

domestic demand will definitely have to be restructured for a cost competitiveness on a par with strategic export locations if they want to stay in production.

3. Tasks to be Tackled in Electrical and Electronics Industry Promotion Policy

It is important to perform the following four tasks in nurturing Viet Nam's electrical and electronics industry.

- a) Cultivation of export-oriented industry (as opposed to industry oriented toward the domestic market)
- b) Maximum utilization of investment and technology brought in by foreign businesses
- c) Formulation and implementation of policies to nurture industries that are consistent over the long term
- d) Obtaining international competitiveness through nurturing of parts and supporting industries

(1) Promotion of export-oriented industry (as opposed to industry oriented toward the domestic market)

In the area of major home electric appliances, the yearly demand within Viet Nam currently comes to about 600,000 TV sets, 150,000 VCRs, 100,000 refrigerators, 10,000 washing machines, and 100,000 air conditioners (mainly for office use).

Corresponding rates of household diffusion in urban areas are comparatively high at about 38 percent for TV (mostly CTV) sets, 40 percent for radio-cassette players, and 18 percent for refrigerators. Diffusion on the national level is much lower, however, due to the influence of the scant diffusion in rural communities, which account for about 85 percent of the population; the rates are just 4 percent for TV sets, 4 percent for radio-cassette players, 12 percent for radios, and 1 percent for refrigerators.

The major causes of the low level of diffusion of electric and electronic products in Viet Nam are the low income levels and low rate of electrification. Government plans call for a rise in the rate of electrification to 70 percent by 2000. If this target is achieved and income levels rise, the yearly domestic demand around 2000 could reach 1.5 million CTV sets, 150,000 refrigerators, 120,000 air conditioners, and 50,000 washing machines.

Over the longer term, the rise in income levels along with economic growth could very well deepen the attractiveness of the potential of the market of Viet Nam as its population nears 100 million. Nevertheless, the latent scale of the Vietnamese market alone in this field would only amount to from a few tens of thousands to a few hundreds of thousands of mainstays (such as refrigerators and washing machines), or from a few hundreds of thousands to a few millions of AV products, even if the country attained a semi-developed status. There would be no prospects for inducing economy of scale effects needed to cultivate industry solely on the strength of a demand on this level. For example, the required scale of production for strategic locations for CTV sets and VCRs, the typical AV products, is a few millions of units per plant. Similarly, for mainstays such as refrigerators and washing machines, the yearly demand must be in the range of at least 300,000 - 400,000 units to justify siting for production from components because of the huge capital investment entailed.

Viet Nam has great potential as a market with a population that will exceed 100 million in the near future. And if income levels were to reach a par with those in developed countries, it would consequently have an enormous demand. Even as of 2010, the terminal year of the time horizon of this project, however, industrialization will still be in the formative phase, and it would not be very worthwhile (or realistic) to consider measures for promotion of electric/electronics industry siting aimed at the domestic market alone.

The implication is that policy should be developed with a view to the growth of industry targeted at the global market and capable of participating in export markets. The term "global market" here refers especially to the developed-country markets of Japan and the West, the semi-developed countries from Central Asia to Eastern Europe, the Russian Federation, and South America, and the markets of other ASEAN members and neighboring countries. Naturally, the domestic market will also become a target over the long term as the level of the domestic economy rises.

An analogous situation applies for the component industry. Although there is a possibility of a rise in the share of the total component production occupied by sales in the domestic market as the domestic set production expands, emphasis should be placed on the export market for the foreseeable future.

(2) Maximum utilization of investment and technology brought in by foreign businesses

In a changing investment environment brought on by the formation of economic blocs (the E.U., NAFTA, etc.), expanding emerging markets (China, Eastern Europe, etc.) and increasing trends toward in-house manufacturing, rapid growth and expansion of the ASEAN markets and the creation of the AFTA, Japanese and other foreign businesses which have been investing in the ASEAN nations are now trying to restructure their strategic production bases.

(a) Foreign, primarily Japanese, firms have created a major production base of home appliances, semiconductors, and general-purpose parts in such ASEAN nations as Singapore, Malaysia, and Thailand. However, costs have gone up sharply in these countries, which are also suffering a severe manpower shortage. These production bases are forced to transform themselves into bases for high value-added, technology-intensive production from labor-intensive manufacturing.

(b) The creation of AFTA is said to further strengthen competitiveness of a strategic production base, such as Malaysia. However, given the above-mentioned bottlenecks in supply capacity, the size of the potential markets, and non-tariff barriers, the view is gaining wide acceptance that AFTA will prompt foreign firms to transfer strategic production bases to late comers, such as Indonesia, the Philippines and then Viet Nam.

(c) In the case of home appliances, Japanese firms are now working to build production facilities for home appliances and related parts in Indonesia. South Korea, which was slow to move into Singapore and Malaysia, is also focusing on Indonesia. For labor-intensive assembly work of home appliances and their parts and the "back end" processes in semiconductor manufacturing, the transfer to Indonesia is very attractive because of the nation's abundant low-cost labor force and large potential markets.

(d) With the globalization of firms and a glut of production capacity, the existence of potential local markets is growing in importance as an investment yardstick rather than the export possibility alone. In this sense, international firms are pinning great expectations to potential markets in such new ASEAN nations as Viet Nam and Myanmar.

This change in investment environment, which will have a major impact on investment behavior of international firms, offers unsurpassed opportunities for Viet Nam, which is planning to nurture its still underdeveloped electrical and electronics industry. The Vietnamese government agency in charge of industrial policy should capture this opportunity and aggressively utilize foreign capital. If it fails to do so, it will miss the chance to become an international player in the electrical and electronics sector, and may well be unable to bring it out of the infant stage for a long time to come.

Viet Nam must quickly improve its investment environment, especially make fundamental improvements in incentives given to foreign firms wishing to do business in the country, in order to import capital. Mandatory export requirement should be implemented realistically, taking into account

the level of domestic production of parts and materials that are used by foreign companies. The government should introduce rules to enable the writing and execution of long-term timetables rather than aim for short-term results.

(3) Formulation and implementation of policies to nurture industries that are consistent over the long term

During the development of the electrical and electronics industry, Japan and South Korea adopted multi-faceted industrial policies aimed at both import substitution and export promotion. The electronics industry, in particular, was selected as a priority industry, and such preferential treatments as tax and tariff exemption or reduction, low-interest loans, approval for the introduction of foreign technology, waiver of Anti Monopoly Law application were extended. At the same time, domestic companies were protected by import restrictions and high tariff rates. Also, R&D groups were formed and subsidies were allocated to aid the development of important technology. Trade associations played important roles in communication and harmonization of views among the companies as well as with the Ministry of International Trade and Industry (the Ministry of Commerce and Industry in the case of South Korea) and other relevant ministries and agencies.

Characteristics of Japan's electronics industry promotion policy were as follows:

- a) The Ministry of International Trade and Industry took the initiative in achieving consistency and coordination among various industrialization, trade, financial, and science and technology policies.
- b) In implementing policies for priority industries, such as electronics, the government drew up future plans and guidelines with the help of councils and industrial associations and showed them to companies.
- c) The so-called "administrative guidance" was very effective in industry restructuring, capital investment adjustments, and adjustments of sectors in which companies may produce.
- d) Especially effective was the subsidies system designed to promote the development of computer technology, including integrated circuits technology, where Japan was far behind the United States and Europe.

With the emergence of trade friction with the United States and Europe, Japan implemented trade and capital liberalization, and as the effectiveness of market mechanisms was recognized, the major role of the government shifted to formulating "visions" in cooperation with the private sector and to supplying information in order to guide industrial activity. As increasing emphasis was placed on free activity of private companies, the government has narrowed the Ministry of International Trade and Industry took the initiative in achieving consistency and coordination among various industrialization, trade, financial and science and technology policies.

The electronics industry promotion policies varied from country to country in such ASEAN nations as Singapore, Malaysia, and Thailand. The process of development was also different from country to country: The Bumiputra policy in Malaysia; joint ventures with Thai conglomerates, etc. However, in all cases, the government selected the electronics industry as a priority industry, relied on Japanese and other foreign companies for capital and technology, and extended various preferential treatments to foreign firms in order to obtain export markets.

Whether the selection of priority industries and executing policies to nurture and protect them will be effective in nurturing the electrical and electronics industry in Viet Nam must be carefully examined for the following reasons. However, case studies of Japan, South Korea, Malaysia, and Thailand in the areas of concrete policy menus and the formulation and implementation of consistent and integrated policies will at least be worthwhile. In Viet Nam's case, in which the nation will

depend primarily on foreign capital and need to pursue a policy for both import substitution and export promotion, a Thailand-type promotion policy appears to be appropriate.

(a) Unlike in the past, today's electronics industry is very broad in scope and the industry is diversified. In the past, the industry was primarily hardware, such as home appliances and their parts, but today the industry has diverse elements such as software for information communications and audio-video equipment and information communications services.

(b) While the effectiveness of industrial policy is debated, in Japan self-help efforts on the part of private companies played an important role in labor-intensive assembly industries, such as home electronics, while the government subsidies system is said to have been instrumental in the development of technology in the technology-intensive sectors, such as computers and communications, areas in which Japan lagged far behind the United States and Europe. Viet Nam can learn from the Japanese-type industrial policy taking the elements that are appropriate for its stage of development.

(c) Japan and South Korea pursued electrical and electronics industry promotion policies that gave priority on the fostering of domestic firms rather than introducing foreign capital. Therefore, Viet Nam, which must rely on foreign capital, cannot adopt the Japanese or South Korean industrial policies as they are. Thailand, however, would be a good model, as the nation pursued import substitution and export promotion in the ASEAN region.

(d) Given the contents and direction of today's framework of trade advocated by the World Trade Organization (WTO), APEC, and AFTA, the government of Viet Nam should avoid as much as possible policies that protect domestic industries. Policies must be in accordance with WTO principles, such as the most favored nation treatment, national treatment, general prohibition on quantitative restrictions, and a ban on tariffs in excess of concessionary tariffs. However, it is thought that a developing nation like Viet Nam will be granted some grace period during which domestic industries can be protected.

(e) Problems with Viet Nam's industrial policies viewed from foreign investors' perspective are as follows: a) There is no overall consistent policy that is in accordance with market economy principles; b) Due to the absence of a single government ministry or agency that takes initiative in electrical and electronics industry policy, there is not enough policy coordination among related ministries, including the MPI, the Ministries of Industry, Finance, Commerce, and Science and Technology. These are organizational problems associated with policy execution. In this sense, Viet Nam should take a leaf from Japan's or South Korea's book. In Japan the MITI implemented more or less consistent and integrated policies.

Important factors in attracting foreign capital are that a) laws and administrative procedures are made public in writing so that there is predictability for foreign companies (transparency); b) there are no frequent changes in and abandoning of laws (stability); and that c) there are no inconsistencies or arbitrary implementation of laws between the legislature and administration, the central and local governments, among relevant ministries, and among people in charge (consistency).

Cumbersome administrative red tapes not only slow down clerical work but also impede smooth economic activity by private enterprises. Permit and approval procedures sometimes become a hot bed of corruption, cause a lack of transparency and sense of being treated unfairly, and could hamper active economic activities. Therefore, these procedures should be improved promptly.

Table 17(1) The electronics industry promotion policies of major Asian nations

Type	History of industry promotion policies and characteristics of electronics	Implications for Viet Nam's industrial policy (B)
Japanese-type	<p>During the development of the electronics industry, Japan adopted multi-faceted industrial policies aimed at both import substitution and export promotion. The electronics industry, in particular, was selected as a priority industry, and such preferential treatments as tax and tariff exemption or reduction, low-interest loans, approval for the introduction of foreign technology, waiver of Anti Monopoly Law application were extended. At the same time, domestic companies were protected by import restrictions and high tariff rates. Also, R&D groups were formed and subsidies were allocated to aid the development of important technology. Trade associations played important roles in communication and harmonization of views among the companies as well as with the Ministry of International Trade and Industry and other relevant ministries and agencies.</p> <p>With the emergence of trade friction with the United States and Europe, Japan implemented trade and capital liberalization, and as the effectiveness of market mechanisms was recognized, the major role of the government shifted to formulating "visions" in cooperation with the private sector and to providing information in order to guide industrial activity. As increasing emphasis was placed on free activity of private companies, the government narrowed the scope of application of subsidies, low-interest financing, and tax incentives.</p> <p>Characteristics of Japan's electronics industry promotion policy were as follows: (A) The Ministry of International Trade and Industry took the initiative in achieving consistency and coordination among various industrialization, trade, financial, and science and technology policies. (B) In implementing policies for priority industries, such as electronics, the government drew up future plans and guidelines with the help of councils and industrial associations and showed them to companies. (C) The so-called "administrative guidance" was very effective in industry restructuring, capital investment adjustments, and adjustments of sectors in which companies may engage in production. (D) Especially effective was the subsidies system designed to promote the development of computer technology, including integrated circuits technology, where Japan was far behind the United States and Europe.</p>	<p>*Japan's electronics industry policy was implemented under a special ad-hoc law. While the law was in effect, the country was able to implement a consistent industrial policy thanks to the initiative of powerful MITI.</p> <p>*Because Japan's policy placed priority on nurturing domestic industrial capital and curbed the activities of foreign companies through regulations on foreign capital, the policy environment in Japan is markedly different from the current situation in Viet Nam.</p> <p>*The impact of the industrial policy includes industrial restructuring and adjustments of capital investment through MITI's administrative guidance. The most effective measure, however, was the subsidies system in the area of technology development. It is deemed that the system closed the technology gap in industrial applications, such as computers and ICs, which were far behind home appliances. It is necessary to keep in mind that the Japanese policy is somewhat different from the industrial policy Viet Nam needs today.</p>

Table 17(2) The electronics industry promotion policies of major Asian nations

Malaysia-type	<ul style="list-style-type: none"> ▪ The government established MIDA in the 1960s and placed emphasis on export promotion rather than import substitution through investment promotion law. However, as it placed too much emphasis on the nurturing of Bumiputra capital, which was primarily publicly-run enterprises, the industrialization was led primarily by government expenditure. ▪ In 1986, the government introduced Basic Industrial Plans (1986-95) and Investment Promotion Law in a package. They were designed to promote the introduction of foreign capital by extending strong incentives to export industries and to implement the Bumiputra policy flexibly. ▪ The Investment Promotion Law enacted in the mid-1980s was implemented flexibly depending on the export ratio, the size of employment, and the amount of paid-in capital. The foreign capital introduction projects for which applications were made in 1986-1990 were subjects of flexible application of the law, though only for a set period of time. *Under Malaysia's industrial policy, while the Bumiputra policy was implemented flexibly, the electronics industry, which depended heavily on foreign capital and technology, became a core export industry. This policy attracted investment by many Japanese and American electronics makers (sets plus parts), and the industry, though mostly assembly work, has become increasingly capital and technology intensive and internationally competitive. 	<p>*Malaysia managed domestic factors (Bumiputra policy) flexibly, and provided incentives for the introduction of foreign capital and technology into assembly of sets and parts, thereby making it into an export industry.</p> <p>*Because of the small size of Malaysia's markets, foreign companies aimed from the outset at sets and parts exports and supply of parts to set makers. However, because of its large potential markets, Viet Nam is regarded as a nation generating large demand.</p> <p>*Foreign companies operating in Malaysia are engaged primarily in labor-intensive assembly work. As a result, supporting industries, such as subcontractors, are not yet well developed. However, the government policy aims at developing product development capability, improving the technology levels of subcontractors, and the introduction of high-tech foreign firms in such areas as information communications equipment and services in stages.</p>
Thailand-type	<ul style="list-style-type: none"> ▪ In 1972, Thailand enacted investment promotion law, foreign enterprise regulation law, and alien job regulation law, and strengthened the Board of Investment (BOI), which had been established earlier to develop import substitution industries, to develop export industries through selective introduction of foreign capital. ▪ In the early 1980s, the government revised the investment promotion law to enhance the power of the BOI. It authorized 50% or more foreign capital participation if the finished product export ratio is 50% or more, and 100% foreign capital participation if the export ratio is 100%. While the nurturing of domestic capital was an important objective, the country utilized capital, management know-how, and technologies of foreign companies in order to promote export industries. ▪ After the mid-1980s, the investment promotion law was reviewed to give preferential treatment to re-investment and investment in supporting industries and investment in regions other than Bangkok, and 	<p>*While placing emphasis on nurturing domestic capital (mainly conglomerates), which are domestically competitive, Thailand is utilizing capital and technologies of foreign companies, while allowing them partial entry into domestic markets to help develop export industries.</p> <p>*While allowing foreign firms to enter domestic markets depending on the ratio of their capital participation, it is important for the government to flexibly implement investment incentives for foreign firms in such areas as technology transfer in machine fabrication, such as metal mold</p>

<p>reduced the minimum amount of investment. This has accelerated investment by Japanese and other foreign firms in the electronics industry.</p> <ul style="list-style-type: none"> Under a policy to encourage domestic production of parts, import tariffs for parts which are being manufactured in Thailand were set at 30%, and for those which are not produced domestically were set at 10%. <p>*Thailand has a relative large domestic market, and the government at one time regulated foreign capital in order to nurture domestic industrial capital, mainly Thailand's conglomerates. The investment promotion law enacted in the mid 1980s designated the electronics industry as a priority industry. Although foreign companies are expected to promote exports, the industry is being nurtured towards allowing foreign companies to enter domestic markets depending on the ratio of their capital participation.</p>	<p>manufacturing, and dispersion of factories to provinces.</p> <p>*Given Viet Nam's large potential markets, it is desirable for the government to pursue a policy of nurturing the electronics and machinery industries, which include parts and machinery fabrication industries, to prepare for structural changes in the manufacturing industries in the ASEAN region, rather than pursuing a special policy for the electronics industry.</p>
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Source NRI

Table 18 Trend of industrial policy in East Asian countries

Korea	1961~72	promotion of export, protection of the domestic market, nationalization of financial institutions	1973~79	replacement of import (heavy and chemical industries), promotion of export	1980~	liberalization of trade and investment, financial decontrol	1990s	emphasis on international harmony, relaxation or removal of regulations
	1953~57	replacement of import	1958~80	promotion of export	1981~	promotion of export, cultivation of strategic industries	1990s	promotion of research and development
Taiwan							1986~	cultivation of information industry
							liberalization	
Thailand	1961~71	replacement of import	1971~86	reinforcement of import replacement (capital goods beginning in 1981), cultivation of export industries	1986~		1986~	promotion of export, cultivation of technology-intensive industries
Malaysia	1950~70	replacement of import (gradual)	1971~86	addition of promotion of export to replacement of import	1986~		1986~	liberalization of trade and investment
Indonesia	1967~73	"new order" administration (liberalization)	1974~81	replacement of import	1986~		1986~	promotion of export, liberalization
Philippines	1950~	replacement of import	1970s	reinforcement of import controls (collusion between government and business)	1980s	liberalization of trade and investment (political instability)	1990s	retraction of liberalization of trade and investment (stabilization of the political situation)
China	1965~76	cultivation of the defense industry (heavy industries inland)	1977~78	plant import	1980s	industrialization along the coast (mainly light manufacturing)	1990s	infrastructural development, cultivation of high-tech

Source NRI

(4) Obtaining international competitiveness through nurturing of parts and supporting industries

The current problem facing South Korea, which more or less faithfully followed the steps of Japan in industrial policy, and Malaysia and other ASEAN states that achieved high growth relying mostly on Japanese and other foreign companies, is that while transfer of assembly technology has made progress, they have not sufficiently nurtured supporting industries that are the foundation of competitiveness, though the degree of such weakness varies from country to country. In this regard, Taiwan is relatively successful because of the entrepreneurial spirit of ethnic Chinese.

In the parts industries in Malaysia and other ASEAN states, production has expanded thanks to foreign firms, accompanied by a rising trend of the ratio of local contents. On the other hand, such industries as plastic molding, sheet metal processing, metal molds and surface treatment, which are mostly the realms of small and medium-sized firms, are fragile. It is still very difficult to procure parts and metal molds that require special processing or a high degree of precision from local firms, both in terms of quality and prices. These industries must be enhanced in each nation to shorten delivery time, reduce costs, and secure stable supply.

Consequently, while Viet Nam will try to attract foreign companies' assembly plants of labor-intensive home appliances products and related parts in order to build the foundation for the development of electrical and electronics industry, it must at the same time try to promote well-planned transfer of capital and technology from foreign companies in supporting industries, such as machinery fabrication (metal and plastic processing, including metal mold fabrication), design and software technology, and, if possible, the materials industries. By doing so, it will be possible to aggressively guide domestic small and medium-sized enterprises into these sectors. The development of supporting industries is the key to true international competitiveness and is vital in nurturing the electrical and electronics industry into a full-fledged export industry in the long term.

4. Stages of Development of Electrical and Electronics Industry and Viet Nam's Potentials

The chart below shows the potentials for foreign companies' operations in Viet Nam based on the characteristics of the electrical and electronics industry and recent behavior of Japanese and other foreign businesses in this sector.

In summary, if Viet Nam's investment environment improves, Japanese and other foreign companies may promote operations in Viet Nam, starting from the home appliances sector, as they pin expectations on the large potential market in the country. This should encourage the entry of related parts makers and labor-intensive parts assembly (including the "back end" processes of semiconductor manufacturing) companies which wish to export their products overseas. This could accelerate the redeployment of electrical and electronics industry's production facilities, mostly Japanese, built in such ASEAN states as Singapore, Malaysia, and Thailand.

Although the government of Viet Nam states that it wants to foster the electrical and electronics industry as an export industry from the outset, foreign firms' interest is in developing production facilities in Viet Nam as a strategic production base in the ASEAN region in the long run as well as in the country's potential as a market. Therefore it is suggested that long-term development potential at various stages be considered from the following perspectives.

- a) Because of the creation of AFTA, the distinction between domestic markets and export markets will disappear at least within the ASEAN region.
- b) Because of the formation of economic blocs in America and Europe, the major export markets

will be the ASEAN and other Asian markets.

c) In order to be competitive in export markets, Viet Nam must take the time to develop domestic parts industries.

Table 19 Characteristics of major electronic product areas and Viet Nam's potentials

Product category	Type of products and industry's characteristics	Behavior of foreign businesses	Potentials for foreign businesses' operations in Viet Nam
Home appliances (audio-visual)	<ul style="list-style-type: none"> -Color TVs, VCRs, Audio equipment, etc. *Mass production assembly based on the supply of key devices and large-variety, large-lot general purpose parts. Relatively small capital investment. 	<ul style="list-style-type: none"> -Japanese companies' product development initiatives -Global expansion of Japanese and South Korean firms to be close to markets due to trade friction, exchange rates, the formation of regional blocs -Export bases in ASEAN to be restructured due to AFTA 	<ul style="list-style-type: none"> -If Viet Nam's investment environment improves, possibility exists of entry by Japanese and South Korean businesses because of Viet Nam's large potential markets and the trend towards the restructuring of ASEAN production bases
Home appliances (White goods)	<ul style="list-style-type: none"> -Washers, refrigerators, air conditioners, vacuum cleaners, etc. *Large capital investment due to fabrication of machinery and in-house parts production (one or two digits higher than investment for audio-video equipment manufacturing) 	<ul style="list-style-type: none"> -Makers will locate in countries with large potential markets due to investment and shipping efficiency -Japanese companies are highly competitive in key devices 	<ul style="list-style-type: none"> -If Viet Nam's investment environment improves, Japanese and South Korean firms may actively enter Viet Nam because of its large potential markets and rising living standards.
Communications equipment and systems	<ul style="list-style-type: none"> -Switchboards, transmitters, communication terminals, etc. *For infrastructure systems, the firms will locate in the market also for maintenance purposes. For terminals, such as telephone sets, mounting technology and mass production assembly are required 	<ul style="list-style-type: none"> -Japanese, U.S. and European firms and others are operating in the market or forming capital tie-ups, and entering into each other's turf. -While U.S. and European firms excel in system capabilities and proposing standard technologies, Japanese firms excel in terminal parts technologies and mass production capabilities. 	<ul style="list-style-type: none"> -In the long term, while Viet Nam builds its domestic communications infrastructure, cooperation (in terms of funding and technology transfer) among Japanese, U.S. and European firms is essential.
Information equipment	<ul style="list-style-type: none"> -PCs, hard disk drives, monitors, printers, CD-Roms, etc. *PCs are technology intensive in software and semiconductors and their development cycle is short. They are also mass production assembly. Peripheral equipment are technology intensive in key devices and mechatronics and are mass produced. 	<ul style="list-style-type: none"> -In PCs, the United States is dominant because of its strong operating systems development capabilities and favorable environment for venture businesses. -Aside from Taiwanese firms' strength in PC and monitor assembly, Japanese firms excel by far because of their accumulation of technology related to key devices and mechatronics. 	<ul style="list-style-type: none"> -If Viet Nam's investment environment improves thanks to the building of infrastructure, American firms, which hitherto have assembled in the ASEAN nations, may well transplant labor-intensive processes to Viet Nam.
Electronic devices	<ul style="list-style-type: none"> -MPUs, DRAMs, LEDs, LCDs, etc. * "Front end" processes consist mostly of equipment-intensive processing, while "back end" processes consist of labor-intensive work. 	<ul style="list-style-type: none"> -While U.S. companies far excel in MPU development capabilities, Japanese companies are dominant in memory chips and other devices. -"Front end" processes are carried out in Japan, the U.S. and Europe (and South Korea and Taiwan), while "back end" processes are carried out in low-cost ASEAN countries. 	<ul style="list-style-type: none"> -If Viet Nam's investment environment improves, Japanese, U.S. and European companies may transplant some of labor-intensive "back end" assembly work now conducted in the ASEAN nations to Viet Nam.

<p>Material-type parts</p>	<p>-Resistors, capacitors, etc. *As in the case of electronic devices, "front end" processes are equipment intensive, while "back end" processes are labor intensive.</p>	<p>-With the exception of parts for industrial use, which are typically small-lot, large-variety production, Japanese firms supply the bulk of parts for consumer equipment. -Most parts for consumer equipment are now manufactured in the ASEAN nations, which have become the production bases for finished sets. There is division of labor between Japan and the ASEAN nations.</p>	<p>-If Viet Nam's investment environment improves, and assembly of home appliances there expands, some of "back end" processes now conducted in the ASEAN nations could be transferred to Viet Nam.</p>
<p>Assembly-type parts</p>	<p>-Coils, transformers, switches, connectors, PCBs, etc. *Most of these parts require labor-intensive assembly using metal or resin materials.</p>	<p>-As in the case of material-type parts, the bulk of parts for consumer equipment are supplied by Japanese firms. Parts in the middle range or lower are increasingly produced in South Korea and Taiwan. -Makers are moving to developing nations to take advantage of low labor costs.</p>	<p>-If Viet Nam's investment environment improves and assembly of home appliances there increases, some of the assembly work now carried out in the ASEAN nations can be transferred to Viet Nam.</p>
<p>Special-purpose processed components</p>	<p>- Various processed components that are not standardized and must be adapted to the product or component development in question, such as equipment frames and PCBs. * Most involve labor-intensive processes using metal or plastic material.</p>	<p>- In development of offshore locations, set manufacturers depend on in-house production or supply from local manufacturers that have technical tie-ups with, or are joint ventures of, Japanese companies. - Japanese processing companies capable of offshore business development site overseas along with set component manufacturers.</p>	<p>- Japanese and other developed-country manufacturers of special-purpose processed components move while monitoring the siting activity of counterpart set and component manufacturers.</p>

Source NRI

5. Stages in the Phased Advancement of Electric and Electronics Industry in Viet Nam

Policy for a phased advancement of electric and electronics industry in Viet Nam as outlined below is thought to be advisable in light of factors such as the characteristics of electronics products, the stage of advancement in Malaysia and other countries where siting began earlier, and the international trends in industrial capital from Japan and other countries. More specifically, it is thought that Viet Nam should attract foreign capital for assembly-based production of home appliances and related components for the domestic market and key components for personal computers and other such information equipment. In so doing, it should aspire to reinforce its component industry and gradually transform itself into a strategically important site of production for supply of other ASEAN markets and other Asian markets.

ASEAN countries which attracted siting in this industry earlier, meaning most importantly Malaysia and Thailand, were able to make progress in turn from the initial stage of import replacement to export. For Viet Nam, however, there is no longer much temporal margin for making such a division between import replacement and export promotion in policy for advancement, because of factors such as the global maturation of production capacities for equipment and components, the imposition of common tariffs in ASEAN trade under the AFTA scheme, and the influence of the WTO. In other words, Viet Nam must realize that is facing the need to replace import and promote export at the same time.

Stage 1 (from the present to about 2000; Laying the foundation of the electric and electronics industry)

- a) Stage of laying the foundation of the electric and electronics industry with reliance mainly on home electric and electronics appliance manufacturers from Japan and other countries
- b) Policy for parallel promotion of replacement of AV product import by CKD assembly and export accenting assembly of key components(sub-assemblies) for personal computers and other types of information equipment, and of components for assembly
- c) Assurance of the consistency of policy on foreign capital and clarification of incentives for siting

Stage 2 (for five years, from 2000 to 2005; Adaptation to AFTA/CEPT)

- a) Stage of attraction of siting of strategic export bases in response to the reconstruction of ASEAN production sites by Japanese and other foreign capital
- b) Cultivation of component industry with reliance on Japanese and other foreign capital (promotion of export of assembly-use components, domestic production of special-purpose processed components, and reduction in tariffs on import of general-purpose components, for expansion of the items of domestic component production)

Stage 3 (for five years, from 2005 to 2010; Building international competitiveness)

- a) Stage of nurturing the competitiveness of set production in the international market through acquisition of competitiveness (in the aspects of quality, lead time, and cost) by the component industry
- b) Improvement of the infrastructure for promotion of supporting industry (induction of foreign

capital and support for ventures)

c) Nurturing of the development of domestic industrial capital for conditioning of the infrastructure of life activities, the environment, and information processing and communications along with economic growth

Stage 4 (for ten years, from 2010 to 2020; Build-up of domestic industrial capital)

a) Stage of full-scale advancement of the electric and electronics industry, with international competitiveness in the ASEAN context, by both foreign and domestic capital

b) Acquisition of engineering skills enabling original development and design and facility maintenance

c) Foothold for “catching up” in high-VA, high-tech fields such as info-communications and electronic devices

Table 20 Fields of phased promotion of electric and electronics industry in Viet Nam

	Stage 1 (present - 2000) Laying the foundation of the electric/electronics industry	Stage 2 (2000 - 2005) Adaptation to AFTA/CEPT	Stage 3 (2005 - 2010) Acquisition of international competitiveness	Stage 4 (2010 - 2020) Increase in domestic industrial capital
Characteristics of each stage as regards policy for cultivation of electric/electronics industry	<ul style="list-style-type: none"> ▪ Stage of laying the foundation of the industry with reliance on Japanese and other foreign capital (AV manufacturers) ▪ Parallel promotion of import replacement through CKD assembly of AV products and promotion of export emphasizing assembly of assembly-use components ▪ Assurance of the consistency of policy on foreign capital and clarification of incentives for siting 	<ul style="list-style-type: none"> ▪ Stage of attraction of siting of strategic export bases in response to the reconstruction of ASEAN production sites by Japanese and other foreign capital ▪ Cultivation of component industry with reliance on Japanese and other foreign capital (promotion of export of assembly-use components, domestic production of special purpose processed components, and reduction in tariffs on import of general-purpose components, for expansion of the items of domestic component production) 	<ul style="list-style-type: none"> ▪ Stage of nurturing the competitiveness of set production in the international market through acquisition of competitiveness (quality, lead time, and cost) by the component industry ▪ Improvement of the infrastructure for promotion of supporting industry (induction of foreign capital and support for ventures) ▪ Nurturing of the development of domestic industrial capital for conditioning of the infrastructure of life activities, the environment, and information processing and communications along with economic growth 	<ul style="list-style-type: none"> ▪ Stage of full-scale advancement of the electric and electronics industry, with international competitiveness in the ASEAN context, using both foreign and domestic capital ▪ Acquisition of engineering skills enabling original development and design and facility maintenance ▪ Foothold for "catching up" in high / V/A, high-tech fields such as info-communications and electronic devices
AV and home appliance mainstays	<ul style="list-style-type: none"> ▪ Promotion of replacement of AV import with CKD production based on joint ventures between domestic and foreign capital 	<ul style="list-style-type: none"> ▪ Construction of AV assembly bases with a strategic importance in the ASEAN context, taking account of compliance with AFTA/CEPT by foreign capital (i.e., reconstruction of supply structures) 	<ul style="list-style-type: none"> ▪ Promotion of replacement of import of household mainstays through expanded production by foreign capital and by joint ventures with foreign capital 	<ul style="list-style-type: none"> ▪ Construction of production sites and development of engineering capabilities (development functions plus assembly functions) with a strategic importance in the ASEAN context for products for which general-purpose components can be domestically sourced
Electronic equipment production				

<p>Information equipment, components, and systems, and communications equipments and systems</p>	<ul style="list-style-type: none"> ▪ Attraction of siting of export oriented assembly-based (CKD/SKD) productions of info-communications components (all types of board assembly and switching power sources) by Japanese and other foreign capital 	<ul style="list-style-type: none"> ▪ Growth of assembly of more labor-intensive, mass-production products such as monitors, CD-ROM, DVD, and cordless phones by attraction of Japanese, Taiwanese, and other foreign capital 	<ul style="list-style-type: none"> ▪ Expansion of assembly-based production of HDD, printers, fax, copiers, and other mechatronics information-type products by attraction of Japanese, U.S., and other foreign capital ▪ Infrastructural conditioning for cultivation of domestic production in the info-communications field (e.g., software) 	<ul style="list-style-type: none"> ▪ Growth into strategic site through acquisition of full-fledged competitiveness in assembly of info-communications equipment, albeit with reliance on foreign capital ▪ In-depth development of info-communications industry based on domestic capital <ul style="list-style-type: none"> - Info-communications service networks - Information processing industry - Software industry etc.
<p>Assembly components, special-purpose processed components</p>	<ul style="list-style-type: none"> ▪ Aggressive attraction of siting by Japanese and other foreign manufacturers of special-purpose processed components needed for assembly of home appliances, and support for domestic sourcing of components by set manufacturers ▪ Establishment of export processing zones and aggressive attraction of siting by Japanese component makers given incentives conditioned on export of all of the production 	<ul style="list-style-type: none"> ▪ Growth as strategic site of production by Japanese and other foreign manufacturers of components for assembly which are making efforts to reconstruct their ASEAN production schemes in response to cost increases, difficulties in employment, and AFTA/CEPT 	<ul style="list-style-type: none"> ▪ Acquisition of international competitiveness in set production through domestic production of assembly components and special-purpose processed components, enabling attainment of local contents of more than 50 percent in home appliance production with the help of Japanese capital 	<ul style="list-style-type: none"> ▪ Acquisition of precision processing technology for molded (metal-formed) components, etc., through technology transfer from Japan, enabling domestic production of mechatronics components indispensable for production of info-communications equipment

Electronic component industry

<p>Electronic devices and material-type components</p>	<ul style="list-style-type: none"> ▪ Establishment of export processing zones and aggressive attraction of siting by Japanese component manufacturers given incentives conditioned on export of all of the production 	<ul style="list-style-type: none"> ▪ Aggressive attraction of post-process lines for material-type components and semiconductors 	<ul style="list-style-type: none"> ▪ Development of pre-process lines for material-type components, enabling a local contents of more than 50 percent for electric and electronic products, with reliance on foreign capital ▪ Full-scale development of IC technology in cooperation with foreign capital (trial) 	<ul style="list-style-type: none"> ▪ Promotion of the growth of pre-process lines for material-type components and of domestic semiconductor industry (taking up the challenge of full-fledged pre-processing)
<p>Machining technology, molding and molded components, and materials (steel, chemicals and synthetics)</p>	<ul style="list-style-type: none"> ▪ Attraction of siting by Japanese and other foreign component manufacturers for production of special-purpose processed components for home electric appliances ▪ Conditioning of the infrastructure of export processing zones, power, communications, roads, ports and harbors, etc. 	<ul style="list-style-type: none"> ▪ Attraction of siting by Japanese and other foreign component manufacturers for production of machining components (promotion of joint ventures) • Reinforced development of technicians in the fields of molding and metal and plastic processing ▪ Encouragement of participation by domestic capital and skilled technicians in supporting industry (including state-run enterprises) 	<ul style="list-style-type: none"> ▪ Promotion of transfer of molding, machining, and other core technology from Japanese and Taiwanese capital (clarification of siting incentives) ▪ Intensification of, and construction of bases for, R&D functions (development of high-tech parks, etc.) 	<ul style="list-style-type: none"> ▪ Fostering of the growth of core industries such as steel and petrochemicals to enable domestic sourcing of general-purpose steel sheet and plastics
<p>Supporting industry</p>				

Source NRI

Table 21 shows ratings of factors of Viet Nam's international competitiveness relative to other ASEAN countries which are at a further stage of industrial advancement, taking account of the impact of AFTA and assuming that Viet Nam deployed appropriate industrial policy as regards induction of foreign capital and conditioning of the investment regime to that end.

If the Vietnamese government deploys appropriate policy for promotion of industry while attracting foreign investment, it is thought that the electric and electronics industry would be able to preserve a competitive edge in respect of labor conditions and that the country could catch up to the levels of more developed ASEAN countries in respect of infrastructure and other factors by around 2010.

Table 22 profiles the stages of development of the electric and electronics industry in Viet Nam in the aspects of form of set and component production and changes in the supply structure.

The initial stage would be characterized by reliance on import for most components for set assembly. Over the medium and long terms, however, the focuses would be promotion of domestic production for general- and special-purpose processed components, transformation of both set and component industries into export industries, and major expansion of the electric and electronics industry.

Table 21 Rating of factors of the International competitiveness of Viet Nam

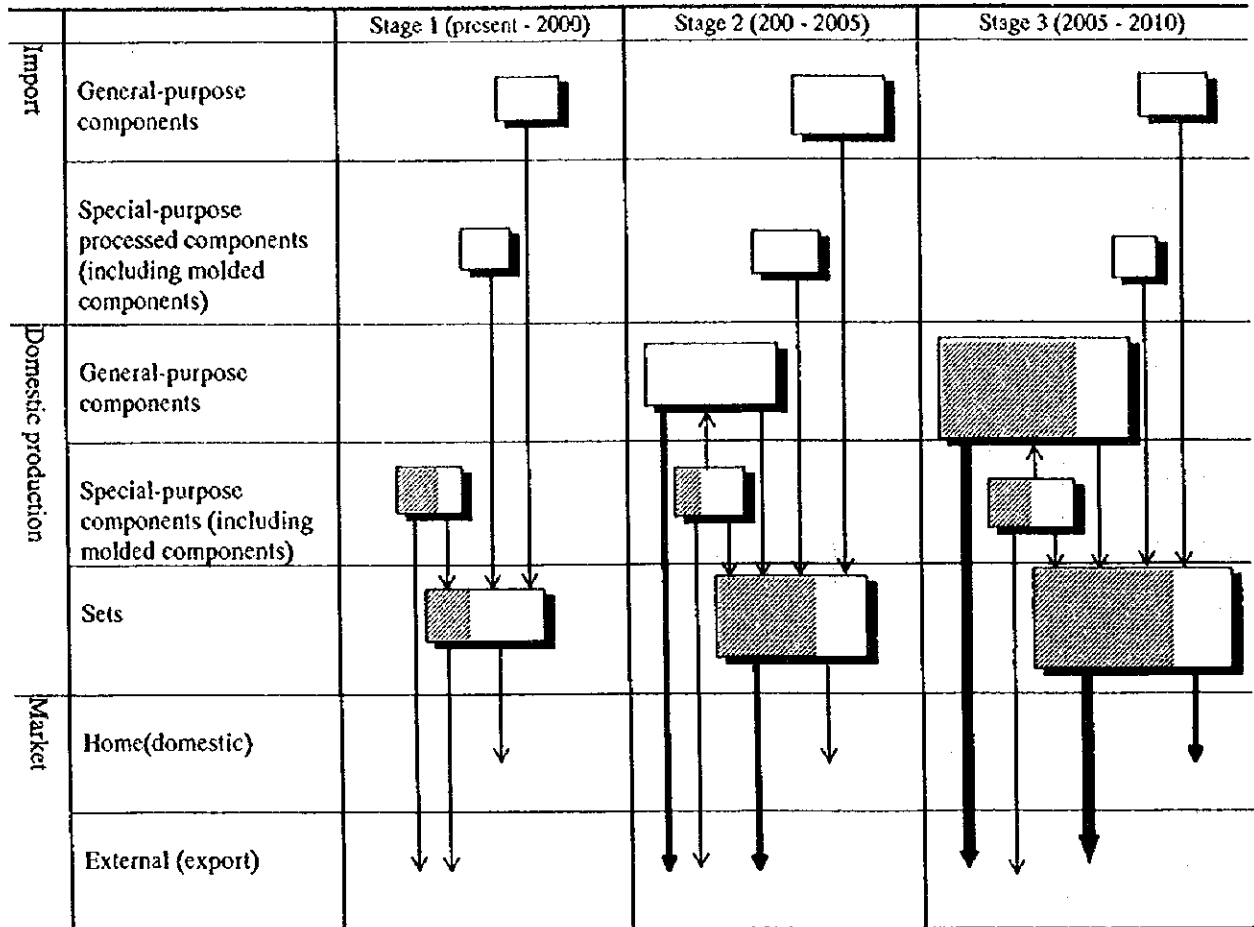
	Stage 1 (around 2000)			Stage 2 (around 2005)			Stage 3 (around 2010)		
	Relative to Malaysia	Relative to Thailand	Relative to Indonesia	Relative to Malaysia	Relative to Thailand	Relative to Indonesia	Relative to Malaysia	Relative to Thailand	Relative to Indonesia
Labor cost	⊙	⊙	○	⊙	⊙	○	○	○	==
Labor quality	○	○	○	○	○	○	○	○	○
Labor force (quantity)	⊙	○	=	⊙	○	=	⊙	○	=
Infrastructure	×	×	△	△	△	△	=	=	=
Supporting industry	△	△	△	△	△	△	○	=	○
Market economy mechanism	×	×	×	△	△	△	=	=	=
Industrial policy (induction of foreign capital, industrialization, etc.)	×	×	×	△	△	△	=	=	=
Latent market scale	×	×	△	△	△	△	○	=	=
Export competitiveness	×	×	×	△	△	△	=	=	=

Notes

- ⊙ : Vietnamese competitiveness is considerably superior
- : Vietnamese competitiveness is relatively superior
- = : Vietnamese competitiveness is on roughly the same level
- △ : Vietnamese competitiveness is relatively inferior
- ×

Source NRI

Table 22 Form of set and component production and changes in the supply structure in each stage of industrial advancement in Viet Nam



Notes

- 1) In this figure, sets indicate AV equipment and info-communications equipment, and key components (sub-assemblies) of the latter (e.g., PC mother boards, major circuit boards, and switching power sources).
- 2) Shaded portions indicate export, and blank portions, production for the domestic market.

Source NRI

Table 23 Capital and technology intensiveness of electronics industry in major Asian countries and Viet Nam's potential

	South Korea, Taiwan		Singapore, Malaysia		Indonesia, (the Philippines)		Viet Nam's potential		
	Present	Future	Present	Future	Present	Future	Present	In 10 years.	In 20 years.
Home appliances (AV)	◎	○	◎	○	○	◎	△	○	◎
Home appliances (white goods)	○	○	○	○	○	○	△	○	○
Communication equipment systems	○	△	△	△	△	△	△	△	△
Information equipment systems	△	○	○	◎	△	○	△	△	○
Electronic devices (semiconductor parts, etc.)	○	○	△	○	○	○	△	△	○
Material-type parts	○	○	△	○	○	○	△	△	○
Assembly-type parts	○	○	◎	◎	○	◎	△	○	◎
Supporting industries	△	○	△	△	△	△	△	△	○
Accumulation of basic technologies (machine fabrication, metal molds)									
Basic materials industries	○	○	△	△	△	△	△	△	○

Source NRI

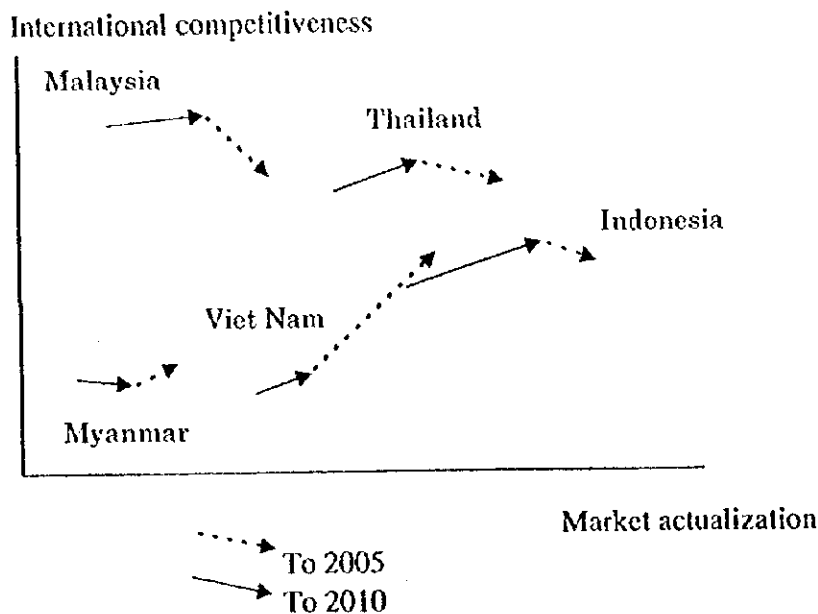


Chart 17 Comparison of more industrialized Asian countries and Viet Nam in respect of market actualization and international competitiveness

Source NRI

6. Opportunities and Cautions for Viet Nam in Major Fields of the Electric and Electronics Industry

(I) Home appliances (AV)

Lowering import tariffs on general-purpose components and to gain competitiveness relative to smuggled goods as well as requires conditioning of the environment to encourage replacement of import and acquisition of an export capability as far as possible. Eradication of smuggling is necessary for expansion of the scale of domestic assembly and normalization of competitiveness.

It would be difficult to attract investment in projects directed to the home market on the part of manufacturers of general-purpose components if the domestic production is only on the order of 1.0 - 2.0 million units. However, a large demand is not necessarily required in the case of special-purpose processed components such as frames, which change with the set design. As such, foreign concerns may decide to site of their own accord once the set production has advanced to a certain degree. This, in turn, would encourage siting by set manufacturers.

The question of whether or not Viet Nam will be able to develop an industry with export competitiveness in the field of AV equipment following the effectuation of CEPT in 2003 depends on its actions. If Viet Nam succeeds in attracting siting by manufacturers of components for assembly and Japanese manufacturers build production bases there, it could very well secure a position as a center of export.

Over the long term, Viet Nam should aggressively seek transfer of development activities adapted to local needs and promote a structure combining sets, components, processing manufacturers, and press (mold stamping) manufacturers so that the industry progresses beyond accumulation of assembly know-how.

Following 2003, it should attain the target of reduction of the tariff on general-purpose components, at the least, to 5 percent or less, and thereby take full advantage of CIFT while attaching priority to nurturing set competitiveness.

Video equipment has taken on the nature of household necessities, and a sufficient economy of scale may be expected from the domestic demand. In the case of audio equipment, a mass-production effect is essential for rigorous price reduction, and this inevitably makes the production led by export.

(2) Home appliances (conventional mainstays)

Many Japanese manufacturers have already completed construction of production networks for conventional mainstay appliances in the ASEAN region. In light of the huge investment required, it is unlikely that manufacturers will build strategic locations in this field in Viet Nam, with the possible exception of those which have been slow to site offshore, such as Sanyo Electric and Korean manufacturers, and those targeting the domestic Vietnamese market.

As such, the approach should be to promote the growth of industry in step with the demand for mainstay electric appliances, which generally rises along with the standard of living, while making use of the energies of foreign concerns desiring to site. Although there are no prospects for siting of full-fledged plants extending to press processes, there are high expectations for the demand in Viet Nam, and many Japanese companies could become interested in siting for assembly-based production on the CKD level. Furthermore, production should shift to an end-to-end system as the demand is actualized.

The major tasks in the area of mainstay appliances are arrangements for sourcing of steel sheet and other materials (not to mention general-purpose components) and construction of sales channels. There will also be a need for transfer of maintenance technology for metal presses (molds), for which the operation will have to depend on in-house production or import from areas such as Japan or Taiwan for the time being. Over the longer term, technology for production of presses will have to be transferred. Some fairly large presses could be involved, and it would be necessary to consider synergy with automotive components.

(3) Information-communications equipment and systems

Products such as personal computers (PCs), core PC components (e.g., mother boards, interface boards, and power sources), cordless telephones, and mass-produced PC peripheral products such as CD-ROM drives, monitors, and floppy disk drives (FDD) apply high-tech features for key components. At the same time, the environment of international competition in this field is extremely harsh, and costs must be held to the bare minimum. As such, while it depends on import for key components, production of sets, peripheral products, and core components by developed-country manufacturers is often sited in countries offering low costs, such as Thailand, China, and the Philippines.

Viet Nam has the potential to be a promising producer in this field if it can offer sources for frames and metal and plastic special-purpose components as well as a full supply of low-cost yet high-quality labor. It would have to target Japanese and U.S. high-tech companies that have not yet sited in China or the Philippines.

Products such as hard disk drives (HDDs), fax machines, and copiers require components and assembly employing more high-precision mechanical technology. Even if entry into these segments is effected through reliance on Japanese and other developed-country manufacturers, it would be essential to promote the growth of a supporting industry domestically in such areas as machining and presses over the long term.

To condition the domestic information-communications infrastructure will demand attraction of siting by foreign concerns in the areas of electronic switches and relays as well as import of the requisite products and components and maintenance provisions for the same. An additional requirement is the training of all sorts of system engineers toward the goal of construction of an information-communications system to support both corporate activities and public services. However, this training would make a contribution more in the area of the domestic infrastructure than in that of export competitiveness.

(4) Assembly components and specialized processed components

Assembly components such as coils, transformers, and power sources are generally labor-intensive. Recently, production has begun to migrate from Malaysia and Thailand, where it had gravitated, to countries offering lower costs, such as Indonesia, China, and the Philippines. This trend is being accelerated by AFTA and CEPT. Viet Nam consequently could become a candidate site.

In the areas of PCBs, frames, and special-purpose metal and plastic processed components, there is a strong trend toward siting adjacent to the concentration of set production. The expansion of set assembly in Viet Nam therefore should intensify needs for siting of component production nearby and encourage siting by manufacturers of such components. These manufacturers are usually small or medium enterprises, and promotion of siting by the same requires carefully articulated measures, such as clear incentives and simplification of procedures.

In the case of the former components, siting by production by foreign concerns would have to center around export because the domestic market would not be large enough initially. All input materials would be imported, assembled, with the output then exported. There would be little effect for technology transfer, but such a scheme would be a means of great foreign exchange earnings. A prerequisite would be adequate preparation of export processing zones.

Assembly components can be supplied to the domestic demand for sets only when the country has become a full-fledged base of set export. This would require transfer of assembly technology to Viet Nam, in connection with the cultivation of supporting industry.

(5) Material components and electronic devices

In both fields, the initial prospects would be confined exclusively to post-process lines of foreign manufacturers (mainly Japanese for material components, and Japanese and Western for electronic devices). The sites of post-process assembly lines of Western manufacturers are basically settled, but there is a possibility of expansion to new sites as the scale of production expands. In the case of Japanese manufacturers, the foreign sites account for only about 20 - 30 percent of the production volume, and there is a chance of reconstruction of production schemes including siting of pre-processes in ASEAN countries. Viet Nam could catch siting of the related assembly plants over the next five years. It should take aim at siting of post-processes for the time being and examine the prospects for attracting siting of pre-processes over the long term.

Even in the case of these components and devices, if the substance is assembly, the required arrangement in the host country is basically the same as for ordinary assembly-base components, but the prime candidates would be large enterprises. As such, efforts would have to take full consideration of actualizing possibilities as regards investment ripple-effects and ongoing investment in pre-processes.

(6) Supporting industry

As noted below, the scope of supporting industry is extremely broad. This section concerns mainly

the first type, which is deeply connected to the electric and electronics industry.

- 1) Material processing areas such as presses, press products, metal processing, plastic processing, surface processing, and jigs, as well as chemical treatment, CAD-CAM design, etc.
- 2) Production of machinery and equipment for the development, assembly, and production activities of manufacturers
- 3) Supply of materials such as iron, non-ferrous metals, and petrochemicals
- 4) Various infrastructural provisions (e.g., physical distribution)

In ASEAN countries, local industry supporting production and assembly of global products mainly by foreign-affiliated manufacturers accounts for a very low share of the total. Those local manufacturers which are not joint ventures of or are not receiving technology transfer from Japanese or other foreign capital have negligible capabilities for supply of pressed and machined components; their capability is basically limited to printed materials for instruction, packing materials, and simple items such as screws.

The seat of supporting industry is usually made up by the aggregate of small and medium enterprises in possession of the specialized technology. While policy measures are indispensable for training such technicians, on-the-job training (OJT) provided through business with foreign capital is the most effective means of achieving technical levels up to international standards. For this reason, the timing of induction of foreign investment in this area cannot be too soon (i.e., siting will not be made without a sufficient market), and there is a need for full provision of incentives for the same (given the great risks attending siting by small and medium enterprises).

Thailand provides a precedent case in this field. Considering the presence of skilled labor at state enterprises, Viet Nam is thought to have a high potential as regards the latent scale of the market and prospects for development of automotive and other mechanical industries. As such, it should reinforce training while looking for synergistic effects with the auto industry.

It used to be said that producing press technicians took about ten years. Today, however, much of the know-how has been incorporated into facilities, and the time requirement has decreased. In Japan, spin-out from large companies accounts for a large proportion of the press technicians. This points to a need for ongoing reinforcement of training in response to requests from set manufacturers entering Viet Nam, through fiscal aid for programs for spin-out personnel in press production divisions and active use of the skills of state enterprises.

7. Investigation of the Policy Options for Promotion of Electric and Electronics Industry in Viet Nam

There are two major perspectives on policy for promotion of electric and electronics industry in Viet Nam, as shown below. Investigations of the orientation of the development of this industry and deployment of related policy must be grounded in a full awareness of the difference between the two. Studies based on this point must also be made for the prospective preparation of master plans for the electric and electronic industry by the Vietnamese government, with a view to building a widespread consensus among the concerned parties.

- 1) Introduction of capital and technology (both assembly and component) with the assistance of foreign concerns, in order to acquire foreign currency and advanced technology needed for the promotion of economic growth and industrialization; cultivation of the electric and electronic industry as a leading export industry.

2) Construction of the domestic infrastructure of information processing and communications and production (technology), e.g., telecommunications and computer (network) systems, through introduction of advanced technology; over the longer term, development of original R&D capabilities to promote the growth of high-tech industry in such fields as semiconductors, if possible.

The perspective of this project is confined to the first, i.e., cultivation of the electric and electronic industry as a leading export industry. Considering factors including response to AFTA, it is thought that Viet Nam has a position of comparative advantage relative to other ASEAN countries, in spite of its late start, as regards overall competitiveness in the aspect of labor factors (quantity, quality, and cost). As such, it has the potential to acquire sufficient competitiveness for production in this industry over the long term.

It is vital for Viet Nam to develop its industry in a manner that will enable full exercise of its international competitiveness and differs somewhat from that in other forerunning ASEAN countries (i.e., that will emphasize the first perspective above and make effective use of the results to contribute to advancement in line with the second perspective). To this end, it is essential for Vietnamese industry to have the capability to supply set manufacturers with quality yet low-cost domestically produced components, and component manufacturers with quality yet low-cost domestically produced materials and special-purpose processed components.

For this reason, as its top priorities for induction of foreign capital, Vietnamese policy for promotion of industry through aggressive encouragement of siting should emphasize component manufacturers over set manufacturers, and special-purpose processed component manufacturers (i.e., molding and other supporting industries) over general-purpose component manufacturers. In addition, policy must reflect consideration of this point. In other words, it is thought that the development of supporting industry will naturally lead to an influx of foreign-affiliated manufacturers of general-purpose components and sets as long as Viet Nam retains a competitive edge, at least in respect of labor circumstances.

However, it would not be advisable for the Vietnamese government to attempt to achieve such a flow of capital by regulatory or control-type means. It must be firmly committed to operation of policy that will facilitate the natural gravitation of foreign capital and advanced technology to Viet Nam while leaving the process to the logic of capital, even if that entails a little more time.

Industrial policy grounded in the second perspective is largely involved with infrastructural conditioning. As such, it would be more realistic for state-run Vietnamese enterprises to play the principal role in it while receiving advanced technology from other countries (of course, considerations of efficiency could result in partial privatization of, or formation of joint ventures by, these enterprises). The introduction of such advanced systems should parallel economic advancement. Over the long term, universities and national research institutes presumably have a key role to play in development of human resources and advanced technology needed to give Viet Nam a distinctive competitive strength.

(1) Overall policy on the electric and electronics industry

Viet Nam can draw on the comparative advantage deriving from its labor supply and latent market and on the changes in the investment environment in the years leading up to the effectuation of AFTA in 2003 in promoting aggressive campaigns to attract siting by Japanese and other developed-country concerns in this industry. Such siting would enable acquisition of capital, advanced technology, and an export capability. Over the longer term, it could aspire to development of a full-fledged industry

with international competitiveness through cultivation of domestic industry and capital and nurturing of R&D capabilities.

Viet Nam should prepare its own master plan for the industry spelling out the orientation and targets of its future development, the methods of acquiring capital and advanced technology at each stage of development, and the division of roles between domestic and foreign capital.

To this end, Viet Nam must promptly condition the investment regime to encourage an influx of foreign capital. At the same time, to acquire international competitiveness, it must attract foreign capital with component assembly and processing technology on a level above set assembly while also promoting the transfer of foreign capital and technology needed for the growth of supporting industry to underpin its electric and electronics industry.

High risks are associated with specification by government of industries to be cultivated and governmental involvement in all aspects related to industrial cultivation and development. Such involvement is, to a certain extent, unavoidable in the case of the auto industry, for which there are high expectations for growth into one of the country's core industries. In the case of the electric and electronics industry, however, governmental policy involvement, whether direct or indirect, is not advisable, seeing that technological advancement is constantly moving forward over a very broad front and that the development is to depend on multinational capital. In other words, the government should basically leave the industry to develop freely by itself, aside from application of the fundamental rules pertaining to policy for attraction of foreign capital.

(2) Response to AFTA/CEPT

In its phased adaptation to AFTA/CEPT (i.e., lowering of tariff rates for selected items), the Vietnamese government should basically take tariff measures that are advantageous to its interests. However, it is thought to be advisable for Viet Nam to accept the common tariff measures as scheduled in the program culminating in the effectuation of the AFTA/CEPT scheme in 2003, with certain exceptions where there is room for negotiation in light of Viet Nam's underdeveloped status. The reasons for this conclusion are as follows.

Although common ASEAN tariffs based on AFTA/CEPT pose a major threat to domestic industry, which is not internationally competitive, over the short term, the prospective benefits to Viet Nam over the long term far outweigh the short-term drawbacks. This is because, over the long term, AFTA/CEPT will stimulate the mobilization of capital needed for the construction of strategic production sites in countries offering higher levels of production efficiency by Japanese and other foreign industrial capital, and Viet Nam is equipped with advantageous siting circumstances given its low-cost supply of abundant labor and the potential of its domestic market.

The electric and electronics industry principals requiring protection from import tariff reductions for the time being are state enterprises and other companies that lack international competitiveness. Over the long term, however, it would not be advisable for Viet Nam to retain protection for specific fields, with the exception of those related to the national infrastructure. At the least, the government should press rapidly ahead with conversion to setups that do not require protection, whether by tariffs or by non-tariff measures, by 2003 for the group of state enterprises supplying the private-sector demand.

At the same time, to receive the benefits of the common tariffs, it would be necessary to recognize homologation if the production has a local contents of at least 40 percent on the cost basis. To achieve such a rate, Viet Nam will have to promote the growth of component industries accompanying supporting industries (e.g., manufacturers of general-purpose components and special-purpose processed components).

(3) Policy for induction of foreign capital

To attract foreign investment, it is advisable for the prime minister or other high-ranking official to take the lead in reinforcing related organizations and capabilities in the interest of ensuring the consistency of MPI policy in the area and inducing a full exercise of abilities for coordination of related measures among concerned ministries and agencies. This is also effective for increasing the credibility of the policy in the eyes of international capital.

More specifically, there is an urgent need for putting all policy instruments into a coherent form and setting them in motion both inside and outside the country. The instruments in question include provisions such as the adjustment of capital subscription ceilings in accordance with import replacement and export activities; various incentives (e.g., income tax deductions and exemptions, and preferential tariffs on import of components, materials, and manufacturing equipment); conditioning of the infrastructure of industrial parks that are prospective sites (e.g., putting in order the supply of electricity, communications and distribution services, water, etc., and unification of procedural requirements); and the whole body of laws and regulations, siting circumstances, and employment terms related to foreign capital, including the issues of overseas remittance and royalty payments.

Judging from the business environment of international industrial capital and the level of industrial development of Viet Nam, the electric and electronics industry segments and enterprises to be emphasized in campaigns for attraction of foreign capital in each stage are as follows.

Stage 1

- a) Manufacturers of home appliances (AV) to replace import (with some export), and manufacturers of the related special-purpose processed components
- b) Companies assembling PCs and other types of information equipment and their core components, and manufacturers of the related special-purpose processed components
- c) Manufacturers of assembly-base components that are labor-intensive and have prospects for export from Viet Nam

Stage 2

- a) Manufacturers of home appliances (AV) and related components restructuring their strategic assembly locations in preparation for AFTA
- b) Japanese and U.S. manufacturers restructuring their ASEAN locations for materials components and semiconductor post-processes
- c) Manufacturers of information equipment and components (half-finished goods) aimed at establishment of mass-production plants in ASEAN countries
- d) Small and medium component manufacturers from Japan and other developed countries for production of machined components (promotion of joint venture)

Stage 3

- a) Manufacturers with a total (end-to-end) production of capital-investment-intensive home appliances (mainstays)
- b) Japanese and U.S. assemblers of mechatronic information equipment components such as HDD and printers
- c) Japanese component manufacturers restructuring ASEAN locations for pre-processing of materials components

The following may be cited as examples of generally conceivable preferential measures.

(a) Various guarantees

- 1) Prohibition of nationalization and of establishment of new state enterprises that would be competitors
- 2) Prohibition of price controls

(b) Approval of various items

- 1) Entry by foreign nationals for investigation of investment possibilities
- 2) Taking or remittance of foreign currency out of the country

(c) Tax incentives

- 1) Reduction or exemption from tariffs on import of materials and facilities (up to 90 percent in Thailand)
- 2) Exemption from corporate income tax (in Thailand, there is exemption for from three to eight years, and losses incurred during this period can be carried over for up to five more years)
- 3) Exemption of dividend income from income tax during the period of exemption from corporate income tax

(d) Incentives for exporters

- 1) Exemption from tariffs on import of materials and components
- 2) Exemption from tariffs on import of goods for re-export
- 3) Exemption from export tariffs

For its part, the MPI could provide support for the acquisition of visas, labor licenses, and housing by foreign-affiliated firms doing or intending to do business in Viet Nam.

(4) Measures for promotion of export

Because export prospects would depend largely on the international competitiveness of the siting foreign companies, there is an overlap between the aforementioned measures for induction of foreign capital and those for promotion of export. At present, it would be difficult to expect the domestic capital to be equipped with export competitiveness in the electric and electronics field. As such, domestic competitiveness must be nurtured over the long term through, for example, transfer of technology. For the time being, however, priority should be attached to measures for promotion of export depending almost wholly on international industrial capital siting in Viet Nam.

The stimulation of export activities by attraction of siting by international industrial capital to export processing zones would definitely have great advantages over the short term for creation of jobs and foreign currency earnings. However, it would be difficult to hope for transfer of technology beyond the level of simple assembly, and there would be few ripple effects for growth of supporting industry, for example. This underscores the need for promotion of technology tie-ups and joint ventures enabling technology transfer to local capital. Improvement of the disposition of domestic firms with an emphasis on international business practices would be a must to this end.

It would be hard for foreign firms to source components and materials from within Viet Nam. And given the tariffs on component import, it would be next to impossible for them to meet Vietnamese expectations regarding export right from an early stage. For this reason, Viet Nam should avoid

imposing excessive export obligations on foreign-affiliated set manufacturers, which would site mainly for the purpose of import replacement at first. Instead, it would be more realistic to apply export obligations that slide with the share of capital subscription as a condition of the siting, to expect a phased increase in export after siting, and to offer incentives in the aspect of tariffs on import of components for assembly of products for export.

Improvement of the international competitiveness of the concerned companies, whether foreign-affiliated or local, calls for a revision of the current import tariff system. In an assembly industry like the AV industry, it would be difficult to acquire price competitiveness under a system of CSK component import followed two years later by IKD component sourcing (the local contents rate being 20 percent initially and rising to 40 percent in the fifth year). Over the long term, it is preferable from the standpoint of promoting the growth of export industry to hold duties on import of components and materials to low levels with consideration of the actual availability of the same domestically. While there is some apprehension that domestic industry will not grow if tariffs on components and materials are low, more attention should be paid to the effects of the growth of set industry for developing the component industry.

Various steps should be taken to support the export activities of local capital, which are anticipated to emerge on a full scale beginning in the third stage. Besides promotion of transfer of technology from developed-country manufacturers to small and medium local firms for improvement of quality, these include the staging of international trade fairs jointly with organizations such as JETRO, participation in various expositions overseas, preparation of a list and construction of a data base of export-oriented manufacturers and trading firms, establishment of Viet Nam trade centers in selected countries around the world, and promotional campaigns.

(5) Infrastructural conditioning

Viet Nam must actively improve the investment regime for export processing zones, industrial parks, and other sites to encourage an influx of foreign capital. In addition, it must promote information intensification through construction of information-communications networks applying the latest technology in order to provide public services and management systems that are in line with the market economy and up to international standards.

Viet Nam must condition the siting infrastructure of electrical power, communications, water, roads, and ports while also improving physical distribution and other elements of the social system. The gap with other countries in respect of communications functions must be narrowed through the construction and expansion of the telecommunications network. A program of information intensification with a clear schedule must be prepared and promoted with a view to introducing public services and management systems that are grounded in the market economy and up to international standards.

(6) Cultivation of supporting industry

Promotion of the growth of industry to support the set and component industry is indispensable for solidifying the international competitiveness of the electric and electronic industry, setting the industry apart from more developed counterparts in other ASEAN countries, and striving for the emergence of a distinctive Vietnamese industry over the long term.

The role of supporting industry is played mainly by small and medium enterprises, and requires a great store of expertise and technology. Supporting industry consequently must be nurtured from a long-range perspective. The fields of technology that should be emphasized are casting and forging, press and press components, cutting, surface processing, metallurgy, and CAD.

The approach to this end should emphasize technology transfer from Japan, where this industry is highly developed, and include attraction of siting by and formation of joint ventures with small and medium Japanese firms. The Vietnamese side could make use of the energies of state enterprises on the condition of eventual privatization. While technology transfer could take place through programs of human resource development backed by ODA or other official funding, the most effective means would be transfer through actual business activities.

Viet Nam should nurture the metal mold industry, which is an essential element of supporting industries, from a long-term perspective for the following reasons.

- 1) There are business opportunities, because the metal mold industry has not yet fully developed in the ASEAN region.
- 2) In the past technology transfer in this sector took a long time, because the metal mold technology depended on individual skills and dexterity. However, the individual skills are increasingly replaced by machines.
- 3) Japan's metal mold technology is on the decline because of the lack of market. Retired skilled Japanese craftsmen can be enlisted to help technology transfer to Viet Nam.
- 4) Because Vietnamese people are very dexterous, highly educated, and patient, they will make excellent craftsmen for metal mold manufacturing.

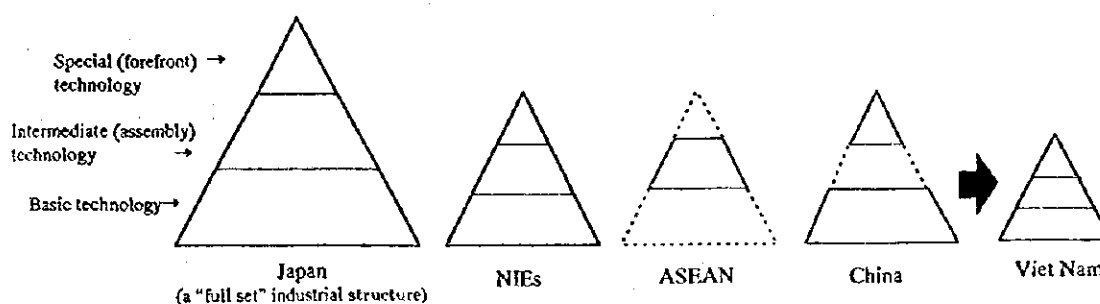


Chart 18 Picture of technology accumulation Viet Nam is aiming at (long-term target)

Notes Basic technology includes machine fabrication technology (metal and resins, including the fabrication of metal molds), design and software technology, materials technology, etc.

Source NRI

(7) Measures for state enterprises

State enterprises are heavily involved in the national infrastructure in sectors such as communications and power. They should actively work to form technology tie-ups and joint ventures with international industrial capital for the purpose of acquiring advanced technology and meeting the demand for funds as soon as possible. There is also a need for consideration of partial privatization over the long term as necessary.

For state enterprises involved in the private demand sector, the government should promote privatization as a general rule and research the possibilities of subsistence of the business in an environment of competition in a market economy. As in the infrastructural sector, these enterprises should pursue technology transfer from and partnership with international industrial capital in order to

build competitive strength.

Viet Nam should erect a scheme enabling the talented technicians and system engineers attached to state enterprises to "spin out" of the same and receive financial support for starting their own businesses (venture capital) if they meet certain qualifications. Such a scheme would help to promote the growth of a pool of small and medium enterprises to play the role of next-generation supporting industry in fields such as machining and software development.

(8) Domestic R&D and human resource development

In parallel with the transfer of technology by foreign capital for the growth of export industry, Viet Nam should promote the conditioning and amplification of universities and public research institutions for the furtherance of information intensification over the short and medium terms and generation of uniquely Vietnamese high-tech industries, mainly in the fields of information-communications and devices, over the long term.

State enterprises and local private firms cannot be expected to make much investment for research and development for the foreseeable future. For this reason, the R&D capabilities of universities and public institutions should be built up gradually with the cooperation of developed countries. The major prospective R&D fields include information-communications (for promotion of domestic information intensification), electronic devices, and materials (with a view to domestic production of ICs and other materials).

In promoting industrialization, development of human resources is an urgent priority along with standardization in accordance with international levels. This will call for a full supply of institutions to produce the required personnel, such as universities, technical high schools, and schools of engineering and management science.

The vision for a high-tech park being promoted as part of the JICA project should be developed with awareness of the actual level of R&D activities in Viet Nam and realized over the long term.

The following table presents the basic stance and actual approaches of policy options for development of electric and electronics industry in Viet Nam from the standpoints of the overall situation, induction of foreign capital, export promotion, and domestic policy (as regards state enterprises, infrastructural conditioning, supporting industry, and R&D and human resource development).

Table 26 shows the prospective policy options for phased (meaning in this case from stages one through three outlined above) promotion of the development of electric and electronics industry into a leading export industry in Viet Nam.

Table 24(1) Policy options for promotion of electric and electronics industry growth in Viet Nam (overall, introduction of foreign capital, export promotion)

	Basic stance	Details
Overall policy on the electric and electronics industry	<p>★ Viet Nam is thought to possess comparative advantage as a site of electric and electronics industry as regards labor force and the latent market. By making the most of this advantage and the changes in the investment environment leading up to the effectuation of AFTA in 2002, Viet Nam could induce active siting by Japanese and other foreign capital. In this way, it could acquire the capital and leading technology needed for enhancing export capabilities. Over the long term, the expansion of domestic industrial capital and improvement of R&D capabilities could usher in full-scale advancement by an electric and electronic industry equipped with international competitiveness.</p>	<p>- Preparation of original master plan for the electric and electronic industry, incorporating clear statements of the future orientation and targets, means of acquiring capital and advanced technology commensurate with the stage of advancement, and the division of roles between foreign and domestic capital.</p> <p>- Prompt conditioning of the investment regime to encourage the influx of foreign capital. To acquire international competitiveness, Viet Nam also must attract investment by foreign concerns in possession of component assembly and processing technology (rather than set assembly technology) and promote active transfer of capital and technology needed to nurture the growth of supporting industries to underpin the electric and electronics industry.</p> <p>- High risks accompany designation of priority industries by the national government and its involvement in their cultivation and advancement in all aspects. In the case of the auto industry, for which the government holds great expectations of emergence into a trunk industry, such involvement is inevitable to a certain extent. In the case of the electric and electronics industry, however, technological innovation is constantly proceeding on an extremely broad front, and advancement would have to depend on multinational capital. As such, it is not advisable for government to become involved, either directly or indirectly; the development should basically be free except for the fundamental principle of encouraging the influx of foreign capital.</p>
Policy on induction of foreign capital	<p>★ Promotion of the influx of foreign capital requires assurance of the consistency in policy on MPI foreign capital induction and full development of functions for coordination of related policies among all concerned agencies. For these reasons, it is essential to reinforce the organizations and powers headed by the prime minister or other official with an equivalent rank and thereby to gain solid credibility in the eyes of international industrial capital.</p>	<p>- Need for consistent and coordinated deployment of policies by all concerned agencies in respect of limits on foreign capital subscription, export rates, tariffs on import (components, materials, equipment), local contents rates, external remittances, royalty payments, and environmental measures.</p> <p>- The priority candidates for the time being would be manufacturers of home appliances to replace import and manufacturers of information equipment components and assembly-use components. Strategic siting of component and set production should be targeted for around 2000.</p> <p>- Attraction of siting by medium and small enterprises to play the role of supporting industry in parallel with the attraction of siting by export-oriented set and component manufacturers. Risks would have to be mitigated by joint ventures, etc. Viet Nam should promptly review the investment regime in aspects including legislation and procedures and recover an environment favoring revival of the flow of foreign capital to Viet Nam and the beneficent cycle of siting by set manufacturers followed by component manufacturers and supporting manufacturers.</p>

Table 24(2) Policy options for promotion of electric and electronics industry growth in Viet Nam
(overall, introduction of foreign capital, export promotion)

Policy for promotion of export	Basic stance	Details
	<p>★ Measures for promotion of export will depend mainly on the international competitiveness of the foreign-affiliated companies attracted to site, and will therefore overlap with the measures to attract foreign capital outlined above. At present, it would not be realistic to look to domestic capital for export competitiveness in the electric and electronics field. Although domestic capital could gather competitiveness through technology transfer over the long term, there is consequently a need for priority deployment of export-promoting policy depending almost completely on the international industrial capital sitting in Viet Nam for the time being.</p> <p>★ The quickening of export activities at export processing zones where international industrial capital has sited will definitely hold great benefits for creation of employment and foreign currency earnings over the short term. However, it could not be expected to hold much benefit in the aspect of transfer of technology other than simple assembly technology, and will have little rippling effect for stimulating the growth of supporting industries, for example. For this reason, there is a need for encouraging technology tie-ups and joint ventures that will make possible technology transfer to domestic capital. This, in turn, will require an improvement of the management disposition of domestic firms with an emphasis on bringing business behavior in line with international standards.</p>	<p>- It would be difficult to source very many components or materials in Viet Nam, and also for the siting companies to meet the export expectations of the Vietnamese side very soon after siting, considering the tariffs on imported components. It would therefore be advisable not to impose an excessive export obligation on foreign-affiliated set manufacturers, which would site mainly for the purpose of import replacement in the initial period. If export obligations are imposed in accordance with the rate of capital subscription as a condition of siting, these obligations should be phased in accordance with the passage of time after siting and accompanied by realistic measures such as preferential tariff rates on components for assembly of products for export.</p> <p>- An improvement of the international competitiveness of concerned domestic companies as well as the foreign-affiliated ones will demand a review of the current system of import tariffs. In the case of assembly-based industry like the AV industry, it would be difficult to acquire cost competitiveness under a system of CSK component import followed two years later by IKD sourcing (with a local contents rate of 20 percent initially and 40 percent no later than five years after the start of production). From the standpoint of promoting the growth of export industries, it would be advisable over the long term to hold down tariffs on import of components and materials while making realistic provisions for the level of domestic sourcing.</p> <p>- The aforementioned outlook envisions the start of full-fledged export activities by local (domestic) capital in the third stage. Supporting these activities will call for not only an improvement of quality through transfer of production technology from foreign capital and the ASEAN countries with a head start to small and medium Vietnamese companies but also for a mass of other measures to support the latter. These measures include the staging of international trade fairs with the help of parties such as JETRO, participation in trade shows staged in other countries, preparation of lists and data bases of companies engaged in manufacture and export and trading firms, establishment of Vietnamese trade centers in key countries around the world, and related promotional activities.</p>

Source NRI

Table 25(1) Policy options for promotion of electric and electronics industry growth in Viet Nam (focus on domestic industrial policy)

Domestic industrial policy		Details
State enterprises	<p>Basic stance</p> <p>★ State enterprises are deeply involved in the formation of the national infrastructure of communications, electric power, etc. The government should actively pursue technology transfer and joint ventures with international industrial capital so that they can quickly acquire advanced technology and satisfy their funding demand. Over the longer term, it must consider partial privatization in accordance with the necessities.</p>	<p>- For state enterprises involved in the private demand sector, the government must, as a general rule, promote privatization and explore the possibilities of continuation of the business in the competitive environment of the market economy. As in the case of the infrastructural sector, technology transfer from and joint ventures with international industrial capital should be promoted to make the enterprises competitive.</p> <p>- There is a need for construction of a scheme providing skilled technicians and system development technicians attached to state enterprises and meeting certain qualifications with venture capital to launch their own "spinoff" enterprises if they so desire. Such a scheme will assist the development of small and medium enterprises in fields such as machining, software development, and others constituting supporting industry.</p>
Infrastructural conditioning	<p>★ To stimulate an influx of foreign capital, Viet Nam must vigorously promote improvement of the investment regime and environment in export processing zones, industrial parks, and other siting areas. At the same time, the realization of public services and management systems that are up to international standards and attuned to the market economy will entail information intensification in such forms as information processing and communications networks applying advanced technology.</p>	<p>- Viet Nam must condition the siting environment and infrastructure in such aspects as electric power, communications, water supply, roads, and ports and harbors, and improve socioeconomic systems as regards physical distribution, etc. The construction and extension of the telecommunications network will help to rectify both internal and external gaps in communications functions. In addition, a program of information intensification should be prepared and promoted in order to introduce public services and management systems that are up to international standards and grounded in the market economy.</p> <p>- The electronics industry requires provisions for treatment of waste liquid and other such environmental measures. Such measures must not be neglected by any country, regardless of the stage of advancement. To a certain degree, however, regulations should take account of the need for promotion of industry, and could be tightened gradually and in accordance with actual circumstances.</p> <p>- Improprieties such as smuggling and tax evasion must be eradicated if corporate activities are to gain vitality. There is also a need for improvement of the living and social environment for residence by foreign nationals accompanying siting by foreign capital (especially in the case of siting by small and medium enterprises).</p>

Table 25(2) Policy options for promotion of electric and electronics industry growth in Viet Nam (focus on domestic industrial policy)

		Basic stance	Details
Supporting industry	Domestic industrial policy	<p>★ Industry to support set and component manufacturers is indispensable for making Viet Nam's electric and electronics industry internationally competitive and setting it apart from more developed counterparts in other ASEAN countries as well as for developing a distinctive Vietnamese industry over the long term. More specifically, Viet Nam must promote the growth of domestic capital (small and medium enterprises), which will be the seat of production of special-purpose processed components, through technology transfer and joint ventures with foreign capital.</p> <p>★ In parallel with technology transfer from foreign capital needed for the growth of export industry, Viet Nam must reinforce and amplify the capabilities of universities and public research institutes. This is necessary for the short-to-medium-term end of promoting domestic information intensification and for the long-term end of breeding high-tech industry distinctive to Viet Nam, mainly in the fields of info-communications and electronic devices.</p>	<ul style="list-style-type: none"> - The role of supporting industry falls mainly to small and medium enterprises. The industry requires a concentration of technical know-how of various types and must be nurtured from a long-range perspective. The focal technologies are casting and forging, molding and molded components, cutting, surface processing, jig work, and CAD. - The advisable approach to cultivating supporting industry is technology transfer mainly from Japan, where this industry is highly developed, and attraction of sitting by and joint venture with small and medium Japanese enterprises in the same fields. On the Vietnamese side, the scope of subjects could include state enterprises on condition of future privatization. - While the means of technology transfer would presumably include training programs staged with official assistance in such forms as ODA, technology is most effectively transferred through practical business activities. - For the time being, state enterprises and local private firms could not be expected to make significant investment in R&D. The focus would therefore be reinforcement of the R&D capabilities of universities and public research institutes with the cooperation of developed countries. - The major fields of R&D activities include info-communications (promotion of information intensification in Viet Nam), electronic devices, and materials research aimed at domestic production of ICs and various related materials. - The most urgent priorities for promotion of industrialization are formulation of standards in line with international levels and acquisition of human resources. For this reason, Viet Nam should reinforce capabilities for production of engineers and management material at universities and technical high schools, etc. - The high-tech park concept that is the subject of the JICA project could be brought into reality over the long term through promotion in step with the actual level of R&D capabilities at the time.
R&D and human resource development			

Source NRI

Table 26(1) Policy options for phased promotion of the development of the electric and electronics industry into a leading export industry

	Stage 1 (present - 2000)	Stage 2 (2000 - 2005)	Stage 3 (2005 - 2010)
Basic stance	<p>★ Vigorous conditioning of the investment regime and environment in such aspects as legislation, siting, and employment in order to add impetus to the influx of international industrial capital into Viet Nam; delineation of the target image for the future of state enterprises in light of the environment of international competition at the same time</p>	<p>★ Deployment of attraction-oriented industrial policy inducing priority selection by international industrial capital of Viet Nam as a site of strategic supply amid the reconstruction of ASEAN production schemes in response to AFTA/CEPT</p>	<p>★ Deployment of industrial policy emphasizing supporting of component industry and electronics industry (including the sites of international industrial capital) internationally competitive in both quantitative and qualitative terms</p>
Policy on induction of foreign capital	<p>★ Prompt review of schemes and policies with a view to encouragement of inbound foreign investment, and promotion of related measures with consistency and coordination</p> <ul style="list-style-type: none"> - Assurance of the consistency of, and interagency coordination in, reinforcement of MPI authority and the aforementioned policy- Provisions for forms of entry and incentives that take account of the characteristics of the product technology of the foreign firms and the stage of advancement in Viet Nam - Attraction targeting set manufacturers, manufacturers of related special-purpose processed components, and export-oriented component manufacturers- Determination of export obligations and local contents rates for import-replacing AV manufacturers that are appropriate for the realities and properly phased - Publicity campaigns directed at foreign companies through investment seminars staged overseas in cooperation with JETRO, etc. - Tariff reductions or exemptions for general-purpose components and materials needed for assembly, to ensure export competitiveness 	<p>★ Switch to policy for induction of foreign capital aimed at international industrial capital reconstructing strategic supply points in response to AFTA</p> <ul style="list-style-type: none"> - Flexible provision of incentives commensurate with export contribution and be local contents rate (target of 40 percent) - Foreign investment incentives to boost capabilities of domestic component production toward attainment of the local contents rate required for homologation under CEPT (at least 40 percent) - Accent on attraction of Japanese and U.S. capital siting for post-process lines for material-type and semiconductor components as well as for components built into info-communications equipment such as DVD - Tariff reductions or exemptions for general-purpose components and materials needed for assembly, to ensure export competitiveness - Conditioning of export processing zones and industrial parks for siting by small and medium enterprises (services of batch proxy performance of procedures, etc.) 	<p>★ Accelerated induction of foreign capital, particularly in component and supporting industries, for development of an electric and electronic industry with international competitiveness</p> <ul style="list-style-type: none"> - Powerful incentives for siting by foreign supporting industry (relaxation and privileges related to terms of investment, siting, export, etc.) - Provision of investment incentives that vary with the siting district (to promote a regional distribution of investment) - Permission for foreign participation even in CKD production due to the great investment required for end-to-end production systems as the demand for mainstay household appliances increases - Induction of foreign capital in high-tech fields such as semiconductor technology (full-fledged development through joint ventures) - Attraction of siting by foreign info-communications firms of high-tech R&D functions in high-tech parks, etc.

Table 25(2) Policy options for phased promotion of the development of the electric and electronics industry into a leading export industry

Policy for export promotion (operated as a set with policy for induction of foreign capital for portions depending on foreign capital)	Stage 1 (present - 2000)	Stage 2 (2000 - 2005)	Stage 3 (2005 - 2010)
<p>Policy for export promotion (operated as a set with policy for induction of foreign capital for portions depending on foreign capital)</p>	<p>★ Emphasis on foreign capital for promotion of export in this stage (in order to acquire international competitiveness) and consequent focus on match with policy for induction of the same</p> <ul style="list-style-type: none"> - Conditioning of export processing zones (and addition of equivalent functions in ordinary industrial parks) and unification of procedures - Tariff reductions or exemptions for import of components, materials, and equipment needed for assembly-based production, and simplification of entry procedures for the same - Phased application of export obligations for import-replacing companies (especially AV-related) in accordance with the realities 	<p>★ Continued emphasis on foreign capital for promotion of export in the interest of international competitiveness and focus on match with policy for induction of the same</p> <ul style="list-style-type: none"> - Promotion of export through attraction of siting of strategic supply bases for sets, semifinished goods, and components by Japanese manufacturers (with an open domestic market) - Promotion of transformation of AV companies siting for the purpose of import replacement into strategic export companies - Increase in export cost (price) competitiveness through reduction of tariffs on imported components and materials - Promotion of foreign investment for domestic sourcing of special-purpose processed components and of technology transfer to small and medium firms 	<p>★ Continued support of the export activities of foreign capital in the aspects of legislation and the siting environment, coupled with acquisition of export competitiveness by domestic capital and promotion of supporting schemes and activities for export and export development</p> <ul style="list-style-type: none"> - Improvement of quality through transfer of production technology from foreign concerns and more developed ASEAN countries to domestic small and medium enterprises - Staging of international trade fairs jointly with JETRO, etc., and participation in various overseas trade fairs - Preparation of lists and data bases of companies engaged in manufacture and export, trading firms, etc. - Establishment of Vietnamese trade centers and deployment of promotional campaigns in key countries around the world

Source NRI

4-2-2

Developing Leading Export Industries —Metal Mold Industry (The Key to Inducing Increased Value Added and a More Advanced Export Mix)—

Seiki Teshiba

Nomura Research Institute, Ltd.

1. Characteristics of the Metal Mold Industry as a Core Supporting Industry

(1) Definition of supporting industries

From the perspective of the final assembly stage, the broadly defined supporting industries include the following elements.

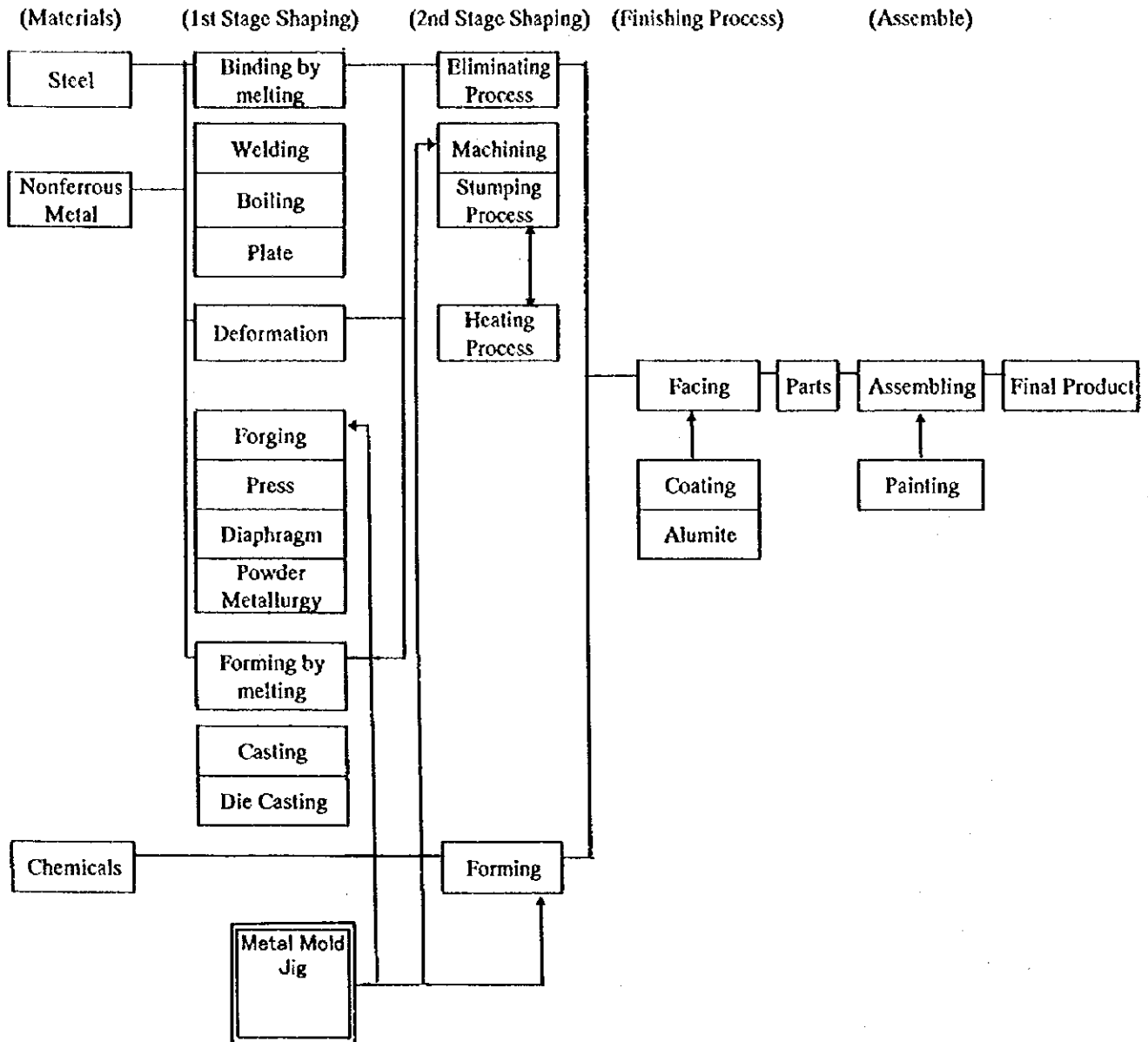
- 1) Related industries, such as materials processing, including metal molds, metal mold components, metal processing, plastic processing, surface treatment, tools, chemical treatment, and CAD-CAM design.
- 2) Component manufacturing
- 3) Production of machinery, facilities and equipment for development, assembly and production activities in the manufacturing sector
- 4) Basic material industries, including iron, non-ferrous metals and petrochemicals
- 5) Distribution systems and other infrastructure

Supporting industries are the source of international competitiveness. In developing countries in particular, the promotion of supporting industries is an extremely important and topical policy priority.

The functions and features of manufactured goods are realized through the combination of parts formed by molding basic materials into the required shapes. Molds enable large quantities of goods to be produced to a uniform quality in a short period of time. They are absolutely vital to mass-production and form the nucleus of supporting industries.

Assembled products, such as televisions and automobiles, can be made simply by putting parts together according to instructions. Mold manufacturing requires extreme precision on a level that cannot be defined in manuals. Their manufacture involves the intensive application of various industrial technologies and skills based on the experience of production workers. That is why the standard of the metal mold industry is regarded as a barometer of a nation's industrial potential. Chart 1 shows the involvement of related industries in the production of assembled and processed products, together with process flows.

Chart 1 Flow of process



Source Nomura Research Institute

(2) Characteristics of Metal Molds and the Metal Mold Industry

1) Product Characteristics

- 1) Metal mold manufacturing involves the production of a wide variety of products in small lots. In fact, it is unusual to produce five units that are the same. For this reason, there is no potential for mass-production merits. In the case of Japan, the value of metal mold shipments is not small compared with the shipments of mass-production industries, such as automobiles, electrical appliances and electronic goods. However, the metal mold industry has far more businesses than other industries, which means that the average value of shipments per business is extremely small. As shown in Table 1, the industry structure is dominated by

small and medium-sized companies.

Table 1 Factories and shipment among selected items

Item	No. of Factories	Shipment	Average Shipment
Mold	12,834	15,824	123
Motorcycle	4	2,556	63,910
Automobile	44	108,947	247,607
IC	147	60,404	41,091
TV	28	7,511	26,825
Refrigerator	23	4,962	21,572

Notes

1) Unit of Shipment is 100 Million Japanese Yen.

2) Unit of Average Shipment is Million Japanese Yen

Source Census of Manufactures of '95 Ministry of Trade and Industry

- 2) Demand for metal molds emerges ahead of model changes. Once the model change is complete, demand disappears. The industry is thus subject to sharp demand fluctuations.
- 3) Major companies produce some metal molds in-house. Because of the demand fluctuation factor, however, total self-sufficiency would result in cost increases, and even large manufacturers are forced to use outside suppliers of metal molds.

2) Competitiveness Factors

- 1) Design capabilities (a key influence on production times)
- 2) Processing precision
- 3) Quality management through post-production adjustment and testing
- 4) Delivery times

The CAD/CAM systems used in design and the NC machine tools used in processing incorporate computer functions that enable the accumulated know-how of skilled workers to be recorded for future use. However, it is not possible to make perfect computerized records of all skills, and manufacturers still need highly experienced skilled workers.

As stated above, there is no potential for mass-production merits in metal molds manufacturing, which requires skilled and experienced workers. For these reasons, specialist metal mold manufacturers tend to be small, even in major industrialized nations, and two-thirds of suppliers employ less than 50 people.

Table 2 Size of mold manufactures

Country	No. of Engineers and Workers	No. of Firms	Size of Firms
U.S.A.	Around 190,000	Around 10,000	Above 50 persons : 1,500 20 - 49 persons : 3,000 Less than 19 persons : 5,500
Japan	Around 110,000	12,834	Above 100 persons : 412 20 - 99 persons : 1,790 10 - 19 persons : 1,636 4 - 9 persons : 4,573 1 - 3 persons : 4,423
China	Around 220,000	150	N.A.
Korea	Around 35,000	2,000	Above 50 persons : 100 20 - 49 persons : 250 Less than 19 persons : 1,650
Taiwan	Around 30,000	3,500	Above 31 persons : 150 11 - 30 persons : 850 6 - 10 persons : 1,250 1 - 5 persons : 1,250
Hong Kong	Around 40,000	1,000	Most of firms are less than 50 persons.
Singapore	Around 5,000	210	Above 51 persons : 30 21 - 50 persons : 50 Less than 20 persons : 130
Malaysia	N.A.	20	Most of firms are less than 30 persons.
Thailand	N.A.	50	Most of firms are less than 50 persons.

Notes

- 1) N.A. means Not Available
 - 2) China's number of engineers and workers are nation total
- Source
- 1) Annual Report of Int'l Special Tooling Association in '96
 - 2) Japan from Census Manufactures of '95

Labor costs make up 50% of the average cost mix of metal mold production, with materials accounting for 20%, depreciation for 10%, and selling and administrative costs for 20%. The high proportion of labor costs reflects the involvement of highly paid skilled workers in the production of metal molds. This factor will eventually have a significant impact on the cost competitiveness of labor costs.

Table 3 provides shows the value of production by specialist metal mold manufacturers in major countries in a global context. Because metal molds are used in the manufacture of mass-produced goods, the level of production is naturally higher in advanced industrialized nations. Among the Asian NIEs, however, South Korea and Taiwan both boast levels of production close to or even higher than those of France, Italy and the United Kingdom. This reflects the expanding shares of Taiwanese and South Korean manufactured goods in world markets in recent years.

Table 3 Mold output by country in '95

Country	Output	Export	Import
U.S.A.	6,500	490	1,530
Japan	4,180	2,441	163
Germany	3,227	1,035	559
Korea	1,688	276	190
France	1,587	251	285
Taiwan	1,328	329	128
Italy	1,155	592	178
U.K.	986	107	333
Spain	623	178	155
Belgium	311	227	201

Notes

1) Unit 100 million Japanese Yen

2) Japanese output is different from the shipment of Table 1.

Because the census covers wider than the association' survey.

Source Annual report of International Special Tooling Association

There are no detailed statistics concerning the value of production by non-specialist manufacturers in each country. According to data compiled by the Japan Die and Mold Manufacturers Association, production by non-specialist manufacturers was worth ¥88 billion in 1995. This is equivalent to just 27% of production by specialist manufacturers and indicates that the industry is still based primarily on specialist manufacturers.

As shown in Table 4, metal molds are made in wide variety of types according to the purpose for which they are intended. Since metal molds used in metal pressing are used to shape hard metals, the characteristics of the metals used must be determined according to conditions during the pressing process, including pressures and times. In addition, frequent testing is required before molds reach the finished product stage. For this reason, production of these molds requires wide-ranging experience.

The metal molds used in plastic injection molding are used to process soft materials. As a result, the standard of technology required is not as demanding as in the case of press molds used to process metal products.

Table 4 Summary of usage for metal mold

Type	Used for	Comment
For metal press		
(1) High precision, Large size	Outer body panel for automobile Outer body panel for home appliances	The highest skill required, hard to enter this category without track record Always latest expensive equipment needed Frequent data exchange done among users, material suppliers and mold manufacturer
(2) Low precision, Large size	Inner body panel for automobile Inner body panel for home appliances	Due to not be seen, accuracy is not required. Determinant factor is price.
(3) High precision, Small size	Automobile parts Home appliances parts Electronics parts	Same comments attached to (1) Due to frequent model changes in electronics industry, mold manufacture, located close to user, is advantage.
(4) Low precision, Small size	Automobile parts Home appliances parts Electronics parts Sundry goods	Same comments attached to (2) Due to frequent model changes in electronics industry, mold manufacture, located close to user, is advantage.
For plastic injection		
(1) High precision, Large size	Trim for automobile Outer body panel for home appliances	The highest skill required, hard to enter this category without track record Always latest expensive equipment needed Frequent data exchange done among users, material suppliers and mold manufacturer
(2) Low precision, Large size	Construction materials Household articles	Determinant factor is cost competitiveness.
(3) High precision, Small size	Trim for automobile Outer case for TV, radio, etc. Electronics components	Always latest expensive equipment needed Due to frequent model changes in electronics industry, mold manufacture, located close to user, is advantage.
(4) Low precision, Small size	Household articles	Determinant factor is cost competitiveness.

Source Nomura Research Institute

2. Current Situation in Viet Nam and Issues for the Future

(1) Lack of Metal Mold Manufacturers

During the Viet Nam's planned economy era, machinery factories produced a high percentage of their parts in-house. When they needed metal molds, they also produced these in-house. The effects of this situation are still apparent, in the sense that there are no specialist manufacturers selling metal molds to other companies.

There are no statistics relating to metal molds for metal presses and plastic injection molding, which are the subject of this report. Our survey revealed that the only organizations and companies engaged in outside sales of metal molds were the following.

1) Institute for Machinery and Industrial Instruments (IMI)

Attached to the Ministry of Industry, this organization was established 23 years ago to develop applied technology for use in machining. It has facilities and equipment purchased with US\$1 million in aid from Sweden. The Institute functions as a center for disseminating advanced machining technology to factories. Approximately 100 engineers have been assigned to IMI from various factories to undergo training in CAE, which involves the application of computer technology at all stages from design through to production. The training provided is equivalent to graduate school standard.

IMI produces about 500 metal molds (mainly for plastic injection molding) annually under contract. However, it does not approach this task as a profit-making activity and is instead using it to bridge the gap between theory and practice, and to gain experience in solving problems that occur in a production context.

2) Vina Shiroki

This company is a joint venture established by Japan's Shiroki Corporation and Hanoi Mechanical Company, a state-owned enterprise based in Hanoi. It has the capacity to produce 1,000 metal molds for use in the production of automotive plastic injection moldings. It commenced production in December 1996. In addition to domestic sales, it also aims to export its products.

Besides Vina Shiroki, three Japanese companies plan to sell (and export) metal dies produced at facilities that they have established in Tan Thuan Industrial Park. These developments suggest that the Vietnamese metal mold industry has at last started to build an industrial base.

(2) Machinery Industries Hit by Low Operating Rates Since the Break-up of the Commune System

Before attempting to gauge the future potential of the metal mold industry, we will first provide an overview of the current state of machinery industries in Viet Nam. The general machinery industry (including companies that produce metal molds for use in parts production) is made up of 460 state-owned enterprises employing a total of 104,000 people, together with 43 non-state enterprises (cooperatives, family businesses, etc.), which employ a total of 93,000 people.

Production capacity for castings, which are needed domestically for the production of spare parts and machinery production parts, stands at 40,000 tons. Yet in recent years production has reached only 12,000 tons, or one-third of capacity. Castings cannot be exported. There are four companies with annual casting capacities in excess of 5,000 tons. Electric furnaces can produce 0.5-0.6 tons per charge, compared with 150-400kg per charge for high-frequency electric furnaces. Steel castings weighing up to five tons can be produced. However, high-quality castings cannot be produced, since there are no material analysis systems or control systems able to utilize the results of such analysis.

The low operating rates of casting plants reflect a downturn in the use of heavy agricultural

machinery following the break-up of the commune system under the *Doi Moi* (reform) program. As a result, manufacturers were forced to suspend production of replacement parts, causing the national average operating rate to sink to as low as 30%. From 1954 onwards, the former North Viet Nam sought to develop heavy industries under successive five-year economic plans. When Viet Nam introduced the commune system following North-South unification in 1975, it established a structure capable of meeting its own demand for replacement parts for heavy agricultural machinery. The state-owned enterprises that handled production of these items achieved operating rates as high as 90% during this period.

(3) Factors Limiting the Development of Machinery Industries (Including the Metal Mold Industry)

The following issues confront the metal mold machinery, as seen from a wider perspective that also encompasses machinery industries.

- 1) The majority of factories that produce machinery and machinery parts are small-scale operations with aging production facilities. During the Viet Nam War, the North relocated factories into the countryside and suburbs in order to avoid American bombing raids. The resulting dispersal of factories means that Viet Nam is today unable to reap the benefits that result from concentrations of industrial facilities.
- 2) Companies manufacturing machinery and machinery parts are not actively seeking new customers. As a result, there is no growth in demand.
- 3) There is a shortage of funds for modernization.
- 4) High-quality parts cannot be produced due to the inferior facilities that are used to make castings.
- 5) Metal mold processing is carried out using general-purpose machines, which are unable to provide high standards of precision. Facility performance is far behind that observed in the West. According to Japanese experts, Viet Nam is at least 20 years behind Japan in terms of the facilities used to make metal molds. It would be unrealistic to expect facilities such as these to turn out high-precision molds.
- 6) Human resources with experience of machining are not being used to their full potential. (Viet Nam has 17,200 engineers and 1,200 with doctorates.)

(4) Direction of Government's Industry Promotion Policy

1) Industry promotion policy

The government is fully aware of the important role played by the metal mold industry. It has concluded that Viet Nam can compete with neighboring countries as a metal mold producer in terms of labor costs and raw materials. (Here the government appears to be focusing in particular on materials used in heavy castings.) There is a strong commitment to the development of a production base for metal molds.

- 1) The government's promotion plan for the metal mold industry calls for domestic production of metal molds to reach 50-60% of total demand, or 150-160,000 tons, by 2010.
- 2) While domestic demand will remain the chief focus, Viet Nam is expected to become an exporter of metal molds in the long-term future. It is possible that countries that export metal molds today will become importers in the future.
- 3) The level of funding required to modernize the metal mold industry is low compared with other sectors, such as steel industry, basic material industries. Because of its importance, and because of the potential for high returns on investment, the industry has been accorded a high priority in Viet Nam's modernization plans.

4) Today's technicians and skilled workers will be encouraged to acquire more advanced know-how.

5) At present there is demand, albeit limited, for metal molds for use in production of plastic sundries. Over the past 2~3 years, there has been a dramatic increase in the number of family businesses producing plastic tableware, buckets, water jars and other items, especially in Ho Chi Minh City. These enterprises apparently import second-hand metal molds from overseas and modify them for use in their operations. The government will create systems that enable demand information to be conveyed to companies that produce metal molds.

2) Key measures for achieving policy goals

1) Until the year 2000, the government will maintain a system designed to provide financial support for facility modernization, so that manufacturers can provide the quality improvement and price reductions demanded by the market.

2) A network will be established to ensure that customer information is conveyed promptly to manufacturers.

3) Foreign-owned companies that could produce metal molds in Viet Nam will be actively courted, so that Viet Nam can benefit from technology transfers via these firms.

4) In order to encourage investment by foreign-owned companies, the government will develop infrastructure and industrial parks.

5) Support will be provided for the training of skilled workers.

3. Conditions and Opportunities for Participation in the Vietnamese Metal Mold Industry

(1) Issues Facing the Asian Metal Mold Industry

At present, the only Asian economies exporting metal molds on a significant scale are Japan, South Korea, Taiwan, Hong Kong and Singapore (Table 5). However, each of these countries faces its own specific problems. In Japan's case, these include high labor costs, the rising age of skilled workers, and the closure of manufacturers due to a lack of successors. Taiwan, Hong Kong and Singapore all face soaring wages and labor shortages, while South Korea's problems include rapidly rising wage levels and labor shortages resulting from the declining attractiveness of the industry to young people due to the fact that it takes 10 years to reach full competence. Sooner or later, each of these countries will inevitably suffer a decline in their export capacity.

Metal mold industries in other Asian countries are still under-developed. Malaysia recognizes the importance of the metal mold industry but has only recently started to attract manufacturers from Japan.

As stated earlier, the metal mold industry is virtually non-existent in Viet Nam. However, given the importance of industry in terms of enhancing the added value of export industries and developing a more sophisticated export mix, the changes that are affecting metal mold manufacturers in other countries, notably Japan and Taiwan, are providing an excellent opportunity for the creation of an industrial base for metal mold manufacturing in Viet Nam.

Table 5 Asian Mold Exporting Country's Overseas Market

Country	Metal	Injection	Die Cast	Others	Exporting Region
	%	%	%	%	
Japan	42	46	12	0	North America 25% China 10% Hong Kong 9% Korea 8% Taiwan 4% ASEAN 38%
Korea	3	81	0	16	China & Southeast Asian Countries 60% Japan 10%
Taiwan	15	80	5	0	China 40% Southeast Asian Countries 40% Japan 10%
Hong Kong	10	80	0	10	China 80% Southeast Asian Countries 20%
Singapore	20	70	5	5	Malaysia 30% Southeast Asian Countries (except Malaysia) 40% China 20% India 10%

Notes Hong Kong and Singapore are surveyed in '96 by "Sokeizai Center, Tokyo, Japan."

Others includes mold for glass and rubber, jig

Source Annual Report of International Special Tooling Association in '96

(2) The Activities of Japanese-Affiliated Companies as an Illustration of the Expansion of the Metal Mold Industry into Asia

1) Expansion into Asia by Japanese-affiliated manufacturers of machinery parts and related companies

Before focusing on the activities of metal mold manufacturers, we also need to consider the number of operations established in various countries by manufacturers of machined parts and companies in related fields (Table 6). In addition to the large numbers of casting and diecasting operations, the figures also reveal that manufacturers of metal molds and pressed metal parts have established numerous operations in Singapore, Thailand, Malaysia, China and elsewhere.

Table 6 Direct investment in Asian region by Japanese machine parts and its relating firms

Country	Casting	Die Cast	Forging	Powder Metallurgy	Metal Press	Mold
China	34	20	6	2	26	25
Korea	5	2	1	1	10	7
Taiwan	3	13	1	2	22	15
Singapore	9	10	1	4	17	22
Thailand	26	21	6	3	28	28
Malaysia	12	10	1	4	15	11
Indonesia	12	15	5	0	12	5
Philippines	3	10	2	0	10	3
Viet Nam	1	1	0	0	0	3
India	1	0	0	0	1	1
Hong Kong	1	1	0	0	5	5
Other Asian Region	1	4	0	0	0	0
Total	108	107	23	16	146	125

Source Survey done by Sokeizai Center, Tokyo

2) Activities of Japanese-affiliated metal die manufacturers — approaches to the transfer of technology

The survey focused on the activities of companies producing metal molds in Asia for the electrical machinery industry. Almost all companies in this category are in Singapore. An interview survey was carried out concerning the transfer of technology and skills, especially among companies of this type (Table 7).

Table 7 Technology and skill transfers by Japanese-affiliated metal mold manufacturers

Firm	Mold for Use	Years	Management	Designer of Mold	Mold Making	Use Japan made Mold
E	AV, PC, Others	19	Local	Local	Local	Yes
F	AV, PC, Others	18	Local	Local	Local	Yes
G	AV Relating	10	Local	Japanese	Local	Yes
H	PC Relating	19	Local	Local	Local	No

Notes

1) AV means Audio Visual

2) PC means Personal Computer

3) Years means Years from starting operation

Source Nomura Research Institute

With the exception of Company G, local staffs are involved in metal mold design as well as factory operations. The situation at Company G is attributable not to the fact that Company G has been present for a shorter period than other manufacturers, but rather to the fact that it has installed a Japanese-language CAD/CAM system. Company H's operations are managed entirely by local staff, with the Japanese president simply providing advice when it is needed.

Apart from Company H, manufacturers use metal molds manufactured in Japan for high-grade items or items requiring short delivery times, in part because of strong pressure from users. In this sense, the technology transfer process is not perfect.

According to the interview findings, the main characteristics of the technology and skill transfer process are as follows. First, it is necessary to assign staff from Japan. Second, the transfer process takes time. Third, companies are striving to transfer skills and technology. Fourth, there are some types

of know-how that cannot be transferred.

One of the main methods used to transfer technology and skills is instruction by Japanese staff stationed locally. In addition, most companies send technical training personnel from Japan for certain periods each year.

The problem is that the transfer of technology and skills takes a considerable period of time. According to the interview results, the periods required to produce a fully trained worker capable of handling normal tasks are 3~10 years for electroplating, 3~5 years for plastic molding, and around 10 years for metal and metal mold pressing. The wide range of periods cited for electroplating reflects the inclusion of specialized electroplating processes for semiconductors (Table 8).

Table 8 Reasons for expansion into Asia by machined parts manufacturers

Category	Reason to be in Asia	Investment Amount	Years
Plating	Market Development	Large	3 - 10
Making Mold for Injection, Plastic Parts Producing	Request by user	Small	3 - 5
Making Mold for Metal, Stamping	Market Development	Small	10

Notes Years means Years needed to be technology transfer

Source Nomura Research Institute

These periods represent not the number of years of operation of local subsidiaries, but rather employees' years of continuous service. Unless there are workers in key areas with at least these levels of experience, it will be difficult for operations to be handled solely by local employees. While recognizing that the technology transfer process is not easy, most manufacturers agreed that it was possible, given time. However, the basic ability to absorb training is a key issue. Interviewees emphasized the importance of education and the number of people wishing to become technicians.

3) Structural changes affecting Japanese-affiliated companies in Singapore

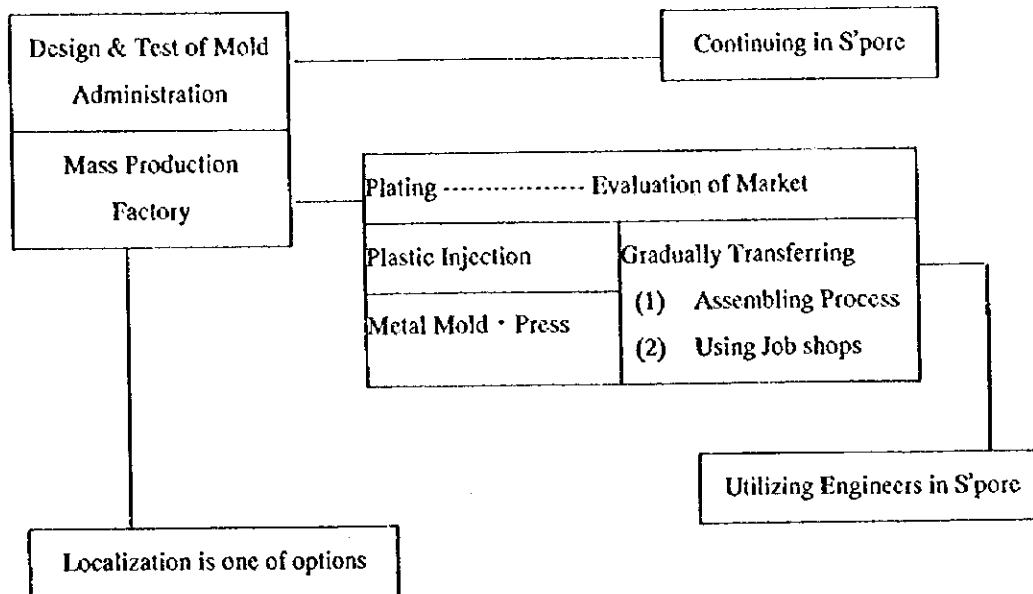
Set manufacturers in Singapore are moving their operations, especially production, to Malaysia, Indonesia, Thailand and other countries because of problems relating to labor costs and taxation. However, manufacturers of machined parts will be unable to follow this trend immediately because of their need for facilities, skilled workers and technical staff.

It is still not clear which of the surrounding nations will become the main base of operations for set manufacturers, and it is possible that choices will vary from company to company. However, since many set manufacturers have their regional headquarters in Singapore, they will probably be able to keep at least their development (metal mold design and production and prototype production) and coordination organizations in Singapore without causing any problems (Chart 2).

This leaves production. The country to which production operations are relocated will vary from industry to industry, and there is also the localization option. In the case of pressed metal parts and metal molds, there is the problem of skilled workers. One approach is to send technicians from Japan, but since the technology transfer process requires as much as 10 years, the better choice in most cases will be to localize existing operations.

There are two possible ways to reduce initial risk when transferring operations. First, there is the choice of which part of the production line should be moved first. The logical choice is assembly and final processing, since facility costs are minimal and the labor cost advantage is considerable. Second, there is the use of contractors and suppliers. If contractors and suppliers can be found in the location chosen for the transfer, it will be possible to meet user needs without heavy investment in facilities. In that case, the use of local executives recruited in Singapore is also likely to be a useful approach.

Chart 2 Transfer Operation of Machine Industry from Singapore



Source Nomura Research Institute

(3) Viet Nam's Advantages in Terms of Establishing an Industrial Base for Metal Mold Manufacturing

1) The electrical appliance and electronics industries are both major users of metal molds. The huge size of the potential domestic markets for these products is helping to drive sustained foreign investment intentions.

2) Labor costs are cheaper than in other Asian countries, especially the ASEAN members. A sharp rise in labor costs is unlikely due to strong population growth pressure (Table 9).

3) Viet Nam could enjoy an advantage over its ASEAN neighbors by virtue of national characteristics, including:

- 1) Manual dexterity
- 2) Excellent ability to find solutions through individual effort
- 3) Excellent engineering skills
- 4) High capacity to accept new concepts
- 5) Strong identification with production operations, even among highly educated technical personnel
- 6) Excellent mathematical skills.

Table 9 Comparison of monthly wage and salary among ASEAN

Country	City	Worker	Engineer	Manager
Singapore	Singapore	680 - 1,400	960 - 2,600	1,990 - 3,900
Thailand	Bangkok	150 - 320	380 - 660	790 - 2,200
Malaysia	Kuala Lumpur	200 - 350	480 - 1,410	1,180 - 2,800
Indonesia	Jakarta	100 - 120	280 - 560	430 - 1,400
The Philippines	Manila	190 - 300	300 - 350	640 - 1,100
Viet Nam	Ho Chi Minh	70 - 140	180 - 260	270 - 530

Note Unit is US\$

Source JETRO's survey done in May and June of '97

4. Policy Options to Foster the Metal Mold Industry

(1) Formulating Basic Policy—Learning from Taiwan's Success and Thailand's Failure

1) Taiwan's success

As part of efforts to enhance the added value of Taiwan's exports, the Taiwanese government actively encouraged investment by foreign parts manufacturers who could supply parts to assemblers which had already established operations in Taiwan. These foreign parts manufacturers became major users of metal molds. Recognizing the importance of metal molds, the government also focused on the development of metal mold manufacturers, especially small and medium Taiwanese-owned companies.

The government employed three specific measures. First, it provided low-interest loans to finance for capital investment by metal mold manufacturers. Second, it directed the Industrial Technology Institute (established in 1973) to develop metal mold-related technology and make it available to manufacturers. Third, it supported the establishment of spin-off companies by highly entrepreneurial employees of metal mold manufacturers. The former employers of these people used the new companies as suppliers. The resulting increase in the number of metal mold manufacturers inevitably led to fierce competition, which in turn drove the improvement of technology. Moreover, the process of manufacturing metal molds leads naturally to specialization. In Taiwan, this tendency helped to raise the overall level of technology in the industry and reduce costs.

Japanese electrical appliance manufacturers and American electronics manufacturers accounted for large shares of foreign investment in the establishment of export bases in Taiwan during the 1960s. In part because of this pattern, the development of metal mold production was led by production of molds for use in electrical appliance and electronics manufacturing (primarily plastic molds).

In 1995, Taiwan's exports of metal molds were worth ¥32.9 billion (approximately 25% of total production), making it Asia's second biggest exporter after Japan. Its main export markets are China via Hong Kong (40%), Southeast Asia (40%) and Japan (10%).

2) Thailand's failure

In the mid-1980s, Thailand began to work actively to attract foreign-owned companies in the final assembly production process in the hope that these companies would use Thailand as an export base for electrical appliances and electronic products. Unfortunately, the government was not sufficiently aware of the importance of attracting foreign-owned parts manufacturers and supporting industries to supply these assemblers.

Parts manufacturers are major users of metal molds. Thailand failed to take advantage of the influx of foreign-owned assemblers to create an industrial base for metal mold manufacturing, with electrical appliance and electronics manufacturers as customers.

However, joint ventures established by Honda in 1996 and Toyota in 1997 have started to produce "Asian cars" that reflect the characteristics of Thailand's domestic market. This trend is mirrored in the activities of Japanese parts manufacturers, which have established operations in Thailand in quick succession since 1995. Metal mold manufacturers, which are key suppliers to parts manufacturers, have also started to move into Thailand. To date some 15 companies have established operations there (Table 10). The weight of automobile parts per unit of volume is high compared with electrical and electronics parts. For this reason, manufacturers of automobile parts generally site their plants close to assembly plants in order to reduce transportation costs.

Table 10 Japanese mold manufacturers relating to automobile industry in Thailand

Company Name		Year	Product
Apic Yamada (T)	100%	96	Mold for injection
Thai Summit Ikuyo Mold	40%	95	Precision Injection Mold for Auto Parts
Enkei Thai Moldings	100%	96	Mold for Aluminum Die Cast
PCS Nissin	96%	95	Precision Injection Mold for Auto Parts
Sanko Gosei Technology (T)	75%	95	Precision Injection Mold for Auto Parts
Sanko Tochemi Manufacturing	100%	96	Injection Mold for Auto Parts
Saha Seiren	51%	95	Metal Mold for Auto Parts
Daiwa Circuit Module (T)	100%	96	Precision Metal Mold for Auto Parts
Thai Nissin Mold	100%	96	Precision Injection Mold for Auto Parts
SV-Nittan Precision	97%	96	Metal Mold for Auto Parts
Hirata Parts (T)	96%	95	Metal Mold for Auto Parts, Auto Parts Production
Thai Marujun	49%	95	Metal Mold for Auto Parts, Auto Parts Production
MCI Mould	75%	96	Precision Injection Mold for Auto Parts
Srithai Miyagawa	49%	96	Precision Injection Mold for Auto and Electronics Parts
BJKC (T)	41%	96	Metal Mold for Auto Parts, Auto Parts Production

Notes

- 1) (T) in the firm's name stands for (Thailand)
- 2) Percentage shows the Japanese Company's portion of shares
- 3) Year means Starting Year of Operation

Source Compiled from Toyokeizai Data by Nomura Research Institute

Mazda of Japan and GM of the United States also plan to produce compact passenger cars in Thailand. If these plans are implemented, demand for automobile parts is likely to increase still further, leading to growth in the volume of work for metal mold manufacturers. Domestic demand for cars has started to expand in earnest in Thailand, encouraging local capital to establish metal mold manufacturers. The industry has entered an important phase.

3) Basic principles of policy formation

- 1) Efforts to attract foreign assemblers should be paralleled by simultaneous efforts to attract parts manufacturers.
- 2) Since parts manufacturers are indirectly involved in exporting through their role as suppliers to assemblers, they should be eligible for the same incentives as exporters.
- 3) Even in advanced industrialized nations, most metal mold manufacturers are small companies employing less than 50 people. Special provision should be made for investment by these companies, since their ability to sustain the risks involved in overseas expansion is limited.
- 4) Support systems should be established for entrepreneurs who wish to establish metal mold manufacturing operations.

5) To support the improvement of technology in the metal mold industry, the Research Institute should be established to develop metal mold technology.

As far as the implications under AFPA are concerned, all types of metal molds are subject to a zero tariff and are already within the CEPT target range. (Table 11)

Table 11 Vietnamese Tariff Rate for Molding

Tariff Code No.	Item	Tariff Rate	Rate for CEPT
848010	Moulding boxes for metal foundry	0%	0%
848020	Mould base	0%	0%
848030	Moulding patterns	0%	0%
	Moulds for metal foundry or metal carbides	0%	0%
	Injection or compression type of moulds	0%	0%
848049	Others	0%	0%
848050	Moulds for glass	0%	0%
848060	Moulds for mineral materials	0%	0%
	Moulds for rubber or plastics	0%	0%
848071	Injection or compression moulds	0%	0%
848079	Other moulds	0%	0%

Notes

1) Tariff Rate is as the end of June '97

2) CEPT rate for '96

Viet Nam has virtually no metal mold manufacturers owned by domestic capital and is reliant on imports not only for high-precision items, but for almost all types of molds. Low tariff rates are obviously preferable in that environment. However, there may be an argument for raising tariffs as a way of protecting and fostering the fledgling metal mold industry, including domestic capital. At present, Japanese-affiliated companies are more concerned about the possibility that Viet Nam will impose quantitative restrictions because of its foreign currency situation, than about the problem of tariff protection. Sustained development over the long term is important for the metal mold industry, and tariff-based protectionist policies are unlikely to be a suitable policy option.

(2) Policy Options for Phased Development

Many facets of metal mold production still cannot be automated. These include design, the adjustment of finished molds, and the testing of molds after installation in presses and injection molding machines. Manufacturers must rely on the accumulated experience of technicians and skilled workers for these tasks. Because of these industry characteristics, it seems appropriate to begin with an involvement in production of metal molds for low-precision items, such as plastic sundries and construction materials, which are just starting to be used in daily life in Viet Nam. Eventually domestic production of electrical appliances and electronic parts will begin in earnest, led by foreign capital. This is likely to be accompanied by a shift to production of metal molds for high-precision plastic items used in the production of plastic parts.

Table 12 Summary of development for Vietnamese mold manufacturing industry

Type of Mold	Present	By Year of 2005	Year from 2006 to 2010	Year from 2011 to 2020
Plastic Injection				
Low Precision	Δ	○		
High Precision			○	○
Metal Press				
Low Precision, (Small Size)			Δ	
High Precision, (Small Size)				○
Major Market for Mold				
Plastic Injection	Sundries	Construction Materials	Home Appliances & Electronics (For Firms in Viet Nam)	Export Mold used for Electronics
Metal Press				Auto Parts Manufacturers (For Firms in Viet Nam) Home Appliances & Electronics (For Firms in Viet Nam)

Notes

- 1) Δ means to start increasing demand.
- 2) ○ means to establish the firm demand.

Source: Nomura Research Institute

Once production of metal molds for plastic moldings has been firmly established, demand for metal molds used in the production of metal parts for electrical appliances and electronic goods is likely to emerge.

These factors are reflected in Table 12, which summarizes the development stages for metal mold manufacturing.

1) Period to 2005: development of human resources required for metal mold production

- 1) During this phase, Metal Mold Industrial Parks would be developed, together with training schools for technicians based on IMI, Technology Research Institutes and Metal Mold Testing Institutes. These facilities would have the latest equipment.
- 2) The establishment of Testing Institutes would be significant for two reasons. First, they would be able to provide inspection services and guarantee the quality of metal molds. Second, they would remove the need for manufacturers to have their own testing equipment, thereby reducing the cost burden.
- 3) In order to acquire advanced metal mold technology from overseas over a short period of time, foreign-owned metal mold manufacturers would be actively encouraged to move into Viet Nam. Small-scale companies attracted in this way would be encouraged to move into Metal Mold Industrial Parks in order to minimize their risk.

- 4) A percentage of the value of metal molds supplied to customers would be treated as “deemed exports,” enabling metal mold manufacturers to benefit from the same incentives as exporters.
- 5) An industry association would be created to foster development of the metal mold industry, which would also become a venue for exchanging information on customers and technologies.

2) 2006~2010: Accumulation of experience and establishment of metal mold companies owned by domestic capital

- 1) Metal mold industrial parks would become fully operational, creating a denser concentration of metal mold manufacturers. At the same time, specialization and networking among metal mold manufacturers would be encouraged in order to raise the standard of technology in the industry as a whole.
- 2) Support would be provided to enable people wishing to establish metal mold manufacturing firms to become independent. Such support would consist mainly of low-interest finance, the introduction of customers and permission to use research findings from Metal Mold Research Institutes.
- 3) In preparation for metal mold exporting, Testing Institutes would acquire certification under industrial standards of other countries.

3) 2010~2020: Development of Vietnamese-Owned Metal Mold Manufacturers

Measures such as the following would be employed to establish Viet Nam as a metal mold supply center for neighboring ASEAN countries.

- 1) Full-scale support based on the supply of capital (venture capital)
- 2) Strengthening of the setup as an OEM supplier to Japan, Taiwan and other countries where the metal mold industry is more advanced than in Viet Nam.

Box**For Bringing Out Latest Capabilities of Viet Nam's Human Resources**

It is also possible to implement a development policy designed to bring out latent capabilities of Viet Nam's human resources, which are one of the nation's comparative advantages. It is worth considering the implementation of measures under such framework as a "Special Law to Develop Latent Capabilities of Human Resources."

- 1) "A high literacy rate combined with manual dexterity and patient disposition of the people" is in itself a sufficient foundation for the development of labor-intensive light industries, which can compete successfully in international markets. However, the government should exercise caution so that foreign investment will not be merely hunting low-wage labor. Every time I visit Hanoi or Ho Chi Minh City, I am very much impressed by the high sense of fashion and individual taste of Vietnamese ladies. Such latent capability must be allowed to blossom. For example, in order to maintain export competitiveness for many years to come, the government is advised to take measures to increase the fashion and design development capabilities of Vietnamese designers under assistance from France, Italy or other countries in such sectors as textiles, apparel, and footwear.
- 2) It is internationally recognized that the Vietnamese people have unrivaled mathematical abilities. In order to take advantage of this strength, the government is advised to take measures to realize the people's latent capability and develop the computer software industry into Viet Nam's strategic industry. For example, the government of Taiwan in 1977 established a science and industry park in Xinzhu. A similar "software development zone" could be established on or near the campuses of Hanoi Institute of Engineering or Hanoi University to build an industry-academia cooperation system.
- 3) The Vietnamese people are also known for their skills in dismantling used cars and machinery to get usable parts or to build new machines that work. In this sense, I believe the Vietnamese people are highly adaptable to building the motorcycle assembly or parts industry. Measures to develop such engineering skills will also be very effective. I would like to place special emphasis on the development of metal mold technology as a core technology in the machinery industry.

All these capabilities can be called the three major core soft technologies. Fashion design (including industrial design), computer software, and metal mold engineering can also be mutually linked by computers.

