

Chapter 6. Raw Materials

6-1. Domestically Produced Raw Materials

(1) NPC-1

Thailand Stage 1 petrochemical complex, operating using natural gas as its feedstock, began operating at Maptaput in the fall of 1989. NPC-1 is scheduled to enable utilization of the ethane and propane supplied from the natural gas cracking plant to produce 105,000 tons of propylene and 315,000 tons of ethylene, with the former being used to make 100,000 tons of PP and the latter used to make 65,000 tons of LDPE, 197,500 tons of HDPE, and 140,000 tons of vinyl chloride monomer (VCM). This is scheduled to be used to meet domestic demand up until 1992. Some of the polymer plants, however, were operating before NPC-1 using imported monomers. These have switched to domestically produced monomers with the start of operation of NPC-1.

(2) NPC-2

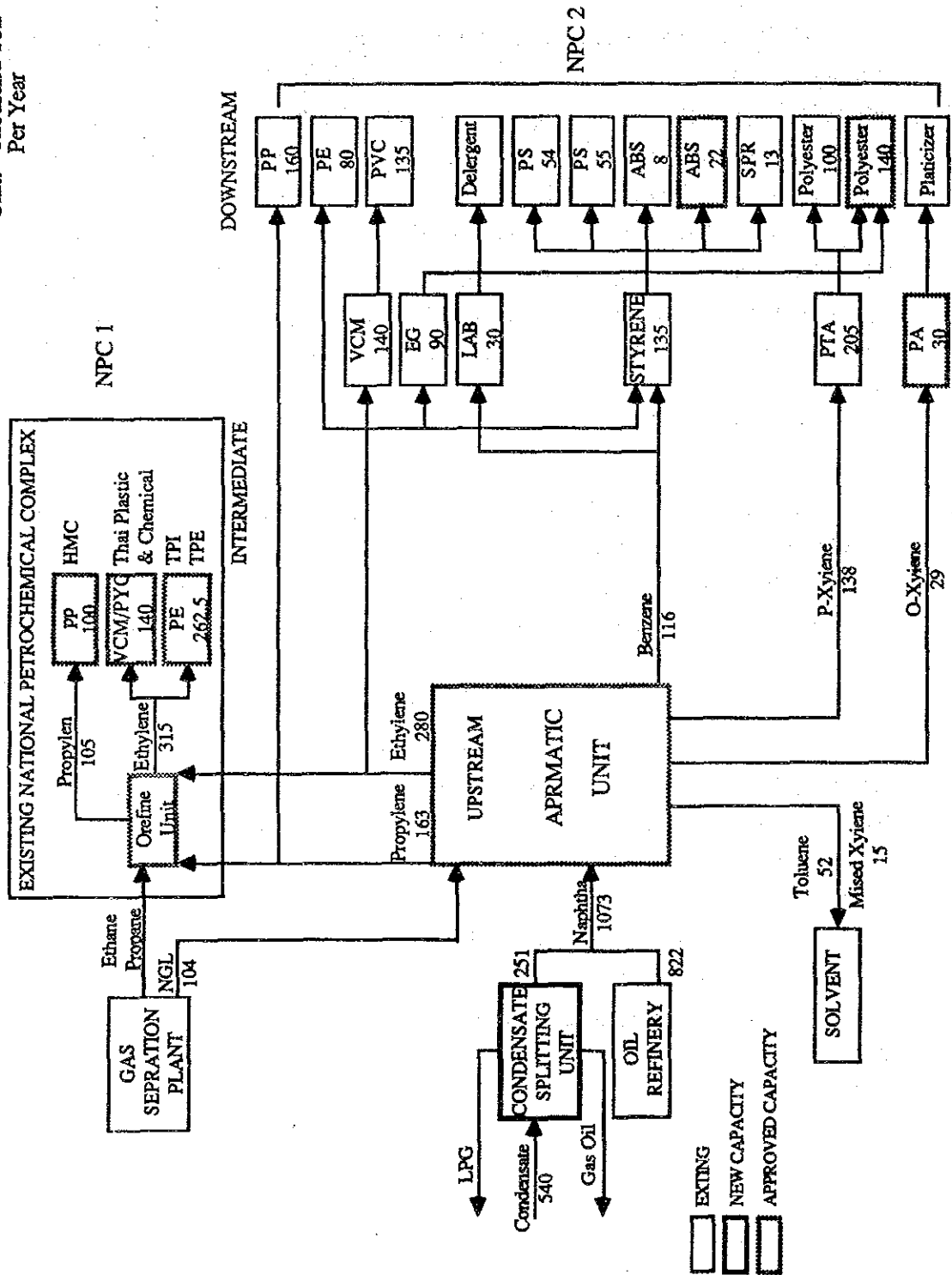
NPC-1 is limited to the production of ethylene and propylene using as feedstock the ethane and propane separated from natural gas and cannot produce benzene and other aromatics. Therefore, at the present time, Thailand imports styrene monomers (SM) and produces a total of about 54,000 tons of polystyrene (PS) and foam polystyrene (FPS).

NPC-2 is scheduled to enable domestic demand after 1992 to be met and to enable exports. In addition to natural gas, naphtha will be used to produce benzene, toluene, xylene, and other aromatics and, as by-products, to produce ethylene and propylene. The above-mentioned toluene, xylene, etc. will be used, it is planned, in the area of plastics, for the production of 140,000 tons of VCM and 135,000 tons of styrene monomers (SM) and the production of 155,000 tons of PP, 85,000 tons of PE, 130,000 tons of PVC, 55,000 tons of PS, and 8,000 tons of ABS.

The structure of these petrochemical complexes is shown in Fig. III-6-1.

Fig. III-6-1. Structure of Petrochemical Complex

Unit: Thousand Ton Per Year



(3) Plastic Resins for Industrial Parts

The plastic resins produced by NPC-1 and NPC-2 are shown in Table III-6-1. These plastic materials should enable tremendous development in Thai's plastic processing industry.

These materials, however, are primarily for household goods for the domestic market and for exports of materials. Use for parts of export type industrial products would seemingly be difficult. The reasons are the scarcity of grades for each resin and problems with quality. For example, looking at polypropylene (PP), Thailand produces homopolymers, but does not produce the copolymers for industrial parts requiring impact strength. In the case of polystyrene (PS), Thailand also produces high impact strength grades (HIPS), but in many cases does not offer the grades designated by the customers. Further, when using imported raw materials for parts for exports of finished goods, such as home electrical appliances, a tax refund is available and so imported raw materials become cheaper than domestic raw materials.

As mentioned above, in actuality, almost no use is made of domestic raw materials for industrial parts due to both quality and price factors.

(4) Plastic Materials for Household Goods

Household goods mostly use general use grades of commodity plastics, so considerable use is made of domestically produced LDPE, HDPE, PVC, and PS.

Table III-6-1. Thai Plastic Producing Plants

Product	Manufacturer	Capacity (T/Y)	Start-up
PE	Thai Petrochemical Industry	65,000 (LDPE)	On stream
	"	60,000 (HDPE)	"
	Thai Polyethylene	137,500 (LDPE/HDPE)	On stream
	Chotsiri	140,000	Approved
PP	HMC Polymer	100,000 (HOMO)	On stream
	Thai Polyethylene	80,000	Approved
	Thai Petrochemical Industry	80,000	Approved
PVC	Thai Plastic and Chemical	140,000	On stream
	Solvay	135,000	Approved
PS	Pacific Plastics	22,500 (GPS/HIPS)	On stream
	Eternal Resin	30,000 (GPS/HIPS)	On stream
	Srithepthai Plaschem	14,000	On stream
	Huntsman	25,000	Approved
	Thai Petrochemical Industry	29,000	Approved
EPS	Thai Polystyrene	3,000	On stream
	Srithepthai Plaschem	3,000	On stream
ABS	Thai Petrochemical Industry	18,000	Approved
	Eternal	7,200	Approved

Source: Plastic Industry Club 1989: The Development of the Plastic Industry in Thailand

6-2. Imported Raw Materials

The total consumption of plastic resins in Thailand is as shown in Table III-6-2. With the exception of melamine and other thermosetting plastics, a total of about 440,000 tons of thermoplastic resins were consumed in 1987. On the other hand, its imports and exports of plastic resins were as shown in Table III-6-3 and Table III-6-4. That is, in 1987, it exported 4,951 tons and imported 210,837 tons. Of this, a total of 46,150 tons of thermoplastic resins were imported from Japan, as shown in Table III-6-5. In addition, 6,444 tons of thermosetting plastics were imported from Japan. Limiting ourselves to processing manufacturers of industrial parts, almost all materials were imported from Japan. In the case of processing manufacturers of household goods, use is being made of imports of PP, ABS, AS, etc., which previously were not produced domestically. The biggest problem with imported raw materials is the large fluctuations in price.

Table III-6-2. Plastic Consumption in Thailand

(Unit: 1000 metric tons)

Material	1983	1984	1985	1986	1987
LDPE	40	42	45	50	60
LLDPE	—	—	—	2	10
HDPE	70	65	68	75	85
PP	83	78	87	97	99
PVC resin	65	60	70	77	85
PVC compound	45	40	40	45	60
PVC paste	5	5	6	7	10
PS	16	17	21	24	28

Source: Plastic Industry Club 1989, The Development of the Plastic Industry in Thailand

Table III-6-3. Export volume and value of plastic pellet in 1986-1988

volume : ton
value : million baht

Product	1986		1987		1988*	
	volume	value	volume	value	volume	value
PE	2,311.9	51.3	2,069.0	41.4	2,503.0	61.5
PP	30.9	0.7	246.5	5.1	3,117.8	107.6
PS	1,281.6	21.2	2,002.6	62.0	5,301.9	205.7
PVC	644.0	9.6	633.0	10.9	729.5	28.4
Total	4,267.5	82.8	4,951.1	119.4	11,202.2	403.2

*Preliminary figures from Jan.-Aug. 1988

Source: Bank of Thailand

Table III-6-4. Import volume and value of plastic pellet in 1986-1988

volume : ton
value : million baht

Product	1986		1987		1988*	
	volume	value	volume	value	volume	value
PE	82,360.2	1,484.4	74,014.4	1,577.2	49,408.7	1,593.7
PP	97,447.9	1,918.0	101,357.6	2,629.6	62,722.3	2,183.8
PS	4,442.6	96.8	6,957.1	206.0	19,037.2	817.2
PVC	16,924.2	354.7	19,508.4	509.1	17,940.1	549.0
Total	201,174.9	3,853.9	210,837.5	4,921.9	149,108.3	5,143.7

*Preliminary figures from Jan.-Aug. 1988

Source: Bank of Thailand

6-3. Problems and Countermeasures

Even today, with the NPC-1 beginning operation, the quality specifications of grades of resins for plastic industrial parts are sophisticated and production costs are high. Further, the Thai market is a small one. Therefore, in the future, companies will probably have to still rely on imported raw materials. Even in cases where domestically produced raw materials are available for processing, the problem of high prices will remain. The processing manufacturers and the manufacturers supplying the raw materials judge that while there will be improvement in delivery periods and price stability due to the operation of the NPC-1, the market price of the raw materials will not themselves fall. The majority of companies expect that the domestic prices will be based on the CIF price of imported raw materials plus the tariffs and expenses relating to storage and transport. The processing manufacturers of household goods find this price aspect to be a particular problem.

Table III-6-5. Exports of Plastic Materials to Thailand
(Amounts Imported From Japan)

	Tons	1000 yen
Thermosetting plastics		
Melamine resins	2,106	450,968
Phenol resins	973	261,153
Epoxy resins	578	346,055
Other thermosetting plastics	2,787	937,442
Total of thermosetting plastics	6,444	1,995,618
Thermoplastic plastics		
Polyethylene	16,906	2,071,807
Polypropylene	7,645	1,160,875
Polyvinyl chloride	5,682	903,805
Polystyrene	4,751	915,786
Polyvinyl alcohol	3,498	771,581
ABS	3,408	725,084
Polyamides	1,071	376,883
Polymethyl methacrylate	457	114,792
Other thermoplastic plastics	2,732	650,895
Total of thermoplastic plastics	46,150	7,691,508
Total of plastics	52,594	9,687,126

Source: Nihon Boeki Nenpo (Japan Trade Yearly) 1987

With the above situation being projected, the following two countermeasures may be considered:

(1) Promotion of Plastic Compounders

In many cases, industrial parts are made using complex materials made by blending various types of plastic resins and, when necessary, adding glass fiber, calcium carbonate, etc. Such complex materials are called compounds, composites, or polymer alloys depending on their composition and performance. The business entities which produce these complex materials are referred to as compounders. Manufacturers of plastic materials produce large volumes of the basic grades, while the compounders produce small amounts of various types of grades of materials for different applications by using these basic grades and additives. The U.S. has numerous independent compounders which produce their own grades. In Japan, compounders, except for some major color manufacturers (coloring also being included in compounding), all are affiliated with certain plastic resin manufacturers. Whatever the case, half of the total production of plastics is used in the form of compounds.

The main equipment required by compounders are blenders, melt mixers, and granulators. Any scale of production is possible in accordance with the size of the market, but in Japan the smallest factories produce several 1000 tons a year. Compared with plastic resin producing plants, it is possible to set up sufficient functions with an extremely small capital investment.

At the present time, there are a few compounders for coloring but no compounders which produce compounds resins for industrial parts in Thailand. Therefore, the operation of compounders with a high level of technical expertise or the bringing of overseas compounders to Thailand is desired by the foreign companies operating in Thailand.

As mentioned, the cost of compounding equipment is not very large and it would be possible for an import substitution industry making use of imported, reasonably priced raw materials to establish a sales channel to the export industry.

Generally speaking, compounding resins and specification differ greatly according to the kind of parts or assembly manufacturers. Compounding requires a high technical level for blending materials and analyzing. Therefore, the promotion of joint ventures

with overseas compounders and technical cooperation would be practical and useful for encouraging a compounding industry.

(2) Establishment of Testing and Research System for Plastic Resins

It is necessary to establish a research system which can perform full analyses of imported compounds and molded articles use the results to blend various types of materials to produce other compounds and a system for providing guidance to processing manufacturers and compounders. This would preferably be done by a public organization as it would be impossible for individual compounders both in terms of money and manpower.

Chapter 7. Supporting Industries

7-1. Facilities

(1) Domestic Production Facilities

The majority of the plastic processing facilities being used in Thailand are imported, but domestic products account for a large share of the domestic market for some processing facilities and some of these are even exported.

There are three manufacturers of injection molding machines established by local capital and these produce small quantities of mainly small sized injection molding machines for domestic users. Note that the production capacity of the three companies is about 100 units a year. These companies having been producing injection molding machines for surprisingly long times, having started out with manual type injection molding machines in the 1950s and moving on to production of hydraulic type injection molding machines from the middle of the 1980s. The models produced fall under the category of the old style vertical and horizontal hydraulic types and have the capacity of about a dozen odd horsepower, enabling molding of sundry goods, toys, and simple industrial parts.

Looking at production, these companies well realize they cannot compete with overseas molding machines and therefore are trying to maintain their markets by target suitable users. While there is the difficulty that the types of functions offered are fewer than with imported molding machines, their machines are lower in price and they have the ability to offer good after sales service - these are the points on which they manage to maintain their business. At the present time, they enjoy a good flow of orders even without any special sales activities.

Turning to the procurement of materials and parts, the finished steel is imported steel procured domestically while the electrical components and hydraulic system components etc. are imported through agents. At the present time, there are no problems in the procurement of materials, but the rate of procurement of imported parts has reached over 60 percent on a purchase value basis.

The sales prices range from 50,000 to 60,000 bahts to 400,000 to 500,000 bahts per set, about one-quarter the price of Japanese made injection molding machines of the

same molding capacity. Note that materials account for 60 percent of the total costs.

Looking at the user evaluation, Thai machines suffer from many problems in the parallelism of the tiebars and the overall toughness, so are very poorly evaluated by the processing industry. This is recognized by the manufacturers of the molding machines as well, who understand there are problems in the precision of fabrication and strength. Further, no consideration is given at all to worker safety. These machines, however, have been exported to nearby countries.

Japanese affiliated sales outlets of injection molding machines consider that Thai companies could produce injection molding machines of up to a clamping force of 50 tons and if the models were limited could produce ones of up to a maximum 150 tons.

There has been a rapid spread of extrusion blown film making machines for making plastic bags starting from the middle 1980s and a large number of manufacturers are producing them. These account for the majority of the domestic market and are busy exporting as well.

Domestic makes of blow molding machines and compression molding machines are also being used. There are presently two companies producing blow molding machines in Thailand, of which one is producing eight models, based around a 1.5 liter product volume, and has a capacity of 20 units a month. Thailand's blow molding machines are relatively good in performance and have spread widely throughout the Thai market. Further, about 40 percent of the production is exported from the ASEAN nations to the Middle and Near East countries. Note that the maximum capacity of blow molding machines which can be produced in Thailand is 5 liters. For the production, the companies import thick steel plate, special cast steel, and other materials and hydraulic components, electrical outfitting components and motors of over 10 PS.

The prices are over 1 million bahts per unit for PE use average specification models with product volumes of 1.5 liters and 10 percent higher for PP use models, but in both cases are one-third the price of imports from West Germany and Italy.

In addition, foreign capital affiliated auto parts makers are using Thai vacuum molding machines for processing fenders, inner liners, etc.

As to related facilities, granulators and pulverizers are also being made by

domestic Thai machine manufacturers and are being widely distributed. Thai pulverizers, however, are evaluated extremely poorly as to performance in that they require cleaning along with disassembly using a chain block when changing the color of the materials, so require massive labor, are noisy, and suffer from large variations in size of the particles of material. There is strong dissatisfaction that despite this, BOI tax incentives cannot be obtained for imported machines.

Note that three Japanese and Taiwanese manufacturers of injection molding machines are planning joint venture factories with Thai companies and two are already in the middle of construction of factories. Part of the injection molding machines produced by these factories are scheduled to be exported from Thailand. The production of these three companies is estimated at about 100 units a year for the time being. Japanese companies estimate demand for injection molding machines in Thailand of about 1,200 units a year. Therefore, several Japanese injection molding machine manufacturers are studying production in Thailand. Further, Japanese affiliated companies have recently been starting production of hopper loaders by the knockdown (KD) method.

Problems mentioned as accompanying Japanese investment include (1) the forced reliance on procurement of the majority of materials and parts from Japan and other countries (about 400 parts excluding nuts, bolts, packing, etc.), (2) the large burden of import tariffs on the same, (3) the inability to secure quality processing and assembly due to the lack of skilled workers, etc. In particular, it is difficult to guarantee the quality of steel materials and the companies have to rely on imports. Problems in local procurement of materials such as the inability to produce and process the ductile gray cast iron (FCD) frequently used for strength and sliding of the mold and also the bottleneck in the heat treatment technology for sliding members are considered critical.

7-1-2. Imported Facilities

According to import statistics, the state of Thailand's imports of the key plastic molding facilities of injection molding machines was as follows (including used facilities):

(Unit: Sets)					
<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>
701	333	277	380	1,095	1,876

The country of origin of the injection molding machines was Japan in an

overwhelming number of cases, with that country supplying 1,158 of the machines in 1988. Other than this, Taiwan accounted for 323 machines, Hong Kong for 268, and West Germany for 57. All regions have increased the volume of their exports to Thailand considerably since 1987.

However, there are those which doubt the above statistics. Eight representatives of the industry, including processors, molding machine manufacturers, and machinery importers brought individually researched data to a conference at the Hilton Hotel in May 1989 wherein it was concluded that as of 1988 there were a total of 2000 injection molding machines installed in Thailand, broken down in 1,100 Japanese makes and 500 to 600 Hong Kong and Taiwanese makes.

By way of note, the numbers of injection molding machines (including used ones) exported to Thailand from Japan, according to a survey by the Japan Plastic Machinery Association, were 255 in 1985, 306 in 1986, 709 in 1987, and 456 from January to May 1988, with a total of 1,726 exported in just that period.

On the other hand, the local affiliate of the biggest exporter of Japanese made injection molding machines to Thailand judged that the total number of injection molding machines in Thailand, including used machines, stood at 12,000 units as of 1990, of which half were considered to be Japanese make.

According to materials of the above conference at Hilton Hotel, the biggest country of origin of the plastic processing facilities in Thailand was Japan, followed by Taiwan, Hong Kong, West Germany and Italy, in that order. Further, it was reported that Thai makes of processing facilities accounted for only a 2 to 3 percent share of the market and that 50 percent of all their parts were imported.

The same report touched on the technical level of the Thai makes of injection molding machines and concluded that while they were superior to Philippine, Indonesian, and Malaysian makes, they were not superior to Singaporean makes.

Further, according to discussions with Japanese processing engineers residing in Bangkok, the recently increasing number of Taiwanese makes of injection molding machines mostly use a mechanical method of clamping and are not too suited for sophisticated molding, but the Korean makes use a noncontact electrical control method and are superior in performance.

A survey was made of the trends in market prices according to data of local affiliates of Japanese injection molding machine manufacturers, giving the following ranges. Note that the survey covered similar injection molding machines with clamping force of about 150 tons, but that the functions, safety measures, and other specifications differed completely.

Price of Thai injection molding machines	About 35% of price of Japanese injection molding machines
Price of Taiwanese injection molding machines	About 40-60% of price of Japanese injection molding machines
Price of Hong Kong injection molding machines	About 40-70% of price of Japanese injection molding machines
Price of South Korean injection molding machines	About 50-70% of price of Japanese injection molding machines
Price of West German injection molding machines	About 80% of price of Japanese injection molding machines
Price of Italian injection molding machines	About 60-70% of price of Japanese injection molding machines

Note that according to import statistics, regarding processing facilities other than injection molding machines, France accounts for the overwhelmingly large share of extruders, followed by Taiwan and Japan, while blow molding machines are imported from Taiwan and Japan. Vacuum molding machines are mostly imported from Taiwan, followed by Japan and the U.S.

7-2. Secondary Materials

The main secondary materials used for plastic processing are coloring dyes and various additives such as oils and fats for compounds. Considerable use is also made of finishing paints, plating chemicals, and solutions and adhesives for assembly etc.

The processing manufacturers surveyed had relatively little interest in these secondary materials did not seem to feel there were any problems in the quality, price, or acquisition of the same. In general, these can be easily acquired in sales outlets in the cities, so the companies do not make any distinction as to whether the secondary materials they use are domestically made or imported.

A joint venture was established in 1976 with a Swiss firm for colors and additives. This is the largest company in Asia outside of Japan and produces alone 40 percent (value base) of the amount of these items used in Thailand a year. The company also exports, primarily to Asia.

There are currently five Japanese affiliated color manufacturers, all of which import their raw materials from Japan. At the present time, the only colors which can be produced using domestic Thai materials are cyan blue and carbon type rubber use colors, which pose no problems in quality and which numerous companies are thus producing.

Thailand depends almost completely on imports for color materials other than the above. The colors produced in Thailand (Dry Color (DC)), however, are not considered a problem in quality, price, or delivery either by Thai or foreign affiliated companies. Regarding the color compound color master batch (MB) and colored pellets (CP), however, there are problems in the resin materials made in Thailand, so the quality is unstable in Thai companies.

At the present time, Thailand has numerous production companies for such secondary materials, including these firms, and, aside from these, could make use of domestic materials for some dyes, paints, and inks and further liquid stabilizers etc. quality wise. Further, it has sufficient supply capabilities for the plastic processing industry. However, it has to rely on imports for dispersants, flame retardants, lubricants for resin mixing, solvents, and powder stabilizers (Japan etc. shifted considerably earlier to powder stabilizers in view of the quality of the products, and they were used to products for exports from Thailand).

7-3. Problems and Countermeasures

(1) Training and Securing of Technicians for Maintenance and Repair of Facilities

The maintenance and repair of imported injection molding machines and other processing machines is a difficult problem for processing manufacturers. In principle, the processing manufacturers themselves should establish maintenance and repair systems and deploy the necessary staff, but the industry as a whole suffers from insufficient personnel knowledgeable in the maintenance and repair of facilities and is forced to rely on the service personnel of the manufacturers of the processing machines for everything

except simple work. In the future, it is expected that further high performance processing facilities will be introduced - a trend that probably will become more and more pronounced. On the other hand, there are also limited numbers of service personnel in the manufacturers of the processing machines, so the industry as a whole must work to train more maintenance and repair personnel.

Toward this end, it is considered that necessary to establish courses of the maintenance and repair of processing machines in the plastic processing education and training facilities run by some industrial organizations so as to provide basic training in general machine maintenance and also to obtain the cooperation of manufacturers of processing machines and their instructors so as to provide maintenance and repair training for individual processing machines.

(2) Flexible Application of Import Tariffs

The tariff rates on parts required for the assembly of machinery and equipment are on the average higher than the tariff rates assessed on finished processing facilities. For Thai manufacturers of processing machinery, which procure 50 to 60 percent of the parts for plastic processing facilities from abroad, the rate of the tariff burden in production costs cannot be ignored. Further, this forms an obstacle to raising the quality of products by using good quality overseas parts. The tariff rates on the good quality machine tools and tools required for production are high ones of 30 to 40 percent, making them very difficult to introduce. This is a problem shared by the general machinery manufacturing industries of Thailand. To promote and protect the domestic machinery industry and parts industry, it is desirable to flexibly sharply reduce the tariffs on the above products by limited duration legislative means, the strong opinion was expressed in the related industries.

(3) Support by Government to Companies Investing in Thailand

There has been tremendous promotion of investment using the BOI scheme, but recently numerous problems have begun to appear from such technical areas as the BOI examination and procedures for ordering overseas of materials including raw materials required for production, exports of products and deliveries to domestic export oriented industries, etc. This has begun to have an effect on the production plans of companies as well.

Leaving aside the question of single products and assembled finished products, most of the above is believed to have been due to the surge in investments from a wide range of fields classified as supporting industries and the rapid diversification and sophistication of the materials (including raw materials), parts, facilities, etc. used for the same, making it impossible for the BOI administrative staff to keep up in the technical knowledge regarding the same. In other words, the staff does not understand the types of materials (raw materials), detailed use, application, methods of use, types of parts and facilities, functions, and comparative performance, objects of use etc., so complicated procedures and long examinations are required. Sometimes the amount of the refund of the import tariffs turn out to be far less than planned.

Further, Thailand inherently has little sense of the division of labor in production. The production system has been adopted wherein everything is handled in the same company. This is judged to be one aspect of the reasons why there is insufficient understanding of production systems where product specifications and production volumes cannot be determined by the company itself, for example, as in the supporting industries, and the complexity of the applications of products or their distribution channels.

Therefore, in the future it would be desirable to train staff with a wide range of knowledge regarding technology, both in its quality aspects and its members and to deploy them on a preferential basis in channels dealing with the private sector.

Chapter 8. Environmental Problems

Demand for plastic processed products has increased in all fields, but in recent years we have been confronted with a serious problem of what to do with the used products. Due to the global discussions regarding the environment, the handling of waste plastic has become an important issue.

The problem of plastic waste products cannot be resolved by control in the manufacturing processes alone for the reason that it is less a problem caused by the manufacturing process than one after use of the products.

In the U.S., some states with strong powers have restricted use of certain kinds of plastics. Movements have also begun to place the burden of the costs for the cleanup on the plastic producers.

At the present time, three methods of dealing with waste plastic are in use: 1) recycling, 2) incineration, and 3) burying. In the West, there is a strong movement for promotion of recycling, but there are serious economic problems with this and full realization of this has yet to be achieved. Research is going on at the present time in all countries on methods of disposal. Even the producers are moving to develop biodegradable plastics.

Thailand too will have to consider such measures. The present survey did not go into the disposal problem, but this type of problem might influence exports of plastic products. A study of the problem will be necessary not only as a problem of exports but also from the viewpoint of environmental protection in Thailand.

Therefore, the Ministry of Industry, private organizations, the Ministry of Welfare, and other organizations related with the environment may have to collect this kind of information and establish countermeasures for the problems. Seen globally, both producers and environmental groups are tackling this problem, so Thailand will have to take comprehensive measures not bound by jurisdictional constraints.

PART-IV.
CERAMIC INDUSTRY

Part-IV. CERAMIC INDUSTRY

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PART-IV. CERAMIC INDUSTRY

Chapter 1. Summary of Industry

1-1. Summary of Industry

The Thai ceramic industry began in the era of the Sukhotai dynasty of the 13th century under the influence of the Chinese. Since then, tableware and ornaments have been produced on a small scale. It was not until the 1960s that ceramics developed as a full-fledged industry, so the industry is relatively new.

At the present time, the only ceramic products produced in Thailand on a large scale by modern facilities are floor and wall tiles, mosaic tiles, sanitary porcelain, insulators, tableware and kitchenware. There are only 10 odd companies engaged in such mass production in all of Thailand.

A look at the ceramic manufacturers registered at the Thai Ministry of Industry shows there are 218 companies in Bangkok and its environs, 128 in Chiang Mai, Lampang, and other areas in the North, and 191 in the South, for a total of 537 companies (however, including those making bricks)(Table IV-1-1). In addition, there are numerous cottage sized companies which are unregistered, but there are no statistics or other materials regarding these enterprises and the state of their production lines, production volumes, etc. is not known.

In Bangkok and its environs, there are factories producing tiles, sanitary porcelain, tableware, insulators, and refractory brick using modern facilities. These are active not only in the domestic market, but in exports as well.

Chiang Mai in the north of the country is mainly producing traditional artistic products (tableware and novelties) generally known as celadon. Further, Lampang is producing general household use tableware and novelties consumed by regional cities other than Bangkok. In both regions, the majority of the factories are small in size, but in the case of Lampang some factories are engaged in mass production using modern facilities.

On the other hand, the centrally located Ratchaburi is producing mainly water vessels and flower pots. Further, the South is producing mainly bricks and flower pots. These are being produced mostly by cottage sized enterprises.

Unless otherwise specified the ceramic products to be covered by this survey, selected for their relatively high added value from the standpoint of promoting export industries, are porcelain, pottery, semiporcelain, stoneware, bone china, and other porcelain and pottery corresponding to the following two items. In terms of geographics, it was decided to focus on the northern areas of Lampang and Chiang Mai together with Bangkok and the surrounding region, all of which are major producing regions for these products.

- 1) Porcelain and pottery tableware and kitchen ware (of SITC Nos. 691110 and 691210)
- 2) Statuettes and other ornaments of porcelain and ceramic (SITC 691310 and 691390)

In this section, for convenience sake, 1) will be referred to as "tableware and kitchenware" and 2) as "novelties".

**Table IV-1-1. Ceramic Industry
(Number of Factories Registered at Ministry of Industry)**

	Product	No. of factories
(Central Region)		
	Sanitary porcelain	8
	Tableware and kitchenware	6
	Novelties and artistic works	17
	Tiles	22
	Refractories	8
	Flower pots and braziers	62
	Brick	92
	Insulators	3
	Sub total	218
(North)		
	Tableware and kitchenware	40
	Novelties and artistic works	30
	Tiles	8
	Braziers	7
	Brick	43
	Sub total	128
(South)		
	Bricks	176
	Flower pots	10
	Braziers	5
	Sub total	191
	Total	537

Source: Department of Industrial Works

1-2. Industrial Structure

(1) Summary of Thailand

The production capacity of ceramic products in the 82 factories known to the Ministry of Industry, including refractory brick, was about 350,000 tons as of 1986 (Table IV-1-2).

A look at the production capacity of the 82 factories by product shows floor and wall tiles accounting for 141,660 tons, or 40 percent of the total, followed by refractory brick, mosaic tiles, tableware and kitchenware, and sanitary porcelain, in that order. Of these, the states of tableware and kitchenware, and novelties, products covered by this survey, are as follows:

**Table IV-1-2. Production Capacities by Product
(1986)**

Name of product	No. of factories	Production capacity(t)
Mozaic tiles	4	46,000
Floor and wall tiles	8	141,660
Sanitary porcelain	5	24,500
Insulators	3	4,200
Tableware and kitchenware	55	38,000
Refractory brick	7	95,800
Total	82	350,160

Note:: Some companies produce more than one item.

Source: Department of Industrial Promotion of Ministry of Industry

1) Tableware and kitchenware

The industry can be roughly divided into two groups of companies according to their technical level and scale of operations.

First there are the 10 medium and large sized companies, nine of which were enjoying the investment incentives of the BOI as of 1985. These 10 companies together have a production capacity of 31,175 tons a year (Table IV-1-3). These companies produce medium and high grade tableware and kitchenware. Their customers are hotels, high class restaurants, high income families, and exports. About 40 percent of the tableware and kitchenware produced domestically is estimated to be of medium and high grades.

The majority of the 10 companies rely particularly on Japanese and West German technology. Their machinery (kilns, ceramic machines, SIC plates, aluminum layers, etc.) are imported, but some machinery (ball mills, vibrate sieves, slip tanks, etc.), kiln materials, and electrical systems are procured locally. As of July 1990, there were eight large plants located across Thailand, as shown in Table IV-1-5. Each of the firms received investment incentives from the BOI.

The second group consists primarily of 60-70 medium and small sized factories located around Lampang. Statistics on the production scale and production figures of these small and medium sized factories are not available, but it is estimated that they had a total production capacity of approximately 20,500 tons a year in 1985. In the past, the products of these small and medium sized companies were mostly for the general

domestic consumer and exports were extremely limited, but in recent years there have been considerably brisk exports.

Table IV-1-3. Summary of 10 BOI Promoted Companies (1985)

Name of Company	Production capacity (t/yr)	Registered capital (Million Baht)	No. of employees	Location
1. S.P. Ceramic Co., Ltd.	8,400	40	1,047	Samut Sakorn
2. Lotus Cermaic Co., Ltd.	4,500	70	511	Samut Sakorn
3. Eastern Chinaware Co., Ltd.	3,200	15	160	Bangkok
4. Thailand Tableware Co., Ltd.	1,035	1	70	Lampang
5. Chour Lampang Earthenware Co, Ltd.	2,240	2	90	Lampang
6. T. G. Ceramic Co., Ltd.	2,500	100	540	Saraburi
7. Central Ceramic Co., Ltd.	3,000	40	200	Saraburi
8. Asia Porcelain Industry Co., Ltd.	2,000	25	275	Saraburi
9. Lampang Silpa Nakorn Co., Ltd.	1,800	16	292	Lampang
10. Asia Ceramic Industry Co., Ltd.	2,500	70	241	Saraburi
Total	31,175	379	3,426	

Note 1: No. 4 is non-promoted firm

No. 10 is currently non-operational

Note 2: As of July 1990, No. 7 and No. 10 ceased to exist.

Note 3: No. 6 has changed its corporate name to Royal Porcelain.

Source: Industrial Economics Planning Division
Ministry of industry

Table IV-1-4. Production of Nine BOI Promoted Companies (1)

Year	(Ton)	(%)
1976	9,281	2.10
1977	8,160	-12.10
1978	8,276	1.40
1979	7,730	-6.60
1980	10,004	29.40
1981	12,357	23.70
1982	12,975	4.90
1983	13,422	3.60
1984	13,174	-2.00
1985	13,770	4.50
1986 ⁽²⁾	15,285	11.00
1987 ⁽²⁾	16,966	11.00

Note: (1) Nine of 10 companies in Table IV-1-3 minus Thailand Tableware Co., which is not receiving BOI promotion.

(2) Estimates based on 11 percent average annual growth rate from 1976 to 1985.

Source: Industrial Economics Planning division,
Ministry of Industry

2) Novelties

There are no large companies in this sector. Ninety to 100 small and medium sized, or cottage sized, companies throughout the country mass produce various types of products. Their production capacity and production figures are unknown. Estimates have it that about half of their products (50 to 60 percent) are for the local market, but in recent years exports of some of their products, mostly superior ones, have been increasing considerably.

3) Summary of Companies Visited

In the current survey, we visited 44 ceramic manufacturers in Lampang, Chiang Mai and Bangkok and its environs (including surrounding regions). There were different characteristics in each region, and these will be summarized below (Table IV-1-6).

[1] Lampang

There were approximately 60~70 factories in the province. Most of them were medium in size (probably 60 to 70 percent), but there were also large sized factories with over 200 workers. The lines of production were mostly tableware and novelties, but some factories were producing tableware and novelties or novelties and construction materials (baluster) or tile etc.

A special feature of the region was the production using as main materials the Lampang stone produced in the surrounding areas. Most of the products made were for the domestic market, so with the exception of a very few enterprises, the quality of the products was relatively low.

[2] Chiang Mai

There were about 14 medium and small sized factories in the province. The lines of production were traditional celadon (Ch'ingt'sin) in the form of novelties, tableware, vases, etc. The color of the celadon was green (light green, blue green, olive green, etc) or blue or else grey in glaze. These were produced industrially for the first time in 1960 by Thai Celadon Co. The glazes are mainly comprised of ash and the products have a hand made feel.

[3] Bangkok and its Environs (Including Surrounding Regions)

There are numerous factories in Bangkok and its environs and in the surrounding regions, but the exact number is not known. In the current survey, we visited only three large mass production factories making tableware and kitchenware on a full-scale basis. We mainly covered small and medium sized factories in our visit. Among the ones visited were two joint ventures with foreign firms. The main surrounding region was Samutsakorn.

The quality of the products of the factories visited varied tremendously depending on the enterprise and on the size of the same, but the quality of the products of the large mass production factories and the foreign capital affiliated companies and the medium sized firms was very high or relatively good (medium level products). On the other hand, in the case of small sized factories, while there were factories making artistic products, there were also those making low grade items, i.e., there was a large variation among the factories.

Table IV-1-5. Large Tableware Manufacturers

Company	Main products
Saraburi	
Royal Porcelain Co., Ltd. (previously: TG Ceramic)	Porcelain
Siam Fine China Co., Ltd	Stoneware porcelain, bone china
Asia Porcelain Industry Co., Ltd. (previously: Royal Asia Porcelain Industry)	Stoneware
Asia Tableware Industry	(under construction)
Lampang	
Kasalong Ceramic Co., Ltd.	Porcelain
Lampang Silapanakorn Co., Ltd	Porcelain, Stoneware
Chour Lampang Earthenware	Porcelain
Bangkok	
Sanwa Ceramic Co., Ltd.	Bone china

Source: Ministry of Industry

Table IV-1-6. Summary of Companies Visited

	Size ⁽¹⁾				Main lines of production ⁽²⁾			
	Small	Medium	Large	Total	Tableware	Novelties	Baluster	Others
Lampang	2	10	3	15	3	13	2	1 (tile)
Chiang Mai	4	7	0	11	1	9		1 (tile, flowerpots)
Bangkok and environs	9	6 ⁽³⁾	3	18	4	13		3 (figures, miniature animals, flowerpots)
Total	15	23	6	44	8	35	2	5

(1) Based on classification of Ministry of Industry. Less than 50 workers: Small sized factories, 50 to 199 workers: Medium sized factories, 200 or more workers: Large sized factories

(2) There were six factories making two to three lines of products

(3) Including two joint ventures with foreign firms

(2) Current State of Competing Countries

1) Korea

According to a survey of the Economic Planning Agency, manufacturers of ceramic tableware and kitchenware having over five permanent employees rose in number from 45 in 1984 to 87 in 1987. The number of employees in those companies rose from 7,603 to 10,644, but the average number of employees per company fell from 169 to 122. During this period, further, the per company value of production rose from 1,281 million won to 1,462 million won. This was due to the increasing mechanization accompanying rationalization measures meant to deal with soaring labor costs.

On the other hand, novelty manufacturers increased in number from 89 to 125 in the same period, with the total number of employees rising from 4,224 to 4,411. The number of employees per company, however, fell from 47 to 35. In the case of novelties, the per company value of production fell from 282 million won to 252 million won, with the companies thus becoming smaller in size.

The sizes of the companies are generally small in both tableware and kitchenware and novelties. In 1987, there were five tableware and kitchenware manufacturers with over 500 employees and just one such novelty manufacturer. As opposed to this, there were 66 tableware and kitchenware manufacturers of a small size with less than 100 workers (76 percent of the total) and 115 such novelty manufacturers (92 percent of the same).

2) Taiwan

According to a survey report on industry and commerce by the Statistics Office of the Administrative Yuan, there were 894 manufacturers of home use ceramic products as of October 1988. This represents the total of all business type enterprises, including cottage industries.

When one takes away the small sized cottage industries and jointly managed companies, one is left with the 165 companies of the Taiwan Ceramic Industry Association.

Of these 165 companies, 73 are manufacturers specializing in tableware and kitchenware, 83 are manufacturers of arts and crafts and novelties, and 39 are manufacturers engaged in production of both.

The Taiwanese manufacturers of home use ceramic products with less than 20 employees account for over half (503) of the companies. In recent years, the percentage of companies with fewer employees has been rising due to the shortage of labor.

Small and medium sized manufacturers are defined as those with an annual production of less than NT\$50 million (about US\$1.75 million). A full 852 companies, or 95 percent of the 894, fall under this category.

Since 1985 there have been no official statistics given on the shipments of home use ceramic products. According to nonofficial materials, NT\$6,773 million worth of tableware and kitchenware, NT\$9,285 million of arts and crafts and novelties, or a total of NT\$16,058 million (about US\$569 million) were shipped in 1988.

1-3. Position of Ceramic Industry

According to the National Economic and Social Development Board (NESDB), the ceramic industry accounted for 0.91 percent, or 1,770 million bahts, of the added value production (1972 real prices) of all manufacturing industries in 1980. This percent represents more than a three-fold growth over the 0.29 percent of 1975, five years before, but its share as an industry is still extremely small (Table IV-1-7).

Next, there were 39,626 factories registered at the Department of Industrial Works of the Ministry of Industry as of 1984. Of these, there were 237 ceramic factories, accounting for 0.6 percent of the total. Further, according to the statistics of the Department of Industrial Works, there were 1,169,193 persons employed in industry, of which 11,785 were employed in the ceramic industry, or 1.0 percent of the same. The latter statistics indicate that there were 34,773 workers employed in refractories and stone, listed apart from ceramics. Bricks are considered to fall under the category of refractories, so the share of the ceramic industry as seen from the number of employees is somewhat higher than 1.0 percent.

Table IV-1-7. Trends in Value Added Production of Ceramic Industry (1972 Real Prices)

(Unit: Million Baht)

Year	Ceramic industry(A)	All manufacturing industries(B)	(A)/(B)
1975	226	77446	0.29 (%)
1976	340	88,450	0.38
1977	534	108,446	0.49
1978	954	130,000	0.73
1979	1,235	159,390	0.77
1980	1,770	193,794	0.91

Source: National Economic and Social Development Board (NESDB).

On the other hand, a look at the share of ceramic products in exports shows that ceramics accounted for 0.53 percent of the total value of exports as of 1988. This signifies a more than two-fold increase in eight years from the 0.25 percent of 1980.

On the other hand, ceramic products accounted for 0.53 percent of the total value of exports as of 1988. The figure in 1980 was 0.25 percent, signifying a more than two-fold increase in eight years.

1-4. Industrial Organizations and Their Activities

At the present time, there are three organizations relating to the ceramic industry. All of these have few member companies and do not cover the industry as a whole. Further, they have not been active that long.

A summary of the three organizations is given below:

(1) **Ceramic Industry Club of Thailand**

This was established in 1980 and currently has 29 member companies. The members include manufacturers of tiles, sanitary porcelain, tableware and kitchenware, novelties, refractory brick, insulators, etc. and also manufacturers of raw materials and traders. The companies participating include not only large sized ones, but small sized ones as well.

The object of the establishment of the club was to assemble together companies for mutual cooperation. Specifically, the club engages in negotiations with the government of industrial policies, export marketing, participation in trade fairs, introduction of new technology, quality control, and training of technicians. Note that the club is under the jurisdiction of the Federation of Thai Industries (FTI).

(2) **Lampang Ceramic Association**

This organization was established in 1989 and has 63 member companies. The majority of the ceramic manufacturers in Lampang in Northern Thailand are members (there are four to five outsiders).

The object of the establishment of the association was the promotion of development of the ceramic industry and coordination with the government for improvement of product quality and to promote cooperation among member factories to raise the economic level of Lampang.

Since the association has just been established, it has yet to do much in terms of specific projects or activities, but it is contributing to the reduction of fuel costs by the joint purchasing of fuel gas. The challenge for the time being will be the implementation of specific measures for improvement of quality.

(3) The Thai Ceramic Society

This organization is located in the Department of Materials Science, Faculty of Science, Chulalongkon University. It was launched from the club activities of the university about 20 years ago and began using the name of a "society" about 15 years ago.

The current members fall under the following three groups:

Students

Private individuals, small business owners, private ceramic lovers About 150

Corporations, ceramic manufacturers, material manufacturers, trading companies, etc. About 50

The main activities include technical training for workers of ceramic manufacturers, seminars on new technology, business management, etc., and the like.

The society issues an annual journal in which it gives information on business trends, new technology, society activities, etc.

The above three organizations are all independent from each other, but cooperate when holding seminars etc. by sending lecturers, allowing use of facilities, etc. The members also often overlap, with some joining all three organizations.

The Lampang Ceramic Association is an regional association of businessmen in the same field and includes almost all the related enterprises in the province, but the other two organizations have relatively few members and do not yet cover the industry as a whole.

1-5. Problems and Countermeasures

In the present survey, we visited 44 ceramic manufacturers in Lampang, Chiang Mai, and Bangkok and its environs (including surrounding regions).

Generally speaking, one problem common to the three regions is the extremely good market for tableware and kitchenware and novelties. This has created a situation where anything produced can be sold regardless of the quality and this has led manufacturers to focus more on producing larger quantities than on improving the quality of the products.

Another problem is that while most manufacturers are aware of the unstable quality of locally-supplied raw materials (clay or stone), they can do nothing about it. One reason for this is the heavy demand for raw materials from the ceramic industry in general, which has created a seller's market for raw material suppliers.

In addition, most of the manufacturers are small businesses and are not organized very tightly and thus their bargaining positions are weak with respect to the raw material suppliers. It has also been pointed out by some in the industry that there are problems with the management of mining concessions. The quality of ceramic products, and tableware and novelty items in particular, is heavily affected by raw material quality, and the competitiveness of these products is in effect determined by the quality of raw materials which can be obtained. If the government hopes to promote exports, therefore, it must become fully aware of this problem and make proper use of the concessions.

Located in the northern region, in Chiang Mai city, is the Northern Industrial Promotion Center (NIPC), which is engaged in various projects for promotion of industry in the 17 northern provinces. The NIPC, however, suffers from a lack of staff and insufficient technical capabilities, so cannot fully cope with the needs of business. Further, the activities of the NIPC are not sufficiently publicized, so are not necessarily used by the industry.

To deal with this situation, the Ministry of Industry plans to establish a Ceramic Center in Lampang province. This center would be formed by breaking off the ceramic division of the NIPC and would work to raise the level of technology in the industry around Lampang and to promote the economic development of the region.

While there are differences in the size of companies in Lampang province, similar types of companies tend to concentrate in the same regions, so the establishment of the center in such an area would be effective in terms of provision of market information, technical guidance, and numerous other areas.

The industrial organizations, the NIPC, or the planned Ceramic Center have to strengthen much more their seminars, training, participation in exhibitions, and other projects much more.

Concerning raw materials in particular, there is a need to strengthen cooperative relationships between industry associations and improve the status of manufacturers. At the same time, government-affiliated institutions should work to improve mutual cooperation and policy adjustment efforts and remove the restrictions on raw material supply. Furthermore, it is strongly suggested that the organizations of relevant government institutions (NIPC and the Ceramic Center) be reinforced and their cooperative ties with industry improved. In particular, the lack of interest and closed-mindedness regarding the collection of market information seen in some owners is a "state of mind" problem and will probably be impossible to change in the short term. Government organizations should exert effort in collection and dissemination of information and should engage in exchanges with industry so as to open up the minds of the managers. Toward this end, it is most important for the Ceramic Center to work to win the image of a reliable organization.

Chapter 2. State of Supply and Demand

2-1. Supply

As alluded to in 1-2, the only statistics that could be obtained on domestic production of tableware and kitchenware are for the nine companies covered by the investment promotion program of the BOI. The amount of production of other small and medium sized manufacturers is not known. Further, there are no production statistics on novelties. Therefore, it is only possible to roughly estimate the state of supply.

(1) Tableware and kitchenware

The nine major companies (Table IV-1-4) produced a total of 13,770 tons of tableware and kitchenware in 1985. This figure corresponds to 45.7 percent of the total 30,140 ton production capacity^(Note*) of the nine companies. From these production figures, the operating rate of the production facilities can be estimated as being 45.7 percent.

On the other hand, Thailand imported 7.5 tons of tableware and kitchenware in 1985, so the supply for that year was 13,777.5 tons. (Table IV-2-1)

Imports fell 37 percent in 1978 compared with the previous year, but this was due to a ban on all imports of ceramic tableware and kitchenware by the government in January of that year with the aim at protecting domestic products. The government once lifted the ban, except on porcelain, in March of the same year, and raised the tariff from the old 50 percent to 80 percent. This tariff rate continues even today.

The government also decided to ban imports of pottery and stoneware at the end of 1982 and enforced the ban from January of 1983, causing a sudden sharp drop in imports of tableware and kitchenware.

Next, the other 60~70 small and medium sized manufacturers for which production statistics are unavailable can be estimated to have a total production capacity of 20,500 tons.

(Note*)

Obtained by subtracting the 1,035 ton production capacity of Thailand Tableware Co., Ltd., which is not promoted by the BOI, from the 31,175 ton production capacity of Table IV-1-3.

The operating rate of the production facilities of the small and medium sized manufacturers is 41.5 percent, according to a survey on 41 manufacturers (including manufacturers of novelties in addition to tableware and kitchenware) in Lampang by the Ministry of Industry's NIPC.

If we apply this 41.5 percent operating rate to the 60-70 small and medium sized manufacturers, we would get a figure of 8,058 tons (20,500 x 0.415). If this is considered the production of the 60 companies and the 13,770 tons production of the nine companies mentioned earlier is added, the result would be 21,828 tons. This may be estimated as being the domestic production in 1985. By adding the 7.5 tons of imports to this domestic production, it is possible to estimate the total supply as being 21,836 tons.

Table IV-2-1. State of Supply and Demand of Tableware
(Unit: Ton)

Year	(A) Domestic ⁽¹⁾ Production	(B) Import ⁽²⁾	(C)=(A)+(B) Sub Total	(D) Export ⁽³⁾	(E)=(C)-(D) Domestic Demand
1976	8,281	1,003.2	9,284.2	46.1	9,237.7
1977	8,160	1,408.6	9,568.6	96.1	9,472.5
1978	8,276	888.5	9,164.5	105.5	9,059.9
1979	7,730	1,814.7	9,544.7	14.39	9,400.8
1980	10,004	4,169.0	14,173.0	99.0	14,074.0
1981	12,375	5,165.6	17,540.6	192.4	17,348.2
1982	12,975	2,854.2	15,829.2	390.9	15,438.3
1983	13,422	43.5	13,465.5	670.1	12,795.4
1984	13,174	27.5	13,201.5	216.3	12,985.2
1985	13,770	7.5	13,777.5	694.4	13,083.1
1986	15,285	40.1	15,325.1	670.4	14,654.7
1987	16,966	0.7	16,966.7	2,872.9	14,093.8
1988	N.A.	1.6	N.A.	14,069.5	N.A.

Note: (1) Production of Table IV-1-4

(2), and (3) Figures for imports and exports and totals of two items of 691101 and 691202.

Source: Domestic production figures come from Table IV-1-4.

Import and export figures come from Department of Customs: Foreign Trade Statistics of Thailand

However, exports have been growing tremendously since 1987. The establishment of new companies (including those set up by investment from foreign corporations) has been reported together with the expansion of facilities at existing firms. Table IV.2-2 details some of the facility expansion carried out since 1986. Of the firms listed in the Table, the following two were also listed in Table IV.1-3.

Asia Porcelain Industry Co., Ltd.

Lotus Ceramic Co., Ltd.

Deducing the production of these two companies, annual production capacity at the remaining five companies was 21,980 tons, but since production capacity at Asia Porcelain rose 2,200 tons in 1985, total production capacity for the group amounts to 23,980 tons. If operation rates at these facilities are assumed to be the same as the 45.7% at the previously-mentioned nine firms, annual production amounts to about 11,000 tons.

Lotus Ceramic is a group firm in the S.P. Ceramic Co. organization listed in Table IV.1-3. Due to management-related problems three years ago, S.P. Ceramic is now under bank management (under the name Prathaan Kaankhaa), with only a portion of its divisions engaged in production activities. At Lotus Ceramic, production continues under a different management and name (Anuchon Ceramic). Production capacity at S.P. has dropped significantly, however, and Lotus as well has reduced its annual capacity from 4,500 to 3,700 tons. Even when these reductions are taken into account, however, tableware production has expanded significantly. Particularly worthy of note are the 80-100% increases in production capacity carried out at five of the manufacturers since 1987.

Table IV.2-2 Facility Expansion at Tableware Manufacturers

Company	New plant/expansion of current facilities, year	Main products, production capacity (tons/year)	Foreign capital involved
Royal Asia Porcelain Industry Co., Ltd.	Sept. 29, 1986 Expansion	Stoneware (2,000)	No
Asia Porcelain Industry Co., Ltd.	Dec. 16, 1987 Expansion 100%	Tableware (4,000)	No
Kaslong Ceramics Co., Ltd.	Sept. 23, 1988 Expansion 80%	Tableware/china (4,480)	China, Taiwan
Asia Tableware Industry Co., Ltd.	Oct. 17, 1988 Expansion 80%	Tableware (2,500)	No
Siam Fine China Co., Ltd.	Feb. 24, 1989 Expansion 80%	Kitchenware, giftware, stoneware (5,500); vitreous chinaware (500); China (2,000); bone china (1,000). (Total: 9,000)	No
Royal Porcelain Co., Ltd.	July 13, 1989 Expansion 80%	Tableware, gifts (4,000)	West Germany
Lotus Ceramics Co., Ltd. (Anuchon Ceramic)	Nov. 10, 1986	China tableware (1,825); stoneware tableware (1,825). (Total: 3,700)	No
Total		29,680	

Source: Department of Industry

Further, from the increase in the supply of domestically produced clay (Table IV-2-4), the raw material for tableware and kitchenware, etc., it is possible to deduce that there has been a striking increase in the production capacity of the tableware and kitchenware manufacturers, including small and medium sized enterprises.

A very rough estimate of the current production figures is given below.

If, according to Table IV-2-1, the domestic demand is 14,000 tons, then since 14,070 tons are exported (assuming zero imports), the result would be a production of 28,070 tons in 1988. This corresponds to about twice the production in 1985. If this growth rate is applied to the production of small and medium sized enterprises as well, then we would get a production of twice 8,058 tons, that is, 16,116 tons. If the total 44,168 is then the domestic supply, then one of the factors behind the surge in exports may be considered to have been the clearing out of inventories resulting from the good business conditions, so the actual domestic production in 1988 is estimated to have reached around 40,000 tons.

(2) Novelties

Novelties are mainly produced in Lampang and Chiang Mai in the North, but considerable amounts are also produced in Bangkok and its environs. The types of novelties produced are diverse, including furniture, statuettes, decorations, etc. and most of the producers are small or medium in size or else cottage industries, so data regarding production is not available. In general, however, it is considered that about half of the production is consumed domestically and the remainder is exported.

The volume of exports may be grasped from the trade statistics (Table IV-2-3), so if half of the production is assumed to have been exported, then domestic production may be estimated as twice the volume of exports. Since 1,821 tons were exported in 1987, this would mean a production in that year of around 3,642 tons. Further, 174 tons were imported in that year, so it may be estimated that the supply was a total of 3,816 tons, the production plus imports. Further, exports in 1988 increased 59.0 percent from the previous year to reach 2844.9 tons and imports increased 2.5 fold to reach 483.9 tons. If this is applied straightforwardly to the domestic production, then a figure of about 5690 tons is obtained for the production of 1988. The increase in exports may be considered to have been partially due to disposal of inventories in the same way as tableware, so the actual production is estimated to have been around 5,000 tons.

Table IV-2-3. Trends in Exports and Imports of Tableware

(Unit: Ton)

Year	Export	Import
1980	338.3	52.7
1981	360.1	67.6
1982	307.5	65.6
1983	339.1	89.1
1984	547.1	393.8
1985	957.0	93.8
1986	1,211.1	126.7
1987	1,820.5	174.2
1988	2,844.9	438.8

Source: Department of Customs: Foreign Trade Statistics of Thailand

Table IV-2-4. State of Domestic Supply of Ceramic Materials

(Unit: Ton)

Year	Kaolin	White Clay	Feldspar	Quartz
1983	36,350	4,960	47,908	15,159
1984	58,616	2,520	74,404	20,687
1985	106,704	7,988	104,586	27,305
1986	132,155	11,203	115,163	18,068
1987	206,568	56,719	168,881	27,459
1988	269,688	N.A.	293,686	N.A.

Source: Department of Mineral Resources, Ministry of Industry
Thailand Development Research Institute Foundation for 1988

2.2. State of Shipments

(1) Domestic Market

1) Tableware and kitchenware

Domestic demand for tableware and kitchenware has conventionally been divided into two groups. The first group is the demand for the medium and low class product market which accounts for about 80 percent of the total demand, including exports, which market primarily consists of medium and low income level households and general food stores and restaurants. The second group accounts for 20 percent of the total demand and consists mainly of demand from domestic, first class hotels, restaurants, high class food stores, and high income families. Exports are also included.

Exports, however, have been rising rapidly since 1987 and exports of products of the medium class and down have grown due to the diversification of overseas markets and other factors. Great changes have been seen in the demand situation for medium class and high class goods and in the export ratios.

The amount of domestic demand for tableware and kitchenware cannot be determined due to the incompleteness of production statistics.

2) Novelties

In the same way as tableware, the state of production of novelties is not clear, so it is not possible to obtain an accurate grasp of domestic demand, but it is assumed that half of the production is consumed domestically. Looking at the rapid rise in imports of 1987 and 1988, domestic demand is estimated to be increasing considerably.

3) Sales Channels

Tableware and kitchenware and novelties for domestic demand in general go from the manufacturers through agents or distributors to the retailers and from the retailers to the end consumers. Hotels, restaurants, or mass merchandising department stores or supermarkets, however, usually directly purchase from the manufacturers.

Further, in general, small and medium sized enterprises rely to a relatively high degree on agents for their sales, including their exports, and do not seem to have a sufficient grasp of the margins in the distribution stage or the final sales prices.

In particular, in the case of exports, agents play a large role for the Lampang manufacturers or the small sized manufacturers in the suburbs of Bangkok. Agents in Bangkok purchase goods from large numbers of manufacturers and perform inspections and grading of products using their own standards so as not to sell substandard items. Another major role of the agents is communication between the manufacturers and the foreign importers. The usual business negotiations and collection of information are performed by the agents. The agents are also seen as taking care of delivery control of products for the foreign importers.

2-3. Imports

In January 1978, the government instituted a complete ban on imports of ceramics so as to protect domestic products. In March of the same year, however, it lifted the ban for items other than porcelain (Table IV-2-5). As a result, imports of ceramic tableware and kitchenware have been extremely low.

In place of porcelain, imports of pottery (including stoneware) increased. Imports as a whole subsequently rose.

Nevertheless, the government then placed a ban on imports of pottery in January 1983, resulting in imports of tableware and kitchenware falling to almost zero. As shown in Table IV-2-6, imports totaled 7 million bahts in 1986, but only 360,000 baht in 1987.

These imports were of high class items for use in hotels. Since March 1983, imports have been allowed with the condition that the hotel name or trademark be clearly indicated on the product.

Table IV-2-5. Trends in Imports of Tableware and Novelties
(Unit: CIF million baht)

	1980	1981	1982	1983	1984	1985	1986	1987	1988
Tableware and kitchen-ware of porcelain or china	0.04	0.15	0.79	1.12	3.35	0.47	7.00	0.34	0.27
Ceramic tableware and kitchenware, other than of porcelain or china	68.86	83.18	50.08	1.91	0.11	1.74	0.07	0.02	0.04
Subtotal	68.90	83.23	50.87	3.03	3.46	2.21	7.07	0.36	0.31
Novelties	3.11	4.56	13.98	7.65	6.76	7.38	7.12	9.43	14.70
Total	72.01	87.79	64.85	10.68	10.22	9.59	14.19	9.79	15.01

Source: Department of Customs: Foreign Trade Statistics of Thailand

Table IV-2-6. Imports of Tableware by Key Partners
(Unit: 1,000Baht)

	1985	1986	1987	1988]
W. Germany	1,637	879	173	-
U. K.	24	453	62	180
Japan	359	5,711	4	77
Hong Kong	-	3	83	19
China	88	3	-	-
France	52	-	6	11
Taiwan	-	-	26	-
Total (including others)	2,200	7,070	366	310

Source: Department of Customs: Foreign Trade Statistics of Thailand

Table IV-2-7. Imports of Novelties by Key Partners

Unit: 1000 baht for value and %, upper rows indicating change over previous year and lower rows percent composition

	1985		1986		1987		1988	
	Value		Value	%	Value	%	Value	%
China	1,740.6		2,811.9	61.5 39.5	4,730.2	68.2 50.2	11,168.2	136.1 75.9
Italy	479.9		928.2	93.4 13.0	2,939.1	216.6 31.2	1,852.3	-37.0 12.6
Taiwan	1,872.7		1,038.9	-44.5 14.6	607.6	-41.5 6.4	322.6	-46.9 2.2
U. K.	264.9		257.0	-3.0 3.6	260.5	1.4 2.8	56.6	-78.3 0.4
Spain	18.9		114.3	504.8 1.6	643.4	462.9 6.8	203.3	-68.4 1.4
Hong Kong	1,291.0		856.0	-33.7 12.0	662.1	-22.7 7.0	321.9	-51.4 2.2
Japan	566.1		361.0	-36.2 5.1	213.6	-40.8 2.3	274.3	28.4 1.9
W. Germany	342.6		506.2	47.8 7.1	31.0	-93.9 0.3	101.6	227.7 0.7
Total (including others)	7,381.8		7,124.6	-3.5 100.0	9,425.3	32.3 100.0	14,706.2	56.0 100.0

Source: Department of Customs: Foreign Trade Statistics of Thailand

On the other hand, there has been a large influx of Chinese made novelties. In 1977, these captured over half of the import market of Thailand. Following this, there was a striking rise in imports from Italy, with that country capturing an over 31 percent share of the market in the same year. Spain has also achieved large growth, though its share is still small. As opposed to this, the traditional suppliers of Taiwan, Hong Kong, Japan, and West Germany lost their markets in Thailand (Table IV-2-7).

Novelties are an extremely labor intensive industry and costs directly rebound in price competitiveness. The share of imports from the U.K. has fallen, but value-wise remains about the same due to traditional competitive features (quality, design, etc.) other than price, it seems.

2-4. Problems and Countermeasures

At the present time, Thai tableware and kitchenware and novelty products of the medium class up are mostly exported, while those of lower classes are sold on the domestic market. The majority of the companies visited in the present survey sold both to the export and domestic markets, but a careful look at the actual situation shows that they can be classified into two groups: export oriented companies and domestic market oriented companies.

Right now, the state of production of tableware and kitchenware and novelties in the country as a whole is unknown. There is no grasp of the production capacities, production volumes, or the rate of operation. Without knowing the supply capacity (production), one cannot formulate export promotion plans (projections). Further, it is necessary to obtain a grasp of the rankings of quality in production as a whole (for example, the shares of A class products, B class products, etc.).

Also, to expand production, establishment of a system of supply of raw materials, including imports, would be essential. It is therefore necessary to obtain a grasp of the domestic production of raw materials, for example, the percentage of production of good quality materials suitable for ceramics, in particular, production of tableware and kitchenware and novelties, in the production of kaolin. This would require the establishment of statistics on production of different grades of raw materials.

On the other hand, in promoting exports of both tableware and kitchenware and novelties, a certain degree of consideration must be given to a balance with the domestic market. Overreliance on overseas markets would make the industry very susceptible to overseas economic recessions, fluctuating exchange rates, etc., which could seriously rebound and cause employment problems in the ceramic industry, which is highly labor intensive.

For the above reasons, it is necessary to hurry and establish statistics not only for products, but also for related sectors.

Chapter 3. Exports

3-1. Summary of Exports

As clear from Table IV-3-1, exports of tableware and novelties remained fairly stagnant up until 1984, but starting 1985 there was large growth in both items, with the growth in 1988 in particular being high - just under a five-fold increase for tableware and a 1.7-fold increase for novelties.

The fact that the growth in exports was also a growth in volume was already mentioned (Table IV-2-1 and Table IV-2-3).

Table IV-3-2 and Table IV-3-3 show the exports, by main destination, of ceramic products, including cosmetic goods (in the international standard classification of commodities, 6911, 6912, and 6913) and the share of those products in 1988 by destination.

(1) Tableware

Table IV-3-4 shows the state of exports of tableware by main destination starting in 1985, when exports began to grow rapidly. (Fig. IV-3-1)

First, a look at the export destinations in 1988 shows the U.S. absorbing almost half of the exports. Belgium, the Netherlands, the U.K., and other West European countries each accounted for several percent of the market (Fig. IV-3-2).

Next, a look at the changes over the years shows the total value of exports growing by a tremendous 323 percent and 387 percent in 1987 and 1988, compared with the previous years. A look at this situation by country shows exports to the largest market, the U.S., rising over four-fold in 1987 and almost six-fold in 1988.

In addition, particular note should be taken of the remarkable growth in exports to the Netherlands, Belgium, the U.K., Italy, and other West European countries. For example, in the case of the Netherlands, exports stood at 126,000 baht in 1986, accounting for a 0.4 percent share, but increased over 60 fold to 7.262 million baht in 1987, growing to a 6.0 percent share. Similarly, exports to Belgium grew widely from the 205,000 baht of 1986 (0.7 percent) over 50-fold to 9.059 million baht (7.5 percent) in 1987. Australia accounted for a 10.7 percent and 12.3 percent share of the exports in

1986 and 1987, but fell in share considerably to 2.6 percent in 1988, though the value of exports that year increased slightly.

Exports to Japan increased over twice the previous year in 1988, but the overall growth in exports was larger than that, so the share fell from 5.5 percent to 4.4 percent.

In Asia, Hong Kong began to constitute a major market in 1986. That is, Hong Kong accounted for an 8.4 percent share in 1986. This fell to 1.5 percent in 1987, but increased again to 1.9 percent in 1988.

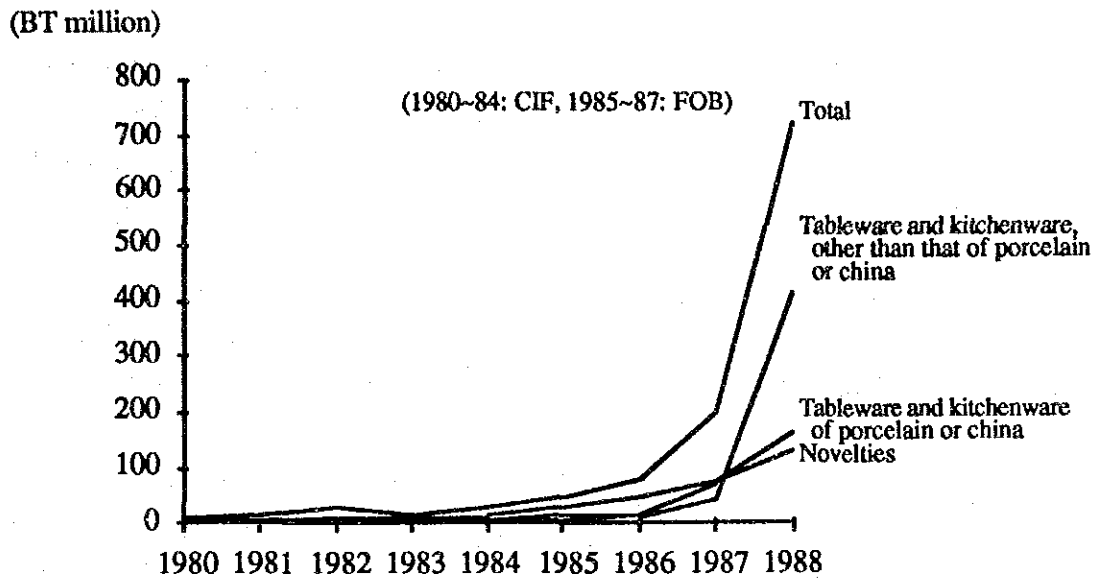
Table IV-3-1. Trends in Exports of Tableware and Novelties

(Unit: million baht)
1980 - 84 CIF
1985 - 87 FOB

	1980	1981	1982	1983	1984	1985	1986	1987	1988
Tableware and kitchenware of porcelain or china	3.30	3.64	5.88	2.93	4.90	3.58	19.90	77.80	169.17
Ceramic tableware and kitchenware, other than of porcelain or china	3.49	7.46	10.66	4.67	3.43	20.44	9.20	42.89	419.46
Subtotal	6.79	11.10	16.54	7.60	8.33	24.02	29.10	120.69	588.63
Novelty	3.12	4.57	13.98	9.84	14.29	28.20	50.79	77.86	135.09
Total	9.91	15.67	30.52	17.44	29.39	52.22	79.89	198.55	723.72

Source: Department of Customs: Foreign Trade Statistics of Thailand

Figure IV-3-1. Trends in Exports of Tableware and Kitchenware and Novelties



Source: Department of Customs, Foreign Trade Statistics of Thailand

(2) Novelties

Exports of novelties also grew slowly up until 1984, in the same way as tableware and kitchenware, but rapidly rose starting in 1985. That is, exports grew 97.3 percent in 1985, 80.1 percent in 1986, 53.3 percent in 1987, and 73.5 percent in 1988 (Table IV-3-1 and Table IV-3-5).

The biggest market is the U.S., but note should be taken that in 1986 Hong Kong absorbed over one-quarter of Thai's exports. The U.S. accounted for 27.9 percent of all exports in 1988, about twice that of the second place West Germany.

In the same way as with tableware and kitchenware, exports to the West European countries rose rapidly in this sector. That is, there was large growth in each year in exports to France, West Germany, the Netherlands, and the U.K., with these countries thus growing into large markets for Thailand.

Japan also grew rapidly as an export market and in 1988 accounted for a 9.2 percent share of Thailand's exports.

3-2. Position of Thai Products in Export Markets

(1) Summary

The UN Yearbook of International Trade Statistics reveals the global trade for the following three types of ceramic products:

(1)	Porcelain (tableware etc.)	6664
(2)	Other porcelain (tableware etc.)	6665
(3)	Ceramic novelties etc.	6666

Looking at the world exports of these three products, exports of porcelain (tableware etc.) totaled US\$1,059.6 million in 1987, other porcelain (tableware etc.) US\$786.4 million, and ceramic novelties etc. US\$825 million. Of this, Thailand accounted for US\$3.1 million, US\$5.1 million, and US\$6.2 million, very small values. Thailand's share was thus 0.3 percent, 0.6 percent, and 0.8 percent, respectively. However, there was large growth in all three products in 1987 (Table IV-3-6).

Table IV-3-2. Thai Exports of Cermaic Products (Note) by Main Destinations

(Unit: 1,000 baht)

	1985		1986		1987		1988	
	Value	Share (%)	Value	Share (%)	Value	Share (%)	Value	Share (%)
Australia	11,990	15.1	16,253	11.1	19,880	5.9	24,431	3.1
Belgium	204	0.3	815	0.6	13,853	4.1	89,551	11.5
Canada	420	0.5	2,960	2.0	3,798	1.1	13,387	1.7
Denmark	1,409	1.8	1,589	1.1	5,508	1.6	20,151	2.6
France	6,912	8.7	15,950	10.8	15,094	4.5	19,928	2.6
W. Germany	6,903	8.7	10,547	7.2	22,796	6.8	43,357	5.6
Hong Kong	2,004	2.5	21,366	14.5	16,274	4.8	15,066	1.9
Italy	567	0.7	812	0.6	8,503	2.5	18,347	2.4
Japan	1,968	2.5	10,410	7.1	22,522	6.7	39,451	5.1
Malaysia	753	1.0	1,458	1.0	4,618	1.4	8,275	1.1
Netherlands	2,654	3.3	2,843	1.9	11,068	3.3	46,411	6.0
New Zealand	95	0.1	123	0.1	7,650	2.3	10,741	1.4
Norway	1,844	2.3	1,641	1.1	2,182	0.7	3,898	0.5
Singapore	2,544	3.2	5,120	3.5	8,430	2.5	13,024	1.7
Switzerland	511	0.7	807	0.6	5,257	1.6	2,577	0.3
U.K.	1,721	2.2	5,261	3.6	16,354	4.9	48,213	6.2
U.S.A.	33,690	42.3	39,649	27.0	112,223	33.3	341,843	44.0
Total (including others)	79,599	100.0	147,118	100.0	336,880	100.0	776,981	100.0

Note: Total of 6911, 6912 and 6913

Source: Department of Customs: Foreign Trade Statistics of Thailand

**Table IV-3-3. Share of Thai Ceramic Products by Main Destinations
(1988)**

(Unit: 1,000baht)

	A (6911)		B(6912)		S (A+B)		C (6913)		T (S+C)	
	Value	Share (%)	Value	Share (%)	Value	Share (%)	Value	Share (%)	Value	Share (%)
Australia	8,241	33.7	9,820	40.2	18,061	73.9	6,370	26.1	24,431	100.0
Belgium	696	0.8	86,600	96.7	87,296	97.5	2,255	2.5	89,551	100.0
Canada	8,004	59.8	3,248	24.3	11,252	84.1	2,135	15.9	13,387	100.0
Denmark	7,431	36.9	10,338	51.3	17,769	88.2	2,382	11.8	20,151	100.0
France	1,542	7.7	5,739	28.8	7,281	36.5	12,647	63.5	19,928	100.0
W. Germany	1,399	3.2	9,914	22.9	11,313	26.1	32,044	73.9	43,357	100.0
Hong Kong	7,443	49.6	3,945	26.2	11,388	75.8	3,678	24.2	15,066	100.0
Italy	16,090	87.7	375	2.0	16,465	89.7	1,882	10.3	18,347	100.0
Japan	15,118	38.3	11,851	30.0	26,969	68.3	12,482	31.7	39,451	100.0
Malaysia	4,039	48.8	3,885	46.9	7,924	95.7	351	4.3	8,275	100.0
Netherlands	25,046	54.0	14,868	32.0	39,914	86.0	6,497	14.0	46,411	100.0
New Zealand	2,656	24.7	5,143	47.9	7,799	72.6	2,942	27.4	10,741	100.0
Norway	-	-	1,626	41.7	1,626	41.7	2,272	58.3	3,898	100.0
Singapore	2,801	21.5	8,136	62.5	10,937	84.0	2,087	16.0	13,024	100.0
Switzerland	93	3.6	585	22.7	678	26.3	1,899	73.7	2,577	100.0
U.K.	15,067	31.3	23,769	49.3	33,836	80.6	9,377	19.4	48,213	100.0
U.S.A.	63,732	18.6	240,465	70.4	304,197	89.0	37,646	11.0	341,843	100.0
Total (including others)	185,165	23.8	456,726	58.8	641,891	82.6	135,090	17.4	776,981	100.0

Source: Department of Customs: Foreign Trade Statistics of Thailand

Table IV-3-4. Share of Main Export Destinations of Tableware and Kitchenware

(Unit: 1000baht for value and %, upper rows indicating change over previous year and lower rows percent composition)

	1985	1986		1987		1988	
	Value	Value	%	Value	%	Value	%
U.S.A.	18,292	11,860	-35.2 41.5	48,828	311.7 40.0	287,596	489.0 48.9
Australia	2,187	3,042	39.1 10.7	14,817	387.1 12.3	15,116	2.0 2.6
W. Germany	690	1,267	83.6 4.4	6,036	376.4 5.0	9,531	57.9 1.6
Netherlands	22	126	472.7 0.4	7,262	5,363.5 6.0	36,377	400.9 6.2
Belgium	32	205	540.6 0.7	9,059	4,319.0 7.5	86,343	853.1 14.7
U. K.	372	1,741	368.0 6.1	5,042	189.6 4.2	34,593	586.1 5.9
Japan	353	1,781	404.5 6.2	5,294	197.2 4.4	21,930	314.2 3.7
Italy	295	259	-12.2 0.9	6,043	2,233.2 5.0	13,711	126.9 2.3
Hong Kong	96	2,396	2,395.8 8.4	1,804	-24.7 1.5	10,938	506.3 1.9
Total (including others)	24,024	28,560	18.9 100.0	120,798	323.0 100.0	588,633	387.3 100.0

Source: Department of Customs: Foreign Trade Statistics of Thailand

Table IV-3-5. Share of Main Export Destinations of Novelties

(Unit: 1000 baht for value, and %, with upper rows indicating change over previous year and lower rows percent composition)

	1985	1986		1987		1988	
	Value	Value	%	Value	%	Value	%
U.S.A.	7,995.5	9,191.3	15.0 18.1	14,299.9	55.6 18.4	37,646.3	163.3 27.9
France	3,914.2	5,894.4	50.6 11.6	3,575.5	-39.3 4.6	12,647.0	253.7 9.4
W. Germany	2,420.0	5,216.3	115.5 10.3	8,800.1	68.7 11.3	19,397.2	120.4 14.4
Netherlands	1,455.2	1,167.3	-19.8 2.3	3,617.6	209.9 4.6	6,497.4	79.6 4.8
Japan	225.8	1,632.6	623.0 3.2	3,896.1	138.6 5.0	12,481.5	220.4 9.2
Australia	6,026.0	5,741.6	-4.7 11.3	8,615.4	50.1 11.1	6,370.0	-26.1 4.7
Hong Kong	634.8	12,793.9	1,915.4 25.2	8,229.9	-35.7 10.6	3,678.6	-55.3 2.7
U.K.	837.1	1,425.4	70.3 2.8	5,166.2	262.4 6.6	9,377.3	81.5 6.9
Total (including others)	28,199.4	50,785.4	80.1 100.0	77,863.1	53.3 100.0	135,089.5	73.5 100.0

Source: Department of Customs: Foreign Trade Statistics of Thailand

Fig. IV-3-2. Share of Main Export Destinations of Tableware and Kitchenware (1988)

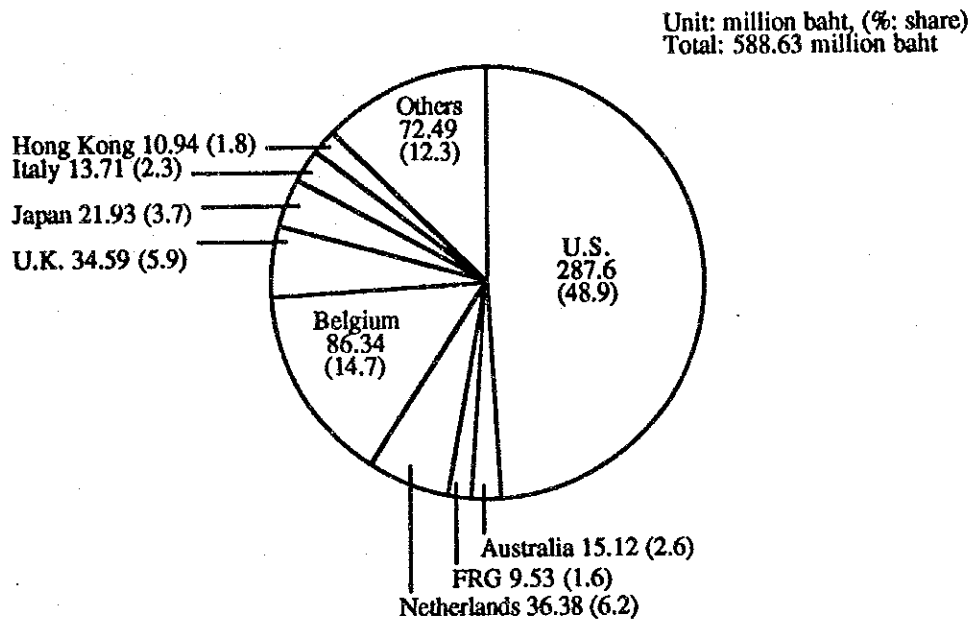


Fig. IV-3-3. Share of Main Export Destinations of Novelties (1988)

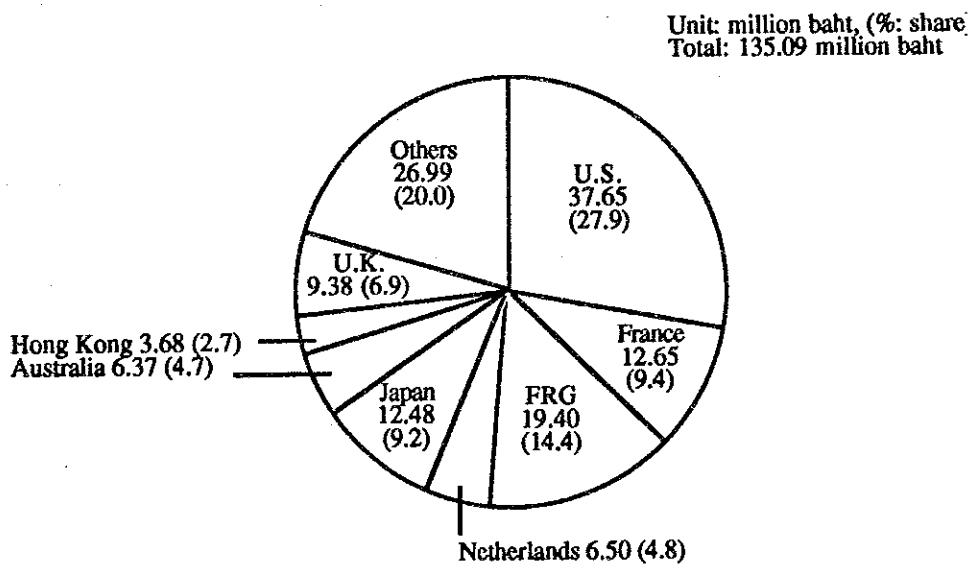


Table IV-3-6 (1).Share of Thailand in World Exports of Ceramic Products

(Unit: million baht for value and % for share)

(1) Porcelain (tableware etc.)6664

	1983		1984		1985		1986		1987	
	Value	Share	Value	Share	Value	Share	Value	Share	Value	Share
Japan	206.5	29.2	211.2	30.2	193.4	27.2	205.0	23.7	217.7	20.5
W. Germany	191.8	27.1	186.5	26.6	194.9	27.3	265.6	30.7	314.6	29.7
U.K.	101.3	14.3	92.7	13.2	109.2	15.4	128.2	14.8	148.0	14.0
Hong Kong	42.0	5.9	46.4	6.6	49.5	7.0	64.5	7.4	89.5	8.4
France	37.4	5.3	37.6	5.4	42.1	5.9	47.1	5.4	56.4	5.3
Brazil	1.9	0.3	8.1	1.2	5.7	0.8	6.9	0.8	8.0	0.8
South Korea	5.5	0.8	2.9	0.4	3.3	0.5	6.8	0.8	6.6	0.6
Thailand	0.7	0.1	0.8	0.1	0.5	0.1	0.7	0.1	3.1	0.3
philippines	3.9	0.6	3.9	0.6	2.7	0.4	3.2	0.4	3.2	0.3
Sri Lanka	2.9	0.4	2.4	0.3	4.1	0.6	5.1	0.6	4.5	0.4
Total (including others)	706.7	100.0	700.1	100.0	711.2	100.0	866.4	100.0	1,059.6	100.0

Source: U.N. Yearbook of International Trade Statistics

Table IV-3-6 (2).Share of Thailand in World Exports of Ceramic Products

(Unit: million baht for value and % for share)

(2) Other porcelain (tableware etc.) 6665

	1983		1984		1985		1986		1987	
	Value	Share	Value	Share	Value	Share	Value	Share	Value	Share
Japan	214.1	39.8	241.3	41.1	229.1	39.2	243.0	36.1	228.4	29.0
U.K.	102.3	19.0	95.8	16.3	123.7	21.2	124.2	18.4	144.4	18.4
Italy	49.4	9.2	48.3	8.2	48.0	8.2	68.8	10.2	90.4	11.5
South Korea	41.9	7.9	50.7	8.6	47.5	8.1	60.0	8.9	84.8	10.8
Portugal	19.0	3.5	24.6	4.2	26.4	4.5	38.8	5.8	57.1	7.3
W. Germany	25.3	4.7	22.5	3.8	21.1	3.6	30.0	4.5	34.6	4.4
Hong Kong	3.1	0.6	2.1	0.4	2.2	0.4	9.7	1.4	20.3	2.6
Malaysia	1.5	0.3	1.6	0.3	1.9	0.3	1.7	0.3	2.8	0.4
Thailand	1.6	0.3	1.3	0.2	1.4	0.2	1.4	0.2	5.1	0.6
Singapore	1.3	0.2	1.3	0.2	0.9	0.2	1.4	0.2	2.2	0.3
Total (including others)	538.1	100.0	587.7	100.0	584.2	100.0	674.0	100.0	786.4	100.0

Source: U.N. Yearbook of International Trade Statistics

Table IV-3-6 (3).Share of Thailand in World Exports of Ceramic Products

(Unit: million baht for value and % for share)

(3) Ceramic novelties etc. 6666

	1983		1984		1985		1986		1987	
	Value	Share	Value	Share	Value	Share	Value	Share	Value	Share
Italy	109.3	22.1	107.7	19.8	114.5	19.9	151.6	21.3	175.8	21.3
Japan	97.6	19.7	116.4	21.4	105.5	18.3	117.5	16.5	109.8	13.3
W. Germany	73.6	14.9	66.5	12.2	72.7	12.6	95.7	13.5	97.2	11.8
Spain	26.8	5.4	35.7	6.6	45.1	7.8	57.4	8.1	68.0	8.2
U.K.	29.3	5.9	34.9	6.4	34.4	6.0	37.2	5.3	44.1	5.3
Netherlands	28.4	5.7	28.9	5.3	32.0	5.5	44.7	6.3	51.8	6.3
South Korea	25.1	5.1	26.6	4.9	23.0	4.0	27.2	3.8	35.9	4.4
Hong Kong	14.9	3.0	17.1	3.1	19.0	3.3	27.4	3.9	43.0	5.2
Philippines	07	0.1	0.9	0.2	0.8	0.1	1.7	0.2	3.6	0.4
Thailand	0.4	0.1	0.6	0.1	1.0	0.2	3.6	0.5	6.2	0.8
Total (including others)	495.0	100.0	543.5	100.0	576.6	100.0	710.7	100.0	825.0	100.0

Source: U.N. Yearbook of International Trade Statistics

Table IV-3-7 Comparison by RCA

	1970	1975	1980	1985
Japan	5.7322841	4.1738282	3.9316780	2.9783346
R. of Korea	0.1555494	1.1712626	3.7511212	2.4169843
Hong Kong	1.0336031	2.0808420	1.6218006	2.3371895
Portugal	2.2776853	4.3399742	6.1518101	9.5959977
Spain	1.2519821	2.032852	2.0989937	0.5200223
Malaysia	0.0751345	0.0703885	0.1035755	0.3971126
Thailand	0.0079045	0.0898860	0.276221	0.4082511

Source: Prepared based on U.N. Statistics

Note: RCA = revealed Comparative Advantage Indices

E_i : Export value of i product from h country

E_h : Total export value from h country

W_i : World's total export value of i product

W : World's total export value

On the other hand, Japan's share in world exports of all three items has been declining since a peak in 1984.

As shown in Table IV-3-7, Japan's Revealed Comparative Advantage Indices (RCA) declined from 5.73 in 1970 to 2.98 in 1985. Thailand's indices grew from 0.0079 to 0.408. Indices above 1.0 mean that the RCA of a country's products is higher than the world average. Indices below 1.0 mean that the RCA is lower than the world

average. In the case of Thailand, it can be seen that the country's RCA is gradually nearing 1.0, suggesting growing export competitiveness.

Some manufacturers of ceramic products in Thailand have been progressing with capital investment projects. Furthermore, abundant supplies of domestic raw materials and steady increases in exports in recent years indicate that exports will grow further in the coming years.

3-3. Export Marketing

(1) Summary

In the present survey, we visited 53 companies, of which 45 were manufacturing tableware and kitchenware and novelties. Of these in turn, we obtained information on factory activities through interviews or responses to questionnaires from 44 (in one company we just visited the showroom).

Of the 44 companies, 30 were found to be engaged in direct or indirect exports. The other 14 companies which either were not exporting or else for which the information could not be obtained were all small sized enterprises with fewer than 50 workers with the exception of one.

Table IV-3-8 summarizes the marketing (export and domestic sales) situation as learned from the interviews and the questionnaires.

There were 16 companies from which relatively specific responses could be obtained in the interviews etc. regarding the sales policies, export ratios, destination countries, export channels, product planning, etc. As opposed to this, there were 14 companies which either responded that they left exports and other sales to their agents, gave unclear explanations, made contradictory statements, or otherwise did not provide enough information to obtain a sufficient grasp of the state of sales of their products.

Regarding exports, out of the companies from which clear explanations could be obtained, several companies were engaged in direct transactions with foreign buyers. The rest went through agents, but were believed to be maintaining contacts with their buyers and to have a good understanding of the situation in the destination markets.

On the other hand, those companies which responded that they left everything to agents had little interest in the export markets and gave the impression of desiring to rely on agents for product development and planning.

Among the ten companies which responded they were not exporting, there were some which indicated they would like to export in the future once they were properly set up internally and some which indicated that they were already doing good business domestically, so were not interested in exports, even though they had had inquiries.

From the above, it may be understood that Thai manufacturers rely to a considerable extent on exports and that they have a high interest in exporting. At the same time, however, the suggestion is that the companies may be divided into two major groups according to size: companies with a high export orientation and companies with a strong orientation toward the domestic market.

Table IV-3-8. Marketing Situation

	No. of factories	
Changmai		
Exporting on their own (1)	5	Medium sized enterprises
Exports left to agents (2)	2	Medium sized enterprises
Only domestic sales	3	Small sized enterprises
Unknown	1	
Subtotal	11	
Lampang		
Exporting on their own (1)	2	Large and medium sized enterprises, 1 each
Exports left to agents (2)	9	Large sized enterprises, 2 Small sized enterprises, 4 Medium sized enterprises, 6
Only domestic sales	1	Small sized enterprises
Unknown	3	
Subtotal	15	
Bangkok and its environs		
Exporting on their own (1)	9	Medium sized enterprises, 7 large sized enterprises, 2
Exports left to agents (2)	3	Small sized enterprises
Only domestic sales	6	Large sized enterprises, 1 Small sized enterprises, 5
Subtotal	18	
Total	44	

- (1) Companies which gave somewhat clear explanations regarding share of destination countries, export channels, and sales policies.
- (2) Companies for which the shares of destination countries were unclear, which left exports to agents, or which gave contradictory explanations. Among these, there were some cases of companies which did not wish to disclose information. In the cases of companies in Lamapang, the atmosphere in particular was one of unwillingness to disclose internal information.

3-4. Main Markets

(1) U.S. Market

1) Summary

The U.S. is the biggest market for Thai ceramic products. The U.S. market for home use ceramic products was worth US\$2,188.98 million in 1988, of which about 60 percent was imported. Imports have increased by an average annual 11.9 percent looking at the period from 1984 to 1988.

Imports of ceramic products from the Southeast Asian countries have increased faster than even those from the NIEs.

The increase in imports from Thailand has been particularly striking, with imports of ceramic tableware and other household goods (except bone china products) increasing eight-fold in value and 16-fold in volume in the period from 1984 to 1988. Further, imports of earthenware tableware increased 96-fold in value and 50-fold in volume in the same period. Also, while small in value, imports of earthenware and stoneware smoking utensils and other household goods rose over six-fold. (Table IV-3-9)

A look at the share of Thai products in the U.S. market in 1988 shows products other than bone china tableware, for which import figures are not available, accounting for 0.2 percent to 2.2 percent of the market.

Blue and white patterned Thai products are well known in the U.S. industry. The types of products include napkin rings, spoon holders, mugs and cups, canisters, etc. In addition, there are good gift items and novelties. Thai products are evaluated as being of good quality in view of their price compared with the products of the NIEs and other Southeast Asian countries.

2) Competitiveness of Thai Products

First, in porcelain tableware and other household goods, the biggest exporter is Taiwan, which accounts for 30.2 percent of the value and 34.7 percent of the volume of exports to the U.S. This is followed by China (14.0 percent of the value and 26.1 percent

of the volume) and South Korea (2.2 percent of the value and 2.7 percent of the volume) (Table IV-3-10).

Thailand accounts for 0.6 percent of the value and 0.5 percent of the volume of exports, small shares, but fairly equal in value and volume. A look at the growth in the period from 1984 to 1988 shows the value rising 701 percent and the volume 1525 percent, the highest rate of growth among the four countries.

On the other hand, a look at the unit price per dozen pieces shows Thailand boasting a figure of US\$14.96, the highest among the four countries (Table IV-3-11). However, the volume of imports by the U.S. has been growing at about twice the rate of the value of imports, so this means that imports of relatively cheaper products have been increasing.

Next, in pottery tableware, South Korea is the largest exporter in value and volume, accounting for 13.6 percent and 20.0 percent, respectively, followed by Taiwan (13.2 percent in value and 12.2 percent in volume). Thailand accounts for 2.2 percent of the value and 4.0 percent of the volume, thus holding about twice the share of volume as value. This signifies that relatively cheap items are being imported from Thailand. However, imports of the U.S. from Thailand increased 9515 percent in value and 4933 percent in volume in the period from 1984 to 1988, overwhelming the growth of the other three countries. Also, the value of the same grew by about twice the rate as the volume. This suggests that there was an improvement in the price of Thai products in this area.

In pottery and stoneware smoking articles and other household goods, Taiwan held a 48.4 percent share of the market, Mexico 2.9 percent, China 2.6 percent, and Thailand just 0.7 percent.

Further, in terms of the growth in the period from 1984 to 1988, China grew 497 percent, Taiwan 171 percent, and Mexico 60 percent, while Thailand grew by 512 percent - the largest rate of all.

Thailand's share of the market for bone china statuettes and other novelties and household goods is only a very small 0.2 percent. Further, imports from Thailand only began in 1986. In this product line, out of the four countries, Taiwan accounts for 35 percent and Spain for 18 percent. This sector is one of traditional strength of the European countries.

Note that there are no statistics on import volumes of the latter two product groups available in the U.S., so it is impossible to calculate unit prices.

3) Evaluation of Thai Products

U.S. business (importers, manufacturers, and retailers) evaluate Thai products in various ways. A summary of their evaluations is given in Table IV-3-12.

Although product quality was judged to be good considering the price, criticism was voiced concerning variations in size and coloring.

It was frequently pointed out that designs are old-fashioned and copies are numerous. The preferences of U.S. consumers are changing with the alternation of generations, and designs suited to the sensibilities of the new generation must be developed.

The biggest problem in imports from Thailand is delivery times. Sharp criticism is leveled at the insufficient observance of commitments. In particular, Thailand was considered inferior to the NIEs on this point. Since this was a problem with orders of large lots (in particular of the production system of Thai manufacturers), the countermeasure taken is sometimes to order small lots.

In terms of price, Thai products are competitive. The sales method (routes), however, is considered inefficient since direct transactions with Thai manufacturers are difficult and intermediaries are used. U.S. businesses do not consider the Thai manufacturers to have any basic sales ability. For example, if the manufacturers were to decide on a sole agent for a particular market and push sales through the same, they could probably raise the image of their products, it was considered.

Table IV-3-9 (1) U.S. Imports of Ceramic Products by Product
 (Unit: Value:US\$1,000 Volume: Dozen)
 Porcelain tableware and other household goods (excluding bone china) (6664040)

	1984			1985			1986			1987			1988			Change 1984-88 (%)		Share 1988 (%)	
	Value	Volume	Vol.	Value	Volume	Vol.	Value	Volume	Vol.	Value	Volume	Vol.	Value	Volume	Vol.	Val.	Vol.	Val.	Vol.
U.K.	10,430	810,300	10,522	482,100	11,985	699,799	11,392	486,706	13,468	496,977	29.1	-38.7	3.0	1.3					
W. Germany	24,254	1,189,947	25,490	1,666,798	27,949	1,384,435	19,883	1,000,851	22,022	858,917	-9.2	-27.8	4.9	2.3					
Thailand	358	11,804	255	6,801	330	20,069	1,429	126,341	2,869	191,812	701.4	1,525.0	0.6	0.5					
Philippines	3,112	157,257	2,217	99,812	2,369	147,322	2,247	165,017	3,318	399,322	+6.6	153.9	0.7	1.0					
China	30,765	7,328,733	24,986	6,389,165	28,396	7,502,697	47,117	8,918,140	63,565	9,972,562	106.6	36.1	14.0	26.1					
South Korea	10,947	1,099,772	11,294	1,017,318	10,099	1,279,881	11,961	1,249,203	10,067	1,011,993	-8.0	-8.0	2.2	2.7					
Taiwan	79,814	8,521,468	79,508	9,644,007	92,171	12,089,346	132,039	15,012,209	137,473	13,242,375	72.2	55.4	30.2	34.7					
Japan	149,230	14,473,299	148,837	16,183,283	145,043	13,063,039	133,371	10,453,564	112,765	8,075,997	-17.7	-44.2	24.7	21.2					
Total	356,897	36,432,193	356,472	39,147,920	381,041	40,410,432	435,283	43,579,588	455,818	38,151,142	27.7	4.7	100.0	100.0					

Source: U.S. Department of Commerce

Table IV-3-9 (2) U.S. Imports of Ceramic Products by Product
 (Unit: Value:US\$1,000 Volume: Dozen)
 Pottery tableware (6665025)

	1984			1985			1986			1987			1988			Change 1984-88 (%)		Share 1988 (%)	
	Value	Volume	Vol.	Value	Volume	Vol.	Value	Volume	Vol.	Value	Volume	Vol.	Value	Volume	Vol.	Val.	Vol.	Val.	Vol.
Brazil	9,762	2,041,513	10,890	2,724,494	7,479	1,511,409	9,452	1,733,159	11,963	1,237,221	22.5	-39.4	3.2	3.2					
U.K.	26,822	2,944,246	27,938	3,323,471	28,812	2,267,624	30,212	2,517,614	35,420	2,311,217	32.1	-21.5	9.5	5.4					
Thailand	84	33,869	523	88,594	704	106,101	2,782	613,718	8,080	1,704,840	9,519.0	4,933.6	2.2	4.0					
China	5,851	1,976,649	7,025	2,353,001	11,422	4,273,143	15,657	4,732,767	22,222	6,188,519	279.8	213.1	6.0	14.4					
South Korea	27,437	4,989,029	35,184	6,560,342	35,121	6,588,938	49,125	8,716,938	50,415	8,575,684	83.7	71.9	13.6	20.0					
Taiwan	21,365	4,027,779	20,672	4,100,205	27,736	5,803,719	58,121	6,918,128	49,145	5,237,597	136.0	30.0	13.2	12.2					
Japan	156,425	22,397,799	177,197	27,683,238	174,947	25,565,514	164,317	26,374,251	142,284	13,267,767	-9.0	-40.8	38.3	31.0					
Total (including others)	277,446	41,162,154	311,296	50,807,617	325,123	50,694,942	369,739	55,721,625	371,434	42,842,551	33.9	4.1	100.0	100.0					

Source: U.S. Department of Commerce

Table IV-3-9 (3) Imports of Ceramic Products by U.S. by Product

(Unit: US\$1,000)

Pottery and stoneware smoking articles and other household goods (6665040)

	1984	1985	1986	1987	1988		
Mexico	4,908	3,557	4,115	5,292	7,864	60.2	2.9
U.K.	6,429	5,808	7,069	9,073	11,260	75.1	4.2
Italy	18,294	21,342	25,343	33,335	32,097	75.5	12.0
Thailand	290	330	351	753	1,775	512.1	0.7
China	1,168	2,136	1,671	3,226	6,968	496.6	2.6
Taiwan	48,003	55,934	78,067	141,158	130,275	171.4	48.8
Japan	41,170	41,008	40,925	31,121	25,820	-40.2	9.7
Total (including others)	149,452	161,610	195,136	264,219	266,950	78.6	100.0

Source: U.S. Department of Commerce

Table IV-3-9 (4) Imports of Ceramic Products by U.S. by Product

(Unit: US\$1,000)

Bone china statuettes and other novelties and other household goods (6666000)

	1984	1985	1986	1987	1988		
U.K.	11,124	11,660	12,789	12,087	14,315	28.7	8.9
W. Germany	17,978	17,234	22,115	26,688	22,142	23.2	13.8
Spain	12,718	16,906	25,540	26,692	28,911	127.3	18.0
Italy	2,077	2,811	4,114	6,534	5,312	155.8	3.3
Thailand			144	157	299	NC	0.2
South Korea	429	1,008	1,145	1,000	1,839	328.7	1.1
Taiwan	25,978	32,638	39,144	58,676	56,878	118.9	35.4
Total (including others)	87,698	107,981	144,224	169,480	160,803	83.4	100.0

Source: U.S. Department of Commerce

**Table IV-3-10. Comparison of Competitiveness in U.S. Market
(Market Share)**

(Unit: %)

(1) Porcelain tableware and other household goods (excluding bone china) (664040)				
Thailand	1988 share	Value	0.6	
		Volume	0.5	
	1984-88 change	Value	701.4	
		Volume	1,525.0	
Taiwan	1988 share	Value	30.2	
		Volume	34.7	
	1984-88 change	Value	72.2	
		Volume	55.4	
China	1988 share	Value	14.0	
		Volume	26.1	
	1984-88 change	Value	106.6	
		Volume	36.1	
South Korea	1988 share	Value	2.2	
		Volume	2.7	
	1984-88 change	Value	-8.0	
		Volume	-8.0	
(2) Pottery tableware (6665025)				
Thailand	1988 share	Value	2.2	
		Volume	4.0	
	1984-88 change	Value	9,519.0	
		Volume	4,933.4	
Taiwan	1988 share	Value	13.2	
		Volume	12.2	
	1984-88 change	Value	130.0	
		Volume	30.0	
South Korea	1988 share	Value	13.6	
		Volume	20.0	
	1984-88 change	Value	83.7	
		Volume	71.9	
China	1988 share	Value	6.0	
		Volume	14.4	
	1984-88 change	Value	279.8	
		Volume	213.1	
(3) Pottery and stoneware smoking articles and other household goods (6665040)				
Thailand	1988 share	Value	0.7	
		Value	512.1	
Taiwan	1988 share	Value	48.4	
		Value	171.4	
China	1988 share	Value	2.6	
		Value	496.6	
Mexico	1988 share	Value	2.9	
		Value	60.2	

Source: Prepared from Table IV-3-9

**Table IV-3-11. Comparison of Competitiveness in U.S. Market
(Comparison of Unit Price)**

(Unit: US\$/dozen)

(1)	Porcelain tableware and other household goods (excluding bone china) (6664040)	
	Thailand	14.96
	Taiwan	10.38
	China	6.37
	South Korea	9.95
(2)	Pottery tableware (6665025)	
	Thailand	4.74
	Taiwan	9.38
	South Korea	5.88
	China	3.59

Source: Prepared from Table IV-3-9.

Table IV-3-12. Opinions in U.S. About Thai Products

	Importers (11)	Manufacturers (13)	Retailers (10)
Quality	Fare-very good	Color and dimensions not uniform - very good	Good - very good
Design	Ordinary-many copies	Old fashioned - new design development required	Technical problems exists - very goods
Delivery Control	Poor - over 30 days required by sea	Late - inferior to NIEs	Poor - impoters deal with this by small lots
Price	Very competitive - better than NIEs	Competitive with NIEs	Good - high (not as cheap as Chinese products)
Sales Methods	Too many intermediaries	Not efficient	- No response -

() represents number of interviewees
 Source: Interview survey

(2) Australian Market

1) Summary

The Australian market for ceramic products was worth 220 million Australian dollars (hereinafter abbreviated as A\$) in fiscal 1989 (July 1988 to June 1989). A breakdown shows domestic production accounting for A\$102 million, imports A\$119 million, and exports A\$1 million.

Of this, tableware and kitchenware accounted for A\$98 million (domestic production A\$17 million and imports A\$81 million), with imports accounting for about 83 percent of this. Novelties are not produced domestically and are all imported (Table IV-3-13).

Australian ceramic manufacturers are weak overall in competitiveness and imports are increasing. In particular, there has been striking growth in imports of high value added tableware and kitchenware.

In tableware and kitchenware, the design largely influences the purchasing by the general consumer. Famous European and Japanese brands are considered high class products. As a result, Australian manufacturers mainly concentrate in the production of lower priced tableware and kitchenware by mass production. The domestic production supplies about 16 percent of the domestic market and competes with imports from the NIEs and the other ASEAN nations in the area of medium and low class products.

Seen in the short term, there is almost no sign of the domestic producers moving to produce high class tableware and kitchenware.

2) Imports

The main countries of origin are the U.K. and Japan, but in recent years imports have been rapidly increasing from Southeast Asia too. The share of the seven Southeast Asian countries, including Thailand, has risen from the 22 percent of 1985 to 33 percent in 1989, while the share of Japan, the main country of origin, has been cut in half from 39 percent to 18 percent in the same period. (Table IV-3-14).

Thailand holds only a small 2 percent share (1989), but the value of imports from that country has risen from the A\$767,000 of 1985 to A\$2.759 million in 1989 - a 4.6 fold increase. The main items being imported are porcelain and ceramic dinner sets, tea sets, kitchenware, and novelties, with novelties in particular rising in imports. In 1989, novelties accounted for 29.1 percent of the total import value.

Table IV-3-13. Ceramic Market of Australia
(Unit: A\$ million)

	Import	Domestic Production	Export	Total
Tableware and kitchenware	81	17	-1	97
Sanitary porcelain	3	50	-	53
Novelity	35	-	-	35
Insulators etc.	-	35	-	35
Total	119	102	-1	220

3) Evaluation of Thai Products

The rapid surge in imports from Thailand attests to the high marks given to the quality and price of its products in the market.

According to interviews with industry experts, there are no complaints as to the quality, design, or price of the products. According to Thebe International Pty Ltd., the largest importer of ceramic products, Thai products are treated as of medium class. As opposed to this, the products of China, the biggest supplier among the Southeast Asian countries, are considered to be cheap items.

Table IV-3-14. Share of Main Countries of Origin (1)
(Unit: %)

	1985	1986	1987	1988	1989
Philippines	1	1	1	0	1
Malaysia	1	1	1	1	2
Thailand	1	0	1	1	2
Hong Kong	0	0	1	1	1
South Korea	4	3	4	4	3
Taiwan	10	8	10	7	11
China	5	5	9	11	13
(Subtotal)	22	18	27	25	33
Japan	39	37	26	19	18
U.K.	17	24	21	26	24
Others	22	22	27	29	23
(Subtotal)	78	84	74	74	65
Total	100	100	100	100	100

Note: (1) In addition to tableware and novelties, figures include cosmetic goods, though small in value.

(3) Japanese Market

1) Summary

According to I/O tables, there were 1988 places of business in Japan engaged in the manufacture of tableware and kitchenware and 529 in the manufacture of novelties. A look at this by size shows that small and medium sized enterprises with less than 200 employees accounted for 1972 of the tableware manufacturers (99.2 percent) and all of the novelty manufacturers. In particular, there is an overwhelming number of cottage sized enterprises with less than 20 workers (83.4 percent of tableware and kitchenware manufacturers and 88.7 percent of novelty manufacturers). (Table IV-3-15)

In 1989, these business places produced 412,300 tons of tableware and kitchenware and 53,700 tons of novelties. The amount of production, however, has been falling with each year in both items due to the loss of competitiveness caused by soaring personnel expenses and shortages of labor (Table IV-3-16). The number of business places manufacturing tableware and kitchenware fell from the 2323 locations of 1982 to 335 in 1989.

In the main producing countries of the West such as the U.K., West Germany, and the U.S., the factories generally have 150 to 200 workers - a significant difference from the small sized factories of Japan. The biggest reason for this is believed to be that in the West everything from the refining of the raw materials to the painting is handled vertically in-house, while in Japan there is a division of labor for each of the work processes. That is, there is considerable specialization in work, with there being clay and glaze manufacturers, base manufacturers, decorators, manufacturers of saggors and other ceramic tools, manufacturers of plaster molds, etc.

2) Demand

A look at the value of shipments shows that there is high export reliance in Japan both in tableware and kitchenware and novelties. However, in 1985 to 1986, due to the impact of the yen appreciation, the share of exports plummeted. In the years 1982 to 1985, over half of the tableware and kitchenware produced was exported, but in 1989 exports had fallen to just over 35 percent. The share of exports of novelties also fell from around 90 percent to 43 percent in that period. During the same period, imports gradually rose and the apparent domestic consumption increased in both items. (Table IV-3-16)

In the Japanese tableware and kitchenware market, household demand and gift demand account for large market shares. In addition, there is institutional demand such as for hotels and restaurants. As a recent trend, all families have experienced an improvement in their standards of living and are now equipped with almost everything they need, so interest is rising in tableware less as necessities than as means for enjoying their lifestyles. Therefore, the demand for higher class goods has been growing relatively.

On the other hand, there was a large growth in apparent domestic demand for novelties starting 1989, but this has a lot to do with the decline in exports due to the yen appreciation. Recently, however, demand has been growing due to the diversification of consumption accompanying the improvement of the standard of living.

3) Imports

The main countries of origin of tableware and kitchenware imported by Japan are the U.K., West Germany, Denmark, and other European countries. Japan only imported about 130 million yen worth of tableware and kitchenware from Thailand, a mere 1 to 2 percent of its imports. (Table IV-3-17).

As to the countries of origin of novelties, Italy and South Korea stand fairly shoulder to shoulder in the lead, followed by Taiwan and China. Thailand has increased its share tremendously in the past three years and in 1989 accounted for 2.7 percent of the imports.

Table IV-3-15. Distribution of Ceramic Companies of Japan by Number of Employees (Companies with Four or More Employees)

	Tableware and Kitchenware		Novelties	
	No. of business Establishments	Share (%)	No. of business Establishments	Share (%)
4 - 9	1,310	65.9	385	72.8
10 - 19	347	17.5	84	15.9
20 - 29	144	7.2	30	5.7
30 - 49	70	3.5	15	2.8
50 - 99	69	3.5	14	2.7
100 - 199	32	1.6	1	0.2
200 - 299	6	0.3	-	-
300 - 499	6	0.3	-	-
500 - 999	4	0.2	-	-
Total	1988	100.0	529	100.0

Source: MITI, I/O Tables, Industries (April, 1989)

Table IV-3-16. Trends in Supply and Demand of Ceramics in Japan (Unit: Billion yen)

	Production (1,000Ton)	Shipment value	Import	Export	Apparent ⁽¹⁾ domestic consumption
Tableware					
1982	478.7	168.2	4.8	86.1	86.9
1983	480.6	174.2	4.3	94.5	84.0
1984	489.6	180.5	4.6	100.9	84.2
1985	469.2	173.4	5.1	94.8	83.7
1986	423.8	162.6	5.4	71.5	96.5
1987	405.5	158.6	6.2	61.6	103.2
1988	414.6	164.0	8.4	54.5	117.9
1989	412.3	173.6	12.7	61.4	124.9
Novelties					
1982	68.4	34.2	2.8	31.3	5.7
1983	72.1	36.0	4.0	31.4	8.6
1984	70.9	37.2	3.0	36.6	3.6
1985	60.6	32.9	3.3	34.0	2.2
1986	55.6	30.1	3.8	26.5	7.4
1987	51.2	27.6	5.3	16.0	16.9
1988	53.5	27.5	6.0	12.0	21.5
1989	53.7	28.3	7.4	12.2	23.5

Note: (1) Domestic consumption = Domestic shipments + Imports - Exports

Source: "Statistics of General Merchandise", MITI
"Monthly trade Statistics", Ministry of Finance

Table IV-3-17. Imports of Ceramics in Japan by Main Countries of Origin
(Unit: million yen)

Country (region)	Year	Tableware (Note)		Novelties	
		Value	Share (%)	Value	Share (%)
South Korea	1987	342.1	5.5	996.9	18.9
	1988	475.5	5.6	1,318.6	30.0
	1989	317.3	2.4	1,199.7	16.1
China	1987	327.6	5.3	435.7	8.3
	1988	337.8	4.0	538.0	9.0
	1989	356.7	2.7	644.4	8.7
Taiwan	1987	104.3	1.7	633.9	12.0
	1988	142.5	1.7	635.4	10.6
	1989	153.9	1.2	736.9	9.9
Denmark	1987	697.1	11.2	219.4	4.1
	1988	897.1	10.6	233.0	3.9
	1989	1,247.3	9.7	356.3	4.8
U.K.	1987	2,461.3	39.6	305.7	5.8
	1988	3,338.1	39.7	390.0	6.5
	1989	5,896.0	45.7	409.0	5.5
France	1987	488.0	7.8	213.9	4.1
	1988	658.3	7.8	223.0	3.9
	1989	984.9	7.6	308.7	4.2
W.Germany	1987	621.2	10.0	300.9	5.7
	1988	849.7	10.1	354.2	5.9
	1989	1,265.6	9.8	449.4	6.0
Italy	1987	444.3	7.1	1,373.2	26.0
	1988	547.6	6.5	1,166.7	19.4
	1989	913.0	7.1	1,621.1	21.8
U.S.A.	1987	125.3	2.0	178.8	3.4
	1988	136.2	1.6	280.0	4.6
	1989	351.1	2.7	262.8	3.5
Thailand	1987	129.2	2.1	36.1	0.7
	1988	135.8	1.6	75.8	1.3
	1989	125.8	1.0	204.4	2.7
Others	1987	474.7	7.6	579.9	11.0
	1988	892.1	10.6	781.3	13.0
	1989	1,272.1	9.9	1,244.8	16.7
Total	1987	6,215.1	100.0	5,274.4	100.0
	1988	8,410.7	100.0	5,996.0	100.0
	1989	12,883.7	100.0	7,437.5	100.0

Note: Includes household goods (cosmetic goods etc.) in addition to tableware and kitchenware
Source: "Monthly Trade Statistics", Ministry of Finance

3.5. Competing Countries

(1) Korea

The structure of exports of ceramic products changed dramatically in the period from 1973 to 1986. Specifically, the share of tiles, which accounted for about 87 percent of exports of ceramics in 1973, plummeted to 11.5 percent by 1986. This was due to the changeover of tile production to an emphasis on domestic demand. As opposed to this, the relatively high added value tableware and kitchenware and novelty sectors grew tremendously in exports during the same period and came to account for 61.6 percent and 25.1 percent of exports of ceramic products in 1986.

The main markets for exports are the U.S., Europe, and Japan. The main export items are, in tableware and kitchenware, coffee sets, plates, and bowls.

A look at the methods of export shows that 90 percent of the exports of tableware and kitchenware is by OEM. In particular, the ratio of OEM exports is high in bone china products and other high class items. OEM exports refer to the case where the manufacturer receives orders from the foreign buyer, makes the products based on the design and other specifications designated by the buyer, and sells the products through the buyer's sales channels.

As opposed to this, most of the exports of novelties are not by OEM. This is because the sales of such products are not as strongly influenced by brand as in the case of tableware and kitchenware.

In general, business is rarely through general trading companies and other intermediaries and is most direct between the manufacturer and the buyer. Further, the size of the transactions is generally small.

As to marketing methods, in South Korea, the technique used is for the manufacturer to invite foreign buyers visiting the country to discuss business or to send directories or catalogs overseas so as to introduce their products. The buyers guides issued by the Korean Trade Promotion Agency (KOTRA) are also actively used in introducing products overseas. Further, manufacturers participate in trade fairs, exhibitions, etc. held in foreign countries and hold business discussions with foreign buyers there.

(2) Taiwan

Exports of ceramic products mainly consisted of novelties up until the early 1980s, with tableware and kitchenware exports only coming to about 20 percent those of novelties. The quality of tableware and kitchenware rose and competitiveness increased, however, resulting in tableware and kitchenware exports coming to 35 percent of novelties in 1988.

In 1989 (estimated), Taiwan exported about NT\$4 billion worth of novelties and over NT\$2.5 billion worth of tableware and kitchenware, with the latter thus corresponding to over 60 percent of the former.

The difference between tableware and kitchenware and novelties is that exports of the former were primarily for the inexpensive product market up until the beginning of the 1980s, but improvements in technology and quality made possible exports of high class products for the general home.

As opposed to this, no progress has been seen toward westernization of novelty designs. Only copies are made of Western products. Further, there is a limited range of designs of Chinese style novelties. As a result, exports are not stable.

The export destinations are primarily the Western countries, in particular the U.S., for both tableware and kitchenware and novelties.

In Taiwan's case, 60 to 70 percent of the exports of tableware is by the OEM method, with the exception of some large corporations. The methods of OEM export are as follows:

a) Manufacturers engage in production based on OEM orders from foreign companies with which they either have a technical tieup or a joint venture relationship and then ship the products directly to the foreign buyers.

b) Manufacturers exhibit in exhibitions and trade fairs held in Taiwan, foreign buyers attending the same or foreign agents in Taiwan attending the same, purchase samples, then the buyers place OEM orders designating designs, sizes, etc. The manufacturers ship directly to the foreign buyers.

c) 70 percent of the exports based on orders from large local trading companies are OEM and 30 percent are under the manufacturers' brands or with the name of the vendor indicated (exporting company etc.)

d) Exports of Chinese style novelties (statues of buddha etc.) are directly shipped to the designated receivers (mostly Chinese traders) with the name of the antique dealer or exporter printed on the packaging together with the name of the Taiwanese manufacturer.

The large manufacturers with overseas offices or special agents produce and export under their own brands.

Table IV-3-18. Exports of Ceramic Products of South Korea
(Unit: US\$1000)

	1973	1978	1981	1983	1985	1986
Tile	11,037 (86.9)	24,338 (39.2)	34,963 (27.5)	16,143 (17.7)	7,685 (9.1)	12,412 (11.5)
Sanitary Porcelain	284 (2.2)	492 (0.8)	670 (0.5)	794 (0.9)	385 (0.5)	0 (0)
Tableware and Kitchenware	449 (3.5)	22,355 (36.0)	59,347 (46.7)	47,448 (52.0)	50,850 (60.4)	66,803 (61.6)
Novelty	170 (1.4)	14,224 (22.9)	29,275 (23.1)	25,073 (27.5)	23,008 (27.3)	27,156 (25.1)
Others	762 (6.0)	718 (1.1)	2,728 (2.2)	1,745 (1.9)	2,241 (2.7)	2,008 (1.8)
Total	12,702 (100.0)	62,127 (100.0)	126,983 (100.0)	91,203 (100.0)	84,169 (100.0)	108,379 (100.0)

Note: Figures in parentheses indicate share (%)

Source: Office of Customs Administration, "Yearly Trade Statistics" for each year

Table IV-3-19. Destination of Exports of Tableware and Kitchenware and Novelties from South Korea

(Unit: US\$1000)

Main export destination	1985	1986	1987	1988	Growth 1988/1987(%)
U.S.A.	48,580	54,140	73,032	74,041	1.4
Japan	2,220	4,541	8,276	12,945	56.4
Canada	3,721	8,580	8,929	8,406	-5.9
W. Germany	2,592	3,348	4,292	8,221	91.3
U.K.	3,453	7,154	10,903	6,962	36.1
Total (including others)	73,859	93,959	127,260	138,083	8.5

Source: KOTRA

Table IV-3-20. Exports of Tableware and Kitchenware and Novelties by Taiwan

(Unit: Volume : tons
Value : million NT\$)

Year	(1)Ceramic tableware & kitchenware		(2)Porcelain tableware & kitchenware		Tableware & kitchenware total (1)+(2)		Ceramic Novelties		Ratio of tableware to novelties (%)
	Volume	Value	Volume	Value	Volume	Value	Volume	Value	
1985	12,260	982	3,362	320	15,621	1,302	32,742	5,771	22.6
1986	17,890	1,538	6,549	674	24,440	2,212	31,074	5,468	40.5
1987	21,088	1,933	6,614	660	27,701	2,593	38,227	7,114	36.5
1988	15,368	1,550	4,889	541	20,257	2,091	28,782	5,933	35.3
1989 (Jan-Aug)	7,328	794	8,291	881	15,619	1,675	11,233	2,551	65.7

Source: Customs

3-6. Problems and Countermeasures

The following problems may be pointed to in exports of Thai products judging from Table IV-3-12:

- | | |
|-----------------------|------------------------------------------------------------------------------------|
| (1) Quality: | Colors and dimensions are not uniform. |
| (2) Designs: | There are many copies and they are old fashioned and there are technical problems. |
| (3) Delivery control: | Poor and slow (inferior to NIEs) |
| (4) Prices: | Competitive, but not as cheap as Chinese products. |
| (5) Sales methods: | Too many intermediaries, inefficient. |

In summary, there are problems in all areas except for prices. In particular, U.S. businesses strongly criticized the delivery control.

These problems seemingly were problems faced by the majority of the factories visited in the present survey and cannot be resolved overnight.

With the exception of a few large enterprises and the foreign capital affiliated companies, the majority of the factories did not have any specialized technicians or designers. Further, there were only specialists in charge of sales, including exports, in exceptional cases.

To promote exports, these problems have to be resolved. For the time being, it is important for the ISD, NIPC, or industrial organizations to cooperate and sponsor seminars, bring over foreign technicians, etc. so as to disseminate knowledge and information and raise the awareness of the owners. In the medium and long term, it will be necessary to augment the technical capabilities and guidance abilities of the Ceramic Center for Lampang, where there are many problems with quality, and to develop human resources in coordination with industrial organizations.

Note: Information on key markets and the current state of competition from other countries contained in this chapter is based on the Survey of the Market and Survey of Competing Countries by JICA.

Chapter 4. Production Activities and Technology

In the current survey, we visited 44 ceramic manufacturers in Lampang, Chiang Mai, and Bangkok and its environs. There were special characteristics to each region and neither the main materials or products were the same. Further, there were unique features in each region in the production facilities, product development, and corporate standings as well.

Classification of Ceramic Manufacturers Visited

Region	Number of employees		
	200 or more	51 to 99	50 or less
Lampang	3	10	2
Chiang Mai	-	7	4
Bangkok and environs	3	6	9

(1) Lampang

There were approximately 60-70 manufacturers, of which we visited 15. The manufacturers used as main materials the white sticky materials available in the areas surrounding the region and produced white porcelain like novelties and tableware.

(2) Chiang Mai

There were approximately 15 manufacturers, of which we visited eleven. The manufacturers used as main materials the black plastic clay produced in Mae Rim, an area near the county, and produced so-called traditional Thai celadon tableware and vases.

(3) Bangkok and environs

We visited 18 manufacturers. Each manufacturer was different. There were some joint ventures too. Some of the manufacturers used imported raw materials. The products were of a wide range from high class items to low class ones.

4-1. Product Development

(1) Current State

Product development must be considered from two angles: One is the development of new products differing from old ones in the properties of the materials used and production factors. The other is design development of color, shape, patterns, and the like.

The former new product development starts with basic research and constitutes the development work up until the establishment of the production technology, so a high level of technical ability is required. The latter design development is primarily the province of designers and production engineers and should be performed constantly during the production activities.

In so far as the manufacturers visited in the present survey go, there were no companies seen which had the technical ability enabling them to develop new products with different material properties than old products, products with high degrees of whiteness, and other different qualities like those of bone china. At the present, even the technical capabilities for improving the productivity of products seem to be weak.

Design development is essential for corporate survival. All companies are working at it, but some differences were seen according to region. In Lampang, many manufacturers were seen relying on the designs of the buyers, while in Chiang Mai, a strong trend toward independent design development was felt. In Bangkok, the situation was diverse, with some manufacturers relying on the designs of the buyers and others primarily developing them on their own.

Lampang products are divided into the two major classes of blue and white, and novelty. The blue and white form and pattern follow traditional designs. Further, since most ceramic manufacturers in Lampang operate on a small scale, it can be seen that it is difficult for them to employ specialty designers for the purpose of developing newly designed blue and white products. Although the novelty field is one in which new planning and designs are indispensable, at present one can also see the trend of making products similar to those of other countries and manufacturers.

Chiang Mai products are mostly in the traditional celadon, and in design one can

also see many traditional products. For this reason, it can be understood that there are a few cases in which the designs are supplied by buyers. Although there are many traditional products, some manufacturers can be seen venturing into the development of high quality goods blending the celadon with cobalt pigment (Gosu) as a new venture.

Small scale manufacturers in Bangkok and environs are in almost the same condition as ceramic manufacturers in Lampang, and one gets the feeling of a lack of planning and development ability in design. However, example is seen of a manufacturer who manufactures miniature animals developing all designs in-house.

The two joint ventures with foreign capital manufacturers we visited mainly manufactured products for export, and obtained their designs from the foreign companies with which they had their joint ventures. Their product development and marketing were mostly run by their foreign partners, and the focus of both companies was on manufacturing functions.

The large sized tableware manufacturers developed their own designs. One can see their products in top class hotels and department stores in Bangkok. We believe that these are not inferior to the tablewares mass produced in advanced countries.

Table IV-4-1 Current State of Design Development at the Ceramic Manufacturers Visited

Chiang Mai			Lampang			Bangkok and environs		
Company	Rate of in-house design	In-house designer	Company	Rate of in-house design	In-house designer	Company	Rate of in-house design	In-house designer
C01	100%	None	L01	50%	Yes	B01	80%	None
C03	100%	Yes	L02	80%	None	B02	0%	None
C04	100%	None	L03	0%	None	B03	50%	Yes
C05	50%	None	L04	0%	None	B04	0%	None
C06	100%	None	L06	0%	None	B05	50%	None
C07	100%	None	L07	0%	None	B06	100%	Yes
C08	70%	Yes	L08	80%	None	B07	20%	None
C10	70%	None	L09	0%	None	B08	0%	None
C11	100%	Yes	L10	80%	None	B09	0%	None
			L11	80%	None	B10	50%	Yes
			L12	50%	None	B11	50%	Yes
			L13	80%	None	B12	20%	None
			L14	50%	None	B13	0%	None
			L15	80%	None	B14	100%	None
						B15	50%	None
						B16	100%	Yes
						B17	100%	Yes
						B18	100%	Yes

Note: Two companies, B02 and B04, are joint ventures with foreign capital.
Three companies, B16, B17 and B18 are large sized tableware manufacturers.

(2) Considerations

In the future, to achieve further growth as an export industry, stress should be laid on both strengthening the development capabilities for the quality and designs sought by the market and the development of new products with different characteristics of those currently in production.

The majority of the manufacturers visited, it was observed, did not have any designers. Strengthening of the design development capabilities requires training of designers. Strength in knowledge and know-how relating to industrial design, such as improvements of forms to raise productivity, and patterns which are suitable for production, are necessary in order to foster designers, and not just planning ability in independent designs. Further, although many specifications and designs are supplied by buyers when producing for export, in order to expand exports one must have the capacity to understand these specifications and designs, and to improve ones ability to conduct trial manufacturing.

Finally, the gathering of foreign information, and research and surveys of overseas markets must be carried out on a greater scale than at present together with fostering designers, for the purpose of strengthening design development capacity. The function of acquiring overseas information preferably should be given to the Ceramic Center now under planning. The inspections and surveys of overseas markets would probably have to be done in cooperation with the DEP, ISD, DIP, and other government organizations.

There is little possibility of the companies engaging in new product development on their own. Therefore, a system will have to be set up wherein the NIPC and the Ceramic Center do the basic research and then work with the companies for research into the production technology for commercialization of the same.

4-2. Procurement and Preparation of Raw Materials

Most of the materials used for ceramics are natural mineral resources. Natural clay and ore always include various accompanying minerals and impurities. Therefore, it is desirable to remove these to enhance the purity and improve the product quality.

Ceramic materials may be divided into the materials of the body and the glaze. The materials of the body are prepared by mixing the carefully graded materials such as plastic materials (kaolin, clay, pottery stone, etc.) and nonplastic materials (feldspar, silica, lime, talc, etc.) in predetermined rations and pulverizing the same. The glazes are prepared by mixing and pulverizing materials so as to melt and form a beautiful appearance at a predetermined firing temperature.

The kaolin, clay, and pottery stone plastic materials differ according to their production regions and have their own unique characteristics. The accompanying minerals and impurities also differ. Therefore, different methods of refinement are required. In general, pretreatment such as rinsing and washing.

The feldspar, silica, lime, and other nonplastic materials are generally processed by roughly crushing the original stone, crushing it to an intermediate level, then removing the impurities with the naked eye.

The ability to procure stable, good quality materials is the first most necessary task of ceramic manufacturers.

(1) Lampang

The majority of the manufacturers in Lampang have stone washing facilities on their own factory grounds. These manufacturers mix about 10 to 20 percent of black clay in the washed materials to make the body. The black clay used by the factories differs in origin. In some cases, use is made of clay from Chiang Mai, Lampang, or Southern Thailand.

The method of washing in the Lampang manufacturers is in general as follows:

- [1] The stone material is crushed by the wet method.
- [2] It is made into a slurry state by an agitator.
- [3] The result is placed in a settling tank and allowed to stand to separate out the rough silica component.
- [4] The supernatant mixture of the clay and fine silica is transferred to a tank.
- [5] Black clay slip is added to this to make the clay slip.
- [6] Water is removed by a filter press to make the body.

The quality of Lampang stone is not uniform. It is not clear how it fluctuates. Therefore, it may be said that the quality of the materials after the washing process is not stable at the present. Further, there is no grasp of the state of its changes.

The manufacturers each prepare their own glazes. The general method they use for this is to mix and crush the materials by the wet method with a crusher or a ball mill. Screening is performed using a sieve, but iron is not removed by a ferrofilter.

(2) Current State in Chiang Mai

Most Chiang Mai manufacturers produce traditional Thai celadon. The materials are prepared using traditional methods. The main material used is the black clay produced in the Mae Rim county in the suburbs of Chiang Mai. The material includes pieces of wood and other foreign matter, so these are removed by the dry or wet method to make the body. In one factory, the black clay was used as is. Also, some manufacturers were seen mixing in about 10-20 percent of refined materials produced in Lampang.

The glaze is prepared by traditional methods like the body. The main materials are wood ash and surface clay from the rice fields. In one method, the wood ash is washed and repeated allowed to settle to remove the water soluble components and mixed and crushed with surface clay.

(3) Bangkok and Environs

1) Large Sized Tableware Manufacturers

Body and glazes were being prepared by the individual factories themselves. The kinds of materials used fall under the category of factory secrets, and details could not be obtained. Some of the materials are imported.

2) Joint Ventures with Foreign Capital

The two manufacturers with were joint ventures with foreign capital were importing all of their prepared materials. The local factory did not have any facilities for their preparation. At present the domestically produced raw materials are not sufficient from the standpoints of color or consistent quality. For this reason these manufacturers have relied on imports of raw materials from Taiwan and Japan.

3) Small and Medium Sized Manufacturers

Most factories were purchasing body prepared by Compound Clay Co. of Bangkok. Several factories were observed to be purchasing materials and preparing them on their own and others were observed to be using materials imported from abroad.

Further, among several companies of the manufacturers using purchased body pointed out product deformations due to the refractriness charges of the body, as well as air bubble and black spots on product surfaces, as a defect in the purchased body.

(4) Considerations

1) Lampang

The manufacturers rely on Lampang stone for much of their materials, but do not check the quality of the Lampang stone and further do not exercise technical control over the washing in the factories. Therefore, the quality of the body fluctuates, causing various problems in production, it is believed. First, it is considered necessary to establish a method of checking the quality of the materials and body and achieving stable quality. Some public organization, for example, the NIPC or the Ceramic Center, should take the lead in tackling this problem.

2) Chiang Mai

Body and glaze are manufactured here by traditional experience. In the future, to stabilize the quality and increase production, it will be necessary to introduce scientific measurement technology and modern facilities. The NIPC and the Ceramic Center should be active in this area too.

3) Bangkok and its Environs

Almost all small and medium sized manufacturers relay on Compound Clay Co. for their body and glazes, so stabilization of its quality is essential. Cooperation and assistance from public organizations would probably be necessary for this.

IV-4-2. Method of Procurement of Raw Materials of Small and Medium Sized Manufacturers Visited

Chiang Mai			Lampang			Bangkok and environs		
Company	Body	Glaze	Company	Body	Glaze	Company	Body	Glaze
C01	In-house	In-house	L01	In-house	In-house	B01	Purchase	Purchase
C03	In-house	In-house	L02	In-house/ Purchase	In-house	B02	Purchase (Import)	Purchase (Import)
C04	In-house	In-house	L03	In-house	In-house	B03	Purchase	Purchase
C05	In-house	In-house	L04	In-house/ Purchase	In-house	B04	Purchase (Import)	Purchase (Import)
C06	In-house	In-house	L05	In-house	In-house	B05	In-house/ Purchase	Purchase
C07	In-house	In-house	L06	In-house	In-house	B06	In-house	In-house
C08	In-house	In-house	L07	In-house	In-house	B07	Purchase	In-house
C10	In-house	In-house	L08	In-house	In-house	B08	Purchase	Purchase
C11	In-house	In-house	L09	In-house	In-house	B09	Purchase	Purchase
			L10	In-house	In-house	B10	Purchase	Purchase
			L11	In-house	In-house	B11	Purchase	Purchase
			L12	In-house	In-house	B12	Purchase	Purchase
			L13	In-house	In-house	B13	Purchase	Purchase
			L14	In-house	In-house	B14	In-house/ Purchase	Purchase
			L15	In-house	In-house	B15	In-house	In-house

Note: Two companies, B02 and B04, are joint ventures with foreign capital.

Table IV-4-3. Procurement of Materials by Manufacturers Visited and State of Procurement

	Lampang	Chiang Mai	Bangkok and environs		
			Large size tableware makers	Foreign capital affiliated	Small and medium sized makers
Clay					
Main ingredients	About 80~90% is Lampang stone, and small amount of black clay	About 80~90% is Mae Rim, black clay, and small amount of Lampang clay	Details unknown	Imports (Clay)	Clay mostly purchased. Some made by own factory.
Preparation	Washing in own factory (to remove silica component)	Used as is or treated to remove pieces of wood	By own factory	—	Prepared clay purchased. Some made by own factory
Glaze					
Main ingredients	Lime glaze (limestone, feldspar, clay, silica)	Wood ash glaze	Details unknown	Imports (glaze)	Lime glaze (limestone, feldspar, clay, silica)
Preparation	By own factory	By own factory	By own factory	—	Majority purchased, some made by own factory

4-3. Molding

There are two methods of molding ceramics: by jiggers and by casting. The molding method is determined by the shape of the product. That is, round dishes, braziers, and the like which are round in shape are molded using jiggers, while oval dishes, vases, teapots, creamers, and the like with complicated shapes are molded by casting.

In both methods, gypsum molds are used as tools. The precision and quality of the molds have a large effect on the quality of the final product. Therefore, the fabrication of the gypsum molds is also an important process. Most of the products of the small and medium sized manufacturers in Lampang, Chiang Mai, and the Bangkok environs are novelties and casting is the main method of molding used. Some factories use hand jiggers to produce rice bowls and plates.

(1) Molding by Casting

1) Quality of Slip

The slip is prepared by adding water and a deflocculant to the body and mixing with a ball mill or agitator. There are not any particular problems in terms of facilities. Stable production requires control of the properties of the slip, i.e., the viscosity, water content, and the amount of the deflocculant, but at the present time almost no interest is shown in this. At the majority of manufacturers visited, we did not see any equipment used to measure the viscosity, water content, or amount of the deflocculant. As slip is measured by eye, the viscosity, water content or amount of the deflocculant are all inconsistent, and defects after firing easily appear such as discoloration, deformation and pin holes, this is related to the decline in product quality and productivity.

As among manufacturers who mainly work molding by casting, slip which includes deflocculant is repeatedly used, the amount of deflocculant increases gradually, and there are many defects such as deformations due to the decrease of refractriness. We saw several cases of this even among the manufacturers we visited.

Further, as the standardization of operations for removing air holes from the slip has not advanced, pinholes often arise. Among porcelain manufacturers in the developed world, vacuum agitators are commonly used to remove air bubbles from slip. However,

among the small and medium sized manufacturers visited on this occasion, we did not see any such equipment installed.

2) Quality of Gypsum Molds

The quality of the cast production is considerably influenced by the quality of the gypsum molds. That is, gypsum molds are used repeatedly, so the molds, which are not that hard, gradually become worn and change in shape. Therefore, the number of repetitions of use should be limited, but almost all manufacturers use them molds until they break. A case was seen of a Bangkok manufacturer with extremely good quality products which discarded molds after using them 40 to 50 times, but the majority of factories use the molds an estimated 150 to 200 times. As gypsum molds are used beyond its limit for number of times used, we saw factors connected with defects such as the appearance of seams along the joints of the molds, partial discoloration at the time of firing from the attachment of solute silicate, and a low product standard lacking in sharpness.

Further no steps were being taken to make the gypsum molds more rigid, with the exception of several factories. Normally, in order to consistently improve the hardness of the gypsum molds, steps are taken to measure the amount of water and plaster, to increase the level of plaster in relation to that of water through the use of a vacuum agitators and to control the plaster quality. However, of the medium and small sized manufacturers whom we visited, none of them seemed very concerned about the mold rigidity.

Finally, of the 39 small and medium sized manufacturers we visited, only two could be seen to have introduced vacuum agitators.

(2) Molding by Jiggers

Factories producing mainly novelties used primitive manual jiggers. One exception was a factory mass producing tableware and kitchenware, which used automatic jiggering machines. Another manufacturer was planning to produce large planters using mechanized jiggering machines developed on its own.

The kneading process is any important part of the molding work, but this is currently neglected and the molding is performed with insufficient kneading. Ceramic manufacturers in developed countries commonly use vacuum extruders to remove air

bubbles before perform the molding. However, of the small and medium sized manufacturers we visited, with the exception of a few companies, none of them used vacuum extruders. Further, even when air bubbles were removed manually, operating procedures were not given much consideration. Causes of fissures at the time of drying and pinholes after the firing were created by this situation.

(3) Drying

The drying after the molding is primarily natural drying, making it difficult to deal with changes in seasons.

As a method for improvement, one might suggest establishing a drying room or compartment space into which hot air is blown. This would not be expensive and would be easy to introduce.

Further, there are many cases of fissures, which arise at the time of drying, occurring in the initial stages of drying. For this reason, it is necessary to pay particularly close attention to controlling the temperature and humidity at this stage.

(4) Considerations

To raise the quality of the products, it is necessary to use proper molds in the molding process. At the present time, many of the factories seem to consider that gypsum molds should be used until they break. First of all, this way of thinking must be changed. Further, training will be required in the fabrication of molds.

Extremely elementary methods are used for production in both the case of use of jiggers and casting and many small defects appear in the products. Work training and guidance are required to reduce these small defects in products for export. In particular, knowledge, procedure and machine necessary for stability of quality at each process of kneading, regulating the slip and making the gypsum molds seem to be necessary for the ceramic manufacturers who wish to carry out export.

4-4. Decoration

The decoration of ceramics, that is, the painting, is performed by various methods, as follows:

1. Over-glaze decoration wherein the fired glaze is decorated with pigments then fired again
2. Under-glaze decoration wherein the decoration is applied under the glaze, that is, before the application of the glaze
3. Decoration using colored glazes and colored earth

There are various decoration techniques as well: hand painting, transfers, spray, stamps, direct printing, etc.

High class ceramic products in the international market feature good quality body materials themselves and also clever, careful decoration. High class items are recognized as artistic works.

(1) Current State

Almost all the novelties in Lampang are produced with under-glaze decoration. Further, some use color glazes. Among these, blue and white decoration is prevalent.

The Thai Celadon of Chiang Mai falls under the category of color glazed products, but this is natural color formation using wood ash and no pigments.

The factories in Bangkok and its environs carry out under-glaze decoration, color glaze decoration and over-glaze decoration. Special items are decorated with lacquer paint.

(2) Considerations

Many of the products of the small and medium sized manufactures are hand drawn. Especially, most of the novelties, such as miniatures and pottery dolls, are hand drawn. In many places, over half the employees are engaged in decoration work.

The decoration can have a major effect on productivity depending on the design. That is, an awareness of industrial design is important so as to determine how designs should be made from the standpoint of production costs.

When such items as hand painted under-glaze decoration are done over the entire surface of the product, a great amount of labor power is necessary, and from the standpoint of the trend towards a skilled labor shortage, it is very important to examine the technology of using transfer paper with hand paintings or other technologies. Further, a movement towards division of labor which would follow the work flow for under-glaze decoration, which takes much labor, would be advantageous to improving productivity. A small and medium size manufacturer in Bangkok divided decoration process into rough drawing by pencils and painting by pigment to make work simple. This is an example of improvement in the productivity of the decoration process.

Among the manufacturers we visited, we saw that some used the piece rate method for payment of wages for decoration worker, and some used a fixed rate method. Some manufacturer had changed to a fixed rate, as a piece rate encourages a reduction in quality, and they can maintain quality. In order to increase quality while maintaining production under the piece rate, normally it is necessary to increase the number of quality control personnel. However, many small and medium size manufacturers in Thailand have found it difficult to increase the number of control personnel. For this reason it is very important to investigate the method of a fixed rate as a basis in order to improve and maintain product quality.

To raise the technical level of the decoration process and improve the quality and quantity of the decoration work, training is required. Preferably the ceramic Center would provide assistance in this regard.

Table IV-4-4. Method of Decoration at the Manufacturers Visited

Chiang Mai			Lampang			Bangkok and environs					
Company	Over-glaze	Under-glaze	Colored	Company	Over-glaze	Under-glaze	Colored	Company	Over-glaze	Under-glaze	Colored
C01		○	○	L01		○		B01		○	○
C03	○	○	○	L02		○	○	B02	○	○	
C04		○	○	L03		○	○	B03		○	
C05		○	○	L04		○	○	B04	○		
C06		○	○	L05	○	○	○	B05	○	○	○
C07			○	L06		○	○	B06		○	
C08		○	○	L07		○		B07	○	○	
C10		○	○	L08		○	○	B08		○	
C11			○	L09		○	○	B09		○	
				L10		○	○	B10		○	
				L11		○	○	B11		○	○
				L12		○	○	B12		○	
				L13		○	○	B13		○	○
				L14		○	○	B14		○	○
				L15		○	○	B15		○	○
								B16	○		
								B17	○		
								B18	○		

Note: Two companies, B02 and B04, are joint ventures with foreign capital.
 Three companies, B16, B17 and B18 are large-size tableware manufacturers.

4-5. Firing

The baking of refractory products at high temperatures is called "firing". This process causes the materials to sinter and the component ingredients to react with each other to produce a desired property. Firing is an important process along with the preparation of the compound materials and the molding.

The type of kiln facilities, fuel, the selection of the quality, and the technical control of the burning process enable good products to be efficiently obtained. It is desired that there be improvements made in the firing facilities and the heat efficiency be raised from the viewpoints of the environment and energy saving as well.

(1) Current State of Firing Facilities

In the process of development of the ceramic industry, which goes back far in history, firing facilities have progressed from simple kilns to dragon kilns and on to tunnel kilns and shuttle kilns. The source of fuel has also changed from firewood to coal, oil, electricity, and LPG.

The optimum firing facility depends on the product produced. A tunnel kiln is most suited for mass production of tableware and kitchenware, while in general shuttle kilns are built for novelties. Further, it is necessary to use electric furnaces for production of dolomiteware.

Chiang Mai has a long history of ceramic production and primarily makes traditional celadon products. The firing facilities are also old fashioned, i.e., simple kilns using firewood are still in operation. Modernization is underway, though gradual, and several factories have installed shuttle kilns with superior heat efficiencies incorporating modern foreign technology. Extremely good results are being obtained. In the future, improvements will probably continue to be made.

The novelty producing factories visited in Lampang had an average of three to four shuttle kilns in operation. One factory was seen which had 10 such facilities. Modern, imported kilns have still not yet been introduced, however, i.e., all are made in-house, and there is considerable room for improvement.

(2) Considerations

The kiln facilities of Thai ceramic manufacturers are mostly shuttle types. The situation is as follows:

- Most of the shuttle kilns have a volume of 2 to 3 cubic meters, though an exceptional kiln of 8 cubic meters was also seen.
- In so far as the manufacturers visited went, Lampang had the most number of kilns per factory.
- Lampang has not yet introduced any imported kilns.
- Chiang Mai and Bangkok are expected to increase their usage of imported kilns in the future.

Further, other firing facilities were also observed. The situation with them was as follows:

- Dragon kilns were found mainly in Lampang.
- Simple round kilns were found in Chiang Mai.
- Electric furnaces were mostly for dolomite ware.
- Tunnel kilns are unsuited for the celadon of Chiang Mai and were not installed.
- All the tunnel kilns were imports.

Thirty one of the forty four manufacturers we visited on this occasion used in-house shuttle kilns. Among these kilns the following problems could be seen:

1. Inefficient heat insulation due to insufficient use of heat insulating material.
2. The intrusion of cold air into the kiln interior.
3. Uneven internal temperatures caused by kiln construction.
4. *Uneven internal temperatures caused by installing the kiln in an inappropriate place.*

There is a limit as to how much the kilns with these problems can be improved. For this reason, in order to pursue high product quality and high product yields, kilns with these problems should ideally be replaced by kilns with high efficiency. However, in view of the replacement cost involved, the improvement of the kilns used by small and medium sized manufacturers will probably be undertaken on a long term basis.

As a plan for the present, research should be carried out to find the important

points for adjustment concerning number of products fired, placement of products within the kiln, and temperature during firing etc., through trial and error, and covering the problem points through operating techniques. Also, the system which would provide technical support in this regard should be examined.

Table IV-4-5. State of Firing Facilities of Manufacturers visited

Chiang Mai (Medium/Small sized)		Bangkok and environs (Medium/Small sized)	
Company	State of Facility	Company	State of Facility
C01	4 In-house Shuttle Kilns 1 Imported Shuttle Kiln (England)	B01	1 In-house Shuttle Kiln
C03	3 Imported Shuttle Kilns 1 Imported Electric Furnace (Japanese)	B03	1 In-house Shuttle Kiln 1 Electric Furnace
C04	1 In-house Shuttle Kiln 1 Imported Shuttle Kiln (Australia)	B05	4 In-house Shuttle Kilns
C05	2 In-house Shuttle Kilns 1 Imported Shuttle Kiln (Australia)	B06	2 Imported Shuttle Kilns (England)
C06	4 New Simple Kilns	B07	7 Imported Electric Furnaces (England)
C07	3 New Simple Kilns	B08	1 In-house Shuttle Kiln
C08	2 In-house Shuttle Kilns	B09	2 In-house Shuttle Kilns
C10	5 In-house Shuttle Kilns	B10	3 In-house Shuttle Kilns
C11	4 In-house Shuttle Kilns 1 Imported Shuttle Kiln 1 New Simple Kiln	B11	3 In-house Shuttle Kilns 1 Imported Shuttle Kilns (England)
		B12	3 In-house Shuttle Kilns
		B13	2 In-house Shuttle Kilns
		B14	2 In-house Shuttle Kilns
		B15	3 In-house Shuttle Kilns
Lampang (Medium/Small sized)		Bangkok and environs (Joint Venture with Foreign Capital)	
Company	State of Facility	Company	State of Facility
L01	4 In-house Shuttle Kilns	B02	1 Imported Shuttle Kiln 2 Imported Electric Furnaces (Taiwanese)
L02	3 In-house Shuttle Kilns	B04	2 Imported Shuttle Kilns 2 Imported Tunnel Kilns (Japanese)
L03	3 In-house Shuttle Kilns		
L04	3 In-house Shuttle Kilns	Bangkok and environs (Large Size Tableware Manufacturer)	
L05	3 Imported Tunnel Kilns (Japanese)	Company	State of Facility
L06	4 In-house Shuttle Kilns	B16	9 Imported Tunnel Kilns (Japanese/West Germany)
L07	1 In-house Shuttle Kiln	B17	Imported Tunnel Kiln (West Germany)
L08	2 In-house Shuttle Kilns	B18	Imported Tunnel Kiln (West Germany)
L09	9 In-house Shuttle Kilns		
L10	3 In-house Shuttle Kilns 4 Dragon Kilns		
L11	4 In-house Shuttle Kilns 1 Dragon Kiln		
L12	9 In-house Shuttle Kilns 3 Electric Furnaces		
L13	3 In-house Shuttle Kilns 6 Dragon Kilns		
L14	2 In-house Shuttle Kilns		
L15	2 In-house Shuttle Kilns 6 Dragon Kilns		

Table IV-4-6. State of Firing by Manufacturers Visited

	Bangkok and environs				
	Lampang	Chiang Mai	Large size tableware makers	Foreign capital affiliated	Small & medium sized makers
Kiln	Majority is shuttle kilns. Most places having 3-4 kilns made in-house. In some places, old fashion dragon kilns operating. A manufacturer equipped with tunnel kilns	Majority is shuttle kilns. Mostly made in-house, but in recent years, imported kilns being installed. Old fashion single kilns still remain.	Tunnel kilns of advanced countries	Mostly shuttle or shuttle kilns of advanced countries. Electric furnace used in dolomite-ware factory.	Mostly shuttle kilns made in-house. Some introducing imported kilns. Electric furnace (imported) used for dolomite-ware.
Technical staff	None	None	Some technical staff	Some technical staff	None
Software	Generally, lack of technical knowhow	Somewhat insufficient	No problems	No problems	Generally, lack of technical knowhow

4-6. Problems and Countermeasures

(1) Information Concerning Products for the Export Market

In order to develop the ceramic industry as an export industry, it is necessary to obtain information concerning the products that will be accepted in overseas markets, and to expand the capacity that can design these products. However, most of the small and medium size manufacturers we visited seemed to be lacking in this capacity.

Small and medium size manufacturers, when they gather product information for the export market, seemed to have difficulty in responding by solidifying and developing information sources, in communication and understanding foreign languages, in securing staff, and in bearing the costs etc. In each of the small and medium size manufacturers, we got the feeling that they were not progressing at all in gathering product information.

For this reason, it would be useful at present to establish a function, as a public institution, which would acquire product information concerning the overseas market, and publicize it in a form easily understood by the ceramic manufacturers.

(2) Manufacture of Raw Materials at Lampang Ceramic Manufacturers

The majority of Lampang ceramic manufacturers make their own body. However due to the unstable composition of the stone, the lack of technical control over processing methods, and the insufficiency in equipment, body of consistent quality is not manufactured. This is not a problem when producing and shipping low cost and low quality goods. However, in order to enter the higher quality and higher price product field, stabilizing the quality of the body is indispensable.

For this reason, at least the following are necessary for ceramic manufacturers:

1. Knowledge concerning raw material character and product quality.
2. Introduction of appropriate control methods for processing raw materials.
3. Moving towards routine checks of body quality.

However, a key point for obtaining stable body is for the mining companies to supply the ceramic manufacturing companies with raw materials of consistent quality. There is an immediate need for mining companies to firmly establish their quality control methods.

(3) Quality Control of Slip and Gypsum Molds

Small and medium size manufacturers mainly use casting as their molding method. However, it could be seen that the quality of slip and the gypsum molds extended a deleterious influence over productivity and product quality.

For the slip, there were insufficient checks concerning the amount of water and deflocculant. At least undertaking checks using measuring equipment should be inserted into the manufacturing process. Concerning the gypsum molds, there are still many manufactures with the concept of "use them until they break." It is necessary to revise this concept, and to saturate them with the idea that there is a limit to the number of times gypsum molds can be used.

Finally, introducing vacuum agitators for manufacture of the slips, and for the manufacture of gypsum molds, would be advantageous to the improvement of product quality.

(4) Improving the Efficiency of Decoration Through the Introduction of Industrial Design

Along with the recent increase in Thai ceramic exports has come an increase in hand painted products which are the main export product of small and medium sized manufacturers. For this reason, a trend has appeared which is a shortage of workers skilled in hand painting. There is the possibility that this will prove a bottleneck in the expansion of exports by small and medium sized manufacturers.

For this reason, there is a necessity for steps to carry out greater manufacture of export products with a limited supply of skilled workers. Thus it is necessary to actively introduce industrial design, such as technology to improve productivity by the betterment of decoration design itself, as well as technology involving the joint use of transfer papers and hand paintings.

(5) Inefficiency of In-house Shuttle Kilns

There were many cases of shuttle kilns being the main firing equipment, among the ceramic manufacturers we visited. Further many of the manufacturers had in-house kilns, 31 out of the 44 we visited. However, as inappropriate designs and materials were used, there were many cases of inefficiently heating kilns. In the future, these inefficient kilns should be replaced, but for the present production using these kilns is unavoidable.

For this reason, it is necessary to cover these defects with operation technology of firing, and to strengthen measures to maintain product quality. In this regard, at least the system for the adjustment of the conditions which cause the defects after firing and pursuit of these causes is necessary.

(6) Reinforcement of Technical Support System in Lampang

Through visits to the manufacturers in Chiang Mai, Lampang and Bangkok, we were made aware of the necessity of technical support, particularly for small and medium sized manufacturers in Lampang. In the future, in order to increase their ratio of activities in the export field, as a ceramic manufacturer it is necessary to improve their quality and their yields. At the same time, technical support of ceramic manufacturers is indispensable. For this reason reinforcement of technical support by official organizations in Lampang would be desirable.