IV-3. Present Status of the Overseas Market for Office Electronics Equipment

IV-3-1. World Market Trends

It is very important to identify worldwide demand for office electronics equipment in formulating a marketing strategy.

The size and structure of the world market for OA equipment such as photocopying machines and facsimile machines was examined based on import-export data.

(1) OA Equipment

The world import market for OA equipment* in 1986 totaled US$6,227 million, an increase of 12% over the previous year according to estimates by Benn Electronics. Below is a breakdown of demand by region and major countries.

Table IV. 3-1 World Import Market for OA Equipment

Area	Share (%)
North America	42.2
U.S.A.	35.9
Canada	6.3
Asia	5.5
Japan	
Singapore	4.2
Hong Kong	
Korea	
Europe	49.1
U.K.	7.7
W. Germany	9.7
France	8.0
Others	3.2
Total	100.0

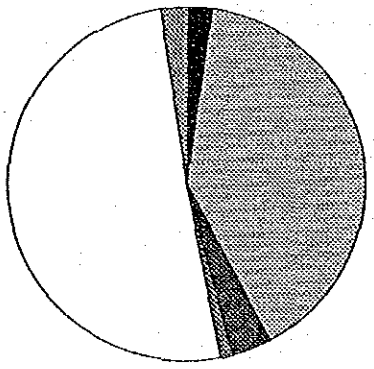
Source: Benn Electronics

*OA equipment refers to Electronic Typewriters, Electronic Calculators, Electronic Cash Registers, Electronic Accounting Machines, Dictation Equipment, Copying Machines.

(2) Photocopying Machines

According to the International Statistics Yearbook, demand for photocopying machines increased at an annual average annual rate of 10.8% during the five years from 1982 through 1986. In 1986 alone, demand grew 20% over the previous year to $3,468 million. When world imports are broken down by region, Europe was the largest importer, accounting for 50.4% of the total, followed by the U.S. with a 40.0% share. As shown in the accompanying table, the U.S., West Germany, France, the U.K. and Canada were among the leading importing countries.

Fig. IV. 3-1 World Imports of Photocopying Machines by Region in 1986



	US$ millions	*Percent*
Africa	75.0	2.1
U.S.A.	1394.3	40.0
Asia	128.8	3.7
Middle East	41.4	1.2
Europe	1759.6	50.5
Oceania	86.4	2.5
Total	3485.5	

Source: International Statistics Yearbook Vol. II

(3) Facsimile Machines

At present there are only two non-Japanese manufacturers of facsimile machines outside Japan, one in France and one in Taiwan. There are 14 major Japanese OA concerns engaged in facsimile machine production and the country supplies roughly 95% of the world's facsimile machines. World demand has shown rapid growth, concentrating in Japan and other advanced countries in Europe and the U.S. During the past three years, in fact, Japanese production and exports have almost doubled each year, as shown in Table IV. 3-2.

Table IV. 3-2 Supply Trend of Japanese Facsimile Machines

(Unit: Set)

Financial Year (Note)	Production	Export
1984	580,000	200,000
1985	920,000	380,000
1986	1,400,000	680,000
1987	2,800,000	1,800,000

Source: Production - Cabinet Statistics Dept.,MITI
Export - Monthly Statistics, MOF
(Note) April - March

Furthermore, in a survey done by the Communications Industry Association of Japan, the number of facsimile machines in use in the world as of March 1987 was estimated to be 4.25 million, as shown below.

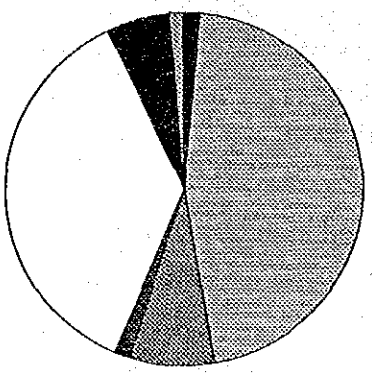
Table IV. 3-3 Number of Facsimile Machines in Use by Country/Region

Country • Region	Set
Japan	2,200,000
U.S.A.	1,100,000
Europe	600,000
Others	350,000
Total	4,250,000

Source: The Communications Industry Associations of Japan.

Japanese facsimile machine exports were broken down by region and compiled in the accompanying table. (Share was calculated based on number of units. When converted to dollar-based value using an exchange rate of ¥145.34 [exports in yen divided by exports in dollars], the figure is $1,618 million.)

Fig. IV. 3-2 Exports of Facsimile Machines from Japan in 1987



	US$ millions	Percent
Africa	19.0	1.3
North America	685.0	45.9
Asia	119.0	7.9
Middle East	22.0	1.5
Europe	542.0	36.3
Oceania	88.0	5.9
Central/South America	18.0	1.2
U.S.S.R./East Europe	0.6	0.0
Total	1493.6	

Source: Japan Exports and Imports, Dec. '87

Table IV. 3-4 Exports of Facsimile Machines from Japan in 1987

(Unit: Set)

	Set	Share
Africa	19,000	1.2
North America	685,000	45.9
USA	615,000	41.2
Canada	70,000	4.7
Central & South America	18,000	1.2
Asia	119,000	8.0
Taiwan	33,000	2.2
Singapore	20,000	1.3
Hong Kong	40,000	2.6
Korea	5,000	
Thailand	4,000	0.6
Middle East	22,000	1.5
Europe	542,000	36.3
UK	108,000	7.2
W. Germany	144,000	9.6
Italy	52,000	3.5
USSR, East Europe	650	0.0
Oceania, Pacific Islands	88,000	5.9
Total	1,493,650	100.0%

Source: Japan Exports and Imports, Dec. '87.

IV-3-2. World Market Development

The world market has expanded sustained by a great demand from the U.S. and Europe. But supplying nations have being forced to respond creatively to the strong yen, surfacing trade frictions and other deterioration of the trade environment. The following is a summary of overseas market development by Japan, one of the leading suppliers.

In response to the steep rise in the value of the yen which was triggered by the Plaza Agreement in September 1985, the industry focused its attention on the Asian NIES with their relatively low labour costs and began developing overseas production bases, primarily in Hong Kong, Korea and Taiwan.

In the U.S., trade friction over automobiles and electronics goods began to surface. In Europe as well, movements to restrict imports from Japan became common. In 1985 the EC accused Japan of dumping photocopying machines and in August 1986 the decision was made to apply anti-dumping duties on the same. This was not the first such case. In 1984 electronic typewriters were singled out for criticism and anti-dumping duties were levied on the same in August of the following year. These experiences helped to accelerate the movement towards local production in Europe and the U.S.

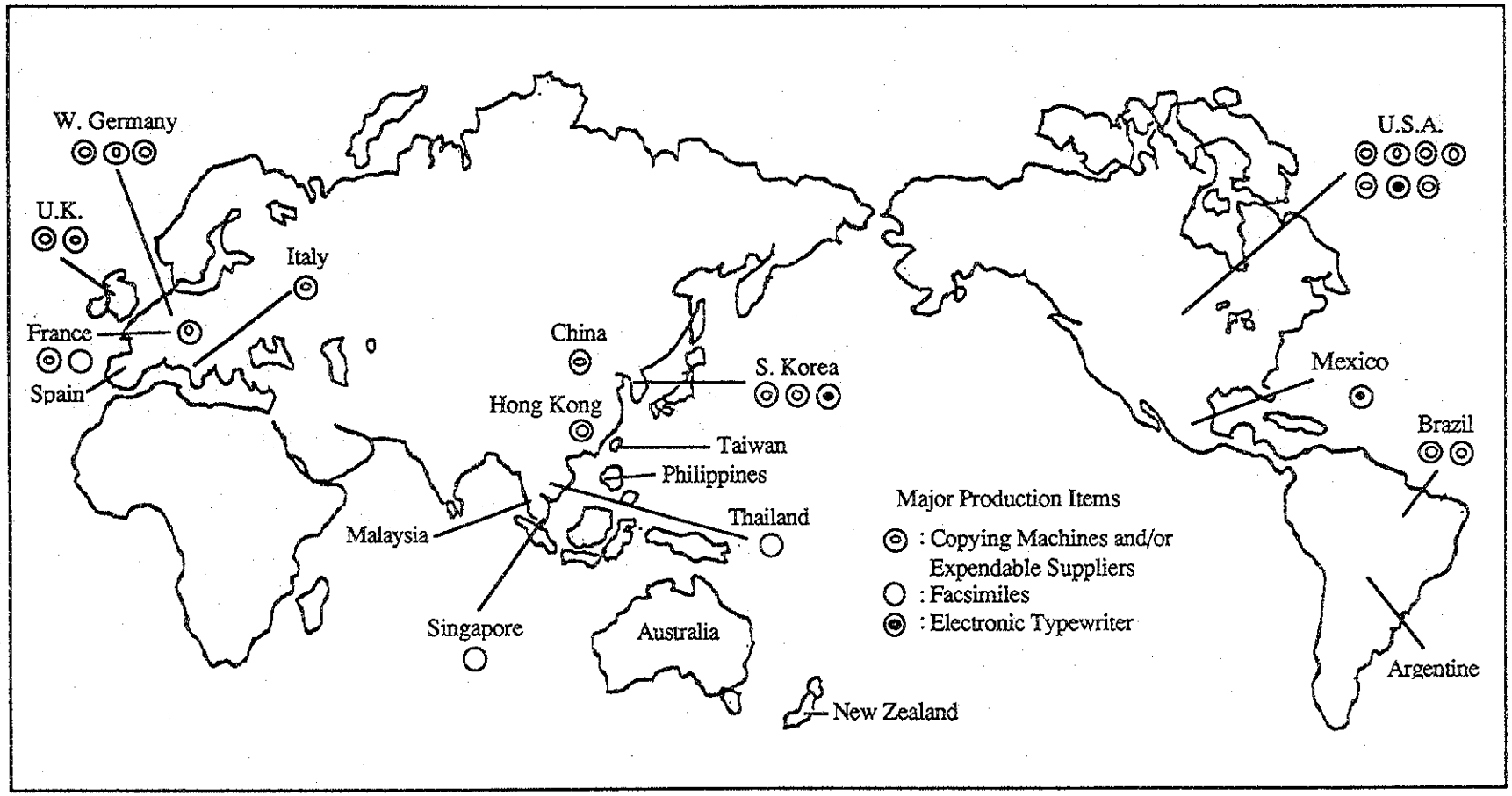
The U.K., West Germany and France are the main European production bases for Japanese firms, but investment in Italy and Spain is on the rise because of low labour costs and government incentives. With the unification of the EC in 1992, both exports from Japan and investment within the region are likely to become more difficult. Since increased sales in the European market will prove difficult without further local production, localisation of parts production is also expected to proceed at a rapid pace in an attempt to raise local content ratios.

Localisation of parts production is expected to proceed in the U.S. as well.

In Asia, high labour costs and strong local currencies are discouraging Japanese firms from investing in Korea and Taiwan, while Hong Kong suffers from a serious land shortage. As a result, there is a trend toward the establishment of production bases in other countries in the region.

Although the industry's shift to overseas production and globalisation is being undertaken in a relatively short period of time. Some even estimate that by the beginning of 1990 overseas production ratios for the sector will reach 50%.

Fig. IV. 3-3 Off-Shore Production of Major OA Equipment by Japanese Manufacturers



Source: Denpa Shinbun

Table IV. 3-5 Off-Shore Production of OA Equipment

Name of Company	Location	Production Items	No. of Employees	Operation
Matsushita				
Matsushita & Business Machine (Europe) GmbH	W. Germany	PPC	130	Sep. 1986
Singapore Matsushita Denso	Singapore	Fax.	90	Sep. 1987
NEC				
NEC America	Oregon	Fax.		Oct. 1985
Toshiba				
Toshiba Information System France	Normandy	PPC	200	Oct. 1988
Toshiba America	South Dakota	Toner	60	Oct. 1988
Canon				
Canon Giessen	Giessen,	PPC, Toner Drum,	250	Jul. 1973
Canon Business Machine	California	Toner, Drum,	150	Sep. 1974
Canon Virginia	Virginia	PPC, Toner Laser beam Printer	750	Mar. 1987
Lotte Canon	Kyungkai	PPC, Drum Toner	100	Jan. 1986
Zhanjiang Photocopier Industry Co.	Zhanjiang	PPC	250	
Pecan Information Technology Inc.	Beijing	Electronics Printing System	25	Mar. 1988
Olivetti-Canon Industrale S.p.A.	Aglie	PPC	350	Mar. 1987
C.S.Polymer	Virginia	Toner	10	(Mar. '89)
Ricoh				
Ricoh Electronics	California	PPC, Fax, Toner, Thermal Paper	1,200	Jan. 1973
Ricoh Products UK	Telford	PPC, Fax, Toner, Photosensitive	380	Dec. 1983
Ricoh Industries France	Wetrlesheim	PPC, Fax	200	Apr. 1987
Sindo Ricoh	Seoul	PPC, Fax	640	Jul. 1960

Table IV.3-5 next

Name of Company	Location	Production Items	No. of Employees	Operation
Sharp				
Sharp Manufacturing Company of UK	UK	Electronic Typewriter PPC	750	Feb. 1985
Sharp Korea Corp.	Kyungki-Lo	Calculator, Electronic Typewriter	950	Sep. 1973
Sharp de Brazil	Amazonas	Calculator, PPC	7,000	Oct. 1971
Sharp Appliances (Thailand)	Thailand	Fax.	1,800	Jan. 1987
Minolta				
Develop Dr. Eisbein GmbH & Co.	Gerlingen	PPC	400	Jul. 1986
Minolta Advance Technology INC.	New York	Toner	50	Summer, 1989
Minolta de Amazonas	Amazonas	PPC	50	Feb. 1989
MITA				
Mita Hong Kong	Kowloon	PPC	530	Jul. 1980

Source: Denpa Shinbun

(Note 1) In Singapore, Matsushita Graphics System is the only company manufacturing facsimiles machines. It began full-scale production in 1988. About 80 percent of the products are for export.

(Note 2) In Thailand, only Sharp Appliances (Thailand) Ltd. is manufacturing facsimile machines in the OA industry. This company was established on January 23, 1987 and has 1800 workers. It produces microwave ovens, audio equipment, facsimile machines, etc., over 90 percent of which is f or export. Its main customers are Europe, 44 to 45 percent, North America, 40 percent, and Japan and Australia. Facsimile machine production just began in January 1989.

[Source: JICA Study Team]

IV-3-3. Japanese Market Trends

(1) Japanese Supply Trends

Of the five major types of OA equipment -- photocopying machines, facsimile machines, Japanese word processors, personal computers and office computers -- photocopying machines account for the largest production value. As a result of the shift to overseas production bases due to the surfacing import restriction movements in Europe and the trade friction with the U.S., Japanese production has fallen steadily since 1985. On the other hand, production of facsimile machines, boosted by increased use in the U.S. and Europe and lower prices, grew three-fold during the period 1985-1988 and production of Japanese word processors also doubled during this period due to steep price cuts and increased domestic use. The following figures and tables show supply trends for major OA products during the period 1984-1989.

Table IV. 3-6 Production and Export of Word Processors (Japanese Language) and Typewriters (Foreign Languages)

(Unit: 100 Million Yen)

Year	Word Processors				Typewriters			
	Set Domestic	Increase (%)	Value Domestic	Increase (%)	Set Export	Increase (%)	Value Export	Increase (%)
1984	228	-	1,026	-	4,321	-	1,437	-
1985	996	336.2	1,458	42.1	4,308	Δ 0.3	1,302	Δ 9.4
1986	2,167	117.7	1,910	31.0	3,840	Δ10.9	946	Δ27.3
1987	2,158	Δ 0.4	2,102	10.0	2,316	Δ39.7	515	Δ45.7
1988	2,400	11.2	2,400	14.2	1,999	Δ13.7	487	Δ 5.4
1989	2,650	10.4	2,700	12.5	1,999	0.0	487	0.0

Source: Japan Business Machines Makers Association

Table IV. 3-7 Production and Export of Photocopying Machines

(Unit: 100 Million Yen)

Year	Photocopying Machines											
	Set						Value					
	Domestic		Export		Total		Domestic		Export		Total	
		Increase (%)		Increase (%)		Increase (%)		Increase (%)		Increase (%)		Increase (%)
1984	590	-	1,781	-	2,372	-	1,632	-	4,120	-	5,752	-
1985	567	Δ4.0	2,140	20.1	2,707	14.1	1,490	Δ8.7	4,744	15.1	6,233	8.4
1986	620	9.2	1,974	Δ 7.8	2,593	Δ 4.2	1,490	0.0	3,705	Δ 21.9	5,194	Δ16.7
1987	626	0.6	1,687	Δ 14.6	2,313	Δ 10.8	1,568	5.2	3,242	Δ 12.5	4,810	Δ 7.4
1988	700	11.9	1,603	Δ 5.0	2,303	Δ 0.4	1,849	18.0	2,878	Δ 11.2	4,727	Δ 1.7
1989	729	4.1	1,563	Δ 2.5	2,292	Δ 0.5	1,937	4.8	2,838	Δ 1.4	4,775	1.0

Source: Japan Business Machine Makers Association

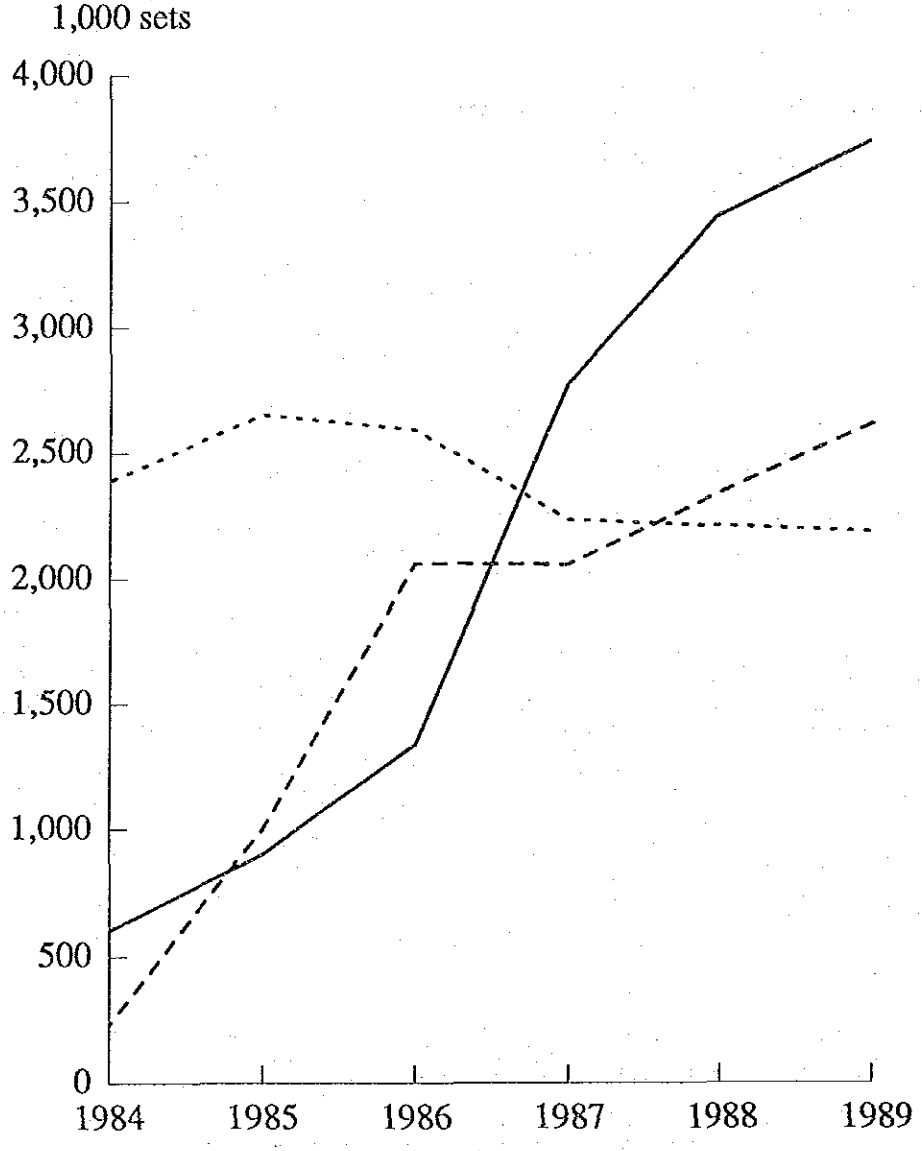
Table IV. 3-8 Production of Facsimile Machines

(Unit: 100 Million Yen)

Year	Facsimile Value Domestic (* 1)	Increase (%)
1984	2,657	-
1985	3,084	16.0
1986	3,120	1.2
1987	3,859	23.7
1988	4,693 (* 2)	21.7
1989	5,139 (* 2)	9.5

(* 1) Apr.-Mar. (Financial Year)
(* 2) Forecast
Source: Communications Industry Association of Japan

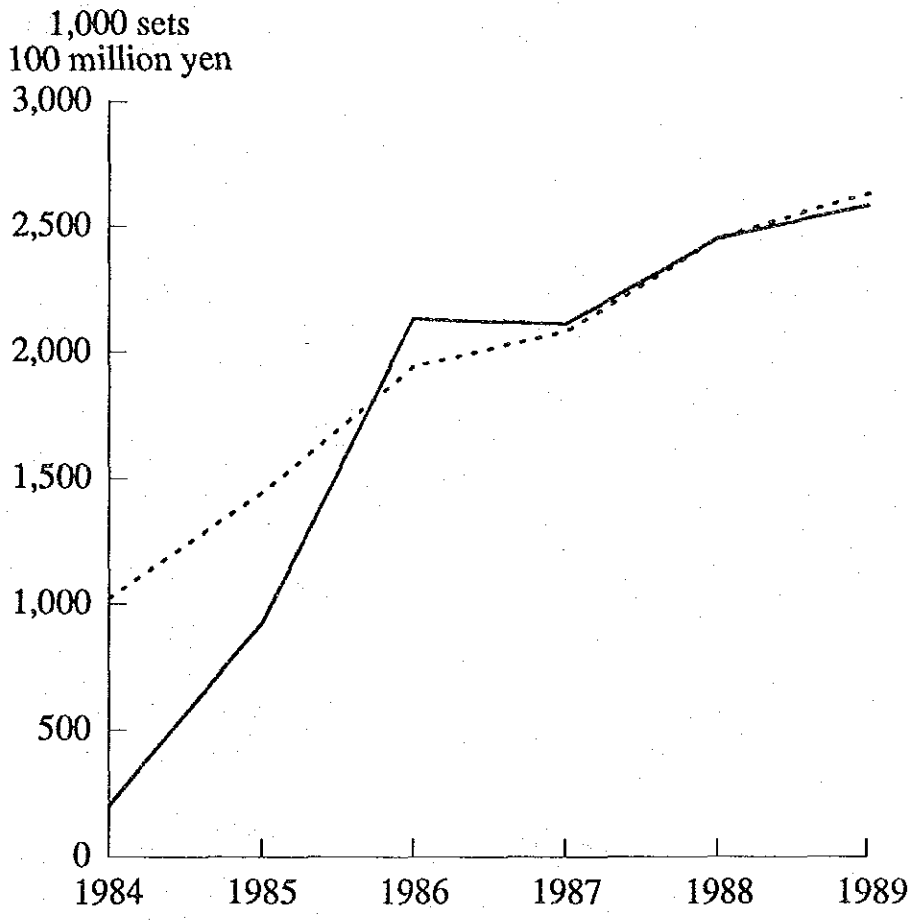
Fig. IV. 3-4 Production Trends of Major OA Equipment in Japan



Source: Communications Industry Association of Japan
Note: Estimate based on the production value base

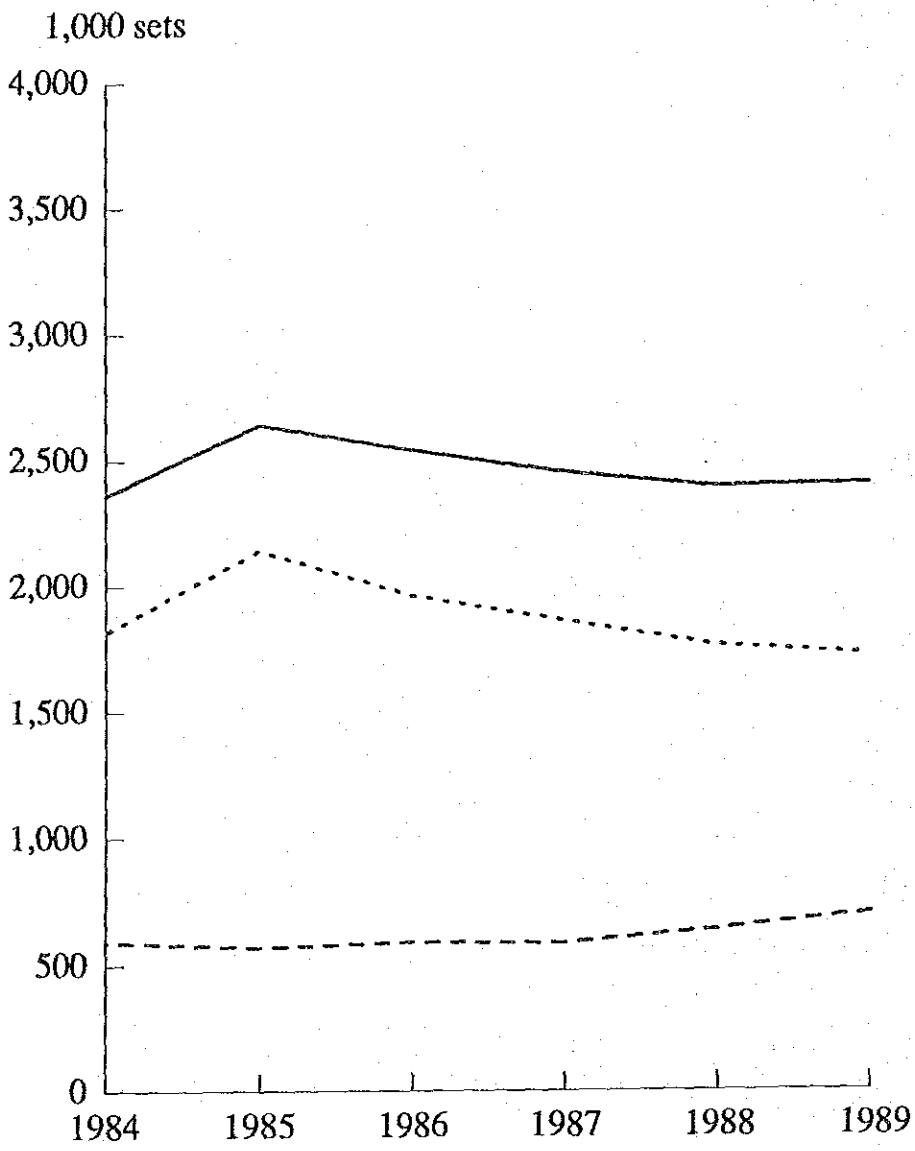
- - - - Word Processors
. . . . . Photocopying machines
——— Facsimile machines

Fig. IV. 3-5 Production Trend of Word Processors in Japan



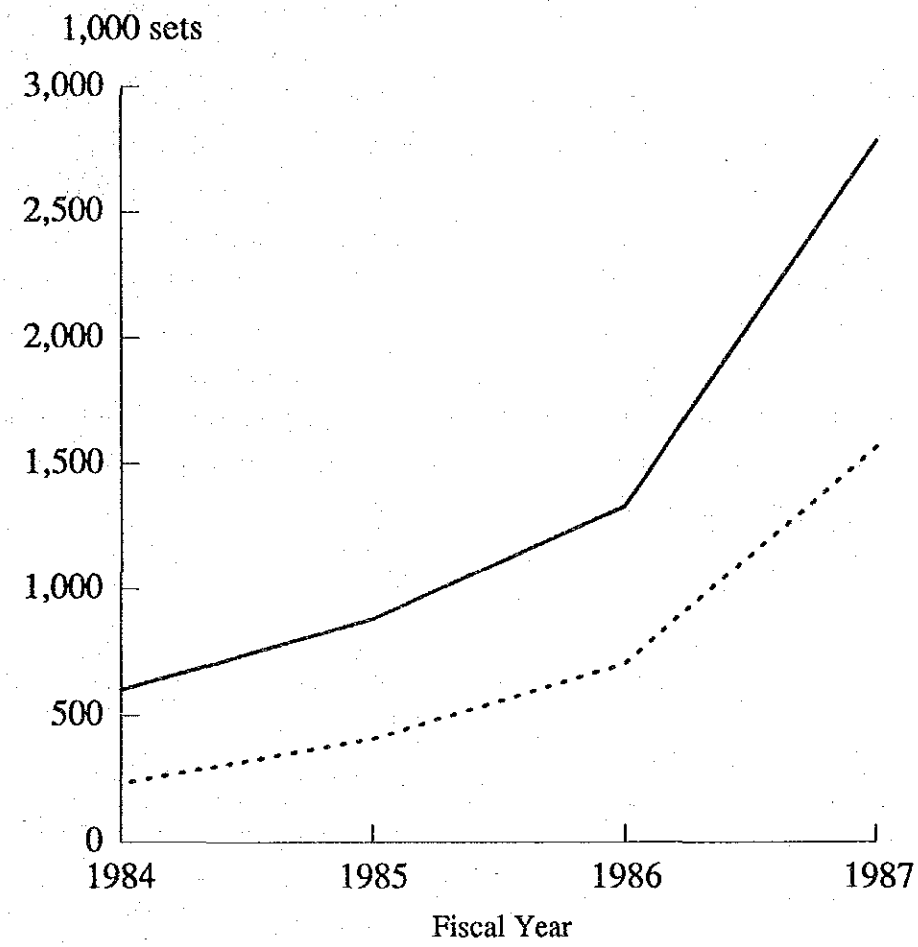
Source: Japan Business Machine Makers Association

Fig. IV. 3-6 Production and Export Trend of Photocopying Machines in Japan



Source: Japan Business Machine Makers Association

Fig. IV. 3-7 Production and Export Trend of Facsimile Machines in Japan



Source: Communications Industry Association of Japan

——— Production
..... Export

(2)Major Manufacturers of OA Equipment

As shown in the following table, the market for OA equipment includes manufacturers from five different industries. Due to the successful transition to a domestic-demand-oriented market, manufacturers of home electrical appliances were quick to recover from the initial havoc wreaked by the strong yen and it now appears that the age when these firms dealt solely in such appliances is over. Instead, they have been forced to undergo strategic conversions, some being transformed into general AV manufacturers (including software) and others working to create the HA (home automation) market. Naturally, entry into this market necessitates the incorporation of the OA field. At present there is increasing contact between the telephone and facsimile markets and other OA equipment markets, but it will be the personal computer which plays the central role in the OA market. Accumulating and developing know-how around the personal computer will become the key to OA market strategies.

Table IV. 3-9 OA Manufacturers in Japan

Industry	Name of Company	Office Computer	Personal Computer	Calculator	ECR	WP	FAX.	PPC	IC
	Ricoh	○	○			○	◎	◎	○
Office Machines	Canon	○	○	◎		◎	◎	◎	
	Fuji Zerox	○	○	○		○	○	◎	
	Casio Computer	○	○	◎	◎	○	○		
	Minoruta Camera					○	○	○	
	Uchida Yoko	◎				○			
Telecommunications Apparatus	NEC	◎	◎			◎	◎		◎
	Fujitsu	◎	◎			◎	○		◎
	Oki Electric Industry	○	○			○	○		○
	Nippon Univac	○	○			○			
Electrical Machinery Apparatus and Appliances	Hitachi	○	○			○	○		◎
	Toshiba	◎	◎	◎		◎	◎	○	◎
	Mitsubishi Electric	◎	○				○		◎
	NCR, Japan	○			◎				
	Tokyo Electric Apparatus	○			◎	○			
Machinery and Chemicals	Konica Corp.							◎	
	Copyer							○	
	Brother Industries			○		○			
	Silver Seiko								
	Murata Data Instruments	○					○		
Home Electrical Appliances	Matsushita Electric	○	○	○		○	◎	○	○
	Sharp	○	◎	◎	◎	◎		◎	○
	Sanyo Denki	○		◎		○	○	○	○

(Note) ◎ = one of major five:
Source: Industrial Analysis for Investors

Table IV. 3-10 Market Share (1986)

Ranking	Japanese WP	Personal Computer	PPC	FAX
Value (100 M¥)	1,739	3,815	4,943	3,030
1	Toshiba (17.9%)	NEC (51.7%)	Ricoh (38.0%)	Ricoh (22.7%)
2	Sharp (16.3%)	Fujitsu (15.1%)	Canon (26.0%)	Matsushita Electric (21.5%)
3	NEC (10.7%)	Nippon IBM (7.0%)	Fuji Xerox (19.7%)	NEC (12.6%)
4	Canon (10.0%)	Toshiba (6.7%)	Sharp (6.2%)	Canon (11.8%)
5	Fujitsu (8.8%)	Seiko-Epson (6.1%)	Konica (4.8%)	Toshiba (10.5%)
Total	(63.7%)	(86.6%)	(94.7%)	(79.1%)

Source: Nomura Sogo Kenkyusho

IV-3-4. Development of Office Electronic Equipment Industry in South Korea

In Southeast Asia, the country which has achieved the biggest growth in the office automation industry outside of Japan is South Korea. It is important to examine at the development of the South Korean industry, and the roles of the government and the private sector at various stages of that growth. Below, the main points of the same will be examined.

(1) 1964 to 1980 - Stage of Establishment of Industrial Base

Almost all of the major manufacturers in the office automation industry were established during the period from 1964 to 1980.

For facsimile machines, three manufacturers account for about a 70 percent share and for photocopying machines, three for a 90 percent share. These were all established during this period. The major manufacturers were established in the following years:

Word processors	Dong Ah Trading Corp.	1951
	QUIX	1972
	Lotte Business Machine	1974
Photocopying Machines	Korea Zerox	1974
	Sindo Ricoh Co., Ltd.	1964
Facsimile machines	Sindo Ricoh Co., Ltd.	1964
	Samsung Semiconductor & Telecom Co., Ltd.	1979
	Gold Star Electric Co., Ltd.	1970
Telex machines	Gold Star Tele-Electric Co., Ltd.	1969

Facsimile machines had previously been limited to institutional use among newspapers and police stations, but began to be used for transmission of documents among private companies in the beginning of the 1970s.

Telex service began in 1965.

(2) 1981 to 1985 - Stage of Expansion of Demand

There were then 10,000 telex lines in operation, enough to completely meet domestic demand. Since 1983, however, demand declined and manufacturers took a negative attitude as to telex production. In contrast, demand for facsimile machines soared. This was due to the removal of restrictions on public telephone lines in 1983, the

government's designation of facsimiles as the number one OA equipment for promotion, and the spread of facsimiles among government offices since 1985. Demand rose sharply as a result.

Photocopying machines continued to be dominated by the three top companies, but in view of the bright prospects for such equipment in the future, as seen from current demand trends, the competition from later-starting manufacturers became much greater since this stage.

(3) Since 1986 - Stage of Strengthening of Parts Industries

To improve the import-inducing industrial structure and the chronic drain in trade with Japan, the Ministry of Industry designated 704 products, including certain machinery, parts, and materials, for promotion of domestic production. In 1987, it added 723 products and in 1988 another 243 products (primary), bringing the total to 1798 products. Among these, 527 were electronics or electrical parts, including supermultilayer PCB's, connectors, chip resistors, and other key OA equipment parts.

In 1980, there were 51 major electronic parts manufacturers and in 1985 this rose to 53. As opposed to this, the number of small and medium sized companies doubled from 225 to 497 during that period.

The new entrants to the field are therefore small and medium sized enterprises which contribute to the creation of employment. The large manufacturers, on the other hand, have been restricted in investment.

Since 1987, however, restrictions over productionof chip capacitors, tantalum electrolytic, color monitor high pressure transformersfor colour monitor, deflection yokes, brushless motors for OA equipment, stepping motors, keyboards, switches, portable hybrid ICs, etc. have been lifted, enabling entry of large manufacturers into those fields.

The OA equipment manufacturers have formed technical tie-ups with overseas manufacturers, but there have been relatively few such cases among parts manufacturers.

The parts manufacturers have been aggressive in independent development and have formed nine research associations. In 1986, 23 manufacturers, the largest number of initial members ever, started the South Korean Semiconductor Association.

(4) Since 1987 - Stage of New Market Development

The OA industry and the copier industry continue to be dominated by three large companies, but there has been a remarkable number of new entries due to the rising demand.

In 1987, Gold Star formed a technical tie-up with Toshiba for production of copiers. Samsung Electronics is supplying and selling copiers on an OEM basis from Korea Xerox. In the second half of 1988, Samsung Electronics concluded a technical tie-up agreement with Sanyo for entry into the copier business. The new entrants, armed with new technologies, will intensify competition in the future.

IV-3-5. Demand Projections for 1988 to 1993

Up until here, the import demand for OA equipment on the world market and supply trends were reviewed. Demand projections by major supplying countries, which will be useful for the examination of production policies and marketing measures, can be summarised as follows.

(1) U.S.

From 1988 to 1993, the largest growth will be shown by facsimile machines, with demand expected to increase 4.3 fold. Demand for photocopying machines is expected as rising 1.5 fold. As for word processors, a figure of 1.9 million units is given for 1988, but the differentiation with microcomputers has become unclear due to advances in technology, so word processors have been combined with the latter. Therefore, in the projections of demand for main OA equipment given in the following table, microcomputers are shown, not word processors.

Fig. IV. 3-8 Demand Projections for 1988 to 1993 (USA)

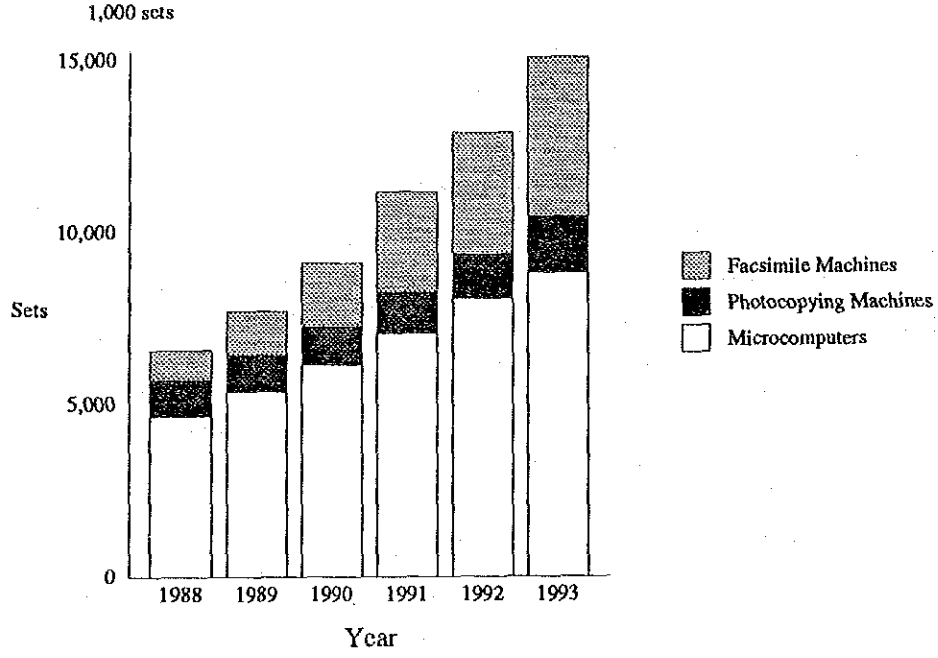


Table IV. 3-11 Demand Projections for 1988 to 1993 in U.S.

( ): Rate of Increase
Unit: Set

	1988	1989	1990	1991	1992	1993
Microcomputer	4,700,000	5,386,200 (14.6%)	6,064,850 (12.6%)	7,108,500 (17.2%)	8,295,050 (16.7%)	9,638,850 (16.2%)
Photocopying Machine	1,265,600	1,339,400 (5.8%)	1,406,100 (5.0%)	1,546,400 (10.0%)	1,666,400 (7.8%)	1,785,500 (7.1%)
Facsimile Machine	1,115,000	1,644,500 (47.5%)	2,113,000 (28.5%)	2,831,700 (30.0%)	3,726,500 (31.6%)	4,825,800 (29.5%)

Source: CBEMA, 1989 Data Book

(2) Japan

In Japan's case too, the largest growth in demand from 1988 to 1993 is expected to be in facsimile machines, with demand rising 1.5 fold, followed by word processors at 1.3 fold. For photocopying machines, the ratio of overseas production will rise due to efforts made to alleviate trade friction and due to the cost advantages of overseas production brought about by the yen appreciation. Exports are expected to continue to fall and production to remain at about the same level.

Fig. IV. 3-9 Production Projections for 1987 to 1998 (Japan)

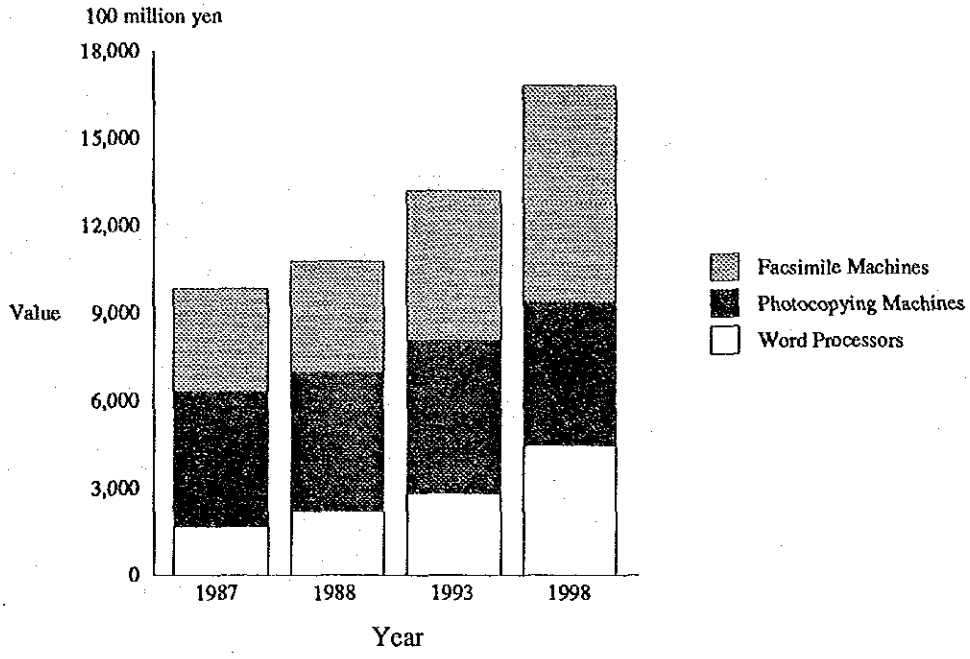


Table IV. 3-12 Production Projections for 1988 to 1998 in Japan

(Unit: 100 Million Yen)

	1987	Increase Rate	1988	Increase Rate	1993	Average Annual Increase Rate	1998	Average Annual Increase Rate
Photocopying Machine	* 4,581	Δ 9.0	4,571	Δ 0.2	4,711	0.6	4,928	0.9
Calculator	* 743	Δ 23.4	966	30.0	1,940	15.0	3,100	9.8
ECR/POS	* 945	Δ 5.8	1,011	7.0	1,420	7.0	1,810	5.0
Typewriter	* 651	Δ 40.2	500	Δ 23.2	380	Δ 5.4	250	Δ 8.0
Word Processor	* 1,831	5.2	2,310	26.2	3,000	5.4	4,600	8.9
Micro Graphics	* 140	Δ 26.9	195	39.3	249	5.0	317	4.9
Other Office Machine	* 591	Δ 17.9	610	3.2	777	5.0	990	5.0
Total	* 9,482	Δ 9.9	10,163	7.2	12,477	4.2	15,995	5.1
Other OA Equipment								
Office Computer	5,100	9.3	5,500	7.8	7,020	5.5	8,750	4.5
Personal Computer	7,330	18.0	8,730	19.1	17,550	15.0	30,920	12.0
Facsimile	3,680	17.9	4,100	11.4	6,030	8.0	8,070	6.0
Total	16,110	15.1	18,330	13.8	30,600	10.8	47,740	9.3
Office Supply	13,144	9.7	13,761	4.7	17,856	5.3	23,572	5.7
Grand Total	38,736	6.1	42,254	9.1	60,933	7.6	87,307	7.5

Note: 1) * is figure from Monthly Machine Statistics.
2) Other Office Machine refers to Accounting Machine, Duplicating Machine, Printing Machine for Office Use, Time Recover/Time Stamp and Shredder.

Source: Yearbook of Electronic Industry, 1989.

(3) South Korea

As a result of interviews with experts of related South Korean industries and the Korean electronic industry promotion association, the projections given in the following table were made for future demand. Word processors are expected to rise remarkably in demand by about 3-fold, facsimiles by 2.6 fold, and photocopying machines by over 2.1 fold. A great increase in demand is expected for three types of OA equipment.

Table IV. 3-13 Demand Projections in Korea

(Unit: Set)

	1988	1993	Average Annual Increase Rate 1989 - 1993
Word Processor	12,000	35,464	24.2
Photocopying Machine	100,000	214,600	16.5
Facsimile Machine	35,000	91,912	21.3

(4) Singapore

As a result of interviews with related industries and users, it is projected that Singapore will increase demand for facsimile machines, photocopying machines, and word processors, in that order, as shown below.

Table IV. 3-14 Demand Increase for 1990 to 1993 in Singapore

Word Processor	10%
Photocopying Machine	15%
Facsimile Machine	35%

(5) Thailand

Table IV. 3-15 shows the demand for office electronic equipment in Thailand.

Table IV. 3-15 Demand for 1988 to 1992 in Thailand

(Unit: Set)

	Demand in 1988	Average Annual Increase Rate 1989 - 1993
Photocopying Machine	6,600	7.5 (10% in 1989)
Facsimile Machine	10,000	7.5
Telex Machine	1,217 (Note 1)	(Note 2)

(Note 1) The number of subscribers as of September 1988
(Note 2) Future demand is expected to decrease due to the replacement of facsimile machines.

Word processors are mixed with micro computers in terms of statistical records because of their functions and qualifications. Therefore it is very difficult to identify marked demand for word processors alone. However, import statistics which can identify automatic typewriters and word processors separately from other types of office machines are available for the first six months of 1988. During this period, Thailand imported 628 units of automatic typewriters and word processors. Future demand is expected to grow very slowly.

IV-3-6. Targeted Markets and Their Sizes

Between IV-3-1 and IV-3-5, we dealt mainly with the demand and supply situation in the world including the size of the global market viewed in terms of imports, the supply situation in Japan and the demand outlook for the main markets. Summing up these factors, we have come up with the size of the targeted market for each type of equipment.

Table IV. 3-16 shows the number of units in demand classified by type of equipment in 1988. As an N.B. to the table states, the figure for Europe represents a total for four major countries. The figure for the whole of Europe including other countries is estimated to be about 30 percent more.

Table IV. 3-16 Main Markets of OA Equipments in 1988

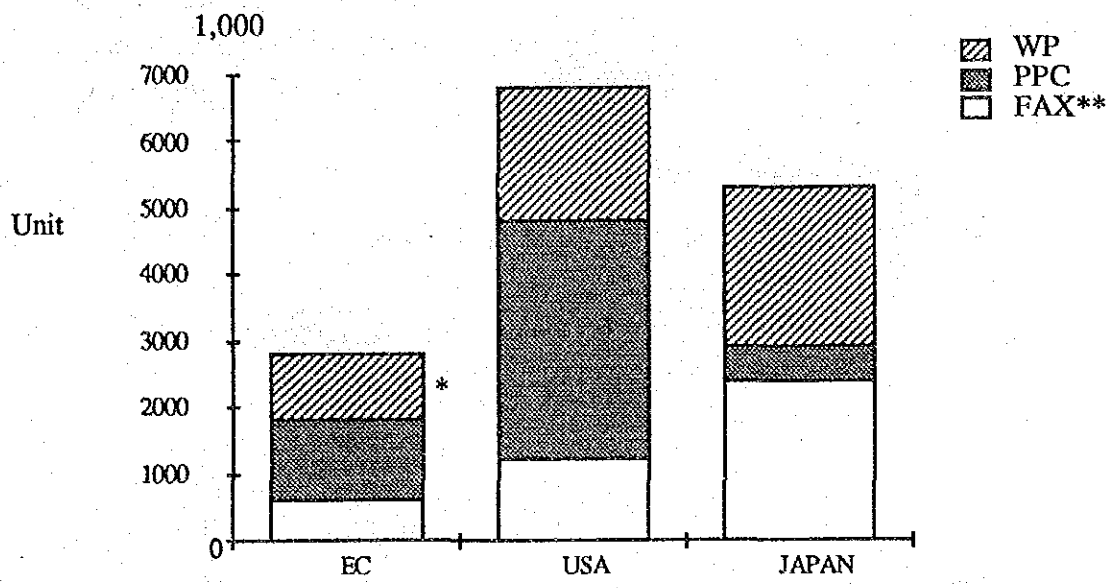
(Unit: 1,000 sets)

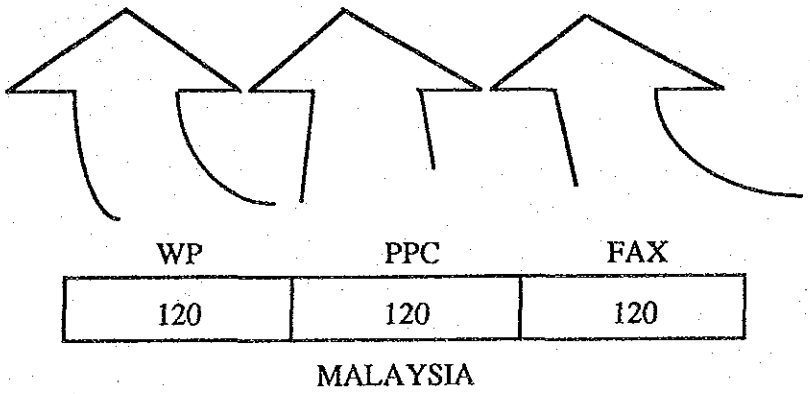
	Electronic Typewriter	Photocopying Machine	Facsimile Machine (Note 3)
Japan	835 (Note 1)	640	2,200
USA	3,210 (Note 2)	3,750	1,100
Europe	1,435 (Note 4)	1,190	600
W. Germany	560	440	-
UK	350	230	-
France	305	345	-
Italy	220	175	-

(Note 1) Japanese word processors were produced 2.31 million sets in 1988.
(Note 2) Demand of word processors was 1.90 million sets in 1988.
(Note 3) Estimated number in use, as of March 1987.
(Note 4) Total figure of four countries (W. Germany, UK, France and Italy), which are accounted for 70% in whole European market.

Source: Denn Electronics, Communication Industry Association of Japan, Japan Business Machine Makers Association

Fig. IV. 3-10 Main Market in 1988



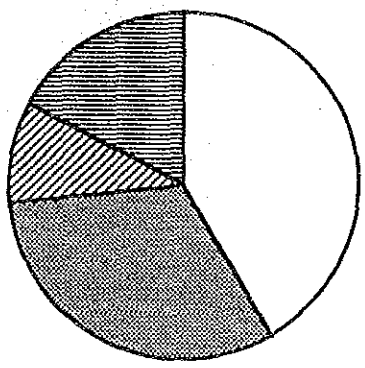


* Estimated
* Estimated Number in Use in 1987

Unit : 1,000 sets

As stated in the preceding IV-3-5, demand is expected to keep increasing in the future. The attraction of firms based on prospects of demand increase, however, should be made from a long-term viewpoint taking into consideration various conditions including the availability of parts and the level of technology in the prospective host countries, the situation of demand in the surrounding nations, the frequency of new product developments, and the trends of trade and economic friction in the European and North American countries.

Fig. IV. 3-11 World Market of OA Equipments in 1988



	1000 sets	%
USA	6750	41.5
JAPAN	5150	31.7
OTHER	1626	10.0
EC	2740	16.8
TOTAL	16266	

Note : Demand of PPC in other Countries than UK, W.Germany, France and Italy Excluded.

IV-4. Feasibility Analysis of Investment

IV-4-1. Methodology of Feasibility Analysis

The price competitiveness in the world market of office electronic equipment manufactured in Malaysia would be a precondition for the promotion of the office electronic industry in Malaysia and for the promotion of investment in this sector.

In this section, in order to evaluate the possibility of Malaysia as an industry site of office electronic equipment, a quite rough analysis of investment feasibility was conducted on the assumption that office electronic equipment plants are to be newly constructed in Malaysia, and the cost competitiveness of the products manufactured at those plants in the Europe, U.S., and Japan markets was examined.

As the results of the survey of the world market show, a large part of office electronic equipment production is made by Japanese firms. Japanese firms can be considered as major targets for investment promotion.

The feasibility analysis was conducted on the following assumptions.

a) Investment by a Japanese firm
b) Take-over of the production of products for the European and American markets
c) Feasibility analysis of three different factories for three products

Major factors in the assumption were set as follows:

Assumptions for the Feasibility Analysis

Construction period:	1 year
Price:	Fixed price as of 1988
Investment incentives:	Ten year exemption from corporation tax
Exchange rate:	M$1 = ¥46, US$1 = M$2.67

IV-4-2. Product Item and Production Capacity

(1) Product Item

For three products, photocopying machines, facsimile machines, and word processors, small-sized and popular product types were selected as subject product items of the analysis. The following product types were selected.

Word processor:	Office-use word processor of letter quality and with CRT
Photocopying machine:	Popular type photocopying machine with copying speed of 6 copies per minute
Facsimile machine:	Popular type facsimile machine of GIII type

The reasons for this selection were as follows:

a) Assembly is technologically easy because they have less value added and are of simple structure.
b) It is easier to raise the local content ratio because these products need fewer special parts and components.
c) Japanese firms tend to select popular-type products for which production costs need to be reduced and for which value added can not be easily increased when they examine production shifts.

(2) Production Capacity

One assembly line was assumed as the minimum production scale for each product. The production capacity of each product was 10 thousand units per month.

IV-4-3. Outline of the Plants and Initial Investment Costs

(1) Outline of the Plants

The general outline of the plants assumed in Section 4-2 is as follows.

1) Word processor factory

Product item:	Office-use word processor of letter quality and with CRT
Production capacity:	10 thousand units per month
Number of employees:	88
Land:	15,300m^2
Building:	3,465m^2
Initial investment:	21.4 million M$

2) Photocopying machine factory

Product item:	Popular-type photocopying machine of 6 copies per minute
Production capacity:	10 thousand units per month
Number of employees:	117
Land:	16,300m^2
Building:	3,665m^2
Initial investment:	74.4 million M$

3) Facsimile machine factory

Product item:	Popular-type facsimile machine of GIII type
Production capacity:	10 thousand units per month
Number of employees:	93
Land:	15,400m^2
Building:	3,515m^2
Initial investment:	21.4 million M$

(2) Initial Investment Cost

1) Assumptions

- Major possible sites are Johor State, the Kuala Lumpur area, and Penang State considering such factors as site availability, easy procurement of parts, and

access to the market. In this study, it was assumed that plants would be constructed at Sha Alam near Kuala Lumpur.

- Manufacturing process would be final assembly, some sub-assembly, inspection, adjustment, packing and shipping.
- All the machinery and equipment would be imported from Japan. It was reported that some belt conveyers are available in Malaysia, but it is assumed that they would also be imported from Japan because it was not clear whether the level of specification satisfies the level required for office electronic equipment production.

2) Word Processor Factory

Initial investment cost for the word processor factory is assumed to be M$ 21.4 million. The breakdown of expenditures is as follows.

Table IV. 4-1 Initial Investment Value for Word Processor Factory

(Unit: M$1,000)

Item	Calculation Base	Value
1 Land	M$116.26/$m^2$ x 15,300m^2	1,779
2 Factory Construction		5,857
Factory Building	M$1,120/$m^2$ x 3,465m^2	(3,880)
Incidental Facilities		(1,792)
Guarantee for Outside, Gutter, Water Supply, etc.		(185)
3 Machinery and Equipment		9,815
Assembly Line and Incidental Facilities		(4,239)
Distribution and Warehouse		(3,261)
Others		(2,315)
4 Vehicles and Others		1,170
5 Moulds and Jigs*		2,828
Total		21,449

*Investment for renewal of moulds and jigs would be made every 2 Years.

3) Photocopying Machine Factory

Initial investment cost for the photocopying machine factory is assumed to be M$ 74.4 million. The breakdown of expenditures is as follows.

Table IV. 4-2 Initial Investment Value for Photocopying Machine Factory

(Unit: M$1,000)

Item	Calculation Base	Value
1 Land	M$116.26/$m^2$ x 16,300m^2	1,895
2 Factory Construction		6,196
Factory Building	M$1,120/$m^2$ x 3,665m^2	(4,105)
Incidental Facilities		(1,895)
Guarantee for Outside, Gutter, Water Supply, etc.		(196)
3 Machinery and Equipment		40,565
Assembly Line and Incidental Facilities		(5,217)
Distribution and Warehouse		(33,033)
Others		(2,315)
4 Vehicles and Others		1,170
5 Moulds and Jigs*		24,597
Total		74,422

*Investment for renewal of moulds and jigs would be made every 2 years.

4) Facsimile Machine Factory

Initial investment cost for the facsimile machine factory is assumed to be M$ 21.4 million. The breakdown of expenditures is as follows.

Table IV. 4-3 Initial Investment Value for Facsimile Machine Factory

(Unit: M$1,000)

Item	Calculation Base	Value
1 Land	M$116.26/$m^2$ x 15,400m^2	1,790
2 Factory Construction		5,942
Factory Building	M$1,120/$m^2$ x 3,515m^2	(3,936)
Incidental Facilities		(1,818)
Guarantee for Outside, Gutter, Water Supply, etc.		(188)
3 Machinery and Equipment		9,815
Assembly Line and Incidental Facilities		(4,239)
Distribution and Warehouse		(3,261)
Others		(2,315)
4 Vehicles and Others		1,170
5 Moulds and Jigs*		2,676
Total		21,393

*Investment for renewal of moulds and jigs would be made every 2 years.

5) Depreciation

The method of depreciation for the above investment is assumed as follows:

Depreciation Method

Item	Method
Building	20 Years Straight Line Depreciation
Incidental Facilities	10 Years Straight Line Depreciation
Machinery and Equipment	10 Years Straight Line Depreciation
Vehicles	5 Years Straight Line Depreciation
Moulds and Jigs	2 Years Straight Line Depreciation

The annual depreciation cost for the investment is shown as follows.

Table IV. 4-4 Annual Depreciation Expense

(Unit: M$1,000)

Item	Annual Depreciation Expense
1 Word Processor Factory	3,102
Building	(203)
Incidental Facilities	(179)
Machinery and Equipment	(982)
Vehicles	(234)
Moulds and Jigs	(1,414)
2 Photocopying Machine Factory	16,993
Building	(215)
Incidental Facilities	(190)
Machinery and Equipment	(4,057)
Vehicles	(234)
Moulds and Jigs	(12,298)
3 Facsimile Machine Factory	2,941
Building	(206)
Incidental Facilities	(182)
Machinery and Equipment	(982)
Vehicles	(234)
Moulds and Jigs	(1,337)

IV-4-4.Production and Sales Programmes

Annual production and sales plans and annual turnover of each factory are assumed as follows. For the first year, production volumes are set lower than the capacity considering the start-up nature of the operation.

Table IV. 4-5 Production and Sales Programmes

Item	Unit Price	Production Volume in the First Year (Sales in the First Year)	Production Volume since the Second Year (Sales since the Second Year)
1 Word Processor Factory			
Office-Use Word Processor	M$1,426	90,000 Units (M$128,340 Thousand)	120,000 Units (M$171,120 Thousand)
2 Photocopying Machine Factory			
Popular-Type Photocopying Machine	M$1,026	90,000 Units (M$92,340 Thousand)	120,000 Units (M$123,120 Thousand)
3 Facsimile Machine Factory			
Popular-Type Facsimile Machine	M$1,537	90,000 Units (M$138,330 Thousand)	120,000 Units M$184,440 Thousand)

IV-4-5. Parts and Materials Costs

Parts and components procurement programmes by source of suppliers (Malaysia; neighbouring Asian countries/areas such as Korea, Taiwan, and Singapore, and Japan) were made up according to the results of the survey on the availability of parts in Malaysia.

Annual cost for purchase of parts and components by source of suppliers of each product is shown in Table IV.4-6~8.

Table IV. 4-6 Procurement Costs of Parts by Country - Word Processor

(Unit: M$ Per One Word Processor)

	Weight (%)	1st Yr. Malaysia	1st Yr. Other Asia	1st Yr. Japan	After 2nd Yr. Malaysia	After 2nd Yr. Other Asia	After 2nd Yr. Japan
Mechanical Parts							
Pressed Metal Parts	2.7	3.2	17.0	17.9	3.2	17.0	17.9
Plastic Injection Moulded Parts	6.1	6.5	27.5	50.5	19.4	34.3	20.2
Turning Parts	0.6		3.4	5.0		3.4	5.0
Rubber, Rubber Rollers	0.4			6.6			6.6
Precision Springs	0.0			0.0			0.0
Screws, Washers	0.3		3.2	1.0		3.2	1.0
Others	0.5			8.3			8.3
Sub-Total	(10.6)	(9.7)	(51.0)	(89.2)	(22.6)	(57.9)	(58.9)
Electrical Parts							
IC/LSI	18.0	19.1	42.9	208.5	19.1	42.9	208.5
Resistors, Capacitors	2.3	4.9	12.2	11.4	7.3	12.2	7.6
Diodes, Transistors	2.3	6.1	15.2	11.4	9.1	15.2	7.6
Transformers	1.9	5.0	5.0	17.3	10.1	10.1	3.1
Solenoids, Coils	0.3	1.0	0.6	2.5	1.0	0.6	2.5
Printed Circuit Boards	7.8		103.3			103.3	
Motors	1.8	7.1		20.9	7.1		20.9
Power Supply	1.9		12.6	15.7		12.6	15.7
Connectors, Wire Harnesses	1.8	3.3	5.0	14.9	5.0	6.7	8.9
Switches	0.4		2.6	3.3		2.6	3.3
Others	0.1			101.0			101.0
Sub-Total	(44.6)	(46.5)	(199.5)	(406.9)	(58.7)	(206.2)	(379.1)
Specific Parts							
Keyboards	4.4	55.3			55.3		
CRT	19.6		233.5			233.5	
FDD	15.6		196.2			196.2	
Platen-Rollers	1.4			23.2			23.2
Others	0.1			1.7			1.7
Sub-Total	(41.1)	(55.3)	(429.7)	(24.8)	(55.3)	(429.7)	(24.8)
Sub-Assembly							
PCB Mounting	2.2		17.5			17.5	
Units Sub-Assembly	1.5		9.9	12.4		19.9	
Sub-Total	(3.7)	( )	(27.4)	(12.4)	( )	(37.3)	( )
Grand Total	100.0	111.5 (8.2%)	707.6 (52.3%)	533.3 (39.4%)	136.3 (10.3%)	731.1 (54.9%)	462.9 (34.8%)
			1,352.4			1,330.6	
Annual Production			90,000 units			120,000 units	
Total Annual Procurement Costs of Parts			M$ 121.7 Million			M$ 159.7 Million	

Note: Sum of items is not equal to the total because of rounding.

Table IV. 4-7 Procurement Costs of Parts by Country - Photocopying Machines

(Unit: M$ Per One Photocopying Machine)

	Weight (%)	1st Yr. Malaysia	1st Yr. Other Asia	1st Yr. Japan	After 2nd Yr. Malaysia	After 2nd Yr. Other Asia	After 2nd Yr. Japan
Mechanical Parts							
Pressed Metal Parts	10.0	3.4	35.5	42.1	3.4	35.5	42.1
Plastic Injection Moulded Parts	21.0	12.6	53.5	98.3	12.6	53.5	98.3
Turning Parts	2.0		5.1	11.2		5.1	11.2
Rubber, Rubber Rollers	7.1			66.5			66.5
Precision Springs	0.7		2.4	3.3		2.4	3.3
Screws, Washers	0.6		2.9	1.1		2.9	1.1
Others	1.3			12.2			12.2
Sub-Total	(42.7)	(16.0)	(99.4)	(234.7)	(16.0)	(99.4)	(234.7)
Electrical Parts							
IC/LSI	3.4	2.0	4.6	22.3	2.0	4.6	22.3
Resistors, Capacitors	1.0	1.2	3.0	2.8	3.0	3.0	
Diodes, Transistors	1.5	2.3	5.6	4.2	5.6	5.6	
Transformers	3.1	4.6	4.6	17.4	4.6	4.6	17.4
Solenoids, Coils	1.4	1.3	1.3	9.2	2.5	2.5	5.2
Printed Circuit Boards	1.6		5.7	7.5		11.4	
Motors	5.8	13.0		38.0	13.0		38.0
Power Supply	8.1		15.1	56.9	15.2	15.2	37.9
Connectors, Wire Harnesses	0.8	0.8	1.4	3.7	2.1	2.4	
Switches	1.7		6.4	8.0		6.4	8.0
Others	5.4			50.6			50.6
Sub-Total	(33.9)	(25.3)	(47.8)	(220.5)	(48.1)	(55.7)	(179.4)
Specific Parts							
Lenses	5.5		41.2			41.2	
Glasses	1.2	9.0			9.0		
Linear Bearings	1.0			9.4			9.4
Drum Cylinders	1.8			16.9			16.9
Silicon Rubber Rollers	0.8			7.5			7.5
Magnet Rollers	0.8			7.5			7.5
Heaters	1.9			17.8			17.8
Sub-Total	(13.0)	(9.0)	(41.2)	(59.1)	(9.0)	(41.2)	(59.1)
Sub-Assembly							
PCB Mounting	4.6		14.1	22.0		28.2	
Units Sub-Assembly	5.8		17.4	27.2		34.8	
Sub-Total	(10.4)	( )	(31.5)	(49.2)	( )	(62.9)	( )
Grand Total	100.0	50.2 (6.0%)	219.8 (26.4%) 833.3	563.5 (67.6%)	73.0 (9.1%)	259.1 (32.2%) 805.2	473.3 (58.7%)
Annual Production			90,000 units			120,000 units	
Total Annual Procurement Costs of Parts			M$ 75.0 Million			M$ 96.6 Million	

Note: Sum of items is not equal to the total because of rounding.

Table IV. 4-8 Procurement Costs of Parts by Country - Facsimile Machines

(Unit: M$ Per One Facsimile Machine)

	Weight (%)	1st Yr. Malaysia	1st Yr. Other Asia	1st Yr. Japan	After 2nd Yr. Malaysia	After 2nd Yr. Other Asia	After 2nd Yr. Japan
Mechanical Parts							
Pressed Metal Parts	1.1	1.3	6.8	7.2	2.6	6.9	5.4
Plastic Injection Moulded Parts	3.1	6.5	6.5	30.6	6.5	13.0	20.4
Turning Parts	0.2			3.3			3.3
Rubber, Rubber Rollers	1.5			24.6			24.6
Precision Springs	0.0			0.0			0.0
Screws, Washers	0.1		1.1	0.3		1.1	0.3
Others	1.3			21.4			21.4
Sub-Total	(7.3)	(7.8)	(14.4)	(87.4)	(9.1)	(21.1)	(75.4)
Electrical Parts							
IC/LSI	17.5	9.2	41.4	215.6	18.3	41.3	201.4
Resisters, Capacitors	2.5	5.3	13.2	12.3	5.3	13.2	12.3
Diodes, Transistors	1.1	2.3	5.8	5.4	2.3	5.8	5.4
Transformers	0.7	1.8	1.8	6.9	2.8	2.8	4.6
Solenoids, Coils	0.3	0.6	1.0	2.5	1.0	1.0	2.0
Printed Circuit Boards	4.1		53.9			53.9	
Motors	1.6	6.3	14.0		6.3	14.0	
Power Supply	8.2		53.6	67.4		53.9	67.4
Connectors, Wire Harnesses	2.2	4.1	6.1	18.1	6.1	8.1	10.9
Switches	0.4		2.6	3.3		2.6	3.3
Others	6.9			113.4			113.4
Sub-Total	(45.5)	(29.6)	(193.6)	(444.9)	(42.1)	(196.6)	(420.5)
Specific Parts							
Modems	12.7			208.7		167.0	
Invertors	2.0		28.9			28.9	
CCD	16.3			267.9			267.9
Thermal Heads	13.6		187.7			187.7	
Sub-Total	(44.6)	( )	(216.7)	(476.6)	( )	(383.6)	(267.9)
Sub-Assembly							
PCB Mounting	1.2		6.3	9.9		12.6	
Units Sub-Assembly	1.4		8.3	11.5		16.6	
Sub-Total	(2.6)	( )	(14.6)	(21.4)	( )	(29.2)	( )
Grand Total	100.0	37.4 (2.5%)	439.3 (29.1%) 1,507.1	1,030.3 (68.4%)	51.2 (3.5%)	630.4 (43.6%) 1,445.4	763.8 (52.8%)
Annual Production			90,000 units			120,000 units	
Total Annual Procurement Costs of Parts			M$ 135.6 Million			M$ 173.4 Million	

Note: Sum of items is not equal to the total because of rounding.

IV-4-6. Personnel Programme

(1) Assumptions

The following assumptions of factory operation were set in order to estimate the number of personnel necessary for the operation of the assumed plants.

Assumptions of Operation of Factories

Yearly Working Days:	252	Days/Year
Working Hours:	480	Minutes/Day
Interval:	15	Minutes/Days
Work Attendance Ratio:	95	%

(2) Personnel Expenses

Data on personnel costs (including fringe benefits and bonus) by type of work were obtained through field interviews in Malaysia and various statistics.

The number of necessary personnel, personnel unit cost (monthly wage), and annual personnel expenses calculated according to the above data are shown in Table IV.4-9 to Table IV.4-11.

(3) Education Level And Required Skill for Engineers and Technicians in Plant Operation

Skills in actual operation could be obtained through on-the-job training, however, it would be better if engineers and technicians in each job category had completed basic education in their various fields and at the level shown generally in Table IV.4-12.

Table IV. 4-9 Annual Personnel Costs of Word Processor Factory

Section and Type of Personnel	Number	Unit Monthly Cost (M$)	Annual Cost (M$1,000)
Direct Production			
Factory Manager	1	2,000	28
Foremen	2	650	18
Assistant Engineers	2	1,000	28
Clerical Workers	1	500	7
Skilled Workers	2	500	14
Unskilled Workers	48	250	168
Sub-Total	(56)	-	(263)
Production Support (Technology, Production Management, Purchase, Etc.)			
Section Managers	2	2,500	70
Supervisor	1	650	9
Engineers	4	1,500	84
Clerical Chiefs	4	1,500	84
Clerical Workers	2	500	14
Unskilled Workers	5	250	18
Japanese Managers	2	15,000	420
Japanese Engineers	3	13,000	546
Japanese Clerical Chiefs	2	13,000	364
Sub-Total	(25)	-	(1,609)
Administration			
Administration Manager	1	2,500	35
Clerical Chiefs	2	1,500	42
Clerical Workers	2	500	14
Japanese Managers	2	15,000	420
Sub-Total	(7)	-	(511)
Grand Total	93	-	2,383

Table IV. 4-10 Annual Personnel Costs of Photocopying Machine Factory

Section and Type of Personnel	Number	Unit Monthly Cost (M$)	Annual Cost After the Second Year (M$1,000)
Direct Production			
Factory Manager	1	2,000	28
Foremen	2	650	18
Assistant Engineers	3	1,000	42
Clerical Workers	2	500	14
Skilled Workers	3	500	21
Unskilled Workers	72	250	252
Sub-Total	(83)	-	(375)
Production Support (Technology, Production Management, Purchase, Etc.)			
Section Managers	2	2,500	70
Supervisor	1	650	9
Engineers	5	1,500	105
Clerical Chiefs	4	1,500	84
Clerical Workers	2	500	14
Unskilled Workers	5	250	18
Japanese Managers	2	15,000	420
Japanese Engineers	4	13,000	728
Japanese Clerical Chiefs	2	13,000	364
Sub-Total	(27)	-	(1,812)
Administration			
Administration Manager	1	2,500	35
Clerical Chiefs	2	1,500	42
Clerical Workers	2	500	14
Japanese Managers	2	15,000	420
Sub-Total	(7)	-	(511)
Grand Total	117	-	2,698

Table IV. 4-11 Annual Personnel Costs of Facsimile Machine Factory

Section and Type of Personnel	Number	Unit Monthly Cost (M$)	Annual Cost (M$1,000)
Direct Production			
Factory Manager	1	2,000	28
Foremen	2	650	18
Assistant Engineers	2	1,000	28
Clerical Workers	1	500	7
Skilled Workers	2	500	14
Unskilled Workers	50	250	175
Sub-Total	(58)	-	(270)
Production Support (Technology, Production Management, Purchase, Etc.)			
Section Managers	2	2,500	70
Supervisor	1	650	9
Engineers	6	1,500	126
Clerical Chiefs	4	1,500	84
Clerical Workers	2	500	14
Unskilled Workers	5	250	18
Japanese Managers	2	15,000	420
Japanese Engineers	4	13,000	728
Japanese Clerical Chiefs	2	13,000	364
Sub-Total	(28)	-	(1,833)
Administration			
Administration Manager	1	2,500	35
Clerical Chiefs	2	1,500	42
Clerical Workers	2	500	14
Japanese Managers	2	15,000	420
Sub-Total	(7)	-	(511)
Grand Total	93	-	2,614

Table IV. 4-12 Reguired Education Level and Speciality for Engineers and Technicians in Each Job Category Office Electronic Equipment

Job Category		Outline of Job	Graduated from	Member of Engineers and Technicians Required by Factory								
				Photocopying Machine Factory			Facsimile Machine Factory			Word Processor Factory		
				Electric	Machinery	Other	Electric	Machinery	Other	Electric	Machinery	Other
Direct Production		• Inspection and later adjustment of defective products on (production) lines • Inspection of tools and dies • Other	University Polytechnics, etc. Senior Secondary Technical School	2	2	2	1	1	2	1	1	2
Production Support	Technology	• Technical activities involving products in our factory and subcontractor factories [change of specifications, planning of processing methods, technical transfer, etc.] • Technical activities involving plant and machinery used for production and inspection. [design, policy, adjustment, maintenance, etc.]	University Polytechnics, etc. Senior Secondary Technical School	3	3	1 (physics)	4	3		3	2	
	QC Administration	• Evaluation analysis on data, and activities for up-grading and assurance, following neccesary inspection.	University Polytechnics, etc. Senior Secondary Technical School	1	1		1	2		2		
Total				6	6	3	6	6	2	6	3	2

IV-4-7. Other Expenses

Considering the examples of factories in Japan and the price level of Malaysia, other expenses were set as follows.

Utilities expense:	0.15~0.16% of sales
Indirect material cost:	0.17% of sales
Other expenses:	1.00~1.01% of sales

IV-4-8. Financing Programme

Approximately one third of the initial value necessary for the plants was assumed to be procured from paid-up capital and the remaining two thirds from long-term borrowing.

Working capital was assumed to be 1/12 of annual sales, that is, monthly sales, and to be financed by short-term borrowing from financial institutions. Interest rates of both long-term and short-term borrowings were assumed to be 8% per annum.

Table IV. 4-13 Financing Programme

Items	Amount (M$ 1,000)	Conditions
Word Processor Factory		
Paid-Up Capital	7,000	
Long-Term borrowing	16,000	10 Years Average Reimbursement. Interest 8%
Short-Term Borrowing	Working Capital	Within One Year Reimbursement. Interest 8%
Photocopying Factory		
Paid-Up Capital	25,000	
Long-Term Borrowing	52,000	10 Years Average Reimbursement. Interest 8%
Short-Term Borrowing	Working Capital	Within One Year Reimbursement. Interest 8%
Facsimile Machine Factory		
Paid-Up Capital	7,000	
Long-Term Borrowing	15,000	10 Years Average Reimbursement. Interest 8%
Short-Term Borrowing	Working Capital	Within One Year Reimbursement. Interest 8%

Table IV. 4-14 Long-Term Flow of Profit and Loss Projection
(Word Processor Factory)

(Unit: M$ 1,000)

	1st Yr.	2nd Yr.	3rd Yr.	4th Yr.	5th Yr.	6th Yr.
Sales	128,340	171,120	171,120	171,120	171,120	171,120
Production Cost						
Materials Cost	121,718	159,672	159,672	159,672	159,672	159,672
Indirect Materials Cost	213	284	284	284	284	284
Direct Labour Cost	267	263	263	263	263	263
Indirect Labour Cost	1,609	1,609	1,609	1,609	1,609	1,609
Depreciation Expense	2,660	2,660	2,660	2,660	2,660	2,660
Utilities Expense	205	274	274	274	274	274
Other Expenses	1,194	1,591	1,591	1,591	1,591	1,591
Sub-Total	127,866	166,352	166,352	166,352	166,352	166,352
Administration						
Materials Cost	18	25	25	25	25	25
Labour Cost (Management & Sales	511	511	511	511	511	511
Depreciation Expense)	352	352	352	352	352	352
Utilities Expense	63	84	84	84	84	84
Other Expenses	103	137	137	137	137	137
Sub-Total	1,047	1,109	1,109	1,109	1,109	1,109
Operating Profits	-573	3,659	3,659	3,659	3,659	3,659
Non-Operating Expenses	1,640	1,956	1,832	1,544	1,232	1,012
Net Profit	-2,213	1,703	1,827	2,115	2,427	2,647

Table IV. 4-15 Cash Flow Estimates (Word Processor Factory)

(Unit: M$ 1,000)

	Before Operation	1st Yr.	2nd Yr.	3rd Yr.	4th Yr.	5th Yr.	6th Yr.
Carry-Over from Previous Year		911	15	65	76	3	14
Capital Payment	7,000						
Sales Revenue		128,340	171,120	171,120	171,120	171,120	171,120
Cost of Products		127,866	166,352	166,352	166,352	166,352	166,352
Administration		1,047	1,109	1,109	1,109	1,109	1,109
Total Expenses		128,913	167,461	167,461	167,461	167,461	167,461
Operating Balance	0	-573	3,659	3,659	3,659	3,659	3,659
Working Capital at the Beginning of Year			10,695	14,260	14,260	14,260	14,260
Working Capital at the End of Year		10,695	14,260	14,260	14,260	14,260	14,260
Working Capital Balance	0	-10,695	-3,565	0	0	0	0
Depreciation		3,012	3,012	3,012	3,012	3,012	3,012
Fixed Investment	21,449			2,828		2,828	1,170
Investment Balance	-21,449	3,012	3,012	184	3,012	184	1,842
Long-Term Borrowing	16,000						
Principal Repayment		800	800	800	800	800	800
Investment	640	1,248	1,184	1,120	1,056	992	928
(Amount Borrowed)	(16,000)	(15,200)	(14,400)	(13,600)	(12,800)	(12,000)	(11,200)
Long-Term Borrowing Balance	15,360	-2,084	-1,984	-1,920	-1,856	-1,792	-1,728
Short-Term Borrowing		9,800	9,500	8,300	3,900	2,100	0
Principal Repayment		0	9,800	9,500	8,300	3,900	2,100
Investment		392	772	712	488	240	84
(Amount Borrowed)		9,800	9,500	8,300	3,900	2,100	0
Short-Term Borrowing Balance	0	9,408	-1,072	-1,912	-4,888	-2,040	-2,184
Financing Balance	15,360	7,360	-3,056	-3,832	-6,744	-3,832	-3,912
Total Balance	911	-896	50	11	-73	11	1,589
Carry-Over for Next Year	911	15	65	76	3	14	1,603

Table IV. 4-16 Long-Term Flow of Profit and Loss Projection (Photocopying Machine Factory)

(Unit: M$ 1,000)

	1st Yr.	2nd Yr.	3rd Yr.	4th Yr.	5th Yr.	6th Yr.
Sales	92,340	123,120	123,120	123,120	123,120	123,120
Production Cost						
Materials Cost	74,996	96,626	96,626	96,626	96,626	96,626
Indirect Materials Cost	156	208	208	208	208	208
Direct Labour Cost	388	375	375	375	375	375
Indirect Labour Cost	1,812	1,812	1,812	1,812	1,812	1,812
Depreciation Expense	16,625	16,625	16,625	16,625	16,625	16,625
Utilities Expense	139	185	185	185	185	185
Other Expenses	869	1,158	1,158	1,158	1,158	1,158
Sub-Total	94,984	116,988	116,988	116,988	116,988	116,988
Administration Expenses						
Materials Cost	10	13	13	13	13	13
Labour Cost (Management & Sales	511	511	511	511	511	511
Depreciation Expense)	369	369	369	369	369	369
Utilities Expense	46	61	61	61	61	61
Other Expenses	54	74	74	74	74	74
Sub-Total	990	1,028	1,028	1,028	1,028	1,028
Operating Profit	-3,634	5,104	5,104	5,104	5,104	5,104
Non-Operating Expenses	4,080	3,872	3,640	3,432	3,224	3,016
Net Profit	-7,714	1,232	1,464	1,672	1,880	2,088

Table IV. 4-17 Cash Flow Estimates (Photocopying Machine Factory)

(Unit: M$ 1,000)

	Before Operation	1st Yr.	2nd Yr.	3rd Yr.	4th Yr.	5th Yr.	6th Yr.
Carry-Over from Previous Year		498	82	12,542	3,802	19,867	11,543
Capital Payment	25,000						
Sales Revenue		92,340	123,120	123,120	123,120	123,120	123,120
Cost of Products		94,984	116,988	116,988	116,988	116,988	116,988
Administration Expenses		990	1,028	1,028	1,028	1,028	1,028
Total Costs Expenses		95,974	118,016	118,016	118,016	118,016	118,016
Operating Balance	0	-3,634	5,104	5,104	5,104	5,104	5,104
Working Capital at the Beginning of Year			7,695	10,260	10,260	10,260	10,260
Working Capital at the End of Year		7,695	10,260	10,260	10,260	10,260	10,260
Change of Working Capital	0	-7,695	-2,565	0	0	0	0
Depreciation		16,993	16,993	16,993	16,993	16,996	16,993
Fixed Investment	74,422			24,597		24,597	1,170
Investment Balance	-74,422	16,993	16,993	-7,604	16,993	-7,604	16,993
Long-Term Borrowing	52,000						
Principal Repayment		2,600	2,600	2,600	2,600	2,600	2,600
Interest	2,080	4,056	3,848	3,640	3,432	3,224	3,016
(Amount Borrowed)	(52,000)	(49,400)	(46,800)	(44,200)	(41,600)	(39,000)	(36,400)
Lont-Term Borrowing Balance	49,920	-6,656	-6,448	-6,240	-6,032	-5,824	-5,616
Short-Term Borrowing		600					
Principal Repayment			600				
Interest		24	24				
(Amount Borrowed)		600					
Short-Term Borrowing Balance	0	576	-624	0	0	0	0
Financing Balance	49,920	-6,080	-7,072	-6,240	-6,032	-5,824	-5,616
Total Balance	498	-416	12,460	-8,740	16,065	-8,324	15,311
Carry-Over for Next Year	498	82	12,542	3,802	19,867	11,543	26,854

Table IV. 4-18 Long-Term Flow of Profit and Loss Projection (Facsimile Machine Factory)

(Unit: M$ 1,000)

	1st Yr.	2nd Yr.	3rd Yr.	4th Yr.	5th Yr.	6th Yr.
Sales	138,330	184,440	184,440	184,440	184,440	184,440
Production Cost						
Materials Cost	135,636	173,446	173,446	173,446	173,446	173,446
Indirect Materials Cost	230	307	307	307	307	307
Direct Labour Cost	270	270	270	270	270	270
Indirect Labour Cost	1,833	1,833	1,833	1,833	1,833	1,833
Depreciation Expense	2,587	2,587	2,587	2,587	2,587	2,587
Utilities Expense	221	295	295	295	295	295
Other Expenses	1,292	1,723	1,723	1,723	1,723	1,723
Sub-Total	142,069	180,461	180,461	180,461	180,461	180,461
Administration Expenses						
Materials Cost	19	25	25	25	25	25
Labour Cost (Management & Sales	511	511	511	511	511	511
Depreciation Expense)	354	354	354	354	354	354
Utilities Expense	69	92	92	92	92	92
Other Expenses	105	140	140	140	140	140
Sub-Total	1,058	1,122	1,122	1,122	1,122	1,122
Operating Profit	-4,797	2,857	2,857	2,857	2,857	2,857
Non-Operating Expenses	1,810	2,438	2,430	2,262	2,078	1,930
Net Profit	-6,607	419	427	595	779	927

Table IV. 4-19 Cash Flow Estimates (Facsimile Machine Factory)

(Unit: M$ 1,000)

	Before Operation	1st Yr.	2nd Yr.	3rd Yr.	4th Yr.	5th Yr.	6th Yr.
Carry-Over from Previous Year		7	64	31	73	59	53
Capital Payment	7,000						
Sales Revenue		138,330	184,440	184,440	184,440	184,440	184,440
Cost of Products		142,069	180,461	180,461	180,461	180,461	180,461
Administration Expenses		1,058	1,122	1,122	1,122	1,122	1,122
Total Expenses		143,127	181,582	181,582	181,582	181,582	181,582
Operating Balance	0	-4,797	2,857	2,857	2,857	2,857	2,857
Working Capital at the Beginning of Year			11,528	15,370	15,370	15,370	15,370
Working Capital at the End of Year		11,528	15,370	15,370	15,370	15,370	15,370
Working Capital Balance	0	-11,528	-3,843	0	0	0	0
Depreciation		2,941	2,941	2,941	2,941	2,941	2,941
Fixed Investment	21,393			2,676		2,676	1,170
Investment Balance	-21,393	2,941	2,941	265	2,941	265	1,771
Long-Term Borrowing	15,000						
Principal Repayment		750	750	750	750	750	750
Interest	600	1,170	1,110	1,050	990	930	870
(Amount Borrowed)	(15,000)	(14,250)	(13,500)	(12,750)	(12,000)	(11,250)	(10,500)
Long-Term Borrowing Balance	14,400	-1,920	-1,860	-1,800	-1,740	-1,680	-1,620
Short-Term Borrowing		16,000	17,200	17,300	14,500	14,200	12,300
Principal Repayment		0	16,000	17,200	17,300	14,500	14,200
Interest		640	1,328	1,380	1,272	1,148	1,060
(Amount Borrowed)		16,000	17,200	17,300	14,500	14,200	12,300
Short-Term Borrowing Balance	0	15,360	-128	-1,280	-4,072	-1,448	-2,960
Financing Balance	14,400	13,440	-1,988	-3,080	-5,812	-3,128	-4,580
Total Balance	7	57	-33	44	-13	-4	-29
Carry-Over for Next Year	7	64	31	73	59	53	101

IV-4-9. Projection of Long-Term Profit and Loss

Projection of long-term profit and loss for each plant based on the estimated sales volume and costs was assumed. The profit and loss projection and financing schedule based on the financing programme are shown in Table IV.4-14~19.

The projection results indicate the following evaluations.

(1) Three factories would record profit on both an operating profit and recurrent profit basis. The balance of borrowing would decrease year by year.

(2) The ratio of material cost to sales is high. That ratio after the 2nd year is as follows.

Word Processor Machine Factory:	93.3%
Photocopying Factory:	78.5%
Facsimile Machine Factory:	94.0%

Thus, changes in parts and components cost would significantly affect the profitability.

(3) The reduction of parts costs by increasing the procurement from Malaysia and the neighbouring countries such as Singapore would contribute much to the improvement of the profitability. Parts procurement after the 2nd year is projected as follows:

Table IV. 4-20 Parts and Components Procurement Projection (Since the Second Year of Operation)

	Malaysia	Other Asian Countries	Japan	Ratio of Operating Profit to Sales
Word Processor	10.3%	54.9%	34.8%	2.1%
Photocopying Machine	9.1%	26.3%	58.7%	4.1%
Facsimile Machine	3.5%	43.6%	52.8%	1.5%

(4) Financial internal rate of return (FIRR) was calculated assuming that the project period is 10 years. FIRRs by product are as follows.

	FIRR
Word Processor Machine Factory:	11.60%
Photocopying Machine Factory:	7.83%
Facsimile Machine Factory:	6.90%

The FIRR of the word processor factory is the highest among the three subject products, second is the photocopying machine, and lowest, the facsimile machine. These FIRRs are not necessarily high enough to invite foreign investment. But they show that the projects are fairly viable.

As a measure to raise FIRR, firstly the increase of local parts procurement is pointed out.

Table IV. 4-21 Cash-Flow Table and FIRR of Assumed Word Processor Factory

(Unit: M$ 1,000)

Year	Cash Outflow	Cash Inflow			Net Cash-Flow
		Operating Profit	Depreciation	Net Inflow	
Before Operation	-21449.0	0.0	0.0	0.0	-21449.0
1	-10695.0	-573.0	3012.0	2439.0	-8256.0
2	-3565.0	3659.0	3012.0	6671.0	3106.0
3	-2828.0	3659.0	3012.0	6671.0	3843.0
4	0.0	3659.0	3012.0	6671.0	6671.0
5	-2828.0	3659.0	3012.0	6671.0	3843.0
6	-1170.0	3659.0	3012.0	6671.0	5501.0
7	-2828.0	3659.0	3012.0	6671.0	3843.0
8	0.0	3659.0	3012.0	6671.0	6671.0
9	-2828.0	3659.0	3012.0	6671.0	3843.0
10	17979.0 1)	3659.0	3012.0	6671.0	24650.0

1) Salvage Value in Last Year: Land (1,779), Building (1,940) and Working Capital (14,260)

FIRR = 11.60%

Table IV. 4-22 Cash-Flow Table and FIRR of Assumed Photocopying Machine Factory

(Unit: M$ 1,000)

Year	Cash Outflow	Cash Inflow			Net Cash-Flow
		Operating Profit	Depreciation	Net Inflow	
Before Operation	-74422.0	0.0	0.0	0.0	-74422.0
1	-7695.0	-3634.0	16993.0	13359.0	5664.0
2	-2565.0	5104.0	16993.0	22097.0	19532.0
3	-24597.0	5104.0	16993.0	22097.0	-2500.0
4	0.0	5104.0	16993.0	22097.0	22097.0
5	-24597.0	5104.0	16993.0	22097.0	-2500.0
6	-1170.0	5104.0	16993.0	22097.0	20927.0
7	-24597.0	5104.0	16993.0	22097.0	-2500.0
8	0.0	5104.0	16993.0	22097.0	22097.0
9	-24597.0	5104.0	16993.0	22097.0	-2500.0
10	14207.0 1)	5104.0	16993.0	22097.0	36304.0

1) Salvage Value in Last Year: Land (1,895), Building (2,052) and Working Capital (10,260)

FIRR = 7.83%

Table IV. 4-23 Cash-Flow Table and FIRR of Assumed Facsimile Machine Factory

(Unit: M$ 1,000)

Year	Cash Outflow	Cash Inflow			Net Cash-Flow
		Operating Profit	Depreciation	Net Inflow	
Before Operation	-21393.0	0.0	0.0	0.0	-21393.0
1	-11527.5	-4797.0	2941.0	-1856.0	-13383.5
2	-3842.5	2857.0	2941.0	5798.0	1955.5
3	-2676.0	2857.0	2941.0	5798.0	3122.0
4	0.0	2857.0	2941.0	5798.0	5798.0
5	-2676.0	2857.0	2941.0	5798.0	3122.0
6	-1170.0	2857.0	2941.0	5798.0	4628.0
7	-2676.0	2857.0	2941.0	5798.0	3122.0
8	0.0	2857.0	2941.0	5798.0	5798.0
9	-2676.0	2857.0	2941.0	5798.0	3122.0
10	19128.0 1)	2857.0	2941.0	5798.0	24926.0

1) Salvage Value in Last Year: Land (1,790), Building (1,968) and Working Capital (15,370)

FIRR = 6.90%

IV-4-10. Cost Analysis

(1) Cost Competitiveness in the World Market

In order to compare the cost competitiveness in the major markets in the world, the European market, the U.S. market, and the Japan market, the product costs at the markets were calculated and compared. Product costs were calculated by adding freight, insurance fees, and import duty to the production costs at a factory in Japan and a factory in Malaysia.

The comparison of costs in the major markets is shown in Fig. IV.4-1~3. The costs are composed of material cost, factory fixed cost, freight, insurance fees, and import duty. For the exact comparison of costs, such factors as development expense, and other headquarters' expenses are not excluded from consideration.

The major findings of the comparison are as follows.

1) The ratios of product costs of Malaysian products to those of Japanese products, assuming that product costs of Japanese products were 1.000, were as shown in Table IV. 4-24.

Table IV. 4-24 Ratio of Product Costs of Malaysian Products to Those of Japanese Products

	Japan Market	U.S. Market	European Market
Word Processor	0.971	0.904	0.903
Photocopying Machine	0.989	0.985	0.982
Facsimile Machine	0.999	0.996	0.994

The cost of word processors manufactured in Malaysia would be lower than those of Japan by 2.9~9.7%. But the cost of photocopying machines and facsimile machines manufactured in Malaysia would be cheaper than the cost of products made in Japan by just 0.1~1.8% and the cost competitiveness is not large.

2) Malaysia products would have the largest cost competitiveness in the Europe market against Japanese products, secondly in the North American market, and lowest in the Japanese market due to the influence of freight, insurance fees, and import duty.

3) The application of the GSP would increase the cost competitiveness by 4.2~10.4%.

Import tax rates of the markets are as follows:

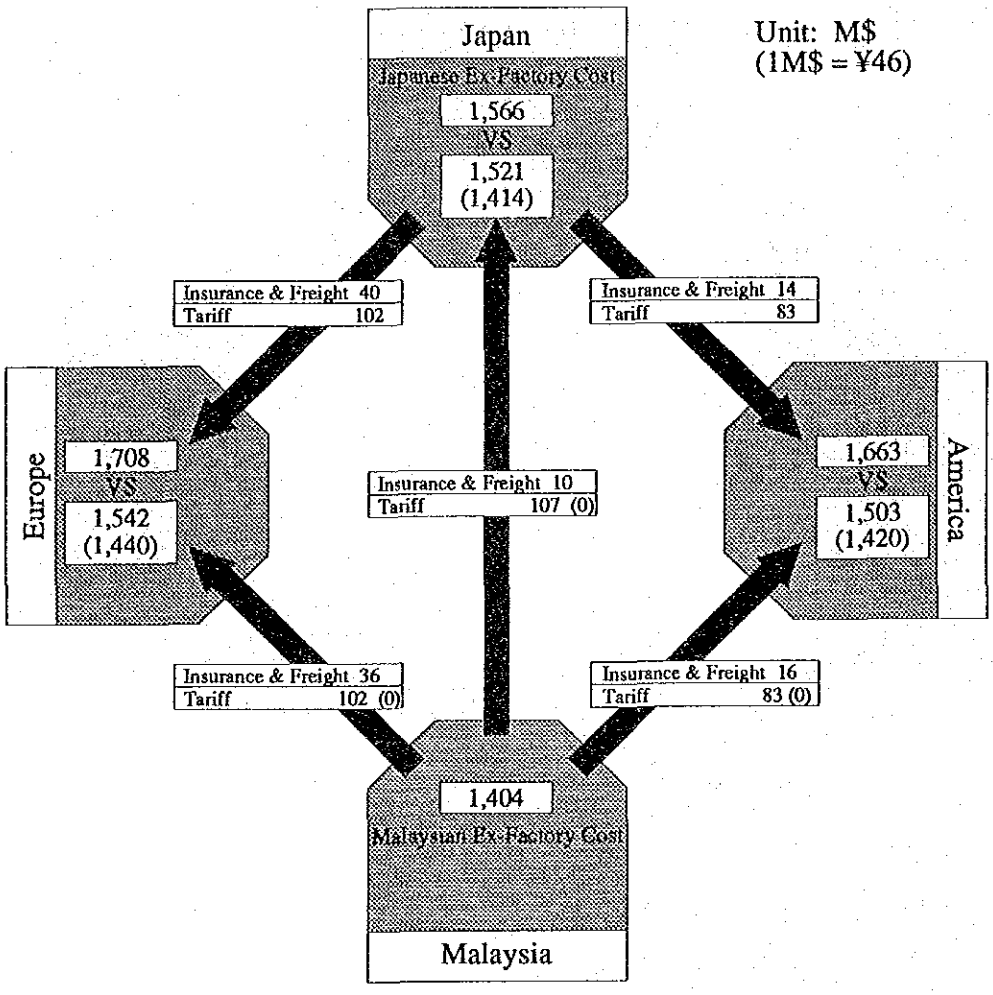
Table IV. 4-25 Import Tariff Rates

CIF, ( ) Preferential

	Europe	North America	Japan
Word Processor	4.6% (0%)	3.9% (0%)* 3.7% (0%)**	4.9%
Photocopying Machine	7.2% (0%)	3.7% (0%)	0%
Facsimile Machine	7.5% (0%)	4.7% (0%)	0%

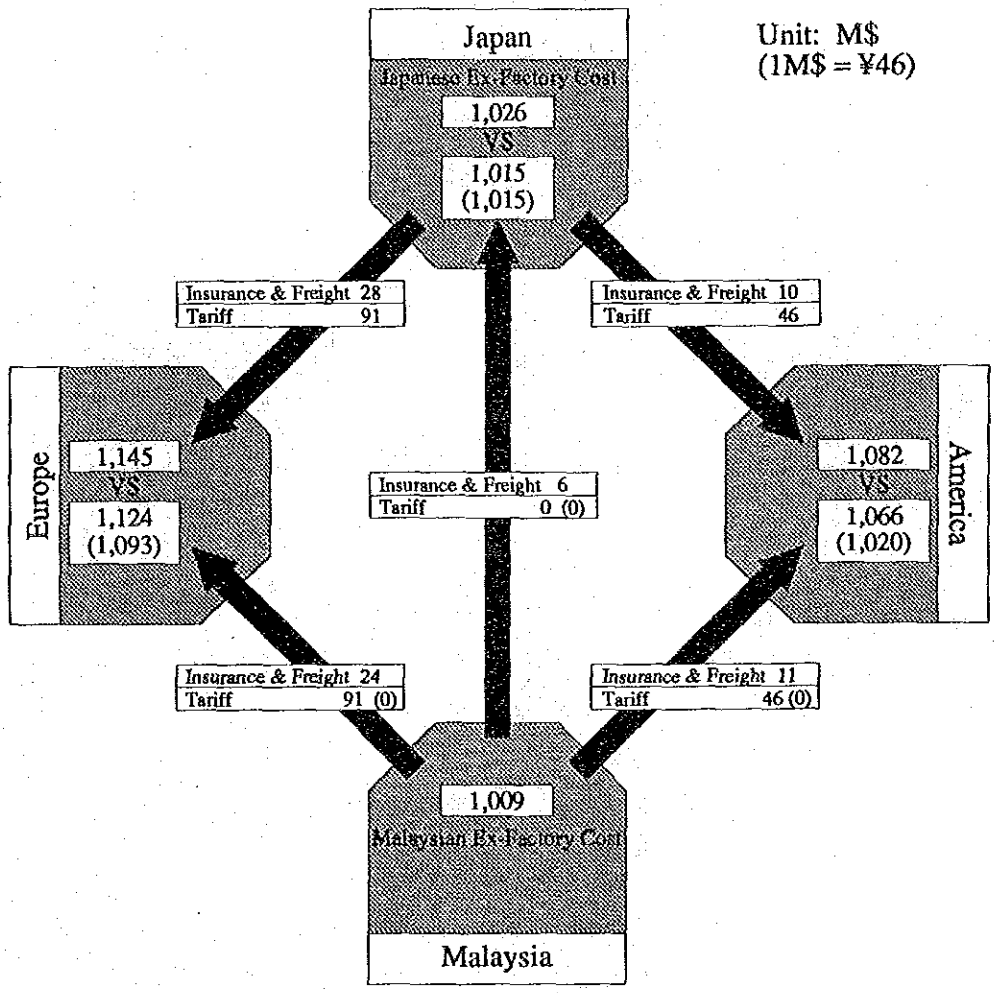
* Main Body
** Printer Part

Fig. IV. 4-1 Cost Competitiveness in the Word Processor Market



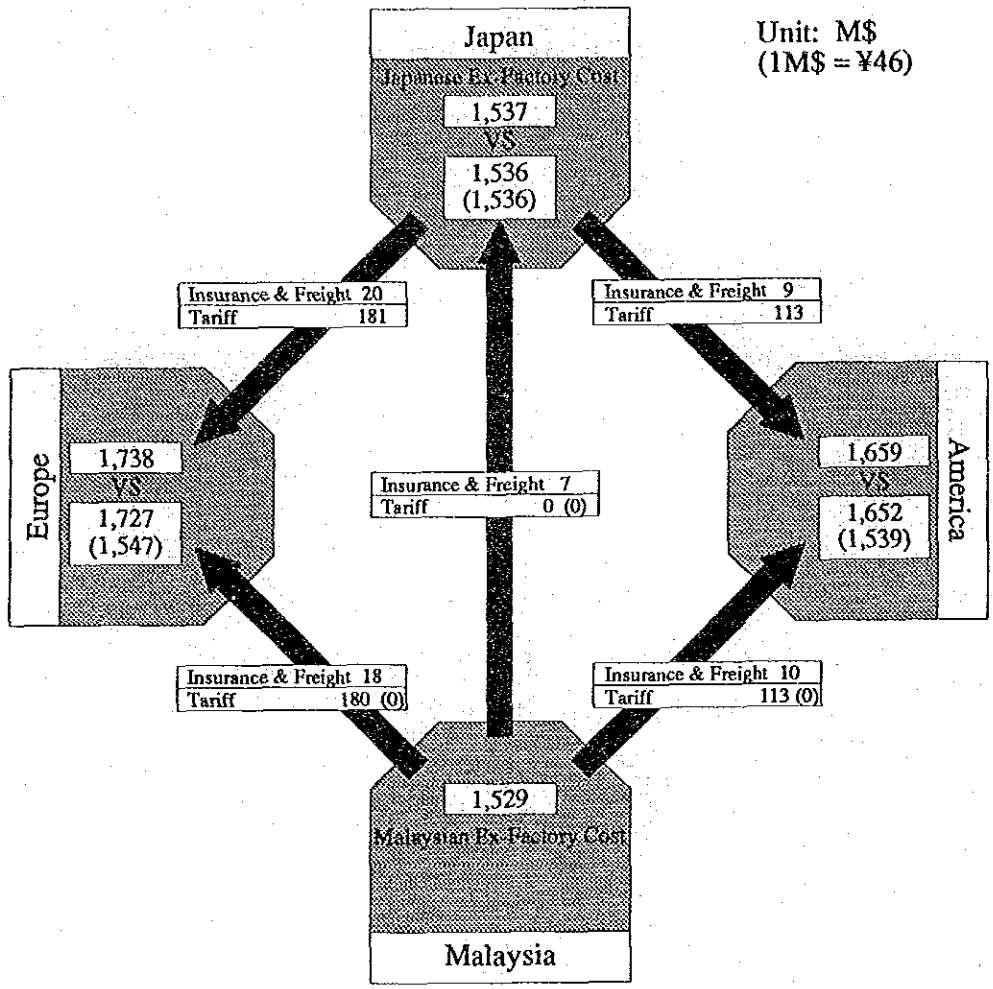
Notes: Numbers in parentheses indicate preferential tariff rates.
These costs do not include R&D costs or head office expenses.

Fig. IV. 4-2 Cost Competitiveness in the Photocopying Machine Market



Notes: Numbers in parentheses indicate preferential tariff rates.
These costs do not include R&D costs or head office expenses.

Fig. IV. 4-3 Cost Competitiveness in the Facsimile Machine Market



Notes: Numbers in parentheses indicate preferential tariff rates.
These costs do not include R&D costs or head office expenses.

(2) Cost Structure Analysis

For the examination of cost competitiveness, the cost compositions of each product shipped from a Malaysian factory and from Japan were compared in Fig. IV.4-4~6.

The results of the comparison are as follows.

1) For the three products, the production cost in Malaysia would be larger than that in Japan because prices of parts purchased from Japan would include freight, insurance fees, handling charges concerning purchase and shipment in Japan. Those additional costs would be 20~40% of the prices of parts in Japan. In this analysis, the additional costs were assumed at 25% of parts prices on average.

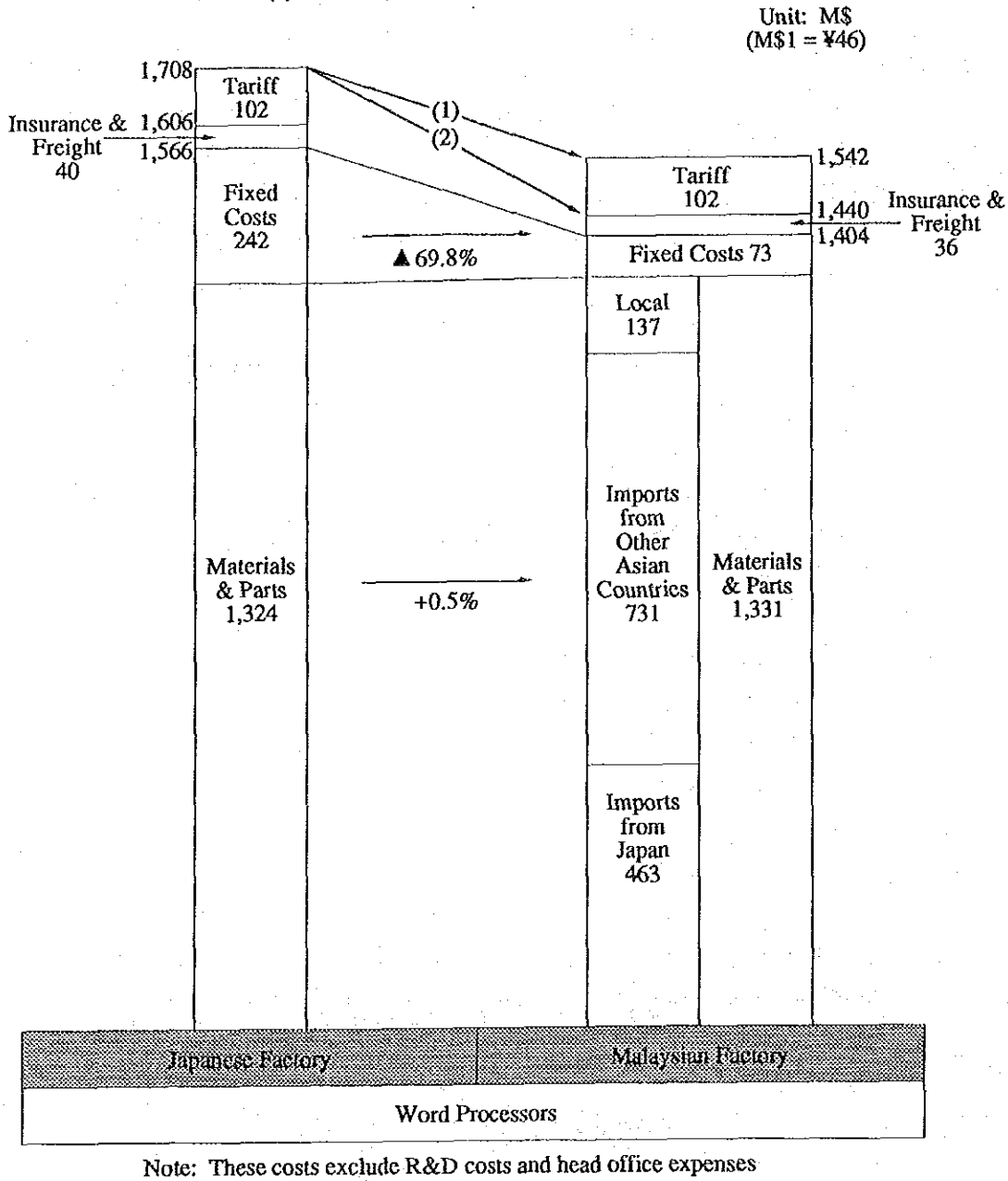
   This means that cost reduction could be realised by increasing the purchase of parts and components from Malaysia and neighbouring countries instead of from Japan.

2) The fixed cost of products made in Malaysia would be lower than that made in Japan by 69.8% for word processors, by 26.7% for photocopying machines, and by 62.2% for facsimile machines . Those lower fixed costs in Malaysia are mainly due to lower labour cost.
   For the production of photocopying machines, which is more capital-intensive, initial investment would be larger. Personnel expenses would have relatively small weight in the total production cost of photocopying machines compared with that of word processors and facsimile machines. The degree of the cost reduction effect of lower personnel cost in Malaysia would be relatively small for photocopying machine production.

3) There is little difference between Malaysian products and Japanese products for freight, insurance fees, and import duty. The application of GSP would be an important factor to increase the cost competitiveness of Malaysian products.

Fig. IV. 4-4 Cost Structure - Word Processors

(1) ▲166 (▲9.7%) Non-Preferential Tariff Case
(2) ▲268 (▲15.7%) Preferential Tariff Case

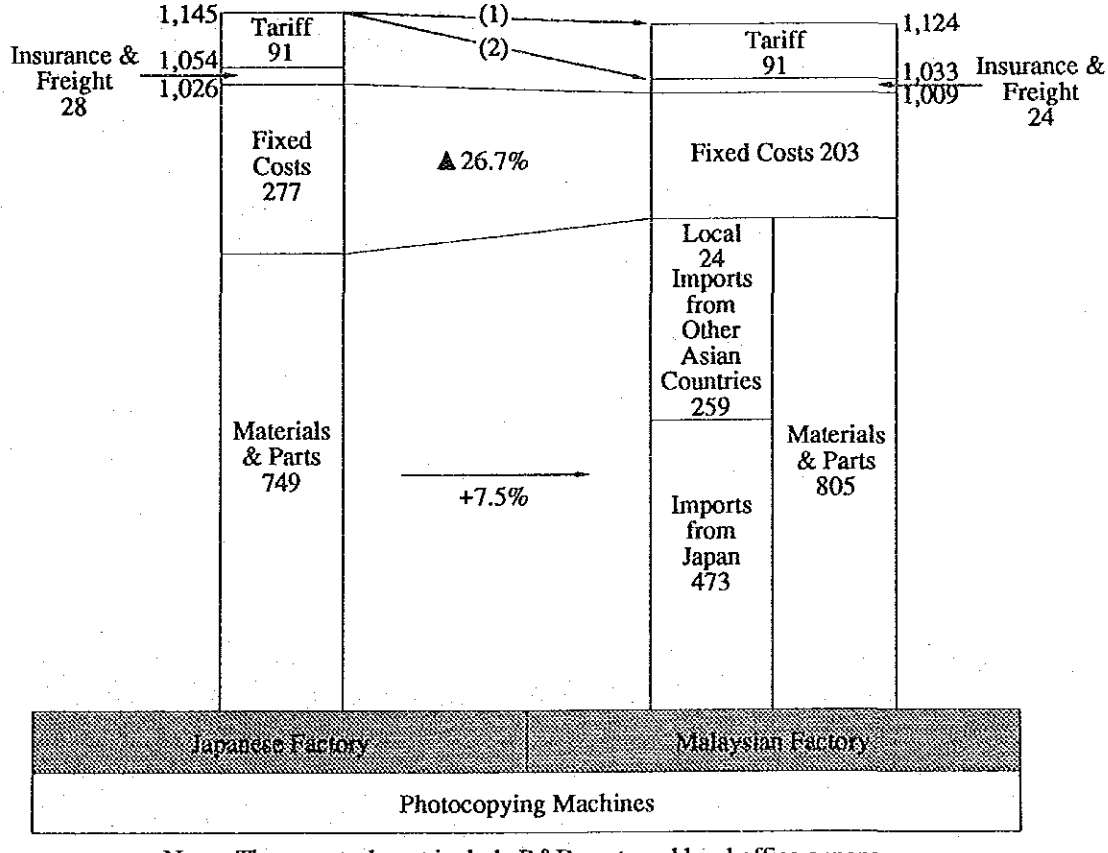


Note: These costs exclude R&D costs and head office expenses

Fig. IV. 4-5 Cost Structure - Photocopying Machines

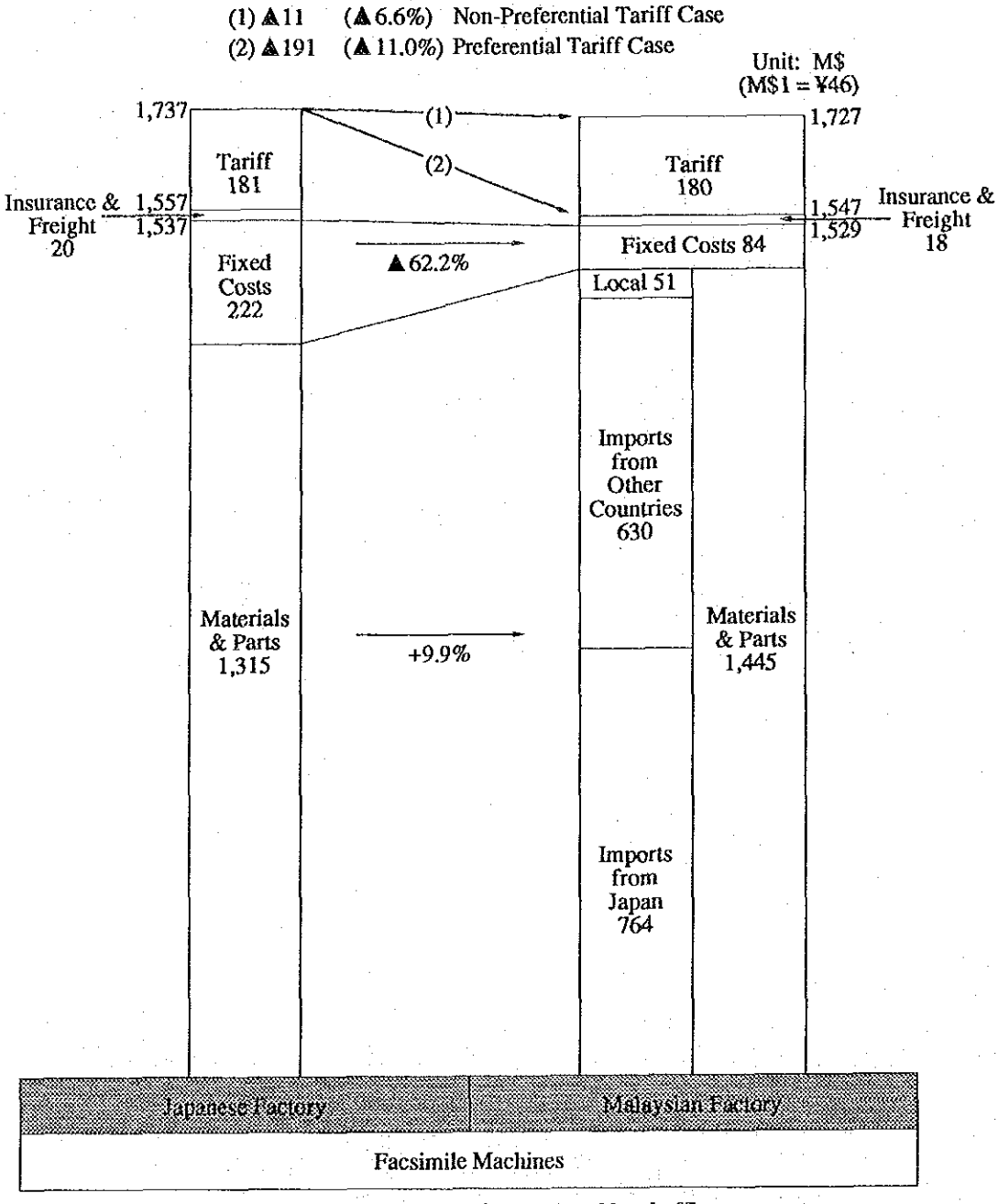
(1) ▲21 (▲1.8%) Non-Preferential Tariff Case
(2) ▲112 (▲9.8%) Preferential Tariff Case

Unit: M$
(M$1 = ¥46)



Note: These costs do not include R&D costs and head office expenses

Fig. IV. 4-6 Cost Structure - Facsimile Machines



Note: These costs do not include R&D costs and head office expenses

IV-5. Future Direction

IV-5-1. Overall Evaluation of the Present Status and the Problems for the Future

Based on the results of the analysis and evaluation of the present status of the Malaysian electronics industry and the possibility of developing the office electronic equipment industry in Malaysia, the problems and strategies for the promotion of the office electronic equipment industry were examined in this chapter.

(1) Alternatives for the Promotion of the Office Electronic Equipment Industry in Malaysia

Promotion of new investment in office electronic equipment production is essential for the development of the office electronic equipment industry in Malaysia due to the nonexistence of office electronic equipment manufacturers in Malaysia.

There are four patterns of new investment by types of supposed investors as follows.

1) Investment in office electronic equipment production by foreign office electronic equipment manufacturers which do not operate in Malaysia

2) Investment in office electronic equipment production for the diversification of product lines by foreign electronics manufacturers which are operating in Malaysia

3) Investment in office electronic equipment production for the diversification by Malaysian electronics manufacturers

4) Investment in office electronic equipment production or joint-venture partnership by the Malaysian government

Which alternative investment pattern among the four should be given the top priority was evaluated considering the following four factors for the development of the electronic office equipment industry in Malaysia.

1) Trends in the international market and overseas production of major manufacturers
2) Business growth possibilities in case the production of office electronic

equipment production starts in Malaysia

3) Matching the industrial development policy taken by the Malaysia government
4) Economic, financial and social burdens for the Malaysia government

(2) Evaluation of Alternatives

Advantageous and disadvantageous points of each alternative for the promotion of new investment are as follows.

1) Investment by foreign office electronic equipment manufacturers

In the office electronic equipment industry, suppliers are limited to the major electronics manufacturers in the world market due to the necessity of technology accumulation, product assortment, such as an OA system, rapid new product development, and the establishment of sales and an after-sale service network. Foreign office electronic equipment manufacturers already have required technical know-how, sales networks and big-name brands and would have no difficulty in exporting their products manufactured in Malaysia.

Japanese office electronic equipment manufacturers are actually shifting their production base to overseas plants for the realisation of cost reduction.

But there remains the problem that it is difficult to take effective direct promotional measures except for foreign investment promotional measures.

2) Diversification of Investment by Foreign Electronics Manufacturers Operating in Malaysia.

The results of the survey conducted in Malaysia show that their technology level has nearly reached the level required for the production of office electronic equipment although there are some problems to be improved.

Electronics manufacturers which engage in production of office electronic equipment in their home countries could start the production of office electronic equipment with relative by small investments, because they could use their existing production facilities in Malaysia. However, R&D activities to acquire specific technological know-how would be necessary in case of starting newly the production of office electronic equipment.

Most foreign electronics manufacturers in Malaysia are expanding the production of their existing products and there is limited room for new production of office electronic equipment.

3) Diversification of Investment by Malaysian Electronics Manufacturers

This would lead to the development of Malaysian companies. They already have a technological foundation in basic assembly technology. There is a difficulty in the production of photocopying machines due to the technological gap. But, for word processors and facsimile machines, there is a possibility that they could carry out assembly because the technological gap is relatively small. In this case, they would have to acquire technological know-hows of office electronic equipment production through technical tie-ups with foreign manufacturers and make investment in production technology improvement. It is a probable step to start production through technical tie-up or by joint-venture.

On the other hand, major foreign office electronic equipment manufacturers mostly establish wholly owned slants in overseas production. They seem to be rather reluctant to carry out a joint-venture business. For technical tie-up with a Malaysian firm, foreign manufacturers should expect to provide technological support until the production get off the ground.

OEM production under technical support from a foreign manufacturer is considered to be most possible. But unless OEM production gains attention among foreign manufacturers stemming from the technology improvement of Malaysian manufactures, increase of the availability of local parts and components, and the intensification of price competition, the possibility of a start of OEM production is at present small.

A large amount of investment in production facilities and the improvement of production technology are required, and this is a burden for Malaysian local manufactures.

If they start production based on their original technology, they would have to invest in technology development. As for the production of word processors, which is considered to require the lowest level of technology among the subject products, software development of word processing is required. If they have to direct their products mainly to the domestic market due to their weak overseas sales network, their production scale would be rather small.

4) Investment or Participation by the Malaysian Government

This requires the partnership of a foreign office electronic equipment manufacturer. Considering the attractiveness of this joint venture business for foreign office electronic equipment manufacturers, the fitness to the Malaysian economic policy, and economic and social effects on Malaysia, this pattern has little possibility.

It is concluded from the above examination that the promotion of investments by foreign office electronic equipment manufacturers should receive the priority, taking the possibility of the expected impact on the development of the office electronic equipment industry into consideration.

(3) Evaluation of Promotion Priority by Product Type among Office Electronic Equipment

A priority of promotion by product was evaluated judging from such factors as market attractiveness, the possibility of Japanese manufacturers investing in Malaysia, and value-added in Malaysia for the subject products of this survey: word processors, photocopying machines, and facsimile machines. The top priority was given to word processor, and secondly, facsimile machines, and lastly, photocopying machines. The priority of telex machines for industrial promotion is little because the market potentiality for telex machines is very small compared with other products.

	Word Processors	Photocopying Machines	Facsimile Machines
Market Size	△	○	○
Market Potential	○	△	◎
Possibility of Japanese Manufacturers Investing in ASEAN Countries	○	△	◎
Profitability of Operation	◎	○	△
Availability of Local Parts and Components	◎	○	△

Relative advantage: ◎ = High ○ = Medium △ = Low

(4) Importance of the Development of the Domestic Parts and Components Industries

The results of the feasibility analysis show that a Japanese manufacturer can reduce production cost by increasing the use of local parts and components. Under the present situation, if an office electronic equipment plant is set up in Malaysia, it would have to depend on imports for most of its parts and components at the beginning.

The weight of parts and components costs among the total production cost of office electronic equipment is high. The increase of local parts procurement would improve the profitability of production of office electronic equipment in Malaysia. The

availability of local parts and components is one of the key factors which determines foreign office electronic equipment manufacturers' decisions in investment in Malaysia.

The industrial promotion of the parts and components industries is a key subject for the promotion of investments in the office electronic equipment industry and, further, the information equipment industry. Continuous efforts should be paid to the development of the local parts and components industries and improvement of the technological level of local parts and components manufacturers.

The priority of development by type of part and component for the production of office electronic equipment was evaluated considering the needs of office electronic equipment manufacturers (cost weights, needs of localisation from the viewpoint of physical distribution, and difficulty in in-house production) and the significance for development in Malaysia (existing foundations in Malaysia, the degree of general-purpose use, and the development prospects of technologies). The results of the evaluation are shown in Figure IV.5-1~2.

It would be important that this priority be given consideration in the Malaysian government examining the promotional measures toward the parts and components industries for the development of the office electronic equipment industry.

(5) Overall Evaluation of the Survey Conducted in Malaysia, the World Market, and the Feasibility Analysis

Evaluating the results of the survey of electronics assemblers and parts and components manufacturers in Malaysia, the survey on the world market, and the feasibility analysis of producing office electronic equipment in Malaysia, in addition to the survey on Malaysia's electronics industry development policy, and the questionnaire surveys in Malaysia and Japan, the following can be pointed out.

- The development of the office electronic equipment industry should be primarily sought through the invitation of investments by foreign office electronic equipment manufacturers.
- Results of the feasibility analysis show that cost reduction merits would accrue to an office electronic equipment manufacturer from production in Malaysia. There is a possibility of inviting foreign investment in Malaysia.
- In addition to reinforcing investment promotion activities, it is necessary to make the investment climate, which includes the availability of local parts and components, more attractive compared to other investment candidate countries.

Fig. IV. 5-1 Priority of Parts Industry Promotion

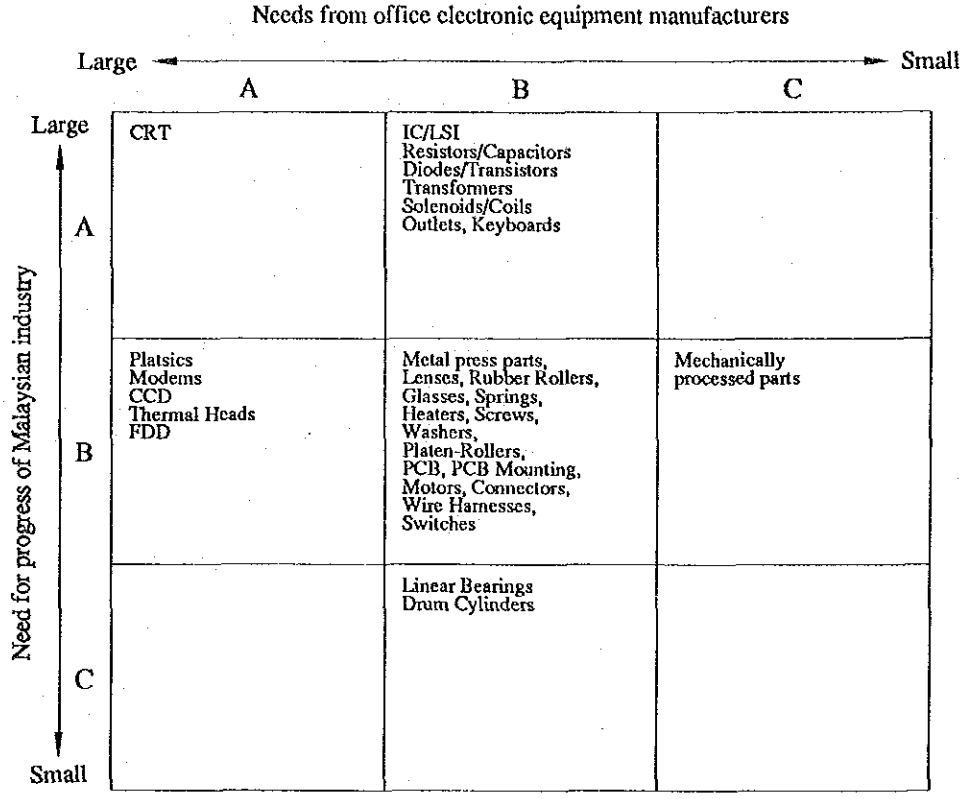
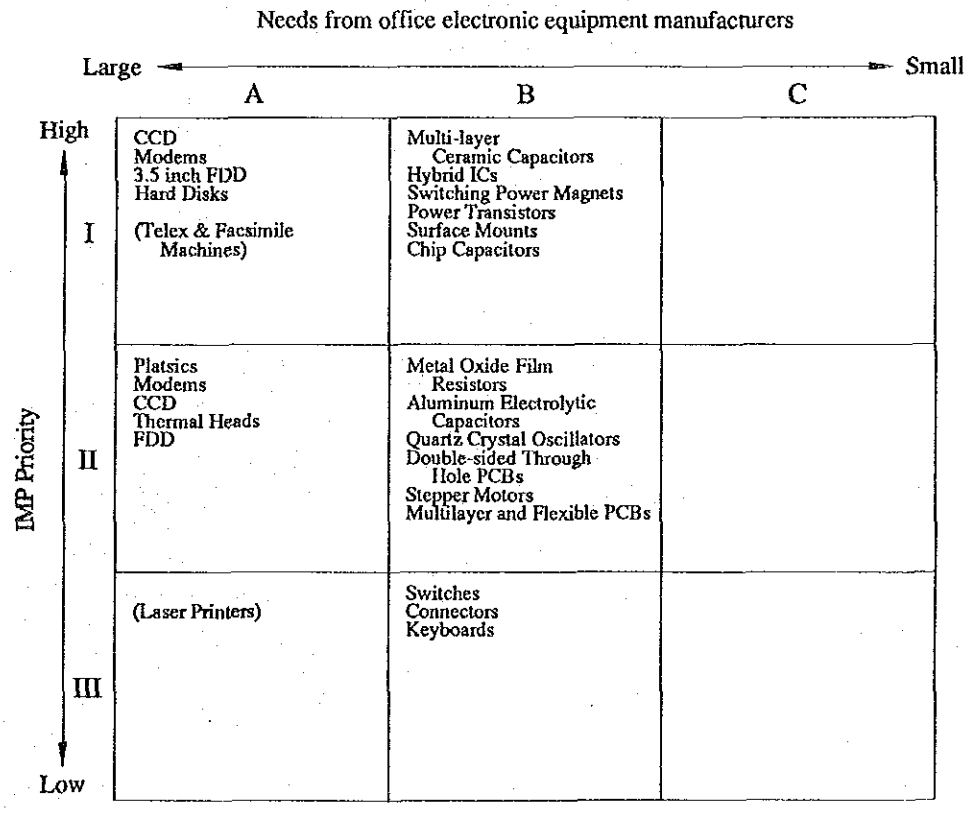


Fig. IV. 5-2 IMP Priority of Parts Industry Promotion



IV-5-2. Scenario of the Development of the Office Electronic Equipment Industry in Malaysia

The positioning of the office electronics equipment industry in the Malaysian electronics industry, steps of future development and measures for development were examined based upon the evaluations of the present status.

(1) Objectives of the Development of the Electronics Industry in Malaysia

Development objectives and strategies of the Malaysian electronics industry are summarised as below.

Targets

1) To accelerate the growth of the export-oriented consumer and industrial electronics subsectors
2) To foster the development of suppliers and support industries for the electronics industry in order to lessen the dependences on imported materials and parts
3) To encourage production of value-added products through greater investment in research and development activities and improving design capabilities
4) To increase local participation in the electronics industry
5) To increase productivity

Strategies

1) To improve product technology and production technology
2) To achieve export-oriented growth
3) To strengthen the linkages within the electronics industry
4) To promote technology transfer to Malaysia and accumulation of technology by Malaysia
5) To create the domestic market for electronics products through government procurement
6) To realise stable demands by diversifying into the production of a wider range of products

(2) Positioning of the Office Electronic Equipment Industry

The office electronic equipment industry has been growing significantly, keeping pace with the development of information processing and communication technologies.

Technologies for each product of the office electronic equipment industry have been developed separately, but the integration and systematisation of office electronic equipment are advancing at a rapid pace. It is expected that the systematisation of office electronic equipment will be further advanced.

The following factors can be pointed out as the background of the diffusion of office electronic equipment.

- The introduction of offices electronic equipment for the improvement of the efficiency of office work are rapidly progressing at the companies.
- As the result of the development of telecommunication technologies and the deregulation of telecommunication, the high-technology communication network system are advancing. Companies are taking necessary measures to keeps up with advanced communication and information processing technologies.
- Both speeds of new product development and of price reduction have become rapid, which produces new demands.

As the results of the development and diffusion of office electronic equipment, the industry is bringing about changes in individuals' lives, as well as in business activities and the industry structure.

The society and economic activities are increasing its dependence upon the information processing and communication systems. The information processing and communication industries including the office electronic equipment industry are expected to grow successively providing the foundation of other industries.

Electronics manufacturers recognise, as the key factors for survival, the importance of maintaining and accumulating high technology development capability in the field of information processing and communication and the importance of growing as supplier of office electronic equipment.

(3) Importance of the Promotion of the Office Electronic Equipment Industry in Malaysia

Examining development needs of the Malaysian electronics industry and the present status of the world electronics industry concerning office electronic equipment,

the following factors are pointed out as the reasons for the importance of the office electronic equipment industry in Malaysia at present.

1) It is expected to contribute to Malaysian foreign exchange income considering the strong demand in the international market.

2) It is expected to contribute to balancing the Malaysian electronics industry structure which is presently confined to the semiconductor subsector.

3) It is expected to contribute toward creating the foundation for the successive growth of the Malaysian electronics industry. It is expected to play an important role in resolving the technology gap in the high-technology field of electronics.

4) It is expected to contribute to the establishment and development of information processing and electronics telecommunication network systems in Malaysia which would upgrade the quality of business activities and enforce the linkage with the world economy.

5) It is expected to contribute toward upgrading the level of Malaysian engineers and promote technology transfer to Malaysia in the field of high-technology for the long-term.

(4) Development Process of the Office Electronic Equipment Industry in Malaysia

The results of surveys on the present status of the Malaysian electronics industry and on the world market indicate that the priority subject is the promotion of new investment and major foreign office electronic equipment manufacturers are of essential importance as the target of promotional measures.

The scenario for the promotion of the office electronic equipment industry in Malaysia is illustrated in Fig.IV.5-3. By the process of the development of the industry, it would further the breakdown as being shown in Fig.IV.5-4.

The development process of the office electronic equipment industry can be divided into the following four stages.

1) First Stage - Stage of Promotion of Investment

At this stage, investment would be made for an office electronic equipment plant. The establishment of office electronic equipment plants would create the opportunity of new employment. On the other hand, due to the necessity of importing of up-to-date production facilities, imports of machinery and equipment would take place.

This is the key stage of the promotion of the office electronic equipment industry. The result of promotion of foreign investment would decide the growth pace of the Malaysian office electronic equipment industry.

At this stage, it is desirable that active investment promotional measures would be taken by the Malaysian government. The investment promotional measures are divided into two groups: one is the reinforcement of direct investment promotional activities, and the other is to increase the attractiveness of investment in Malaysia toward office electronic equipment manufacturers by improving the investment environment.

2) Second Stage - Expansion of Exports

At the second stage, the production of office electronic equipment would increase and exports would start to expand. The production of office electronic equipment competitive in price and quality in the international market would be of importance. The expansion of exports would contribute to the foreign exchange position.

On the other hand, imports of parts and components, which are not produced in Malaysia, would also increase. For parts and components produced in Malaysia, local procurement would stimulate the local parts and component industries.

At this step, export promotion measures extended by the Malaysian government would contribute to the expansion of exports. At the same time, the guidance for the increase of local content ratio would be gradually strengthened.

Fig. IV. 5-3 Scenario of Promotion of the Office Electronic Equipment Industry

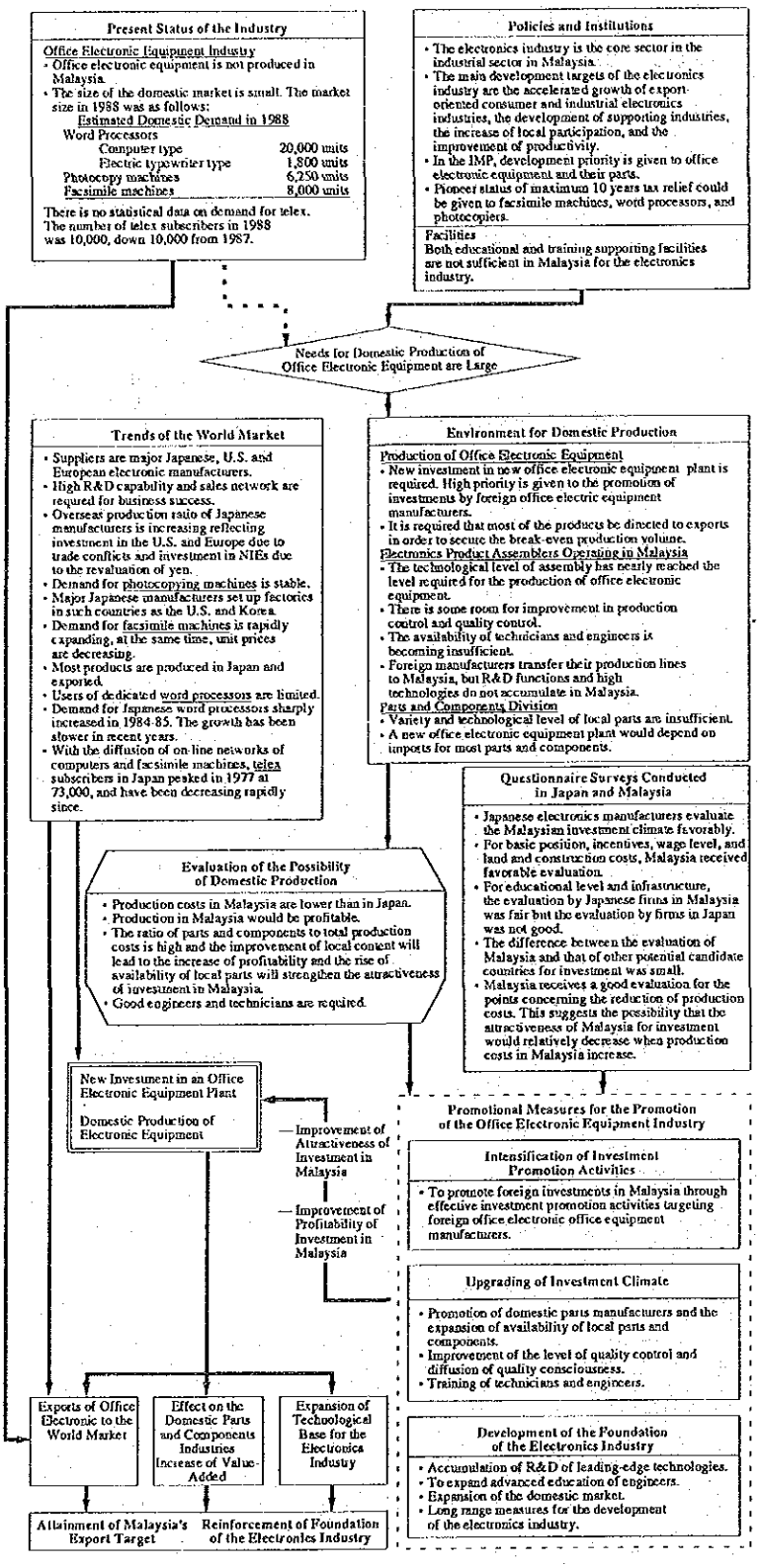
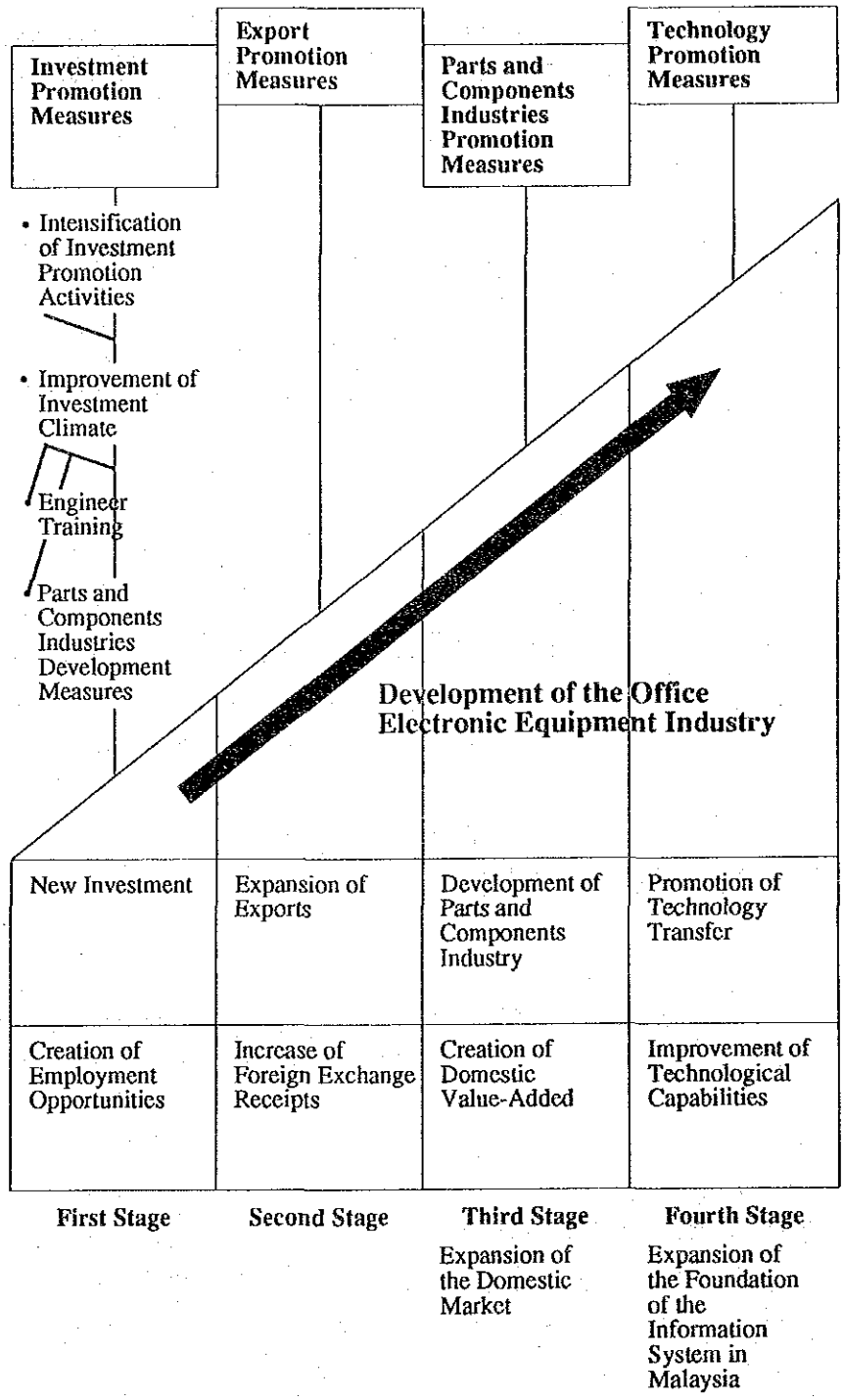


Fig. IV. 5-4 Development Stages of the Office Electronic Equipment Industry and Measures for the Development



3) Third Stage - Promotion of the Local Parts Industry

The import substitution of parts and components would advance and the growth of local parts manufacturers would be realised due to the efforts to increase local parts procurement by office electronic equipment manufacturers and their technical guidance to local parts manufacturers and as the result of investments by foreign parts manufacturers.

The value added of office electronic equipment production in Malaysia would increase with the progress of the local parts content ratio.

The improved product level and increase of local parts manufacturers would have an influence on the development of other electronics assemblers.

In order to realise this stage, active promotional measures for the development of the local parts and components industry should be taken as well as in the former stage. In addition, promotional activities to expand domestic demand for office electronic equipment and the upgrading of the country's information/communication infrastructure should be pursues. Demand of office electronic equipment and intensification of domestic infrastructure of information telecommunication will be required.

4) Fourth Stage - Progress of Technology Transfer

High value added activities such as designing and development would be partly transferred to Malaysia as the result of the increase of abilities of Malaysian engineers, and the progress of technological transfer by office electronic manufacturers. Further, the production of higher technology or systematised products might be started.

The needs for system engineers who speak English would be large as sales activities of systematised electronic office equipment, positioned Malaysia as a sales base, would become active in neighbouring Asian countries.

The accumulation of R&D activities and the upgrading of the R&D capability would be prerequisite for the development of the level of technologies related to the office electronic equipment in Malaysia.

With the progress of technology transfer, at this stage, it may be possible that local manufacturers would start the production of office electronic equipment and OEM production or production of products for niche markets would be carried out by them.

For the realisation of this stage, it is necessary that technology promotional measures be taken by the Malaysian government and the linkage between the office electronic industry and other information/communication industries should be reinforced.

The developmental stage would not move to the next stage one by one. The stages would overlap and some elements of the stages would possibly appear at the same time.

IV-5-3. Basic Strategies for the Promotion of the Office Electronic Equipment Industry in Malaysia

Measures to be taken for the promotion of the office electronic equipment industyry are summerised in Fig.IV.5-5. The measures for the first stage (promotion of investment) would be main part of urgent measures to be taken.

The direction of measures to be taken for the promotion of the office electronic industry can be summarised as follows.

- Investment promotional activities toward foreign office electronic manufacturers would be the core of strategies for the development of the office electronic equipment industry in Malaysia.

  Investment by foreign manufacturers would clear the problems of technological gap between Malaysia and advanced countries and the access to overseas markets. The development of the office electronic industry would be promoted by the initiative of foreign investment. The effects of foreign investment on the growth .

- Direct investment promotional activities should be intensified. Besides keeping office electronic equipment subject to pioneer status, reinforcing investment promotional activities by MIDA and other governmental organisations is of importance.

  The most favorable investment incentive, "Pioneer Status," is applicable to office electronic equipment. As for investment incentives, Malaysia can stand comparison with other candidate countries for investment. Thus, effective and focussed investment promotion activities targeting office electronic equipment manufacturers are desirable in the future.

  From this point of view, such focussed promotion activities as the preparation of data and materials, invitation of investment missions, and the preparation of data and materials, invitation of investment missions should be carried out.

- Various measures to increase the attractiveness of the Malaysian investment environment toward foreign office electronic manufacturers, and measures to establish the foundation of the office electronic equipment industry should be taken as follows.

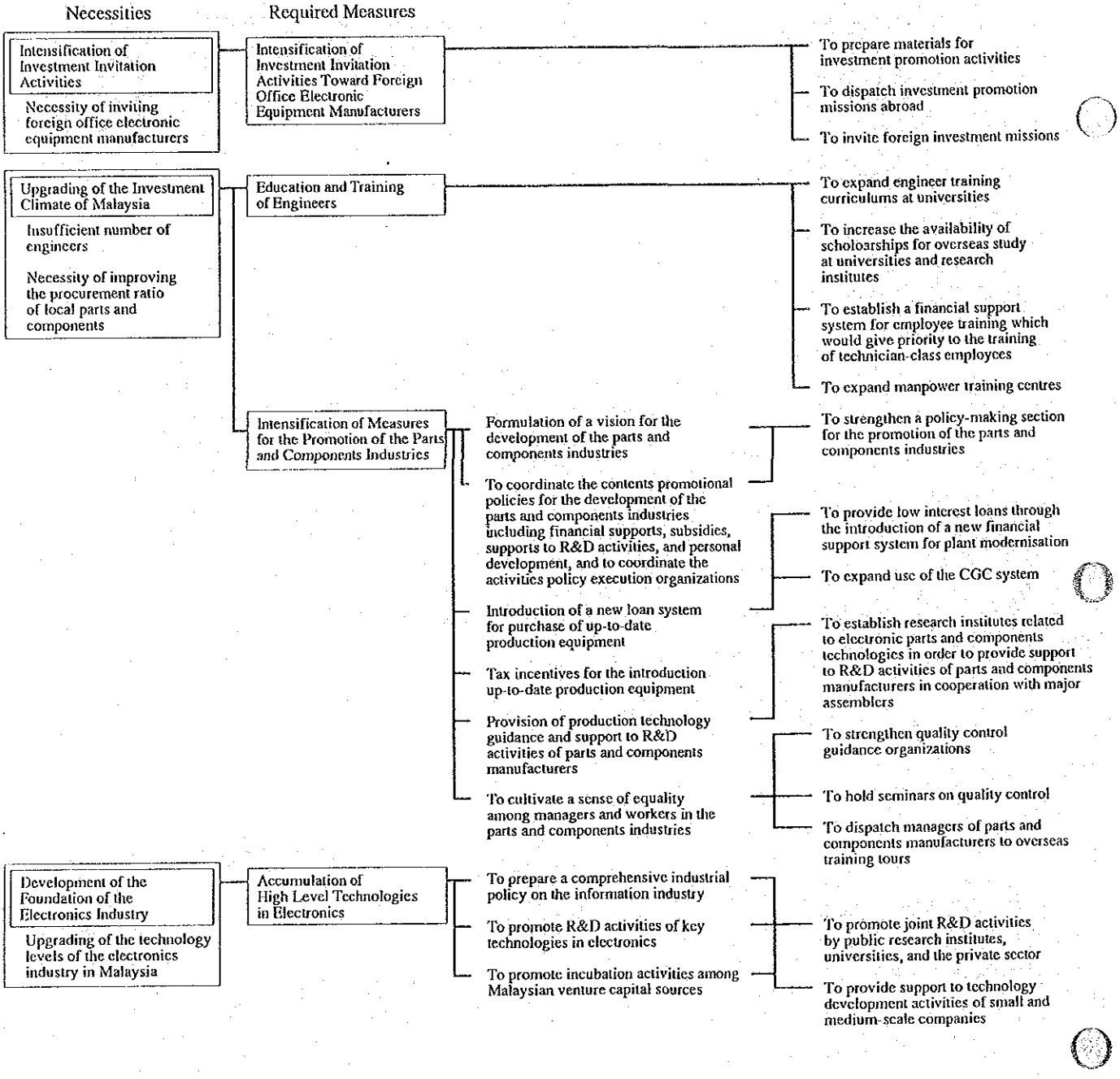
1) The main activities for the establishment of the foundation for the office electronic equipment industry will be the promotion of the parts and components industries, and the improvement of the quality of the labour force, especially training of engineers. These measures would be important as well from the viewpoint of the overall development of the Malaysian electronics industry.

2) As for the development of the parts and components industries, such measures as the intensification of a related government section in charge of policy making, the formulation of a vision for the development of the parts and components industries, and the coordination among policy executing organisations should be taken.

3) It is necessary to establish support measures for the introduction of modern manufacturing machinery in order to promote the parts supply of existing parts manufacturers to the office electronic equipment industry.

4) For the development of the parts and components industries and the improvement of the technological level, such measures as the establishment of successive research and development systems at public research institutes, supports to technology improvement, supports to employee training, and activities for the diffusion of quality control techniques and up-to-date production technologies should be carried out.

Fig. IV. 5-5 Measures to Achieve the Goal of the Development Scenario of the Office Electronic Equipment Industry



V. Cathode Ray Tube (CRT) Industry

V. Cathode Ray Tube (CRT)

V-1. Overview of the Industry

V-1-1. Outline of the Television Industry

(1) Production

There has been a striking increase in the production of T.V. sets in Malaysia in recent years (refer to Table V.1-1).
In particular, in 1986 and 1987, there were annual increases of 51.8% and 43.8% compared with the previous years. This was largely due to the increased production of Sharp-Roxy Electronics, Malaysia's largest export television manufacturer. In the future too, due to the 1988 start of production by large factories of Silver Electronics and Sony TV and the 1989 start of production by Matsushita TV, on a scale comparable to that of Sharp-Roxy Electronics, T.V. sets production in Malaysia is expected to increase dramatically.

Table V. 1-1 Production of TV Sets in Malaysia

Year	Volume (Set)	Annual Increase (%)
1983	382,766	-
1984	443,025	15.7
1985	568,384	28.3
1986	862,573	51.8
1987	1,240,125	43.8
1988 (Jan.-Aug.)	881,815	13.4

Source: Monthly Industrial Statistics

(2) Export and Import

Along with the increase in production, exports of T.V. sets from Malaysia have also risen. Table V.1-2 shows the exports and imports of T.V. sets in the past five years. Imports have continued to fall, while exports have risen about 6.2 fold in the past five years.

The export destinations of T.V. sets in 1987 were as follows:

C.T.V. Sets mains operated with Screen of 41.6cm & below

1. USA (share : 75.2%)
2. Germany (share : 6.9%)
3. Australia (share : 6.9%)

C.T.V. Set mains operated others

1. USA (share : 77.9%)
2. Singapore (share : 4.5%)
3. France (share : 4.0%)

Table V. 1-2 Exports and Imports of TV Sets

(Unit: M$ Million)

		1983	1984	1985	1986	1987
TV Receivers	Export	65.24	85.66	132.74	227.76	402.96
(SITC 761)	Import	84.73	80.47	64.88	51.40	53.04
CTV 1	Export	58.21	70.47	129.33	211.25	263.27
(SITC 761110)	Import	46.30	49.80	35.59	30.51	33.18
CTV 2	Export	0.23	0.83	3.25	15.86	132.47
(SITC 761120)	Import	29.51	24.94	25.66	16.41	17.04

Notes: 1. CTV Receivers Mains Operated with Screen of 41.6cm & Below.
2. CTV Receivers Mains Operated, Others.
Source: Malaysia Annual Statistics of External Trade

(3) Domestic Demand

The household holding rate of T.V. sets in Malaysia is high with 80% of the electricity supplied households (65%) reportedly already owning colour T.V.sets.

Domestic demand estimates made by seven sales companies in Malaysia were as follows:

1983: 230,000 to 240,000 units
1984: 230,000 to 240,000 units
1985: 180,000 units
1986: 180,000 units
1987: 200,000 units
1988: 250,000 units

The import duties on T.V. sets leaps from 30% to 50% for sets of over 16 inches, so 14 inch and 16 inch T.V. sets, which are rather cheaper sets, are popular. However, along with the rise in income, it is expected that demand will rise for 20 inch, and other larger models, so the production companies are studying manufacturing of larger sizes.

(4) Outline of T.V. Set Manufacturers

At present, there are 10 companies engaged in T.V. set production in Malaysia. Table V.1-3 gives a summary of these companies. In the table the information on Siong, which could not be visited, was based on "A Study on the Promotion of the Supporting Services Industry in the Manufacturing of Television", made by MIDA in June to July 1988, and the information on Sony TV, was obtained from the results of a questionnaire survey.

1) Domestic Sales-Oriented Manufacturers

Among those domestic sales-oriented manufacturers, Matsushita Electric and Sharp-Roxy Appliances are general home electric appliance manufacturers oriented toward the domestic market and produce T.V. sets as part of their line. Further, East Coast Electronics and Setron are also oriented to the domestic market. East Coast Electronics engages in assembly and sale of products under the NEC brand and Sanyo, Thomson, ITT, Normandie and Gold Star brands, while Setron does so under the Setron brand (kits purchased from NEC).

Syarikat Hitec has a high export ratio. They have taken over the production of Toshiba, which ceased production in 1986, and Maltronics, which ceased production in 1988 (brand name of Philips), and currently engage in domestic sales under the four brands of Mitsubishi, JVC, Toshiba, and Philips.

2) Export-Oriented Manufacturers

All of the five manufacturers specialising in exports entered the country in the 1980s. The oldest and the largest in production scale is Sharp-Roxy Electronics. This company functions as the centre for overseas production of compact televisions (14 inch) in the group and further produces chassises and kits for Sharp's U.S. factory: 1,114,000 units in 1987 and 485,000 units in 1988.

Further, three Japanese affiliated companies established operations in Malaysia in 1988, of which two are already in production. In 1988, Silver Electronics produced

80,000 units and Sony 35,000 units. In the future, Silver Electronics will produce in the order of 300,000 to 350,000 units a year, and Sony TV will produce 900,000 units a year. Japanese affiliated companies are given an important position as their group's overseas production centres due to the past rapid appreciation of the yen, and as a result are pursuing cost merits through production intensification (in the case of Sharp) or moving to locate closer to the markets (Matsushita TV and Sony).

Siong Export Industries is engaged in the production of T.V. sets as a subcontractor for Samsung, but it said that, Samsung is considering establishing its own operation in Malaysia and thus Siong will commence production for Gold Star from next year.

Table V. 1-3 Outline of TV Manufacturers in Malaysia

		Year of Establishment	Location	Number of Employees	Annual Sales (M$ Million)	Market (88)	Production (1,000 Units)	Production Share by Size (88)
1	Matsushita Electric	1965	Shah Alam Selangor	1,430	201.4	Domestic : 85.7% Australia : 8.6% New Zealand : 1.8%	87 : 98 88 : 102 89 : 95	14" : 46.9% 16" : 26.0% 20" : 22.0% 21" : 4.8%
2	Matsushita TV (Production starts from April 1989)	1988	Shah Alam Selangor	-	-	Singapore Middle East Japan (in Future)	89 : 400 90 : 1,000-1,200	14" : - 16" : - 20" : - 21" : -
3	Sharp-Roxy Appliances	1985	Petaling Jaya Selangor	320	30.5	Domestic : 100%	87 : 45 88 : 65 89 : 70	14" : 22.0% 16" : 43.0% 20" : 25.0% 21" : 0.1%
4	Sharp-Roxy Electronics	1980	Batu Pahat Johor	1,500	¥ 868.6 Million	USA : 48.7% EC : 51.3%	87 : 1,136 (1,114) 88 : 991 (485) 89 : -	14" : 72.0% 20" : 15.0% 21" : 13.0%
5	Silver Electronics	1988	Shah Alam Selangor	290	-	USA & Canada : 100%	88 : 80 89 : 350	6" : 10.0% 10" : 5.0% 14" : 45.0% 20" : 40.0%
6	Syarikat Hitec.	1973	Kluang Johor	700	60	Domestic : 13% Singapore : 87% USA & Canada	87 : 28-30 88 : 70-74 89 : 74 (42-48)	14" : 25.9% 16" : 25.9% 18" : 5.2% 20" : 34.5% 21" : 8.6%
7	Setron	1971	J. Bharu Johor	130	-	Domestic : 80-90% Australia : 10-20%	87 : 36 88 : 48 89 : 60	14" : 30% 16" : 20% 20" : 50%

Table V. 1-3 Outline of TV Manufacturers in Malaysia
(Continued)

		Year of Establishment	Location	Number of Employees	Annual Sales (M$ Million)	Market (88)	Production (1,000 Units)	Production Share by Size (88)
8	East Coast Electronics	1973	Semambu Kuantan	79	2.3	Domestic : 100%	87 : 5.6 88 : 10.3 89 : -	14" : 43.3% 16" : 28.2% 20" : 28.5%
9	Siong Export Industries	1984	Klang			Export : 100%	Production Capacity 162	-
10	Sony TV	1988	Bangi Selangor	333	-	Singapore : 90%	88 : 35 Production Capacity 900	-

* Figures in Brackets are Volume of Chasis.

V-1-2. Supply and Demand Trends of CRTs in Malaysia

(1) Demand

At present, CRTs are not being produced in Malaysia, so all CRTs have to be imported.

Table V.1-4 shows the imports of CRTs in the past four years. The largest country of origin is Singapore, which rose in share on a volume basis from 52.6% in 1984 to 76.7% in 1987. Imports from Japan have fallen from 45.3% to 11.4%, so the rise in Singapore's share takes the form of coverage of this decline. Since 1986, further, imports from Taiwan have risen considerably.

Compiling the results of the field survey, the demand for CRTs, by size, in 1988 is estimated and shown in Table IV.1-5. The total share of CRTs by size is largely affected by the demand from Sharp-Roxy Electronics, which has a large production scale. In the demand from domestic market-oriented manufacturers, however, the shares of 14 inch and 16 inch are very high. As for future projections, it is estimated that CRT demand will exceed 2.5 million units in 1989 due to the commencement of full scale production by Silver Electronics and Sony TV and the start of production by Matsushita TV.

Table V. 1-4 Import of CRTs (SITC 776100)

	1983	1984	1985	1986	1987
Total Value (M$ Million)	41.36	51.96	61.96	105.27	164.25
Total Volume (1,000 Units)	1,865.4	576.5	665.0	1,285.6	1,441.4
Of Which					
Japan	302.5	260.9	257.1	181.7	164.7
Singapore	1,537.2	303.5	398.5	1,051.3	1,105.0
Korea	2.0	1.7	1.4	5.0	39.1
Taiwan	19.2	6.9	1.8	45.4	120.3

Source: Malaysia Annual Statistics of External Trades

Table V. 1-5 CRT Demand by Size (1988)

(1,000 Units)

Company	6"	10"	14"	16"	20"	21"	29"	Total
A	-	-	47.9	26.6	22.5	4.9	0.2	102.1
B	-	-	14.3	28.0	16.3	6.5	-	65.1
C	-	-	775.4	-	161.6	140.0	-	1,077.0
D	7.2	7.2	36.0	-	29.6	-	-	80.0
E	-	-	18.0	18.0	3.6~ 6.0	24.0	6.0~ 8.4	69.6~ 74.4
F	-	-	10.8	7.2	18.0	-	-	36.0
G	-	-	2.9	4.4	2.9	-	-	10.2
Total	7.2	7.2	905.3	84.2	254.5~ 256.9	175.4	6.2~ 8.6	1,440.0~ 1,442.4

(2) Supply

Not all of the companies would reveal the breakdown of their purchases by sources, so clear figures are not available. However, Hitachi Singapore, which is the main place of purchase for Sharp-Roxy Electronics, accounts for an overwhelmingly large shares. In addition, South Korea's Gold Star, Samsung and Orion, Taiwan's CPT and Philips were named. However, there were many complaints that South Korean makes have become difficult to obtain due to the increase in supply to China.

TV production in Singapore is also expanding, so Hitachi Singapore tends to be short on supplies as well.

The supply of CRTs in Asia is thus becoming tight. Hitachi Singapore has a production scale of 350,000 units/months (4 million units/year) and produces 14, 20, and 21 inches of CRTs.

(3) Purchasing Situation

Regarding purchases of CRTs, OEM manufacturers such as Syarikat Hitec or Setron are supplied CRTs by OEM parts suppliers and do not select vendors by themselves. As for the others, one has a regional purchasing centre and their parts are supplied from the centre. But aside from this, most T.V. set manufacturers wish to purchase CRTs and other parts from closer suppliers if approval of the head offices could be obtained. At present, the supply of CRTs is tight and due in part to this, all the companies indicated their desire for the purchase of local-made CRTs in the case of establishment of domestic production.

V-1-3. Trends in the Procurement of T.V. Components and the Significance of the Domestic Production of CRTs

(1) Parts Able to be Procured Locally

Table V.1-6 shows the possibility of local procurement of key components required for the T.V.set production based on the result of field interview survey. For the unit prices of the components, reference was made to MIDA's "A Study on the Promotion of the Supporting Services Industry in the Manufacturing of TV".

As for the possibilities of the local Procurement of T.V.set parts, there were some differences in view depending on the company. Counting all of the parts for which some companies consider that domestic components are available, the maximum procurement rate of local T.V.set parts in Malaysia is estimated at 38.7%. However, the actual local procurement rates of various manufacturers show a range from a lowest 5% to a highest 33%. This is due in part to the differences in the manner of counting local procurement rates by companies. By comparison, the following trends were observed:

1) In most cases, the local procurement rates of OEM manufacturers are relatively low due to the materials and parts being generally supplied by the brand owners.
2) The highest local content rates were shown by domestic market oriented manufacturers. This is believed to be due to the fact that the import duty on TV components is a high 50%, so these companies, which do not enjoy tariff exemption, try to use domestic products as much as possible.
3) Even in the case that some local manufacturers of certain parts exist, the specifications of individual companies differ and thus some of these parts may often not be usable. In particular, such cases are observed in tuners, ICs and the like.
4) Similarly, while domestic parts manufacturers exist, some export-oriented T.V. set manufacturers consider that procurement from them is not possible due to the insufficient amount of supply. These items include PCB, speakers, etc.
5) Parts for which future domestic production is desired from T.V. set manufacturers are given as CRTs, ICs, PCB, capacitors, resistors, and the like. The shares of these in the total price of parts are, respectively, a high 34.6%, 7.3%, 10.4%, 6.9%, and 3.3 percent. In particular, if CRTs are

produced domestically, the percentage of parts which could be possibly procured locally would soar from the current 38.7% to 73.3%.

Table V. 1-6 Components Required in Manufacturing TV Sets

Item	Price (M$/Set)	Local (M$/Set)	Main Supplying Countries
1. CRT	120.90	0	S'pore, Taiwan, Japan, Korea
2. PCB	36.24	30.00	S'pore
3. IC	25.57	2.55	Japan
4. Capacitor	24.29	2.50	Japan
5. P.W. Cabinet	20.25	20.25	--
6. Tuner	20.00	20.00	--
7. Resister	11.49	2.28	Japan
8. Deflection Yoke	9.43	9.43	--
9. Pear Cover	8.35	8.35	--
10. Coils	8.08	6.79	Korea, Taiwan
11. Diode	5.83	0	Japan
12. Antenna, Antenna Connector	4.66	4.66	--
13. Transistor	4.63	0.56	Japan
14. Filmer	3.89	0	Japan
15. Delay Line	3.50	0	Japan
16. Switch	3.15	1.58	
17. High-Drive Chopper Transformer	3.14	3.14	--
18. Connector/Asseasly	2.84	2.84	--
19. PVC Alu. Punching Pannel	2.60	2.60	--
20. Speaker	2.58	2.58	--
21. Carton	2.55	2.55	--
22. Bead Care	1.67	0	--
23. Power Cord	1.62	0	--
24. Cushion	1.55	1.55	--
25. Oscillator	1.39	0.69	--
26. CRT Socket	1.43	0	--
27. Tape/Printing	1.33	0	--
28. Clamper/Mountain Bracket	1.21	1.21	--
29. CRT Rubber Washer	1.17	1.17	--
30. Lid Body	1.16	1.16	--
31. Others	13.66	6.85	--
Total	349.86	135.29	--
			Local Contents 38.67%

(2) Merits of Local Procurement

1) Price Competitiveness

At present, the materials cost accounts for over 70% of the total product cost of T.V. sets. To increase the competitiveness of the products, the point is how cheaply parts can be purchased.

In particular, export-oriented T.V.set manufacturers have newly begun or expanded production in Malaysia in order to cope with the drop of competitiveness due to the yen appreciation. However, under the condition that a relatively large portion of the parts are still being procured from Japan their aim is not achieved, and replacement of the same is urgent.

Some companies expressed their desire that some Japanese investors would start the production of components either in Malaysia or in neighboring countries, but the prevalent opinion was that it would be the best way to rear local manufacturers by providing assistance and guidance.

Further, the following points were pointed out by many T.V. set manufacturers that a considerable number of Japanese affiliated parts manufacturers are already engaged in production in Malaysia or in Singapore and purchases from these firms account for a substantial share of the local content. Because these manufacturers purchase their metal, plastic, and other materials from Japan, their products do not necessary have enough price competitiveness. The necessity to promote the investment of material manufacturers has often been stressed.

2) Inventories

T.V. set manufacturers, according to the results of a questionnaire survey, usually have inventories of as short as five days to as long as 1.5 months worth of production. In general, companies with smaller scales of production had greater inventories. In particular, due to the tightness of supplies of CRTs, the companies are maintaining larger inventories of the same. From the view of the operation with smaller inventories, too, the local production of CRTs would be welcomed from T.V.set manufacturers.

At present, CRTs are transported from Port Klang or overland from Singapore. It is said that South Korean makes, due to the shipping, tends to be late in delivery.

3) General System of Preferences (GSP)

The tariffs in the main export destination of Malaysian T.V. sets, the U.S. and the EC, are 5% and 14%, respectively. In the U.S., T.V.sets are not covered by the GSP. Although they are covered in the EC, it is not applied in practice.

The conditions for the application of the GSP in the EC are:

a) local procurement of transistors
("local": in this case meaning ASEAN as a whole), and

b) a local content of 50% or more.

There are no companies meeting these requirements at present. Many export market oriented companies have the desire to raise the local content rate so as to strengthen their product competitiveness through use of the GSP.

V-2. Present Status of the Industry Related to the Domestic Production of CRTs in Malaysia

V-2-1. Outline of the Production Process for CRTs

(1) Production Process

For the production of Colour CRTs very lengthy and complicated chemical treatment, assembling, and testing processes are needed. They are briefly summarized as follows:-

1. Shadow Mask Assembly
   - Mask Forming
   - Mask-Panel Assembling
2. Screening
   - Black Matrix Application
   - Phosphor Application
   - Aluminizing
   - Bakeout
3. Funnel Preparation and Bulb Assembly
4. Flit Sealing & Exhausting
   - Panel Funnel Sealing
   - Mount Sealing
   - Exhausting
   - Aging
5. Electron Gun Assembly
6. Finishing
   - Factory Test
   - Implosion Protection
   - Shipping Test
   - Yoke Fixing

The details of the process flow chart of C-CRT are shown both in Fig. V.2-1 and Fig. V.2-2.

Fig V.2-1 Process Flow Chart for CKD Production

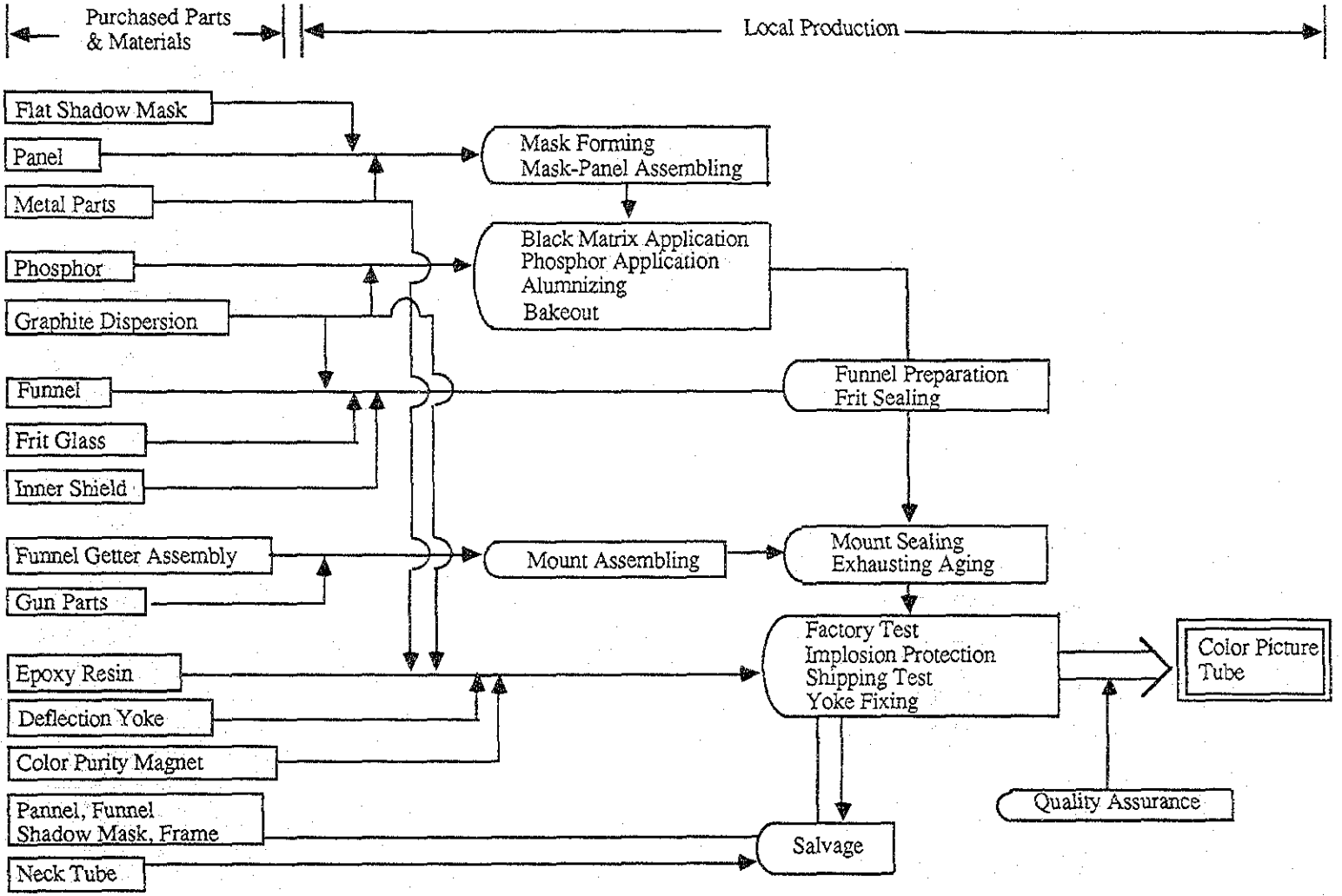
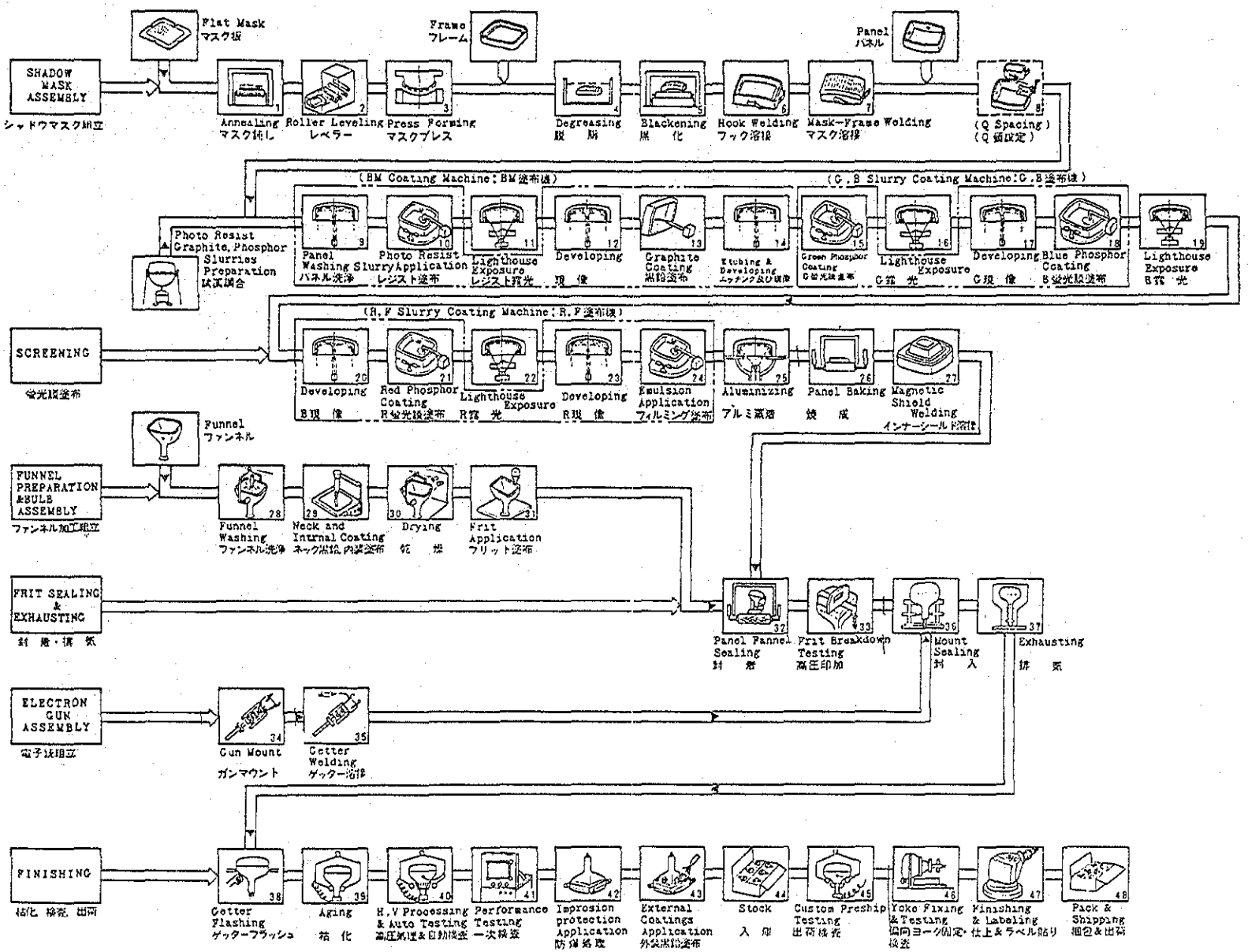


Fig. V.2-2 Process Flow Chart of Colour CRT



(2) Types of Local Assembly of C-CRTs

Because of the nature of C-CRT production consisting of a large number of processing steps, the local production of C-CRT could be started either from partial assembly or adjusting work or from an integrated assembly operation.

The major possible types of local assembly of C-CRT are as follows:-

A. Partial Work of Deflection Yoke Adjusting & Fixing

After the completion of C-CRT assembly, deflection yoke adjusting and fixing processes are needed. Yoke adjusting provides precise motions of electron beams while an operator observes the tube's screen so that a clear picture is reproduced by correcting the position of each beam. Yoke fixing, testing, finishing and labelling procedures would follow yoke adjusting before the shipment of final products.

B. Simple Assembly after Mount Sealing

Local assembly could be started from the process of electron gun mount sealing. In this case, the CRT tubes in the form of sealed panels and funnels and assembled electron guns are supplied as imported parts.

C. SKD (Semi-Knock Down) Assembly after Panel Baking

In SKD assembly, the processed panels, in which the most difficult process of screening has been completed, would be supplied as imported parts.

D. Integrated Assembly except for Electron Gun

In an integrated assembly, all the processes of C-CRT assembly could be made except for the process of electron gun assembly. Assembled electron guns are supplied as imported parts.

E. Integrated Assembly

All the assembling processes would be done domestically including electron gun assembly.

Table V.2-1 shows the relationship between the type of local assembly of C-CRT and the processing work covered

Table V. 2-1 Relationship Between the Type of Local Assembly of C-CRTs and the Processing Work Covered

	A	B	C	D'	D
1. Shadow Mask Assembly					
Mask Forming				X	X
Mask-Panel Assembly					
2. Screening					
Black Matrix Application				X	X
Phosphor Application				X	X
Alumnising				X	X
Bakeout			X	X	X
3. Funnel Preparation and Bulb Assembly					
Funnel Preparation			X	X	X
Bulb Assembly			X	X	X
4. Flit Sealing & Exhausting					
Panel-Funnel Sealing			X	X	X
Mount Sealing		X	X	X	X
Exhausting		X	X	X	X
Aging		X	X	X	X
5. Electron Gun Assembly					
Electron Gun Assembly		(X)	(X)		X
6. Finishing					
Factory Test		X	X	X	X
Implosion Protection		X	X	X	X
Shipping Test		X	X	X	X
Yoke Fixing	X	X	X	X	X

A Partial Work of Deflection Yoke Adjusting & Fixing.
B Simple Assembly After Mount Sealing.
C SKD Assembly After Panel Baking.
D' Integrated Assembly Except for Electron Gun.
D Integrated Assembly.

V-2-2. Possibility of Raw Material and Parts Procurement

(1) Major Raw Materials and Parts Required for C-CRT Production

Table V.2-2 shows the major raw materials and parts required for C-CRT production and their approximate weights in the total material costs. The weight would very largely according to the types of CRTs or to the sourcing measures:

Table V. 2-2 Major Raw Material and Parts Required for C-CRT Production and Their Weights in Material Cost

(Unit: %)

	Major Items	Weight in Material Costs
1.	Panel	26.6
2.	Funnel	19.7
3.	Gun Parts	11.9
4.	Deflection Yoke	11.6
5.	Frame	5.7
6.	Shadow Mask	5.1
7.	Clip-Spring	2.8
8.	Phospher (Green, Blue, Red)	1.9
9.	Inner Shield	1.8
10.	Colour Purity Magnet	1.8
11.	Getter/Support	0.9
12.	Wedge	0.9
13.	Flit Glass	0.7
14.	Others	8.6
	Total	100.0

(2) Possibility of Procurement

1) Panel and Funnel

The glass products of panels and funnels occupy a very large portion of over 45% of the total material cost of C-CRT.

At present, the local procurement of panels and funnels is not possible, and they would have to be imported from Japan or Korea. In Singapore, Asahi TV-Glass is supplying panels and funnels to Hitachi Electronic Devices (S), but their operation in Singapore is presently limited to finishing work. At the end of 1988, Asahi Techno Vision (Singapore) is reported to start the

production of panels from raw materials in Singapore, and to start production of both funnels and panels in Thailand in 1991.

2) Gun Parts

Gun parts consist of various kinds of metal working products, for the production of which highly elaborate mould are needed. Both from the present skill level of mould manufacturers in Malaysia and the lack of merits of scale, the local procurement of these parts would be difficult at the early stages of the production.

3) Deflection Yoke

The deflection yoke occupies around 12% of the total material costs, and is one of the items which could be procured locally in Malaysia. At present, there are two manufacturers which could supply deflection yokes.

4) Frame

The frame is a metal punched product. The production of moulds would become the key factor for local procurement.

5) Shadow Mask

The shadow mask is an etching processed metal sheet. Both from the present skill level and lack of merits of scale, the imports of shadow masks from such countries as Japan, the U.S., Korea or W. Germany would be needed for the time being.

6) Clip-Spring

For the production of clip-springs the import of special stainless steel would be needed. With this imported material the local processing of clip-springs would be possible.

7) Phosphor (Green, Blue, Red)

Phosphors are the major chemical materials used for mask screening. They would have to be imported from Japan, the U.S. or Korea. From Korea, only red phosphor could be obtained.

8) Inner Shield

The local processing of inner shield is expected to become possible in the near future. The sheet metal would have to be imported.

9) Colour Purity Magnet

Colour purity magnets would have to be imported from Japan. There is presently no other country that can supply the products.

10) Getter/Support

The local processing of getters and getter supports is rather difficult at the early stage of the CRT production mainly due to the lack of scale merits.

11) Wedge

Wedges are the plastic moulding product. With the capability of production of moulds, the local production of wedges would be possible.

12) Flit Glass

Flit glass would have to be imported either from Japan or Korea.

The possibility of recruitment of major raw materials and parts is summarised and shown in Table V.2-3.

Table V. 2-3 Procurement Possibility of Major Raw Materials and Parts for CRT Production

Major Raw Materials and Parts	Procurement Level		
	A	B	C
1. Panel			X
2. Funnel			X
3. Gun Parts			X
4. Deflection Yoke	X	X	X
5. Frame		X	X
6. Shadow Mask			
7. Slop-Spring		X	X
8. Phosphor			
9. Inner Shield			X
10. Colour Purity Magnet			
11. Getter/Support			X
12. Wedge			X
13. Flit Glass			
Local Procurement Ratio (%)	11.6	21.9	89.6

Note: A. Locally procured from the start of production.

B. Locally assembled or procured at early stage of the production.

C. Local assembly or procurement is expected in the near future.

V-2-3. Possibility of the Procurement of Major Auxiliary Facilities Related to CRT Factory Construction

(1) General

For the production of C-CRTs, various kins of auxiliary facilities such as a waste water treatment system, deionized water supply system, special gas supply system or clean room are needed. In the case that the local technical level is not sufficient to supply these facilities, the initial investment costs would increase largely. Further, the annual maintenance would also become a heavy burden on the manufacturer of C-CRTs.

With accumulated experience both of construction and maintenance in such industries as semiconductors, chemicals, food processing and timber processing, a relatively large number of Malaysian local contractors are judged to have enough capability to construct most of these facilities needed at C-CRT factories.

(2) Waste Water Treatment System

In the waste water discharged from C-CRT factories, hazardous substances such as fluoride, lead, zinc, iron, chromium or mercury are inevitably involved. For the elimination of these substances from the waste water, a large-scale waste water treatment system has to be installed along with the factory.

In Malaysia, industrial waste water discharge is regulated by the Environmental Quality (Sewage & Industrial Effluent) Regulations under the Environmental Quality Act 1974. The Standards of effluent set in Malaysia for waste water are compared, with those of Japan. They are shown in Table V.2-4.

Although there are no governmental regulations at present in Malaysia, the elimination treatment of the following substances is considered to be essentially needed.

1) Fluorine and its compounds (F)

In both the process of washing and cleaning of glass bulbs and the process of salvage, hydrofluoric acid solution is used, which discharges fluoric ions into the waste water.

2) Chromium (Cr^6)

In both the black stripe screening process and phosphor screening process, hexavalent chromium compounds are added as sensitizers into polyvinyl alcohol liquid, which discharges Cr^6 into the waste water.

3) Mercury

In the process of photo-printing, ultra-high pressure mercury lamps are applied as the exposer of ultraviolet ray for photo-resist layer. In case this lamp is broken and liquid mercury is spread, there is a slight possibility that mercury would be discharged into the waste water.

Table V. 2-4 Comparison of Government Standards for Effluent

Parameter (Unit)	Malaysia A	Malaysia B	Japan
Temperature	40	40	-
pH value (pH) (Mg/l)	6.0-9.0	5.5-9.0	5.8-8.6
Suspended solids (SS) (")	50	100	300
N-hexane Extracts (")	Not Detectable	10.0	MO 5 A & VO 30
Phenols (")	0.001	1.0	0.5
Chemicals Oxygen Demands (COD) (")	50	100	(60)
Biochemical Oxygen Demands (BOD) (")	(at 20° c	5 days)	
	20	50	300
Dissolved Oxygen (DO) (")	-	-	-
Free chlorine	1.0	2.0	
Cyanides (CN) (")	0.005	0.05	1
Fluorine (F) (")	-	-	15
Cadmium and its Compounds (Cd) (")	0.01	0.02	0.1
Lead and its Compounds (Pb) (")	0.10	0.5	1
Zinc (Zn) (")	1.0	1.0	3
Copper (Cu) (")	0.20	1.0	3
Iron and its Compounds (Fe) (")	1.0	5.0	10
Manganese and its Compounds (Mn)	0.20	1.0	1
Nickel (Ni) (")	0.20	1.0	1
Total Chromium (Cr) (")	-	-	2
Chromium (VI) (Cr6+) (")	0.05	0.05	0.5
Arsenic and its Compounds (As) (")	0.05	0.10	0.5
Mercury, Alkylmercury and Other Mercury Compounds (Hg) (")	-	-	0.005
Sulphide (S) (")	0.50	0.20	-

Notes: (1) Malaysian Parameter Limits of effluents of standard A and B are based on the Regulations 1978 - (Regulation 8(1), 8(2), 8(3))
(2) Japanese Standard Values are applied only to effluents discharged into the public waste water treatment system.

As for the above waste water treatment system, Malaysian subcontractors are judged to have enough capability to construct the facility in accordance with the specifications proposed from CRT manufacturers.

(3) Deionised Water Supply System

Deionised water is commonly used in semiconductor factories in Malaysia. The requirement level for deionised water in the C-CRT industry is not usually so high as that in the semiconductor industry and the permissible sizes of foreign particles would be less than 5 microns at the point of use.

From the view of financial viability, however, the facility cost for deionised water would have to be much cheaper in CRT factories than in semiconductor factories. Thus, there is a possibility to use the ion exchanging resin column system in CRT factories rather than to use the reverse osanosis system conventionally used in semiconductor factories, taking into consideration the good quality of water in Malaysia.

Although key components have to be imported, Malaysian local contractors are considered to have enough capability to design, to assemble, to install and to maintain the facilities needed at CRT factories.

(4) Gas Supply Systems

1) LPG (Liquid Petroleum Gas)
   In the processing of glass for C-CRTs, the fluctuation of combustion calories in LPG largely affects the yield ratio and quality of the products. Accordingly, the stabilisation system of combustion calorie would have to be imported. However, all of the other necessary facilities related to the LPG supply system could be installed by local LPG suppliers.
2) Hydrogen, Nitrogen and Oxygen Gas
   Both hydrogen gas and nitrogen gas are supplied from local manufacturers to existing semiconductor manufacturers without any reported problem. Further, some local manufacturers can also supply oxygen gas. Accordingly, there would be no problem for the supply of these special gases to C-CRT manufacturers.
3) Compressed Oil Free Air
   The semiconductor manufacturers in Malaysia produce compressed oil free air inhouse by installing both oil free air compressors and dryers. Oil free air compressors would have to be imported.

(5) Clean Room

The requirement level for the clean rooms in C-CRT factories is not so high as compared with that in semiconductor factories. Accordingly, the Malaysian local contractors are judged to have enough capability to design, assemble, install and maintain the clean rooms required by C-CRT manufacturers. One special requirement from C-CRT factories would be the avoidance of copper parts in the system. This is because of the fact that blue phosphor used in the screening process is easily affected by copper ions, which cause the luminescent colour to change into a yellowish colour. All of the copper parts would have to be replaced by stainless steel parts in order to avoid the deterioration of blue phosphor.

V-3. Present Status of Overseas Market for CRTs

V-3-1. World Market Trends

Table V.3-1 shows the production and demand for CRTs in main user countries in the world for the past four years. According to these figures on the table, worldwide CRT production has grown at an average rate of 10.6% during the past four years, with 1988 production estimated at US$5,248 million. Producing countries are listed below in the order of their market share. Although there have been some changes in market share, the order has remained unchanged these past four years. Countries with the highest average growth rates were Italy, the Netherlands, Korea, and Singapore, in that order, each showing an average annual increase rate of 20% to 30%, while both Japan and the U.S. recorded only single-digit growth.

1. Japan	34.9%	(the share in world production)
2. U.S.A.	16.6%	(the share in world production)
3. Korea	11.2%	(the share in world production)
4. West Germany	8.0%	(the share in world production)

Meanwhile, the world demand for CRTs totaled US$4,352 million in 1988. The average annual growth rate for the past four years was 11.6%, which slightly exceeded the production increase rate. Although growth is expected to slow down to some extent during 1989, it is estimated that demand will still increase to US$4,953 million.

Below is a list of the four countries with the highest demand for CRTs in 1988. Although their order differs slightly, the four largest producing countries also support the world's greatest demand.

1. Japan	21.8%	(the share in world demand)
2. U.S.A.	20.2%	(the share in world demand)
3. Korea	11.4%	(the share in world demand)
4. West Germany	8.3%	(the share in world demand)

When domestic production and demand were compared, it was found that production exceeded demand in eight countries, while the opposite was true in 12 other countries. Countries with the largest gap between production and demand were Japan

and Korea, which depend on overseas markets for US$887 million and $230 million, respectively, of their CRT production.

Table V. 3-1 Trend of CRT Production and Domestic Demand

Unit: M$, %

Countries	1985		1986		1987		1988		1991	Average of Grow Ratio	
	P	D	P	D	P	D	P	D	D (Forecast)	P	D
U.S.A.	828	868	909	978	890	930	870	880	910	1.7	0.5
Canada	–	–	–	–	–	–	–	–	468	–	–
Brazil	170	165	203	228	210	200	220	190	185	9.0	4.8
Australia	–	23	–	19	–	20	–	22	26	–	-1.5
Austria	57	–	92	36	97	35	101	36	37	21.0	–
Belgium	3	52	3	79	3	81	3	83	86	–	16.9
Denmark	–	9	–	16	–	14	–	14	14	–	15.9
Finland	–	35	–	50	–	55	–	55	53	–	16.3
France	254	204	364	300	375	303	404	289	296	16.7	12.3
Ireland	–	–	–	167	–	183	–	213	300	–	12.9
Italy	184	117	325	208	362	211	416	221	225	31.2	23.6
Netherlands	13	63	23	25	27	26	29	28	29	30.7	23.7
Norway	–	–	–	–	–	–	–	–	–	–	–
Spain	44	–	62	94	69	101	73	107	114	18.4	6.7
Sweden	–	28	–	32	–	34	–	33	34	–	5.6
Switzerland	44	–	64	1	65	1	67	1	1	15.0	–
United Kingdom	114	114	110	206	103	213	103	221	228	-3.3	24.7
West Germany	267	288	385	446	401	465	419	498	498	16.2	20.0
(Europe Total)	980	910	1,428	1,660	1,502	1,722	1,615	1,799	1,915	18.1	25.5
Japan	1,523	891	1,805	953	1,775	917	1,834	947	947	6.4	2.1
Hong Kong	–	–	–	–	–	–	–	–	–	–	–
Indonesia	–	–	–	–	–	–	–	–	–	–	–
Malaysia	–	25	–	33	–	39	–	37	39	–	14.0
Philippines	–	1	–	3	–	6	–	7	9	–	91.3
Singapore	66	59	88	79	110	96	119	110	115	21.7	23.1
Thailand	–	–	–	–	–	–	–	–	–	–	–
South Korea	316	192	430	277	540	330	590	360	339	23.1	23.3
Taiwan	–	–	–	–	–	–	–	–	–	–	–
India	–	–	–	–	–	–	–	–	–	–	–
Amount (Including Others)	3,883	3,134	4,863	4,230	5,027	4,260	5,248	4,352	4,953	10.6	11.6

Source: Yearbook of World Electronics Data 1988 by Benn Electronics

V-3-2. Trends in Major Markets

Figure V.3-1 shows colour television set production and the expected rate of CRT self-sufficiency in the main countries and regions of the world. The large CRT markets of more than 10 million units per annum are the U.S., Japan, Korea, China and Europe.

In the case of CRT production in Malaysia, domestic demand is expected to exceed about 3 million units in 1989 and a further 6 million units after 1990. Thus, Malaysia has the market size to enable some plants to be operated in order to fill domestic demand alone, assuming they can produce products which are competitive both in price and quality with those from Singapore and Korea.

If export of Malaysian products is considered, the following factors have to be taken into consideration in order to identify the possible export markets for the 14-inch to 20-inch CRTs.

(a) In both the U.S. and Europe, they have the supply capacity to meet 98.9% and 89.8% of the domestic/regional CRT demand on a value basis respectively.

(b) In both regions, small- and medium-sized TV sets are mostly imported, and there is little use of the above-mentioned size of CRTs for domestic assembly.

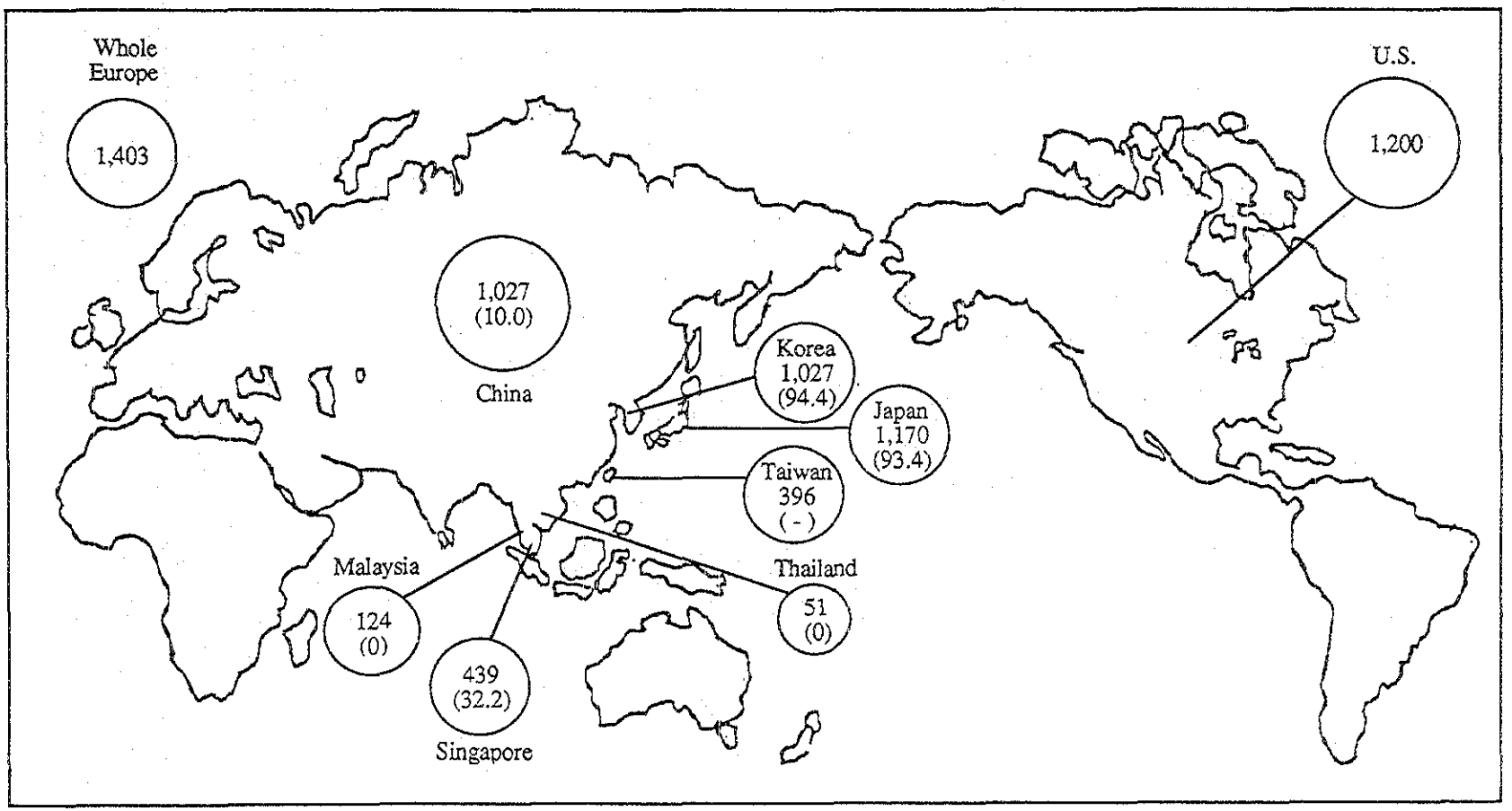
(c) The import environment in both regions is becoming more unfavourable because of the rise of protectionism. In Europe, local content regulation is becoming increasingly severe in view of the integration of the EC in 1992. It is predicted that replacement of imports will be promoted for CRTs which are key components in TV sets.

(d) In the Japanese market, there is a tendancy toward cutting back production of the above mentioned size CRTs and low-end colour TV sets. The demand for Malaysian products is therefore thought to be not very high.

Thus, in future, Asia excluding Japan would become the possible export market for Malaysian products. Among them, Korea, Taiwan and Thailand are considered to be able to meet virtually all demand with domestically-manufactured products. Accordingly, for CRTs made in Malaysia, and Singapore and China would be left as the possible export markets for Malaysian CRTs taking into consideration the mutual complementarity by type of products.

Fig. V. 3-1 Volume of Color/TV Production in Main Countries and Regions (Year of 1987)

Unit: 10,000



*Figures in ( ) Indicate Ratio of Domestic Self-Supply (Unit: %)
*As for Singapore and China, 1988 Figures are Used
Sources) Statistics of Various Countries and Yearbook of World Electronics

(1) Japan

Fig. V.3-2 shows Japanese colour television production over the past ten years. As shown in the Figure, the export ratio is high in Japan, and domestic production has been on the decline since the rapid increase in overseas production starting in 1986. Domestic and overseas production by Japanese manufacturers and affiliates are as shown in Table V.3-2.

Table V. 3-2 Production of Colour T.V. Sets by Japanese Manufacturers

	Domestic Production		Overseas Production	
	1986	1987	1986	1987
Production Volume (1,000 Sets)	15,019	11,700	18,680	23,478
Composition (%)	44.4	33.0	55.2	66.2
Annual Growth (%)	-	-22.1	-	25.8

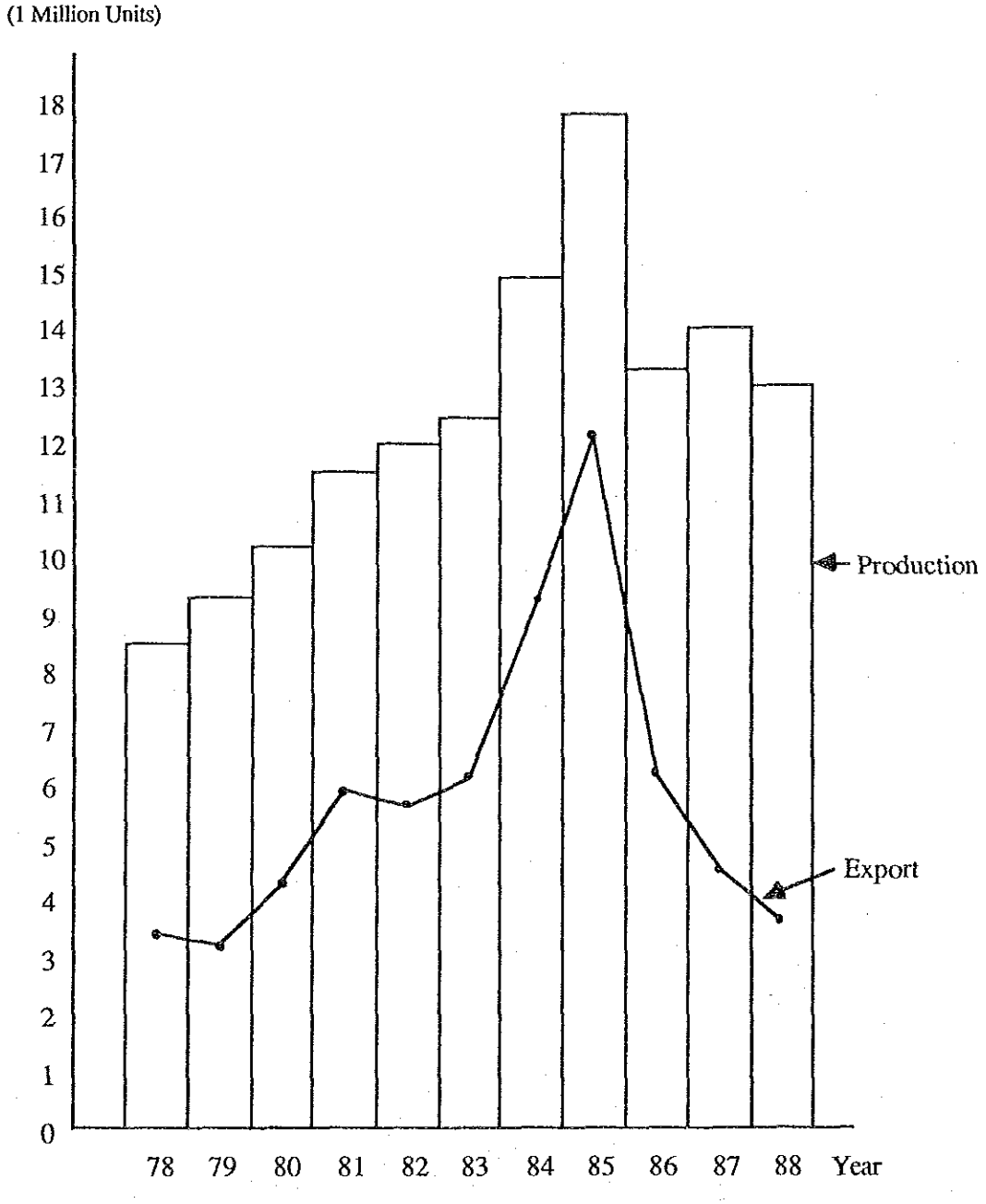
Source: Association of Japan Electronic Industry

Japan's dependence on CRT imports is very low -- 0.4% in 1980 and 6.6% in 1987. Japan is the world's largest producer of CRTs, and in terms of both quality and quantity it remains superior to other nations. However, mounting trade friction with the industrialized nations over Japanese CRTs, intensifying competition with new rival countries, and the strong yen that has prevailed since 1985 have dealt a severe blow to the competitiveness of these products. Since the second half of the 1980s overseas production projects have become common among CRT producers. Domestic production of less profitable compact CRTs is being curtailed, and production is shifting towards high-value-added industrial displays and large-screen CRTs. As a result of this transition, an increase in imports of compact CRTs from the NIES is apparent.

Table V.3-3 shows the countries from which Japan imports CRTs. Since a 252.7% annual increase rate was recorded in 1985, imports have increased rapidly, with total imports in 1987 reaching 4.7 times the level in 1984. By country in 1988, Korea was the major supplier, with a 57.9% share, followed by Singapore, with 29.8%.

As the number of late-arriving CRT exporting nations continues to increase, the shift to high-value-added products among Japanese manufacturers is expected to become increasingly active, with the resulting "hole" in domestic production to be filled by imports. Since overseas production of colour televisions is proceeding at a faster pace than that of CRTs, domestic production of compact, low-end TV sets appears likely to cease altogether, resulting in reduction of demand for CRTs for such products.

Fig. V. 3-2 Trends of Japan's Colour/TV Production and Export



Source: Annual Report of Machinery Statistics, Japan Exports & Imports.

Table V. 3-3 Trend of Colour CRT Imports by Japan

(Unit: Pcs, %)

Nation/Region	1984		1985		1986		1987		1988	
	Quantity	Share	Quantity	Share	Quantity	Share	Quantity	Share	Quantity	Share
Singapore	140,778	85.7	187,183	32.3	266,642	40.1	200,342	25.8	408,666	29.8
Taiwan	10,518	6.4	164,104	28.3	86,791	13.0	47,357	6.1	1,165	0.1
Korea	6,627	4.0	31,890	5.5	284,988	42.8	492,794	63.6	793,643	57.9
U.S.A.	4,591	2.8	176,589	30.5	18,151	2.7	28,322	3.7	140,755	10.3
China	769	0.5	104	0.02	123	0.02	50	0.01	120	0.01
Canada	371	0.2	17,196	3.0	618	0.1	3,354	0.4	22,274	1.6
West Germany	38	0.02	36	0.01	4,570	0.7	26	-	88	0.01
Total Imports (Including Others)	164,283		579,393		665,436		775,260		1,370,232	

Source: Monthly Report of Japan Trade

Table V. 3-4 Trend of Colour TV Production in Major Asian Countries and Regions Excluding Japan

(Unit: 1,000 Sets)

	Korea	Taiwan	Singapore	Thailand	Malaysia	China
1978	552	2,055	725	30	150	4
1979	418	1,145	1,390	39	154	9
1980	947	1,463	1,889	45	157	32
1981	2,378	1,626	2,174	73	132	152
1982	2,398	1,228	1,516	140	249	288
1983	4,015	1,950	1,013	336	382	531
1984	4,614	2,278	1,073	428	443	1,340
1985	4,254	2,264	1,501	386	568	4,353
1986	6,994	3,508	1) 2,586	434	863	4,146
1987	10,273	3,956	1) 3,476	512	1,240	6,727

1) Quantity of Domestic Export in 1986 and 1987.

Source: Korea - Korean Electronics Industry Promotion Association
Taiwan - Industrial Production Statistics Monthly Taiwan Area, The Republic of China
Singapore - Report of The Census of Industrial Production (Till 1985)
- Trade Statistics (1986, 1987)
Thailand - Ministry of Industry
Malaysia - Monthly Industrial Statistics
China - Annual Statistics of China

(2) Other Asian Countries

Table V.3-4 shows production trends in the main colour television producing countries in Asia based on production statistics by country. There was tremendous growth in those countries, and their importance as CRT markets is expected to increase significantly. At present, production in the region is largely of the small-variety and large-volume approach, while the television sets being manufactured are mainly mass-market small- and medium-screen models ranging in size from 14 to 21 inches.

1) Korea

Although there are eight manufacturers (varying in size) of television sets in Korea today, 95% of all production is shared by four companies: Samsung, Gold Star, Daewoo, and Anam. The share of the first two, in fact, accounts for 75% of all production, and they can be said to represent the Korean television industry.

Table V.3-5 shows past production, exports, and imports of CRTs. According to the increase in domestic CRT production, the degree of dependence on imports dropped from 17.6% in 1984 to 5.6% in 1987.

Table V. 3-5 Production and Export of Colour Televisions and CRT Import in Korea

Year	Production (1,000 Sets)	Export (1,000 Sets)	CRT Import (Pcs)
1984	4,614	2,959	814,169
1985	4,254	3,380	17,253,763
1986	6,994	5,586	414,877
1987	10,273	8,628	573,966

Source: Association of Korea Electronic Industry Promotion

No statistical breakdowns of CRT use by size are available, but the domestic production ratio of colour television production according to screen size is shown in Table V.3-6. There have been no major changes in the variety of models in terms of size, and there have been no moves towards the large-screen or ultra-miniature models as seen in Japan. The television industry in Korea, however, believing that domestic TV ownership has virtually reached the saturation point, is predicting that there will be increased demand for CRTs in 20-inch big-screen televisions, high-distinction models, and industrial applications.

Table V. 3-6 Production of Colour Televisions in Korea by Size

(Unit: %)

Year	Below 9"	10" - 14"	15" - 18"	Over 19"
1984	2.6	58.6	14.9	23.8
1985	1.3	61.7	12.7	30.6
1986	2.4	57.2	9.1	31.4
1987	4.9	60.6	8.2	22.6

Source: Association of Korea Electronic Industry Promotion

2) Thailand

Currently there are 17 manufacturers of televisions in Thailand, with an estimated aggregate annual production capacity of at least 660,000 sets. In addition, the BOI approved the establishment of a Korean-Thai joint venture in 1988 for the production of televisions for export that will have a production capacity of 200,000 sets a year.

Furthermore, JVC has plans to establish a new plant to commence production of 600,000 units (including chassis) a year beginning in December 1989. It plans to expand production there to 1.2 million units by 1991. As for Toshiba, it has plans to produce 300,000 units a year for export. With the setting up of three firms, colour TV production in Thailand will extend to 3.6 times the present rate with one stroke in 1991.

Table V.3-7 shows colour television production, imports and exports, and domestic demand for the past ten years in Thailand. Domestic production has yet to catch up with domestic demand, and with an export ratio of only 1.2% in 1987. Thailand has great latent potential as a color television producer.

Table V. 3-7 Production, Imports and Exports, and Domestic Demand for Colour Televisions in Thailand

(Unit: Sets)

Year	Production	Imports	Exports	Domestic Demand
1978	29,700	2,936	67	32,569
1979	39,300	3,910	81	43,129
1980	44,900	7,310	2,726	49,484
1981	72,700	42,704	1,045	114,359
1982	139,500	47,959	13,102	174,357
1983	336,000	53,991	7,433	382,558
1984	428,400	49,755	2,418	475,737
1985	386,300	N.A.	2,662	N.A.
1986	434,253	21,123	1,381	453,995
1987	512,216	31,331	5,907	537,640

Source: Ministry of Industry

According to a BOI survey, Thailand's rate of electrification will reach 90% during the next five years, and 80% of all households (with an average of five persons per household) will have one television set, equivalent to an ownership rate of 16 sets per 100 population. Demand for color television sets is expected to reach 1 million units by 1995.

Since at present no companies in Thailand manufacture CRTs for use in colour televisions, import dependence is 100%. Table V.3-8 shows CRT imports during the past ten years.

Japan is the largest supplier, while CRTs are also imported from Singapore and Taiwan. Imports from the latter country have been on the rise since 1985.

According to a BOI survey, domestic demand for CRTs concentrates on 14- and 20-inch models. Below is a prediction of future demand shares for these two formats.

1988-89	70:30	(ratio of 14-inch to 20-inch)
1990	65:35	(")
1991-96	60:40	(")

Table V. 3-8 Trend of CRT Import in Thailand

(Unit: Pcs)

Year	Import Volume
1979	236,501
1980	562,936
1981	772,272
1982	645,512
1983	646,614
1984	516,898
1985	- 1)
1986	- 1)
1987	- 1)
1988 (Jan. - May)	191,349

Source: Department of Customs
Note: 1) Unknown Because of Error of Statistics in 1985, 86 and 87.

Since two new CRT manufacturers will commence production in mid-1989, Thailand is expected to become a net exporter by 1991. In accordance with increasing domestic production, the Thai government plans to increase import duties on CRTs from the current 10% to 30% on 1 October 1990.

3) Singapore

There are eight major producers of colour television sets in Singapore at present, six of which are Japanese affiliates and two of which are European affiliates. Table V.3-9 shows TV production and exports together with the shift of CRT imports for the past six years.

Table V. 3-9 Trend of Production and Export of Colour Televisions and CRT Import in Singapore

(Unit: 1,000 Pcs.)

	Production	Export	CRT Import
1983	1,013	1,419	860
1984	1,073	1,545	642
1985	1,501	1,922	1,180
1986	-	2,586	1,757
1987	-	3,476	2,584
1988*	-	4,393	2,979

* Between Jan. and Nov. as for Import and Export in '88.
Source: Report of the Census of Industrial Production & Trade Statistics

With the dramatic rise in labour costs that followed the high wage policies enacted in 1979, colour television production in Singapore by foreign affiliates grew sluggish, and after peaking at 2,174,000 units in 1981 has gradually declined. Although 1985 production showed growth of 39.9% over the previous year, production declined at an average rate of 4.4% during 1980-85. Therefore, the trend in Singapore was unique among Asian countries, which boasted an overall growth rate of 21.2%. Since 1985, however, production has again begun to show rapid increases. The reason is that in addition to the government's efforts to strengthen investment incentives, to improve the investment environment by freezing wage levels and to lower taxes, most telling was the rapid expansion of production by Japanese-affiliate corporations since the Plaza Agreement in September 1985. Since production statistics could not be obtained, direct comparisons should be avoided. But it is supposed that exports in 1988 were 2.3 times the 1985 level.

Because Singapore is a city-state with a population of only 2.6 million, the majority of televisions produced domestically are intended for export.

Concerning domestic production of CRTs, Hitachi Electronics Device was producing 4.1 million units annually as of 1988. Since approximately 25% of these are intended for sale on the domestic market, simple calculation would suggest that the country relies on imports for about 3.3 million CRT units, making it a large market for

exports as well. The following is a list of the main importing countries in 1987 for 30 to 55 cm screens, the units with the highest volume of production.

1.Japan	:	58.9%	(share of total imports)
2.Korea	:	24.6%	(")
3.Taiwan	:	6.8%	(")
4.Canada	:	6.1%	(")

However, because it was revealed that Hitachi Electronics Device would be expanding production capacity to 5.4 million units a year in 1989 in order to meet the demand for CRTs in Southeast Asia, the import market for CRTs in Singapore is supposed to be on the decline.

4) China

As can be seen from Table V. 3-10 below, Chinese production of color television sets has grown tremendously in recent years, and this is the major factor behind the current scarcity of CRTs in the Asian market. At present, the nation boasts only one production plant. The annual production capacity of this facility, located in Hanyang, a firm with which Hitachi maintains a technology provision agreement, is approximately 1 million units, which means that 90% of all domestic demand is dependent upon imports.

Table V. 3-10 Quantity of Production of Colour Televisions in China

Year	Production Volume (1,000 Sets)	Annual Growth Rate (%)
1984	1,339.5	-
1985	4,352.8	225.0
1986	4,146.0	-4.8
1987	6,727.0	62.3
1988	10,277.6	52.8

Source: Chinese Statistics Yearbook