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Fostering Supporting Industries in Thailand: through the Linkage between Local and Foreign Interests, the Case of Mold and Die Sector

Jun Tsunekawa

1. Introduction

Thailand has achieved a high economic growth, of an annualized 7-8% over the past ten years. The baht's shift to a floating rate regime on July 2, 1997 triggered the currency's collapse, which plunged the nation's economy into contraction. As the baht crisis affected not only other ASEAN nations, including Malaysia and Indonesia, but even Hong Kong and South Korea, Asia's currency and financial crisis erupted. Thailand's real economic growth rate, which was 5.5% in 1996, was -0.4% in 1997. The rate in 1998 is estimated at -7.8%, and is projected to be 0-1% in 1999. [1]

The baht crisis reflected Thailand's financial system's vulnerability. It was exposed by financial liberalization which invited the free-for-all investment and lending of foreign hot money, and by the ballooning of bad loans consequent to the bursting of the economic bubble. Another factor was the swelling of the nation's current account deficit, which eroded foreign investor's confidence in its economic performance. The current account deficit exceeded 8% as a percentage of gross domestic product in 1996 and 1997, which was due to an increase in imports and a slowdown in exports. Exports in 1997 decreased 1.3% compared with the previous year. Labor-intensive products, including textiles and footwear, accounted for a large proportion of the decrease. Textile products, in particular, lost significant market share to Vietnamese and Chinese competitors in the Middle East and in Eastern Europe. At the root of all this lies the fact that Thailand has failed to improve productivity over the past ten years.[2]

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[1] "Thailand's Economy at a Glance," Jan. 15, 1999, Thai Board of Investment.
[2] Akira Suehiro, "Tai Keizai Kiki no Naijo" , Sekai, Dec. 1997, Iwanami Shoten (in Japanese).

Thailand's export-oriented industries, particularly electric & electronic equipment, which started growing around 1990 continued to depend upon foreign suppliers for raw materials and parts. There was little progress in promoting domestic production of these, and thereby served to increase Thailand's level of imports. While Thailand's current development combines the features of NAIC-style growth and export-oriented industrialization, certainly it is the machinery industry that should propel the Thai economy in the long run. The basic technology that should underpin the machinery industry's strength must be "internalized," and a wide spectrum of supporting industries supplying quality materials and parts must grow. At the same time, the machinery industry must become internationally competitive by developing ties with foreign interests whose ample management resources it should exploit, before the economy may regain a sustainable-growth path.

Each machinery industry embraces many supporting segments. In this report, we will focus on the automotive parts and electric & electronic parts industries, themselves supporting industries, and take particular note of their vital mold and die segment. We will scrutinize Thailand's historical attitudes for the nurturing of supporting industries, and then identify difficulties plaguing the mold and die sector and explore ways to develop it.

2. Necessity for Development of Supporting Industries

2.1. Avoiding Growth of Foreign Enclave

In Thailand's automotive industry, 15 assembling makers now operate, and all are either wholly or partly owned by foreign interests. Of these, nine are Japanese, making the Japanese participation in the industry conspicuous.[3] Examining the Japanese automakers' procurement behavior in Thailand indicates that they have shifted emphasis from procurement from Japan to procurement from local Japanese suppliers and

[3] Also, GM and Ford of the United States obtained BOI's authorization to operate in Thailand, and planned to start operations there in 1999 and in 1998, respectively. The plan has been postponed in the wake of the economic crisis.

suppliers of other ASEAN nations. Meanwhile, local Thai suppliers' share of the Japanese automakers' procurement decreased from 31% in 1985 to 27% in 1994. (Table 1)

According to the Japan External Trade Organization's (JETRO) survey, 353 manufacturers, including parts producers, operate in Thailand's electric & electronic industry. Of these, 105 are 100% Thai-owned. 247 manufacturers, or 70% of the total are foreign-owned, wholly or partially. Of these foreign manufacturers, 94 (26.7%) are Japanese, 57 (16.2%) Taiwanese, and 22 (6%) American. The Japanese account for the biggest share of the foreign participation.[4] These foreign manufacturers act as Thailand's principal exporters of machinery and industrial products.

JETRO's fact-finding survey of Japanese manufacturers operating in Asia outside Japan shows trends in Japanese electric & electronic makers' and transport-equipment makers' local procurement in Thailand.(Table 2) In 1987, Japanese electric & electronic makers reporting a local content ratio of 50% or less accounted for 25% of the total, and the remaining 75% reported a ratio of 51% or more. In 1996, the former group increased sharply to 85% of the total, while the latter dropped to only 15%. The number of makers surveyed must be adjusted for in explaining these changes. Still, the biggest reason may be a sharp increase in the number of new Japanese manufacturers who moved into Thailand during the foreign-investment boom since 1986. Because these manufacturers were export-oriented there, they procured parts from Japan or other nations, instead of locally, or promoted their in-house production, in order to keep their products' quality globally competitive. Procuring parts locally had limits because of the quality and also the volume constantly supplied.

A similar trend has been observed in Japanese transport-equipment manufacturers' local procurement in Thailand, although it has been less pronounced. In 1987, Japanese makers reporting a local content ratio of 50% or less accounted for 57% of the total, and the remaining 43% reported a ratio of 51% or more. In 1996, the former group increased to 62% of the total, while the latter dropped to 38%. The changes may be explained by their stepped-up procurement from other ASEAN nations following the start in 1989 of the BBC (program for the promotion of intra-regional mutually-complementary supply

[4] *Tai ni okeru Supporting Industry no Genjo to Kadai*, JETRO, Machinery Technology

of auto parts). MMC Sittipol and others also increased their procurement overseas in order to meet an increase in the proportion of their exports. A third factor may be that local supplies had difficulties meeting an increase in demand as a reduction in the import tariff on automobiles and the consumption boom proved in their favor.

Thailand's principal exporters of transport equipment, electric & electronic products, and parts are foreign manufacturers, and local Thai manufacturers are only modest exporters and most supply the domestic market. It is only natural that management resources-rich foreign manufacturers play a leadership role in the nation's export sector. Still, the decline in these foreign manufacturers' procurement from local suppliers is of great concern. As the Thai economy becomes more and more globally integrated, the weakening of the relationship between foreign manufacturers and local suppliers might accelerate conspicuous growth of a foreign "enclave" within the local economy which is generally lagging behind. The Interviews at JETRO Bangkok Center have born out the fear. A sharp contrast exists between technologically-advanced manufacturers commanding the bigger share of Japan and other nations' investment and support, and local suppliers scarcely sharing it and struggling on their own to acquire technology. The Center points out that Japanese assembling makers place a high proportion of their orders with Japanese parts producers operating in Thailand or major local manufacturers. They limit their procurement from smaller local suppliers to simple presses or plastic molds.

The automotive and electric & electronic industries have a wide range of supporting industries, and can have significant ripple effects on the economy as a whole. Thailand's local corporate sector consists mostly of smaller firms. In the electric & electronic industry, 2,408 firms operated in 1996, and of these, 2,184, or 90.6% were smaller firms. In the automotive industry, 2,867, or 96.2% of the total were smaller firms.[5] Growth of a foreign "enclave" might hinder the development of these smaller local firms and accelerate the bi-polarization of the industries.

Promoting the development and bolstering the strength of the local parts industries may improve their linkage with foreign interests as they become better able to

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Division 1986, p.29.(in Japanese).

[5] Dr.Kitti Limskul, *Prospect of Selected Supporting Industries in Thailand*, Paper prepared for Workshop by APEC Study Center, IDE on 21 January 1999, pp.1-2.

serve and supply them. This may help prevent development of a foreign enclave. These industries may also acquire cutting-edge and applied technologies via their improved ties with foreign interests.

2.2. Improving International Balance of Payments

A factor behind Thailand's currency and economic crisis was an increase in imports of capital goods, and raw materials and parts. At the early stages of industrialization, a nation will increase imports of capital goods and raw materials needed for the start-up of factories. After the factories start operating, imports of raw materials and parts will increase. As the industrialization progresses, imports of machine tools and computers will increase as a result of the factories' stepping up investment in renewing equipment and research & development. If the industrialization promotes the growth of export industries, that nation's trade imbalance will be corrected as exports exceed imports. Growth of domestic supporting industries which can produce parts, machinery, materials and others to replace imports should improve the nation's trade imbalance. Yet, during its process, the imbalance might worsen as a result of an increase in imports of machinery and equipment necessary for the start-up of these industries. If the nation's petrochemical and steel industries are underdeveloped, imports of materials will increase. In Thailand's case, petrochemicals producers have grown in the eastern seaside industrial district, and the Sahaviriya Group have played a role in fostering the steel industry, but these are yet to become full-fledged. Growth of such supporting industries involves the development of machinery and materials industries which form their periphery. Thailand needs to take such measures as exempting from import tariffs of machinery and materials needed by supporting industries in order to reduce their import costs, for the moment until their peripheral industries grow.

The growth of supporting industries which can produce materials and imports to replace imports will not only improve the nation's trade balance but also increase its ability to create value added domestically. Developing supporting industries will be effective in enhancing the overall level of value added that the economy can create. Casting and forging, in particular, are essential basic technologies. Developing casting and forging supporting industries will lead to the accumulation of such basic

technologies, which will act as the foundation for assimilating applied technologies. This will facilitate the import of advanced technologies. If supporting industries grow and foreign manufacturers increase local procurement from these industries, the transfer of technology between them will become more brisk. The ripple effects may include the domestic development of applied technology.

3. Thailand's Policy for Developing Supporting Industries

In this section, we will review the policy measures which Thailand's Board of Investment (BOI) and Ministry of Industry have adopted for developing its supporting industries.

There are roughly two distinctive ways in which a supporting industry will grow. In one way, the related assembling industry will play a literally leading role. The assembling industry's development will stimulate the growth of parts and other supporting industries. This is known as backward linkage effect. In the second way, the growth of a parts industry will precede that of the related assembling industry. The new entry of export-oriented foreign parts producers will stimulate the development of a parts industry in the host nation, and as the related assembling industry grows, the parts industry will play a greater role in supporting it. The first pattern seems more common, and that has been the case with Thailand. An outstanding example of the second pattern is the development of Malaysia's electric & electronic industry. In this case, electronic parts manufacturers have been promoted in accordance with the government's export-oriented investment policy, and have trouble supplying the domestic market. This has triggered the growth of a foreign enclave. The government needs to revise its investment policy in order to address the problem.

3.1. Promoting Investment to Develop Supporting Industries

In Thailand, a case of the second pattern was triggered by the entry of mostly American multinational semiconductor manufacturers since the latter half of the 1970s. These manufacturers produced ICs mostly for the export market, partly reflecting the fact that

no MPU or computer assembling makers existed in Thailand at that time. More important, the government's investment policy was designed to favor exporters, and most foreign export-oriented manufacturers were allowed to enter Thailand through 100% owned units. Yet, their participation has still to stimulate the development of local Thai manufacturers to whom to supply their ICs. Since the latter half of the 1980s, Japanese parts producers advanced into Thailand (particularly in the electric & electronic equipment industry) by setting up joint ventures in which they held a majority stake (e.g. a diodes producer, R). Their majority ownership was authorized if the joint venture exported at least 80% of their output.[6] The remaining 20% was allowed to be marketed locally, provided there were no local competitors. If local competitors existed, and especially if such competitors were subject to the government's protection, the joint ventures' local marketing was further restricted (a case in point was a Japanese consumer-electronics maker, S). Actually, there were many cases in which such a joint venture was forced to export all its products. In a sense, the government adopted an attitude of separating local manufacturers and foreign entrants in order to protect local industries. Since the beginning of the 1990s, the government shed such policy from the viewpoint of improving local industries' competitiveness, and deregulated foreign ownership and started promoting investment in supporting industries. The government has made increasingly clear its new stance to improve the linkage between leading exporters and the related supporting industries.[7]

Meanwhile, the second pattern of development of supporting industries has hardly been familiar when it comes to molds used for making parts or castings and forgings which are basic components of the automobile. Foundries in such areas find it difficult to operate as exporters, and rather tend to serve customers geographically close to them. They tend to grow as domestic demand increases. In Thailand's automotive industry, where Japanese automakers advanced relatively early on, the casting/forging sector grew more quickly compared with other sectors, because Japanese makers tried to cultivate

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[6] The export ratio herein referred to indicates the ratio of a company's export amount to its total sales.

[7] Foreign and Thai companies are equally qualified to apply for BOI's investment benefits & privileges. Yet, the eligibility to receive such benefits requires the meeting of certain conditions, including the minimum investment amount and export ratio. Consequently, such incentives appear designed to favor foreign companies.

contractors or tie-up suppliers. They made such efforts in order to meet the domestic-production requirements imposed by the government (Ministry of Industry). Japanese consumer electronics manufacturers in Thailand have made similar efforts, too, especially when it comes to white goods. Yet, they can still find few local suppliers of higher-precision molds needed for making products for the export market. They use locally-produced molds or castings/forgings for making products for sale in Thailand, but have to in-house manufacture, procure from local Japanese producers, or import molds for making foreign-bound products.

BOI decides its investment policy within the policy framework of NESDB's socioeconomic plan. Voice calling for the development of supporting industries began growing since the latter half of the 1980s, when the foreign-investment boom started. At that time, the nation was pushing the 5th Socioeconomic Development Plan (1982-1986). The 5th Plan put emphasis on development of the petrochemical industry in the eastern seaside industrial district of Map Ta Phut and promotion of exports. In the wake of the second oil shock, the policy for developing the petrochemical industry was shelved, and greater stress was given promotion of exports. Accordingly, an investment policy revision was made (in 1982) to allow foreign investors to set up a 100% owned firm if its export ratio was at least 80%. Still, the specific measures taken for developing supporting industries then were limited to orthodox mediocre methods for nurturing smaller enterprises and encouraging exports.

The 6th Plan, launched in 1987, shifted emphasis to the invigoration of smaller industries and regional industries, development of the export sector, and development of engineering industries and agriculture-related industries.

Its policy for developing supporting industries was centered on engineering industries. The aim was to contain an increase in imports of capital goods by developing machinery industries, because the foreign-investment boom since the latter half of the 1980s triggered their sharp increase.

For their part, foreign entrants, conspicuously Japanese manufacturers, made huge efforts to dig up local parts producers for cost-reducing purposes. Their scramble for local contractors temporarily became overheated. Eventually, they found few parts producers who could meet the requirements of their exports. They had to decide whether

to manufacture in-house or import their parts, or ask their cooperative suppliers in Japan to advance to Thailand. The supporting industries Thailand lacked at that time included molding (for pressing, injection-molding), plating, and heat treatment. In such circumstances, the Japanese manufacturers asked the local government to step up the development of these supporting industries. However, BOI did not introduce privileges to favor investment in specific supporting industries. It instead sought to increase the number of investment applications from foreign, particularly Japanese, smaller manufacturers or from local concerns, by lowering the minimum investment amount required. The preferential treatment given such investors was basically orthodox tax benefits. The construction of factories was concentrated in the Bangkok metropolitan area, where securing industrial sites, workforce and infrastructure became increasingly difficult. The districts designated for industrial promotion were reviewed to "decentralize" the construction of factories. The more remote from the metropolitan area factories were planned, the handsomer benefits granted. Still, BOI did begin to recognize the necessity for development of such supporting industries as molding, plating and heat treatment. In the latter part of the 1980s, BOI started sending dedicated officers to Japan to make the rounds of smaller producers and invite them to invest in these industries.

The development of supporting industries was geared up significantly in 1992, when the 7th Plan started. The 7th Plan was aimed at resolving the widening income gap, severe traffic congestion, environmental degradation and many other problems stemming from the rapid economic growth. Policy priority was placed on improvement of people's quality of life, environmental conservation and development of smaller regional businesses & promotion of exports as part of which development of supporting industries was recognized. In response to this, BOI adopted a number of measures to promote the development of supporting industries.

(1) Establishing BUILD

In 1992, BOI realigned itself to better serve the purpose of developing supporting industries, and set up a new division, known as BUILD (BOI Unit for Industry Linkage Development Plan). BUILD was designed to gather and build a database of information

about suppliers of parts and processed materials, and offer it to assembling industries needing them in order to establish a linkage between them. By doing this, BUILD was also expected to act as a bridge linking regionally-based suppliers and set manufacturers in order to further the development of regional industries. It was furthermore supposed to serve to contain an increase in imports of parts and materials.

(2) Designating priority supporting industries

Earlier, after the beginning of the 1990s, BOI had started stepping up promotion of investment in the auto parts industry. Such efforts were focused upon seven specific areas: key auto parts, including engine parts, transmission, brakes, steering wheels and suspension systems; a parts category, including radiators, fuel tanks, air filters, oil filters, wire harness, gaskets and plate springs; another parts category; car assembly; surface treatment; heat treatment; and manufacture of electric vehicles.

With this in mind, BOI in October 1993 issued a BOI announcement designating four segments to be promoted on a priority basis:[8]

1) Molds & dies
2) Jigs & fixtures
3) Castings
4) Forgings

In April the following year, ten new segments were added to the list (effective as from June the same year) :[9]

1) Toolings
2) Grinding tools
3) Cutting tools
4) Sintered products
5) Surface treatment (for metals, plastics)
6) Heat treatment
7) Machining centers (incorporating computerized design & control)
8) Electronic connectors

[8] BOI Announcement 2536, No. 1.
[9] BOI Announcement 2537, No. 3.

9) Rechargeable Ni-Cd batteries

10) Engineering plastics

BOI was going to emphasize a total of 14 specific segments in promoting the development of supporting industries. By doing this, BOI aimed mainly to make domestic industries more competitive in the export markets, stimulate employment (especially in the provinces), develop manpower, improve manufacturers' technological strength and reduce imports of parts.

The privileges BOI introduced to promote investment in these supporting sectors included tax exemption of production equipment imports (50% in Zones 1 & 2, 100% in Zone 3), and corporate tax exemption uniformly for the first eight years. Restrictions on foreign ownership ratio were removed (for investment applications filed by the end of December 1996), and foreign manufacturers were authorized to supply the domestic market. When compared with other sectors, where the period of corporate tax exemption was most commonly five years, depending on the geographical Zones, it was a uniform eight years for the designated supporting sectors. The authorization, though for a limited period, to establish 100%-foreign-owned firms, irrespective of their export ratio, no constraints imposed on domestic sales, made the privileges for the supporting sectors handsomer still, which was welcome. This indicated BOI's deepened recognition of the importance of developing these supporting sectors. Allowing foreign manufacturers to sell to the domestic market was necessary for promoting a linkage between local suppliers and foreign manufacturers who tended to be export-oriented. This step was consistent with BUILD's establishment.

(3) Deregulation

The 8th Plan (1997-2001) shared with the 7th Plan the main objective of achieving a sustainable growth by improving people's quality of life, promoting environmental conservation and restructuring industry for improved efficiency, etc. However, following the eruption in July 1997 of the currency/economic crisis, the 8th Plan was significantly revised to put the biggest emphasis on deregulation and liberalization in order to improve the export sector's competitiveness. The revision was made to comply with the requirements of IMF's assistance. In agriculture, the addition of higher value to export

products and development of new agrobusiness took priority. In manufacturing, the realignment of such export industries as automobiles, electric machinery, electronic equipment and general machinery to increase competitiveness was highlighted.

Accordingly, BOI eased the restrictions on foreign ownership and launched a series of policy measures for promoting foreign investment to increase corporate capital or finance business expansion (See Appendix 1). Appendix 1 contains a list of the economic-rehabilitation measures taken by BOI following the currency crisis which were presumably designed in connection with the development of supporting industries. Of these, one certainly thus designed was the issuing in November 1997 of a BOI announcement to add five new industries to the list of priority-promotion supporting segments:

1) Manufacture of machinery (agricultural machines, civil-engineering & metal-working machines, industrial machines, electric machines)
2) Manufacture of measuring instruments
3) ABSs (anti-lock brakes systems)
4) Computer-controlled fuel injection equipment
5) Automobile catalytic converters

The list was now extended to cover a total of 19 supporting sectors. Simultaneously, the privileges specifically to promote investment in these designated supporting sectors were improved and augmented. For example, the geographical zoning was made no longer meaningful in granting these privileges, including corporate tax exemption uniformly for the first eight years and import tariff exemption of machinery & equipment. The authorization to establish 51% to 100%-foreign-owned firms, no constraints imposed on domestic sales, was continued (retroactive to October 27, 1997). The limited period for filing for such permission was extended to the end of December 1999.[10] Additionally, the newly-improved investment privileges only remotely related to the development of supporting industries included:

1) Eligible firms in Zones 2 & 3 were granted an additional corporate tax exemption if they were substantial exporters or employers.
2) Eligible firms were exempted from the tariff on their necessary imports of raw

[10] BOI Announcement 2540, No. 13.

or processed materials, without being required to export their products, with a view to accelerating their exports. The tariff exemption of their materials imports destined for export was renewed upon expiration.

3) If eligible firms expanded their production facilities, improved the operating capacity and extended the operating hours, their corporate tax rate remained unchanged. They were exempted from the tariff on their production equipment imports, retroactive to the time they were given their eligibility certificate.

4) If an eligible joint venture in Zone 1 or 2 planned to increase its capital, in accordance with eased foreign ownership regulations, the foreign partner was allowed to increase its equity ratio to 100% with the local partner's consent.

(All revisions took effect on October 27, 1997.)

To be sure, Thailand has revised its investment policy to ease the restrictions on foreign investment in corporate capital or expansion, essentially as part of its IMF-directed economic restructuring. Yet, the deregulation of foreign investment, particularly the easing of export-based restrictions on foreign ownership or domestic sales, should prove effective in promoting investment in supporting industries and reinforcing their linkage with foreign interests. Since the beginning of the 1990s, it may be observed that the development of supporting industries and the liberalization of foreign investment have become the general direction of Thailand's investment policy. The summit meeting of the ASEAN nations in December 1998 adopted ASEAN's common package of investment promotion measures in order to revive their economies out of their current difficulties. Each nation will introduce the package to the extent that it is compatible with its established set of investment incentives. The common investment-liberalization measures which will benefit new investment projects include: corporate tax exemption for at least the first three years; exemption of eligible firms from the tariff on their capital goods imports; unfettered participation in sales in the host country's domestic market; 100% foreign ownership; and arrangements to accommodate the needed intake of foreign engineers.[11] The package does not contain specific incentives to promote investment in particular supporting industries.

Still, the investment liberalization efforts should invigorate the mechanism for

[11] To benefit from this requires applying with the investment agency of each ASEAN

mutual parts supply/procurement within the ASEAN, further deepening intra-regional mutually-complementary relations. This should foster extended markets for supporting industries. A local supporting industry in one ASEAN nation may find opportunities to establish ties with foreign manufacturers operating in another.

(4) Role of BUILD

In this section, we will scrutinize BOI's BUILD, which may and should play an important role in building a linkage between supporting industries and assembling makers.

As explained earlier, BUILD was set up in accordance with the 7th Program. BUILD is designed to seek the backward-linkage-effect development of Thailand's supporting industries by promoting their linkage with assembling manufacturers. BUILD is also charged with introducing foreign manufacturers in Thailand seeking local procurement of parts to appropriate suppliers. For these purposes, BUILD works to construct a database of Thailand's supporting-sector companies, search it for ideal companies to introduce to assembling makers, or find potential partners for foreign manufacturers planning joint ventures. BUILD has a track record in organizing get-acquainted workshops or seminars, assisting domestic suppliers to participate in trade shows at home or abroad, and arranging for factory tours. One of these efforts is the VMC (Vendor-Meets-Customer) Program. It was worked out in November 1997 to organize meetings, as well as factory tours, for BUILD-registered parts suppliers and assembling companies in order to vitalize business between them. The program takes care of the automotive and electric & electronic industries, in particular, and its meetings are scheduled once in every three weeks. A total of 90 local firms have attended meetings with GM of the United States, which intends to build in Thailand a major parts supply base for its Asia/Pacific operations. Local firms have participated in tours of factories of Ford and a Japanese manufacturer, F.[12] Arranging for factory tours for local supplies is aimed at increasing their awareness of the importance of quality. In November 1996, the BUILD Fair '96 was held to exhibit Thai parts makers' products in

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nation by December 2000.

[12] BOI, "Thailand Update," April 10, 1998, Vol.7, No. 1.

order to attract the interest of assembling companies.

In addition to these matchmaking efforts, BUILD also serves to provide technical consultation to smaller local manufacturers and sponsor education/training workshops for them. It familiarizes them with other government agencies' assistance programs, and advise them on practical procedures for applying for such services.

BUILD's most-important effort seems to be its establishment and management of a database of supporting-sector companies, categorized according to line of business, such as automobiles, electric & electronic equipment, and molds & jigs. The database initially listed only Thailand's companies, but has now been extended to cover supporting industries of other ASEAN nations, too. Since January 1999, the database has begun to be offered on the Internet, and can be accessed and searched in Japan.[13] A downloaded profile (in text-file format) of a molds maker is given in Appendix 2. A benefit of the database is that a manufacturer in Japan looking for an ASEAN-region outsourcing contractor may scan the database to short-list candidates before conducting field researches in the region. Foreign companies should exploit the database aggressively.

(5) BUILD's list of molds makers

In this section, we will study a list of companies profiled in BUILD's database since January 1990. The database covers the molds & jigs makers of nine ASEAN nations, and we will zero in on a list of Thailand's manufacturers. That list comprises a total of 124 makers, of which 70 are 100% Thai-owned, and the remaining 54 are partly or wholly foreign-owned. Of these foreign firms, 44, or the vast majority are Japanese-owned, four Taiwanese, three Singaporean, one Swedish, and one American.

Analyzing BUILD list of molds & jigs makers

1) Breakdown by country of owner

Total: 124 firms

Japanese: 44 firms	Swedish: 1 firm	Thai: 70 firms
Taiwanese: 4 firms	American: 1 firm	
Singaporean: 3 firms	Australian: 1 firm	

It is difficult to count upon only the profiles of these firms given in the database and tell the specific types of molds & jigs which they produce. On the basis of such data, if broken down by country by type of product, 15 Japanese firms produce pressing & stamping molds for metals, and about the same number, or 14 produce molds for plastics. Three apparently produce both types of molds. There are 11 firms whose types of product are not known. This indicates that there remains room for improvement of the way of producing the list.

Of the Thai firms, 35 produce pressing & stamping molds for metals, 25 molds for plastics, and three both types. The makers of molds for metals form the biggest group. This indicates that these makers have grown in tandem with the automotive industry. There are four firms whose types of product are not known. The breakdowns of other country-by-country groups are also given below:

2) Breakdown by country & by type of product (which is given as specifically as possible on the basis of all data given in the database.)

	Japan	Taiwan	Singapore	Sweden	US	Australia	Thai
Molds for metals:	15	1	1			1	34
Molds for plastics:	14	2					25
Both above:	3	1	1				3
Molds for rubber:	1						4
Not known:	11		1	1	1		4

Breaking down the Japanese makers according to the types of their customers shows that the biggest number, or 13 supply electric & electronic parts makers. Eight firms supply auto-related makers. Another eight supply both types of customers. Two firms serve other types of customers. There are as many as 13 firms whose types of customer are not known. This makes it difficult to determine the line of business which the largest group of Japanese molds makers serves. Still, it seems certain that a rising number of Japanese makers supply electric & electronic parts manufacturers.

3) Breakdown of Japanese makers by type of customer (which is given as specifically as

[13] The address on the Internet is "http://www.boi.go.th."

possible on the basis of all data in the database.)

Electric & electronic parts:	13 firms
Automobiles:	8 firms
Both above:	8 firms
Others:	2 firms
Not known:	13 firms

If the Japanese makers are broken down by their Japanese ownership ratio, six firms are 100% Japanese owned. These may have advanced to Thailand since 1994, when supporting industries were first designated as areas to be promoted on a priority basis. There are 11 firms which are more than 51% Japanese owned. Thus, the molds makers in which a majority stake is owned by Japanese number 17. One firm is fifty-fifty owned by local and Japanese interests. 13 Japanese firms are 49% or less owned by Japanese. Because there are as many as 13 firms whose ownership ratios are not known, it is difficult to produce a definite breakdown of the molds makers by the Japanese ownership ratio. Still, it seems likely that the firms in which a majority state is owned by Thai interests form the biggest group.

4) Breakdown of Japanese makers by Japanese ownership ratio

100%	51%	50%	49% or less	Not known
6	11	1	13	13

The Japanese-owned molds & jigs makers profiled in the BUILD database are shown by local corporate name in Appendix 3. Actually, there are more Japanese molds makers operating in Thailand who are not listed in the database. According to Toyo Keizai's "Japanese Companies Overseas 1998," at least 20 Japanese molds makers have advanced into Thailand, as shown in Table 3. Of these, 12 are registered as molds & jigs makers in the BUILD database, and the remaining eight are not. Combining all BUILD-registered and these not-registered Japanese firms shows that at least 52 Japanese molds makers now operate in Thailand. The number indicates that the Japanese makers have played a significant role in the development and expansion of the nation's molding sector, a key supporting industry.

Upon a detailed examination of the above 20 Japanese makers, 10 firms supply molds for automobiles, and about the same number, or eight supply molds for electric & electronic parts. Two firms make both. Studying the time of entering (or starting operations in) Thailand shows that one firm advanced in 1981, four in the latter half of the 1980s, and two in the first half of the 1990s. By far the largest 11 started operating in Thailand in the latter half of the 1990s, and of these, seven in 1996. The increase may reflect BOI's authorization in 1994 to establish 100% foreign owned firms, irrespective of their export ratio and no constraints imposed on domestic sales, as a step of promoting foreign investment. Other important factors may include the yen's appreciation since 1994 and the booming of demand from Japanese customers advancing to that nation. Examining the Japanese ownerships of these 20 makers shows that seven are 100% Japanese owned. Of these, as many as five advanced as recently as after 1996, indicating that they took advantage of relaxed investment regulations. 13 firms are owned jointly with local concerns, and of these, six are more than 50% owned by Japanese. Because Thailand's molding sector was a newly-growing industry, it may have been relatively easy for foreign investors to have a majority stake in a firm even during the 1980s. Of the 20, there are five which are 49% or less owned by Japanese.

The local partners of Japanese joint ventures in Thailand are mostly the nation's major corporations, including Saha Union, Yontrakit, Sahaviriya, The Sittipol, and Union Plastic. Because the establishment of joint ventures is an effective way of importing technology, many medium-sized and smaller firms should take part aggressively in setting up joint ventures. The reality is that, because big corporations are well superior to the smaller firms in management skills, technical strength and manpower, many Japanese manufacturers tend to form joint ventures with big corporations. The smaller firms' general management skills and technological strength must be improved before their linkage with foreign interests may be developed and promoted. It may also be important to develop subcontractors to serve the joint ventures of Japanese manufacturers and local major corporations. Such subcontracting should prove useful also to big corporations if they seek to reduce cost.

Because BOI is chiefly responsible for inviting foreign interests' participation in domestic industry, its policy inevitably tends to favor the big corporations that are more

likely to become their joint venture partners.

It is Ministry of Industry that should take the real and effective initiative in improving the overall strength of Thailand's smaller firms. Ministry of Industry and BOI should work organically together to develop and establish the smaller firms' linkage with foreign interests, particularly major exporters. Yet, cooperation and coordination of policy between the agencies are not being promoted briskly.

3.2. Ministry of Industry's Policy for Industrial Development

Ministry of Industry used to adopt generally protectionist attitudes for the development of domestic industry. It was evidenced by its prohibition of new entries into particular sectors and its exploitation of restrictive measures, including the domestic-production requirements imposed in the automotive sector. In its administration of policy for promoting the development of supporting industries, Japan' ODA has played a key role. Ministry of Industry used to handle its measures for developing supporting industries, as part of its policy for developing smaller enterprises. Thailand began stepping up aggressively the promotion of smaller enterprises in 1964, when the Small Industries Financing Office (SIFO, which is currently SIFCT as a result of merging into IFCT) was established within Ministry of Industry to extend financing to smaller industries. After that, the Industrial Service Institute (ISI) was set up in 1966, and the Northern Industrial Promotion Center was established in 1973, as the nation started emphasizing the development of smaller industries in the provinces. Additionally, the Thailand Management Development and Productivity Center (TMDPC), for providing guidance on management, and the Thai Industrial Standards Institute (TISI), for adopting industrial standards, were also established.

(1) Establishing MIDI

Ministry of Industry began gearing up the promotion of supporting industries in 1989, when Japan's ODA was utilized to establish the Metal Working and Machinery Industries Development Institute (MIDI). As it turned out, MIDI played a pivotal role in instructing smaller enterprises in improving their production and management skills.

The recommendation of the New AID Plan, which was underwritten by Japan's ODA since 1988, prompted the establishment of a molders association and a founders association. Each acted as a bride between MIDI and the industry it represented. The New AID Plan concluded that promoting the automotive and electric & electronic sectors which had a wider range of supporting industries was effective in developing smaller enterprises. This led to the mounting since 1993 of efforts to study the development of their supporting industries. Accordingly, MIDI was restructured into the more-empowered BSID, which worked to promote the development of local supporting industries with a view to making them internationally competitive.[14]

(2) Deregulation

Ministry of Industry dramatically shifted its previous restrictionist attitudes for the development of domestic industry since the beginning of the 1990s. At that time, deregulation suddenly got into full swing in Thailand as making the economy cost-effective, globally competitive and efficient became urgent. The tariff on machinery was reduced to 5% in 1990, and the tariff on raw materials for the manufacture of auto parts was also cut in March 1992. In September the same year, under the Cabinet of Premier Chuan, the import tariff on automobiles was significantly reduced. In February 1993, prior to the establishment of AFTA, Thailand cut its tariffs on 1,474 items of imports from the rest of the ASEAN region. In March 1994, the tariff on electronic parts was cut from the previous 30% plus to around 1%. The seemingly too-radical deregulation exposed even previously protected local industries to international competition, making it imperative for them to become much stronger if they were to survive. As Thailand's exports slumped in 1996, which was followed by the currency crisis, Ministry of Industry was forced to come up with a new policy. Ministry of Industry drew up its master plan for industrial structure adjustment, and a Cabinet meeting adopted the plan in January 1998. The plan was aimed at increasing industry's competitiveness, such as by improving its productivity, fostering human resources/enhancing labor's standards of education, increasing its cost-effectiveness, and

[14] Smaller firms herein referred to indicate companies whose number of employees is 200 or less or whose net fixed assets amount to 50 million bahts or less.

promoting awareness of the importance of on-time delivery. Emphasis was placed on the development of supporting industries (the mold and die sector was recognized explicitly as such). Promoting their collaboration with foreign businesses and domestic manufacturers to accelerate the expansion of their markets and the transfer of technology was identified as an important goal to attain. It should be noted that Ministry of Industry did start emphasizing the establishment of a linkage between local supporting industries on one hand and foreign interests and/or local major corporations on the other. In 1994, with the participation of trade associations, BOI and Ministry of Industry jointly launched the National Supplier Development Program. While the program now acts solely as a vehicle for studying development projects, it may also play an important role in establishing a mechanism of inter-agency and government-industry cooperation. It should be upgraded in the future in practically fruitful ways.

4. Hurdles that Thai Molds Makers Must Clear

Within the ASEAN region, Thailand's molding industry seems to be the most advanced following Singapore's. According to Japan Die and Mold Manufacturers Association's data, the number of molders in Thailand is estimated at approximately 500 (as of 1991). Their production, amount of exports and amount of imports are estimated at 1.8 billion bahts, 470 billion bahts and 3.6 billion bahts, respectively. In Malaysia, which is at nearly the same stage of development as Thailand, a total of 60 molders operate (as of 1987). Their production, exports and imports are estimated at 210 million ringgits, 25 million ringgits and 106 million ringgits, respectively. The number of molders is by far the larger in Thailand. In Indonesia, a total of 50 molders operate. Comparing Thailand an Malaysia shows that, whereas the number of makers of molds for electric & electronic parts is relatively large in Malaysia, that of makers of molds for automobiles seems large in Thailand. This contrast may reflect the difference in the ways in which these industries have grown in their own nations. Studied in the number of employees, in Malaysia, firms whose number of employees is 20 to 30 account for 80% of the total. In Thailand, firms whose number of employees is 10 or less account for 70-80% of the

total, indicating that Thailand's molding sector is crowded with relatively smaller molders. Thailand is ASEAN's largest molding maker. In recent years, as explained earlier, precision molds for plastics have begun being manufactured in Thailand, and lower-precision molds are being shipped also to Malaysia, Indonesia and others.

Thailand's molding industry's development has depended largely upon the growth of automobile and consumer electronics assembling companies. Especially, the expansion into Thailand of Japanese parts suppliers in step with their affiliated manufacturers has certainly contributed to that development. Demand for parts (auto parts) from other ASEAN nations has increased as a result of the promotion of intra-regional mutually-complementary parts supply. Along with this, an increase in demand for molds for plastics thanks to the growth of the electric & electronic equipment industry has also played a part.

Yet, assembling companies in Thailand procure relatively low-precision simple molds from local Thai molders, and depend upon local Japanese producers or producers in Japan to supply molds for large parts or high-precision molds. It is true that they have increased their procurement of simple molds from local Thai molders to meet an increase in demand for their products. Still, that gap has hardly narrowed from a long before.

A reason for this may be that demand for high-precision molds has not been very strong in the first place. Other more fundamental problems can also be detected. In the following sections, we will identify difficulties plaguing makers of pressing molds and makers of molds for plastics, two segments relatively advanced and developed in Thailand's molding sector:

1) Pressing molds manufacturers

Most observers say that Thailand's technology for making molds for large auto parts is relatively advanced. This may be explained by the fact that procuring cast metal needed for making such molds is easy because it is domestically produced, which has advanced the manufacture of such molds. Actually, a Japanese manufacturer, S, admits that local cast metal for automobiles measures up to its requirements. Yet, this applies only to relatively-simple large single-process castings. Thailand's technology for making pressing molds must be more sophisticated before it may manufacture complex formed

products. It is also pointed out that Thailand's molds-design capability reflects the lack of full understanding of the role of drawing beads in the structure of molds and in the forming process. The requirements of limited forming, including die radius or punch radius, may also need better understanding.[15]

It appears that Thai manufacturers of pressing molds have installed quality control-related equipment relatively satisfactorily. Yet, they choose the structure of molds in disregard of the basics of pressing. Most imitate now-antiquated general-purpose structure designs, and fail to study or analyze the essential parts.[16] The lack of knowledge of the basics of pressing or pressing molds-making apparently forces them to cling to the old technology. This then has made it difficult to develop or assimilate applied technology. Thai manufacturers need to acquire the basic technology not only for pressing molds-making but also for pressing. Unless they do so, they may find it difficult to manufacture medium-sized and smaller precision molds. Makers of pressing molds, especially large ones, should give top priority to the acquisition of basic technology rather than the installation of production machinery or quality control-related equipment.

2) Manufacturers of molds for plastics

Thai manufacturers' current capability of making large moldings for plastics seems to reach limit if the injection molding tightening power exceeds 800 tons. Demand for small precision moldings is supplied by imports, because manufacturers lack necessary skills. The trend of domestic demand makes it certain that manufacturers should shift emphasis to small precision moldings in the future. Yet, excepting Japanese manufacturers and joint ventures, few local makers have introduced advanced machine tools capable of making precision tools. They may be somewhat excused by the fact that demand for precision moldings for plastics has begun growing only recently.

According to JICA's report, as in the case of pressing molds-making, Thai manufacturers' technical difficulties in this segment stem from their lack of basic knowledge both of injection forming and molds making. In designing molds for plastics,

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[15] *Taioukoku kogyo bunya shinnkou kaihatsu keikaku (Susono Sangyo) chosa Hokokusho*, JICA, 1995, p.6-3-9, (in Japanese).
[16] ditto, p.6-3-10.

consideration must be given not only to molding but also to plastic forming. Reducing the cost of making molds alone could prove meaningless from a sector-wide perspective if extra time for forming was required. The report also notes the lack of well-skilled operators of machine tools that are also needed for improving the precision of molds.[17]

According to the same report, many Thai manufacturers who have not introduced foreign technology do not have a product check list or measurements table handy at the workshop. They give little thought to installing an infection forming machine and testing their products on it before shipping them to customers. It is also noted that they do not check molding parts at the time of taking delivery of them.

Additionally, molds makers have a number of common hurdles to clear. Thai manufacturers generally are not very aware of the importance of quality. They are not enthusiastic about establishing methodology for improving quality, so they repeat the same errors. They rather try to solve problems of quality by increasing workforce. They do not find on-time delivery very important. There are occasional cases in which a supplier informs its customer, just before its promised delivery date, that it has trouble. Employees tend to change jobs quickly once they learn a level of skills. A Japanese manufacturer, D, explains that technology does not take root systemically because employees easily departure for higher pay. Training a skilled molder takes three to four years, but employees easily give up completing the apprenticeship and change jobs. Thai makers take a long lead time because their technological level is low. These difficulties have remained familiar for at least ten years.

All these constitute obstacles in the eyes of Japanese manufacturers operating in Thailand. Thai manufacturers never find their foreign counterparts infallible. Developing a market among foreign makers in Thailand has limit, because they are merely subsidiaries of their parent manufacturers. Some secretive Japanese makers tend to shy away from independent parts suppliers. Taiwanese makers favor their intra-group suppliers and shun procuring from outsiders.[18] Foreign makers have failed to erase these perceptions also for many years.

5. Proposals for Development

[17] ditto, p.6-3-14.
[18] *Investment Opportunities Study*, BOI, 1998.

It is hugely important for Thailand's molding sector to become more competitive in the export market. Voice calling for the importing of advanced molding technology, which should hold the key to increasing the sector's competitiveness, is louder than ever before in Thailand. Still, because there are many technical and management difficulties that must be overcome, the importing of technology should be promoted from the long-term perspective. For the purpose of improving the sector's technological strength, JICA's patient and strenuous efforts to provide technical guidance and consulting by sending in experts are under way. In the private sector, Japan Overseas Development Council operates projects to provide the services of experts to private companies. JETRO undertakes research projects, delivers the services of experts, and sponsors policy-development meetings. These projects are designed to promote the transfer of technology at the individual firms' level, and need to be continued in the future. Along with this, Japan's direct investment in Thailand's molding sector, which should accelerate the transfer of management resources, should be expanded further. Establishing joint ventures with foreign companies involves few technical difficulties, a fact which has been confirmed by JICA's and other institutions' surveys. This evidences the effectiveness of direct investment. Japanese manufacturers planning to make direct investments in Thailand should form a joint venture with local companies, rather than advance independently through a wholly owned subsidiary. Direct investment in Thai manufacturers of small precision molds for electric & electronic parts and makers of small precision molds for automobiles should be stepped up in the future.

Since the bursting of the economic bubble, Japan's molding industry has remained stagnant due to the slumping of domestic demand. Other Asian nations, too, are now in the throes of economic difficulties, and demand remains sluggish. Yet, Asia's economic fundamentals have not collapsed, but the economic stagnation merely reflects the absence of short-term foreign-currency liquidity, and Asia's growth potential is still great. Japan's molding industry should relocate the area of production which has become unprofitable because of cost in Japan to other Asian regions where demand for molds is expected to grow. The relocation should have the benefit of making Japan's molding industry itself more efficient and sophisticated. Establishing an Asia-wide mechanism of

division of labor should prove beneficial to all molding industries of Japan and other Asian nations. And this should be attained by giving full play to all market forces. Investing overseas could constantly entail difficulties. These would include the shortage of skilled workers, inadequate technological infrastructure, job-hopping, etc. These are not a monopoly of Thailand. In every developing nation whose industrial infrastructure is underdeveloped, foreign manufacturers might find themselves struggling to overcome these difficulties. They should rather anticipate these prior to establishing their production system overseas. Adopting the American-style method of making positive use of manuals on the assumption that new recruits are yet to be trained and skilled is worth consideration. The high level of craftsmanship has been the backbone of Japan's molding industry, and also of Japan's industry as a whole. Asking for the same level of craftsmanship in Thailand, or in other ASEAN nations might be demanding too much. Japanese seasoned molders can finish their ware even if the design is not drawn up in great detail, because their experience allows them to understand even from it the idea of the designer. ASEAN lacks the technological accumulation that allows this kind of craftsmanship. An attitude of trying to draw up designs that cannot be misunderstood is important. Rather, such way of doing business should be regarded as the global standard. Japanese companies may need to adopt this global standard and make efforts to restructure their design and production systems accordingly.

Mirroring an explosive increase in computer use at the workplace, three-dimensional CAD-CAM designs now take a central part in the designing of molds. Thailand and other developing nations' molding industries cannot afford to lag behind, and face a need to introduce this new generation of technology, while their technical infrastructure may still be underdeveloped. Many Japanese joint ventures in Thailand have already introduced CAD-CAM systems and now make full use of them. Reportedly, design software programs they use differ from company to company. Thailand's manufacturers, especially smaller makers many of which operate in the supporting industries, do not have the financial strength to introduce all kinds of software they need. Because of all these, establishing public facilities that offer them "converter" functions that analyze and explain CAD-CAM-designed drawings may be necessary in the future. Japan's technical cooperation should play a role in this area, too.

As Thailand tries to develop its supporting industries, Japan should extend the services of experts, provide technical guidance, supply equipment, and expand direct investment. Yet, it can only assist the development. It is the government of Thailand that must lead the way. Many Thai companies, and certainly almost all smaller companies, do not be given the benefit of establishing ties with foreign interests. These smaller companies should be developed by promoting their linkage with export-oriented corporations, including foreign and major Thai manufacturers. As they deepen their relations with such exporters, these smaller makers should be able to import and assimilate applied technology. The efforts of BUILD, Ministry of Industry and BOI, especially the operation of the National Suppliers Development Program, should be stepped up further. Together with JETRO's investment experts stationed extensively in Asia, these should prove important vehicles for developing and establishing the linkage between the smaller makers and foreign interests.

The building of the linkage will require the development of manpower by promoting basic technological education. It is the manpower that should form the foundation for the establishment of the linkage. As noted in JICA's report, one of the difficulties shared by Thailand's pressing-molds manufacturers and manufacturers of molds for plastics is their lack of basic knowledge both of molds-making and pressing or forming. For this reason, technological education should be promoted in ways which emphasize not a single particular field of technology but a comprehensive system of theory. Technological education should also be expanded at higher-education institutions, including universities.

Education & training facilities have been built and enlarged, as their importance has been voiced loudly, but intended results have not been achieved visibly. This may apply to Thailand and other ASEAN nations, too. A factor behind this is the failure to nurture the enthusiasm to become field engineers. Even graduates of engineers' universities tend to prefer administrative jobs of large corporations. This may partly explain the difficulties the Asian nations face in accumulating and diffusing technology. One way of overcoming this hurdle may be improving the status of engineers by establishing a system of incentives, in such areas as pay and title.

Higher education cannot be promoted before an adequate pool of instructors is

developed. The shortage of instructors at institutions of engineering & technology has remained a problem to address in Thailand. Japan needs to invigorate exchanges between Japanese and Thai universities, such as by sending instructors to teach there. It should also improve and expand scholarships to invite Thai students of engineering to study at universities in Japan. These efforts should act as incentives to promote the enthusiasm to become serious engineers. Additionally, such scholarships should be designed to require the recipients to teach at universities or serve as instructors at public training facilities for a certain period upon completing their study in Japan. That kind of requirement may be needed for the promotion of technological education.

Appendix 1 BOI's New Measures to Encourage More Investment Related to Fostering Supporting Industries

1) Measures announced during Jan. to Oct. 1997

Effective date

90.10.27 Existing projects in zone 1 or 2, which greatly contribute to the Thai economy, (i.e. through job creation or by generating foreign exchange earnings) are now eligible to receive exemption from corporate income tax for expansion of previously-approved projects, if the expansion is on the same premises as the existing project, even if it is required that new projects in these activities must be located elsewhere.

97.10.27 BOI promoted projects, whose benefits under section 36(1)(exemption of import duties on raw and essential materials used for the manufacturing of exports)have expired, may now apply again for this incentive. A one- year exemption from import duties on raw and essential materials used in the manufacture of exports will be granted to projects located in Zone 1 and 2 while a 5-year exemption will be granted to those in Zone 3.

97.10.27 BOI-promoted projects may apply to increase production capacity beyond the level stipulated on their investment promotion certificates by increasing the number of working hours. In addition, these projects may apply for corporate tax exemption for the incremental production. This measure is aimed at encouraging companies to maximize their machinery utilization.

97.10.27 Investment projects in 19 supporting industries will be granted 8-year corporate income tax exemption of import duties on machinery, regardless of location, and foreigners may hold all or the majority of the shares in these projects. Applications must be submitted by December 31, 1999.

97.10.27The 30% export requirement for exemption of import duties on raw materials used in the manufacture of exports (benefit under section36(1)) has been eliminated. Therefore, projects exporting less than 30% of their sales can now enjoy the benefits of section 36(1).

97.10.27Foreigners may now hold all or a majority of the shares in existing manufacturing projects located in Zones 1 and 2 if the existing Thai shareholders give their consent. BOI approval will be granted on a case by case basis.

97.10.27Foreigners are allowed to obtain permanent residence permits by investing at least 10 million baht in new investment projects (direct investment) investing in government bonds, state enterprise bond, or condominiums (investment in securities and assets) in the following minimum amounts; 8 million baht for investors, 6 million baht for spouses, 2 million baht for each unmarried dependent under the age of 20. Applications must be submitted by May 13, 2000.

2) BOI Announcement of Recovery Strategies

Announcement Dates

97.11.03 BOI announcement of Short-term Recovery Strategies;

To promote import substitution, the board has announced the promotion of 5 new supporting industries, in addition to the 14 activities already so classified, as priority activities. The new categories include machine production , measuring devices and equipment, ABA brake systems, electronic fuel injection system, and production of substrate for catalytic converters. In order to help locally-made products compete fairly with imported goods, the BOI shall on a case-by-case consider import duty reduction on raw materials imported by promoted companies to produce and sell domestically.(Effective date: October 27, 1997)

98.6.10 New Promotion Strategies During Economic Crisis; (aimed at attracting

increased foreign investment, promoting efficiency and increased competitiveness of Thai industry, and preventing unemployment through creation of new jobs)

Relaxation of the conditions governing location for activities eligible for promotion. Promoted export projects may now be located on any zone, with incentives following the existing criteria for each zones. This relaxation shall expire December 31, 1999.

Project producing primarily for export shall be permitted to import replacement, machinery using higher technology, duty-free. This permission shall expire December 31, 1999.

98.8.14 BOI announcement on Additional Measures to Stimulate Economy;

In order to improve the efficiency of industry, for projects locating in Zone 1 and Zone 2, producing primarily for export, import duty exemption on machinery will be provided. Existing projects that import replacement machinery using higher technology will receive import duty exemption on that machinery as well. This exemption must be applied for prior to December 31, 1999.

In order to stimulate usage of domestic parts and encourage the exchange of parts between ASEAN companies, The Board of Investment has developed the ASEAN Supporting Industry Directory (ASID). The Development of ASID create a channel through which ASEAN parts manufactures can be promoted, and offers end-product-assemblers a list of ASEAN-based suppliers and provides information about their capabilities.

98.11.24 BOI Approved Relaxation of Joint Venture Criteria;

BOI announced that, effective immediately, majority or total foreign ownership in new investment projects in Zones 1 and 2 would be permitted, without any export requirement. (previously, investment projects in Zones 1and 2 required Thai nationals to be majority shareholders unless at least 80% of sales were from exports.)

BOI announces that this new measure be apply both for new projects and for projects that have already been approved, but which have not yet started operations.

BOI announced that, beginning in 1999, new projects which invest a minimum of 40 million baht either in engineering or basic industries or which export more than 80% of

sales, will be obtain ISO 9000 certification.

98.12.25BOI Permits Majority Foreign Ownership in Retail Sector;

BOI announce that foreign investors would be able to acquire up to 100% of joint venture retail projects that were in operation prior to January 1, 1999.

New retail projects will not be eligible to apply under this category, and must await the revision to the Alien Business Law.

Source: The Office of the Board of Investment

Appendix 2 Sample of BUILD Database

ALEXON CO., LTD.

Office Address :

51/3 SUWINTAWONG ST., KLONGNAKORNNUANGKET, MUANG,
CHACHOENGSAO 24000 Country : THAILAND
Tel : (038) 593-508, 847-057-65, Fax : (038) 593-509, 847-066
e-mail : alxswitn@ksc15.th.com

Contact Person : MS. VANTANEE YAWAPONGSIRI

Capital : 60 MB.

Employee :150

Industrial Base : AUTOMOTIVE, MOLD AND DIES

Business Type : Manufacturing

Product Name : ALUMINUM BRAZING HEAT EXCHANGER:

- OIL COOLER (OIL TO AIR)
- RADIATOR (SCOOTER, MOTORCYCLE, ALL ALUMINUM)
- RADIATOR (CAR & TRUCK, PLASTIC TANK)
- OIL COOLER (OIL TO COOLANT)
- CHARGE AIR COOLER
- CONDENSER (MULTIFLOW)

Main Machine :

CORE BUILDER, PRESS PAINTING
BRAZING
TUBE MILL, FIN MACHINE

Raw Material :

ALUMINUM BAR, ALUMINUM PIPE, ALUMINUM ROUND BAR
ALUMINUM STRIP, ALUMINUM TUBE, HEX BAR

Annual Sale :

DOMESTIC 40%
EXPORT 60%

Appendix 3 List of Japanese Firms Listed in BUILD Database (Mold and die)

ARRK CORPORATION (THAILAND) LTD.
ASAHI SOMBOON SHIPPO MOULDS CO., LTD.
BANGKOK FOAM CO., LTD.
BOONSONG KOLLAKARN SUPPLY LTD., PART.
CP.& S.KANAGATA CO., LTD.
DAITEC CO.,LTD.
DENSO TOOL & DIE (THAILAND) CO., LTD.
ESLEN THAI CO., LTD.
FUJIKURA ENGINEERING (THAILAND) LTD.
FUTABA JTW (THAILAND) LTD.
HIRAISEIMITSU (THAILAND) CO., LTD.
IT FORGING (THAILAND) CO., LTD.
KANAGATA (THAILAND) CO.,LTD.
KK NAKAMURA MOULD CO., LTD.
KYODO DIE-WORKS (THAILAND) CO., LTD.
MATSUSHITA TECHNOLOGY (THAILAND) CO., LTD.
MEIWA MOLD (THAILAND) CO., LTD.
MITSUI GRINDING TECHNOLOGY (THAILAND)
MOLTEN ASIA POLYMER PRODUCTS CO., LTD.
MOULD AND DIE MANUFACTURING CO., LTD.
NISSEI PRECISION (THAILAND) CO., LTD.
PCS-NISSIN CO., LTD.
SANKO TOCHEMI MANUFACTURING (THAILAND) LTD.
SANSIN HITECHNOLOGY (THAILAND) CO., LTD.
SIAM-HITACHI CONSTRUCTION MACHINERY CO., LTD.
SNN TOOLS & DIES CO., LTD.
TAKAO EASTERN CO., LTD.
THAI NISSIN MOLD CO., LTD.
THAI SEISEN CO., LTD.
THAI SOHBI KOHGEI CO., LTD.
THAI STANLEY ELECTRIC PUBLIC COMPANY

THAI STARLITE MANUFACTURING CO.,LTD.

THAI AHRESTY DIE CO., LTD.

THAI INOAC MOLD CO., LTD.

THAI INTERNATIONAL DIE MAKING CO., LTD

THAI KOITO CO., LTD.

THAI PROGRESSIVE DIE CO., LTD.

THAI SUMMIT IWASANSHO CO., LTD.

THAI TECH MATSUDA CO., LTD.

THAI YANAGAWA CO., LTD

TSUCHIYOSHI SOMBOON COATED SAND CO., LTD.

UNION ITOH MOLD CO., LTD

YAMATO - ESULON (THAILAND) CO.,

YANMAR S.P.CO., LTD.

Table 1 Purchase of Parts by Japanese Automobile Companies (%)

	Japanese	J-JV*	Local	J-JV in ASEAN	Local in ASEAN	Others
In Thailand						
1985	44	25	31			
1994	35	27	27	7	2	2
In Malaysia						
1985	46	27	20			7
1994	38	25	25		4	8
In Philippines						
1985	43	14	43			
1995	34	17	33		8	8

Source: Makoto Anazawa, "Nihon Jidosha Sangyo no Tonan-ajia Tenkai," in Shimada et al. ed., *Gendai Ajia no Sangyo Hatten to Kokusai Bungyo*, Minerva, 1997, p.140. (in Japanese)

Note: *J-JV is Japanese joint venture with local firms.

Table 2 Local Purchase of Parts by Japanese Firms in Thailand

	Rate of local purchase	1986*	1997*
Electric & electronics	less than 50%	25%	85%
	more than 51%	75%	15%
	(No. of firms answered)	(12 firms)	(53 firms)
Transport equipment	less than 50%	57%	62%
	more than 51%	43%	38%
	(No. of firms answered)	(25 firms)	(21 firms)

Source: *Activity Survey on Japanese Firms in Asia*, JETRO, various years.
Note: *Figure is the share of firms by rate of local purchase over total firms which answered.

Table 3 Japanese Die and Mold Company in Thailand

			Name of the company in Thailand	Parent company	Type of business	Date*
1	B	○	Thai Stanley Electric Public Co., Ltd.	Stanley Electric	Automotive lighting, mold & die	81.7
2	B	○	Union Itoh Molds Co., Ltd.	Komatsugawa Plastic	Plastic injection mold	88.1
3	C	○	DENSO TOOL & DIE(THAILAND) CO., LTD.	Denso	Mold, die and jig	88.3
4	C	○	Daitec Co., Ltd.	Nisshin Kogyo	Die, mold	88.3
5	A	○	Thai International Die Making Co., Ltd.	Isuzu	Automotive stamping die and parts	89.3
6	A	○	SNN Tools & Dies Co., Ltd.	Nissan	Automotive stamping die and parts, jig	89.7
7	B	○	Fujikura Engineering(Thailand) Ltd.	Fujikura	Mold & die	89.8
8	A		Ogihara(Thailand) Co., Ltd.	Ogihara	Stamping die and parts	90.2
9	B		Cannon Engineering Thailand	Cannon	Plastic injection mold for office machines	91.11
10	B		Thai Summit Ikuyo Mold	Ikuyo	Injection mold for plastic parts	95.11
11	A		Enkei Thai Moldings Ltd.	Enkei	Aluminium casting mold	96.7
12	B	○	K.K. Nakamura Mould Co., Ltd.	Nakamura Seimitsu	Plastic injection mold	96.3
13	B	○	Thai Nissin Mold Co., Ltd.	Nisshin Kako	Engineering plastic injection mold	96.3
14	A		STS Siam Technique Shimizu	Koyo Seiko	Forging, die	96.4
15	B	○	Sanko Tochemi Manufacturing(Thailand) Ltd.	Sanko Gosei	Plastic injection mold, precision parts	96.6
16	B		SV-Nittan Precision Co., Ltd.	Nippon Tungsten	Tool & die, precision parts	96.9
17	A		APIC YAMADA(THAILAND) CO., Ltd.	Apic Yamada	Lead frame, pressing die	96.1
18	A	○	Thai Ahresty Die Co., Ltd.	Ahresty	Aluminium die cast	97.3
19	B		Shonan Gousei(Thailand)	Shonan Gosei Jushi	Plastic injection mold & parts	97.3
20	A	○	Thai Yanagawa Co., Ltd.	Yokokawa Seiki	Mold, aluminium diecast parts	98.3

Source: Toyokeizai, *Kaigai Shinshutsu Kigyo Soran,98* .
Note: *Date of establishment or start of operation.
In column 2, A means diecast press mold, B means plastic injection mold, C means both.
In column 3, ○ means firm which is listed in BUILD database(at the end of Jan.1999).

Table 3 Japanese Die and Mold Company in Thailand(cont'd)

	Capital million Baht	No.of Employee	Japanese share	Other shareholder	Local partner
1	383	1191	50.9		The Sittipol 1919 Co., Ltd.
2	60	110	33.0	Kyoko co.	Union Plastic Plc.
3	43	142	80.0		DENSO (THAILAND) CO., LTD.
4	25	73	43.6	Daishin Sangyo	n.a.
5	88	331	87.0	Miyazu Seisakusho	Tri Petch Isuzu,
6	135	250	49.0	Nissan Trading	
7	40	50	100.0	Aoi Seiki	
8	372	249	51.0	C.Ito	Yontrakit Motor
9	400	117	100.0		
10	200	80	40.0		Thai Summit Autoparts Industry
11	n.a.	n.a.	100.0		
12	20	20	50.0	Kinshomataichi	KKC
13	10	36	100.0	Kanematsu KGK	
14	350	127	n.a.	Shimizu Tekko,	
15	300	92	100.0	Toshiba Chemical	
16	40	55	49.0		Sahaviriya
17	38	54	100.0		
18	85	40	55.0	Nihon Seimitsu Kanagata	Thai Engineering Products Co., Ltd.
19	40	25	100.0	Kanematsu KGK	
20	40	77	51.0	Honda Trading	Thavesakdi Laotrakul

Source: Toyokeizai, *Kaigai Shinshutsu Kigyo Soran, 98* .