRAEL	14690.	9215.	2645.	4710.	0.	1970.	0.	3100.	6300.	6300.	6800.
JAPAN	0.	31000.	22500.	15000.	44000.	25000.	34000.	35000.	42000.	48000.	73000.
JORDAN	1380.	1830.	1990.	1900.	3997.	1400.	3173.	6200.	6000.	2900.	7600.
KAMPUCHEA DM	1000.	1000.	900.	100.	100.	0.	0.	0.	7200.	10500.	7300.
KOREA N.	0.	4000.	24900.	7300.	15800.	9200.	9100.	4600.	9200.	9200.	5100.
KOREA REP	4300.	6700.	0.	9648.	4006.	4941.	1100.	0.	0.	2500.	1300.
KUWAIT	0.	0.	0.	0.	0.	0.	0.	200.	0.	200.	800.
LAOS	100.	100.	100.	100.	100.	100.	52.	87.	6900.	1200.	500.
LEBANON	31400.	38800.	19120.	5400.	16500.	12500.	13200.	19000.	10800.	16900.	17300.
MALAYSIA	38295.	55647.	75296.	44911.	53000.	66000.	103000.	140000.	110000.	105000.	142500.
MONGOLIA	700.	1500.	1600.	1500.	4400.	3700.	4300.	4600.	4500.	9500.	9700.
NEPAL	15067.	8040.	14488.	1780.	12193.	13012.	13746.	17500.	14792.	22800.	20900.
OMAN	0.	131.	177.	254.	130.	200.	182.	808.	667.	1000.	700.
PAKISTAN	115641.	224498.	106487.	73496.	139561.	341823.	480249.	440976.	386654.	95000.	130800.
PHILIPPINES	51000.	94582.	239440.	44100.	63200.	141597.	177493.	217100.	224438.	112700.	222000.
QATAR	0.	0.	0.	0.	0.	0.	0.	0.	0.	800.	0.
SAUDI ARABIA	1295.	4000.	1999.	2300.	769.	3300.	3087.	7300.	9600.	17300.	19900.
SINGAPORE	1000.	1000.	1000.	1000.	1000.	1000.	1000.	1800.	1800.	2000.	2000.
SRI LANKA	54792.	49636.	80604.	34800.	48700.	75800.	76708.	89812.	78443.	46600.	12500.
SYRIA	22217.	23585.	39091.	16500.	16500.	37700.	35000.	72350.	67157.	45500.	27100.
THAILAND	55000.	52854.	73123.	74554.	129700.	151200.	178900.	157000.	158400.	158300.	199100.
TURKEY	360200.	450700.	106748.	320667.	534200.	407400.	469700.	448600.	445400.	127800.	117800.
U A EMIRATES	457.	495.	638.	800.	1000.	500.	730.	2100.	2261.	2400.	3400.
VIETNAM	195134.	103300.	121200.	204000.	208000.	254000.	169000.	79100.	114000.	159700.	210000.
YEMEN AR	510.	735.	600.	3372.	2043.	1894.	9000.	11700.	9400.	10600.	10400.
YEMEN DEM	0.	200.	460.	920.	811.	100.	1000.	1100.	1840.	1700.	1800.
ASIA	3262771.	3494229.	3558890.	3345321.	2947506.	3873268.	4700916.	4958420.	5502681.	4312300.	4270300.

SOURCE: FAO DATA COMPILED BY TVA
NOTE: 1982/83 FISCAL YEAR DATA INCLUDED WITH 1982

Appendix 12

FERTILIZERS:
PHOSPHATE IMPORTS OF ASIAN COUNTRIES
1972 - 1982
(In MT OF P_2O_5)

AREA	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
AFGHANISTAN	13110.	7600.	5200.	8108.	19190.	16541.	22140.	20240.	13800.	6900.	13900.
BAHRAIN	6.	6.	10.	0.	0.	0.	10.	13.	0.	0.	100.
BANGLADESH	54333.	44658.	21800.	102453.	9559.	52712.	87373.	100550.	108600.	85000.	96500.
BHUTAN	0.	0.	9.	0.	0.	0.	0.	0.	0.	0.	0.
BURMA	10125.	13500.	0.	6750.	13500.	9765.	25386.	24800.	24800.	37400.	39400.
CHINA	18000.	110000.	33000.	15000.	8000.	94000.	247100.	171900.	365000.	355800.	600000.
TAIWAN	0.	0.	0.	0.	0.	0.	2433.	138.	1967.	5700.	200.
CYPRUS	11221.	13473.	3567.	8600.	10000.	6000.	7300.	11321.	4315.	2300.	6500.
INDIA	211365.	213973.	285900.	361000.	22800.	163900.	243500.	237100.	452100.	343200.	63400.
INDONESIA	96046.	85000.	348000.	81900.	8000.	29100.	129897.	97000.	79859.	61400.	132800.
IRAN	4371.	44271.	92160.	33580.	56580.	28980.	37720.	167400.	282900.	303600.	[illegible]
IRAQ	6720.	4730.	13560.	6400.	9380.	6900.	13000.	25800.	23300.	15100.	12100.
ISRAEL	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
JAPAN	29900.	58700.	45900.	40700.	109000.	69000.	100000.	97000.	109000.	119000.	160000.
JORDAN	750.	1250.	800.	1300.	1564.	1800.	3860.	7100.	5900.	3300.	6300.
KAMPUCHEA DM	1100.	1000.	300.	0.	0.	0.	0.	0.	900.	7500.	3400.
KOREA N.	0.	2200.	10600.	9800.	0.	0.	0.	0.	0.	0.	0.
KOREA REP	6450.	70000.	91928.	88175.	0.	0.	0.	0.	0.	0.	0.
KUWAIT	0.	0.	0.	0.	0.	0.	0.	200.	200.	100.	100.
LAOS	100.	100.	100.	0.	0.	0.	15.	37.	0.	0.	0.
LEBANON	5500.	0.	0.	0.	2400.	5300.	5500.	8900.	3300.	10300.	8600.
MALAYSIA	10789.	16027.	18301.	12669.	19328.	24700.	36900.	20200.	24300.	16000.	19800.
MONGOLIA	2400.	3900.	1700.	700.	1400.	2800.	2700.	3700.	7000.	4900.	4200.
NEPAL	4533.	4390.	3895.	400.	2891.	3383.	3341.	5500.	3597.	5600.	8200.
OMAN	0.	0.	0.	86.	100.	100.	81.	191.	197.	300.	200.
PAKISTAN	72120.	103794.	26059.	109195.	140071.	204770.	202818.	162439.	302343.	34400.	247100.
PHILIPPINES	2100.	6515.	47723.	600.	0.	0.	8200.	18200.	16518.	10900.	26000.
QATAR	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	100.
SAUDI ARABIA	400.	1242.	1890.	2300.	533.	3000.	4573.	5300.	10310.	23600.	33100.
SINGAPORE	1000.	1000.	1000.	1000.	1000.	1000.	1000.	500.	500.	500.	500.
SRI LANKA	7583.	9012.	19400.	19380.	4190.	4700.	8050.	7290.	20247.	18900.	166[illegible]0.
SYRIA	14582.	1010.	23280.	23000.	23000.	34400.	23000.	42320.	44089.	29900.	2500.
THAILAND	55900.	51381.	70407.	62223.	80300.	132600.	125000.	132500.	126600.	120900.	130000.
TURKEY	136000.	281000.	39244.	0.	34200.	216100.	405400.	350400.	419400.	0.	0.
U A EMIRATES	50.	27.	63.	100.	100.	400.	469.	800.	635.	1000.	1700.
VIETNAM	30365.	33700.	33500.	200.	0.	0.	0.	0.	4600.	0.	8400.
YEMEN AR	100.	140.	190.	1300.	80.	445.	500.	800.	500.	900.	900.
YEMEN DEM	0.	0.	0.	60.	73.	100.	150.	140.	184.	100.	300.
ASIA	807019.	1183599.	1239486.	996979.	577239.	1112496.	1747416.	1719779.	2457001.	1624500.	2036900.

SOURCE: FAO DATA COMPILED BY TVA
DOES NOT INCLUDE GROUND PHOSPHATE ROCK FOR DIRECT APPLICATION
NOTE: 1982/83 FISCAL YEAR DATA INCLUDED WITH 1982

Appendix 13

FERTILIZERS:
POTASH IMPORTS OF ASIAN COUNTRIES
1972 - 1982
(IN [illegible] MT OF K_2O)

AREA	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
AFGHANISTAN	0.	0.	100.	0.	0.	0.	1000.	0.	0.	0.	0.
BAHRAIN	6.	6.	10.	0.	0.	0.	10.	0.	0.	0.	100.
BANGLADESH	11260.	24734.	4200.	22428.	6000.	22500.	46676.	37300.	28300.	16000.	27500.
BHUTAN	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
BURMA	0.	0.	0.	0.	2700.	2700.	1200.	2400.	5400.	14900.	14100.
CHINA	18000.	131000.	146000.	100000.	65000.	70000.	122700.	275000.	362800.	556700.	368000.
TAIWAN	66600.	97100.	112900.	52900.	40000.	79000.	64299.	97026.	136599.	141990.	82100.
CYPRUS	2241.	2167.	2600.	2600.	3100.	3300.	2000.	2027.	827.	1000.	2200.
INDIA	316302.	381033.	443044.	278000.	277800.	598900.	517400.	473200.	796500.	643800.	638600.
INDONESIA	29982.	40300.	33200.	13400.	30000.	40000.	79396.	84201.	91100.	136200.	133100.
IRAN	1043.	1066.	2564.	3500.	2670.	8250.	0.	0.	0.	0.	5300.
IRAQ	950.	1200.	1250.	700.	0.	900.	2248.	2000.	4500.	100.	4900.
ISRAEL	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
JAPAN	603400.	676700.	810600.	546000.	656000.	665000.	667000.	767000.	602400.	459000.	610600.
JORDAN	880.	920.	430.	800.	812.	600.	1000.	2100.	1400.	1000.	1000.
KAMPUCHEA DM	200.	0.	0.	0.	0.	0.	0.	0.	0.	1000.	200.
KOREA N.	31300.	44400.	40500.	45000.	37700.	40800.	104700.	82200.	52200.	92000.	46400.
KOREA REP	113418.	164100.	187800.	164852.	134282.	217617.	196927.	210946.	170000.	197500.	235600.
KUWAIT	0.	0.	0.	0.	0.	0.	0.	200.	100.	100.	100.
LAOS	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
LEBANON	7100.	10472.	10400.	1000.	2400.	6200.	7100.	6000.	6600.	10300.	13600.
MALAYSIA	80823.	89305.	102897.	118747.	143363.	148000.	168600.	195800.	210000.	206000.	186900.
MONGOLIA	0.	100.	200.	500.	0.	100.	0.	0.	0.	0.	0.
NEPAL	1950.	250.	3375.	0.	297.	1072.	1456.	1191.	1440.	0.	1000.
OMAN	0.	0.	0.	86.	200.	200.	15.	257.	197.	300.	200.
PAKISTAN	0.	6310.	746.	0.	0.	2091.	9591.	13558.	22064.	15600.	21500.
PHILIPPINES	45000.	46573.	86319.	44000.	48000.	42777.	53942.	70800.	78626.	73000.	73900.
QATAR	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	100.
SAUDI ARABIA	614.	3200.	1115.	1300.	163.	300.	2836.	300.	3400.	2300.	2200.
SINGAPORE	1000.	1000.	1000.	1000.	1000.	1000.	1000.	2000.	2100.	2200.	2200.
SRI LANKA	20063.	32639.	31370.	17180.	19400.	32800.	39900.	39720.	46456.	49300.	39500.
SYRIA	2870.	500.	2195.	2000.	2000.	2250.	2300.	2500.	2500.	6000.	5800.
THAILAND	42000.	38378.	50929.	39074.	20500.	29800.	34000.	32000.	32800.	36600.	37000.
TURKEY	30000.	24500.	26944.	3559.	38668.	24400.	20600.	25600.	57900.	10000.	33600.
U A EMIRATES	50.	8.	18.	0.	0.	0.	315.	600.	158.	300.	700.
VIETNAM	24679.	40400.	35300.	35800.	34200.	24600.	27300.	37200.	39300.	22100.	21500.
YEMEN AR	100.	140.	190.	400.	0.	400.	400.	800.	0.	600.	2900.
YEMEN DEM	0.	0.	0.	10.	45.	0.	50.	100.	0.	0.	200.
ASIA	1451831.	1858501.	2138196.	1494836.	1566300.	2065557.	2175961.	2464026.	2763667.	2695800.	2612600.

SOURCE: FAO DATA COMPILED BY TVA

NOTE: 1982/83 FISCAL YEAR DATA INCLUDED WITH 1982

Appendix 14

FERTILIZERS:
NITROGEN EXPORTS OF ASIAN COUNTRIES
1972 - 1982
(IN MT OF N)

AREA	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
AFGHANISTAN	0.	0.	0.	0.	9200.	8300.	18400.	27600.	18400.	23700.	19900.
BAHRAIN	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
BANGLADESH	0.	0.	0.	0.	0.	0.	0.	0.	19090.	4000.	33000.
BHUTAN	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
BURMA	3200.	0.	6000.	3000.	2700.	0.	0.	0.	0.	0.	0.
CHINA	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
TAIWAN	34000.	19000.	2700.	0.	2200.	12300.	9637.	11129.	0.	0.	2500.
CYPRUS	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
INDIA	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
INDONESIA	0.	0.	0.	0.	0.	184090.	106013.	137678.	82516.	17900.	43800.
IRAN	3100.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
IRAQ	5100.	6810.	7750.	0.	100.	43700.	107500.	244101.	306400.	0.	0.
ISRAEL	4265.	6475.	7535.	16680.	15725.	20105.	28575.	25230.	21920.	21000.	21000.
JAPAN	1661000.	1312300.	1410400.	851000.	742000.	822000.	806000.	701000.	580000.	470000.	332000.
JORDAN	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	12600.
KAMPUCHEA DM	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
KOREA N.	5100.	0.	22800.	4500.	0.	6400.	14600.	13300.	11700.	45100.	33500.
KOREA REP	103981.	30000.	0.	8000.	44989.	216700.	304564.	279153.	362000.	185300.	193500.
KUWAIT	276378.	296700.	273900.	236600.	246900.	271441.	326200.	290600.	22[illegible]700.	175900.	195700.
LAOS	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
LEBANON	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
MALAYSIA	5338.	5672.	5814.	5538.	0.	0.	0.	0.	0.	0.	0.
MONGOLIA	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NEPAL	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
OMAN	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
PAKISTAN	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	46500.
PHILIPPINES	0.	0.	0.	0.	0.	4500.	1200.	0.	0.	0.	0.
QATAR	0.	1000.	40000.	68125.	107649.	52600.	135900.	181600.	320900.	253800.	285100.
SAUDI ARABIA	64900.	60700.	80000.	35386.	62989.	96951.	118094.	133900.	131300.	132600.	134100.
SINGAPORE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SRI LANKA	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	22800.
SYRIA	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
THAILAND	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
TURKEY	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	2000.
U A EMIRATES	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
VIETNAM	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
YEMEN AR	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
YEMEN DEM	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ASIA	2166362.	1738657.	1856899.	1228829.	1234452.	1739087.	1976683.	2045290.	2079926.	1329300.	1378000.

SOURCE: FAO DATA COMPILED BY TVA

NOTE: 1982/83 FISCAL YEAR DATA INCLUDED WITH 1982

Appendix 15

FERTILIZERS:
PHOSPHATE EXPORTS OF ASIAN COUNTRIES
1972 - 1982
(IN MT OF P_2O_5)

AREA	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
AFGHANISTAN	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
BAHRAIN	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
BANGLADESH	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
BHUTAN	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
BURMA	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
CHINA	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
TAIWAN	5700.	2400.	700.	0.	0.	2800.	537.	1707.	0.	0.	0.
CYPRUS	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
INDIA	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
INDONESIA	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
IRAN	7800.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
IRAQ	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ISRAEL	1575.	1645.	2075.	2835.	3890.	1035.	1080.	3300.	25400.	22300.	11900.
JAPAN	59800.	25200.	24600.	16200.	12000.	12000.	35000.	30000.	35000.	42000.	71000.
JORDAN	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	22200.
KAMPUCHEA DM	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
KOREA N.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	600.
KOREA REP	37690.	38700.	0.	0.	3657.	83132.	196277.	283307.	344000.	142000.	282500.
KUWAIT	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
LAOS	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
LEBANON	33400.	41394.	112100.	61800.	20000.	63000.	57400.	72000.	95000.	47000.	52600.
MALAYSIA	5265.	4812.	0.	0.	0.	0.	0.	0.	0.	0.	0.
MONGOLIA	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NEPAL	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
OMAN	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
PAKISTAN	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
PHILIPPINES	0.	1600.	0.	0.	0.	5600.	2600.	0.	0.	0.	0.
QATAR	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SAUDI ARABIA	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SINGAPORE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SRI LANKA	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SYRIA	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
THAILAND	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
TURKEY	0.	0.	0.	0.	0.	0.	0.	0.	0.	15200.	116000.
U A EMIRATES	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
VIETNAM	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
YEMEN AR	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
YEMEN DEM	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ASIA	151230.	115751.	139475.	80835.	39547.	167567.	292894.	390314.	499400.	268500.	556800.

SOURCE: FAO DATA COMPILED BY TVA
DOES NOT INCLUDE GROUND PHOSPHATE ROCK FOR DIRECT APPLICATION
NOTE: 1982/83 FISCAL YEAR DATA INCLUDED WITH 1982

Appendix 16

FERTILIZERS: POTASH EXPORTS OF ASIAN COUNTRIES 1972 - 1982 (IN MT OF K_2O)

AREA	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
AFGHANISTAN	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
BAHRAIN	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
BANGLADESH	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
BHUTAN	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
BURMA	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
CHINA	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
TAIWAN	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
CYPRUS	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
INDIA	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
INDONESIA	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
IRAN	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
IRAQ	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ISRAEL	581285.	432095.	582035.	398995.	535240.	609950.	684501.	773900.	762300.	806900.	868200.
JAPAN	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
JORDAN	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	3300.
KAMPUCHEA DM	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
KOREA N.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
KOREA REP	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
KUWAIT	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
LAOS	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
LEBANON	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
MALAYSIA	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
MONGOLIA	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
NEPAL	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
OMAN	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
PAKISTAN	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
PHILIPPINES	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
QATAR	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SAUDI ARABIA	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SINGAPORE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SRI LANKA	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
SYRIA	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
THAILAND	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
TURKEY	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
U A EMIRATES	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
VIETNAM	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
YEMEN AR	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
YEMEN DEM	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ASIA	581285.	432095.	582035.	398995.	535240.	609950.	684501.	773900.	762300.	806900.	871500.

SOURCE: FAO DATA COMPILED BY TVA

NOTE: 1982/83 FISCAL YEAR DATA INCLUDED WITH 1982

FERTILIZERS:
NITROGEN PRODUCTION AND CONSUMPTION OF ASIAN COUNTRIES
1972 - 1982
(IN MT OF N)

Country		1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
Afghanistan	Production	-	-	19,117	14,774	26,203	37,689	48,300	48,300	48,900	48,600	49,600
	Consumption	16,000	17,700	24,200	27,668	30,646	37,014	35,497	33,227	37,800	25,600	31,400
	Surplus (Deficit)	(16,000)	(17,700)	(5,083)	(12,894)	(4,443)	675	12,803	15,073	11,100	23,000	18,200
Bahrain	Production	-	-	-	-	-	-	-	-	-	-	-
	Consumption	6	16	20	23	-	-	23	13	-	300	-
	Surplus (Deficit)	(6)	(16)	(20)	(23)	-	-	(23)	(13)	-	(300)	-
Bangladesh	Production	92,230	129,700	32,680	131,088	126,144	107,674	134,851	168,125	160,508	193,400	236,600
	Consumption	129,291	126,953	82,811	146,723	165,836	225,191	227,785	260,215	267,908	251,600	306,000
	Surplus (Deficit)	(37,061)	2,747	(50,131)	(15,635)	(39,692)	(117,517)	(92,934)	(92,090)	(107,400)	(58,200)	(69,400)
Bhutan	Production	-	-	-	-	-	-	-	-	-	-	-
	Consumption	-	-	74	100	100	100	100	100	100	100	100
	Surplus (Deficit)	-	-	(74)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)
Burma	Production	36,800	36,800	43,328	47,354	55,490	53,000	57,524	61,600	59,800	60,000	51,200
	Consumption	31,795	36,471	38,142	42,470	42,931	49,901	67,942	69,700	66,800	92,900	114,700
	Surplus (Deficit)	5,005	329	5,186	4,884	12,559	3,099	(10,418)	(8,100)	(7,000)	(32,900)	(63,500)
China	Production	2,444,000	2,996,000	2,827,000	3,709,000	3,815,000	5,509,000	7,639,000	8,821,000	9,9993,400	9,857,600	10,219,000
	Consumption	3,692,000	4,214,000	3,621,000	4,809,000	4,515,000	6,824,000	9,060,000	10,383,000	11,844,400	11,272,000	11,969,000
	Surplus (Deficit)	(1,248,000)	(1,218,000)	(794,000)	(1,100,000)	(7,000,000)	(1,315,000)	(1,421,000)	(1,562,000)	(1,851,000)	(1,414,400)	(1,750,000)
Taiwan	Production	201,000	224,000	190,000	255,000	227,000	242,000	264,100	274,900	244,000	249,000	237,000
	Consumption	167,000	237,000	228,000	230,000	240,000	249,000	220,000	258,000	267,700	256,300	241,000
	Surplus (Deficit)	34,000	(13,000)	(38,000)	25,000	(13,000)	(7,000)	44,100	16,900	(23,700)	(7,300)	(4,000)
Cyprus	Production	-	-	-	-	-	-	-	-	-	-	-
	Consumption	16,618	19,645	7,4[illegible]	15,000	15,000	8,200	7,690	9,136	8,197	9,000	11,600
	Surplus (Deficit)	(16,618)	(19,645)	(7,441)	(15,000)	(15,000)	(8,200)	(7,690)	(9,136)	(8,197)	(9,000)	(11,600)
India	Production	1,054,000	1,049,900	1,186,600	1,508,000	1,862,400	1,999,800	2,173,000	2,224,300	2,163,900	3,143,300	3,429,700
	Consumption	1,742,100	1,613,000	1,845,200	1,908,700	2,351,700	2,813,400	2,986,300	3,444,200	3,522,000	3,881,700	4,043,000
	Surplus (Deficit)	(688,100)	(563,100)	(658,600)	(400,700)	(489,300)	(813,600)	(813,300)	(1,219,900)	(1,358,100)	(738,400)	(613,300)

FERTILIZERS:
NITROGEN PRODUCTION AND CONSUMPTION OF ASIAN COUNTRIES
1972 - 1982
(IN MT OF N)

Country		1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
Indonesia	Production	59,856	85,200	165,900	207,500	184,200	396,100	694,044	874,826	958,426	970,600	951,000
	Consumption	347,404	350,000	345,000	341,900	351,200	465,200	548,998	620,419	850,931	997,100	981,000
	Surplus (Deficit)	(287,548)	(264,800)	(179,100)	(134,400)	(167,000)	(69,100)	145,046	254,407	107,495	(26,500)	(30,000)
Iran	Production	142,830	130,765	131,025	125,700	136,214	124,026	72,344	93,200	71,000	21,400	21,800
	Consumption	123,799	194,080	188,525	189,980	220,460	221,685	167,237	237,000	274,800	386,600	492,800
	Surplus (Deficit)	19,031	(63,315)	(57,500)	(64,280)	(84,246)	(97,659)	(94,893)	(143,800)	(203,800)	(365,200)	(471,000)
Iraq	Production	26,198	28,124	33,600	24,300	25,332	125,460	165,800	387,000	355,000	-	-
	Consumption	15,000	20,139	27,317	25,000	35,000	45,000	43,388	74,200	64,500	63,600	62,100
	Surplus (Deficit)	11,198	7,985	6,283	(700)	(9,668)	80,460	122,412	312,800	290,500	(63,600)	(62,100)
Israel	Production	24,000	31,805	39,135	59,070	56,455	68,095	79,500	76,070	62,286	62,400	74,900
	Consumption	33,465	30,340	32,604	37,375	36,495	38,195	37,620	35,717	39,506	35,800	39,200
	Surplus (Deficit)	(9,465)	1,465	6,531	21,695	19,960	29,900	41,880	40,353	22,780	26,600	35,700
Japan	Production	2,199,000	2,138,300	2,340,900	1,557,000	1,171,000	1,446,000	1,457,000	1,458,000	1,202,000	1,253,000	1,126,000
	Consumption	733,000	821,200	690,800	653,000	702,000	716,000	723,000	777,000	614,000	643,000	687,000
	Surplus (Deficit)	1,466,000	1,317,100	1,650,100	904,000	469,000	730,000	734,000	681,000	588,000	610,000	439,000
Jordan	Production	-	-	-	-	-	-	-	-	-	-	21,200
	Consumption	1,380	1,830	1,990	1,900	3,997	1,400	3,173	6,200	6,000	2,900	7,100
	Surplus (Deficit)	(1,380)	(1,830)	(1,990)	(1,900)	(3,997)	(1,400)	(3,173)	(6,200)	(6,000)	(2,900)	14,100
Kampuchea DM	Production	-	-	-	-	-	-	-	-	-	-	
	Consumption	1,000	1,000	900	100	100	-	-	-	7,200	10,500	7,300
	Surplus (Deficit)	(1,000)	(1,000)	(900)	(100)	(100)	-	-	-	(7,200)	(10,500)	(7,300)
N. Korea	Production	230,000	240,000	250,000	260,000	370,000	440,000	540,000	550,000	553,000	600,000	620,000
	Consumption	224,900	244,000	251,900	264,000	385,800	442,800	535,000	540,000	550,000	564,100	591,600
	Surplus (Deficit)	5,100	(4,000)	(1,900)	(4,000)	(15,800)	(2,800)	5,000	10,000	3,000	35,900	28,400
Rep. of Korea	Production	418,193	447,255	513,773	579,200	535,300	635,900	751,000	786,400	688,400	666,000	615,500
	Consumption	372,585	411,236	447,377	467,678	361,289	387,890	461,610	443,900	447,224	431,800	308,600
	Surplus (Deficit)	45,608	36,019	66,396	111,522	174,011	248,010	289,390	342,500	241,176	234,200	306,900

FERTILIZERS:
NITROGEN PRODUCTION AND CONSUMPTION OF ASIAN COUNTRIES
1972 - 1982
(IN MT OF N)

Country		1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
Kuwait	Production	269,549	290,500	275,500	258,700	228,000	290,818	310,000	307,100	217,600	183,000	234,100
	Consumption	-	-	-	-	-	100	100	260	140	300	600
	Surplus (Deficit)	269,549	290,500	275,500	258,700	228,000	290,718	309,900	306,840	217,460	182,700	233,500
Laos	Production	-	-	-	-	-	-	-	-	-	-	-
	Consumption	100	100	100	100	100	100	52	87	4,000	4,000	500
	Surplus (Deficit)	(100)	(100)	(100)	(100)	(100)	(100)	(52)	(87)	(4,000)	(4,000)	(500)
Lebanon	Production	2,300	-	-	1,200	1,200	1,200	1,200	-	-	-	-
	Consumption	33,000	38,600	19,120	7,000	17,700	13,700	14,400	16,000	14,000	16,900	17,300
	Surplus (Deficit)	(30,700)	(38,600)	(19,120)	(5,800)	(16,500)	(12,500)	(13,200)	(16,000)	(14,000)	(16,900)	(17,300)
Malaysia	Production	40,000	46,200	37,000	34,000	42,000	43,000	37,400	37,200	35,200	20,000	19,800
	Consumption	80,817	112,181	68,878	77,573	90,000	102,000	109,500	137,700	139,300	127,900	138,000
	Surplus (Deficit)	(40,817)	(65,981)	(31,878)	(43,573)	(48,000)	(59,000)	(72,100)	(100,500)	(104,100)	(107,900)	(118,200)
Mongolia	Production	-	-	-	-	-	-	-	-	-	-	-
	Consumption	700	1,500	1,600	1,500	4,400	3,700	4,300	4,600	4,500	9,500	9,700
	Surplus (Deficit)	(700)	(1,500)	(1,600)	(1,500)	(4,400)	(3,700)	(4,300)	(4,600)	(4,500)	(9,500)	(9,700)
Nepal	Production	-	-	-	-	-	-	-	-	-	-	-
	Consumption	7,713	9,002	8,961	8,421	10,687	13,012	13,746	15,479	16,434	17,400	23,000
	Surplus (Deficit)	(7,713)	(9,002)	(8,961)	(8,421)	(10,687)	(13,012)	(13,746)	(15,479)	(16,434)	(17,400)	(23,000)
Oman	Production	-	-	-	-	-	-	-	-	-	-	-
	Consumption	-	131	177	254	130	200	182	808	667	1,000	700
	Surplus (Deficit)	-	(131)	(177)	(254)	(130)	(200)	(182)	(808)	(667)	(1,000)	(700)
Pakistan	Production	274,446	299,860	296,326	316,456	312,129	310,983	336,675	398,700	579,954	715,000	999,400
	Consumption	386,230	341,944	362,900	443,451	511,000	554,100	684,300	775,804	843,574	832,600	958,600
	Surplus (Deficit)	(111,784)	(42,084)	(66,574)	(126,995)	(198,871)	(243,117)	(347,625)	(377,104)	(263,620)	(117,600)	40,800
Philippines	Production	55,400	53,496	53,419	62,100	48,400	37,909	45,705	35,500	34,000	41,100	18,200
	Consumption	114,500	151,902	177,381	144,100	177,200	174,249	205,400	226,700	224,800	210,700	231,400
	Surplus (Deficit)	(59,100)	(98,406)	(123,962)	(82,000)	(128,800)	(136,340)	(159,695)	(191,200)	(190,800)	(169,600)	(213,200)

FERTILIZERS:
NITROGEN PRODUCTION AND CONSUMPTION OF ASIAN COUNTRIES
1972 - 1982
(IN MT OF N)

Country		1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
Qatar	Production	-	14,000	55,453	87,000	95,200	75,900	104,000	228,600	286,100	264,500	304,500
	Consumption	-	-	-	200	300	300	414	600	800	800	1,000
	Surplus (Deficit)	-	14,000	55,453	86,800	94,900	75,600	103,586	228,000	285,300	263,700	303,500
Saudi Arabia	Production	69,000	60,700	80,600	99,820	84,134	92,800	120,980	137,500	152,000	158,700	161,000
	Consumption	1,500	4,000	5,000	5,700	6,415	4,708	7,020	15,971	25,168	41,500	59,000
	Surplus (Deficit)	67,500	56,700	75,600	94,120	77,719	88,092	113,960	121,529	126,832	117,200	102,000
Singapore	Production	-	-	-	-	-	-	-	-	-	-	-
	Consumption	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,800	1,800	2,000	2,000
	Surplus (Deficit)	(1,000)	(1,000)	(1,000)	(1,000)	(1,000)	(1,000)	(1,000)	(1,800)	(1,800)	(2,000)	(2,000)
Sri Lanka	Production	-	-	-	-	-	-	-	-	-	38,400	97,000
	Consumption	54,792	51,202	74,400	37,800	52,400	66,300	80,900	77,200	91,600	78,500	79,400
	Surplus (Deficit)	(54,792)	(51,202)	(74,400)	(37,800)	(52,400)	(66,300)	(80,900)	(77,200)	(91,600)	(40,100)	(17,600)
Syria	Production	15,600	9,465	12,500	26,000	22,048	24,180	24,960	20,800	12,624	36,900	80,000
	Consumption	32,876	33,255	36,624	35,214	48,099	55,242	65,000	78,940	79,781	83,100	95,900
	Surplus (Deficit)	(17,276)	(23,790)	(24,124)	(9,214)	(26,051)	(31,062)	(40,040)	(58,140)	(67,157)	(46,200)	(15,900)
Thailand	Production	7,723	7,358	6,722	4,298	6,852	8,900	3,500	-	-	-	-
	Consumption	62,000	60,212	79,845	78,852	136,300	160,100	153,500	160,000	159,000	162,000	180,000
	Surplus (Deficit)	(54,277)	(52,854)	(73,123)	(74,554)	(129,448)	(151,200)	(150,000)	(160,000)	(159,000)	(162,000)	(180,000)
Turkey	Production	145,300	135,000	146,211	170,547	189,000	187,300	268,700	353,900	462,500	717,700	723,000
	Consumption	369,300	429,900	282,899	482,204	590,700	665,700	773,800	769,500	631,500	798,900	863,400
	Surplus (Deficit)	(224,000)	(294,900)	(136,688)	(311,657)	(401,700)	(478,400)	(505,100)	(415,600)	(169,000)	(81,200)	(140,400)
United Arab Emirates	Production	-	-	-	-	-	-	-	-	-	-	-
	Consumption	457	495	638	800	1,000	500	730	2,100	2,261	2,400	2,900
	Surplus (Deficit)	(457)	(495)	(638)	(800)	(1,000)	(500)	(730)	(2,100)	(2,261)	(2,400)	(2,900)

FERTILIZERS:
NITROGEN PRODUCTION AND CONSUMPTION OF ASIAN COUNTRIES
1972 - 1982
(IN MT OF N)

Country		1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
Vietnam	Production	-	-	-	-	25,000	34,000	40,000	40,000	40,000	40,000	40,000
	Consumption	161,100	133,300	121,200	194,000	241,500	288,000	209,000	121,000	156,000	199,700	250,000
	Surplus (Deficit)	(161,100)	(133,300)	(121,200)	(194,000)	(216,500)	(254,000)	(169,000)	(81,000)	(116,000)	(159,700)	(210,000)
Yemen AR	Production	-	-	-	-	-	-	-	-	-	-	-
	Consumption	510	735	600	3,372	2,043	1,894	9,000	11,700	9,400	10,600	10,400
	Surplus (Deficit)	(510)	(735)	(600)	(3,372)	(2,043)	(1,894)	(9,000)	(11,700)	(9,400)	(10,600)	(10,400)
Yemen DEM	Production	-	-	-	-	-	-	-	-	-	-	-
	Consumption	-	200	460	920	811	100	1,000	1,100	1,840	1,700	1,800
	Surplus (Deficit)	-	(200)	(460)	(920)	(811)	(100)	(1,000)	(1,100)	(1,840)	(1,700)	(1,800)
Total Surplus (Deficit)		(1,146,513)	(1,253,841)	(338,295)	(1,144,971)	(1,704,638)	(2,338,247)	(2,089,124)	(2,226,355)	(2,895,033)	(2,185,800)	(2,488,600)

Note : 1982/83 fiscal year data included with 1982

Source: FAO data compiled by TVA

SGV-Kassim Chan Sdn. Bhd.

Appendix 18

IMPORTS OF SELECTED PETROCHEMICALS BY DEVELOPED MARKET ECONOMIES, 1979 (IN TONNES)

Product	Exports From	Exports To Developed Market Economies				Total	% of Total
		EEC	Japan	USA	Other		
Ethylene	World	27,391	2,0402	36,388	19,489	87,670	100.0
	CPE	0	0	0	0	0	0.0
	Developing	16,852	2,402	0	0	19,254	22.0
	Developed	10,539	0	38,388	19,489	68,416	78.0
	EEC	1,327,778	0	0	18,961	18,961	21.6
	Japan	0	-	0	0	0	0.0
	USA	10	0	-	526	536	0.6
Propylene	World	162,197	0	238,938	1,151	402,286	100.0
	CPE	0	0	0	0	0	0.0
	Developing	0	0	0	0	0	0.0
	Developed	162,197	0	238,938	1,151	402,286	100.0
	EEC	945,791	0	0	59	59	Neg.
	Japan	0	-	0	0	0	0.0
	USA	0	0	-	1,092	1,092	0.3
Butadiene	World	30,338	35,216	342,457	53,807	461,818	100.0
	CPE	84	0	0	0	84	Neg.
	Developing	250	0	4,532	0	4,782	1.0
	Developed	28,666	35,216	337,925	53,807	455,614	98.6
	EEC	288,383	30,699	236,211	3,249	270,159	58.5
	Japan	5,914	-	6,864	13,414	26,192	5.7
	USA	7,044	4,517	-	37,144	48,705	10.5
Benzene	World	368,631	5,155	225,337	12,776	611,899	100.0
	CPE	107,282	2,196	0	0	109,478	17.9
	Developing	24,067	2,959	17,308	0	44,334	7.2
	Developed	237,282	0	208,029	12,776	458,087	74.9
	EEC	815,726	0	54,294	25	54,319	8.9
	Japan	47,692	-	16,555	n.a.	64,297	10.5
	USA	79,984	0	-	12,751	92,735	15.2
Xylene	World	394,721	99,421	205,976	57,076	757,194	100.0
	CPE	32,610	1,789	3,988	4,066	42,453	5.6
	Developing	24,102	15,395	13,949	0	53,466	7.1
	Developed	338,009	82,237	188,039	53,010	661,295	87.3
	EEC	453,316	3,945	5,453	18,683	28,081	3.7
	Japan	993	-	6,894	959	8,846	1.2
	USA	277,361	78,292	-	33,142	388,795	51.3

Product	Exports From	Exports To Developed Market Economies: EEC	Japan	USA	Other	Total	% of Total
Methanol	World	440,062	286,611	207,781	185,338	1,119792	100.0
	CPE	59,453	5,353	0	20,004	84,810	7.6
	Developing	284,855	196,366	79,953	0	561,174	50.1
	Developed	95,754	84,892	127,828	165,334	473,808	42.3
	EEC	540,210	0	4,571	127,308	131,879	11.8
	Japan	0	-	0	0	0	0.0
	USA	38,776	18,319	-	32,371	89,466	8.0
Ammonia	World	789,500	32	1,769,852	511,487	3,070851	100.0
	CPE	426,419	0	705,012	109,875	1,214,306	40.4
	Developing	226,179	0	580,038	151,199	958,218	31.2
	Developed	136,902	32	484,002	250,393	871,329	28.4
	EEC	577,033	0	0	43,814	43,814	1.4
	Japan	0	-	0	1	0	0.0
	USA	43,839	32	-	187,352	231,223	7.5
Polyethylene	World	379,157	12,838	61,666	397,289	850,950	100.0
	CPE	55,263	221	0	7,555	63,039	7.4
	Developing	3,088	4,637	1,992	2,254	11,971	1.4
	Developed	320,806	7,980	59,674	387,480	775,940	91.2
	EEC	2,091,586	1,789	29,671	190,932	222,392	26.1
	Japan	1,573	-	995	294	2,862	0.3
	USA	54,142	4,624	-	85,598	144,364	17.0
Polypropylene	World	96,362	11,019	9,157	84,229	200,767	100.0
	CPE	3,329	315	18	162	3,824	1.9
	Developing	1,005	1,454	163	286	2,908	1.5
	Developed	92,028	9,250	8,976	83,781	194,035	96.6
	EEC	477,024	4,061	2,590	31,242	37,893	18.9
	Japan	5,610	-	5,824	1,792	13,226	6.6
	USA	14,039	4,730	-	44,143	62,912	31.3
Polystyrene	World	79,089	31,390	9,755	94,556	214,790	100.0
	CPE	5,418	714	0	316	6,448	3.0
	Developing	4,106	12,582	3	395	17,086	8.0
	Developed	69,565	18,094	9,752	93,845	191,256	89.0
	EEC	1,059,014	3,688	1,096	35,122	39,906	18.6
	Japan	11,621	-	248	2,968	14,837	6.9
	USA	19,615	12,488	-	49,835	81,938	38.1

Product	Exports From	Exports To Developed Market Economic				Total	% of Total
		EEC	Japan	USA	Other		
PVC	World	249,018	34,768	88,054	225,328	597,168	100.0
	CPE	64,103	1,523	0	5,997	71,623	12.0
	Developing	33,950	26,627	36,157	2,775	99,509	16.7
	Developed	150,965	6,618	51,897	216,556	426,036	71.3
	EEC	1,387,425	2,741	28,827	95,444	127,012	21.3
	Japan	3,303	-	9,318	1,718	14,333	2.4
	USA	8,785	3,626	-	59,822	72,233	12.1
Polyester Fibres	World	61,44	11,542	1,446	55,732	130,164	100.0
	CPE	10,640	0	0	48	10,688	8.2
	Developing	850	11,222	888	2,015	14,975	11.5
	Developed	49,954	320	558	53,669	104,501	80.3
	EEC	122,033	3	362	8,615	8,980	6.9
	Japan	886	-	37	17,235	18,158	14.0
	USA	21,011	316.	-	26,179	47,506	36.5
Polyamide Fibres	World	13,137	1,117	1,537	14,381	30,172	100.0
	CPE	923	0	0	0	923	3.0
	Developing	0	112	30	0	142	0.5
	Developed	12,214	1,005	1,507	14,381	29,107	96.5
	EEC	64,735	231	1,079	2,855	4,165	13.8
	Japan	23	-	299	221	543	1.8
	USA	6,368	774	-	9,944	17,086	56.6
Styrene Butadiene Rubber	World	7,235	233	18,230	41,777	67,475	100.0
	CPE	316	0	0	0	31	0.5
	Developing	966	0	2	0	968	1.4
	Developed	5,556	233	18,228	41,777	65,794	97.5
	EEC	183,691	15	3,067	30,927	34,009	50.4
	Japan	61	-	13	95	171	0.3
	USA	1,106	218	-	261	1,585	2.3

Notes : 1. Exports to EEC from the World and developed countries exclude EEC intra-trade which is shown in EEC export to EEC.
2. Other developed market economies include Australia, Austria, Canada, Findlan, New Zealand, Norway, Sweden and Switzerland.
3. CPE refer to Centrally Planned Economies.

Source: Second World-wide Study on the Petrochemical Industry: Process of Restructuring, UNIDO.

WORLD CAPACITY, PRODUCTION AND DEMAND FOR SELECTED BASIC PETROCHEMICALS, 1975 - 1990 (IN '000 MT)

	CAPACITY			PRODUCTION			DEMAND				INCREASE IN DEMAND (per cent per annum)		
	1975	1979	1984	1975	1979	1984	1975	1979	1984	1990	1975-79	1979-84	1984-90
DEVELOPED COUNTRIES													
Ethylene	33,800	43,200	53,300	23,250	34,950	43,450	23,350	34,700	43,550	56,500	10.4	5.8	4.3
Propylene	18,560	24,680	30,310	12,120	18,530	22,900	12,120	18,430	22,900	32,240	8.7	4.4	5.9
Butadiene	5,220	5,950	6,770	3,235	4,640	5,360	3,335	4,520	5,430	6,700	7.8	3.7	3.6
Benzene	18,300	21,700	25,100	10,630	16,000	20,430	10,710	16,200	20,400	25,800	10.8	4.7	4.0
Xylenes	5,560	7,100	8,260	3,610	5,450	6,910	3,680	5,300	6,800	8,850	9.3	5.1	4.5
Methanol	9,800	12,275	20,500	7,200	10,400	16,000	7,400	10,800	16,600	24,000	10.1	11.4	6.3
TOTAL	91,240	114,905	144,240	60,045	89,970	115,050	60,595	89,950	115,680	154,250	10.4	5.2	4.9
DEVELOPING COUNTRIES													
Ethylene	1,400	3,360	7,900	1,150	2,680	6,150	1,150	2,680	6,150	13,950	24.0	17.6	14.9
Propylene	740	1,520	3,050	470	1,190	2,410	470	1,190	2,410	4,470	26.0	15.1	10.8
Butadiene	280	540	1,040	210	420	900	210	420	900	1,600	18.9	16.4	10.0
Benzene	1,050	1,600	3,170	680	1,180	2,620	800	1,300	2,700	5,000	12.8	15.6	10.8
Xylenes	210	830	2,150	160	660	1,690	200	800	1,800	3,000	41.4	17.6	8.8
Methanol	400	1,560	3,310	340	1,320	2,900	450	940	1,800	3,550	20.1	17.6	12.0
TOTAL	4,080	9,410	20,620	3,010	7,450	16,670	3,280	7,330	15,760	31,570	22.3	16.5	12.3
WORLD TOTAL													
Ethylene	35,200	46,560	61,200	24,400	37,630	49,600	24,500	37,380	49,700	70,450	11.2	6.2	6.0
Propylene	19,300	26,200	33,360	12,590	19,720	25,310	12,590	19,620	25,310	36,870	11.8	5.2	6.4
Butadiene	5,500	6,490	7,810	3,445	5,060	6,260	3,545	4,940	6,330	8,300	8.8	5.0	4.6
Benzene	19,350	23,300	28,270	11,310	17,180	23,050	11,510	17,500	23,100	30,800	11.0	5.7	4.9
Xylenes	5,770	7,930	10,410	3,770	6,110	8,600	3,850	6,100	8,600	11,850	11.8	7.1	5.6
Methanol	10,200	13,835	23,810	7,540	11,720	18,900	7,850	11,740	18,400	27,550	10.4	9.6	7.0
TOTAL	95,320	124,315	164,860	63,055	97,420	131,720	63,875	97,280	131,440	185,820	11.1	6.2	5.9
SHARE OF DEVELOPING COUNTRIES IN WORLD TOTAL %													
Ethylene	4.0	7.2	12.9	4.7	7.2	12.4	4.7	7.2	12.4	19.8			
Propylene	3.8	5.8	9.1	3.7	6.0	9.5	3.7	6.0	9.5	12.1			
Butadiene	5.1	8.3	13.3	5.8	7.9	14.4	5.9	8.5	14.2	19.3			
Benzene	5.4	7.4	11.2	6.0	6.9	11.4	7.0	7.4	11.7	16.2			
Xylenes	3.6	12.6	21.7	4.2	10.8	19.7	5.1	13.1	20.9	25.3			
Methanol	3.9	11.3	13.9	4.5	11.3	15.3	5.7	8.0	9.8	12.9			

Source: Second World-wide Study on the Petrochemical Industry: Process of Restructuring, UNIDO.

WORLD CAPACITY, PRODUCTION AND DEMAND FOR
SELECTED THERMOPLASTICS, 1975 - 1990
(IN '000 MT)

	CAPACITY			PRODUCTION			DEMAND				INCREASED IN DEMAND (per cent per annum)		
	1975	1979	1984	1975	1979	1984	1975	1979	1984	1990	1975-79	1979-84	1984-90
DEVELOPED COUNTRIES													
LDPE	10,010	13,150	16,600	7,040	11,150	13,020	6,530	10,030	11,960	15,040	11.3	3.6	3.9
HDPE	4,520	6,190	8,880	3,130	5,510	6,960	2,590	4,840	6,330	8,440	16.9	5.5	4.9
Polypropylene	3,880	6,000	7,580	2,290	4,640	6,290	2,060	4,140	5,940	9,290	19.0	7.7	7.6
PVC	10,680	13,065	15,850	6,920	10,630	13,210	6,710	10,030	12,510	16,420	10.6	4.6	4.6
Polystyrene	6,600	7,440	9,240	3,600	5,490	6,850	3,430	5,250	6,600	8,810	11.2	4.7	4.9
TOTAL	35,690	45,845	58,150	22,980	37,420	46,330	21,320	34,290	43,340	58,000	12.6	4.8	5.0
DEVELOPING COUNTRIES													
LDPE	560	1,300	3,260	455	1,085	2,590	1,100	2,210	3,750	6,950	19.1	11.1	10.8
HDPE	130	365	1,225	85	290	980	350	840	1,460	2,720	24.4	11.4	11.2
Polypropylene	70	440	1,275	50	350	1,030	310	850	1,520	3,040	28.7	12.3	12.2
PVC	850	2,010	3,940	670	1,600	3,220	1,160	2,110	3,850	7,200	16.1	12.7	11.0
Polystyrene	290	630	860	190	420	690	360	700	1,140	2,090	18.1	10.2	10.6
TOTAL	1,900	4,745	10,560	1,450	3,745	8,510	3,280	6,710	11,720	22,000	19.6	11.8	11.1
WORLD TOTAL													
LDPE	10,570	14,450	19,860	7,495	12,235	15,610	7,630	12,240	15,710	21,990	10.3	5.1	5.8
HDPE	4,650	6,555	10,105	3,215	5,800	7,940	2,940	5,680	7,790	11,160	17.9	6.5	6.1
Polypropylene	3,950	6,440	8,855	2,340	4,990	7,320	2,370	4,990	7,460	12,330	20.4	8.5	8.6
PVC	11,530	15,075	19,790	7,590	12,230	16,430	7,870	12,140	16,360	23,620	11.4	6.2	6.3
Polystyrene	6,890	8,070	10,100	3,790	5,910	7,540	3,790	5,950	7,740	10,900	11.9	5.4	5.9
TOTAL	37,590	50,590	68,710	24,430	41,165	54,840	24,600	41,100	55,060	80,000	13.6	6.1	6.4
SHARE OF DEVELOPING COUNTRIES IN WORLD TOTAL %													
LPDE	5.3	9.0	16.4	6.1	8.9	16.6	14.4	18.2	23.9	21.6			
HDPE	2.8	5.6	12.1	2.6	5.0	12.3	11.9	14.8	18.5	24.4			
Polypropylene	1.8	6.8	14.4	2.1	7.0	14.1	13.1	17.0	20.0	24.6			
PVC	7.4	13.9	19.9	8.8	13.0	19.6	14.7	17.4	23.5	30.5			
Polystyrene	4.2	7.8	9.3	5.0	7.1	9.1	9.5	11.8	14.7	19.2			

Source: Second World-wide Study on the Petrochemical Industry: Process of Restructuring, UNIDO.

WORLD CAPACITY, PRODUCTION AND DEMAND FOR SELECTED SYNTHETIC FIBRES, 1975 - 1990 (IN '000 MT)

	CAPACITY			PRODUCTION			DEMAND				INCREASE IN DEMAND (per cent per annum)		
	1975	1979	1984	1975	1979	1984	1975	1979	1984	1990	1975-79	1979-84	1984-90
DEVELOPED COUNTRIES													
Acrylic Fibres	1,705	1,980	2,260	1,140	1,610	1,800	990	1,420	1,580	1,835	9.4	2.1	4.0
Polyamide (Nylon) Fibres	3,050	3,405	3,850	2,180	2,810	3,220	2,060	2,660	3,050	3,290	6.6	2.8	[illegible].3
Polyester Fibres	3,830	4,450	5,080	2,800	3,820	4,450	2,490	3,480	4,260	4,890	8.7	4.1	2.3
TOTAL	8,585	9,835	11,190	6,120	8,240	9,470	5,540	7,560	8,890	10,015	8.1	3.0	3.2
DEVELOPING COUNTRIES													
Acrylic Fibres	220	390	610	170	305	450	230	390	550	810	14.1	7.1	6.6
Polyamide (Nylon) Fibres	410	545	740	305	430	610	430	620	810	1,150	8.2	6.3	5.5
Polyester Fibres	840	1,200	2,150	700	1,065	1,760	895	1,460	2,110	3,140	13.0	7.6	6.9
TOTAL	1,470	2,135	3,500	1,175	1,800	2,820	1,555	2,470	3,470	5,100	11.9	7.4	6.4
WORLD TOTAL													
Acrylic Fibres	1,925	2,370	2,870	1,310	1,915	2,250	1,220	1,810	2,130	2,645	10.3	2.8	3.6
Polyamide (Nylon) Fibres	3,460	3,950	4,590	2,485	3,240	3,830	2,490	3,280	3,860	4,440	7.2	2.8	2.4
Polyester Fibres	4,670	5,650	7,230	3,500	4,885	6,210	3,385	4,940	6,370	8,030	9.9	5.1	3.7
TOTAL	10,055	11,970	14,690	7,295	10,040	12,290	7,095	10,030	12,360	15,115	9.0	4.1	3.5
SHARE OF DEVELOPING COUNTRIES IN WORLD TOTAL %													
Acrylic Fibres	11.4	16.4	21.2	13.0	16.0	20.0	18.8	21.5	25.8	30.6			
Poliamide (Nylon) Fibres	11.8	13.8	16.1	12.3	13.3	15.9	17.2	18.9	21.0	25.9			
Polyester Fibres	18.0	21.2	29.7	20.0	21.8	28.3	26.4	29.5	33.1	39.6			

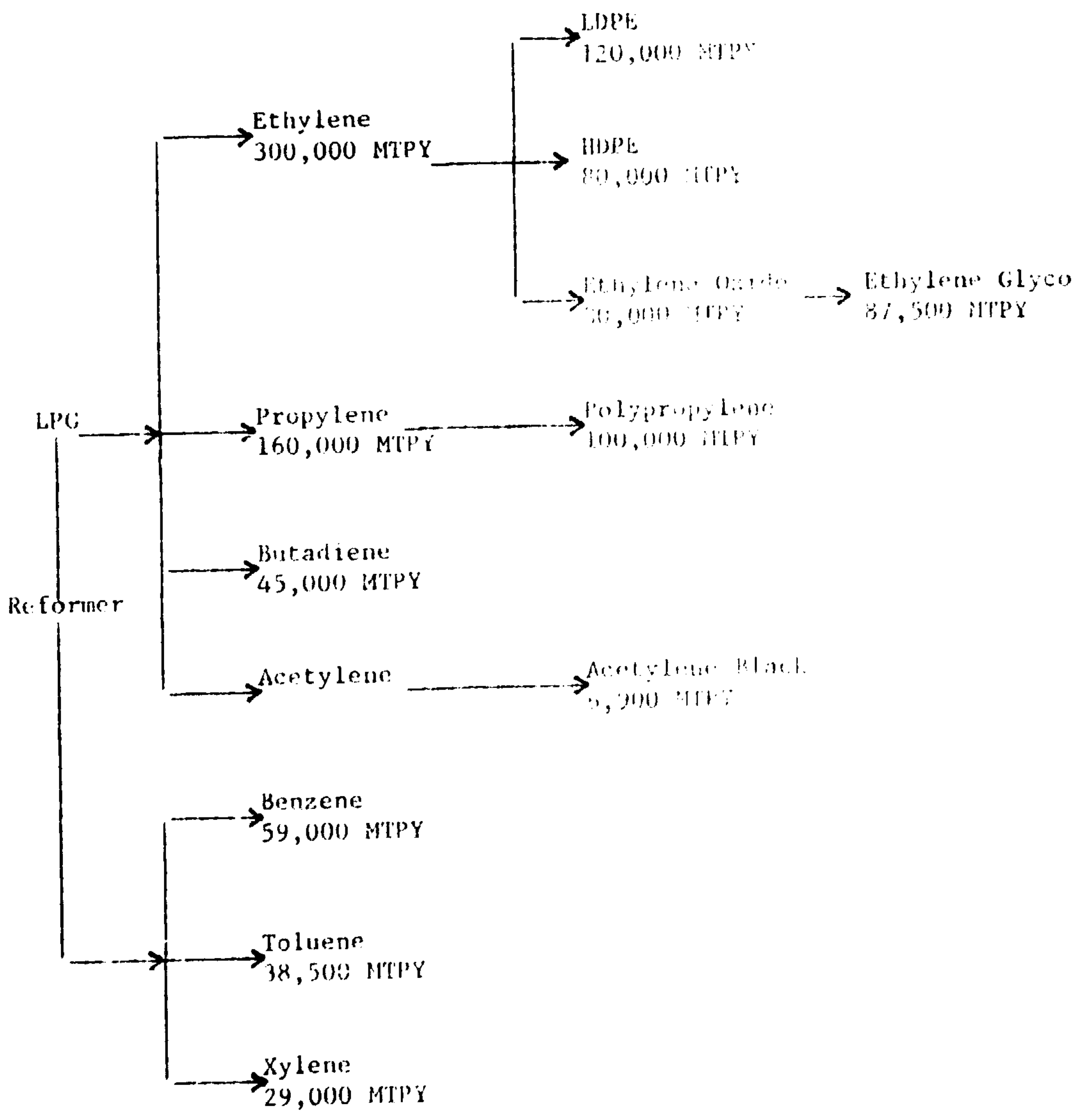
Source: Second World-wide Study on the Petrochemical Industry: Process of Restructuring, UNIDO.

WORLD CAPACITY, PRODUCTION AND DEMAND FOR SELECTED SYNTHETIC RUBBERS, 1975 - 1990 (IN '000 MT)

	CAPACITY			PRODUCTION			DEMAND				INCREASE IN DEMAND (per cent per annum)		
	1975	1979	1984	1975	1979	1984	1975	1979	1984	1990	1975-79	1979-84	1984-90
DEVELOPED COUNTRIES													
SBR	5,000	6,000	7,080	3,800	4,800	5,750	3,460	4,450	5,300	6,400	6.6	3.5	3.2
Polybutadiene	1,140	1,370	1,620	900	1,090	1,380	770	1,010	1,330	1,570	7.0	5.6	2.8
TOTAL	6,140	7,370	8,700	4,700	5,890	7,130	4,230	5,460	6,630	7,970	6.6	3.9	3.1
DEVELOPING COUNTRIES													
SBR	360	550	920	270	400	700	450	770	1,150	1,630	14.3	8.3	6.0
Polybutadiene	60	120	280	70	100	200	90	150	250	350	13.7	16.7	5.8
TOTAL	420	670	1,200	340	500	900	540	920	1,400	1,980	14.1	8.7	5.9
WORLD TOTAL													
SBR	5,360	6,550	8,000	4,070	5,200	6,450	3,910	5,220	6,450	8,030	7.2	4.2	3.7
Polybutadiene	1,200	1,490	1,900	970	1,190	1,580	860	1,160	1,580	1,920	7.8	6.3	3.2
TOTAL	6,560	8,040	9,900	5,040	6,390	8,030	4,770	6,380	8,030	9,950	7.5	5.8	3.6
SHARE OF DEVELOPING COUNTRIES IN WORLD TOTAL %													
SBR	6.7	8.4	8.9	6.6	7.7	10.8	11.5	14.8	17.8	20.3			
Polybutadiene	5.0	8.0	14.3	7.0	8.4	12.6	10.5	12.9	15.8	18.2			

Source: Second World-wide Study on the Petrochemical Industry: Process of Restructuring, UNIDO.

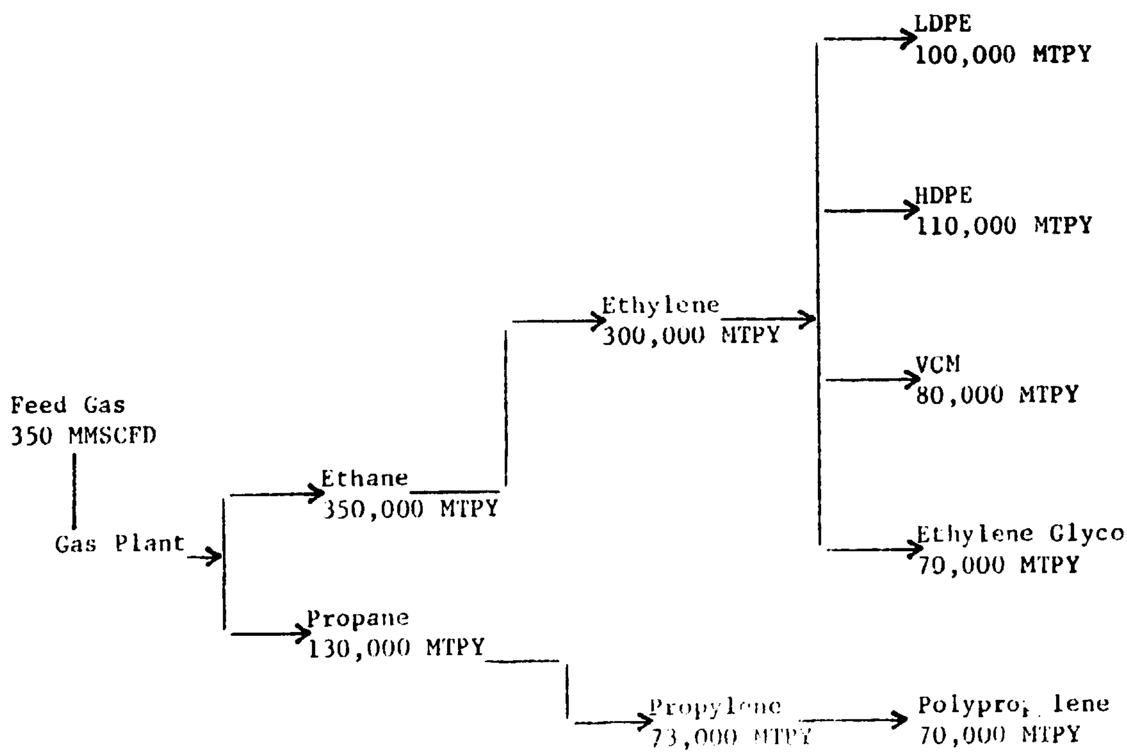
THE SINGAPORE PETROCHEMICAL COMPLEX



Source: Petroleum Corporation of Singapore (Pte) Ltd.

Appendix 24

THE THAILAND PETROCHEMICAL COMPLEX



Source: Board of Investment, Thailand

Appendix 25

PESTICIDES:
APPARENT DOMESTIC CONSUMPTION
1973 - 1981
(M$ Million at Current Price)

Year	Imports	Local Production	Exports and Re-exports	Apparent Consumption
1973	14,407	29,798	2,063	42,142
1974	20,018	35,824	5,401	50,441
1975	21,846	51,894	3,490	70,250
1976	37,809	58,896	3,393	93,312
1977	43,952	65,280	5,531	103,701
1978	49,458	94,742	7,854	136,346
1979	76,259	127,645	12,286	191,618
1980	91,881	124,644	13,747	202,778
1981	92,786	110,006	15,619	187,173

Sources: Department of Statistics
MIDA

Appendix 26

COSMETICS, SOAPS AND DETERGENTS:
APPARENT DOMESTIC CONSUMPTION
1973 - 1981
(IN M$ MILLION AT CURRENT PRICES)

Year	Imports	Local Production	Exports and Re-Exports	Apparent Consumption
1973	32,960	102,331	9,938	125,353
1974	48,704	139,382	11,038	177,048
1975	52,905	126,829	16,594	163,140
1976	50,158	144,155	18,712	175,601
1977	63,554	161,286	21,738	203,102
1978	76,021	187,667	17,169	246,519
1979	90,289	216,151	27,098	279,342
1980	112,408	249,819	27,288	334,939
1981	132,984	255,250	36,007	352,227

Sources: Department of Statistics
MIDA

PROJECTED VALUE-ADDED OF AGRICULTURE, FORESTRY AND FISHING 1985 - 1995 (IN M$ MILLION IN 1970 CONSTANT PRICES)

Year	Projected Value-Added of Agriculture, Forestry and Fishing
1985	7,670
1986	7,977
1987	8,296
1988	8,626
1989	8,973
1990	9,332
1991	9,612
1992	9,900
1993	10,197
1994	10,503
1995	10,818

Note : Growth rates for agriculture, forestry and fishing based on EPU forecasts are as follows:

1985 - 1990 4.0% p.a.
1990 - 1995 3.0% p.a.

Source: Economic Planning Unit
Prime Minister's Department

PROJECTED VALUE-ADDED OF MANUFACTURING 1985 - 1995 (IN M$ MILLION IN 1970 CONSTANT PRICES)

Year	Low Growth	Medium Growth	High Growth
1985	6,533	6,533	6,533
1986	7,069	7,212	7,356
1987	7,649	7,962	8,283
1988	8,276	8,790	9,327
1989	8,955	9,704	10,502
1990	9,689	10,713	11,825
1991	10,532	11,795	13,173
1992	11,448	12,986	14,675
1993	12,444	14,297	16,348
1994	13,527	15,741	18,212
1995	14,704	17,331	20,288

Note : Growth rates for manufacturing value-added based on EPU forecasts are as follows:

	1985 - 1990	1990 - 1995
1. Low growth	8.2% p.a.	8.7% p.a.
2. Medium growth	10.4	10.1
3. High growth	12.6	11.4

Source: Economic Planning Unit
Prime Minister's Department

Appendix 29

PROJECTED PER CAPITA PRIVATE CONSUMPTION EXPENDITURE
1985 - 1995

Year	Gross Domestic Product (In M$ Million)			Population (In Millions)	Per Capita Private Consumption Expenditure (In M$)		
	Low Growth	Medium Growth	High Growth		Low Growth	Medium Growth	High Growth
1985	35,759	35,759	35,759	15.5	1,292	1,292	1,292
1986	37,905	38,262	38,620	15.9	1,335	1,348	1,360
1987	40,178	40,940	41,710	16.3	1,380	1,407	1,433
1988	42,588	43,806	45,047	16.7	1,428	1,469	1,511
1989	45,143	46,872	48,651	17.1	1,478	1,535	1,595
1990	47,851	50,153	52,543	17.5	1,531	1,605	1,681
1991	50,722	53,664	56,746	18.0	1,578	1,670	1,765
1992	53,765	57,420	61,286	18.4	1,636	1,748	1,865
1993	56,991	61,439	66,189	18.8	1,698	1,830	1,972
1994	60,410	65,740	71,484	19.3	1,753	1,907	2,074
1995	64,035	70,342	77,203	19.7	1,820	2,000	2,195

Notes:

1. Forecasts of gross domestic product (GDP) were obtained from the Economic Planning Unit, Prime Minister's Department.

2. Private consumption expenditure is assumed to be 56% of gross domestic product. This factor represents the average historical ratio of private consumption to gross domestic product for the period 1973 to 1981 based on EPU statistics.

3. Population growth is assumed at 2.5% from 1985 - 1990 and 2.4% from 1991 - 1995.

4. Per capita private consumption expenditure = $\frac{0.56 \times GDP}{Population}$

Appendix 30

PROJECTED PER CAPITA GDP
1985 - 1995
(IN M$ MILLION IN 1970 CONSTANT PRICES)

Year	Gross Domestic Product			Population (In Million)	Per Capita GDP		
	Low Growth	Medium Growth	High Growth		Low Growth	Medium Growth	High Growth
1985	35,759	35,759	35,759	15.5	2,307	2,307	2,307
1986	37,905	38,262	38,620	15.9	2,384	2,406	2,429
1987	40,178	40,940	41,710	16.3	2,465	2,512	2,559
1988	42,588	43,806	45,047	16.7	2,550	2,623	2,697
1989	45,143	46,872	48,651	17.1	2,640	2,741	2,845
1990	47,851	50,153	52,543	17.5	2,734	2,866	3,002
1991	50,722	53,664	56,746	18.0	2,818	2,981	3,153
1992	53,765	57,420	61,286	18.4	2,922	3,121	3,331
1993	56,991	61,439	66,189	18.8	3,031	3,268	3,521
1994	60,410	65,740	71,484	19.3	3,130	3,406	3,704
1995	64,035	70,342	77,203	19.7	3,251	3,571	3,919

Notes:

1. Forecasts of gross domestic product (GDP) were obtained from the Economic Planning Unit, Prime Minister's Department.

2. Population growth is assumed at 2.5% per annum from 1985 - 1990 and 2.4% per annum from 1991 - 1995.

MALAYSIAN INDUSTRIAL MASTERPLAN
SURVEY QUESTIONNAIRE

PART 1 - CHIEF EXECUTIVE OFFICER

A. GENERAL

Name of Company : ______________________________

Address & Telephones : ______________________________

____

Name of Respondent : ______________ Designation: ______________

Name of Interviewer : ______________ Date : ______________

Nature of Business : ______________________________

____

____

____

Sub-sector : ______________________________

Inorganic products and intermediates	1
Fertilizers	2
Petrochemical building blocks and intermediates	3
Plastics and resins	4
Paints and varnishes	5
Inks, pigments and dyes	6
Pharmaceuticals	7
Pesticides	8
Cosmetics, soaps and detergents	9

B. MARKET

1. Markets served by the company at present.

Product	Industry	D Region/State	F Country

(D - Domestic, F - Foreign)

2. Potential markets not served.

Product	Industry	D	F	Reasons

3. Plans to supply potential markets

Industry	Yes	No	Reasons

C. COMPETITION

4. Share of the domestic market
(For local company, identify if producer/importor/distributor)

Product	Company Share	Domestic Competition		Foreign Competition	
		Company	Share	Country	Share

5. Type of competition

	D	F	Elaborate
Price Competition			
- Labour cost			
- Material cost			
- Taxes, duties			
Non-Price Competition			
- Quality			
- Distribution			
- Advert. & Promo.			
- R & D			
- Packaging			
- Others (specify)			

6. How do you respond to competition?

____

____

____

____

D. REGULATORY FRAMEWORK

7.a Effect of legislation, policies and regulations

Regulation/Policy/ Scheme	Effect	Explain
a. Industrial Coordination Act	0 1 2 3	____________
b. New Economic Policy	0 1 2 3	____________
c. Petroleum Development Act	0 1 2 3	____________

Regulation/Policy/ Scheme	Effect	Explain and give suggestion
d. Environmental Quality Act	0 1 2 3	______________
e. Incentives	0 1 2 3	______________
- PS	0 1 2 3	______________
- LI	0 1 2 3	______________
- LUR	0 1 2 3	______________
- ITC	0 1 2 3	______________
- ADA	0 1 2 3	______________
- ICA	0 1 2 3	______________
- Reinvestment Allow.	0 1 2 3	______________
- Restructuring Incentives	0 1 2 3	______________
- FIZ	0 1 2 3	______________
- LMW	0 1 2 3	______________
- Import Duty Drawback	0 1 2 3	______________
- Import Duty Exemption	0 1 2 3	______________
- Export Allowance	0 1 2 3	______________
- Deduction for overseas promotion	0 1 2 3	______________
- Sales tax exemption	0 1 2 3	______________

f. Patent Protection

g. Others

h. Can you propose any new regulation, policy or incentive scheme which would benefit the sub-sector/chemical industry. Explain.

(0 - Don't know, 1 - No effect, 2 - Favourable, 3 - Adverse)

E. PROSPECTS

8. What opportunities do you see in the chemical industry in the domestic market? in the export market? (Specify sub-sector starting with own sub-sector, then other sub-sectors) Elaborate.

____

____

____

____

9. Problems faced by the industry

Problem	Rank	Elaborate/Recommended Solution
Raw material supply	0 1 2 3	____________
Government regulation	0 1 2 3	____________
Small domestic market	0 1 2 3	____________
Product substitutes	0 1 2 3	____________
Increasing competition	0 1 2 3	____________
Dumping from foreign Countries	0 1 2 3	____________
Cost of energy & fuel	0 1 2 3	____________
Tariff and non-tariff barriers in foreign markets	0 1 2 3	____________
Shortage of labour/ skills	0 1 2 3	____________
Availability of local financing assistance	0 1 2 3	____________
Others: ____________	0 1 2 3	____________
____________	0 1 2 3	____________
____________	0 1 2 3	____________

(0 - not a problem, 1 - not serious, 2 - serious, 3 - needs immediate action)

F. ORGANISATIONS

10. Role and effectiveness of associations and other agencies.
Chemical Industries Council of Malaysia (CICM)

Malaysian Agricultural Chemicals Association (MACA)

Malaysian Pharmaceutical Trade & Mfrs Association (MPTMA)

Malaysian Industrial Development Authority (MIDA)

State Economic Development Corporation (SEDC)

Others

PART II - MARKETING FUNCTION

A. GENERAL

Name of Company : ______________________

Address & Telephone: ______________________

Name of Respondent : ____________ Designation : ____________

Name of Interviewer: ____________ Date : ____________

B. MARKET

1. Existing product lines

Products	% of Total Sales	Brand

2. Market segments purchasing company's products

Product	Domestic Market Segments	% Sales	Foreign Markets	% Sales

3. Reasons for these segments purchasing company's products.

Reasons	D	F	Elaborate
a. Well established in that market	1	2	______
b. Sole supplier	1	2	______
c. Long established personal relationship	1	2	______
d. Good distributors	1	2	______
e. Heavy advertising & promotion	1	2	______
f. Good product quality	1	2	______
g. Experienced sales force	1	2	______
h. Price competitive	1	2	______
i. Good location	1	2	______
j. Others (specify)	1	2	______

4. Potential market segments

Product	Domestic Market Segments	Foreign Markets
______	______	______
______	______	______
______	______	______
______	______	______
______	______	______

5. Reasons for above market segments not purchasing company's products

Reasons	D	F	Elaborate
a. Limited sales force	1	2	______
b. Limited distribution outlets	1	2	______
c. Limited production capability	1	2	______

Reasons	D	F	Elaborate
d. Poor product quality	1	2	______
e. Insufficient advertising & promotion	1	2	______
f. Not price competitive	1	2	______
g. Substitute products	1	2	______
. Segments too small	1	2	______
i. Government regulation	1	2	______
j. Others (specify)	1	2	______

6. Sales turnover for 1981, 1982 and 1983.

______

______

______

C. DISTRIBUTION

7. Describe overall channel flow for company's products (domestic and export sales).-

8. Percentage of sales through each channel.

Product	Type of Channel/Outlet				
	%	%	%	%	%

9. Number of outlets

Type of Outlet	West Coast P. Malaysia	East Coast P. Malaysia	Sabah/ Sarawak

D. PROMOTION & ADVERTISING

10. Promotion and advertising cost/budget as a percentage of total cost.

    Promotion ____ %
    Advertising ____ %

11. Advertising media

Media	Specify	Rank
Newspapers	____________	____
Magazines	____________	____
Trade Journals	____________	____
Television	____________	____
Radio	____________	____
Others	____________	____
	____________	____
	____________	____

12. Type of promotion used.

____

____

____

____

E. PRICING

13. Pricing strategy

Product	Cost Plus	Competitive	Customer/ Demand-oriented
____________	1	2	3
____________	1	2	3
____________	1	2	3
____________	1	2	3
____________	1	2	3
____________	1	2	3

14. Price ranges (For agricultural chemicals, indicate ot active ingredient and effective cost per acre)

Product	Company		Local Competitors		Imported Products	
	Ex-factory	Retail	Ex-factory	Retail	Landed	Retail

15. Credit facilities provided for or arranged by company for customers, if any.

F. PROSPECTS

16. Opportunities in the industry.

Market opportunities (Domestic & Foreign)

Product opportunities

17. Threats to the industry and recommended solutions.

____

____

____

____

18. Identify areas (technology/finance/marketing/manpower/govt regulations) where Government can assist in developing the industry and elaborate.

19. Estimated sales/growth over next 5 years.

Product	1984	1985	1986	1987	1988

PART III - PRODUCTION FUNCTION

A. GENERAL

Name of Company : ______________________________

Address & Telephone: ______________________________

Name of Respondent : ______________ Designation : ______________

Name of Interviewer: ______________ Date : ______________

B. EXISTING PLANTS

i. Number of plants. ______

ii. Location, products, capacity, raw materials used and technical processes.

Location	Main Products	Rated Capacity	Raw Materials: Local	Raw Materials: Imported (Country)

3. Production volume.

Product	Estimated Production Volume		
	1981	1982	1983

E. FUTURE PLANTS

1. Future plants or expansion projects.

Location	Targetted Date	Main Products	Capacity		Raw Materials and Source
			Starting	Full Operation	

2. Other opportunities in the industry.

Market opportunities (Domestic and foreign)

Product opportunities

Threats to the industry and recommended solutions

F. COST STRUCTURE

6. Breakdown of total production cost for 1983. (By product)

Cost Item	%	Major Components
Direct Labour		
Direct Material		
Local		
Imported		
Factory Overheads		
Energy		
Depreciation		
Repair & Maintenance		
Packaging		
Direct Labour		
Direct Material		
Local		
Imported		
Factory Overheads		
Energy		
Depreciation		
Repair & Maintenance		
Packaging		

Cost Item	%	Major Components
Direct Labour		
Direct Material		
Local		
Imported		
Factory Overheads		
Energy		
Depreciation		
Repair & Maintenance		
Packaging		

Identify areas (technology/finance/marketing/manpower/govt framework/others) where government can assist in developing the industry and elaborate.

What factors should the government consider when identifying and [illegible] sites for (particular) sub-sector? Identify region/state ideal for location of your plant.

9. Draw organization chart for production department and specify no. of workers.

10. Give estimated technical manpowers requirement per unit of activity (e.g. per unit of output, input, value arrear, or investment) or technical manpower requirements for the planning period 1984 - 1985.

Categoty	1984 - 1985	1986 - 1990	1991 - 1995
________	________	________	________
________	________	________	________
________	________	________	________
________	________	________	________

11. Identify particular categories of technical/skilled labour where there is a shortage.

PART IV - PERSONNEL FUNCTION

A. GENERAL

Name of Company : ______________________________

Address & Telephone: ______________________________

Name of Respondent : ______________ Designation : ______________

Name of Interviewer: ______________ Date : ______________

B. COMPOSITION

1. Total number of employees in Company. ______

2. Functional & racial composition of workforce.

Category	Bumiputra	Non-Bumiputra	Foreigner	Total
Professional, Technical & Related Workers				
Administrative, Finance & Managerial Workers				
Clerical & Related Workers				
Sales Workers				
Service Workers				
Production and Related Workers				
Transport Equipment Operators				
Labourers				

3. Type and number of technical and skilled workers (production are sales).

Type of Technical Workers	No.	Type of Skilled Workers	No.
Chemical Engineers			
Engineering Assistants, Chemical			

C. SUPPLY

4. Average labour cost.

Category	Average Basic Wage	Benefits	Total	Projection Wage Level 1984-1985	1986-90	1991-95

5. Average annual labour turnover for the past 3 years.

	Company	Industry
Overall	______	______
Engineers	______	______
Skilled Workers	______	______

6. Supply

Type	Surplus/Shortage	Location/Causes
______________	1 2 3 4	______________
______________	1 2 3 4	______________
______________	1 2 3 4	______________
______________	1 2 3 4	______________
______________	1 2 3 4	______________
______________	1 2 3 4	______________
______________	1 2 3 4	______________
______________	1 2 3 4	______________
______________	1 2 3 4	______________
______________	1 2 3 4	______________

(1 - surplus, 2 - adequate, 3 - shortage, 4 - acute shortage)

D. TRAINING

7. Training for workers.

Type	On-the Job	In-house	Local Inst	Foreign Inst	Foreign Principal	Other
______	1	2	3	4	5	____
______	1	2	3	4	5	____
______	1	2	3	4	5	____
______	1	2	3	4	5	____
______	1	2	3	4	5	____
______	1	2	3	4	5	____
______	1	2	3	4	5	____
______	1	2	3	4	5	____

8. Do you think there are sufficient local training institutions?

Yes 1 Suggestions ______________________

No 2 ______________________

____

9. Adequacy of local training institutions.

Institution	Have ever employed their trainees?		Comments
______	Yes	No	______
______	Yes	No	______
______	Yes	No	______
______	Yes	No	______

E. PROBLEMS

10. Other problems related to labour (apart from supply) and recommended solutions.

Problem Problem		Elaborate/Recommended Solution
Government regulations/policies	1.	______________________ ______________________
Wage rates	2.	______________________ ______________________
Productivity	3.	______________________ ______________________
Trade Unions	4.	______________________ ______________________
Other (specify)	5.	______________________ ______________________

PART V - FINANCE FUNCTION

A. **GENERAL**

Name of Company : ______________________________

Address & Telephone: ______________________________

Name of Respondent : ______________ Designation : ______________

Name of Interviewer: ______________ Date : ______________

B. **OWNERSHIP**

1. Legal organization type.

Sole proprietorship	1
Partnership	2
Private Limited Company	3
Public Limited Company	4
Other (specify) ______________	5

2. Paid-up capital as at ________

	Amount	%
Malaysian		
Bumiputra	$ ________	_____
Non-Bumiputra	________	_____
Government/Government Institutions	________	_____
Other (specify) ______________	________	_____
Foreign	________	_____
Total	$ ========	100 =====

3. Total loans as at ______________ $ ______________

C. SOURCES OF FINANCE

4. Sources of funds.

Source	D	F	Type of Expenditure		Have Used	Most Frequently Used
			Capital	Operating		
O/Draft						
Term Loan						
Equity						
Retained Earnings						
Leasing						
Hire Purchase						
Loan from Parent Co.						
Suppliers' Credit						
Trust Receipts						
Others (specify)						

5. Problems with financing.

____

____

____

____

D. COSTING

6. Percentage breakdown of major cost items in relation to total cost for 1983.

Cost Item	% of Total Cost	Avg. Annual Growth Rate, 1981 - 83
Direct Labour	______	______
Direct Material - Import	______	______
- Local	______	______
Factory overhead - Energy	______	______
- Depreciation	______	______
- Repair and Maintenance	______	______
- Packaging	______	______
- Others	______	______
Selling Costs	______	______
Administrative & General	______	______
Financial Costs	______	______
	______	______

7. Labour cost.

Type	Wage Rate	Benefits
Skilled	______	______
Unskilled	______	______

8. Energy cost (1983)

Source	Consumption Volume	Price Per Unit
______	______	______
______	______	______
______	______	______
______	______	______

E. WORKING CAPITAL

9. Percentage of sales on cash basis. ________%.

10. Credit days extended by suppliers. ____________________

11. Credit days extended to customers. ____________________

F. FINANCIAL DATA

Year	Turnover	Net Profit Before Tax	Fixed Assets		Total Assets
			At Cost	Net Book Value	
1981					
1982					
1983					

Obtain copy of financial statements and annual reports for past 3 years.

PART VI - PURCHASING FUNCTION

A. GENERAL

Name of Company : ____________________

Address & Telephone: ____________________

Name of Respondent : __________ Designation : __________

Name of Interviewer: __________ Date : __________

B. PURCHASES

1. Major raw material purchases.

Item	% L	% I	Volume in 1983	Value

(L - Local, I - Imported)

2. Sources of supply.

Item	Local Materials		Imported Materials	
	Manufacturer	Distributor	Manufacturer	Distributor

3. Duties and taxes.

Item	Import Duty (%)	Surtax (%)	Sales Tax (%)

4. Problems with supply of raw materials and recommended solutions.

Problem	Local	Imports	Elaborate/Recommended Solutions
Fluctuating prices	1	2	______________
Irregular supply	1	2	______________
Quality	1	2	______________
Financing	1	2	______________
Port facilities	1	2	______________
Transportation	1	2	______________
Customs clearance	1	2	______________
Others (specify)	1	2	______________