Gypsum moulds made of Indonesia plaster of Paris are poor in quality and have a short life. Technology for manufacturing moulds is also of a low level. It is necessary to promote the manufacture and supply of good quality plaster of Paris and gypsum moulds intensively.

Major auxiliary materials to be urgently produced domestically are as follows.

[1] Sagger, Slab and Support

For all these, imports which are made of highly durable spall resistant materials using synthetic mullite and corderite are relied upon. These are all essential auxiliary materials in tableware manufacture. Domestic production of them is highly desired.

[2] Plaster of Paris

The plaster of Paris presently produced domestically is of low quality composed mostly of ß-plaster which is inferior in strength. It is necessary to produce a high quality plaster of Paris mixed with ∂-plaster. Plaster of Paris is used in large quantity in the manufacture of tableware and sanitary ware. Most of the high quality plaster of Paris for the manufacture of these products is imported. Domestic production of higher quality plaster of Paris is desirable.

[3] Transfer paper

For high class ceramic ware, transfer papers with better designs and multicolored (6 - 12 colors) printing to highlight the colorful nature of the product would be desirable.

(2) Exchange of information within the industry and smoother distribution

1) Exchange of information within the industry

As has already been stated, the ceramic industry is an industry very strongly inter-related in all sectors from the raw material sector upstream to the final finishing off and marketing downstream. One of prequisites for development of ceramic industry is that all sectors be adequately controlled and inter-related cooperation should function effectively.

Therefore in order to develop the ceramic industry, it is extremely important to activate the exchange of communication among all the sectors including raw material production, manufacture of auxiliary materials, manufacture of ceramic products and marketing in order to mutually acquire detailed information of the actual situation and needs in each sector.

The exchange of technology and general information within each sector is considered as a very effective measure to up-grade the technological level of each manufacturer.

However, the ceramic industry in Indonesia at present seems to be far from attaining the requisite condition of inter-connection and exchange of information both in vertical relationships from upstream to downstream and horizontal relationships within the each sector.

In particular, the relationship between the two major sectors, the raw material production and the product manufacturing secorts seems to be very weak.

In regard to the exchange of information within each sector, all companies show a low degree of interest and are extremely closed off from one another.

It is true that it is difficult for companies to freely exchange industrial and technological information with each other due to the fact that they are competitors. It can

be said that without the establishment of some kind of system or facilities for the exchange of information, the difficulty will not be overcome easily.

Therefore, the vitalization of the industrial organizations and public institutes such as ASAKI, IRDCRI, the Industrial Mineral Association and MTDC is keenly desired to play a leading role by providing an opportunity for the exchange of information.

For reference, in the case of Japan, ceramic companies exist in the locations where raw materials products, auxiliary materials manufacturers and distributors ,etc are concentrated. This fact enables the daily vertical exchange of opinions among related industries such as raw materials producers, auxiliary material manufacturers and ceramic product manufacturers through daily business transaction, as well as the horizontal and periodic exchange of information via the activities of the industrial association.

In addition, other industry such as machinery and plant makers can be a useful source of information.

Due to the difference of industrial structure between Japan and Indonesia, an information exchange system similar to Japan's would be difficult to be applied to the Indonesian ceramic industry. However, it may serve as a model case for reference.

Following are representative cases of information exchange as seen widely within the Japanese ceramic industry.

[1] Development of new product

Periodic and regional trade fairs are held to provide information on product and design trends through mutual exchange of opinions among the ceramic related manufacturers. New product development for the manufacturers depends greatly on such industrial information exchange.

[2] Manufacturing Technology

Ceramics manufacturers obtain large amounts of technical information on what kind of products are going to be made, how they are to be made, and new types of production methods utilized by the other ceramics manufacturers through the manufacturers of production machines and equipment. Factory visits by one manufacturer to another manufacturer may be arranged by manufacturers of the same, if possible.

[3] Industrial Magazines, etc.

Industrial magazines related to ceramic products and newspapers specializing in ceramic products are often used for information gathering.

[4] Exhibition

In most cases, manufacturers have their own show rooms for their products, where visitors can exchange opinions on useful market trends, etc.

[5] Meeting for the exchange of technical information

Technical committees are regularly held within the Industrial Associations in order to exchange the technical information through a discussion forum.

2) Smoother distribution

In Indonesia, there are many problems found related to the distribution of raw materials and auxiliary materials partly due to the considerable distance between the locations of raw material producers and product manufacturers as well as the under-development of the auxiliary industry for ceramic products. One can also point out the

fact that there are limits for small and medium sized manufacturers in storage capacity of raw materials and auxiliary materials.

Taking this situation into account, one of the most important issues for the fostering of the ceramic industry is said to be the establishment of a smoother distribution system for materials.

Along with the expansion of industrial infrastructure with regard to aspects such as communication, transportation and stockage facilities, the drastic countermeasures of establishing centers for collecting important raw materials and auxiliary materials located somewhere easily accessible for ceramic product manufacturers are expected to be taken to solve the distribution problem.

This concept is for the creation of a complex to serve as a collection and distribution center in order to provide a stable supply of raw materials collected from various sources and various auxiliary materials produced from the same raw materials to the necessary users.

When such a complex is implemented, there will be no longer be the problem of materials storage for small and medium manufacturers. Whenever necessary users would be able to obtain the materials they require.

The collection center could be a stepping stone for strong development of the ceramic industry in Indonesia.

(3) Improvement in the import environment

As is the case with main raw materials, for auxiliary materials and other materials it is desirable that the environment for importing be improved by either abolishing or lowering tariffs imposed on imports up until such time as the related domestic industries have been developed.

(4) Provision of infrastructure

Infrastructures which need to be examined and put in place are those in regard to fuel, electricity, transportation equipment, and water for industrial use.

1) Fuel supply

Although the types of fuels used vary from one region to another, industrial diesel oil, LPG and natural gas are mainly being used. In some places transition is taking place to the use of natural gas, an inexpensive and efficient fuel. It is easy to control gas fuels as they are easy to handle and to regulate. Furthermore, they have no adverse effects on products.

It is necessary to establish a network for the stable supply of natural gas to major regions as early as possible.

2) Electricity supply

The supply of electricity is generally extremely unstable. As a result the majority of companies rely on their own electricity generation. The establishment of a stable electricity supply system is urgently required.

3) Servicing and paving of roads and the securing of transportation facilities

At the present time, a fairly large number of main trunk roads have been built and it is expected that these will have been extended in the coming seven years. However,

access roads which branch off from these trunk roads are inadequate, and it is necessary that they be serviced and paved.

Ceramic plants rely entirely on trucks for bringing in raw materials and for taking out products. Consideration must be paid to the securing and servicing of rolling stock for the deepening of links between producing regions and consumption regions, and collection and delivery functions improved.

4) Water for industrial use

The main plants use underground water. In regions where the quality of the water varies, it is necessary to establish a supply system, using a public organization, for the supply of water which may also be used for drinking.

2-5-3 Improvement of Plant Management

A comprehensive reappraisal of plant management, including improvements of the work environment, is required.

(1) Securing, training and allocation of staff

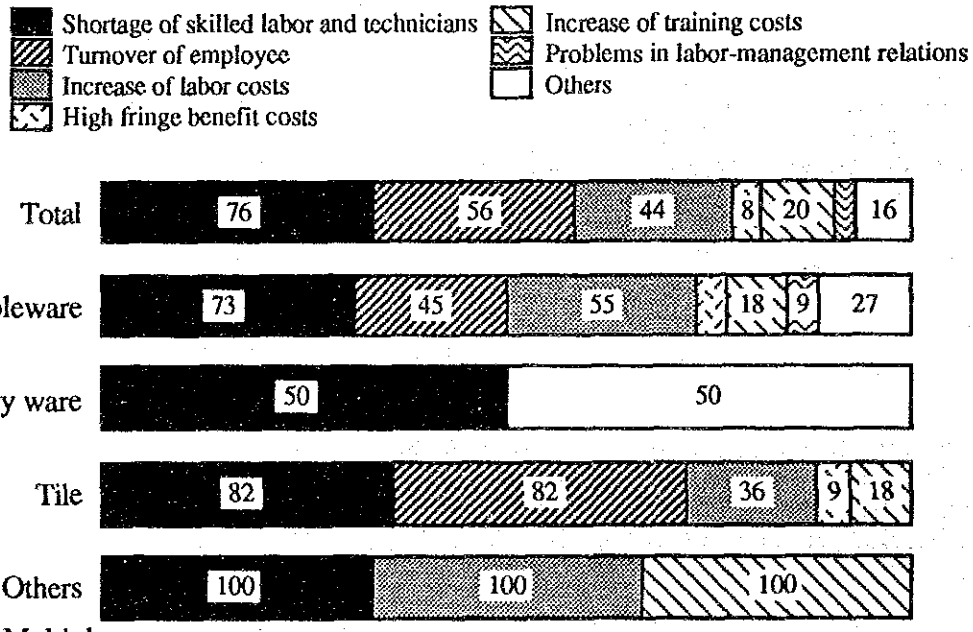
Most companies suffer from a shortage of technicians with skills in the area of technology development and quality control as well as intermediate manager with basic specialized knowledge, therefore, the securing of personnel for this technical and management sector is highly desirable.

In addition, with the exception of the three excellent sanitary ware companies, there is a problem with frequent employee turnover at ceramic product manufacturers.

Due to the many manufacturing processes which require a high degree of experience and skill, frequent turnover may hinder the improvement of product quality.

Improvement of employment conditions and working atmosphere would be necessary.

Fig. 2-5-3: Problems in Labor Management



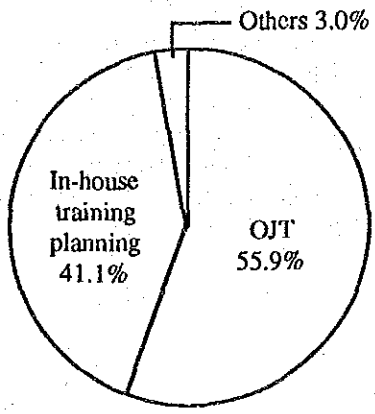
Note: Multiple response
Total number of responding firms which selected each item/Total number of all responding firms
Source: Questionnaire survey under this study

The necessity of staff training is felt by most companies. The three sanitary ware companies dispatch some employees to their overseas group companies for training periods. In some companies the training of mid-level staff is achieved by establishing a training system within the plant and by implementing QC activities. However, at the majority of companies, training is not carried out due to the shortage of training staff and

to a low level of technical know-how with regard to ceramics. On the job training (OJT) is used only for very simple jobs.

It is necessary to set up a training center by way of a government organization for the training of management staff, specialist technicians, and skilled workers.

Fig. 2-5-4: Content of Training at Ceramic Product Manufacturers



Note: Same as Fig. 2-5-3
Source: Same as Fig. 2-5-3

Although in the case of tile and sanitary ware plants the allocation of staff has been relatively rationalized, there is a noticeable excess in work allocation in table ware plants, and idling is seen at the factories. It is necessary to strengthen work management.

The important points to be given priority in the training and allocation of staff are as follows.

[1] Selection of raw materials

This is one of the most important factors in quality control. Before adopting new materials, comparison tests with materials currently in use should be conducted to identify quality differences, dispersion of grade and utilization limit checks based on inspection standards so as to determine whether to adopt it or not.

It might be possible, however, to inspect quality differences from time to time through visual observation only at the delivery stage. Therefore, it is important for raw material inspectors to observe the actual condition and appearance of the delivered raw materials through frequent inspections at the delivery stage.

[2] Preparation of body and glaze

Mastery of the preparation method and control of body and slip with regard to moisture, plasticity or viscosity and particle distribution, etc., are essential to obtaining stable quality of products. It is important to maintain consistent conditions by accurate observation of the mixing ratio, grinding time adjustment, glazing quantity, etc.

If consistent conditions are not maintained, faults in quality of product will not be discovered until the final stage of the manufacturing process, leading to bad quality products.

[3] Forming and Finishing

There are two methods of forming relative to the different product categories, ie. casting and jigger forming. The conditions of forming and finishing are very difficult to grasp in a short period of training and study. Mastery of them takes a rather long time through repetitive on-the-job experience. Accordingly, a long training period is required to master these manufacturing processes.

[4] Decoration

There are many methods of decoration such as hand painting, transfer paper decoration, spray painting, etc. Each method requires the execution of an accurate and consistent copy of the draft design. Decoration techniques also require experience obtained through lengthy training using the correct and exact operational procedures. In particular, mastery of extremely detailed decorations would necessitate careful long-term training under the guidance of capable instructors or skilled decorators forming a team to maintain constant supervision of the trainees.

[5] Inspection

Inspection on quality of products is not so strict in general. The inspection department should prepare boundary samples - representatives of first class, second class and defective products - to provide basic references so as to complete inspection. Periodic comparison to the boundary samples and final inspection of the finished products are important processes which are necessary to avoid the intrusion of bad quality products or defective products.

[6] Gypsum Molds

Gypsum molds are used in the forming stage of tableware, sanitary ware and novelty manufacturing. Mastering the technology of gypsum mold manufacturing from original molds to working molds generally takes a long time. In the case of sanitary ware in particular, it is said to take more than ten years to completely master the technology to make an original mold. Long period is needed for training of technicians specialized in mold making. It should be understood that obtaining stable and constant shapes through control of working molds (utilization of frequency checks, orderly casting, damage inspection, etc.,) is an essential point.

[7] Other general points regarding the manufacturing process, by product

a) Tableware

The most important stages of the manufacturing process of the selection and mixing of raw materials, forming and firing. All of these require mastery of technology and training, especially for firing. Firing in a reduced oxygen atmosphere is extremely difficult to master and necessitates very intensive training of technicians.

b) Tile

Automated manufacturing processes are generally used. Therefore, the maintenance and operation of manufacturing equipment are important topics of training.

c) Sanitary ware

The important stages of the manufacturing process are the adjustment of the casting slip, casting and firing conditions, all of which require that personnel be specially

trained in technical skills. This specialized training is necessary because of the relatively large size of sanitary ware compared to other products.

d) Novelties

The important factors in the manufacturing of these products are design and decoration. For these, constant efforts are required with a view toward new product development through the collection of written materials focusing on novelties from overseas. In the manufacturing process, the achievement of sophisticated decoration techniques of detailed precision and careful finishing is desired.

(2) Modernization of equipment

Most tile plants adopt a positive attitude with regard to investment in plant and equipment, and they adopt full production lines which include automated molding lines and firing. Though there are no areas causing problems in the manufacturing sector, it is desirable that equipment which is able to detect flaws such as pin holes, bending and distortions is adopted in the area of the inspection of finished products. It is recommended that cooperation be sought from equipment manufacturers as a means of solving this problem.

Old molding equipment is noticeable in table ware plants. It is recommended that plants which mass produce single items install automated molding machinery. In the Japanese industry a fully automated molding machine which integrates the molding, drying, and finishing off of cups and plates has been developed and this is conducive to mass production. As for Indonesia where there is an abundance of human resources, the adoption of automated equipment will pose some problems. Nonetheless, as a means of taking steps to strengthen quality control, one issue for the future, is the need to adopt automated molding lines, although such equipment is not suitable for the small lot production of a variety of items so that it is practical to utilize the abundant and cheap labor in such line.

With regard to kilns, virtually all the plants have the old type of kiln which uses large quantities of fuel. Given that energy- saving kilns have been developed and have been in wide use recently, there is a need to gradually adopt this type of new shuttle kiln as a means of conserving energy.

Sanitary ware plants are in the process of rationalizing molding plants which incorporate casting. With the new energy saving shuttle kilns being introduced for small quantity firing, there would seem to be no need to adopt new equipment.

(3) Improving manufacturing skills

Automated tile plants require that the machinery be regulated and maintained. It is therefore necessary to be thoroughly familiar with the handling of equipment. It is necessary to carry out exhaustive testing and maintenance on a daily basis.

As regards table ware, all areas, including properties of body, molding conditions (thickness, edging, other), finishing, attaching handles, the regulation of glazing, regulating of firing atmosphere, decoration, and the manufacture of molds, require a high degree of skills and techniques. Because it is an industry which has a high employee turnover, an environment and conditions conducive to making workers stay should be provided, and the acquisition of skills must be improved through the accumulation of repetitive work.

It is desirable for team leaders or supervisors to be allocated to each area, under whose management guidance and training is provided. This requires an increase in the number of supervisors so that one supervisor may be put in charge of an each section.

In the case of sanitary ware, the acquisition of skills for the casting and molding, mold removal, finishing off, glazing, firing, and mold manufacturing sectors requires a fairly long period of time. Compared to table ware the shapes of items are larger, so that it also requires skill to handle body. It is desirable skills of workers are improved by deciding operational procedures and by the repetition of these procedures. As regards this point the same applies to table ware and novelty items in that it is necessary to acquire and have an understanding of the basic conditions while work is being carried out. It is important that problem areas are raised regularly and that an opportunity to discuss them is created at the work site as part of an effort to raise work awareness.

Each company is strong in its request for the establishment of a public skills training institute. Along with fostering official training instructors, it is necessary to build a training center.

(4) Safety and hygiene management

In the course of visiting plants in this survey there were no areas in which it was felt that there was particular danger. However, it is necessary to formulate measures for the following areas in which care is required:
[1] Installation of a safety shelf in the area surrounding ball mills in body preparing plants;
[2] Measures to prevent dust in the stone materials grinding sector;
[3] Fire prevention measures in case of fuel leaks, especially gas leaks;
[4] Ventilation and appropriate lighting inside plants.

(5) Modernization of management

Companies which are foreign capital joint ventures or which are engaged in technical cooperation with foreign companies are relatively quick to obtain information on trends in new technologies and in new products, and adopt a positive attitude towards this. Good examples of this are to be found in sanitary ware and some of tile plants. Each company is actively engaged in marketing through the networks of their joint venture partners, etc. In addition, they are the quickest of all companies involved in the ceramics industry to reflect the wishes of the customer by changing to new lines of products. However, marketing also cannot be carried out independently. All these areas require assistance from foreign partners.

Marketing by the table ware industry is still inadequate.

On the whole, the situation regarding marketing, prices, product quality, design, production technology, and the effective utilization of operating capital is not satisfactory.

It is desirable that management be strengthened by providing education for managers, and that guidance be given in regard to product design and improving the environment.

(6) Prevention of pollution

Though there are no special problems involving pollution in the ceramics industry, but problems are to be found with regard to the following points:

[1] In cases where fuels which contain a lot of sulphur are used, there is an increase in sodium dioxide in the exhaust gas, and this causes air pollution. This problem can be solved by using LPG or natural gas as a fuel source;

[2] Dirty waste water is generated through washing raw materials in water and in refining the body. This problem is resolved by installing a sedimentation tank and carrying out separation through sedimentation.

2-5-4 Improvement of Quality Control

Quality control is an important means of strengthening the overall position of a company, and today emphasis is being placed on TQC. Nonetheless, TQC is not carried out in most of the ceramic plants in Indonesia. And what is more, QC methods are being undertaken only in some sections.

(1) Management of raw materials and materials

It is not possible to produce good quality products on a continuing basis if the quality of raw materials is unstable. The first condition required to stabilize products is to regulate the raw materials in order to make it uniform. When receiving raw materials and material at plants it is necessary to always conduct tests at the time of delivery. An example of this is provided below.

[1] A good quality sample of raw materials should be kept for carrying out an external inspection by comparing the received raw materials with it, and according to which the materials are evaluated (water content, color, impurities, etc);
[2] A firing of new raw materials should be carried out, and an assessment is made by comparing the results with a good quality sample;
[3] Heat resilience tests should be conducted and assessment made of the degree.
[4] Mixing tests should be conducted, and a comparison and assessment made of viscosity, molding capacity, shrinkage rate, strength, and weight, etc;
[5] A firing test should be conducted by using a test piece, and an assessment should be made on the basis of a comparison with current products;
[6] Chemical analysis should be carried out, and an assessment is made by comparing constituents;
[7] A comparison and assessment should be made of the mineral composition by using an X-ray Analysis.

Though it does depend on equipment, at the very least the processes in [1] through [5] above must be carried out, and an evaluation of the quality of the materials made on the basis of the results.

Raw materials which pass these tests should be clearly divided and stored in different storage areas so that they do not become mixed with other types of raw materials. A label should be attached showing the name of the raw material, shipment date, and grade.

(2) Process management

As a means of maintaining uniform quality and preventing the occurrence of poor quality products it is important to standardize conditions, movements, and procedures for the methods of operations carried out during processes, and to make sure that these are maintained. Of special importance is the mixing of raw materials, used for body and glazing. Should a mistake be made in the mixing ratio it will not be possible to detect it until the finished product has been produced. That is to say, in many cases it is not possible to know if a mistake has been made halfway through the process. Therefore, when mixing it is necessary to carry out the operation with the presence of a supervisor, who is usually the person in charge of testing and research or the chief technician. However, the tasks actually be left to just the person in charge in all plants.

Plants which have set operations procedures for molding and finishing off are the Type A (mentioned in section 2-3-4) companies in the sanitary ware and novelty item industries, and this may be regarded as a sign that these companies are faithfully carrying out process management.

In many table ware plants the management of molds in the casting and molding sector is inadequate. The same applies to plants which make medium to low grade novelty items as their management of molds is extremely bad, and standards for assortment and the number of times they may be used are not adhered to.

Tile plants carry out sampling inspection of filling density, measurement, warping of the green body by checking measurements of strength. With tiles there is a substantial amount of shrinkage due to the fact that clay is the main raw material which is used. Management of this is especially important. The majority of companies carry out checks by taken samples twice a day, once in the morning and once in the afternoon. Type B and C companies do not carry out management by undertaking intermediate testing.

(3) Quality control of products

The top ranking companies for sanitary ware, novelty items, table ware and tiles all check products, and their quality control is relatively extensive. A set of faulty samples and boundary samples is made for checking faults in quality (cracking, uneven color, deformities, warping, magnetic dirt, etc) which can be seen externally. A check and assessment is then made on the basis of these samples. Because there is the danger that faults will appear inside sanitary ware items which have a complex structure, tests such as flash tests are carried out on parts which are not visible on the surface.

Sanitary plants which are tied up with Japanese companies and other foreign companies are constantly working to maintain stable products. They do this by dividing up the tasks within the company group, by, for example, having products tested in Japan at regular intervals.

Type C, D and E companies in all of the ceramic industries simply carry out testing by external appearance only (assessments made by the judgements of employees). As a result, the degree of inspection varies from individual to individual and standards are not consistent.

In the case of many tile plants there are problems with the unevenness of the color of single colored items. Only few plants, however, check their tiles by using a color meter.

For the time being it is necessary to set testing criteria and to see that they are followed consistently. The setting and rigid observance of in-house testing criteria is important.

2-5-5 Strengthening of Technology and Product Development

As can be seen from Table 2-3-18 which classifys companies on the basis of the findings of the visits to individual companies, companies which are affiliated with foreign capital and those which have received technology guidance from overseas have relatively high levels of technology and product development capability. However, other companies generally lag behind in this respect.

(1) Material mixing technology

There are no serious problems to be found in companies which carry out basic tests on each kind of raw material prior to mixing and preparation. It is easy to make mistakes when selecting raw materials and weighing, so that it is necessary to carry out weighing by following standard of mixing under the supervision of expert.

It is possible to grind, mix and control the body by using a ball mill. It is very important to rigidly observe rules governing grinding time and the quantity of water in the process.

When changing over to a new mixed body it is necessary to carry out preliminary mixing tests, and it must be confirmed that the new body is either of the same or of higher quality than the body which is currently in use. When doing this the use of a large amount of new raw materials at one time is to be avoided. It is important that the old material is replaced little by little and that, while looking at the results of this, the new material is added in increasing amounts. In the case of mixing it is necessary that records are kept which show the mixing ratio, time of day, length of time, and the staffs' name.

(2) Design development

None of the designs which are being adopted at the present time for tiles, table ware and novelty items originate from the manufacturers. Instead, most designs have either been brought in from overseas, designated by customers, or have been copied. Therefore, very few products are developed on the basis of original ideas. Creating oriental-style designs based on traditional Indonesian patterns is something that should be undertaken in the future.

It is necessary to come in contact with new types of designs through trade fairs, exhibitions, pamphlets, etc, and together with this the fostering of specialist designers is also important.

(3) Decoration technology

Table ware and novelty items are decorated by various methods such as hand painting, engraving, stamping, and transference. Of these methods, hand painting and engraving require many years of experience.

Hand painting and transference are used for under glaze decoration of table ware. Although these manual methods are used for adding decoration, the adoption of a pat printing machine using a direct printing decoration method is an efficient means of raising productivity.

The paper transference method is the main method used for over glaze decoration. Gilt wire drawing by hand makes it possible to use less time.

Tiles are given single colors or multicolored designs by using a combination of spray color glazing, flow sprinkling, and screen printing. It is important to adequately control the density of color so that unevenness in color does not occur.

With sanitary ware it is most common to use the spraying method for tinting products with a single color. High-ranked sanitary ware factories strictly observe the density control of the color glazing so as to minimize uneven color.

Hand painting and stamping are mainly used for small novelty items. Variable manual methods such as those using engraving, hand painting, and colored clay are adopted for larger items. Because it takes a fairly long period of time to become skilled in these operations, newly employed workers are teamed up with experienced workers so that they are given training and can improve their skills.

Workers must be subjected to intensive repetition of the same job so that they can become experienced.

2-5-6 Coordinating Policy and Establishing Support Systems

(1) Establishment of a policy coordination function

Without the adequate management which is being carried out in all sectors from the raw material sector upstream to the final finishing off downstream, it is impossible to make ceramics high in quality. That is to say, it is necessary to constantly be working on issues related to every area, ranging from the supply of raw materials, the production and supply of auxiliary materials, the provision of infrastructure, plant management, quality control, and technology and product development to carrying out overseas marketing whereby feedback on overseas demands is passed on to the manufacturing sector.

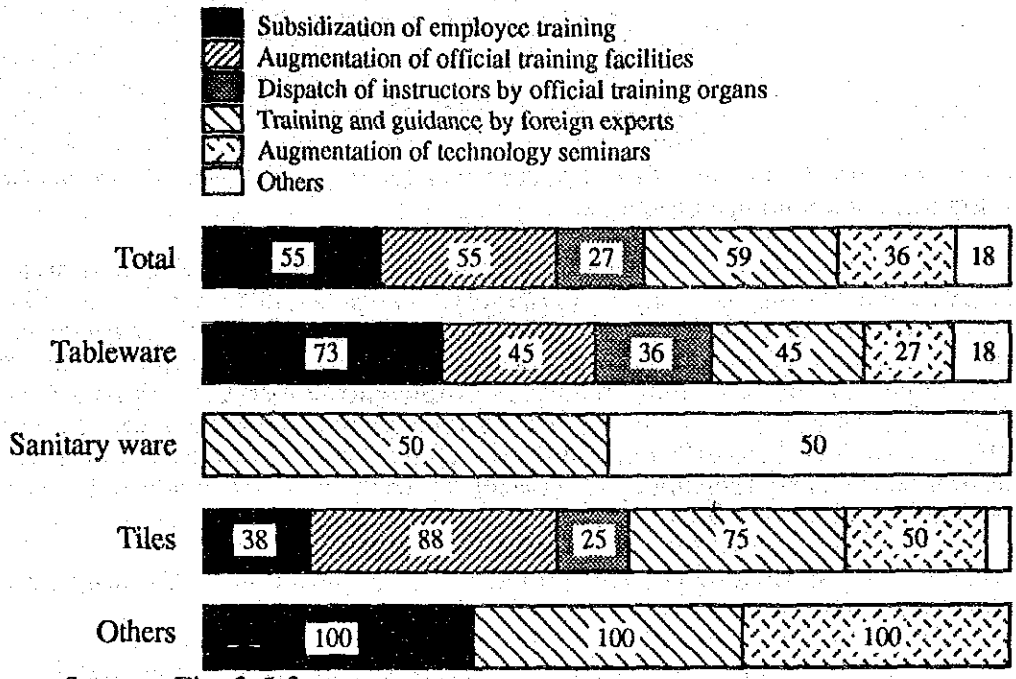
However, the present situation is such that the strength and size of the ceramics industry is too small to be able to overcome the problems facing industry as a whole. Comprehensive policies to organically link various sectors ranging from raw and auxiliary material production to product manufacturing and marketing, while maintaining an overall perspective, are required. Coordination among the industry development measures of the related government ministries and agencies is also hoped for.

(2) Creation of Support Systems

The establishment of a joint public and private sector system which assists the independent efforts of individual companies under coordinated industry development policies is necessary and indispensable. Organizations which should play a central role in this type of support system are, with regard to the raw material sector, the Ministry of Mining and Energy's Mineral Technology Development Centre (MTDC) and the Industrial Mineral Association. For the manufacturing sector this role should be undertaken by the Ministry of Industry's the Institute for Research and Development of Ceramic Industry (IRDCRI) and the Indonesian Ceramic Association (ASAKI). The functions and activities of the IRDCRI and ASAKI are inadequate as they stand at present, and a prerequisite for the establishment of the support system is that these two organizations be made stronger.

Target activities for the support system include the basic functions of public institutes such as: [1] expansion of research and development capability and [2] strengthening of testing and analysis services as well as areas which currently receive insufficient or no attention such as: [3] establishment of personnel development systems, [4] expansion of technological guidance, training and dissemination of information on advanced technologies, [5] completion of industrial standards, [6] introduction of export inspection systems, [7] promotion of industrial development campaigns, [8] strengthening of overseas marketing, and [9] promotion of introduction of foreign capital and technology.

Fig. 2-5-5: Government Measures Which Ceramic Manufacturers Expect



Source: Same as Fig. 2-5-3.
N.B. Do

1) Vitalization of public testing and research and development institutes, strengthening of mutual ties among organizations and with industrial world

a) Strengthening of the functions of the Institute for Research and Development of Ceramic Industry (IRDCRI)

IRDCRI is one of the nine sectoral research and development institutes under the Ministry of Industry. It is the only specialized central institute in the ceramic sector. It has the usual facilities, and as well as carrying out research and development and analyses and tests on the properties of raw materials and products, it provides training to small and medium-sized companies and to staff of Ministry of Industry. It also accepts students from developing countries under the auspices of the Colombo Plan. However, it must be said that the activities which it undertakes are insufficient. Also, it does not enjoy a very favorable rating among private companies. The insufficiency in its activities are attributable to the following:

(1) Shortage of funding;
(2) Shortage of research staff;
(3) Research staff have little awareness of the objectives;
(4) It is used infrequently by companies.

These factors have brought about a vicious cycle whereby the vitalization of the Institute has been hindered. It is hoped for that the IRDCRI break this vicious cycle, and promote its position as assuming the central role in activities for the promotion of industry.

In order to step up and improve the activities of the IRDCRI it is necessary to increase fixed and operational funding in order to expand equipment, personnel, and materials, as well as to have companies use it more actively.

Assistance which the IRDCRI seeks from the central government and foreign countries consists of the following:

(1) Increased budget (routine in budget);
(2) Expansion and renovation of equipment and buildings;
(3) Assistance with staff training;
(4) Provision of know-how for analyzing and testing raw materials, research and development, and training curriculum.

The immediate task of IRDCRI will be strengthening of systems to assist the industry such as testing and analysis services, technological guidance and skill training. It appears necessary to establish a system suitable for the actual situation in Indonesia by examining the current organization and function of the IRDCRI and studying the case of similar organizations in various countries. As reference material for this purpose, the outline of the relevant activities of the Japanese Government Industrial Research Institute, Nagoya is provided below. The institute was established in 1942 under the Agency of Industrial Science and Technology of the Ministry of International Trade and Industry. It is the central institute in the ceramic sector.

[Technological information services provided by the Government Industrial Research Institute, Nagoya]

[1] Technological consultations
The institute provides consultation on various technologies by telephone, letter or meeting.

[2] Technological guidance
It offers guidance on technology on its premises during certain periods and dispatches instructors on request.

[3] Testing and analysis by request
It offers material testing and analysis services and rents testing and research facilities, both for a fee.

[4] Skills training
• It conducts skills training for a certain period every year for technical officials of public testing and research organs in the country.
• It receives skilled trainees from overseas for a certain period through JICA's activities.

[5] Joint research
It conducts joint research with private firms by sharing expenses with them. This is done with a view to commercializing the results of the research.

[6] Research on assignment
It undertakes research on assignment from private firms or other parties with a view to promoting dissemination and commercialization of the results of the studies.

[7] Research facilities
Its research facilities and testing and measurement equipment are open to the public.

It goes without saying that, in addition to direct support for industry, further strengthening of IRDCRI's research and development functions is important. The research and development should focus on two areas: raw materials, manufacturing technology and products in the area of conventional ceramics and fine ceramics as new materials.

However, for the immediate future, emphasis should be placed on the field of the conventional ceramics. As a reference for re-examination of the objectives of research and development by IRDCRI, the outline of activities of the Government Industrial Research Institute, Nagoya is provided below.

[Ceramics-related Departments of Government Industrial Research Institute, Nagoya]

The ceramics-related departments of the Government Industrial Research Institute, Nagoya, are the Ceramic Science Department and the Ceramic Technology Department. The former conducts basic research on fine ceramics and the latter studies raw materials, manufacturing technology for ceramic products and ceramic ware. The research undertaken by the Technology Department would be a good reference for IRDCRI for the time being. Research and development areas covered by the two departments are as follows:

[Ceramic Science Department]

[1] Electronic Ceramics
Material research and device application are being conducted on electrical and magnetic ceramics.

[2] Engineering ceramics
Fundamental research on processing and utilization of engineering ceramics, including both oxide and non-oxide materials, e.g. silicon nitride, silicon carbide and mullite, are being conducted.

[3] Synthesizing technology
Synthesizing techniques for ceramic composites with superior properties such as higher strength at high temperature, durability, low thermal expansion or higher emissivity of infrared rays and synthesizing techniques for oxide materials at ultra-high temperature using solar furnaces or fundamental studies of phase diagrams are performed.

[4] Solid state physical/chemical characterization of bulk, thin film and powder ceramics
The current research topics are; 1) determination of the most appropriate characterization techniques for mechanical properties such as super-plasticity and fracture toughness of bulk ceramics, 2) determination of the most appropriate characterization techniques for the activation of the ceramic powders and fine particles with diameters of nanometers, 3) determination of the most appropriate characterization techniques for optical, thermal and surface electrical properties of ceramic thin films and ultrafine particles.

[Ceramic Technology Department]

[1] Ceramic raw materials
In order to improve the workability of ceramic raw materials, methods for evaluation of the physical and chemical properties of powders have been investigated. Studies on improvement of low- grade clay materials have been carried out by hydrothermal treatment and additions of electrolytes or organic materials to meet the situation of diminution of high-quality clay resources. Recently, new spherical kaolinite has been synthesized and a new project on the preparation of artificial clay for the production of new ceramics on a large scale has been investigated.

[2] Casting technology
Centrifugal casting of ceramic slurries has been studied to develop new molding technology for large size ceramics. In addition, a slip casting method has been tested using resin molds as a substitute for plaster.

[3] Bioceramics and infrared radiant ceramics
Studies on synthesis and sintering of calcium phosphate powder have been carried out to develop an advanced artificial ceramic bone. In addition, infrared radiant ceramics useful for energy conservation have been researched and developed.

[4] Pottery body, glaze, pottery design and decoration
There have been many achievements in the area of colored glazes and structural investigations of colored glazes by means of various spectroscopic

methods such as IR, ESR and X-ray fluorescence have been carried out. Studies on the design of pottery for architectural use, both exterior and interior, and applications of traditional decoration techniques to modern pottery have been done and have been followed by trial production.

b) Strengthening of ties among institutes and ties with industrial world

Up until now research and development organizations such as the IRDCRI and the MIDC have undertaken their activities independently of one another, and links which should have been formed between related organizations are not to be seen. Thus, there were little perspective which seeks the way to develop this industry structurally tieing whole industry together from the upstream sector through to the downstream sector.

However, these organizations are each aware of this demerit, and are strongly interested in the formation of mutual links. As is shown in section 2-4-1-(1)-3) "Links between research and development organizations", the Directorate of Mineral Resources (DMR), the IRDCRI, and the MTDC established a working group in December 1990. The result of joint activities by these related organizations is expected to feed back into industry circles, and to strengthen ties between these institutes and industrial world. It is necessary that these activities start off with the public and private sectors acting as one and that they would be fruitful.

2) Strengthening of activities by industrial associations

As stated in Chapter 2-3-3, ASAKI is the only ceramic manufacturers industrial organization in Indonesia. Established in 1972 as an organ for the promotion of the ceramic industry, it is engaged in activities aimed at the development of the industry and technology. Externally, it takes part in various meetings and trade fairs as a member of the Ceramic Industry Club of ASEAN (CICA). Internally, it holds Indonesian Ceramic Fair and technology seminars. It cannot be said, however, that the organization is as active as it could be.

The following reasons may be given as to why the overall activities of ASAKI tend to be low-key:

[1] Shortage of funding;
[2] Because the whole industry is extremely busy members have little or no time to spend on association activities;
[3] There is little experience and insufficient know-how for carrying out activities as industrial association;
[4] Member companies do not get on very well with each other;
[5] There is a little of recognition of the merits of having exchanges and dividing labor between companies;
[6] ASAKI is deemed by member companies to be simply a social gathering.

However, ASAKI's efforts in relation to its main objectives of promoting technology, strengthening marketing, and providing assistance to rural handicraft industries, etc., would have significant results in assisting companies. It is increasingly important that in the future ASAKI work jointly with the IRDCRI in undertaking practical activities aimed at the development of industry. It is hoped that ASAKI become more active as a body representing the ceramic product manufacturing industry.

The activities of industrial organizations should be aimed at the development of the industry through the promotion of liaison and harmony among members, research and study of the industry as a whole and dissemination of results, formation of the industry opinions, promotion of exports and encouragement of tie-ups with overseas industries. A re-examination of ASAKI's activities and study of the activities of similar organizations

abroad with the aim of working out a new long-term plan suited for the actual situation of the ceramic industry of Indonesia is desirable. As a reference material for this purpose, an outline of industrial organizations in Japan which have a long history and have achieved many results is provided below.

Main bodies among the national ceramics-related industrial organizations in Japan are: the Ceramic Society of Japan, which aims mainly at scientific research; the Japan Pottery Manufacturers' Federation, a union of various industry cooperative societies; and the Japan Ceramic Tile Manufacturers' Association, the Japan Sanitary Ware Industry Association and Federation of Japan Pottery Manufacturers' Cooperative Association, all of which are affiliated with the Japan Pottery Manufacturers' Federation. Cooperative societies are formed in each producing area. In addition, the Japan Pottery Exporters' Association, formed by manufacturers and trading firms, the Japan Pottery Design Center, which aims to protect new designs and prevent unfair practices in relation to design of ceramic ware for export, and the Japan Pottery Inspection Association, aimed at quality inspection of pottery for export, are engaged in maintaining order in export transactions, improving the quality of exports and maintaining the reputation of Japanese ceramic ware.

In the fields of raw and auxiliary materials, there are organizations such as Japan Ceramic Decalcomania Manufacturers Association, Japan Ceramic Pigments Association and the Conference of Japan Sagger Manufacturing Co-operative Associations, all of which belong to the Japan Pottery Manufacturers' Federation.

The organizations maintain close cooperation.

The organizations and activities of the main bodies are as follows:

[1] Ceramic Society of Japan

The society members include individuals, firms and organizations. Established in 1891, it has a 100-year history. It is a scientific organization with the chief aim of research and study of general affairs, science and technology of the ceramic industry.

Main activities:

- Research and study of general affairs, science and technology of the ceramic industry.
- Collection and dissemination of information.
- Holding of meetings for reviewing research reports, lectures and forums.
- Publication of a bulletin and books
- Commendation of persons who have done distinguished work in the fields of industry and science.
- Promotion of standardization
- Exchanges and cooperation with related organizations in Japan and abroad.

[2] Japan Pottery Manufacturers' Federation

Established in 1948, the federation includes 13 national organizations with total membership of 5,760 firms.

With the objective of promoting the ceramic industry as a whole, it is engaged in the following activities:

- Research on the demand-and-supply situation.
- Research on technology and improvement of management.
- Compilation of statistical data and reference materials.
- Supply of information and inquiry services.
- Presentation of views to the government and responding to government inquiries.

[3] Federation of Japan Pottery Manufacturers' Co-operative Associations

Set up in 1949, the federation includes 38 regional cooperative associations across the country.

Aimed at promoting the natural development of the pottery industry, it is engaged in the following activities:

- Joint undertakings on materials and other issues.
- Offering offices for inquiries regarding overseas transactions.
- Research and study on production, distribution, management and technology.
- Liaison and negotiation with the government and related bodies.

[4] Japan Ceramic Tile Manufacturers' Association

Established in 1948, it has a membership of about 200 firms.

It deals with the stimulation and expansion of domestic demand and development of exports through liaison, harmony and friendship among its members, research and study of production and technology and dissemination of the results and the offering of an inquiry service.

Demand is exploited through the drawing up of guidebooks on design and operations such as "Ceramic Tile From Japan" and "Standard Specifications of Tile Work," setting up of telephone service desk "Tile No. 110" for consultations with consumers and participation in international trade fairs overseas.

[5] Japan Sanitary Ware Industrial Association

Established in 1985, it has 11 member firms.

Toward the sound development of the industry, the association is engaged in research and study, guidance, educational undertakings, holding of study meetings and short courses, publication of booklets ("Refreshing Toilets" and others), standardization, enlightenment and information propagation activities and undertakings to cope with the relevant laws and regulations.

[6] Japan Pottery Exporters' Association

Established in 1952, it has approximately 450 member firms.

Putting emphasis on the maintenance of confidence of overseas customers, it has made efforts to maintain order in exports and has been engaged in practical export promotion activities.

For the maintenance of order in exports, it compiled results of discussions on tableware and novelties into a "Code of Ethics Determining Matters the Members Should Observe for the Maintenance of Order in Export Transactions of Pottery" in 1964.

Export promotion undertakings are promoted through exchanges with industries in foreign countries, dispatch of market survey missions and participation in international trade fairs overseas, mainly related to tiles (tableware is exhibited by individual firms independently).

[7] Japan Pottery Design Center

Established in 1956, its membership is currently unspecified.

It makes efforts to improve the design of pottery for export and to promote exports through the protection of new designs and the prevention of unfair practices in relation to design. Its main activities are as follows:

- Registration of design
- Advance examination and certification of design
- Registration and authentication of stamp mark of pottery for export.
- Guidance and assistance in design.

The following matters can be cited as priority tasks for support systems to deal with in the immediate future.

(3) Augmentation of a system for supplying manpower

During the course of the survey there appeared to be no universities in Indonesia which are currently engaged in education related to ceramics. It was learnt as part of the survey carried out in Indonesia that, in relation to the topics about which managers said they are concerned, that they rate the "securing of skilled staff" lower than "employee training". However, this reflects the actual situation whereby given their inability to secure skilled personnel so that each individual company is forced to train its own staff. This should not be taken as a suggestion that companies "do not require new technicians".

There is no doubt at all that all companies also would like to secure skilled staff who are mid-level managers or foremen.

There is a severe shortage of employees who have specialized knowledge of the ceramics industry who are from industrial and technical high schools, and, needless to say, of university students who have specialized in ceramics. The establishment of a technical school specializing in ceramics would be ideal, and another viable option is to establish a ceramics course in an existing industrial technical high school. For the mean time, however, the most practical method is to expand the skills training function of the IRDCRI.

(4) Augmentation of technological guidance, skills training and disseminating information on latest technologies

With the exception of top-ranking firms, including Type A and some Type B enterprises, most firms are lagging behind in factory management, quality control and development of technology and products. Promotion of technology covering all processes from the control of raw and auxiliary materials to finishing may be necessary. Augmentation of technological guidance by public research and development organs emphasizing the TQC method is hoped for. The most desirable form of technological guidance is on-the-spot instruction based on the diagnoses of factories. This is because methods for improving the quality of ceramic products vary significantly in accordance with the raw and auxiliary materials and manufacturing facilities in use. Considering the manufacturers strong desire for "guidance by foreign experts," it may be said that government assistance to realize this is a significant issue.

It was learnt in the course of the recent survey that managers are extremely concerned about "employee training". The education of staff of the mid-level technician and foreman class is particularly important. Foreign affiliated joint ventures or domestic companies in technological tie-ups with foreign companies and which are of an international standard are able, to a certain extent, to carry out skills training and to obtain information on the latest technologies through avenues such as their joint venture investment partners and companies with which they have technical tie-ups. However, for the majority of companies which do not have such means available and which are medium in size or smaller, assistance is necessary by way of a public training system.

If the IRDCRI were to attain expanding its original function, it would be possible for the IRDCRI to be able to take on the role of providing assistance to companies. Also, the "strengthening ties among institutes" would make it possible to use the modern and adequate education and training facilities of the MTDC in relation to ceramic raw materials.

Together with technological guidance and training, dissemination of information on advanced technology is also a major issue. Middle and lower-ranking firms have few opportunities for independent access to information on technology and lack the know-how to use it. More active supply of printed information and the joint organization of technology seminars by public research and development organs and industry organizations are hoped for.

As a reference for the strengthening of the personnel supply and skill training systems outlined above, an example of Aichi Prefectural Ceramics Technology High School as an example of training courses in Japan is provided below. The school is a special school which was set up in 1946 on the basis of the "Law for the Promotion of Occupational Ability Development. It offers, free of charge, basic training for high school graduates, retraining for general applicants and ability improvement training for employed workers.

Table 2-5-7: Example of the Schedule for Education an Technical Training in Japan

[Training subjects and periods]

Subject	Type of training	Fixed number	Training period	Target
First Pottery (Manufacturing) Course	Basic training	30	1 year	High school graduates or higher
Second Pottery (Manufacturing) Course	Retraining	30	1 year	31 years or older
Third Pottery (Manufacturing) Course	Basic training	30	1 year	High school graduates or higher
Pottery Special Study Course (Molding course and design course)	Ability improvement	10	1 year	Graduates from First and Second Course

[Training contents]

Item	First Pottery Course	Second Pottery Course	Third Pottery Course
General subjects	Society, physical education		
Special subjects	Introduction to ceramic science Introduction to production engineering History of arts and crafts Pottery manufacturing methods Materials Pottery design Safety and hygiene		
Basic skills	Basic pottery manufacturing Molding work (potter's hand wheel, hand-shaping, casting and power wheel) Glazing Firing Prototype Molding Glaze compounding Basic drawing Safe and hygienic work		Basic pottery design Basics for drawing of design and molding Basic molding work (hand-shaping and pouring) dyeing of figures on pottery Over glaze decoration, Under glaze decoration, Glazing Firing Color compounding Safe and hygienic work Prototype Transcription (copperplate and screen processes) Glaze compounding

Applied practical skill	Product manufacturing (necessary molding, glazing and firing methods) Product inspection	Art and craft design Product manufacturing (necessary molding, glazing and firing methods)

Special pottery courses

- Molding course
  Persons who have completed the third course and those with equal or higher quqlifications . Mainly training similar to that of the first department mentioned above.
- Design course
  Persons who have completed the first course and those with equal or higher qualifications . Mainly training similar to that of the third department mentioned above.

Lectures on practical subjects are given by instructors (mostly experienced in private industry) of the school and those on other topics by university professors or other qualified outside people upon request.

(5) Completion of industrial standards

In Indonesia there were, originally, independent product standards for products which are under the control of government ministries and agencies, such as the Ministry of Agriculture and the Ministry of Industry, which were established by the respective ministries and agencies. However, in the course of industrial development the products over which the various ministries and agencies have control have changed continuously. As a result, processed products are not necessarily under the control of the Ministry of Industry, some products which are exported are controlled by the Ministry of Trade, and products which are processed agricultural products (raw rubber) are put under the control of the Ministry of Agriculture because they are made from agricultural products, despite the fact that they are processed products. Also, there are more than a few processed products for which more than one ministry or agency has its own product standards. The level of the individual standards and technical levels are low, and they have not been recognized as standards which are acceptable at an international level. As a result, domestic manufacturers, especially those which export, refer to foreign standards such as the JIS, ISO, and the ASTM, for the purpose of manufacture.

In the field of ceramics, standards exist for some tiles but there are no standards for sanitary ware, tableware and novelties at present.

In Indonesia at the present time urgency has been given to solving this confusion concerning product standards, and to creating uniform Indonesian national standards (SNI). The early establishment of an uniform standards as well as introduction of export inspection system mentioned in the following section are desirable for the export promotion of ceramic products.

(6) Introduction of an export inspection system

The introduction of an inspection system for export products as well as the establishment of uniform national standards and a certification system for manufacturing plants is considered to be effective measures of guaranteeing the quality of Indonesian products so as to make it acceptable on overseas markets. As a reference for the introduction of an export inspection system, an outline of Japan's "export inspection system" is provided here.

The export inspection system of Japan related to pottery is administered by the Japan Pottery Inspection Association (JPIA). Set up in 1957 as a public service corporation under civil law, the association is a designated inspection organ under the Export Inspection Law.

[Activities of the Japan Pottery Inspection Association]

[1] Export inspection specified by the Export Inspection Law
JPIA inspects tableware and kitchenware. Products are visually checked against the standards (boundary samples) for shape, decoration and finish, parts and attachments, uniformity of component pieces, size and/or capacity. The inspection is done by inspectors dispatched to factories. The products which have passed all the inspections are labeled as such, and export inspection certificates are issued.

[2] Design checking services
On assignment by the Japan Pottery Design Center, JPIA checks pottery products for export (tableware and novelties) against the design certificates at the time of inspection under the "rules for registration and certification" of design.

[3] Testing and technology services
To cope with the strengthening of safety standards in various countries, JPIA offers testing and other analytical services including various chemical tests, physical tests, utility tests and optical property tests.

Table 2-5-8: Testing & Analytical Services and Main Test Equipment at Japan Pottery Inspection Associtaion

Kinds of tests	Main testing equipment
Physical testing	
Durability (autoclave) test	• Super temp oven
Thermal resistance test	• Autoclave
Water absorption test	• Chemical balance
	• Balance
	• Vacuum desiccator
Utility testing	
Dishwasher resistance	• Electronic oven
Microwave oven to water	• Automatic dishwasher
Microwave oven to table	• Constant low temperature chamber (digital freezer)
Oven to table	• Cooling water bath
Freezer to oven	• Cooling circulator unit
Boiling water test	• Thermo-mate & bath
Direct flame boiling test	• Digital Thermo Tester
Chemical testing	
Determination of leaching lead and cadmium from tableware articles	• Atomic absorption spectrophotometer • Double beam spectrophotometer
Determination of lead and cadmium in paint, coating materials	• Photo-electric optical density meter • Automatic muffle furnace
Lead and cadmium solubility on frits, pigment powder, etc.	• Direct reading balance • Digital Mini PH meter
Determination of calcium phosphate in bone china	• Electric drying oven • Sand bath
Determination of gold & silver in gold decorations	• Hot plate • Water bath
Determination of platinum & palladium in silver decorations	• Mag mixer • Draft chamber
Chemical analysis of ceramic materials	• Draft scrubber
Determination of chloric and sulfuric acid ion in ceramic raw materials	• Heavy metal eliminator • Demineralizer • Distilled water production device
Optical property testing	
Reflectivity measurements	• Color and color different meter
Whiteness measurements	• Translucency meter
Translucency measurements	• Luxmeter
Color difference measurements	
Other testings	
Acid resistance test	• Pendulum type impact tester
Detergent resistance test (up to 2 hrs.)	• Dial caliper
Detergent resistance test (up to 32 hrs.)	• Lighting tester
Surface staining test	• Mullen type bursting strength tester
Wetability test	• Water sensitometer
Water leakage test	• Air conditioner
Impact resistance test	• Air Cleaner
Density measurements	• Firing electric kiln
Porosity measurements	• Drying room
Cardboard bursting test	• Pot mill
Household enamelled ware test	
Analysis for particle size distribution of ceramic powder	
R & D test for ceramic materials	
Other tests	

The inspections and tests stated above are sometimes done on request from government agencies or importers in foreign countries.

(7) Promotion of industrial development campaigns

It has already been stated above that public support systems and their activities are intended for the purpose of improving the level of technology and quality and strengthening the marketing of individual companies by providing them with assistance so that they are able to do these things themselves. It is only natural that the awareness and desires of individual companies will determine whether these support systems are able to function effectively. It is therefore extremely important that the awareness and desires of companies are raised. If the raising of company awareness proves successful it would be fair to say that the objective of the support systems would have been partially achieved.

The task of raising the awareness and desires of individual companies is not that difficult. One finding which was obtained through the field survey was that there are many managers who feel the need to come up with a management strategy which is based on a future outlook. However, there are also many managers who have not been able to find the right method or direction and who have not been able to give enough time to devising a strategy due to the pressure of business. There is a sufficient ground swell of those requiring enlightening activities involving the whole industry.

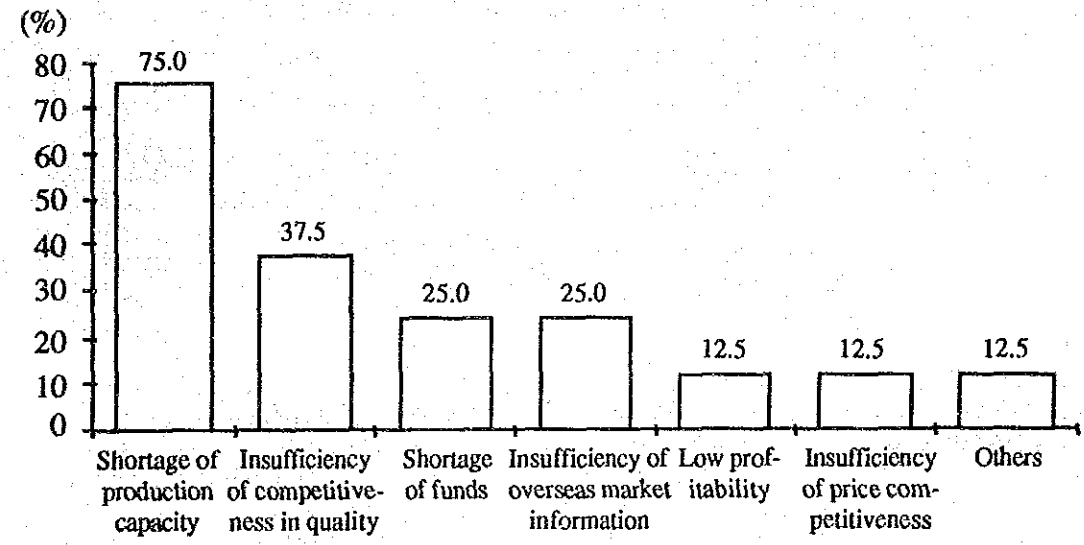
A campaign for carrying out this enlightenment could possibly take the form of holding some sort of festivals, contests, and an award system.

It is the industrial associations which should take on the role of organizing such events. Needless to say, the full cooperation of government organizations such as the Ministry of Industry, Ministry of Trade, and the IRDCRI, etc, is desirable when planning and carrying out such activities.

2-5-7 Strengthening Overseas Marketing

With the exception of joint-venture companies and companies with technical tie-ups with overseas interests, the capability for overseas marketing is weak across the board. That is to say, the majority of companies leave marketing to their traders and agents. What is more, the interest which companies have in exports is also low at the present time. From the questionnaires which were distributed as part of this survey, 27% of all companies put the "strengthening of domestic and overseas marketing" as a matter which concerned them in relation to the management of their businesses. But when it came to the "promotion of exports" and "obtaining information on overseas markets", both of these areas rated just 12%. This response is thought to be due to the extreme pressure of business aimed at the domestic market.

Fig. 2-5-6: Problems with Exports by Ceramic Manufacturers



Source: Same as Fig. 2-5-3.
N.B. Do

However, in several years' time a oversupply is expected to be occur then it will become more important to expand exports, and the strengthening of overseas marketing will become an essential task.

The activities outlined below are activities which are directly linked to strengthening overseas marketing. It is necessary that these activities be undertaken by the entire industry as a while depending on the cooperation of the National Agency for Export Development (NAFED), centering on ASAKI.

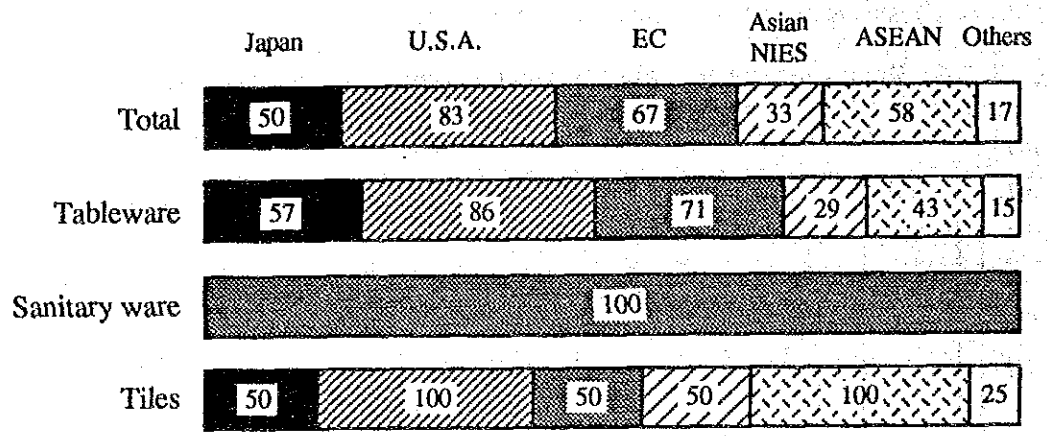
(1) Collection and dissemination of information on overseas markets

In the immediate future the information that is required is that related to overseas buyers, distribution channels, trends in supply and demand and price, shifts in demand, activities related to events such as trade fairs, and overseas standards. The specifications and standards and tastes and fashions related to ceramic products differ considerably depending on the market. For that reason in Japan, there are many manufacturers which specialize in production for their customers, so much so that there are separate manufacturing lines for each market. A system should be established for collecting detailed information in the different major markets, and for providing this information to

companies who request it. As one part of this it is necessary to work on sending a survey mission overseas which is centered on ASAKI.

The countries and territories about which market information is required by ceramic manufacturers include the United States, the EC, ASEAN, Japan and Asian NIEs. Information about buyers, import trends, distribution channels, prices, relative rules, commercial practices and many other topics is required.

Fig. 2-5-7: Countries and Territories about Which Market Information Is Required by Ceramic Manufacturers



Source: Same as Fig. 2-5-3.
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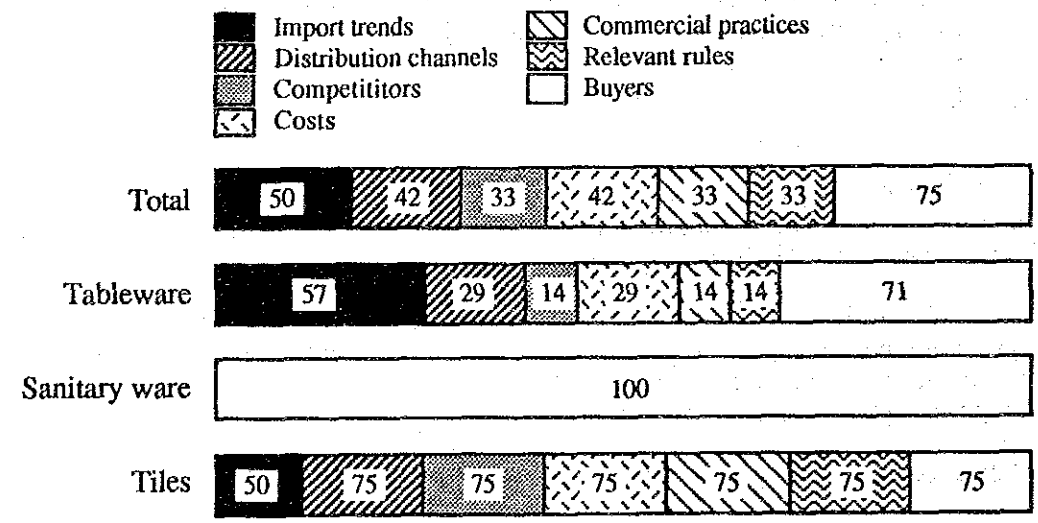
Fig. 2-5-8: Overseas Market Information Necessary for Ceramic Manufacturers



Source: Same as Fig. 2-5-3.
N.B. Do.

(2) Providing information to overseas buyers

A prerequisite for carrying out full-scale marketing is the provision of PR materials. However, the situation is such that it is virtually impossible to get hold of these

kinds of materials. The production of PR materials in English by industrial associations and the completion of company profiles, catalogs, and price lists is urgently required.

In the Japanese industry, trading firms publish catalogs collectively introducing products of dozens of firms every year on top of the comprehensive catalogs edited by industry organizations. Such sales promotion activities which make the most of the rich assortment of goods are very effective.

(3) Participating in overseas trade fairs, holding exhibitions, and holding business talks inside and outside the country

ASAKI takes part in trade fairs held in Indonesia and in other countries by the Ceramics Industry Club of ASEAN (CICA), and it also sponsors an Indonesian Ceramic Fair once every two years in Jakarta. However, it does not undertake any other notable activities, and it has poor links with NAFED's departments. It is necessary for it to seek support from NAFED, and to become more active in activities related to exhibitions and business talks. Also, taking into account the large number of medium and small companies which hesitate to participate in such activities due to unease about their own technology and the insufficient range of products, it is necessary to be constructive by doing things such as establishing joint booths for some companies. As for trade fairs, a priority should be given to specialized trade fairs which have a very high international reputation. These trade fairs provide opportunities for learning about worldwide technological standards and fashions. One practical means is to use trade fairs and the like as opportunities for conducting business talks.

(4) Holding of trade seminars and training sessions

Given the general shortage of experience in the area of exports, the implementation of relevant seminars and training sessions is urgently required. During these seminars and training sessions actual duties should be explained and a priority should be placed on teaching businessmen business etiquette. Problems with individual companies which arise in international business tend to lower the image of all products from that particular country. As a result, it seems important to make efforts to gain a consensus on the need to foster stronger consciousness of quality, time of delivery, prices, responses to specification changes and securement of necessary lots and to promote orderly exports thereby to secure confidense of foreign buyers.

(5) Strengthening links with overseas public organizations

Funding, know-how and links with other countries are indispensable for carrying out the above activities. One effective means of supplementing these needs is to seek the cooperation of foreign public organizations.

2-5-8 Promotion of Introduction of Foreign Capital and Foreign Technology

The introduction of foreign capital and foreign technology is an extremely effective means of developing the Indonesian ceramics industry and promoting its exports. There are in fact three Indonesian sanitary ware manufacturers, two joint venture companies and a company which has a technical tie-ups with a foreign company, which play a leading role in the areas of production and exports. Such companies belonging to the tile, table ware, and novelty item manufacturing industry, also assume a leading role with regard to technology, production, and exports.

Methods for introducing foreign investment and foreign technologies include joint venture capital, and also introducing technology on the basis of a licensed contract, acquiring foreign experts, and holding seminars and training sessions. Of these methods, joint venture investment is the most effective as it comes with a package which includes capital, technology, management know-how, and overseas market channels. Technical tie-ups are not restricted solely to technology as they also bring about the transfer of know-how related to management and overseas marketing.

There is a high level of interest among ceramic manufacturers in joint venture investment and technical tie-ups themselves. Of the 26 companies which replied to the recent written questionnaire, 10 companies (6 table ware companies, 1 sanitary ware, 2 tile companies, and 1 others) replied that they are interested in joint venture investment, and 15 companies (8 table ware, 1 sanitary ware, and 6 tile) replied that they are interested in technical tie-ups.

Objectives regarding foreign investment and the introduction of foreign technology differ according to the type of product. Areas which should be given priority are the table ware and tiles manufacturing sectors which have the highest degree of interest as well as novelties sector where significant progress is yet achieved. The labor intensive areas such as tableware and novelties manufacturing in Indonesia are promising investment and technology export markets for foreign companies as well. This is backed up by the results of a questionnaire (Chapter 2-2-2 (4)) which was distributed among Japanese companies. Priority should be given in these areas to fostering export-oriented companies.

As for the tile manufacturing industry, a over supply on the domestic market is expected to occur several years from now, and it is therefore important to give priority to those which make a substantial contribution to exports. Further, taking the great interests of tiles manufacturers into account, stress should also be put on the introduction of foreign technology.

Foreign affiliated joint ventures are already playing a leading role in the sanitary ware manufacturing industry. One issue which needs to be looked at is promoting expansion investment for existing companies rather than introducing new investment to establish new companies.

It goes without saying that the fundamental precondition of promoting the introduction of foreign investment is improving the environment of companies. For instance, problems in investing in Indonesia which are cited by Japanese companies include the shortage in skilled workers and technicians, the difficulty in obtaining good quality domestically-produced raw materials and the high costs involved in imports of the materials, the underdevelopment of peripheral industries, and the inadequate infrastructure. The solving of these problems is fundamental to promoting the flow of foreign investment into the country. However, as well as solving these problems, more direct promotional activities must be carried out by the public and private sector acting as a one. Some examples of such activities are provided below.

(1) Collecting and disseminating information on foreign companies

The key to introducing foreign capital and foreign technology lies in finding a suitable partner. Candidates often appear in the course of carrying out business transactions, but the inability of companies to collect information means that the collection of information on overseas companies and the provision of that information to interested companies by industrial associations and the like is extremely important. Indonesian ceramic manufacturers are extremely interested in introducing joint venture investment and foreign technology from Japan and Asian NIES such as South Korea, Taiwan, and Hong Kong. For the time being priority should be given to collecting information from these regions.

(2) Providing industry-related information to foreign investors

Carrying out public relations activities aimed at foreign companies is extremely important for the same reasons. One issue which needs to be tackled in the immediate future is producing basic materials and PR journals for this purpose.

(3) Holding of seminars and training sessions on joint venture investment and technological tie-ups

With the exception of companies which have experience in dealing with joint venture companies and with the introduction of technology, there is an extremely poor level of knowledge of related duties in the industry overall. It is considered necessary to hold seminars and training sessions which are given by experts from both within and outside Indonesia.

(4) Dispatch of investment missions

In Indonesia it is the BKPM which, in cooperation with foreign banks, etc, sends investment missions to Japan, Europe, the United States, South Korea, and Taiwan, etc. However, participation in such missions by companies engaged in the ceramics industry has been very low-key up until now. ASAKI should become more active in utilizing this kind of opportunity.

(5) Technical guidance by plant manufacturers and obtaining foreign experts

The technology seminar which was held jointly by ASAKI and an Italian plant manufacturer in July 1990 was an extremely useful activity for disseminating technology. More of this sort of activity by ASAKI and the IRDCRI would be desirable. One other effective means of doing this is to get foreign experts to visit individual companies for a long period of time. Because in the ceramics industry there is a wide variation in manufacturing results depending upon equipment and the raw materials which are used, individual and long-term guidance is extremely useful. It is fairly expensive to employ foreign experts, and the employment of such personnel is restricted to companies which have sufficient financial resources. Thus, one practical means is to use assistance provided by public organizations overseas. A strengthening of the assistance provided by the Indonesian government would be desirable as a means of achieving this.

(6) Strengthening links with overseas public organizations

When not only obtaining experts but when also introducing foreign capital and foreign technology, one of best approachs is to seek the cooperation of foreign public economic and technology cooperation organizations.

2-6 Proposal on Measures to Promote Ceramic Industry

With an abundant labor force and a domestic market holding huge potential demand, the ceramic industry of Indonesia can be appraised as possessing great possibilities for development.

In order to develop it as an export industry, however, further expansion of production as well as a large improvements of products so as to satisfy the needs of overseas markets is considered necessary. Particularly important issues would be the improvement of quality and designs of products and the increase of productivity.

The improvement of quality and designs would require [1] the thorough implementation of TQC in every area from product development and raw material control to the finishing of the final products, [2] obtaining a grasp of the needs of the target markets, and [3] ensuring the stable supply of good quality raw materials and auxiliary materials. To increase productivity, further, [1] improvement of production skills and [2] capital investment would be required. Under the current circumstances, however, it is certain that the ability of individual firms is limited and restricted in the scope of their activities. Accordingly, it is believed indispensable for government and industrial world join to build a system for assistance and promotion of independent development of enterprises.

Firms to which the export promotion measures will be applied should be those belonging to type A (stated in Chapter 2-3-4, Paragraph [1]) and types B and C in each product field. Type A and some type B firms have already taken off as export enterprises. However it is hoped that they expand their production scale and strengthen their technological and product developing capabilities furthermore and expectations are for priority improvement of the environment for that end. Most type B and C firms are believed to possess potentialities for export. But to start exporting on a full scale, they should introduce improvements in a diversity of aspects including quality, design, assortment and scale of output of products. Accordingly, they require comprehensive support. Type B and C firms account for more than a half of the firms visited under this survey. It is very important to nurture them.

Most type D and E firms are expected to stay dependent on the domestic market in the future as well. Accordingly, they should be nurtured as supporters of the domestic market of low-priced products.

In line with such a scenario, proposals concerning the following are given below: [1] viewpoints necessary for the formulation of export industrialization measures; [2] possible promotion measures regarded to be necessary to cope with problems; and [3] programs for effective implementation of these measures.

2-6-1 Basic Viewpoints

(1) Overall viewpoints

The ceramic industry of Indonesia has recently entered a stage of rapid development. Due to increased demands from domestic and overseas markets, investments have become increasingly active and have rapidly expanded the scale of the industry.

Along with an increasing demand for the construction of office buildings, hotels and dwelling houses and a rise in income, domestic demand for sanitary ware during the fourth five-year plan climbed at an annual average rate of 8.2 percent, tiles at 7.5 percent and tableware at 4.6 percent. The domestic market has become increasingly brisk in the last few years.

Exports of the four items of products combined still remained as low as $28.54 million in 1990, but have increased 6.6 times over three years earlier. Exports currently appear to be depressed under the pressure of domestic demand but will be accelerated in a few years' time when production capacity is expected to be expanded even further.

In response to such rapid increases in domestic and overseas demand, investments for new plant and equipment and expansion of the existing facilities continued ceaselessly. As a result, the total (planned) production capacity of sanitary ware grew 2.2 times in the past three and a half years, tiles 1.9 times, tableware and novelties 2.4 times, respectively. Because the desire of firms to invest is still strong, the production capacity is expected to keep expanding in the future as well.

From the outset, the ceramic industry of Indonesia has had a diversity of advantages, including the most abundant and cheapest labor force in Southeast Asia, a huge potential market, rich resources and wide industrial sites. It may be said that the current situation is that such advantages are beginning to display themselves, stimulated by rising domestic demand and increased exports.

Apart from the development of scale, many problems remain to be solved in the fields of industrial structure, management forms and quality and design of products. Especially there are many problems in quality and design. Most of the products "pass in the domestic market but have too many defects to export."

In fact, only a few firms are exporting in earnest, with most of the rest relying on the domestic market for low-grade products. In other words, the industry's structure is such that a wide technological gap is open between those firms such as sanitary ware and novelty manufactures which have achieved an international level of technology through joint ventures or technological tie-ups with foreign firms and have "taken off" as export companies and other firms which depend on the domestic market.

But even among the firms dependent on the domestic market, there are not a few which have potentialities for export. Most of Type B and C firms which account more than a half of the firms under this survey are understood to have such potentialities. The current situation is that they are simply delaying improvement in technology and products due to the pressure of the brisk domestic market for low-grade products, resulting in a failure to raise the products to an international level.

To promote the ceramic industry as an export industry under such circumstances, an essential standpoint should be that government and industrial world join to develop nurturing measures, focussing their efforts on potential export firms of Type B and C and fundamentally overhaul the industry. Without qualitative improvement of the industry as a

whole, the Indonesian products will not be able to gain the confidence of foreign customers. Moreover, without the confidence of customers, there is little hope that Indonesia will emerge as one of the important ceramic producing areas in the world.

Nurturing of potential export firms into actually exporting enterprises will also be to the advantage of the firms which have already entered the international markets. This is because the increase in the number of exporting firms will bring about the merit of accumulation which is essential for major exporting nations such as having a rich assortment of goods as well as a lineup of suppliers, and the spread of knowledge about makers and products' brands, etc.

The improvement of the standing of the ceramic industry cannot, it must be stressed, be achieved just by renovation of the manufacturing sector. Ceramics are products which by nature can be made high in quality only with sufficient control over all processes from the upstream raw material sector to the downstream final finishing sector.

In promoting the industry, it will be necessary to consider comprehensively all sorts of problems and deal with them perpetual basis. As a starting point for this, a summary will be made below of key points in the current problems, as elucidated by this survey.

[1] Supply of raw materials

The domestic materials are generally low in grade and of an uncertain quality. Even the commonly used Bangka and Belitung island kaolin and Lodoyo feldspar present problems in quality when manufacturing high class items. This is believed to be not only because of the quality of the raw materials themselves, but because of factors in grading, processing, and treatment as well.

While raw material resources are scattered all over the the country's vast territory, manufacturers are concentrated in the Java island which is the main consumer region. This makes transport distances of raw materials very long, causing a lack of smoothness in their distribution. Also, coupled with the shortage of information about raw materials, the scope of materials individual firms can utilize is limited. Arrangement of communication as well as transportation and storage facilities means connecting raw material producers with consumers are big problems.

Development of raw materials for ceramics itself also lags behind.

[2] Production and supply of anxiliary materials

The ceramic manufacturers in Indonesia are mostly integrated production type companies as often seen in the production centers of Europe. There is little of the division of labor as is going on in Japanese production centers. There are few manufacturers even now which specialize in anxiliary materials such as plaster of paris molds, saggars, pigments, and transfer paper and the quality of all of these is inferior. All companies are set up to manufacture these anxiliary materials in-house or else purchase imports. This invites diffusion of the manufacturing process, dissipation of power, and higher costs. Such production systems become major burdens on companies, particularly small and medium sized ones.

[3] Infrastructure

A particularly large problem for the ceramic industry is the inadequacy of a fuel network or means for transporting raw materials and the deficient state of joint storage facilities. In particular, augmentation of the network for supply of natural gas would be desirable from the viewpoint of the wider goals of improvement of quality, improvement of the heat efficiency, and prevention of pollution.

[4] Factory control

Along with the rapid development of industry, the shortage of technicians, foremen, and other personnel has become increasingly marked. Many companies also complain of antiquated facilities. Further, the new facilities which are introduced in some cases cannot be made full use of due to the shortage of skilled workers. Interest in areas such as worker safety and sanitation and pollution prevention is also generally very low. Poor working environments and low wages invite frequent job hopping and obstruct the buildup of technical expertise. Improvement of factory control, in particular the securing and training of manpower, is becoming an urgent issue.

[5] Quality control

The shortages in manpower and money and the low interest on the part of managers have combined to result in a general lag in quality control. With the exception of a few larger companies, the system for control of raw materials and other materials, control of the manufacturing process, and quality control of products is very weak. To determine the quality of raw materials in use, some firms utilize the test and analysis services of the Institute for Research and Development of Ceramic Industry (IRDCRI) and the state-operated inspection company SUCOFINCO. Their utilization is not active, however, because it takes one or two months to obtain the results of test and analysis conducted by the former, while the latter charges high fees, and reports are restricted to the results of test and analysis and no appraisals are presented.

[6] Technology and product development capabilities

Indonesia is lagging far behind in development of designs, techniques of mixing materials, decorative techniques, and other technical development.

[7] Overseas marketing

With the exception of a few leading firms, almost all companies leave the overseas marketing to their agents or traders. Therefore, there is little accumulation of information on overseas markets. Ceramics differ considerably in specifications, preferences, trends, etc. depending on the market and the restricted opportunity for getting knowledge of markets has major demerits.

Of the points mentioned above, [1] - [3] are problems related to the whole ceramic industry and [4] - [7] are what should be overcome through the accumulation of experiences and self-help efforts by individual firms.

Under the current circumstances, however, capabilities of the ceramic industry of Indonesia are not sufficient to surmount problems of the whole industry. It also goes without saying that self-help efforts of firms are greatly restricted by lack of both personnel and finance.

Among ceramic manufacturers, accordingly, voices are calling strongly for government support in a diversity of areas including technological guidance, supply of various information and export promotion activities. To nurture the ceramic manufacturing as an export industry, it may be said to be indispensable that industrial organizations and government agencies join to build up a promotion organ and establish a comprehensive system for supporting autonomous development of individual firms.

On the basis of such viewpoints, it seems important to keep the following two points in mind when drawing up industry promotion measures.

[1] It is necessary to draw up overall promotion programs by putting in perspective the whole flow from the production sector of raw and auxiliary materials to

the product manufacturing sector and to the marketing sector while connecting individual sectors into a complete whole.

It is a particularly urgent problem to improve raw materials in response to the needs of the manufacturing sector, arrange a system for their stable supply and draw up programs aimed at nurturing the auxiliary material industry.

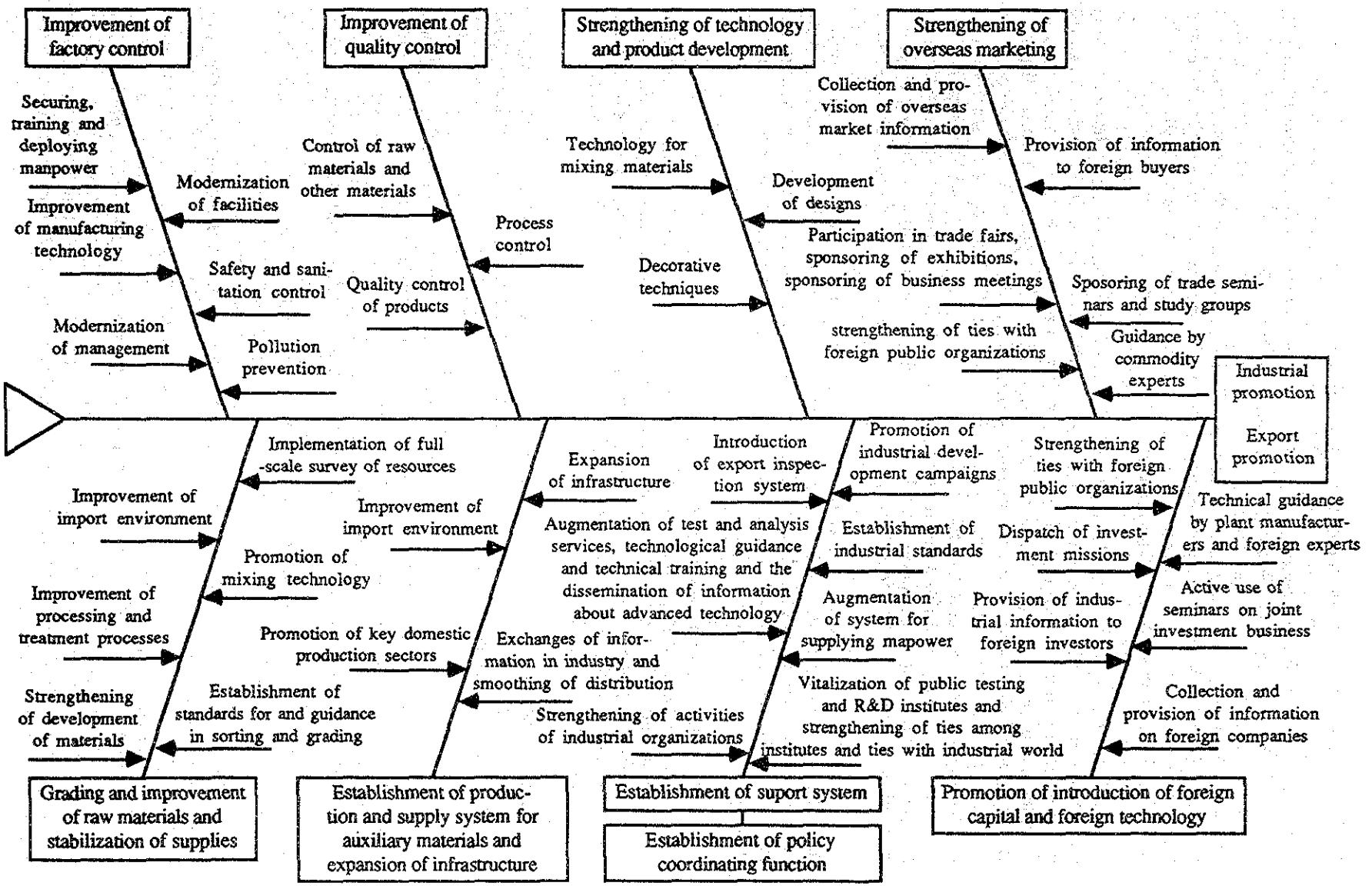
[2] The necessity is very strong for an public support system to be arranged to assist qualitative improvement of product manufacturing firms.

It is particularly necessary to proceed at a considerable pace with the arrangement of systems for personnel supply, training of employees, technological guidance and test and analysis services.

"Fig. 2-6-1: Fishbone Chart of Issues in the Promotion of Ceramic Industry" illustrates various factors for the promotion of the industry along the flow from upstream to downstream by mutually linking individual problems. In the figure, "arrangement of support system" including a support system for the upstream sector is placed at the center of various issues, on the assumption that it is the most urgent factor at present.

"Promotion of foreign capital and technology introduction" is considered to be an effective and "quick remedy" means for the promotion of the industry and is inserted in the chart.

Fig. 2-6-1: Fishbone Chart of Issues in the Promotion of Ceramic Industry



(2) Viewpoints divided by products and types of firms

Problems and issues stated above differ depending on the fields of products and types of firms. Accordingly, measures to be taken differ naturally.

In this paragraph, some assumption will be made about the future image of various fields of products, and main issues classified by individual fields of products and different types of firms and measures regarded necessary to cope with them will be considered on the basis of this assumption.

Consideration here will be made of groups of firms which have "taken off" as export enterprises and groups of firms regarded as possessing potentialities for export. In concrete terms, they are groups of firms belonging to types A, B and C mentioned in Chapter 2-3-4, paragraph (1). Among others, emphasis will be put on groups of firms of B and C types which will be regarded as groups of firms with potentialities for export and become the main targets of export promotion measures. Development stages differ between groups of firms of types B and C and content, scope and width of individual issues differ slightly. But it is judged that there are no great differences between them as far as the large framework is concerned. Accordingly, measures to be taken are believed to be almost the same. Therefore, groups of firms of types B and C will be dealt together.

Promotion measures for firms belonging to types D and E will be roughly described in a lump at the end. These firms are regarded as having to continue fully dependent on the domestic market in the future as well. Accordingly, they are mainly not considered to be qualified for promotion measures which are basically aimed at export industrialization, to be stated below.

1) Sanitary ware manufacturing industry

As of the end of 1990, nine firms have been authorized in the industry and eight of them are operating. Three of them including two joint ventures with foreign capital and a domestic firm in a technological tie-up with a foreign enterprise overwhelmingly lead the industry. The three are export-oriented firms which have achieved technology and products of international level, belonging to type A.

There was no chance to visit other firms for this survey so that their actual situation is unavailable. But, according to information from industry sources, they appear to depend on the domestic market.

The structure of the industry whereby export-oriented firms and enterprises dependent on domestic market coexist, is not expected to change a great deal in the future. This is because that sanitary ware as construction materials should be products of design, color tone and quality that harmonize with buildings in respective markets and, accordingly, it is very difficult for firms without any technological connection with foreign enterprises to become export companies. Of course, it goes without saying that such firms have potentialities for becoming export companies if they go into technological tie-ups with foreign enterprises and make efforts to open up export markets.

Below, future outlook, and problems and necessary measures for firms belonging to type A are described.

a) Outlook for industry

The performance of the sanitary ware industry is very steady. Although domestic demand was dull in the first half of the 1980s, it has sharply increased since 1987-88 when construction work became active. Construction of office buildings, hotels and dwelling houses remain brisk currently as well and demand for sanitary ware is expected to rise steadily in the future.

Growth of exports show a tendency of slowing down under the pressure of such strong domestic demand and are expected to be limited to a moderate growth in the coming few years. Although firms are generally in a state of full operation, they still have capacity for expansion within the total authorized production capacity and a strong will to invest for the expansion of output. This is expected to produce potential exporting power of considerable scale in a few years' time and result in another sharp rise in exports.

Sanitary ware manufacturers in Indonesia have already a certain share of the international market. It is expected that this share will steadily expand in the future as well, with Indonesia emerging as a considerably influential supplying base ranking with Thailand and Malaysia in the long term.

b) Issues

The three sanitary ware manufacturers have achieved an international level in terms of facilities, technology and product quality. They are fully utilizing international networks of respective groups for research and development, quality control and overseas marketing. Thus, the three firms have no serious problems with management.

But each of them has its own room for improvement if further large expansion in the future is to be made. Problems common to them are as follows:

[1] Reduction of cost

Since there are few problems with quality, a decisive factor for the improvement of competitiveness may be reduction of cost. In fact, the firms are strongly interested in the issue.

Chief methods for the reduction of cost will be an improvement in productivity and a lowering of purchasing costs of raw and auxiliary materials.

Securement of qualified personnel and training of employees will be the key to the improvement of productivity.

Augmentation of the use of domestic products and reduction of cost of imports will be important means of cutting purchasing cost of raw and auxiliary materials. Augmentation of domestic products utilization will require quality improvement and stabilization of supply of the same. Domestic products for which the augmentation of utilization seems promising include feldspar and plastic clay in the field of raw materials and gypsum molds as auxiliary materials.

[2] Expansion of output

Although the current production capacity may be said to have tentatively achieved a level sufficient to enjoy the merit of scale, expansion of output is required in aiming at further development. Accordingly, improvement of productivity and augmentation of facilities will continue to be issues.

[3] Securement of personnel and training of employees

Securement of talented personnel and training of employees have become important issues in aiming at the improvement of productivity and expansion of the scale of production. The firms are emphasizing the training of employees and are making efforts for the dispatch of employees for training to the facilities of foreign partners of joint ventures and technological tie-ups. But the expansion of production scale recently has been so rapid that allotment of necessary personnel lags behind. Bringing public education and training organs in the country to adequate levels is desirable.

[4] Strengthening of technology and product development capability

Although the firms have achieved an international level in technology and product quality, this is due to the overall ability of their respective groups and the product development capabilities of their factories in Indonesia are still poor. It is hoped that they strengthen their research and development in the future and extricate themselves from the simple position of a manufacturing base.

c) Necessary measures

[1] Securement of stable supply of raw and auxiliary materials of good quality and reduction of purchasing cost

Prerequisites for these will be an improvement of the quality of domestic products, expansion of supply systems and improvement of the environment related to imports of necessary foreign products.

The improvement of the quality of domestic products and expansion of supply systems will require augmentation of raw and auxiliary material division of the manufacturers themselves and nurturing of the raw and auxiliary material industry.

With a considerably strong corporate power, the three sanitary ware manufacturers may be able to augment their own raw and auxiliary material division. But it goes without saying that the burden will be heavy for the three firms. In addition, being pressed for the expansion of products manufacturing capacity, they do not appear to have a large reserve of power to apply to that purpose. Also it would not be practical from the point of view of cost.

Thus, the development of the raw and auxiliary material industries themselves should be hoped for. Methods for the promotion of this industry include strengthening of resources development, nurturing of enterprises, improvement of quality and expansion of distribution networks.

Since there are no major problems with the supply of raw materials, the improvement of quality and expansion of distribution networks for the same are the measures which will have to be hastened for the immediate future. According to our judgment, it is believed that quality will be elevated considerably through improvements in refining and processing of raw materials. Establishment of grading standards and strengthening of technological guidance jointly by Ministry of Mining and Energy's Mineral Technology Development Centre (MTDC) and IRDCRI are also hoped for.

As for auxiliary materials, it will be necessary to start from the drawing up of overall promotion measures because the sector is still in a state of underdevelopment.

An ideal method for the expansion of distribution networks of raw and auxiliary materials will be the construction of concentrated distribution and supply bases connecting materials producing areas with products manufacturers' factories.

Reduction of cost is the most important issue for imports. A "quick remedy" means for the reduction of import costs would be the reduction or exemption of import duties and the value added tax. Speedier drawback of import duties relevant to raw and auxiliary materials used for export products, also, would be effective for this purpose.

[2] Augmentation of system for supplying manpower and education and training facilities

Since the firms' own training activities are unable to meet the demand for personnel, expectations are put on the augmentation of public education and training facilities. Establishment of ceramics departments in institutes of technology, or colleges specialized in ceramics is hoped for but this would require considerable time and fund to realize. Therefore, for the time being, expectations should be put on the augmentation of education and training functions in IRDCRI and MTDC.

Employees of foreman class will be the main targets of the education and training.

[3] Strengthening of technology and product developing capabilities

Further distribution of results of studies by IRDCRI and other public research and development organs as well as activation of joint government and industry research through studies on assignment or joint studies is hoped for.

The first-stage target of product development in sanitaryware industry will be specifications of products for ASEAN and other Southeast Asian markets.

[4] Improvement of environment for promotion of expansion investments

Requiring a comparatively large amount of capital, the sanitary ware industry is forced to look toward the merit of scale through mass production. Also, a high technological ability is required of this industry, making it unsuitable for small and medium enterprises. Because of such characteristics, an oligopolistic domination of the industry by a few firms is common in every country. In Indonesia, nine firms have been authorized and eight of them are in operation. It may be said that the number of firms is sufficient. Accordingly, it seems that the emphasis of future investment policies should be put on assistance for expansion investments of existing firms.

Methods for the assistance will include fuller tax advantages relative to the expansion of facilities or augmentation of systems for supplying manpower necessary for the expansion of output. As for the tax system, improvement of the depreciation system will be considered as well.

2) Tiles manufacturing industry

In the tiles manufacturing industry, 26 firms have been authorized as of the end of 1990 and 21 of them are operating. Of the authorized 26, only one is a joint venture with foreign capital and the rest are domestic firms.

In this industry 13 manufacturers were surveyed. Broken down by types of firms, nine of them were type B, one type C, one type D and two type E. Modernization of facilities has progressed in the tile industry. Although no "excellent" firms are found, the overall level can be said to be comparatively high.

Firms of types B and C are the targets of the viewpoints that will be stated below.

a) Outlook for industry

As with the sanitary ware industry, the tile industry enjoys a very firm performance owing to increased domestic demand coming from brisk construction activities and upgrading of dwelling houses. Domestic demand is expected to continue at a high level in the future as well.

Despite the pressure from domestic demand and the situation of global oversupply, exports have rapidly grown. Since tiles are not products requiring advanced manufacturing technology, the future potentialities for development as an export industry may be larger than other products. Although the scale of exports is still small, a further

expansion is expected after 1992, when the domestic supply/demand situation is predicted to ease with the completion of plant and equipment investments on going. Apart from the distant markets of Europe and America, there are good possibilities that the industry will be able to gain a certain share of the markets in the ASEAN nations and Asian NIEs.

b) Issues

Modernization of facilities has progressed in general but lags as a whole in the so-called "soft" sectors such as quality control, management technique, product development ability and overseas marketing.

[1] Improvement of raw materials

Tiles are products whose quality matters in raw materials little, so there are relatively few problems there. Also their competitiveness depends on the cost of raw materials so that raw materials of high grade are hard to use.

There is, however, ample room for the improvement on the treatment of raw materials. In all firms, mixture of raw materials is simple and their standards of quality uncertain causing unevenness in the quality of products. Adoption of a diversity of raw materials as well as the introduction of outside guidance regarding methods of mixing is hoped for.

[2] Improvement of factory management

Production lines are properly arranged by plant makers and the conditions of work processes are comparatively good. However, there are problems with quality of products and control of equipment.

Technological guidance by official organs and training of employees are desirable.

[3] Strengthening of technology and product development ability

All the firms lag in this respect. Although tiles do not require advanced technology to manufacture, they are required to have an originality fitting the needs of customers. Efforts should be redoubled to collect information about the needs of the targeted markets. Also, it will be necessary to secure and train designers.

[4] Securement and nurturing of personnel

The industry is under pressure to secure and train engineers and technical experts in machinery control on a large scale.

[5] Strengthening of overseas marketing

This is the measure necessary from the two viewpoints of collection of information and sales promotion. More active participation in international trade fairs, dispatch of survey missions and printing of public relations materials are hoped for. The PR materials should not be limited to the introduction of products but also contain specifications regarding the method of installation. Activities run by the industry as a whole are hoped for.

Moreover, it should be recognized that prerequisites for sales promotion will require improvement of quality, assortment of articles, guarantee of long-term supply of identical goods and stable delivery times.

[6] Introduction of foreign technology and promotion of foreign investment

Introduction of foreign technology is desirable particularly in the field of machinery control. Effective methods for the purpose would be the holding of seminars jointly with major plant makers and the long-term employment of technical experts.

Priority would have to be given to export-oriented type firms in promoting foreign investments. An oversupply in the domestic market is expected to occur in the near future.

c) Necessary measures

The support the tile industry is particularly calling for from public organs includes guidance on quality control and assistance to the introduction of foreign experts. The following are measures concerning these points. Measures concerning the other issues will be omitted here because they have been referred to in the paragraphs on "issues" above.

[1] Improvement of quality control

Guidance is hoped for on the mixing of raw materials, control of facilities and quality inspections of products. The carrying out of guidance rounds and the distribution of technology by IRDCRI should be further activated. Employment of foreign experts and the holding of seminars on technology should also be encouraged.

[2] Employment of foreign experts

The most effective method for the improvement of quality control would be the acceptance of guidance by foreign experts on technology, mainly that regarding machinery. But the securement of top class experts is not easy and requires a considerable expense. Invitation by industrial organizations and government agencies or other methods such as provision of intermediary services and assistance to individual firms should be given consideration. It is recommended that cooperation of official aid organs of foreign nations should be asked for on such occasion.

[3] Augmentation of education and training

Strengthening of educating and training functions of IRDCRI focussing on machinery control is hoped for. Employment for the time being of foreign personnel as instructors will have to be considered. The dispatch of employees overseas for training through the intermediary of foreign plant makers or others would be desirable.

3) Tableware manufacturing industry

In the tableware manufacturing industry, 30 firms have been authorized as of the end of 1990 and 23 of them are operating. All of them are domestic firms. A Japanese joint venture is also being built.

In this industry seven manufacturers were surveyed. Broken down by types of firms, they comprise two each of types B, C and D and one type E. It may be said that more than a half of them have potentialities for export.

Tastes play a big role in the demand for tableware. Many manufacturers compete severely with one another in every country. Accordingly, high quality and excellent design are required for the products. No competitive articles can be manufactured without a thoroughgoing TQC covering all processes from the selection and mixture of raw materials to designing, manufacturing and quality inspection.

The actual situation of the tableware industry in Indonesia is not satisfactory, however. Except for leading manufacturers, the industry is composed of small and medium firms, lacking know-how and personnel. Under such circumstances, issues of this industry range widely.

Nevertheless, tableware manufacturing may be said to be an industry fit for Indonesia which has abundant and cheap labor force because many of the manufacturing processes depend on hand work. It is hoped that the industry is promoted with long-term goals in mind.

a) Outlook for industry

The tableware industry performs well, although it is not as brisk as the construction materials industry examined earlier.

Domestic demand has steadily grown and is expected to keep growing in the future, too, at the rate of population increase and private consumption rise combined, or higher.

Exports have sharply risen since 1989 mainly for the United States, Japan and Singapore. But the exporters are limited to a few firms including those in technological tie-ups with foreign enterprises, and the scale of exports is still small compared to that of Thailand and other competing countries in the neighborhood. It will take a considerably long time before the tableware industry of Indonesia becomes well known in the international market.

b) Issues

There are many problems as stated earlier. Important problems are the stable securement of raw and auxiliary materials of good quality, strengthening of product development ability, improvement of quality control, securement and training of talented personnel for these purposes and strengthening of overseas marketing.

[1] Stable securement of raw and auxiliary materials of good quality

A diversity of raw and auxiliary materials is necessary to manufacture tableware. Moreover, the quality of these materials is very important. The manufacturers for the domestic market often use raw materials produced in the country and auxiliary materials manufactured by themselves. Since both have problems with quality, manufacturers of high-grade products for export are forced to use imported raw and auxiliary materials. Improvement of quality and stabilization of the supply of domestically produced raw and auxiliary materials and reduction of the cost of imports are desirable in aiming at quality improvement, costs reduction and the stable expansion of output. Domestic products which show promise for wider use as raw materials include kaolin, plastic clay and feldspar, and as auxiliary materials, saggers and supports, gypsum for molds and transfer paper.

In manufacturing products, it is very important to fix proper ratios and conditions for raw material mixture and strictly observe them. For that purpose, it is essential to achieve thoroughness in quality inspection and controls, varying according to kinds of raw materials, as well as to accumulate know-how on mixing through repeated firing tests. Strengthening of technological guidance by IRDCRI and other public research and development organs is also hoped for.

[2] Modernization of facilities

In the tableware factories of Indonesia, it is recommendable to construct processes so as to utilize abundant and cheap labor force. As for the products which show promise for mass production, however, introduction of automatic molding lines will be worth considering for the increase of production capacity as well as the improvement of quality.

[3] Improvement of quality control

Generally, the arrangement and control of manufacturing lines are insufficient. In the casting molding sector, there are problems with the control of molds. It is necessary for Type C, D and E firms to wholly improve quality, facilities and work control. Strengthening of technological guidance by public organs is desirable. It would be more effective if guidance by foreign technological experts could be obtained. It would be worth considering inviting them via the methods mentioned earlier in the section on tiles.

[4] Strengthening of product development capabilities

Though this is also the case with the other products, firms either introduce designs of tableware from foreign countries or copy the designs of foreign products. They produce few good original design. Since tastes play a big role in the demand for tableware, development of original design is more of a importance for it than for other products. One possible way for this issue is to arrange the traditional pattern into a motif acceptable to each of the export market. Supply of ideas by public organs also is desirable.

[5] Securing and training of personnel

The shortage of foremen is marked compared to that of general workers. It will be necessary to secure personnel with basic knowledge and train them further. Since in-company training by firms is limited in personnel and know-how of each firm, augmentation of public training institutes is desirable.

Job-hopping of workers and the resultant shortage of skilled laborers have become a source of trouble for firms, because general work also requires skill. Improvement of the employment conditions, working environment and safety and hygiene is desirable to lessen the movement of employees.

[6] Strengthening of overseas marketing

Although marketing is an essential activity not only for promoting sales but also for grasping the needs of the targeted markets, many firms are not active in this respect at present, with many of them leaving traders in full charge of the matter. Strengthening of marketing activities under the direct leadership of managers, further activation of marketing and, as stated before on tiles, an upsurge of recognition of its necessity by the industry as a whole are hoped for.

Acceptance of guidance on design improvement by foreign merchandising experts will be effective for sales promotion.

[7] Completion of SII and introduction of export standards

Since SII has not been set up for tableware, there are no standards for quality in the domestic market. For the immediate future, establishment of safety standards including the prevention of lead noxiousness should be hastened.

As for exports, safety standards of individual foreign countries should be made well known to everybody. Introduction of such a system as to prevent shipment of products of inferior external appearance is desirable for building up confidence of overseas buyers.

[8] Introduction of foreign capital and technology

There is a sufficient supply capacity for the domestic demand. Priority in investment policy should be given to the attraction of export-oriented foreign firms having advanced technology, know-how and marketing ability. The size of the foreign firms is not important. Technological tie-ups with foreign enterprises and the introduction of experts as mentioned earlier would also be effective methods. The best experts will be technically skilled persons well versed in a wide range of raw materials, manufacturing, quality control and trends of overseas markets.

c) Necessary measures

The tableware industry is strongly seeking public support for the supply of various information, export promotion activities and guidance in quality control. Firms in this sector which want joint ventures or technological tie-ups with foreign enterprises are the most numerous among various sectors of the ceramic industry. In promoting the industry, these points will have to be emphasized in working out and implementing overall programs.

Individual measures will be omitted here because they duplicate what has been stated earlier on sanitary ware or tiles and referred to in the preceding paragraphs on "issues." A basic standpoint considered necessary in promoting this sector -- enhancement of recognition by firms -- will be dealt with here.

The tableware industry is more labor-intensive than the sanitary ware or tile industry. This means that the know-how and technical skill which individual firms have acquired through long experience and repetition of trial and error are more decisive factors for the improvement of product quality than technology analyzed in manuals. Accordingly, the future of firms depends greatly on their recognition of the necessity of quality improvement. It should be understood that guidance by outside organs shows only general methods of quality improvement and whether individual firms can utilize it to achieve results depends on their recognition of the necessity of quality improvement coupled with their positive efforts. Take the mixing of new raw materials, for instance. Application of general examples obtained from research organs does not help to gain good results from newly-adopted materials. There are no effective means other than fixation of proper conditions and ratios after repeated firing tests according to general instruction.

Systems of SII and export standards mentioned earlier also function effectively only when firms recognize them as yardsticks for grappling with quality improvement.

The tableware industry is similar to other sectors of the industry in its need to enhance this recognition. But the more labor-intensive an industry is, such as the tableware or novelty industry, the greater the need for enhancement of recognition.

Industry development campaigns are recommended as one means for the enhancement of recognition. They include augmentation of Indonesian Ceramic Fair, holding of product contests and awarding of prizes to superior products. How about starting from an idea contest in which methods of campaign fit for the Indonesian industry are collected?

4) Novelties manufacturing industry

In novelties manufacturing industry six firms were surveyed. Broken down by types of firms, they comprised one each of types A and B and the remaining four of type E which manufacture products of a handicraft character.

The characteristics of novelty industry are almost the same as what was stated earlier on tableware. Since the industry is still more labor-intensive than the tableware industry, it is expected to be one of the industries suited to Indonesia. Though the scale of export is still small, the industry seems to have full possibilities of development.

a) Outlook for industry

Although data on moves in the domestic market are unavailable, its size is estimated to be yet small, except in the case of traditional handicrafts. It is expected to expand gradually, however, if the gift market grows along with increased personal incomes.

Exports have sharply risen since 1989, mainly those to the United States. But most of them are made by firms of type A and B. Other enterprises have done little in the way of exports, leaving the size of the total exports still small. Since tastes play a far bigger role in the demand for novelties than for tableware, exports on a full scale will be difficult without a thorough knowledge of foreign markets. Exports in the future, accordingly, depend a great deal on the development of capital and technological tie-ups with foreign enterprises. One of the prerequisites for the promotion of exports will be an improvement of the environment for the attraction of foreign enterprises through the solution of problems in the industry.

Below, issues of individual types of firms and measures to cope with them are described.

[Type A]

b) Issues

The firm carries out their managements through international networks within the group including purchase (import) of raw materials, product development, manufacturing, quality control and marketing thus has few problems in its operations.

An aspect which could be described as a issue, however is the securement and nurturing of personnel, particularly foremen, for the full-scale operation of facilities. Actually, it appears that the securement and nurturing of personnel lag behind, being pressed with work for rapidly rising exports. For the long term, training of designers to develop original products is desirable.

c) Necessary measures

The biggest supporting measure for the firm would be augmentation of basic training courses by public organs.

[Type B]

b) Issues

The firm is operated under the technological guidance of a foreign company, with the overall level being kept comparatively high. But it is inferior to the firm of type A, having a diversity of issues. The problems are almost the same as those described for tableware.

c) Necessary measures

Accordingly, measures required to cope with the issues are the same as those stated in the section on tableware.

5) Firms of Types D and E

Of all the surveyed firms, three tile manufacturers, three tableware manufacturers and four novelty producers belong to these types. It is surmised that most of the firms not surveyed are classified into these types.

The size of these firms is generally small and their technological level is low. Except for traditional handicrafts, their products are for the domestic market. They are also considered to have little possibilities of exports on a full scale in the future. From all aspects including types, quality, assortment and production scale of the products, it cannot but be said to be extremely difficult to sell these products in foreign markets.

Demand is expected to continue to increase gradually in the domestic market in the future as well. It will comprise markets of building materials for low-priced dwelling houses, tableware and kitchenware for medium and low-income families and ornaments for general households. Nevertheless, competition will become more severe in these markets as well, along with the enlargement of production scale of the ceramic industry and upgrading of the consumers' needs in the future.

Accordingly, big issues for these firms will be the exploitation of domestic demand and a gradual improvement of the quality and design of products while maintaining low prices.

In that sense, strengthening of support by Indonesian Ceramic Association (ASAKI), IRDCRI and regional offices of the Ministry of Industry is hoped for.

ASAKI is assisting handicraft manufacturers and other small firms in villages through activities such as invitation of them to participate in the Indonesian Ceramic Fair and arrangement of visits to and study tours in large enterprises. Such activities are regarded as very significant for the sales promotion and technological enlightenment of small enterprises thus their further activation is hoped for. How about producing ideas for promoting participation of small firms in the Indonesian Ceramic Fairs by means such as the setting up of a pavilion for "good products of low prices," and augmenting booths for joint exhibits of a number of firms, or organizing tours of large enterprises for participants of the fairs? Any support by the Ministry of Industry will provide these activities with momentum.

IRDCRI also is engaged in research and development intended for small enterprises including the development of handicraft design. It is expected to strengthen its guidance rounds and further distribute the research results in provinces in the future. Augmentation of education and training of instructors of related public organs will be effective as well.

As for everyday guidance in provinces, strengthening of the role of the instructors of regional offices of the Ministry of Industry is hoped for. As a prerequisite, capabilities of the instructors will have to be improved. Fuller opportunities for their regular training at IRDCRI and inspection of trade fairs should be provided. How about working out periodical programs for training of regional instructors on every occation of the Indonesian Ceramic Fair. For the field survey in West Kalimantan, a few instructors accompanied the study team. It is worth to note that their will to study was very strong, though their technological knowledge was insufficient.

Table 2-6-1: Main Issues Classified by Products and Types of Firms

	Type A	Types B and C
Sanitary ware	• Expansion of domestic purchase of certain raw and auxiliary materials Reduction of cost for their import • Strengthening of technology and product developing capabilities • Augmentation of education and training in certain firms, particularly for foremen • Improvement of the environment for investments to expand facilities	
Tiles		• Improvement on raw material control and study of mixing methods of various raw materials • Improvement on quality control, facilities control and work control • Securement and training of personnel, centering on mechanical engineers and foremen • Strengthening of overseas marketing • Introduction of foreign technology and promotion of investments by export-oriented foreign enterprises
Tableware		• Securement of stable supply of raw materials (domestic products and imports) of good quality, reduction of import cost of the same and improvement of control of raw materials • Securement of stable supply of auxiliary materials (domestic products and imports) of good quality and reduction of import cost of the same • Improvement of facilities control and, for firms of type C, overall improvement of quality, facilities and work control • Strengthening of product developing capabilities • Securement of merit of scale through expansion of production scale (for type C) • Improvement of work environment and safety and hygiene • Modernization of management form • Strengthening of overseas marketing • Securement and training of personnel centering on foremen and lessening of employee movement • Improvement and stabilization of quality through arrangement of SII and export standards • Introduction of foreign technology and promotion of investments by export-oriented foreign enterprises
Novelties	• Securement and training of personnel centering on foremen • Strengthening of technology and product developing capabilities	• Securement of stable supply of raw materials (domestic products and imports) of good quality, reduction of import cost of the same and quality control of raw materials • Securement of stable supply of auxiliary materials (domestic products and imports) of good quality and reduction of import cost of the same • Improvement of facilities and work control • Strengthening of product developing capabilities • Improvement of work environment and safety and hygiene • Strengthening of overseas marketing • Securement and training of personnel centering on foremen and lessening of employee movement • Introduction of foreign technology and promotion of investments by export-oriented foreign enterprises

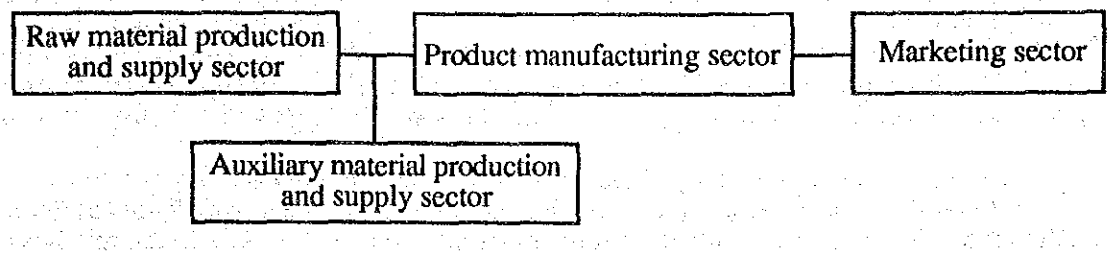
Table 2-6-2: Main Measures Classified by Products and Types of Firms

	Type A	Types B and C
Sanitary ware	• Strengthening of domestic production and supply system of raw and auxiliary materials and improvement of import environment including reduction of import duties • Strengthening of research and development sector and utilization of joint studies with public research and development organs • Augmentation of public education and training organs • Augmentation of incentives for plant and equipment investments	
Tiles		• Strengthening of technological guidance by official research and development organs • Wider incorporation of foreign technological guidance • Enlargement of technology and product developing sectors • Augmentation of public education and training organs and overseas training of employees • Further activation of marketing operations at industrial organization level • Promotion of industry development campaigns • Attraction of influential foreign enterprises
Tableware		• Quality improvement and arrangement of distribution networks of domestically-produced raw materials • Promotion of domestically-prepared body and auxiliary materials manufacturing sector • Improvement of import environment including reduction of import duties on raw and auxiliary materials • Strengthening of technological guidance by public research and development organs • Wider employment of foreign experts • Collection of foreign market information and training of designers • Augmentation of public education and training organs and utilization of overseas study for employees • Arrangement of SII jointly by industrial organizations and IRDCRI and introduction of export inspection system • Promotion of industry development campaigns • Further activation of marketing operations at industrial organization level • Promotion of technological tie-ups with foreign enterprises and attraction of export-oriented foreign firms
Novelties	• Augmentation of public education and training organs • Training of designers	• Quality improvement and arrangement of distribution networks for domestically-produced raw materials • Promotion of domestically-prepared body and auxiliary materials manufacturing sector • Improvement of import environment including reduction of import duties on raw and auxiliary materials • Strengthening of technological guidance by public research and development organs • Wider employment of foreign experts • Training of designers • Augmentation of public education and training organs and overseas study of employees • Promotion of industry development campaigns • Further activation of marketing operations at industrial organization level • Promotion of technological tie-ups with foreign enterprises and attraction of export-oriented foreign firms

2-6-2 Policy Recommendation

The ceramic industry may be roughly divided into the following four sectors in terms of the processes from the upstream to downstream sectors:

Fig. 2-6-2: Flow Chart of Ceramic Industry



The necessity for these sectors to be promoted while organically linked was already emphasized in the previous section. The most desirable pattern of linked development could be said to be one in which the marketing sector provides feedback on needs and trends of the overseas markets to the product manufacturing sector, and the product manufacturing sector, upon receiving that feedback, strives to improve its technology and seeks from the raw material and auxiliary material production and supply sectors the necessary types and qualities of materials, with improvements made in each of the sectors so as to raise the level of quality and realize greater exports.

Therefore, in promoting the ceramic industry, it becomes vital to link all the sectors from a comprehensive perspective and simultaneously to formulate programs tailored to the the issues of each individual sector.

There are diverse individual programs which may be considered, but to facilitate understanding of the overall framework of them, the four sectors are grouped into the following two fields and policies recommended based on the same:

[1] Raw material and auxiliary material production and supply sectors
[2] Product manufacturing sector and marketing sector

(1) Strengthening of Raw Material and Auxiliary Material Production and Supply Sectors

As already mentioned earlier, Indonesia has been generally slow in developing its ceramic material resources. Many resources remain untouched. Th product manufacturers also face major problems such as [1] the low quality of domestic raw materials and the insufficient quality and quantities of auxiliary materials, forcing them to use higher cost imported raw materials and auxiliary materials for the production of high quality products and [2] the great geographical distance between the domestic raw material production areas and product manufacturing centers, obstructing smooth distribution of the same and resulting in instability of supplies, in particularly limiting the range of use by small and medium sized manufacturers.

Therefore, the key issues in policies in these sectors may be said to be [1] the strengthening of development of raw materials, [2] the improvement of the quality of domestic raw materials and auxiliary materials, [3] the stabilization of supplies, and [4] the improvement of the import environment.

1) Strengthening of Development of Raw Materials

A systematic survey desirably should be made of the state of distribution of resources, amounts of reserves, and grades of quality for the main areas with such

resources. The survey could cover kaolin, plastic clay, feldspar, pottery stone, pyrophyllite, silica, gypsum, magnesite, dolomite, etc.

Under the cooperation of the IRDCRI, the Directorate of Mineral Resource of the Ministry of Mining and Energy, the MTDC, and the like can be expected to activate the survey activities. The results of the survey could be further improved if private companies would collect samples and send them to public organizations so as to contribute to the gathering of data.

The inspection and analysis of the quality of raw materials and applied research are also important activities. In this respect, it is hoped that the IRDCRI will be active.

2) Improvement of Quality of Domestic Raw Materials and Auxiliary materials

Regarding raw materials, the improvement of quality of the raw materials used for manufacturing tableware and novelties is an important issue. The problems are relatively small in the Type A companies making sanitary ware, which have established well organized procurement systems for raw materials including foreign produced materials, and in the tile manufacturers, where there is little need for strict sorting of raw materials.

As methods of improving quality, the following may be mentioned: [1] the establishment and thorough enforcement of sorting and grading standards, [2] the improvement of working and processing processes, [3] the promotion of mixing technology, etc.

The basic ways to improve quality, however, are to raise the awareness of quality in the production companies and self-help. Judging from the current conditions, however, where companies are facing shortages of manpower and technical expertise, the urgent topics for the time being are considered to be the establishment of grading standards by the MTDC and the IRDCRI as well as the strengthening of guidance over refining technology etc. It would be desirable that joint research be quickly promoted between the MTDC and the IRDCRI.

Regarding auxiliary materials, it will be necessary to start with the promotion of some leading companies. Judging from the demand, the items considered promising in terms of domestic production are saggars, supports, gypsum plaster molds, and transfer paper.

3) Stabilization of supply

Stabilization of the supply of raw materials and auxiliary materials for tableware and novelties is a particularly important issue. In the sanitary ware and tile manufacturing industries where the companies are relatively large in size, companies are developing materials on their own, manufacturing auxiliary materials, or setting up systems for procurement of the same, so the problems are relatively slight.

Methods for stabilizing supply could include [1] strengthening of development of materials, [2] promotion of auxiliary material manufacturers, [3] improvement of import environment for necessities for which domestic production would be disadvantageous, and [4] facilitation of physical distribution of raw materials.

The necessity for smoother distribution derives from the peculiar situation in Indonesia. Indonesia, compared with neighboring Thailand and Malaysia, has a large land area and resources scattered throughout it, but the majority of the product manufacturers are located in the large consumer region of Java, so the raw materials have to be transported a very long distance to the demand regions.

In this way, there are diverse policy issues, but it would be desirable to consider

comprehensive programs which could deal with them as much as possible as a package. One effective means for this would be to construct a central supply and distribution base for raw materials and auxiliary materials in Java, the product manufacturing center.

By way of note, in the ceramics producing regions of Japan, which are located at the sources of the raw materials, manufacturers of mixed materials, auxiliary materials, and products, distributors, etc. are all concentrated together. This offers the merits of improved quality and reduced costs through division of labor, the exchange and sharing of information among different sectors, a diverse selection of products, and a high name recognition by buyers. The introduction of such functions made possible by such a concentration could be a effective tool for Indonesia as well.

It would be impractical, however, to call together the many product manufacturers which are dispersed throughout Java, so that for the time being it would be practical to aim at centralization of storage and distribution facilities of raw materials, mixed materials, and producers and suppliers of auxiliary materials which are in the initial stages of development.

Construction of such a supply and distribution base would require a considerable preparatory period and massive funds. Further, of course, it is a plan which cannot be realized without the understanding and cooperation of a wide range of related sectors. It would be desirable to quickly launch the joint public-private policy promoting body mentioned in 2-5-6. "Establishment of Policy Coordinating Function" and have this taken up as a key long term issue at that body.

(2) Strengthening of Products Manufacturing Sector and Marketing Sector

The biggest issue in the products manufacturing sector is, of course, the achievement of a level of quality acceptable in the international market. Important issues in improvement of quality are, along with the previously mentioned grasp of the needs of the overseas market and securing of good quality raw materials and auxiliary materials, raising the abilities of the manufacturing sector such as [1] improvement of factory control, [2] improvement of quality control, and [3] strengthening of technology and product development capabilities.

On the other hand, the key issues in the marketing sector may be said to be [1] the collection of information on overseas markets and the feedback of the same to the manufacturing sector and [2] practical sales promotion activities.

These tasks of the product manufacturing and marketing sectors basically should be shouldered by the companies on their own. Policies toward this end were discussed in 2-5-3 to 2-5-7. At the present time, however, there are serious limitations how much companies can help themselves. Therefore, as already mentioned, establishment of a system of public support is considered necessary.

Such a support system could be expected to help not only the products manufacturing sector but also the raw material and auxiliary material sectors. Below, a concept for such a support system will be presented in line with this scenario.

1) Establishment of Support System

The support system desirably would be a joint public and private functional entity. As its implementing body, a joint body formed by the IRDCRI and the Indonesian Ceramic Association (ASAKI) in the product sector and the MTDC and Industrial Mineral Association in the raw material sector would be the most appropriate. With this method, these organizations and entities would organize a consultative body or engage in joint activities so as to establish a system enabling more effective promotion of technology and promotion of industry.

ASAKI was originally established by the initiative of IRDCRI. The IRDCRI is still a member of ASAKI, so the relations between the two are close. Further, the IRDCRI and MTDC have agreed on launching a working group for joint research with the Directorate of Mineral Resource (DMR) of the Ministry of Mining and Energy. The preconditions for the establishment of a support system would be even closer ties, strengthening of the functions of the respective institutes and organizations, and greater activities by the same.

2) Objectives of activities

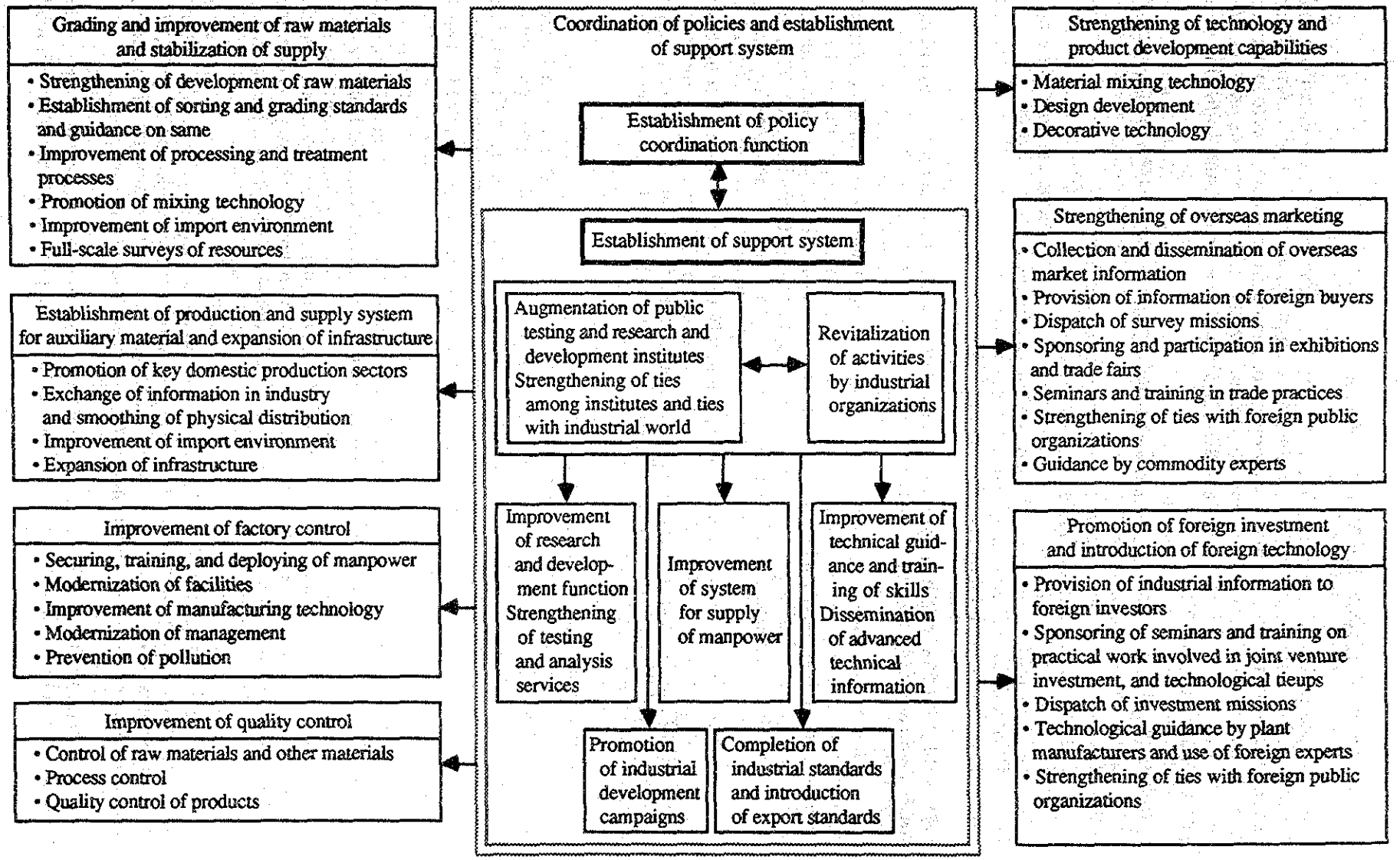
The following may be mentioned as specific objectives for the activities of the support system:

[1] Augmentation of the research and development function
[2] Strengthening and speeding of the testing and analysis services
[3] Establishment of a system for supply of manpower
[4] Augmentation of technological guidance, training of skilled workers and and dissemination of advanced technical information
[5] Completion of industrial standards and introduction of an export inspection system
[6] Promotion of industrial development campaigns
[7] Strengthening of overseas marketing
[8] Promotion of introduction of foreign capital and foreign technology

As seen above, the establishment of a support system covering all sectors - raw materials, auxiliary materials, product manufacture, and marketing - is envisioned as creating a central system for industrial promotion policies. The relationship between the establishment of a support system and the various promotion measures is illustrated in Fig. 2-6-3 "Scenario of Industrial Promotion Plan".

Specific programs in line with the above recommendation will be presented in the following section.

Fig. 2-6-3: Scenario of Industrial Promotion Plan



2-6-3 Recommendation on Main Programs

In the policy recommendation of the previous section, it was pointed out that "strengthening of raw material and auxiliary material production and supply sectors" and "strengthening of the product manufacturing sector and marketing sector" were important. In this section, specific programs will be presented in accordance with this concept. As seen in Fig. 2-6-4 "Promotion Measures for Ceramic Industry", the following five programs are recommended:

[1] Strengthening of development of raw materials and promotion of raw material and auxiliary material industries
[2] Construction of raw material and auxiliary material estate
Programs as the establishment of a support system
[3] Improvement of public testing and research and development institutes and strengthening of ties among institutes and ties with the industrial world
[4] Revitalization of activities of industrial organizations
[5] Establishment of policy coordination function

(1) Program 1: Strengthening of development of raw materials and promotion of raw material and auxiliary material industries

This program has as its object the surveying and development of unconfirmed resources so as to promote the use of domestic resources and the strengthening of the raw material and auxiliary material industries in areas of both quality and supply capabilities so as to develop those industries and secure stable supplies of good quality raw materials, improve quality of products, and lighten manufacturing costs in the manufacturing sector.

Specifically, it is recommended to [1] conduct "a full-scale survey of resources of raw materials" so as to strengthen the development of raw materials and [2] "strengthen technical guidance to raw material producers" and "introduce foreign capital and foreign technology into the auxiliary material industries" so as to promote the raw material and auxiliary material industries.

1) Full-Scale Survey of Resources of Raw Materials

This survey would be handled primarily by the Ministry of Mining and Energy and the MTDC with due coordination with the IRDCRI. An essential condition would be the full cooperation of the Industrial Mineral Association and the companies under its umbrella in the form of provision of samples. Further, it is recommended that technical cooperation be obtained from foreign research and development organizations when a certain amount of data has been collected.

The materials which should be surveyed judging from their promise in view of reserves of resources and demand would be include kaolin, plastic clay, feldspar, pottery stone, pyrophyllite, silica, gypsum, magnesite, dolomite, etc. Of high priority among them are kaolin, feldspar and pottery stone. The development of such resources would enable a considerable degree of import substitution of raw materials. The regions covered cannot be determined until viewing the results of studies on samples collected in the future.

It would be practical to increase the size of the survey step by step. Ceramic materials are generally cheap. Even if the quality of samples collected is good, the materials would be economically impractical to develop if a vast amount of expenses would be involved in the development and such surveys would be meaningless.

Therefore, as a first step, samples of representative raw materials produced in each area should be collected and tested and data on the production sites, terrain, road

situation, difficulty of development, and relationship with nearby industries should be collected and studied. In particular, collection of samples will be important. Once this is done to a certain extent, it will be possible to estimate the distribution of raw materials and their grades and possible to judge the feasibility of development.

If development is considered feasible, then as a second stage the MTDC and IRDCRI will move on to joint exploratory mining and quality tests.

If as a result it can be confirmed that the quality is stable and there are sufficient reserves, then as a third stage it would be possible to start planning for full-scale mining. At this stage, solicitation of technical assistance (in the fields of geology, ceramic materials, resourse development, product development and etc.) from foreign organizations could be considered.

2) Strengthening of Technical Guidance to Raw Material Producers and Introduction of Foreign Capital and Foreign Technology to Auxiliary Material Sector

a) Strengthening of Technical Guidance to Raw Material Producers

The main areas of guidance would be to promote thorough sorting of raw materials and, toward this end, the establishment of grading standards and improvement of refining processes. In particular, guidance for improvement of refining processes would be stressed.

The main materials requiring refining processes are plastic clay and feldspar. These would be the main items for which guidance would be provided. Among these, kaolin is consumed in large quantities for papermaking and other industries as well, so the ripple effect of the improvement of quality would be large.

It is generally more economical to perform the refining at the mining site. Therefore, the MTDC and IRDCRI preferably should jointly make the rounds of mining sites to provide guidance on improvement of facilities and control of the same. Note that depending on the amount of demand and the grade required, it would be considered economical to establish a collection center at the product manufacturing sites and to control the material all together there.

A grasp of the situation concerning raw material producers was not obtained so that it is difficult to mention anything about investment policies and other industrial promotion measures for this sector. In general, consideration may be given to studying the introduction of foreign capital into the refining sector, which requires a relatively high level of technology. So long as high grade materials are not discovered, however, it is considered that the probability of the entry of foreign capital would be low. A more practical approach would be the introduction of technological tie-ups with foreign companies.

b) Introduction of Foreign Capital and Foreign Technology to Auxiliary Material Sector

In this sector, where the industry itself is still undeveloped, it is recommended to start with the promotion of investment. Consideration may be given to the expansion of existing factories and establishment of new factories, but there are few manufacturers and their levels of technology are low, so the establishment of new factories would be essential.

Promotion of this sector, which supports the domestic products manufacturing sector, preferably should be done by Indonesian capital. It is hoped that a study will be made of the feasibility of joint investment by large products manufacturers and raw material producers, etc.