## 2. Examination of Countermeasures

### 2-1. Textiles

#### 2-1-1. Summary of Problems and Countermeasures

Structurally, the Thai textile industry features the characteristics of an import substitution industry, a remnant from the start of the industry in the 1960s. Partly due to this, monopolistic systems are evident in the upstream sector, particular the synthetic fiber materials and spinning stages. These features lead to the high domestic price of yarn and woven fabric and to the insufficient volume, quality, variety, etc. of materials supplied to the garment sector.

As a possible countermeasure for all of this, it is considered necessary in the medium and long run to ease restrictions on facilities and lower duties on yarn and woven fabric so as to enable the market mechanism to work. Before this is done, however, the most urgent necessity is the promotion of investment in the midstream sector, in particular the production and processing of garment materials, including promotion of foreign investment and joint ventures. For this, flexible application of BOI investment incentives would be necessary.

In terms of facilities, the massive buildup of facilities in the upstream sector (spinning) now underway poses fears of an imbalance between the capacities of facilities in the upstream and midstream sectors (weaving, dyeing, printing, etc.) Further, throughout the upstream and midstream sectors, facilities lean toward production of standard items. These are matters for concern from the viewpoint of the supply of materials for garment production.

Further, the monopolistic systems in the upstream sector, the policy of high tariffs on machinery, yarn, and woven fabrics etc., and the lack of prospects for the future, have resulted in companies having a strong tendency to pursue expansion of the volume of their production, expecting only a short-term profit. This has led to slow modernization of facilities and will pose a major problem in the future from the viewpoint of international competitiveness.

As a countermeasure for this, it will first be necessary to lift restrictions on facilities in the midstream sector, in particular weaving, knitting, printing, etc., and promote investment in those fields. Along with this, to promote replacement and modernization of textile machinery, it would be considered effective to establish specific promotion measures.

As to problems in technology and information, a major problem is posed by the lack of up-to-date specialized technology and know-how in the midstream sector (weaving, dyeing, etc.) Further, the lack of a converter function linking the upstream, midstream and downstream sectors may be said to be due to the "lack of 'soft' technology". Further, the shortage of engineers and skilled laborers, a problem similarly seen in numerous industries, is serious in the textile field. An overall lack of information in the midstream and downstream sectors is also an important problem in the textile industry.

A possible countermeasure for these problems in technology would first of all be promotion of foreign investment and joint ventures in the midstream sector. Along with this, it would be effective to promote foreign investment and the establishment of joint ventures etc. for the promotion of companies with converter functions as well. Of course, improvement of the education and training provided at vocational schools, the TID, etc. would also be important.

To deal with the problems in information, it is considered necessary, for example, to stimulate the exchange of information in the midstream and downstream sectors through the formation of an information network, the publication of journals, etc.

Regarding the TID system and functions, first there is the problem that the functions are spread out over too many fields. The next important problem is that there is a shortage of training and inspection machinery and equipment and what there is is antiquated. Further, there is a shortage of instruction and inspection staff and also a shortage in terms of budget and operation expenses.

To eliminate the problems, breathe new life into the TID, and ensure its effective use, it would first be necessary to select key functions of the TID and then strengthen and improve those functions. It would be important to replace and modernize the machinery and equipment for the selected functions and then to improve the content of the services. Further, it is considered necessary to strengthen the collection and provision of technical information and improve training and seminars. Judging from the current state of the textile industry, it is believed to be unavoidable that the principle of the beneficiaries paying for the series of services offered by the TID be introduced and that through this a sufficient financial foundation be built to enable securement of operation costs and flexible replacement of equipment.

In addition to this, in terms of the infrastructure of the textile industry, there are the problems of water supply and waste water in the dyeing and printing sectors. Regarding this, it may be pointed out that the lack of knowledge about water supply and waste water is a widespread problem. Further, fears over shortages of water supply, which already exist, pose a problem which cannot be overlooked. Another major problem

for the future is the fact that the heavy fund burdens for water treatment are dampening corporate investment in the dyeing and printing sectors, which Thailand wishes to improve.

As a countermeasure for these problems, first, consideration may be given to the strengthening of training and seminars at the TID and industrial organizations so as to disseminate information regarding water supplies and waste water. In the medium and long run, it will be necessary to establish public industrial water supply and waste water facilities. It would be effective to provide low-interest financing for water treatment facilities to companies making new investments. However, judging from the importance of the dyeing industry in Thailand in the future, the most effective measure probably would be to promote the establishment of industrial estates for dyeing which are provided with a water supply and waste water treatment infrastructure.

Finally, there are several important problems regarding overall policies for the textile sector. One is the lack of a future vision of the industry. This causes apprehensions in the private sector concerning the future. One reason for this is that the industry has inherited the old import substitution type industrial policies and even today has remnants of controls and protective measures. Further, problems have spawned from this, including the imbalance among textile sectors. This problem is now beginning to manifest itself and is an important one for policy makers.

To deal with these problems, it will be necessary for the government and the private sector to deliberate and come out with a long term development policy covering both the textile and garment sectors and to formulate a future image (vision) of the industry. This vision must be formulated in a way promoting liberalization and the action of the market mechanism. Further, it will be important to ease the existing restrictions and protective measures step by step and in line with the vision and to give advance warning of the schedule for this. The report in a survey of the British garment market that "Thailand has yet to escape from its protectionist image" speaks of the need for this.

Comparing Thailand with key rival producing nations, there are marked differences in the linkage between the midstream and downstream sectors. In Korea, the majority of the garment materials are supplied domestically. The same is true for Taiwan. Hong Kong produces only a little material domestically and imports the majority of it, but improvements in the processing stage after the midstream sector have resulted in the formation of a desirable linkage.

Thailand imported 15.0 billion bahts worth of yarn and woven fabrics in 1987 while exporting 36.0 billion bahts worth of garments. Further, a look at 1987 shows that the rate of increase in exports of garments (77 percent over the previous year) was paralleled by a rate of increase in imports of yarn and woven fabric (56 percent). This

proves the lack of linkage in Thailand and stresses the need for improvement of the situation.

## Table 1. Main Problems and Countermeasures: Textiles

| Item | Problems | Possible Countermeasures |
|---|---|---|
| **Industrial Structure and Market** | • Remnant of characteristics of import substitution type industries<br>• Monopolistic system in upstream sector (in particular man-made fibers)<br>• High domestic prices of yarn and woven fabric<br>• Insufficient supply of materials to garment sector (in quantity, quality, and variety) | • Easing of restrictions on equipment and lowering of tariffs on yarn and woven fabrics (medium and long term)<br>• Promotion of investment (foreign investment and joint ventures) in midstream sector (in particular production and processing of garment materials)<br>• Flexible application of BOI investment incentives |
| **Equipment** | • Imbalance between upstream (spinning) sector and midstream (woven fabric, dyeing, etc.) sector after increasing installation<br>• Preference toward production of standard items<br>• Delay in modernization of equipment | • Lifting of restrictions on equipment in midstream sector (in particular weaving and knitting) and promotion of investment there<br>• Measures to promote replacement and modernization of textile machines (exemption from restrictions on equipment, temporary abatement of import duties, preferential treatment in taxation and financing, etc.) |
| **Technology and Information** | • Lack of updated specialized technology and skills in midstream (woven fabric, dyeing, etc. ) sector<br>• Lack of converter functions<br>• Lack of engineers and skilled laborers<br>• Lack of information concerning mid and downstream sectors | • Promotion of foreign investment and joint ventures in midstream sector<br>• Promotion of companies with converter functions (including attraction of foreign investment and promotion of joint ventures)<br>• Expansion of education and training at technical schools, TID, etc.<br>• Active use of foreign experts and roving guidance by industrial organizations<br>• Stimulation of exchange of information (for example, formation of information network) |
| **TID System** | • Insufficient and antiquidated machinery and equipment for training and testing<br>• Insufficient guidance and testing staff<br>• Insufficient budget and running fee | • Selection of main functions of TID and strengthening and expanding of same<br>• Replacement and modernization of machinery and equipment<br>• Strengthening of collection and supply of technical information<br>• Expansion of training and seminars<br>• Introduction of principle of costs borne by beneficiaries |
| **Infrastructure** | • Insufficient knowledge about water supply and wastewater<br>• Fears of insufficient water supplies<br>• Heavy fund burden in water treatment in dyeing sector | • Strengthening of training and seminars at TID, industrial organizations, etc.<br>• Establishment of public water supply and sewerage facilities<br>• Low interest financing for water treatment related facilities<br>• Establishment of industrial estate for dyeing |
| **Institution and Policies** | • Lack of vision for future<br>• Remnant of controls and protective measures<br>• Imbalance between textile sectors | • Formation of medium and long term vision covering both textile and garment sectors (in direction of positive use of market mechanism)<br>• Step-by-step easing of restrictions and protective measures (medium and long term) |

### 2-1-2. Examination and Summary of Countermeasures

Countermeasures for problems in the textile industry were examined and broken down into three groups: 1) basic policies, 2) TID functions, and 3) education and training. In examining these, we took into consideration the fact that many garment manufacturing countries are sourcing the majority of their materials from within their own countries.

Regarding 1) basic policies, the most important tasks at the present time are quick expansion of facilities, particularly in the midstream sector (particularly for weaving, knitting, dyeing, printing, etc.), and promotion of investment and technical transfers leading to production of diverse garment materials of a good quality.

Among the series of countermeasures, there are two important points: easing or scrapping of restrictions on facilities and promotion of investment and joint ventures in the midstream sector. Further, it is necessary to reduce import duties on textile-related equipment and parts and to offer tax and financial incentives to promote modernization of machinery and equipment in the textile sector overall. Further, promotion of companies provided with "converter functions" which help to strengthen the linkage of the upstream sector and the mid-stream and downstream sectors should be emphasized.

In the survey of the U.S. market, garment buyers gave as an important requirement for the garment exporting country "how much material it can supply domestically". This is due to the importance of being able to react quickly to changes in market trends. The ability to supply materials is necessary in forming a good image as a garment exporting nation.

On the other hand, the need to establish a clear image of the future for the textile industry as a whole should be reconfirmed. For this, formulation of a "vision for the textile industry", which sketches what the textile industry (including garments) will ideally be like after five and 10 years, is essential. Along with the same, it will be necessary to draw up a schedule for the easing or scrapping of restrictions and protective measures, the reduction of tariffs on yarn and woven fabrics, etc. In this regard, the cases of Korea and Taiwan, whose industries grew through conversion from the import substitution type to the export-oriented type, are useful references. In the field of textiles, the Asian NIEs, followed by the ASEAN nations, China, and India and further Turkey, Portugal, Latin America, Eastern Europe, etc., are making rapid inroads into the world market, and thus there is not a great deal of time left for strengthening Thailand's international competitiveness.

Further, as indicated in the results of the survey in Hong Kong, improvement of the supply of materials to the garment industry tends to mean larger benefits to the

midstream sector than to the upstream sector in the textile industry. It should be confirmed that the Thai textile industry is fated to head in that direction too.

On the other hand, in order to lighten the burden of investment in water treatment in the dyeing and printing industries, it is important to enlarge water supply and waste water facilities through public investment or to promote the establishment of "industrial estates for dyeing". Toward this end, industrial water supply and waste water systems should be established, and feasibility studies on the formation of industrial estates should be made as soon as possible to promote the construction of industrial estates by the IEAT or private concerns.

As a measure for the revitalization and use of the TID (Textile Industry Division), it would be effective to select the three functions of training, inspection, and information as key functions and to expand and strengthen the same. To make this possible, stress was laid on the need to promote the augmentation and modernization of training and inspection facilities and equipment. It will also be necessary, on the one hand, to augment the inspection function and, on the other hand, to strengthen the training in skills and technology in the midstream sector, in particular special fabrics, dyeing, printing, etc. Further there is the need for introducing the principle that the burden of costs is to be borne by the beneficiaries and that services should carry charges, through cooperation with industrial organizations etc. Charges are paid for these types of services in many cases in Japan, Korea, Taiwan, etc. In particular, there are quite a few public organizations among the inspection organizations which are self-supporting.

In addition, there is the need for augmenting textile-related departments in the universities and textile-related courses in the vocational schools, and securing the necessary teachers and instructors is a precondition of this. Moreover, active use should be made of private sector experts to assure the provision of teachers or instructors.

## Table 2. Examination of Countermeasures: Textiles

| Topic | Possible Countermeasures | Specific Countermeasures | Details |
|---|---|---|---|
| **Basic policies** | | | |
| • Quick improvement of facilities in midstream sector (in particular, weaving, knitting, dyeing, printing, etc.) | • Easing or scrapping of restrictive measures on facilities by government | • Easing of restrictions on facilities | • Take necessary action after examination at TIDC |
| | • Step by step lowering of tariffs on yarn and woven fabrics | • Reduction of tariffs (yarn and woven fabrics) | • Same as above (however, precondition is formulation of vision) |
| • Promotion of investment and technical transfers leading to production of diverse types of garment materials of good quality | • Promotion of investment and joint ventures in mid-stream sector | • Flexible application of BOI investment incentives<br>• Promotion of investment and introduction of companies for joint ventures | • Dispatch and receipt of investment missions and introductions of companies for joint ventures and tieups |
| | • Lowering of tariffs on textile-related equipment, components, dyes, etc. | • Tariff rollbacks (equipment, components, dyes, etc.) | • Appeals to the Ministry of Finance |
| • Replacement and modernization of facilities in upstream (spinning etc.) and midstream sectors | • Promotion of replacement and modernization of machinery and equipment through extension of tax and financial incentives | • Formation of detailed measures for sector promotion<br>• Active use of institutional financing | • Formulation of sector-wise promotion measures and application of pressure on Ministry of Finance etc. for making them a reality |
| | • Lightening of burden of investment into water treatment in the dyeing and printing industries through the augmentation of water supply and wastewater facilities by public investment or the promotion of establishment of industrial estates for dyeing. | • Establishment of industrial water supply and wastewater systems<br>• Construction of industrial estates by IEAT or private interests<br>• F/S studies on establishment of industrial estates | • Establishment of environment for promotion of investment and joint ventures in dyeing and printing sectors<br>• As the next step, promotion of investment (covering possibility of investment from NIE's) |
| • Strengtheing linkage within textile and garment industry | • Promotion of companies with "converter function" helpful in strengthening linkage of upstream sector and midstream and downstream sectors | • Holding of seminars<br>• BOI investment incentives<br>• Promotion of investments and introduction of companies for joint ventures | • Raising of awareness of need for converter functions and enticement of companies and promotion of joint ventures<br>• Promotion of technical transfers in "soft" fields |
| • Formulation of vision for textile industry | • Sketching of what textile industry (including garments) should be like five and 10 years from now | • Preparation of schedule for easing and scrapping of restrictions and protective measures | • Formulation of vision through consultations between government and industry and preparation of schedule for realization of same |
| **TID (Textile Industry Division)** | | | |
| • Selection and strengthening of key business and functions (for example, training, inspection, information, etc.) | • Augmentation and modernization of training and inspection facilities and equipment | • Augmentation and modernization of facilities and equipment | • As part of rehabilitation of TID, combination of arrangement of materials and invitation of experts |
| | • Augmentation of inspection functions | • Fostering of inspection experts | • Augmentation of TID training and inspection functions, establishment of association of users, and |

**Table 2. Examination of Countermeasures: Textiles**
(Continued)

| Topic | Possible Countermeasures | Specific Countermeasures | Details |
|---|---|---|---|
| | • Strengthening of training of skills and technology in midstream sector (in particular special fabrics, dyeing, printing, etc.) | • Strengthening of technical training at TID<br>• Fostering of instructors<br>• Holding of seminars and workshops | rehabilitation through introduction of principle of payment for services by beneficiaries |
| | • Strengthening of collection and provision of information | • Augmentation of information activities<br>• Publication of textile information journal | |
| • Insufficient budget and running funds | • Augmentation of services such as inspection, training, and information supply and charging for same (introduction of principle of beneficiaries paying for services) | • Invitations to organization experts<br>• Preparation and realization of charging system<br>• Establishment of users association | • Application of pressure on Ministry of Finance etc. for realization of special fund |
| • Promotion of cooperation with related industrial organizations | • Strengthening of cooperative relations with Department of Export Promotion (DEP) of Ministry of Commerce (in particular regarding collection of overseas information) | • Strengthening of cooperation between DIP and DEP | • In particular, seeking cooperation of DEP in collection of overseas information for publication of afore-mentioned information journal |
| **Education and training**<br>• Improvement of level of technology throughout all fields of textile industry | • Augmentation of textile related departments in universities and textile related courses at vocational schools | • Application of pressure on Ministry of Finance and other related ministries | • Promotion of plans now underway for augmentation of universities |
| • Augmentation of education and training for engineers and skilled workers | • Securement of teachers and instructors | • Promotion of use of private experts<br>• Engagement of experts at private level | • In medium and long term, promotion of research and development in textile and polymer fields (obtaining cooperation of TID). |

## 2-2. Garments

### 2-2-1. Summary of Problems and Countermeasures

One of the problems in the industrial structure of Thai's garment industry is, as has already been made clear in the section on the textile sector, the large limitations in the area of procurement of materials, that is, the high reliance on imports and the high price of domestic products. Next, it is important to note that garment exports fall under the export quota system of the MFA (Multinational Fiber Agreement), which blocks free expansion of exports. Further, the lack of converter functions in Thai industry is believed to have led to the aforementioned limitations in the procurement of materials. In addition, most small and medium sized companies still cannot convert to export orientation and the garment sector still does not have enough subcontractors. As a result, it is not easy for Thailand to enlarge its production capacity. Another problem that may be pointed out is that Thai companies are not sufficiently specialized.

Countermeasures for this situation include, first of all, basic policy measures such as the easing of restrictions on facilities, the lowering of tariffs and the promotion of investment in the midstream sector, as already mentioned in the section on the textile industry. To deal with the MFA quota system, it will be necessary to promote exports of nonquota items in nonquota markets. Also important will be the promotion of converter functions and the stimulation of exchanges of information among textile-related sectors. Further, it will be necessary to strengthen export training, seminars, and business introductions for small and medium sized enterprises. For promotion of sewing subcontractors, these are considered effective for expansion of production capacities.

In the area of facilities, two facts stand out: Medium-sized and smaller manufacturers have much antiquated machinery remaining and have few specialized machines overall. Further, medium-sized and smaller manufacturers lack sufficient maintenance personnel for their machinery. This may be considered a major problem.

To deal with these problems, it will be necessary, particularly for replacement and modernization of facilities and machinery, to temporarily reduce or waive import tariffs for sewing machines. Further, with regard to capital investment, it would be effective to provide special measures for promoting small companies and subcontractors. On the other hand, it is considered necessary to augment education, training and seminars at vocational schools, industrial organizations, the TID, etc. to secure and build up maintenance personnel for the machinery.

Regarding production activities and technology, one may first point to the problem of the lack of a training function for garment production in the TID (Textile Industry

Division), which is the only public service organization for the textile industry. This leads to problems such as the unfamiliarity of the industry as a whole with the basics of production control and process control and to the overwhelming shortage of engineers, technicians, and pattern makers. Relating to this point, it was pointed out that there was still much room for improvement in the quality of garments made in Thailand and that the loss on personnel expenses was large in most companies, i.e., work efficiency was poor.

As countermeasures for this, the addition of a training function for garment production to the TID would be essential. Further, it will be necessary to augment education and training in the vocational training centers and vocational schools with regard to garment production. In particular, it would be desirable, if possible, to switch the courses in dress making, which are common in public and private vocational schools, over to courses in industrial production. In relation to this, it would be effective to build a "model factory" for providing practical training and practice and to use the same for visiting inspections and training. For this training and practice, it would be essential to secure the requisite instructors. Consideration should be given to the use of private experts for this. Further, strengthening of the collection and provision of technical information by the TID could be expected to be effective as a countermeasure for this.

Regarding marketing and export promotion, the large number of companies among present-day Thai garment manufacturers which are satisfied with subcontracting for foreign buyers will be a large problem in the future. In relation to this, almost all manufacturers still rely on foreign buyers for designs and brands, so there is the problem of insufficient awareness of designs and brands. Further, there is a shortage of designers for handling such activities. Another major point is that there is insufficient information about foreign markets to enable promotion of design activities in this industry.

To resolve these problems, it would, for example, be necessary to strengthen the collection and provision of information regarding foreign markets and the training, seminars, etc. on exports. Similarly, it would be effective to have Thai garment companies positively participate in overseas exhibitions. To raise the awareness of designs and brands, it should be beneficial to offer frequent measures of encouragement.

In relation to industrial policies, there are fundamental problems such as a "lack of future vision" and "insufficient linkage with the textile industry", just as pointed out with regard to the textile industry. One of the main reasons for this is clearly the lack of exchange of information among related sectors. Further, in relation to this point, it may be pointed out that the Thai garment industry at the present time still relies solely on "cheap wages" and therefore there remain apprehensions over future competitiveness. Still further, in relation to government, one cannot overlook the lack of involvement of the TID in the garment sector.

As a countermeasure for this, it would first be necessary to formulate a medium and long range vision, just as mentioned in relation to textiles. Further, it would probably be effective for the government to tackle the promotion of converter functions and stimulation of exchanges of information. Also, a training and information function for garments should be added to the TID and made use of. This should be one of the essential actions taken by the government.

Regarding the current state of the garment industries of rival countries, Korea and Taiwan are also hampered by the tough quota allocations of the U.S. and are suffering from the rise in the value of their currencies on the foreign exchange market, soaring wages, etc. Thus they are continuing to shift their production capacities overseas (in particular, to Southeast Asia). Hong Kong, more flexibly, is moving its production capacity to Southeast Asia, China, etc., while Hong Kong itself is changing in nature to a center for midstream sector processing, marketing, etc. In the future, whether or not the Thai garment industry can handle a large portion of the work of the production bases moving southward will be the key to its development.

The garment industries of Korea, Taiwan, and Hong Kong are pouring efforts, with government support, into the improvement of product quality and added value and the establishment of design development capabilities and brand images. However, this type of development assumes as a precondition long years of development of human resources and for this reason alone results are not expected to come easily. In the future, Thailand will be pressured from below by low-wage countries such as China and Indonesia and the Thai garment industry will probably have to begin work on the development of human resources quickly.

## Table 3. Main Problems and Countermeasures: Garments

| Item | Problems | Possible Countermeasures |
|---|---|---|
| **Industrial Structure and Market** | • Large restrictions on procurement of materials (high import dependence) and high prices<br>• Export quota system under MFA (Multilateral Fiber Agreement)<br>• Lack of converter functions<br>• Insufficient conversion of medium and small businesses (to export orientation)<br>• Underdeveloped state of subcontractors<br>• Insufficient specialization | • Easing of restrictions on equipment in textile sector, reduction of tariffs, promotion of investment in midstream sector, etc.<br>• Promotion of exports of nonquota items and to nonquota markets<br>• Fostering of converter functions and stimulation of exchange of information<br>• Reinforcement of training, seminars, and business introductions for exports for small and medium sized enterprises<br>• Buildup of subcontractors in sewing on local level<br>• Training and seminars for specialization |
| **Equipment** | • Large numbers of antiquidated machinery remaining<br>• Small number of specialized machines<br>• Insufficient machine maintenance personnel | • Temporary abatement of tariffs on imports of sewing machines, institutional financing of capital investment by small and medium enterprises, lease system for subcontractors, etc.<br>• Expansion of training and seminars at schools, industrial organizations, TID, etc. |
| **Production Activities and Technology** | • No TID functions for training in garment production<br>• Unfamiliarity with basics of production and process management<br>• Insufficient engineers, technicians, and pattern makers<br>• Still large room for improvement on quality<br>• Large loss in personnel expenses (poor work efficiency) | • Expansion of education and training at technical schools, TID, etc.<br>• Designation of "model factories" and use of same for improvements, teaching by example, and training<br>• Reinforcement of training and guidance by active use of private experts<br>• Reinforcement of collection and supply of technical information at TID |
| **Marketing** | • Large number of companies satisfied with subcontracting for foreign buyers<br>• Insufficient awareness of designs and brands<br>• Insufficient designers<br>• Insufficient information on overseas markets | • Collection and supply of information on foreign markets and reinforcement of training, seminars, etc. on exports<br>• Promotion of participation in overseas exhibitions<br>• Training and seminars to raise awareness of designs and brands<br>• Incentives for training of designers<br>• Formation of fashion street in Bangkok (medium and long term) |
| **Institution and Policies** | • Lack of vision for future<br>• Underdeveloped linkage with textile industry<br>• Insufficient exchange of information with related sectors<br>• Remaining unease about future competitiveness<br>• Insufficient role of TID in garment sector | • Formation of medium and long term vision (in common with that for textiles)<br>• Promotion of converter functions<br>• Stimulation of exchange of data<br>• Reinforcement of training and information functions of TID (on garments) |

### 2-2-2. Examination and Summary of Countermeasures

Countermeasures for problems in the garment industry were examined and broken down into five groups: 1) basic policies, 2) TID, 3) education and training, 4) export promotion, and 5) others.

Regarding 1) basic policies, there is a need for strengthening of the linkage with the upstream and midstream sectors and toward that end the promotion of companies with converter functions, just as in the examination of measures for the textile sector. A more important issue in this sector, however, is the expansion of the production capacity for garments. For this, pushing forward with promotion of small and medium sized garment companies and a subcontracting system, including those on the "local level," is important.

Further, as a specific measures for this, active use of institutional financing for promotion of small and medium sized companies, training and seminars in the fostering of a subcontracting system and further technical training on garment production at the local level would be effective. Still further, in promoting small and medium sized enterprises and a subcontracting system, maintaining the level of technology and quality while expanding production capacity is also important.

The garment industry requires relatively small initial investment and further production technology can be acquired in a relatively short term. Thus persons or enterprises with very small, small, or medium capital can relatively easily begin businesses in it. Further, demand in the markets of the advanced nations has been becoming more individualistic and diversified in recent years and, in this sense, small and medium sized enterprises are said to be increasingly superior due to their ability to handle small lots. In actuality, the garment industries in the key garment producing nations of the world developed due to the activities of small and medium sized companies rather than large ones. Even today, the small and medium sized companies form the mainstream of the industries.

The Thai export garment industry is currently based on large sized companies, but to promote activity in the industry, to enable a rapid increase in productivity, and to strengthen competitiveness, promotion of small and medium sized companies and, further, the promotion and active use of subcontractors, will be highly important.

For the same reasons, garment production is relatively easy to develop in rural farming regions far away from the major metropolitan areas. Thailand faces the problem of overconcentration of the population in Bangkok and has made regional economic development a national project. In view of this situation, the development of garment production activities on the local level would be extremely meaningful. However, this

would assume, of course, the preparation of the necessary infrastructure and the promotion of sufficient skilled workers, engineers, and other human resources.

The TID (Textile Industry Division) should be given a training function with respect to garment production. Further, introduction of the principle of beneficiaries paying for services through cooperation with industrial organizations, establishment of a charging system, etc. is essential. In this regard, the possibility of using the method of establishing a users' association should be considered.

Regarding education and training, it is urgent to raise the overall level of technology and augment the education and training of engineers and skilled laborers. Toward this end, there is a need to augment and strengthen education and training at every stage, e.g., vocational schools, dress making schools, vocational training centers, etc. In particular, development of human resources for process control in garment production is an urgent task.

To develop human resources, it would be effective to augment and strengthen garment courses at vocational schools and dress making schools and to establish "model factories" for garment production at vocational schools or vocational training centers. Further, it would be necessary to secure sufficient teachers for this, but experts from the private sector could be used for this.

However, there are several different ideas regarding the most suitable way to split training for production of garments among the TID, vocational schools, dress making schools, vocational training centers, etc. In particular, there are doubts regarding the cooperation of dress-making schools in industrial training.

Regarding designs and brands, the most important thing of all is to make the garment industry aware of the importance of designs and that with this awareness, it will be possible to seek cooperation in the fostering of designers. Specific measures for promotion of designers might include education and training at vocational schools and the establishment of incentives for fostering designers, such as holding design contests and giving winners cash prizes and opportunities for overseas study. In this regard, full consideration should be given to the fact that in the garment markets of advanced nations like the U.S. and the U.K., overall demand is moving in the direction of greater individuality and diversity.

In addition, raising companies' interest in exporting, even those with no prior experience in it, augmenting provision of overseas information, etc. are important. Also, sponsoring "Thai Fashion Weeks" in key foreign markets with the cooperation of the silk, jewelry, and other industries and creation of a "Fashion Street" in Bangkok (together with silk products, jewelry, etc.) would be effective in improving the image of Thai fashion.

Surveys in the markets of third countries such as the U.S., U.K., and West Germany showed that Thailand already has a reputation for "supplying good quality products", but Thai garments still often have the image of being "cheap and crude". This is extremely significant. It is essential that only high quality products be exhibited.

Note that when examining countermeasures for the textile and garment sectors and summarizing the same, quite a few common problems were appeared, such as the lack of linkage between related sectors and the functions of the TID. Therefore, it was judged that when formulating a program it would be suitable to consider the textile and garment sectors together.

## Table 4. Examination of Countermeasures: Garments

| Topic | Possible Countermeasures | Specific Countermeasures | Details |
|---|---|---|---|
| **Basic policies**<br>• Strengthening of linkage between upstream and midstream sectors | • Promotion and strengthening of companies with "converter functions" | • BOI investment incentives<br>• Promotion of investment and introduction of companies for joint ventures | • Common problem with textiles |
| • Expansion of garment production capacity | • Promotion of small and medium sized garment companies<br>• Promotion of subcontracting system | • Active use of institutional financing for promotion of small and medium sized companies<br>• Training and seminars for promotion of subcontracting system<br>• Training of skills for garment production at local level | • Maintaining level of technology and quality while increasing production capacity through promotion of small and medium sized companies and subcontracting system (including at local level) |
| **TID (Textile Industry Division)**<br>• Selection of key business and functions | • Strengthening of training and inspection functions | • Buildup of instructors and inspectors (engagement of experts and dispatch of trainees) | • In particular, strengthening of training function for production control and process control for garments and reeducation of engineers |
| • Expansion and strengthening of training function (in particular for garment production) | • Expansion of seminars and training courses<br>• Introduction of principle of beneficiaries paying for services | • Expansion and modernization of traiing and inspection machinery<br>• Strengthening of training functions<br>• Detailed structuring of charging system | |
| • Promotion of cooperation with industrial organizations | • Strengthening of collection and provision of information (publication of "textile information journal", strengthened cooperation with DEP, etc.) | • Strengthening of information activities<br>• Issuance of journal | • Together with textiles (issuance of journal for both textile and garment industries) |
| • Insufficient budget and running funds | • Expansion of services and charging for same | • Introduction of principle of beneficiaries paying for services<br>• Strengthening of cooperative relations with industry<br>• Establishment of users association | |
| **Education and training**<br>• Overall improvement of level of technology | • Augmentation and strengthening of garment courses at vocational schools (including dress making schools) | • Strengthening of pressure to related ministries, vocational schools, etc. | • Augmentation of education in skills for "industrial production" of garments |
| • Augmentation of education and training for engineers and skilled workers | • Establishment of "model factories" for garment production in vocational schools<br>• Securement of teachers and instructors | • Fostering of instructors (engagement of experts and dispatch of trainees)<br>• FS for establishment of model factories<br>• Use of private sector experts as instructors | • Fostering of skilled workers for production control and process control |

## Table 4. Examination of Countermeasures: Garments
(Continued)

| Topic | Possible Countermeasures | Specific Countermeasures | Details |
|---|---|---|---|
| • Raising of awareness of designs and brands | • Incentives for promotion of designers | • Sponsoring of design contests<br>• Cooperation with garment industry<br>• Dispatch of trainees | • Raising awareness of importance of design in garment industry and seeking cooperation for training of designers |
| **Export promotion**<br>• Raising interest in exports | • Holding seminars on garment exports, designs and brands, etc. | • Engagement of experts and holding of seminars | • In particular, promotion of exports of domestically oriented small and medium sized garment manufacturers |
| • Augmentation of provision of overseas information | • Strengthening of information provision activities (including publication of journal) | • Strengthening of cooperation between DIP and DEP | • Raising of awareness of garment industry with respect to designs and brands |
| • Raising of image of "Thai fashions" | • Strengthening of export promotion activities of DEP | • Participation in trade fairs and dispatch of missions (DEP) | • In particular, promotion of exports by small and medium sized garment manufacturers |
| | | • Sponsoring of "Thai Fashion Weeks" in key foreign markets with cooperation of silk, jewelry, and other industries | • Addition of "improvement of fashion image" to activities of DEP |
| **Others**<br>• Improvement of production control and process control technology | • Designation of factories of private companies as "model factories" | • Technical guidance by TID<br>• Engagement of experts at private level<br>• Active use of institutional financing (SIFO) | • Active use of training of TID, vocational training schools and model factories |
| • Raising image of "Thai fashions" | • Creation of "fashion street" in Bangkok (together with silk products, jewelry, etc.) | | |

## 2-3. Wooden Furniture

### 2-3-1. Summary of Problems and Countermeasures

What the Thai wooden furniture industry needs above all is a supply of lumber resources. The shortage in domestic resources is already becoming a large problem. This has been accompanied by rising prices of materials in some cases and by the ensuing difficulties in acquisition of supplies. Another problem, it may be pointed out, is the large gap between large companies and small and medium sized companies in their acquisition of materials and in their processing technology.

To deal with these problems, it is considered important to promote research and development for the development of technology for utilization of rubber wood, to improve sawing technology, disseminate the same, and thus help raise the level of quality of rubber wood for furniture use and increase supplies. In the future, Thailand will be increasingly relying on imported lumber, so it will be necessary to promote imports of logs and lumber and the liberalization of domestic transactions. Further, to facilitate procurement of materials by small and medium sized furniture manufacturers, consideration should be given to promotion of joint imports of logs and lumber and joint sawing operations.

Note that in the Asian nations and regions, Korea and Taiwan are poor in domestic lumber resources and have developed their export furniture industries through reliance on imported lumber. In this regard, Thailand is envisioned as going through a process of development similar to that of Taiwan. Further, in recent years, the majority of the furniture wood imported by Korea and Taiwan has been from the U.S.

Regarding facilities, a major problem is the slowness of small and medium sized companies in modernization. The shortage of drying facilities for wood in small and medium sized companies similarly is becoming a problem in terms of the improvement of quality. Further, the small and medium sized companies are noticeably late in introducing specialized automated machinery and this is seen as blocking the improvement of productivity. The failure of small and medium sized companies to properly store and polish their cutting tools is also a problem requiring improvement.

To resolve these problems, first it is necessary to promote the replacement and modernization of woodworking machinery. For this, it is considered effective to reduce or waive import tariffs , make active use of institutional financing, etc. Further, the establishment of joint drying factories by small and medium sized companies without drying facilities would be an effective measure. For the small and medium sized

companies, it is considered advantageous to provide training and seminars on woodworking machinery and its operation.

As to problems in technology, it may first be pointed out that small and medium sized companies are unfamiliar with the establishment of production lines. Further, they have low levels of process control and quality control. This is a problem due to insufficient personnel to raise these levels. Still further, small and medium sized companies generally lack awareness of strength and the ability and knowledge for drafting. These problems, it is certain, derive from the shortage of the engineers and skilled workers necessary for the production of wooden furniture.

Therefore, to resolve the problems, it is necessary to augment education and training in universities and vocational schools. At the same time, however, it would be effective to raise the level of existing engineers and skilled workers to augment and strengthen the training and seminars at the FIDC, industrial organizations, etc. Further, to improve the level of technology and secure export markets, it is considered effective to promote tie-ups and joint ventures with foreign companies.

Regarding marketing, most Thai wooden furniture manufacturers have insufficient knowledge and information about foreign markets. Along with this, a lack of product specifications and design capabilities has been pointed out. Further, the lack of effort to sell to foreign markets is another point requiring improvement in the future.

As countermeasures for these problems, first, consideration may be given to strengthening the collection and provision of information on foreign markets by the DEP, FIDC, and other public organizations or the furniture industry association and the like. Along with this, it should be effective to augment training and seminars. Also, it would probably be effective to augment education, training, and seminars on product planning and design. Other effective actions for promotion of exports could be to promote small and medium sized companies.

By way of note, in Korea, the Korean Federation of Furniture Industry Associations is scheduled to participate, with government support, in furniture fairs in West Germany, France, the U.S., Taiwan, and Japan in 1989. Further, it is scheduled to send missions to Southeast Asia, China, and Eastern Europe.

As problems in the system and functions of the FIDC, the shortage and outdatedness of training and inspection machinery may be pointed to. Similarly, a problem is posed by the shortage of technical instructors and inspection staff. At the root of this is a shortage in the budget and running expenses, making replacement of equipment and improvement of services hopeless.

To deal with these problems, it would first be necessary to try to replace and modernize the training and inspection machinery. The augmentation of training courses

aimed at small and medium sized companies will also become a major issue. To do these things and revitalize the FIDC, it will be essential to introduce the principle of beneficiaries paying for the services.

Regarding supporting industries for furniture, there are problems such as high prices for adhesives, paints, etc. and a lack of good quality metal fittings. Means to deal with these problems would include reduction of tariffs for these items or promotion of foreign investment and joint ventures in these fields.

In terms of industrial policies, there is a major problem in that it is unclear right now what direction Thailand will be moving in in the future in terms of resource policies, the import and distribution of lumber, etc. In this regard, the government will have to clarify its policies for promotion of wood products which have high degrees of processing and added value.

## Table 5. Main Problems and Countermeasures: Wooden Furniture

| Item | Problems | Possible Countermeasures |
|---|---|---|
| **Industrial Structure** | • Insufficient domestic resources<br>• Rising prices of raw materials and difficulties in acquisition<br>• Large gap between large companies and medium and small ones | • Dissemination and raising of level of technology for use of rubber plant scraps<br>• Promotion of imports of logs and lumber and liberalization of domestic trade<br>• Joint import and joint lumber making by small and medium sized furniture makers |
| **Equipment** | • Delay in modernization of equipment (in small and medium enterprises)<br>• Insufficient drying facilities ( " )<br>• Delay in introduction of automated specialized machines<br>• Unfamiliarity with storage and grinding of cutting tools | • Promotion of replacement and modernization of wood working machines (abatement of import duties, use of institutional financing, etc.)<br>• Joint drying plants of small and medium sized enterprises<br>• Training and seminars on woodworking machines and their operation |
| **Technology** | • Unskilled setting of production lines<br>• Low level of process control and quality control and insufficient human resources<br>• Insufficient awareness of strength<br>• Insufficient drafting capabilities and knowledge | • Expansion of education in universities and technical schools<br>• Expansion and reinforcement of training and seminars at FIDC, industrial organizations, etc.<br>• Active use of private experts<br>• Promotion of cooperative agreements and joint ventures with foreign enterprise |
| **Marketing** | • Insufficient knowledge and information on foreign markets<br>• Insufficient capabilities in product planning and design<br>• Lack of efforts to sell to foreign markets | • Reinforcement of collection and supply of information on overseas markets<br>• Expansion of training and seminars on above<br>• Expansion of education, training, and seminars on product planning and design<br>• Participation in foreign trade fairs<br>• Establishment of a common exhibition hall for exports |
| **Functions of FIDC** | • Antiquidated machinery for training<br>• Insufficient technical guidance staff<br>• Lack of budget and operating costs | • Replacement and modernization of machinery for training<br>• Improvement of training courses for small and medium sized enterprises<br>• Introduction of principle of costs borne by beneficiaries |
| **Supporting Industries** | • High prices of adhesives, paints, etc.<br>• Poor quality of domestic metal fittings | • Reduction of tariffs<br>• Promotion of foreign investment and joint ventures |
| **Institutions and Policies** | • Lack of clarity on resource policy and measures concerning import and distribution of lumber | • Clarification of policies for promotion of wood product industries involving high degrees of processing and added value<br>• Restrictions on exports of lumber with low degrees of processing |

### 2-3-2. Examination and Summary of Countermeasures

Countermeasures for problems in the wooden furniture industry were examined and broken down into five groups: 1) basic policies, 2) FIDC (Furniture Industry Development Center), 3) education and training, 4) export promotion measures, and 5) others.

Regarding 1) basic policies, two points are important: securing a stable supply of lumber and raising the level of technology of small and medium sized furniture manufacturers. Regarding the former, it would be effective for political measures to be taken to increase trade with nearby countries and also for investment by lumber businesses or sewing factories to be promoted in nearby countries. Also, to facilitate the acquisition of materials by small and medium sized furniture manufacturers, the promotion of joint imports of logs and establishment of joint lumber mills and joint drying factories by small and medium sized furniture manufacturers should be considered. In relation to this, Malaysia has established an industrial estate for furniture in Selanggor which has begun joint lumbering, joint drying, etc. for furniture manufacturers.

In addition, it would be effective to promote research and development with government support so as to improve the quality of parawood lumber, the quality of which still remains varied.

To raise the level of technology of small and medium sized furniture manufacturers, it would be advantageous to promote joint ventures and technical tie-ups with foreign furniture manufacturers in addition to general training. At that time, further, tie-ups of a form leading to technical guidance by foreign manufacturers and purchases of products are probably more realistic.

Regarding the FIDC, augmentation and strengthening of its functions of technical training, inspection, and information and also the rehabilitation of the FIDC through introduction of the principle of the beneficiaries paying for the services, cooperation with industrial organizations, etc. are needed. Regarding training, it is important to strengthen training and seminars on skills for raising the quality and degrees of processing of small and medium sized furniture manufacturers, and the preconditions for this are the replacement and augmentation of training equipment and the securing of instructors.

In addition, it might be possible to augment the development functions of the FIDC, in particular to promote research and development in the field of parawood and also in furniture made of combinations of metal, plastics, etc. It might also be effective for the FIDC to strengthen its information collection and provision functions and publish a "furniture information journal".

Regarding education and training, policies to augment the woodworking and furniture courses at vocational schools, to secure the teachers and instructors for the same, and further to strengthen on-the-job training in companies might be possible. In particular, teaching skills oriented for the production of export furniture are important. Note that the aforementioned Malaysian "industrial estate for furniture" is reportedly considering the establishment of woodworking training courses at a neighboring site.

Regarding export promotion, there is a need for strengthening cooperation between the FIDC and DEP, assuming strengthening of the export promotion activities of the DEP, and augmenting collection and provision of overseas market information and on the sponsoring of furniture fairs in Bangkok, the promoting of participation in foreign furniture fairs, and the dispatching of export missions. Further, the establishment of a standing furniture exhibition in Bangkok paid for by the beneficiaries would be worthy of consideration.

In regard to this point, Thai chairs and other furniture made of materials other than rattan have widely penetrated the U.S. market. Compared with this, in France, a leading importer of furniture, almost all imports from Thailand are rattan furniture. French buyers are not much interested in Thai furniture of other materials. This suggests there is still considerable room for sales efforts of Thai wooden furniture.

In addition, to promote the domestic supply of inexpensive, good quality secondary materials (adhesives, paints, metal fittings, etc.), the promotion of investment by foreign companies and the establishment of joint ventures in the area of secondary materials should be considered. These industries are promising ones for Thailand, offering the possibility of export to nearby countries as well.

## Table 6. Examination of Countermeasures: Wooden Furniture

| Topic | Possible Countermeasures | Specific Countermeasures | Details |
|---|---|---|---|
| **Basic policies** | | | |
| • Securing stable supply of logs and lumber | • Securing log and lumber imports | • Promotion of investment of lumber businesses in nearby countries | • Government support for securing lumber imports from nearby countries |
| • Raising of level of technology of small and medium sized furniture manufacturers | • Promotion of joint imports of logs by small and medium sized furniture manufacturers and establish of joint lumber mills and joint drying factories | • Incentives for joint operations (taxes and financial) | • Facilitation of acquisition of logs and lumber by small and medium sized furniture manufacturers through promotion of joint operations |
| | • Promotion of joint ventures and technical transfers with foreign furniture manufacturers | • BOI investment incentives<br>• Promotion of investment and introduction of companies for joint ventures | • Introduction of companies and encouragement to enable exports by small and medium sized furniture manufacturers through joint ventures and tieups |
| • Modernization of facilities and machinery | • Tax and financial incentives for modernization of facilities | • Formulation and detailed structuring of sectorial promotion measures<br>• Active use of institutional financing | • Promotion of modernization of facilities for improvement of quality and strengthening of competitiveness |
| • Improvement of quality of parawood lumber | • Restriction on exports of low processing parawood | • Step by step increases in parawood export tax | • Guidance for export of as highly processed parawood as possible |
| | • Support by government in development and improvement of technology for parawood lumber | • Research and development through cooperation between Royal Forest Department and FIDC | • Standardization of quality by technical improvements and spread of parawood lumber |
| **FIDC (Furniture Industry Development Center)** | | | |
| • Strengthening of training | • Replacement and augmentation of training and inspection equipment | • Replacement and augmentation of equipment | • Augmentation and strengthening of training and inspection functions and strengthening of training and seminars for raising quality and degree of processing in small and medium sized furniture manufacturers |
| • Introduction of principle of beneficiaries paying for services | • Augmentation of training courses and seminars for small and medium sized companies | • Securing of instructors (engagement of experts and dispatch of trainees) | |
| • Promotion of cooperation with industrial organizations | • Institution of charges for inspection, training, etc. (promotion in parallel with cooperation with industrial organizations) | • Detailed structuring of charging system<br>• Cooperation with furniture industry association | • Introduction of principle of beneficiaries paying for services and rehabilitation of FIDC |
| • Promotion of active use of materials other than lumber | • Promotion of research and development of furniture composed of combinations of metal, plastic, etc. | • Augmentation of development functions of FIDC | • Research and development for use of other materials to enable manufacturers to deal with worldwide shortage of lumber resources (obtaining cooperation of MIDI) |
| • Strengthening of information service activities | • Publication of "furniture information journal" | • Strengthening of collection and provision of information<br>• Publication of information | |

## Table 6. Examination of Countermeasures: Wooden Furniture
(Continued)

| Topic | Possible Countermeasures | Specific Countermeasures | Details |
|---|---|---|---|
| **Education and training**<br>• Augmentation and strengthening of education and training of furniture engineers, designers, and skilled laborers | • Augmentation of woodworking and furniture courses in vocational schools | • Augmentation of vocational colleges | • Teaching of skills aimed at production of export furniture |
| | • Securing of teachers and instructors | • Active use of private experts as instructors | |
| | • Strengthening of on the job training in companies | • Engagement of experts at private level | • Strengthening of on the job training in companies through engagement of experts at the private company level too |
| **Export promotion measures**<br>• Strengthening of information activities | • Collection of information | • FIDC - DEP cooperation | • Strengthening of collection and provision of overseas market information |
| • Promotion of exports to key markets | • Strengthening of export promotion activities of DEP | • Sponsoring of furniture fair in Bangkok | • Export promotion activities, primarily through DEP, for raising image of Thai furniture and stressing its originality |
| | • Establishment of standing furniture exhibition center in Bangkok (by financing by beneficiaries) | • Participation in foreign furniture fairs and dispatch of export missions<br>• Government support for establishment of standing exhibition center | |
| **Others**<br>• Promotion of domestic supply of inexpensive, good quality secondary materials (adhesives, paints, metal fittings, etc.) | • Promotion of investment by foreign companies and establishment of joint ventures in secondary materials | • BOI investment incentives<br>• Promotion of investment and introduction of companies for joint ventures | • Promotion of supporting industries for furniture (which could also be expected to export to nearby countries) |

## 3. Comprehensive Program

### 3-1. Textile and Garment Industries

#### 3-1-1. Basic Strategy

As the basic strategy for the development and expansion of the textile and garment industries of Thailand, consideration may be given to the following framework of measures:

(1) The growth potential of the garment industry, which has been displaying rapid growth as an export industry, should be exploited to the fullest. Toward this end, it will be necessary to promote small and medium sized companies and subconstractors and take other measures to boost production capacity and also to push for stronger competitiveness through improvement in product quality and added value an improvement in productivity. Further, effort should be poured, in the medium and long term, into the development of human resources for design and product development and into raising the image of "Thai fashions" on the international market so as to enable a transition from the current stage where reliance is placed on the designs and brands of the buyers to a stage where companies can develop and export products based on their own designs and brands.

(2) In the past, the textile sector has achieved growth as an import substitution type industry. It should now establish and promote a policy of expanding and strengthening its ability to supply materials to the domestic export garment industry. Toward this end, it will be necessary to eliminate the factors inhibiting the expansion of the supply (production capacity) of garment materials throughout the upstream sector (textile materials and spinning) and the midstream sector (weaving, dyeing, etc.) In particular, it will be essential to ease or scrap restrictions on facilities and to reduce import duties for yarn and woven fabrics. This would make the "market mechanism" act, linked with the international market, in the supply of textile materials and would lead to the strengthening of the international competitiveness of the textile sector and in turn the expansion of exports.

(3) To enlarge the supply capacity of garment materials, an important task will be to modernize the facilities in the corresponding upstream and midstream sectors and raise the level of production technology. To realize this, it would be effect to give some institutional benefits, such as temporary abatement of import duties or low

interest financing, for the corresponding facilities and equipment. In particular, special measures will be needed in the dyeing, printing, finishing, and other sectors to lighten the burden of investment in water supply and wastewater facilities. Further, encouragement of investment by foreign companies with advanced technology and knowhow and promotion of the establishment of joint ventures with foreign companies or corporate tieups would, it is considered, also have large effects.

(4) To increase the supply of materials from the textile sector to the garment sector, in addition to the expansion of production capacity and improvement of technology mentioned above, the development of companies with so-called "converter functions" which link up the two sectors will be needed. To promote their appearance, it would be effective to spread knowledge about and promote awareness of these "converter functions" among related businesses in Thailand (in particular the textile trading companies) and to promote the investment of foreign companies having such functions or joint ventures with the same. Further, in relation to this, it will be essential to stimulate the exchange of information among the different sectors of the textile industry.

(5) Regarding the expansion of production capacity in the garment industry, it should be fully possible to promote the establishment of factories in the local regions and the development of small and medium sized companies to help alleviate the national problems of Thailand of overcrowding in Bangkok and the slow economic development of the local areas. However, to do this smoothly, the prerequisites would be that full consideration be given to the establishment of the infrastructure and development of human resources in the local areas and further that incentives be devised for corporate investment.

(6) The Ministry of Industry should formulate a "vision" for the textile industry in which it states its view of the Thai textile industry (including textiles and garments) five to 10 years hence through exchanges of opinion and deliberations with the related industries and should announce the same to establish a concensus among the related parties in the industries. This should be respected and made use of over a certain period of time as the basic direction along with policies should be drafted and acted on in the related sectors.

(7) The TID, which acts under the DIP, should focus on key issues of the present time, along the direction of the above-mentioned basic strategy, set roles for itself in the same, and use the most effective means available to complete its tasks. At that time, it should introduce the principle of the beneficiaries paying for services

and supplie services, for a fee, advantageous to private industry so as to breathe life back into the organization.

### 3-1-2. Comprehensive Program

Package of Measures [1]

Augmentation and Modernization of Garment Material Supply Sector

To increase domestic production of garment materials, it will be necessary to strengthen the production facilities for various materials in part of the upstream sector (for example, high count yarn) and the midstream sector in accordance with demand trends for garment materials. Toward this end, the required organizations and systems should be set up and promotional measures formulated and realized.

Program [1]

Augmentation and Modernization of Material Supply Sector

To speedily achieve an expansion in the capacity of supply of materials to the garment sector through part of the upstream sector and the midstream sector, the Ministry of Industry should establish the necessary systems and mobilize whatever it can for the same on a concentrated basis for a certain period of time.

As a first stage in this, it will be necessary to clarify the sections and officials in charge for the textile industry and establish a system of responsible agencies and to establish a system of deliberations with industrial organizations etc. which can be used by those at the working level at all times. These sections and officials in charge would take the lead and collect and analyze related information and draft and realize specific policies through deliberations with industrial organizations etc. Note that in regard to this point proposals would be made that an expert be engaged by the TIDC (Textile Industry Development Commission) as a "policy advisor" for two to three years and that one to two officials in charge of textile policy be sent overseas for training for a short period of time.

As specific measures for increasing production capacity, measures to promotion investment in the sectors leading to the supply of garment materials would be effective. As possible measures, consideration may be given to temporary lifting of restraints on facilities, application of BOI incentives, temporary reduction or waiver of import duties for related machinery and equipment, promotion of investment and establishment of joint ventures, etc.

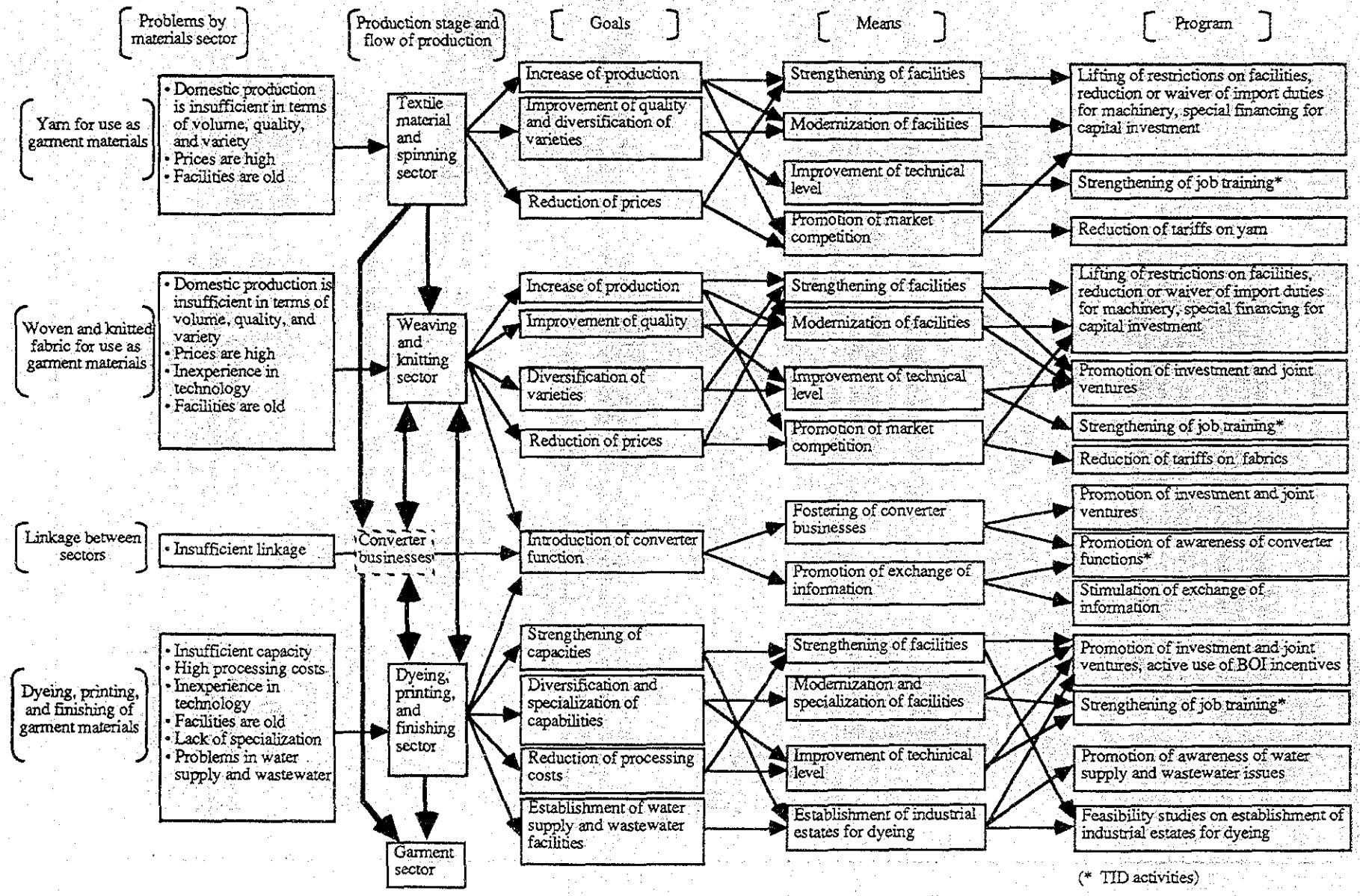
Further, in this field, modernization of the antiquidated and out-dated machinery and equipment are also urgent tasks. For this, easing or lifting of restraints on facilities, temporary abatement of import duties on machinery and equipment, and low interest funding through institutional financing would be effective.

In the midstream sector, particularly the dyeing, printing, and finishing sectors, the establishment of a proper environment for operations, in terms of water supply and wastewater, is another important task. In this regard, proposal would like to be made of inspections and improvement of industrial water supply and wastewater systems and simultaneously the early running of a feasibility study on the establishment of an industrial estate for the dyeing sector (for reference: Plan in Detail -1). Further, in the establishment of such an industrial estate for the dyeing industry, a string of incentives for enticing companies to locate their operations there (application of BOI incentives, low interest financing, abatement of taxes, etc.) would be considered effective. In relation to this, a campaign (for example, seminars, provision of information, etc.) for raising the awareness of water supply and wastewater problems would be significant.

In parallel with the expansion of the supply of materials, deepening and expanding the linkage between the upstream and midstream sectors and the garment sector are important. Toward this end, it will be necessary to promote the development of businesses with so-called "converter functions" For this, it would be effective to promote investment, joint ventures, and tieups and also the awareness of related domestic businesses of "converter functions" through seminars and provision of information.

In the implementation of this string of measures, it will be important to make active use of the functions of the TID to raise the level of technology and skills and strengthen information activities. This will be discussed later in relation to the enlargement and strengthening of the TID.

## Chart 10. Program for Augmentation and Modernization of Materials Sector



[Plan in Detail - 1]

## Plan for Water Supply and Effluent Facilities at Industrial Dyeing Estate

The industrial dyeing estate is aimed at small and medium sized dyeing factories, has as its object the supply of good quality dyed products to the textile and garment manufacturing industries, and gives consideration to the suppression to the minimum extent of the detrimental effects of effluent on the surrounding environment.

A summary is provided of an example of water supply and effluent treatment facilities of an industrial dyeing estate. Note that the study was performed envisioning an industrial dyeing estate comprised of 10 to 15 small and medium sized dyeing companies and a joint management organization.

[Water Supply Treatment Facilities]

- Amount of water treated for use by only manufacturing process: 5,000 $m^3$/day
- Treatment time: 20 hours/day (250 $m^3$/hour)
- Type of water (raw water) supplied: River water treated for industrial use
- Treatment system: The raw water contains Fe, Mn, and Ca and is high also in turbidity, so pretreatment will be performed before water softening treatment. Further, five 50 $m^3$/hour treatment systems will be set up in parallel and consideration given to backwashing. Note that recycling and reuse of processed water used in the dyeing processes is not being considered.
- Other considerations
  Raw water reservoir: Shall have a capacity enabling storage of over half a day's required water and further shall serve as a firefighting water reservoir
  Treated water reservoir: Shall serve both as a reservoir for treating dissolved metals and a reverse washing reservoir for the water softening reservoir. The amount of reverse washing water needed shall be that for reverse washing the treatment vats (10) 30 minutes once a day (624 $m^3$/hour). Further, the maximum amount of water used for the dyeing processes is assumed to be three times the ordinary amount of water (250 $m^3$/hour) and the capacity of the treated water reservoir shall be a capacity in excess of the amount of water required for both.
- Treatment facilities for industrial water supplies: (see Table 1)
- Concept of treatment facilities for industrial water supplies (see Fig. 1)
- Treated properties of industrial water supplies: (See Table 2)
- Required ground area: Approximately 2,100$m^2$ (70 x 30 m)

[Effluent Treatment Facilities]

- Basic thinking: The effluent from the dyeing processes will, after pretreatment of dyeing effluent including catalytic dyes and acidic catalytic dyes, be merged into the main treatment facilities, i.e., the general dyeing effluent system for overall treatment.
- Capacity of treatment of dyeing effluent: 5,000 $m^3$/day
  Pretreatment facilities: 1,000 $m^3$/day
  Main treatment facilities: 5,000 $m^3$/day
- Treatment time: 20 hours/day
- Other considerations: The main effluent treatment facilities shall use dome defizzers as defoaming apparatuses so as to raise the energy saving and biochemical treatment effects and shall use a DO automatic control system (inverter system) so as to reduce the power costs of the aeration blowers. Note that the dyes used, chemicals, and treated water will not be recycled and reclaimed.
- Dyeing effluent treatment facilities: (See Table 3)
- Concept of dyeing effluent treatment facilities: (See Fig. 2)
- Conditions for inflow of effluent into dyeing effluent treatment facilities: (See Table 4)
- Required ground area (not including office)
  Pretreatment: 200 $m^2$ (8 x 25 m)
  Main treatment: 7,200 $m^2$ (120 x 60 m)

[Permanent Staff]

| | |
|---|---|
| Engineer in chief: | 1 (serving in daytime) |
| Engineers (mechanical): | 2 (two shifts of one person each) |
| Engineers (electrical): | 2 (two shifts of one person each) |
| Office staff: | 1 (serving in daytime) |
| Supplementary workers: | 2 (serving in daytime) |

**[Plan - 1] Table 1. Industrial Water Supply Treatment Facility**

| | Unit | Quantity | Remarks |
|---|---|---|---|
| I-1- | Raw Water Reservoir | 1 | 3,000m3 |
| I-2 | NaCLO Tank | 5 | |
| I-3 | Fe Removal Tank | 5 | |
| I-4 | Water Softner | 5 | |
| I-5 | Regeneration Tank (NaCL) | 5 | |
| I-6 | Treated aWater Reservoir | 1 | 1,500m3 |

**[Plan - 1] Table 2. Treated Properties of Industrial Water Supply**

| | Raw water (inflow) | Treated (process) water |
|---|---|---|
| Temperature | < 35°C | < 35°C |
| Turbidity | 4.5 | -- |
| pH | 6.5 - 8.5 | 6.0 - 8.0 |
| Conductivity | 700 μs/cm | < 500 μs/cm |
| TDS | 500 mg/l | -- |
| M-alkalinity (as $CaCo_3$) | 350 mg/l | < 40 mg/l |
| Total hardness (as $CaCo_3$) | 130 mg/l | < 10 mg/l |
| $CL^-$ | 45 mg/l | < 45 mg/l |
| $SO_4^{2-}$ | 20 mg/l | < 20 mg/l |
| Fe | 0.5 mg/l | < 0.1 mg/l |
| Mn | 0.3 mg/l | <0.1 mg/l |

## [Plan - 1] Table 3. Dyeing Effluent Treatment Facilities

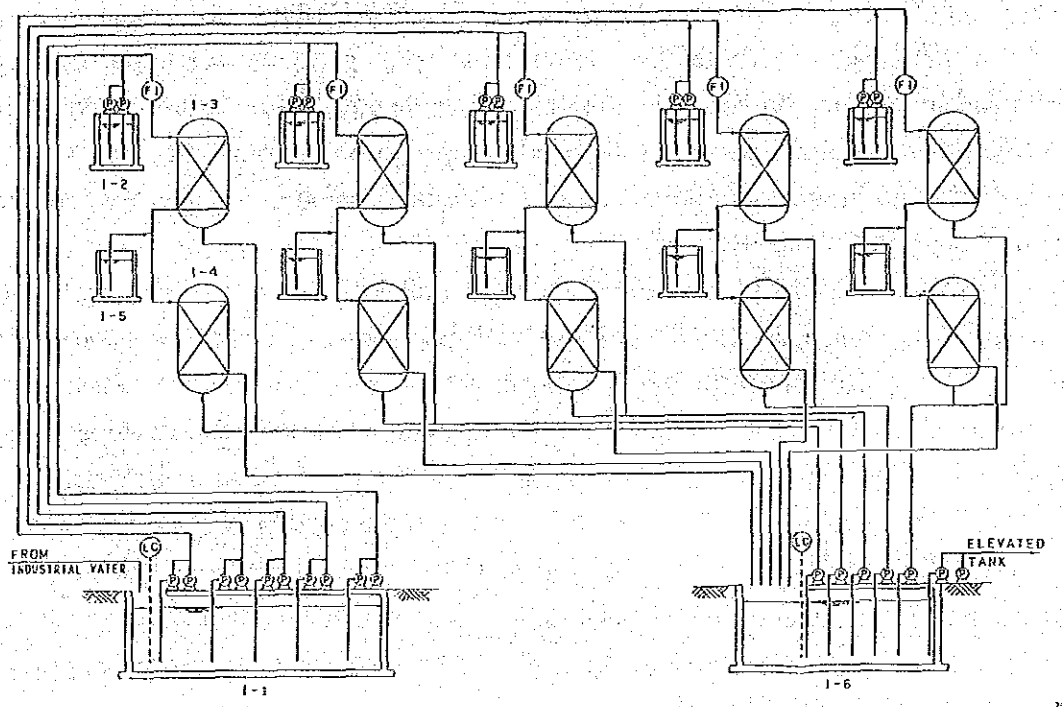
| | Unit | Quantity | Remarks |
|---|---|---|---|
| Dyeing effluent pretreatment facility for mordant and acidic mordant dyes | | | |
| B-1 | Pump Station Equipment | 1 | Pump 11 KW x 2 |
| B-2 | Raw Waster Water Tank | 1 | Pump 7.5KW x 2, Blower 22 KW |
| B-3 | Primary Reaciton Tank | 1 | Agitator 3.7 KW |
| B-4 | Secondary Reaaction Tank | 1 | Agitator 3.7 KW |
| B-5 | Coagulation Tank | 1 | Agitator 3.7 KW |
| B-6 | Coagulation & Settling Tank | 1 | Scraper 0.4 KW, Pump 1.5 kw |
| T-1 | Chemical Storage & Injection Facilities | 1 | Pump 0.2 KW |
| T-2 | — Ditto — | 1 | Pump 0.2 KW |
| T-3 | — Ditto — | 1 | Pump 0.2 KW |
| T-4 | — Ditto — | 1 | Pump 0.2 KW, Pump 0.4 KW |
| T-5 | — Ditto — | 1 | Pump 0.2 KW, Pump 0.4 KW |
| Main treatment facility | | | |
| B-7 | Pump Station equipment | 1 | Pump 30 KW x 2 |
| B-8 | Raw Waster Water Tank | 1 | Pump 15 KW x 2, Blower 37 KW x 2 |
| B-9 | Reduction Tank | 2 | Agitator 11 KW x 2 |
| B-10 | pH Neutralization Tank | 2 | Agitator 11 KW x 2 |
| B-11 | Aeration Tank | 4 | Blower 37 KW x 4 |
| B-12 | Sodimentation Tank | 2 | Scraper 1.5 KW x 2, Pump 3.7 KW x 2 |
| B-13 | Defoaming Pump Tank | 1 | Pump 3.7 KW |
| B-14 | Disinfection/Treated Water Tank | 1 | Pump 0.2 KW |
| B-15 | Cludge Thickened & Storage Tank | 1 | Pump 3.7 KW |
| | Control Panel | | |
| | Dehydrator Unit | | 7.5 KW |
| | Screen Unit | | 0.2 KW, 0.75 KW |
| | pH Meter, ORP Meter | | |
| | pH Controller Unit | | with inverter |
| | Another Equipment | | |

Note: T-4 and T-5 are to be used together.

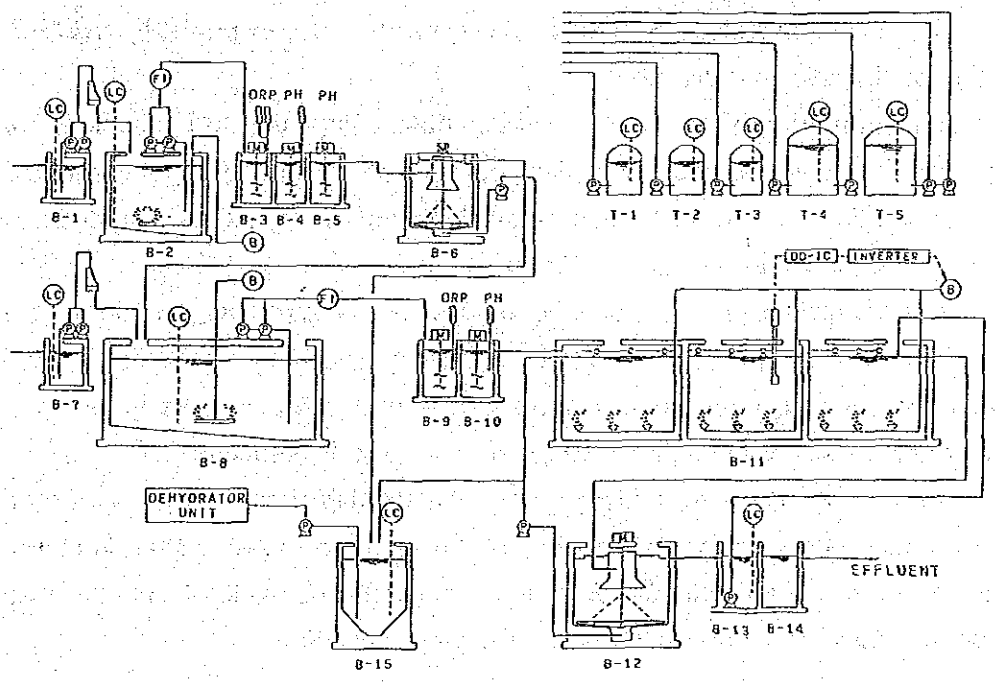
## [Plan - 1] Table 4. Properties of Effluent Flowing Into Dyeing Effluent Treatment Facilities (Conditions)

| | Pretreatment facility | Main treatment facility |
|---|---|---|
| pH | 3.0 - 10.0 | 3.0 - 12.2 |
| BOD | 190 - 550 mg/l | 300 - 800 mg/l |
| COD | 150 - 400 mg/l | 300 - 800 mg/l |
| SS | 100 - 120 mg/l | 100 - 150 mg/l |
| n-Hexane | 10 - 35 mg/l | 10 - 25 mg/l |
| Heavy metal (as Zn) | 3 - 10 mg/l | < 1 mg/l |

[Plan - 1] Fig.1. Schematic Diagram of Industrial Water Treatment System




[Plan - 1] Fig. 2. Schematic Diagram of Waste Water Treatment System



Package of Measures [2]

Expansion of Production Capacity of Garments and Human Resource Development

To increase the overall production capacity of garments for export, greater investment should be promoted, including investment in the local regions and investment in development of small and medium sized companies and a subcontracting system. Toward this end, augmentation and mobilization of the functions of various related organizations will become necessary.

Also, to raise the production technology and skills in the garment sector and increase production capacity, the Ministry of Industry, the Department of Labor of the Ministry of Interior, the Ministry of Education, etc. should cooperate to augment vocational education, job training, etc., in the local areas as well, and develop human resources.

Program [2]

Expansion and Strengthening of Garment Industry

To increase the production capacity of export garments, small and medium sized companies in this field should be fostered and active use be made of the subcontracting system. Toward this end, incentives such as access to institutional financing (SIFO etc.) and abatement of import duties on sewing machines should be devised for small and medium sized companies and cottage industries. Further, establishment of a leasing system for sewing machines by an official organization (for example, by SIFO) for such companies deserves consideration.

For promotion of small and medium sized companies and subcontractors on a local level, it will be necessary to further beef up these incentives and press forward with development of human resources and establishment of the related infrastructure. Linkage with related organizations would also be important.

For the expansion of the production capacity of garments, training of engineers and skilled workers would of course be necessary. To do this, first of all, textile and garment courses in the vocational schools should be augmented. Even before that, it will be important to secure and train the required teachers and instructors.

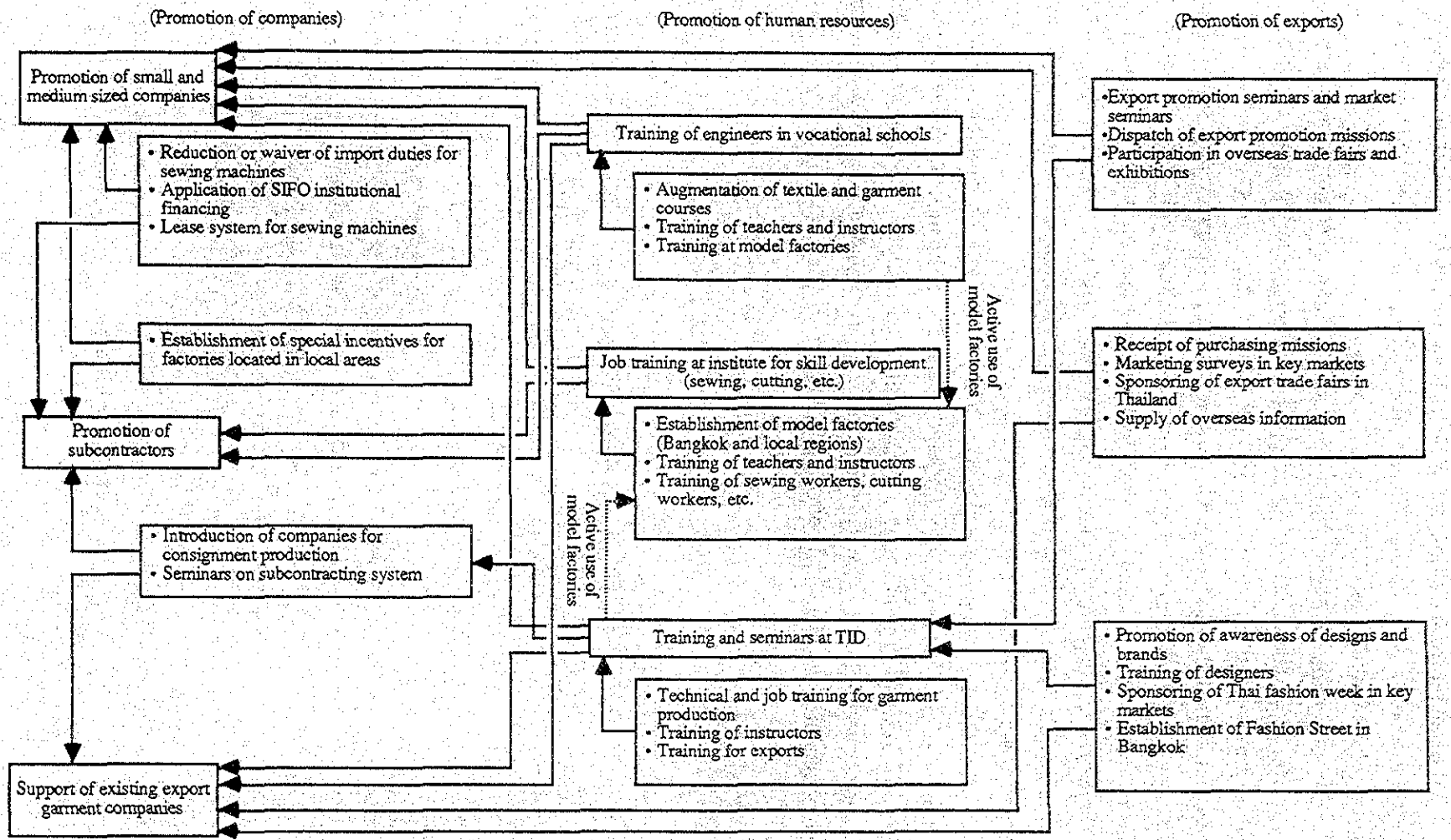
In the Thai garment industry, there is a striking unfamiliarity with production control and process control. Effort should be made to improve this situation in the education in vocational schools. Active use must also be made of the later-mentioned "model factories" of the Institute for Skill Development (ISD).

To make up for the shrotages of instructors for vocational training, cooperation will have to be obtained from the TID and private companies, in particular in the form of engagement of private sector experts.

To train skilled workers, particularly sewing workers and cutting workers, as fast as possible, proposal would like to be made of implementation of a "sewing worker training program" at the Institute for Skill Development. In this regard, it will be necessary to establish "model garment factories" at two locations for the time being, i.e., Bangkok and the local regions (for reference: Plan in Detail - 2). These model factories could be used for both training workers and for education and training by the TID and vocational schools in production control. Instructors would have to be secured and trained for this, which would require formation of a system of cooperation with private companies and use of private sector experts.

In addition, to improve technology and productivity, in particular in small and medium sized garment companies, proposal would like to be made of the engagement of experts by official organizations or industrial organizations so as to provide roving guidance on technology to companies desiring the same (guidance on production control, sewing technology, maintenance of equipment, etc.)

## Chart 11. Program for Expansion and Strengthening of Garment Industry



[Plan in Detail - 2]

**Proposed List of Equipment for Model Factories at the Institute for Skill Development**

To facilitate management, the model factory is planned for production of uniforms for government officials. The list of equipment and machinery is as follows.

<Machinery for garment production>

| Machinery for production control | Production control system | LEVEL3 | |
|---|---|---|---|
| Cloth inspector | | | 1 |
| Cloth analyser | | | 1 |
| Spreading table, machine | Spreading table | 1.8x15m | 2 |
| | Spreading machine | Automatic | 1 |
| Cutting machine | Cutting machine driven by electric Motor with straight cutter | 8 inch | 3 |
| | Bandknife cloth cutting machine | | 1 |
| Cloth-drills | | with heater | 1 |
| Fusing press | Rotary press | | 1 |
| Sewing machines for industrial use | 1-Needle Lock stitch machine | | 30 |
| | 1-Needle Lock stitch machine with Automatic thread trimmer | | 20 |
| | Overlock machine | | 10 |
| | Safety stitch machine | | 5 |
| | 1-Needle top & bottom feed lock stitch machine | | 5 |
| | Bartacking machine | | 5 |
| | Butonholing machine | | 3 |
| | 1-Needle double chain stitch machine | | 3 |
| | Button sewing machine | | 2 |
| | Edge control seamer | | 2 |
| | Serging machine | | 1 |
| | Eyelet stitch button holding machine | | 1 |
| | Blindstitch machine | | 1 |
| | Blindstitch machine | | 1 |
| | Needle feed lockstitch machine | | 1 |
| | Automatic lockstitch welting machine | | 1 |
| | Post-type machine for sleeve | | 1 |
| Iron | Steam iron | | 5 |
| | Electric iron | | 5 |
| Vacuum finishing board | | | 10 |
| Press in process | Mini-press | | 1 |
| Finishing press | Body press | | 1 |
| Carriage | Truck | | 10 |
| Warehouse | Rack | | 10 |

Note: to equip the machinery for sewing knitted goods, it would be preferable to arrange it according to "List of sewing machinery for knitted goods" in Plan in Detail - 6.

Package of Measures [3]

Augmentation and Strengthening of Training, Testing, and Information Functions of Government Organizations

The functions of the TID (Textile Industry Division) should be augmented and strengthened after the fields considered urgent and important have been focused on. Further, the principle of the beneficiaries paying for the services should be introduced and thus the organization revitalized in a form appropriate for industry needs. For the time being, the functions of retraining engineers and skilled workers, testing materials and products, and collection and dissemination of information in particular should be strengthened and put to good use.

Program [3]

Enlargement, Strengthening, and Use of TID

In the enlargement and strengthening of the TID, two things are important: to select those functions considered must necessary in view of the problems being faced now by the related industries and revitalization of the organization along with introduction of the principle of the beneficiaries paying for services. To devise effective means for these, it is proposed that an organizational expert experienced in this field be engaged for two to three years. The advice of this expert should be obtained while establishing and putting into practice the fee-basis system (for reference: Plan in Detail - 3).

Regarding the functions of the TID, it is proposed first that the technical guidance function for the textile sector (in particular the garment material production sector) be improved. Similarly, it would like to be proposed to establish and put to use a training function for garment production. Use of personal computers for the training in these two areas would be advantageous. To realize this, a prerequisite will be the equipping and augmentation of training functions, including the necessary materials and equipment. Also, it will be necessary to secure the instructors for this and to train further instructors for the future (for reference: Plan(s) in Detail - 4, 5, 6).

Regarding the testing and inspection functions, basically it will be necessary to ensure effective utilization through augmentation of those services and the introduction of the principle of the beneficiaries paying for them. However, regular inspections should be carried out by the companies themselves on their own responsibility, while the TID should shift its emphasis to special inspections and testing which the companies are unable to perform. For regular inspections, consideration may be given to introduction of an "open system" where TID equipment can be used by companies for a certain fee.