main planting tree species. This way of development will enable the production of cashew nut and its by-products, for which processing facility will be established in future.

6.3.2 The Mountainous and Hilly Area with Intervening Scattered Plains

A target is set on the hilly area with intervening scattered plains, for the purpose of fast recovering forest coverage, that concentrated afforestation shall be conducted first of all over all barren hills and open land with fast growing species mainly consisting of Eucalyptus spp., Acacia spp. and Pinus spp., coupled with the introduction of a system of agro-forestry techniques into scattered tree planting by the inhabitants, thus expanding afforestation. In particular, it is recommendable in the northern two Provinces, Thua Thien Hue and Quang Tri, that forests are planted with Pinus spp.(Pinus merkusii, P. kesiya and so on.) in the sites suitable to plant them, so that resin can be collected. These forests will provide forest resources, such as resin and wood for pulp and blockboard that is harvested after collecting resin, to be supplied to resin processing plants and the wood processing industry. Besides, long rotation industrial species such as rubber, coffee and tea trees are planted in a mixed plantation with upland crops to properly conserve the forest environment in the middleland hills, while in lowland hills fruit trees appropriate to the plantation in local site conditions will be planted in combination with agro-forestry techniques, thus securing efficient soil and water conservation.

6.3.3 The Mountain Area

Natural forests have been still reserved in the mountain area of each of the four Provinces, where forest resources are exploited. Therefore, it is essential to minimize exploitation as much as possible so as to mitigate damages from floods and drought, to conserve soil and water and to control erosion. To this end, projects for natural forest conservation and rehabilitation should be strengthened. The ethnic minority population live in this area and are engaged in slash and burn system, due to which forest destruction proceeds further. With a view to their permanent settling as well as ameliorating communal economy, it is recommended that further progress be made in the distribution of usufruct right of forest land and farmland for perennial crops, thus encouraging the population to manage a combined system with forestry, agriculture and industry (in the form of afforestation, planting industrial as well as fruit trees, keeping and breeding cows, goats and so on.).

As regards afforestation for rehabilitating natural forests, an enrichment planting with indigenous tree species is recommended for poor forests. Although plantation with long rotation industrial tree species can be applied to the forests in the midland hills, that with cinnamon tree (Cinnamomum cassia) can be extended in suitable sites in the southern Provinces, i.e., Quang Nam Da Nang and Quang Ngai. It is also planned to establish a cinnamon processing industry in this area for improving the local economy and provide foreign currency earnings through exporting cinnamon.

Forests in all these four Provinces have suffered from destruction due to war-related ravages, shifting cultivation practice, over-extraction of timber, forest fires and so on resulting in poorer forest coverage, coupled with a grave deterioration in soil and water conservation capacity. Moreover, steeper slope is abundantly found in mountains and hills in the study area that, coupled with higher fluvial density and skewed concentration of annual rainfall, say 60 - 70 % of it within rainy season, very often causes heavy floods and also brings about drought spells in the dry season.

In order to prevent such calamities to plan social and economic development in the watershed, watershed management programs are often formulated. As a component of these programs, the necessity of providing a plan of rehabilitating forests in the upstream basin of major streams arises from this reason. This is why a study in a macro-basis should be carried out covering the upstream basin for each stream.

6.3.4 Development Plan by Current Forest Status

1) Required Forestation Area

Table 6.20 shows the planned area of afforestation up to 2010, as the required forestation area in bare land, that is derived from Table 6.21, and obtained in such a way that bare land area is allocated into that in coastal area and mountain and hill area, based on data in Existing Landuse 1993 by Geographical Department.

Table 6.20 Bare Land and Afforestation Plan Area

(Unit: sq. km.)

	Bare Land	Afforestation Plan Area		~2010	2011~
Special use forest	441	Coastal area	160	160	0
Protection forest	4,861	Mountain & hill	5,142	3,870	1,272
Sub total	5,302	Sub total	5,302	4,030	1,272
Production forest	4,870	Coastal area	50	50	0
		Mountain & hill	4,820	2,640	2,180
		Sub total	4,870	2,690	2,180
Grand total	10,172		10,172	6,720	4,452

Source: Existing Landuse 1993, Geographical Department & Forestry Department of Each Province, 1994

Table 6.21 provides the current forest status of forest land in the study area. Meanwhile, the required area of forestation estimated from data titled as "Existing Landuse, 1993" by the Geographical Department and also from data received from each Provincial Forestry Department is given in Table 6.22. Based on the ratio of plain area to mountainous and hilly area given in Table 6.22 the total bare land area can be allocated as about 21,000 ha. for bare land in plain area and 997,000 ha. in the latter. Similarly, the area under special - use forest and protection forest was estimated at around 80% of the plain area, i.e.,16,000 ha., while the rest 5,000 ha. was deemed as production forest. It follows that the estimated area to be afforested in mountain and hill comes to 514,000 ha. for special-use forest and protection forest, and 482,000 ha. for production forest.

Table 6.21 Current Forest Status by Province

(Unit: sq. km.)

Forest status	Quang Tri	T.T.Hue	Q.N.Da Nang	Quang Ngai	Total
Special-use forest	11	339	625	52	1,027
Forest covered area	6	231	347	2	586
Bare land	5	108	278	50	441
Protection forest	1,453	1,553	3,007	3,002	9,015
Forest covered area	600	971	1,958	645	4,174
Bare land	853	582	1,049	2,377	4861
Sub total forest land	1,464	1892	3,632	3,054	10,042
Sub total bare land	858	690	1,327	2,427	5,302
Production forest	1,600	1,479	5,310	895	9,284
Forest covered area	475	513	2,607	819	4,414
Bare land	1,125	966	2,703	76	4,870
Total bare land	1,983	1,656	4,030	2,503	10,172

Source: Forestry Department of Each Province, 1994

Table 6.22 Forestation Required Area:
(Potential Forest Area - Actual Forest Area)

(Unit: 1,000 ha, (%))

	Quang Tri	T.T.Hue	Q.N.Da Nang	Quang Ngai	Total
Reforestation area	208.4 (100)	167.6 (100)	435.5 (100)	244.0 (100)	1,055.5 (100)
Forestation in plain	3.8 (2)	1.7 (1)	3.9 (1)	15.1 (6)	24.5 (2)
Forestation in mountain & hills	204.6 (98)	165.9 (99)	431.6 (99)	228.9 (94)	1.031.1 (98)

Source: Existing Landuse 1993, Geographical Department & Forestry Department of Each Province, 1994

2) Special -Use Forest and Protection Forest

In the study area, 10,172 sq. km. of bare land exists within the total forest land. In particular, bare land extends over 5,302 sq. km. accounting for 53 % of the total forest land area 10,042 sq. km. consisting of special-use as well as protection forest for which measures of protection and conservation are required.

In our program, priority should be attached to afforestation in bare land in the form of establishing new special-use forest and protection forest.

(1) Objectives:	Soil and water conservation, shifting sand control, wind break, tourism and amenity.
(2) Area: Coastal area:	Estimated at about 16,000 ha.
Mountain & Hill:	Estimated about 514,000 ha.
(3) Planting Tree Species:	Casuarina spp., Pinus spp., Acacia spp., Eucalyptus spp., Indigenous Species
(4) Planting method:	Concentrated afforestation
(5) Implementing Agencies:	Ministry of Agriculture and Rural Development
(6) Estimated Cost:	292 million USD.

3) Production Forest

9,284 sq. km. of production forest occupies the study area, out of which 4,870 sq. km., accounting for about 52 %, falls in the category of bare land in which re-afforestation is necessary.

(1) Objectives:	Creating forest resources, soil and water conservation, creation of employment opportunities, future wood processing industry development
(2) Area:	Plain Area: about 5,000 ha. are coastal sand area planned to plant Cashew nut and others.
Mountain & Hills:	Out of 482,000 ha., the area, agro-forestry is planned over 96,000 ha., or 20 % , and the rest 386,000 ha. is offered to create commercial forest with industrial plantation
(3) Planting Tree Species:	Pinus spp., Cinnamomum spp., Acacia spp., Eucalyptus spp., Rubber, Coffee, Tea tree and others.
(4) Planting method:	Concentrated afforestation and agro- forestry system.
(5) Implementing Agencies:	Ministry of Agriculture and Rural Development, Private Sector, and Communities.
(6) Estimated Cost:	248 million USD.

6.4 LONG LIST OF PROJECTS AND PROGRAMS

6.4.1 Project for Creating Coastal Sand Shifting Control Forest

1) Objectives

Forest as wind breaker is created to prevent sand and shifting from coastal deposits to highly productive flat crop-fields. The created forest can ease strong and cold sea wind during winter, also avoid sand saltation from coastal quarts sand deposits intruding into paddy area and burying it, thus protecting existing cropland from salinity, degradation and chill damage to paddy seedling.

2) Contents

The proposed project will be able to expand the on-going PAM project by WFP (World Food Program) in all four Provinces. It can be implemented in a way that Agriculture Department undertakes concentrated plantation in close coordination with the Irrigation Department on one side, and promotes participatory forestry activities in the form of scattered tree planting with active participation by local population, on the other.

In this project, Philao (Casuarina spp.) and Acacia spp. are mainly employed for afforestation. These species have resistance against wind damages, with higher preventive fencing effect against sea wind and aeolian sand saltation. Settlers will be invited at the stage of stabilized hinterland that becomes available to cropping for them.

3) Justification

The coastal line in the our Provinces forms sandy open land, where the deposited white sand is subject to saltation or transportation by gale and storms, causing intrusion of sand into farmland and paddy fields in the flat plain area. This not only damages crops, thus hampering farming activities, but also aggravates the living environment during winter, when strong, chilly wind blows directly over living quarters.

The proposed project will mitigate the above mentioned natural calamities, thus improving farm productivity and also expanding land use effectively. Moreover, settlers will use branches and twigs of the planted trees for fuelwood. This forest creating project will also contribute to the creation of employment opportunities in the long run.

4) Scale and Area

The proposed sites for planting are located along the coastal sandy open land at the east side of National Highway No. 1. In Quang Tri Province, 2,000 ha of such a plantation has already been carried out, but there still remains 13 - 15 thousand ha. of open land to be planted. Land reclamation coupled with a settlement program has been implemented by the Forestry Department in a way of constructing dikes followed by planting in collaboration with Irrigation Department This program also provides an element of tourism resources in Thua Thien Hue Province, in addition to the function as sand break and windbreak forest. There is an open-land area of about six thousand ha. in Quang Nam Da Nang Province, to which afforestation is called for as soon as possible. In Quang Ngai Province, just as in the former, continuous patches of sandy open land forms a coastal belt where PAM projects should be expanded.

5) Social Implication

It is desirable to implement the proposed project in two ways, one under the participatory, wage paying form to the local population, and the other in the form of scattered tree planting. In terms of implementation, it would not be feasible without participation from the local population to conduct post-planting tending and protecting. Here, a reasonable wage should be

provided for the participating workers.

6.4.2 Cashew-Nut Tree Planting

1) Objectives

The aim of the proposed project lies in the plantation of cashew-nut trees (Anacardium occidental) for harvesting cashew nut and cashew apple and establishing a processing units therefor.

2) Contents

This project is linked with that is proposed in the agriculture sector in Chapter 5. It should be implemented in a dual way of scattered planting a system and system of agro-forestry techniques, also in the form of a participatory project with the local population. Processing plants are planned to be established in the sandy hinterland zone for processing the harvest from scattered trees by an activity of PAM projects. These will meet the export demand for exporting more cashew nuts and cashew apple juice processed therein.

3) Justification

The study area climatically and pedologically suits to plant cashew-nut trees, thus stable export supply would be sustained.

4) Scale and Areas

The suitable sites for plantation develop along the coastal sandy zone in between Quang Nam Da Nang and Quang Ngai Provinces, where silica sand area has greater potential for the plantation.

6.4.3 Rubber Tree Planting: Just as mentioned in the agriculture sector in Chapter 5.

6.4.4 Coffee/Tea Planting: Ditto.

6.4.5 Pine Tree Planting Project

1) Objectives

To establish new mills for pine resin processing.

2) Contents

Pinus spp. (mainly Pinus merkusii) has been planted in hilly land distributed in Quang Tri and Thua Thien Hue Provinces. Here, resin has been collected during the rainy season for a decade, beginning from the tenth year or so after plantation. Currently, most of the planted trees are still under young growth and resin can be extracted from only a few of them. So, the production quantities are limited, amounting to 91 tons in Quang Tri Province and to 9 tons in Thua Thien Hue Province. Provided that the inhabitants expand the pine area through concentrated afforestation as well as scattered tree planting, resulting in an increased pine resin yield, new resin processing mills will be required. It will fractionate resin pine into volatile oil of terebinth and involatile fixed rosin, both of which are processed and utilized as solvents, medicines, paints and printing ink, thus meeting both domestic and export demands.

3) Justification

Suitable sites are available among barren hills and open land in these Provinces where forest coverage is to be expanded by means of tree planting, thus fulfilling environmental conservation and creating more forest resources. This also enables to produce saw timber and pulp wood, but above all the resin production allows a stable export of resin products.

4) Scale and Area

Quang Tri Province has currently 9 thousand hectares of forest planted with pine, distributed in Tien Phong, Cam Lo, Vin Linh Districts and the western part of Hai Lang District. The amount of resin produced in 1994 was 91 tons. It is envisaged to reach up to 20 thousand ha. in the near future. In Thua Thien Hue Province, where pine has been so far planted over 9,800 ha. with a resin production of 9 tons only, a target to be reached in 2010 has been set at 1.5 to 2 thousand tons annually.

5) Social Implication

The proposed project will create new employment hiring opportunities for the local community in such activities as establishing pine plantation, tending planted forest and resin collection. In terms of forest protection, much attention has to be paid on to how to avoid damages from forest fire, where a concerted preventing action is absolutely essential within the local communities concerned.

6.4.6 Industrial Plantation Establishment Project

1) Objectives

To establish wood processing mills in new industrial zones.

2) Contents

Presently operated processing mills in four Provinces use raw wood extracted from natural forest except VIJACHIP, which employs planted trees as raw wood. The volume of harvested wood would further be depleted by the exploitation under the existing conditions. It is advised to employ planted trees consisting of fast growing species, which will complement depleting natural raw wood. However, conventional sets of equipment and machinery would not rationally serve for processing planted trees. Here, processing plants need to be equipped with pole timber processing units, which require new investment. Wood processing mills with such capacity will be established in new industrial zones.

It is essential to keep a stable supply of a certain amount of products for maintaining the wood product market. To this end, afforestation with such fast growing species as Eucalyptus spp., Acacia spp., Pinus spp. as raw wood must be extended and accelerated. Two methods, namely establishment of industrial plantation and planting of scattered trees are both employed for this purpose.

3) Justification

In terms of soil and water conservation, this project will increase forest coverage by planting adequate fast growing species in barren hills and open land, thus creating new forest resources. It will also contribute to the development of the wood processing industry.

4) Scale and Area

Each of four Provinces annually schedules planting of 6 - 7 thousand ha. in their barren hills and open land. Eucalyptus spp. are planted in low land and gently sloping hills, while Acacia

spp. and Pinus spp. are selected for the sites on hill sides and hill tops.

5) Social Implication

The project will provide to the labor opportunities and contribute to the development of the local economy through enhancing afforestation and wood processing industry.

6.4.7 Cinnamon Tree Planting Project

1) Objectives

To establish new mills for cinnamon processing.

2) Contents

Cinnamomum cassia is a representative industrial tree, the plantation of which has been promoted as a component of the governmental No. 327 Project in Quang Nam Da Nang and Quang Ngai Provinces.

3) Justification

The natural conditions in the project area suit the growth of cinnamon trees as a specialty local produce in this area. The CEMMA (Committee for Ethnic Minorities and Mountain Area) and the MARD (Ministry of Agriculture and Rural Development) have followed a strategy of urging settlement of ethnic minorities, orienting them to settled farming, through various supporting measures, for instance such consolidation of basic agricultural infrastructure as irrigation and drainage, access road construction, tap-water facility, health-care clinic construction, agricultural instruction and land allocation. As a component of this strategy, these organizations allow them to plant cinnamon trees. They will mature in ten to twenty years after planting for exploitation, and exploited cinnamon bark and cinnamon oil that is obtained through processing it in processing mills can be exported, thus serving ethnic minorities for improving their daily life. From now onward, settlement will further be urged and expansion in planting sites for cinnamon trees will be promoted for increasing cinnamon products that is expected as a promising export commodity.

4) Scale and Area

Around 10 thousand families of ethnic people live in six districts in mountainous areas of Quang Nam Da Nang Province. At present, about eight thousand ha. of cinnamon plantation sites has been planted, where 229 tons of cinnamon bark was collected in 1994. It is envisaged to plant one thousand ha. per annum, thus finally 20 thousand ha. under cinnamon plantation is envisioned.

In Quang Ngai Province, about 10 thousand ha. of plantation area under cinnamon has so far been established, from which 350 tons of cinnamon bark were produced in 1994. From now on the planted area will be expanded to 20 - 25 thousand ha., until the production reaches 800 tons. As the production of bark grows, a processing mill is constructed for the production of cinnamon oil and both, bark and oil will be exported. The site of the mill is decided taking access to the production area and traffic convenience into consideration. In future, production of seedlings with higher oil and bark yielding as well as offering higher quality is expected through tree breeding.

5) Social Implication

This project never fails to contribute to better living standard of ethnic minorities, also to their faster shifting from a slash and burn system to settled farming, thus providing so to speak hamlet development by a type of communal participation based on the concept of social

forestry. Hence, it has significance from the view point of respect of ethnic minorities, measures against poverty, WID and participatory development.

6.4.8 A Macro Study for Watershed Forest Rehabilitation

1) Objectives

(1) To formulate the project's planning for forest rehabilitation and watershed development in the major fluvial watershed in four Provinces.

(2) To provide suitable land use planning together with a plan for land rehabilitation as well as soil conservation measures.

(3) To provide an implementation plan of actual forestry activities.

(4) To identify the physical, agricultural, forestry and socio-economic conditions of the area of each sub-watershed area unit based on the collected data, preliminary site investigation and the analysis of remote sensing data and interpretation of aerial photography.

2) Contents

Analysis of remote sensing data covering each watershed of main rivers in the study area is made, and aerial photographs are interpreted for mapping along with general topographic ones, while conducting forest inventory survey consisting of forest analysis and morphological one, and the survey results are analyzed. Particularly, agriculture, silviculture, agro-forestry in the up-stream side of each watershed are surveyed, and soil and water conservation and socio-economic as well as environmental assessment are conducted over the same area.

Besides, supplementary surveys are carried out and collected data and information are analyzed to formulate a rehabilitation plan for upstream watershed forest combined with settlement and farming activities of ethnic minorities living in mountain areas and actually acting the role of soil and water conservation.

3) Justification

Lack of a reliable system for protection of forests has resulted in such natural calamities as floods, droughts, land slides and siltation in riverbeds and reservoirs. This is the reason why watershed management in each river should be properly kept in an integrated way. In particular, forest destruction upstream of watersheds gives grave impacts on water behavior within the watershed, hence rehabilitation in these forest areas has important implications. In implementing forest rehabilitation, a reliable base is essential and the proposed survey provides an adequate rehabilitation plan through a macro study reflecting current situations and attaching importance to the relationship between local inhabitants and forest.

4) Scale and Area

The following Table 6.24 gives a list of streams with major watershed and their catchment areas in the study area:

Table 6.23 A List of Major Rivers and Catchment Areas in the Study Area

Province	River	Catchment Area (sq. km)
Quang Tri	Quang tri	2,660
Thua Thien Hue	Huong	2,830
Quang Nam Da Nang	Thu Bon	10,496
Quang Ngai	Tra Khuc	3,189
Quang Ngai	Ve	1,260

Source: Statistical Data of Water Resources Sector of Vietnam (1986~1990)

Though there is no difference among the importance and urgency in each watershed forest rehabilitation, it is recommended to adopt a macro study for upstream watershed forest rehabilitation of the Huong River as the priority project in this study , because of the existing densely populated urban area in its downstream basin, where countermeasures against flooding are urgently called for.

5) Social Implication

The selected area has not only a large urban population, center of marketing activities but innumerable historical monuments/ruins that are also important for tourism in Thua Thien Hue Province. In order to conserve properly such nationally important properties, the proposed study will contribute much to the realization of radical protection measures.

6.5 A BRIEF DESCRIPTION OF PROPOSED PRIORITY PROJECTS AND PROGRAMS

6.5.1 A Macro Study for Forest Rehabilitation (Upper Huong Watershed) Project

1) Background of the Project

The government of Vietnam, as the objectives and targets for the forestry sector until the year 2000, has established a system of protection forests covering about 6 million hectares for the purpose of protecting watersheds preventing soil erosion, protecting coastal areas against blowing sand, and creating a pleasant environment around cities and towns. Based on the government policy orientation for conserving watershed, it is required to implement the programs of rehabilitation and development of forest within the upper Huong watershed, in the light of the fact that the flood preventing measures have been deemed an essential task to protect its downstream basin, including the urban area in Hue City. The area is covered with poor forest and meadows and being degraded by shifting cultivation practices, although it is recognized that development of upland forest areas is potential. Farmers living in the area depend on shifting cultivation practices due to a luck of employment opportunities and accelerating the cultivation along with expanding population pressure.

As the project aims to rehabilitate the degraded forests/critical land, the following countermeasures should be implemented.

(1) Relevant silvicultural treatment

(2) Activities aiming at promoting people's attitude and ability in rehabilitating and sustaining land resource

(3) Development of forest plantation

(4) Harmonization of shifting cultivation control, and

(5) Extension directed at promoting people participation

2) Objectives

(1) Short term objectives:

A) To formulate the project's planning for forest rehabilitation and watershed development in the Upper Huong watershed

B) To provide suitable land use planning for forest rehabilitation and soil conservation measures plan

C) To propose an implementation plan

D) To assess technical, economic and financial aspects of forest rehabilitation and watershed development measures

E) To strengthen the capability of the institutions related to forest rehabilitation and watershed development in the project area in terms of planning activities, and

F) To carry out technological transfer.

(2) Long term objectives

A) To reduce soil erosion and sedimentation in the river basin area

B) To improve land capability and its production in the Upper Huong watershed

C) To create new forest resources and improve the quality of the environment, and

D) To give a better living standard to the watershed area people.

(3) Especially the objectives of the Macro Study are as follows:

A) To identify the physical, agricultural, forestry and socio-economic conditions of the area of each sub-sub watershed area unit based on the collected data, preliminary site investigation and the analysis of remote sensing data and aerial photograph

B) To identify existing soil erosion and sedimentation, and

C) To recommend on land zoning for the critical area.

3) Contents

(1) Methodology

A) Approach: In order to achieve the objectives of the macro study, the study has been done based on the watershed management concept. Therefore, different factors will be considered at the moment of making the study: soil erosion, sedimentation, land use and forest management. In spite of data and/or information availability constraints, the approach of this study is mainly oriented to watershed protection. In this case, almost all land rehabilitation and soil conservation activities are related to erosion control. Considering to the above representative approach, description of the physical conditions of the project area will be made based on characteristics such as physiography, climate, hydrology and soil. For agricultural aspects, land cover and forest management considerations will be adopted. For socio-economic aspects, description of the project area will be oriented towards the use of indicators like population density, man-land ratio, population pressure index and group dynamics.

The design of the above project area description aims to obtain basic information for identification of critical land based on soil erosion rate. It also aims to obtain adequate information, which will make it possible to identify main problems on rehabilitation plans related to erosion control.

B) Data Collection: To complete the fact finding for the study area, and to collect the following data for further analysis:

- Location and accessibility
- Physiography (geology, geomorphology, topography and relief, land form)
- Climate of project area (general, rainfall, temperature, humidity and evaporation, hydrology)
- Soil (soil classification and distribution, soil characteristic, soil erodibility)
- Present land use and land cover
- Agriculture (area and distribution of shifting cultivation, farm practices, agriculture production area)
- Forestry (forest status, forest vegetation, species composition, forest structure, reforestation and land rehabilitation)
- Socio economic aspects (population, population density, population growth, dependency ratio, family size/household, rural income, group dynamic)

(2) Personnel Requirement

Team Leader, Co-Team Leader, Silviculturist, Agronomist, Agro-Forestry Specialist,

Socio-Economist, Monitoring & Evaluation Specialist, Soil Conservation Specialist, Extension Specialist, Civil Engineer, Institutional Specialist, Soil Scientist, Aerial photo Interpreter, Geodetic Engineer, Tender Document Specialist.

(3) To Draw Up a Rehabilitation Plan

A) Critical land

- Basic condition
- The distribution of soil erosion in project area
- Identification of sediment source area
- Bare land

B) Land capability classification

- General
- Land capability classification
- Land suitability evaluation
- Land suitability assessment

C) Identification of main problems

D) Proposed land zoning

- Basic consideration (zoning)
- Land zoning

(4) Period

Over one year.

CHAPTER 7 FISHERY

7.1 OVERVIEW OF CURRENT SITUATION

This section presents an overview on the current situation of the fishery sector in the four Provinces of the Central Region as set against the national situation.

7.1.1 Production

The annual production by Province and certain other essential statistical data for the performance of the fishery sector within the study area as of 1994 are shown in Table 7.1.

The total fishery production of the nation in 1994 was 1.2 million tons and the fishery production of the four Provinces in the study area, namely 88,500 tons, accounts for 7.4% of total national production. Approximately 37.5% of total national production was contributed by inland-water fishery and the aqua-culture sub-sectors, whereas in the four Provinces of the Central Region, 93.6% of the production was from the marine fishery sub-sector.

Amongst the four Provinces within the study area, Quang Nam Da Nang Province has the largest fleet of fishing vessels and the most fishermen and Quang Ngai Province followed Quang Nam Da Nang Province quite closely in terms of total fishery production and numbers of fishing vessels and fishermen. Quang Tri Province had the least fishery production out of the four Provinces. The output from inland-water fishery and aqua-culture in the Province of Thua Thien Hue accounts for almost 50% of the provincial total fishery production and this peculiar situation of the Province may be attributed to the fact that the Province has the vast the lagoon water surface that is utilized in aqua-culture operations.

7.1.2 Marine Fishery

The coast line of the four Provinces in a study area extends over a distance of approximately 500 km from Quang Tri Province in the north down to Quang Ngai Province in the south. The sea along the region's coast is characterized by the narrow strip of sea board with a depth ranging from 0 m to 30 m. Fishing grounds for the fishing fleets that operate out of the four Provinces are formed within this narrow strip of sea board and fishing is conducted mostly in this depth range.

The majority of the fishing vessels registered in the Provinces of the study area are of smaller tonnage groups, equipped with engines of minimal power capacities and they are, therefore, hardly capable of carrying out fishing in deeper waters beyond the 30-m bathymetric rim. The sea-bed, that is rather shallow along the coast, abruptly drops deep beyond the 30-m bathymetric rim, and, fishery for pelagic, migratory species in the high seas farther beyond is yet to develop with the introduction of fishing vessels of larger sizes and power capacities.

The common fish capture methods are (1) bottom trawling and (2) drift netting, both in very small scales. Also neither the bottom-trawling by in-efficient fishing vessels on the sea-bed, which has repeatedly been combed and ploughed by destructive trawling gears nor the drift-netting in coastal surface waters where dense aggregation of pelagic fish shoals is rarely seen, turns out catches of high-value fish species in sizable volumes.

Table 7.1 Annual Fishery Production and Other Essential Facts

Particulars	National	Q. Ngai	QN-Da Nang	TT-Hue	Q. Tri
Annual Production					
Marine Fishery	750,000t	30,000t	38,000t	8,000t	6,850t
Inland & Culture	450,000t	450t	800t	4,000t	350t
Total	1,200,000t	30,450t	38,800t	12,000t	7,250t
Target -Year 2000	1,600,000t	45,000t	60,000t	16,000t	11,250t
Fishing Vessels					
No. Registered	93,500	3,700	4,200	2,000	1,000
Total Engine CV	1,250,000	82,000	76,400	32,000	11,500
Average CV/vsl	20.2	22.2	18.3	12 - 45	6 - 15
Fishing Ports	75	3	3	2	2
Export Value (US$ Mil)	458.2	1.4	17.0	6.5	2.5
Processing Plant	164	1	10	4	2
Fishermen	250,000	25,000	28,000	18,500	6,000
Aqua-Culture Area	(hectare)				
All Water Surface	1,400,000	2,000	2,500	12,500	n.a.
Utilized	300,000	500	1,000	1,800	n.a.
Hatchery					
Shrimp	260	3	10	3	1
Fish	375	1	3	1	n.a,

Note: n. a. = not available.

Sources: Compiled by the study team from Statistical Yearbook 1994, and the information provided by the provincial fisheries authorities during site visits.

In fact, the fish capture efforts in these coastal water areas are considered to be highly excessive and the fishery resources in shallower waters along the region's coast are said to be heavily over-exploited, although statistical data show that the fisheries overall production for all the four Provinces has been on a steady increase along with the number of the fishing vessels which also showed consistent increase. There has not been any information made available for sectoral break-down of the provincial production, but it could reasonably be assumed that the increase in the overall provincial fisheries production may be attributed to either the considerable increase in aqua-culture production in all the Provinces, or the increase in the landings of low-value trash fish incidentally caught by the trawlers that haul almost any fish indiscriminately from the sea-bed.

It has been noted at the fish landing sites within the study area that no single fish species is found to be dominant in the fish landings. The landing is comprised of an assortment of fish, crustaceans and molluscs and, generally speaking, the fish species composition being of many species in smaller respective volumes may indicate that the resources in the present fishing grounds are not really so abundant, or diminishing.

It is often mentioned that the fishery resources in the distant-water area far off the coast of Viet Nam, which is beyond the reach of the existing fishing fleets operating out of the Provinces in the study area, yet remains un-tapped. However, the distant-water areas off the coasts of Viet Nam and Hainan Island has already been frequented by the fishing fleets of distant-water fishing nations, Japan being one dominant, and the records of their fishing activities in the past are not really so encouraging. In addition, the sea along the Central Region of Viet Nam is noted for very hazardous conditions during the typhoon season and the fishing activities by the existing fishing vessels of the Provinces are much restricted under these severe conditions. As a matter of fact, the loss of fishermen's lives and the missing of fishing vessels in operation out in the sea is a subject of casualty reports commonly seen or heard in the Provinces during the typhoon season of the year.

One very specific feature of the marine fishery sub-sector in the four Provinces within the study area is the absence of fishing port infrastructure and facilities for harboring fishing vessels, landing fish catches, or, taking in the operational requirements such as fuel, water, ice and so on. The only exception is Thuan Phuoc fishing port located at the mouth of Song River in Da Nang City where a wooden structure jetty extends towards the river mouth utilized only for loading of fuel, ice and stores. Even at this fishing port, fish catches are not directly landed ashore, but through transfer onto smaller non-power crafts.

7.1.3 Aqua-Culture

The Provinces of Quang Ngai, Quang Nam Da Nang and Thua Thien Hue have vast inland and brackish water surface that may be developed for utilization in aqua-culture operations, while Quang Tri Province has relatively limited inland and brackish water surface. In every Province in this region under study, extensive efforts have been rendered to develop aqua-culture operations, irrespective of the water surface area being large or small, and by the end of 1994, approximately one fifth of the water surface available for development in the Provinces of the region have been turned into aqua-culture farms, where extensive rearing of shrimps and fish is conducted.

A number of hatcheries to produce and to distribute to the aqua-culture farms fish fries and shrimp larvae have been established and are managed by either provincial fisheries authorities or state-owned sea-products processing enterprises. It is understood that there has not been any hatchery so far that is established or managed by operators in the private sector. Aqua-culture, for shrimp in particular, is, however, so quickly growing that the capacities of hatcheries for production and supply of fish fries and infant shrimps are not large enough to meet the expanding needs of the farms in operation.

The major item for aqua-culture is a shrimp species commercially known as Black Tiger Shrimp which is widely accepted in the markets overseas and Viet Nam owes Taiwan in technology and, in certain instances, in capital investment, for introduction and development of

black tiger shrimp aqua-culture.

It should, however, be noted that it is not only the black tiger shrimp, but also shrimps of other types, fish and crabs, too, that are being reared successfully for commercial purpose. The efforts rendered by those at national or provincial research institutes and stations, and the hard work done by those at hatcheries and farm sites, despite many setbacks and hardships, for developing the aqua-culture to this level that as seen to-day, should be highly commended.

Shrimp culture in the Provinces of the study area is done in an extensive manner, and not in an intensive manner, which is widely practiced in the Mekong Delta region. When the shrimp larvae grow in the nursery tank up to the size of about 2 cm in three weeks or so, they are distributed to shrimp farms and released into the rearing ponds at the rate of 2 to 5 infant shrimps per square meter. The black tiger shrimp live on algae of specific types and planktons that grow naturally in shallow brackish water ponds, and, they are left to grow without feeding. (In an intensive shrimp culture, feeding is an essential requirement.)

It takes about four months for shrimps to grow to commercial sizes (25 to 45 grams per shrimp). The yield that is actually registered in the shrimp culture operations in the study area is in the range from 150 to 700 kgs, or, 450 kgs at average, per hectare (ha) per crop (two crops in a year.) However, the actual production in the Provinces of the study area, particularly in Quang Ngai and Quang Nam Da Nang, fluctuates year to year in a wide range depending on the weather conditions such as rainfalls, typhoons, ambient temperature and so on.

Shrimps grow fast when the salinity of the rearing pond water is consistently maintained at an optimal level. Heavy rainfall causing greater inflow of freshwater into the ponds will serve reducing the salinity of the brackish water in shrimp rearing ponds. And serious flooding in the aqua-culture area sometimes washes the growing shrimps away in the overflow of pond water. On the other hand, little rainfall meaning less freshwater inflow and stronger sun beams will serve for greater evaporation of pond water and for salinity concentration which hampers the growth of shrimps. In either event, the growth of shrimps, or, fish species, will be greatly affected and the yield will vary in a greater range. The culture ponds currently used for rearing of shrimp or fish in the Provinces of the study area are not well provided with any measures to protect them against exposure to those natural hazardous conditions.

7.1.4 Export Trading of Processed Seafood

The export of aquatic products has shown consistently steady growth over the period of ten years from 1985 to 1994. The annual proceeds out of export trading with aquatic products have soared from $82.6 million in 1985 to $485 million in 1994, accounting for approximately 14% of the total foreign exchange earning by export trading with commodities of all types. Frozen shrimp of aqua-culture origin and frozen/dried cuttlefish are the two major items that have contributed greatly to this achievement.

There are a number of seafood processing factories in the Provinces in the study area actively engaged in processing and export marketing operations. Most of them are state-owned, or their subsidiaries, and there are only a few processors in the private sector. Some processors are not directly involved in export marketing as their products are sold through their parent enterprises that are located in Hai Phong or Ho Chi Minh City.

There are some problems in shipping freight for export of frozen sea-products out of the Central Region. The majority of the sea-products processed for export trading are in frozen form and it is necessary to utilize refrigerated containers for shipment to market overseas. However, the services of refrigerated containers in the Da Nang Commercial Port, which is the one and only shipping outlet in the region, are limited and irregular and quite a volume of frozen products are transported from the processors' factories in this region to Hai Phong or to Ho Chi Minh City in refrigerated trucks.

For export trading with aquatic products, Japan is the target market where the seafood of Vietnamese origin is well accepted and consumed. Viet Nam now stands as the fourth largest

exporter of frozen shrimp to Japan, after Indonesia, Thailand and India. The following records for imports of frozen shrimp of all kinds are quoted from the External Trade Statistics, 1994, compiled by the Japanese Ministry of Finance.

Table 7.2 Japanese Imports of Frozen Shrimp

Origin Country	Volume	Value
	MT	Yen million
Indonesia	63,666	81,603
Thailand	49,345	70,208
India	44,113	49,735
Viet Nam	32,979	20,204
Total	302,975	338,774

The total volume of frozen shrimp imports had registered its ever highest point of 320,000 tons in 1990 and then leveled off at slightly over and above a 300,000 ton level since then. This growth in shrimp imports into Japan was largely for meeting rapidly growing institutional needs in the catering trade at the time when the country's economy was booming. The supply of shrimps to the Japanese market is, however, considered as highly excessive, as the market holds heavy inventories of stock-in-trade amounting to one third of the total annual import volume.

7.2 POTENTIALS AND CONSTRAINTS

This section presents the views of the study team on (1) development potentials for the fishery sector, and the prospect for growth in sectoral performances in future; and (2) the consideration over the elements that may possibly serve as constraints to retard and hamper sectoral development and growth.

7.2.1 Development Potentials and Constraints in General Terms

The country's territory stretches out from north to south forming a narrow land strip all along the entire coast line that extends over the distance of 3,200 km and the Exclusive Economic Zone of the nation has the area of approximately one million square kilometers. It is mentioned that the marine fishery resource potential in this water mass of EEZ is estimated at about three million tons, out of which only about 750,000 tons are now utilized annually.

It is also mentioned that there are over 110 rivers flowing into the sea throughout the coastal area and these rivers form wide areas of estuaries water surface. And, in addition, lagoons, which are said to be the largest of its kind in Asia along the sea coast of the Central Region, offer huge expanse of inland water surface. And it is mentioned that out of the total inland water surface of 1.4 million hectares, only about 300,000 hectares or about 21% has so far been utilized for inland-water fishery and aqua-culture, with annual output of 450,000 tons.

The projection in the development plan for 1996-2000 period sets a target for the sectoral production growth at 1.6 million tons, an increase by 400,000 tons from the current level of production. The target so set does not appear to be un-attainable, given the resource potential indicated above.

However, it is also reported that the fishery resources in coastal areas have already been heavily over-exploited and that the production of the marine fishery sub-sector shows a steadily declining trend over the past decade or so. At the same time, the fleets of existing fishing vessels are said to be inefficient and incapable of deep-water operations in the high seas for their inadequate power capacities and poor seaworthiness.

For increasing the marine fishery output, it is definitely essential to go farther out to the high seas for harvesting the resources that remain un-tapped, but this requires fresh input of more

efficient fish capture efforts in the forms of modern fishing vessels and more efficient fishing gears. It will probably be necessary to equip the fishing vessels with engines of larger power capacities, with highly mechanized navigation equipment, and also with sophisticated fish finding devices to find aggregated fish shoals out of the vast expanse of the high seas. And it is also essential for the fishermen to acquire the knowledge and the technology of navigating ships to and fro fishing grounds in the high seas, where no landmarks could be sighted and for an extended period of fishing trips.

It would then be absolutely necessary to establish and manage infrastructure in adequate scales to serve as fishing ports or fish landing centers with facilities for fish handling, storage under refrigeration, ice-making, and distribution and marketing.

For opening up further the un-utilized water surface of inland water areas or lagoons for aqua-culture, it is not really so easy as it appears. The characteristics or quality of water will have to be maintained at optimum levels, the salinity for instance, to meet the specific needs for the growth of specific species of fish or shrimps and this would require certain measures for controlling flow of freshwater or sea-water inward and outward. It will also be necessary to extend and improve the hatcheries production and supply capacities to meet the expanding needs for fish fries and infant shrimps. Installation of those facilities for post-harvest fish handling and quality preservation, marketing distribution and fish transport will also have to be looked into.

During the visits to certain fish landing sites and to the fish/shrimp processing factories in the Provinces of the study area, the study team had an impression that the post-harvest fish preservation is quite carefully done to maintain the freshness and the quality of fish catches. However, there are yet rooms for further improvement in the preservation manners. Installation of adequate facilities for retail sales to consumers and storage under refrigeration at urban fish markets in cities or townships, as well as the measure to keep the hygienic conditions at urban market places, should be seriously studied and implemented. The public infrastructure and facilities to develop higher domestic consumption of aquatic products appear to have been totally lacking.

Financial aspects of the development needs will also require careful studies and various financial means and credit facilities will have to be considered and made available to the industry to support fund raising to meet the varying needs for capital investment and operational working funds.

The lack of statistical information on the performance of the fishery sector should be noted with particular attention. It is absolutely essential to have reliable statistical data to address the situation of the sector and to plan and work out development strategies and improvement measures. It is therefore strongly suggested that proper and efficient systems should be established for monitoring the performances of fisheries and for collecting and analyzing as well the data by sub-sector, Province, fish species, fishing method, fish capture unit, and so on.

7.2.2 Development Potentials and Constraints in Marine Fishery

It is reported that in recent years there have not been researches or studies on the fisheries resource potentials in the sea of Viet Nam's Exclusive Economic Zone and no particular information is available for the marine resource potentials for the four Provinces within the study area. According to the Ministry of Marine Products, however, it is believed that in the Exclusive Economic Zone along the western coast of Viet Nam, namely from Thanh Hoa Province down to Binh Thuan Province, there exists a bio-mass of 657,000 tons, out of which about 252,000 tons (198,000 tons of pelagic species and 54,000 tons of demersal species) may be exploited and utilized.

There are no further details in this respect, but from the above estimate, it is not un-realistic to assume that the volume of the fishery resources exploitable in the sea of this particular study area will amount to 80,000 to 85,000 tons. This is almost the same volume as for the current annual marine fishery production of the four Provinces under the study. In other words, there

is a possibility that the marine fishery production in the four Provinces may be doubled.

The element that is considered to serve as the largest constraint in achieving the production increase is the capability, or the obsolete conditions, of the existing fishing vessels. For increasing the marine fishery production, fish capture activities will have to be extended in a much wider operation range from the bases along the coast, and the period of fishing trips will be extended too. The vessels will be required to have larger loading capacities not only for fish catches but also for fuels, oils, gears, tackles, foodstuff and provisions and their sea-worthiness must be upgraded to stand for high sea navigation.

It will be necessary to equip the vessels with engines of larger power capacities, more advanced fishing gears and navigation equipments. To implement the measures for upgrading and improving the capability and the productivity of the fishing vessels, it would be inevitable to introduce new fishing vessels of larger tonnages as renovation of existing fishing vessels may not be good enough to serve these purposes. Then, injection of fresh capital funds to acquire better fishing vessels and other capital means, as well as provision of extra working funds to meet higher trip expenses will be an essential element.

And the first and foremost, an exploratory fishing expedition to un-known fishing areas in the high seas will have to be organized and implemented to determine and ensure the operators of a reasonable at least, if not, profitable, return from costly, capital-intensive operations. Such experimental fishing expedition to ascertain the commercial viability is too big a burden for commercial operators to undertake. It should, therefore, be undertaken as a part of a development project for the fishery sector, with financial assistance, or with capital means in kind offered as an assistance. And this should be the way of approach for opening up the fresh possibilities of the high seas fishery.

There are not many options for developing the high seas fishery that the Viet Nam's marine fishing industry could take up, when the prospect of attaining economic viability is uncertain. In addition, securing marketing opportunities for the increasing fish production will be another problem to be resolved. One of the very few options is introduction of modernized distant-water long-line fishing vessels for larger-sized high-value tuna with a view to export them to Japan for sashimi use.

The administrative systems for the management of fisheries activities and resource control by means of licensing and enforcement of laws and regulations relating to fisheries activities are another aspect that needs serious study and re-structuring, as it is absolutely necessary that more effective and stricter measures have to be introduced to check and control the increase in the number of coastal fishing vessels, and, the manners of fish capture, particularly for the coastal area, for the purpose of maintaining the current level of fisheries resources to ensure sustainable production.

7.2.3 Development Potentials and Constraints in Aqua-Culture

There is a good prospect for development of aqua-culture in the four Provinces within the study area and there are quite a few options to achieve development in this sub-sector. In all the four Provinces of the Central Region, both the "inland-water" water surface area and the "brackish-water" water surface area that may be utilized in aqua-culture development are abundantly available. Only about one fifth of the total water surface areas have been turned into aqua-culture farms.

Most attention has been drawn to brackish-water shrimp culture operations that have become a commercial success throughout the country, but it should not be overlooked that an extremely good possibility exists in fresh-water fish culture, which does not require inputs of large capital or technological expertise. It is not costly, more cost-effective and much less care-taking. However, the marketing of the products from the fresh-water fish culture is a major constraint in developing this area of aqua-culture.

Fresh-water fish out of aqua-culture is normally regarded as being not for export marketing but for domestic consumption. And although rearing fresh-water fish has been carried on at many

fish farms, it is done in a limited scale because of limited market outlets for the products. It is believed that there is a limited demand in the domestic market, but this does not carry truth. There will be a good demand for fresh-water fish, if only the domestic consumers get more disposable cash income and have more elasticity in household expenditure. If and when domestic household consumption increases in rural areas, there will be a steadily growing demand among the rural consumers, which will stimulate further expansion of the fresh-water fish culture in a viable way.

Fresh-water fish from aqua-culture would be an item that could be exported to markets in neighbouring countries. The costs of production and marketing expenses could be contained in a range that makes the fish marketable, even when transported to the markets along the border areas in the neighboring countries. The rearing of fresh-water fish could be introduced to the minority people in inland areas not only for domestic consumption but also for "export marketing" to neighboring countries. One great advantage of fresh-water fish is that those fish could be transported alive in little water or even without water for a considerable period of time.

The brackish-water black tiger shrimp culture has developed into a well-established and highly viable operation. It encouraged development of export trading and stimulated the growth of sea-products processing throughout the nation. And it appears that the prospect is still bright still for further growth not only in production, but also in processing and export trading. The quality and the price-competitiveness of the Vietnamese origin shrimp would ensure further expansion of Viet Nam's share in the overseas market, and, further development of the shrimp culture operations as well.

There are options for further development along this line. One option is to turn existing extensive culture operations into intensive culture operations. By doing so, the yield will immediately rise by three, four folds, but its introduction will have to be made with much precautions. In the intensive shrimp culture, that had once been so successfully and widely practiced, but then caused abrupt collapse of the industry in Taiwan, and, that is now commonly practiced in Indonesia, Thailand, the Philippines and elsewhere, infant shrimps are released into rearing ponds at the rate of 25 to 35 shrimps per square meter. They are then fed with highly nutrient feedstuff which is given in such excessive volumes as to make the shrimps grow faster and larger. The yield in such intensive culture could rise up to 5 to 6 tons per hectare per crop and it is a common knowledge that a high yield as 11 tons per hectare per crop had easily been attained in Taiwan. However, such intensive shrimp culture as practiced in Taiwan did not last long. Too dense shrimp population in a limited water mass of the culture pond, and, excessive feeding that resulted in accumulation of sludge at the pond bottom caused infectious diseases to spread over, prompting the culture operators to add antibiotics in the feedstuff that eminently remained in the shrimp body even after harvesting. The shrimps out of intensive culture are after all not sound in their health and sometimes the entire shrimp population of a farm die away when infectious disease spreads.

Lessons from the experiences of the Taiwan's shrimp culture industry should carefully be learned and the disastrous total collapse of the shrimp aqua-culture should not be repeated in Viet Nam. The shrimp culture in Viet Nam should remain under the system of extensive culture that is now practiced in the four Provinces, producing wholesome, sound and healthy shrimps that other competing producer countries could not offer.

Another option is to introduce intensive culture operation in a very cautious manner and one other option is to open up more water surface into culture ponds. However, any water surface area that are to be opened up from now on would be under such conditions not so advantageous as for the area already opened. In such respect as accessibility, geographical conditions for supply and control of water flows, and, in many more aspects, initial costs for opening up the culture ponds will be heavier. Therefore, studies for economic viability should carefully be conducted prior to commencement of any work for further development.

The shrimp culture in the four Provinces has so far been one of the so-called "mono culture," namely, just one species to rear. However, it should be studied to see if any such "combination culture" with other species of shrimps or fish of un-carnivorous type could be introduced.

Further development of aqua-culture in the Provinces of the study area would yet require substantial capital investment and when it is intended for export trading, upgrading, extenuation or addition of processing facilities, which also require intensive capital investment, will be necessary. However, aqua-culture development is less capital-intensive and more cost-effective when compared to the exploration of the resources in the distant-water high sea area by deploying modern fishing vessels.

There is one other element in the export marketing of frozen shrimp, which may serve as a constraint against aqua-culture development. This matter will be dealt within the following section on export trading.

7.2.4 Development Potentials and Constraints in Export Trading

For almost all the shrimp exporting countries in Asia, Japan is the main target market where all their exports of shrimps, particularly of black tiger shrimps, are directed to. And over the period of ten years or so till 1992, the Japanese market had continued to expand its purchasing of shrimps from all the supply sources that emerged in the trade. However, there were abrupt changes brought about in the pattern of importing not only shrimps but also all foodstuffs and provisions when the Japanese general economy started showing a declining trend at the early 90's.

Household spending has been tightened up when wage income was not increasing. Food consumption in general, and in institutional catering trade in particular, has gone down considerably. Accumulation of stocks in trade made the inventories of commodities growing rapidly, affecting pricing strategies for fresh purchases. The supply of frozen shrimps, of cultured shrimps in particular, was kept growing from sources that newly emerged. India, that was once known as one of the largest supplier in the world of sea shrimps, has emerged as a highly competitive supplier of cultured shrimps. While Taiwan had completely dropped out of the trade, China is now gaining strength as a substantial supplier with quickly developing aqua-culture for black tiger shrimps in the southern Provinces, and for sea shrimps in the northern coastal Provinces.

Even on the American Continent, the aqua-culture for black tiger shrimps has developed widely and Mexico, Ecuador and other countries in Central and South America export their products to markets in the United States and the European Continent, both of which had been the markets in where the shrimps of South-East Asia origin were dominating.

The export trading that heavily depends on a single target market with products of a few limited items is after all very vulnerable and the export trading of black tiger shrimp to Japan is one of the typical examples of vulnerable export trading. The products and the packaging, too, must conform to the standards and specifications of the importing countries. The buyers also dictate certain terms that require the exporters to extend guarantee for meeting all such requirements of the market. The exporters will also be required to guarantee full refund of export sales proceeds, and reimbursement of all expenses incurred on the buyers, if and when the products fail to conform to the standards/specifications required. There have been instances, in which fractional trace of antibiotics was detected in the body of one shrimp piece out of thousands shrimps in the course of sample examination by public health authorities at the destination, resulting in total rejection of the whole shipment. The loss and the damage burdened by the exporter out of such rejection of a shipment could cause total collapse of the exporter's trading credibility and financial standing.

For the purpose of establishing and consolidating steady, long-lasting export trading, it is absolutely essential (1) to have export items of products in a wider range, and (2) to diversify marketing efforts by exploring opportunities in a number of markets overseas so that the trading would not be too dependent on one single target market.

7.2.5 Capital Fund for Development Project

In planning development projects for the fishery sector in any of the four Provinces in the study

area, it has frequently been mentioned that injection of fresh capital funds from the sources overseas was necessary as there had been no capital funds accumulated within the industry. However, it is important to note that the financial aspect of development project planning be more carefully looked into and studied from every angle. Any undertaking in the fishery sector will require a substantial capital input for the means of production also for operational expenditure.

Fishing vessels, engines and equipment, fishing gears and tackles, processing equipment, refrigeration machineries, hatchery facilities, shrimp rearing ponds, and so on all of these require substantial capital investment. Are these really worth investing large capital?

This is a very simple question but it points out the most essential aspect. A very close analysis to see whether or not the current fishing operations are really profitable.

The processing operations coupled with export trading appear to be substantially profitable. Some state-owned enterprises register good profit in their financial statements and some others branch out in many other lines of business not closely related to the fishery.

The cultured shrimps are purchased and collected mostly by fish merchants who go round the culture farms and the prices paid by them for the shrimp at the farm site at the time of harvest are said to be VND70,000 or so per kilogram on average. The shrimps are then delivered and sold to processing factories at prices in the range of VND120,000 to 150,000 per kg. The retail price of good cultured shrimp is about VND180,000 or more per kg. The export price of processed, headless shell-on, on f.o.b. bases, fluctuates in a volatile range, but it could be around $17.00 per kg for large sizes.

After all, from the above cycle of trading transactions, it could be said that in the entire process of marketing cultured shrimps, an ample margin is retained at every stage of trading transaction. No matter who retains how much of margins, it is obvious that in the whole marketing process dealing with cultured shrimps, quite an ample value is derived out of the trading. Does the added value remain in the sector or does it flow out of the sector? Or is the added value spent for other purposes than for development of the fishery? The added value could be retained in the sector and could be turned into capital funds that may be ploughed back in the sector for further development.

7.2.6 Creation of Domestic Market

Export trading offers so much advantages and benefits to the export-oriented producers and processors. In most instances of export sales, prices with larger profit margin may be secured. Earnings in foreign exchange by export trading will benefit not only the exporters but also the nation. However, the significance of generating domestic demand, and the advantages of creating a domestic market, for aquatic products should not be overlooked.

The items of aquatic products for export trading tend to be too expensive to explore the demand of the domestic consumers, and, to develop trading in the domestic market. As a matter of fact, those seafood items of high quality and freshness, such as sea shrimps, cuttlefish or pomflet that fetch high prices in the export trading, are no longer presented in the domestic market as they are simply too expensive for domestic household consumption. Almost all such high-quality shrimps or fish are collected and delivered to export-oriented processing companies.

However, those expensive items of aqua products could also be presented to domestic household consumers in a modified style and taste that are palatable and acceptable in terms of taste and price. In preparation of an item of products for export to an overseas market, it may be processed into finished product in an excessively refined style by scraping off more than half of the edible portion of fish or shrimp. The processor could never use its own discretion to modify the style of finished products, as it is the standard specification that the overseas market requires. However, for presenting the products for domestic consumption, processing may not have to be so refined or wasteful and by reducing the loss of the edible portion, the pricing could be adjusted to make the products much less expensive. Moreover, it is up to the processor how to modify the style or adjust the pricing structure.

The domestic market could be created and developed into a substantial magnitude and this nation with a population that is expected to reach almost 100 million by 2010, could be turned into a great market. Increase in per capita consumption by one additional kilogram of aquatic products at the price of say one dollar will mean additional 100,000 tons of fresh consumption demand, and an additional $100 million turnover.

At the time of brief site visits in the Provinces of the study area, it was noticed that in almost all processing factories, processing operations were suspended as the raw materials had not been delivered due to unfavorable weather conditions that prevented fishing vessels from going out to the sea. However, there was one factory in Quang Nam Da Nang Province which was in operation, processing certain products for export to Singapore and Hong Kong. The processing that is solely dependent on export trading in a single target market is not really economical and diversification of processing by introducing seafood items for domestic marketing will also serve improving the viability and stability of processing operations.

Items of processed products made from minced fish meat, such as fish balls and so on are very commonly consumed throughout the nation but processing of these items is done in a very small household scale, as the products are very easy to deteriorate without proper storage under refrigeration. It is also commonly seen that processed meat products, which may be called locally-made sausage and ham, are also made in household-scale processing and presented in the consumer market. This proves that the people in this nation have knowledge and technology of food processing in their own traditional manner and it would be worth studying the possibility of establishing the traditional processing into an organized, stable cottage industry with modern facilities for processing, distribution and storage.

The major constraints for development of the domestic market and domestic processing industry are (1) first and foremost, the lack of purchasing power on the part of the domestic household consumers, who have the liking and the taste for seafood, but cannot afford to purchase them regularly, because of very little disposable cash income, particularly in the case of household consumers in rural areas, and (2) the lack of infrastructure and facilities for consumer market in cities and townships.

7.3 DEVELOPMENT STRATEGIES AND POLICIES

7.3.1 At National Level

It is said that almost three-quarters of the nation's population are in the agro-related sector of the economy, but the contribution of this sector towards the nation's economic growth is not really so substantial. The share of the agriculture sector in GDP has declined from 39.4% in 1990 down to about 32.9% in 1995, whereas that of the industry sector has increased from about 18.8% up to 22.8% over the same period.

While the compound real GDP growth of the nation over the period from 1990 to 1994 is said to have been about 7.9%, that of the agriculture sector (including forestry and fishery) was recorded at about 4.3% over the same period and at 4.7% in 1995. The growth for industry sector was about 12.1% in 1995. There is no specific information available for the fishery sector performance, but it may reasonably be assumed that the growth for fishery should have been very close to, or slightly higher than that of the agriculture/forestry sectors.

However, in the planning of the nation's future economic growth, particularly in the next five year period and for the next decade, it is desired that growth at a higher rate will be attained in the food producing sectors. And particularly in the fishery sector that is now regarded as a more important source of protein food supply than the livestock industry, a consistent growth is expected.

The sector should play a more important role in improving the well-being of the people of the nation. According to the project paper for rehabilitation of fishery infrastructure, the per capita consumption of fish in 1993 was said to be 13 kgs, but it declined to 12 kgs in 1994. One of

the elements that have contributed to this decline is the abrupt growth of export trading, for which a substantial volume of aquatic products supply had been taken off the domestic market.

It is now being planned that the per capita annual consumption of aquatic products be brought up to 18 kgs by the year 2,000. At the same time, it is also planned that the value of aquatic products export be brought up to US$1,000 million by the same target year up from the turnover in 1994 of US$485 million. It is, therefore, very essential that a substantial overall increase in the output of the fishery sector must be achieved to meet the projected demand not only for increasing the domestic consumption but also for expanding export trading.

The plans, which are being worked out at the national level for the fishery sector to attain these goals are:

- Building up deep-sea fishing fleets to replace the current coastal fishing fleets and diversify the fishing efforts for exploration of marine resources in distant-water areas
- Building and rehabilitating fishing infrastructure to support and facilitate more productive, efficient fishing activities
- Developing further aqua-culture operations for increase of output to support further increase in export of aquatic products, and
- Upgrading seafood processing facilities and efficiency, and improving the quality of export-grade seafood for maintaining a competitive position of the Viet Namese products in overseas market.

Along the line of planning the strategies for the above, one project for rehabilitating ten fishing ports throughout the nation, including one, Thuan Phuoc Fishing Port in Quang Nam Da Nang Province, is reported to have been successfully negotiated with the Asian Development Bank.

7.3.2 At Provincial Level

During the visits to the Provinces in the study area, the strategies and the plans for development worked out at the provincial level have been briefed by the respective provincial fisheries authorities. The four Provinces in this region share many things in common. The absence of infrastructure and facilities for development is one eminent position being shared by all, and the geographical position, in which the fishery production activities are subjected to severe meteorological conditions, is another. And yet, each Province has its own features and problems that are specific and peculiar to the respective Provinces. Therefore, the plans for development at provincial level have to be worked out by incorporating (1) projects or measures, which will better be implemented and managed jointly with concerted efforts of all the Provinces concerned for attainment of common goals of development, and (2) projects or measures, which will serve for development, or removing obstacles for development, in certain areas or aspects specifically required by each respective Province.

7.3.3 Specific Positions of Respective Provinces

1) Quang Nam Da Nang Province

Quang Nam Da Nang Province has he largest fishing fleet of all among the four Provinces in the study area and it registers the highest annual fishery production. While all other three Provinces do not have, almost totally, any fishing port infrastructure and facilities that are functional to support fishing activities, this Province has a fishing port called Thuan Phuoc Fishing Port and a sizable commercial port, which offers services of direct shipping freight for export of frozen processed seafood, too. Such advantageous position of the Province made it possible to develop seafood processing industry in Quang Nam Da Nang Province to a much more advanced level than in other Provinces. Moreover, an ADB-funded project will be working on the Thuan Phuoc fishing port, which is not really fully provided with port facilities at the present, to turn it into a fully functional fishing port.

Taking into account all such advantages that the Province is benefited with, Quang Nam Da Nang Province may be selected with priority as the Province, in which concentrated efforts will be rendered for diversification of marine fishery towards distant-water exploration, and for expansion of export-oriented seafood processing operations. It is, however, suggested that any such plans for development of distant-water fishery and expansion of seafood processing be left to the enterprises in the fishery and the seafood processing sectors of the Province to study and work out in consultation with the provincial authorities. The enterprises existing and operating in this Province are well established and engaged in active operations not only in processing, but also in marine fishery as fishing fleet owners and in the aqua-culture sector through hatchery operations. They have their own development plans and what is important is to incorporate plans of respective individual enterprises into an integrated development plan for which official financial support could be justified.

The City of Da Nang and its vicinity is now developing into a sizable urban market with a fast growing population and the City's consumer markets are no longer capable of handling the volumes of commodities for daily trading or of accommodating the number of retailers. Moreover, the markets are too congested and the hygienic conditions are deteriorating. For the purpose of increasing the consumption of aquatic products, it is strongly recommended to implement measures of upgrading the facilities for consumer retailing at the public market, or construct and open in Da Nang City a new public market, which may serve as a model specimen of an urban consumer public market.

2) Quang Ngai Province

This Province has a sizable fishing fleet, which is comparable in number to that of Quang Nam Da Nang Province, but smaller in tonnage and power capacity. The Province registers quite a high record of production for both, marine fishery and aqua-culture. However, Quang Ngai Province has an apparently serious setback that serves as a major constraint against development in the fishery sector. In this Province, there exists no fishing port. And a river flowing alongside the coast-line and many land-locked streams of river branches and lagoons make the access to the coast or to the shrimp culture farms that have developed in the coastal areas very difficult. Most of the roads leading to the fish landing places or to the aqua-culture ponds from the trunk roads are narrow and un-paved creating problems in transport of fish catches or shrimp harvest to market places. The problems of difficult access to fish landing places or to aqua-culture farms are common in the other Provinces, but more serious in this Province. The traffic of vehicles on these roads may be completely suspended on rainy days except for motorcycles which will still have a hectic time passing through mud-filled, slippery roads.

The activities in marine fishery are centered at three fishing villages which are serving as major fish landing centers almost without any port infrastructure. The lack of infrastructure at fish landing sites means in most instances total and complete absence of any permanent structure. There, fishing vessels lay at anchor in the stream of a river or off sandy beaches of a sheltered water area or they are pulled up on beaches when the weather turns unfavorable.

Fish catches are landed not directly ashore from the fishing vessels, but by the crew carrying baskets filled with fish and wading through shallow water to the shore, or by transferring fish first into smaller, rowboat like crafts which then carry fish to shore for landing. This is a scene commonly sighted not only in Quang Ngai Province, but also in other Provinces of the study area. It is not just the problem of lacking infrastructure for fish landing activities. The fishermen hardly have their own means of transporting their fish catches or shrimp farm harvests to a market place and it is normally for fish merchants or fish-brokers to go into the landing places or to the aqua-culture farms to collect fish or shrimps from fishermen or fish-farmers. There are no such facilities that may be called "fish market" or "fish auction hall" or any of the sort at fish landing centers.

In Quang Ngai Province, quite a few seafood processing factories are in operation and it is a part of the provincial development plans that new processing factories shall be established, while the existing factories are renovated and upgraded. However, it must be noted that the

value of seafood export from this Province is not rely so great despite the provincial production of shrimp aqua-culture being quite high. This may be attributed to the fact that a substantial portion of seafood processing in this Province is being done under the seafood processing enterprises in Da Nang, which exports the products of Quang Ngai origin to the overseas market under their names. Sometimes, the products of Quang Ngai processors are transported to Ho Chi Minh City for export from there.

The shipbuilding operations in this Province are very active. Although the scale is not very large and many setbacks are experienced, the number of newly-built fishing vessels added to the existing fishing fleet of the Province is worth noting. If the fishing fleet of this Province is given more support and more conveniences in their operations, production out of marine fishery could increase at a considerable rate.

What they need most is engines of larger capacities and more efficient fishing gears. And the efficiency in turnover of fishing trips could easily be improved, and the production should increase considerably, if the fishing port facilities are provided at their operation bases (fish landing centers in their fishing villages) for loading of fuels, fishing gears, ice, fresh-water and other operational requirements.

The water surface areas of inland-water and brackish-water, which are available in this Province for aqua-culture development, have been under-utilized when compared to other Provinces in the study area. And if the problem of access to the water surface areas along the coast of this Province is resolved somehow or other, it would certainly expedite the further opening of water surface for aqua-culture operations. At the same time, it will also serve for increase in landings of fish catches or in collection of cultured shrimp harvests, and, after all, there is a good prospect of having the fishery production increasing in a short time, once the improvement in fishery-supporting infrastructure and facilities is achieved.

3) Thua Thien Hue Province

The Province of Thua Thien Hue has a vast brackish-water "lagoon system" covering an area over 22,000 hectares, which is regarded as the largest of its kind in the whole of South-East Asia. It is therefore a very common belief in the Province that the potential is great for developing aqua-culture by utilizing the vast water surface of the lagoons. The Province is also noted as a water resourceful Province with the highest annual rainfall among the Provinces of the Northern and the Southern Central Regions of Viet Nam.

The lagoons offer opportunities of fishing under safer conditions, and for a variety of fish, crustaceans and molluscs, some of which are found only in shallow, brackish-water lagoons. Throughout the entire stretch of the lagoon system along the coast-line of the Province, the water is very shallow having an average depth of 1.2 to 1.5 m. The tidal difference is not great, in the range of 0.3 to 0.5 m. Under these conditions, the fishermen conduct fishing with smaller fishing crafts and gears of simple-structure. There are quite a number of farmers, who live along the lagoon coast and indulge themselves in fishing in very simple manners, too. There are also those, who concentrate their efforts in culture of shrimps, crabs and fish by enclosing lagoon water surface with partitioning of netting, wood sticks or bamboo poles. So-called "cage culture" is also commonly practiced. These aqua-culture activities in various manners utilizing lagoon water surface have resulted in having the largest area of aqua-culture, and the largest annual production from aqua-culture, among the four Provinces of the study area.

However, the development in utilization of the lagoon system for fishery activities is now posing a social problem. There are some 1,500 small fishing crafts engaged in fishing activities solely in the lagoon waters using very simple methods of fishing, or in collecting of shellfish. The fishermen of this group together with their families live in those small fishing crafts, which have become the permanent residence of their household. The fleet of those small fishing crafts do not stay at any one particular place, but keep drifting throughout the lagoons by shifting their mooing/anchoring places from one point to another. Even the children of infant stage or of schooling ages live the drifting life on board and the population of those

drifting folks is estimated to be about 10,000, and yet on the increasing trend.

The problems arising out of this situation are getting complex and serious. These are (1) the living conditions on board are below poverty level, as they belong to the lowest income quintile group; (2) very few children of schooling ages attend schools; (3) the fleet of those drifting crafts have become a source of serious pollution and contamination; and (4) more serious problems arising out of their anti-social behavior. The provincial authorities are now taking steps for opening up settlements for them to settle down on shore.

The activities in the Province's marine fishery are centered at two fishing villages, Thuan An and Tu Hien, which are located at the outlets of the lagoons to the sea. No fishing port infrastructure is available at either of these two major fish landing centers and the provincial fisheries authorities have a plan to construct one fishing port, at least at Thuan An, where a commercial port serving for local trade cargo vessels of 100 GT class exists. It is planned to construct a fishing port over an area of about 3 hectares immediately next to the compound of the commercial port, and along the water-front side of an existing, but not operating seafood processing factory.

In this Province, too, there are no specific facilities not only for landing, but also for collecting, or transporting, or marketing at wholesale level, of fish catches out of the marine fishery, or the harvest from the aqua-culture farms. These are simple left to the fish merchants, who move around for fish-collecting or offering fishery-supporting services to fishermen or fish-farmers.

Much efforts have been rendered by the provincial fisheries authorities for expanding aqua-culture operations in this Province through fisheries extension/information services, hatchery capacity upgrading, and so on. As a matter of fact, the provincial hatchery operations have succeeded in turning out larvae of blue swimming crab for export-oriented commercial culture and these efforts for further expansion of aqua-culture operations must be encouraged and intensified with assistances in finance and in kind.

It is not only the lagoons that are abundant in this Province. The inland water surface, rivers and lakes, too, are abundant, and the quality of inland water is superb. The potential for inland freshwater fish culture is of magnitude and the provincial hatchery operations have the capabilities of turning out fries of freshwater fish species. However, development in this direction very much depends on the prospects of opening up the market. Demand is there among domestic consumers and the domestic market for freshwater fish should develop as the consumers' purchasing power grows.

As for developing aqua-culture operations utilizing the vast water surface of the lagoons in the Province, the prospect is not really so bright as anticipated. The lagoons are very shallow and this means that the total volume of water-mass in the lagoons is not really so great. The characteristics of the lagoon waters are variable being affected by the changes of the season. During the rainy season of the year, the inflow into the lagoons of land water reduces the salinity of the lagoon water turning it into almost fresh-water. During the dry season, there will practically be no land water flowing in, but the inflow of seawater and constant evaporation from the lagoon surface may sometimes turn the lagoon water saltier than seawater.

The lagoon system of the Province is vast and it would be almost impossible to effectively control the flow of land water and seawater, inward or outward. It would require really extensive capital investment of a tremendous amount to construct dams and lockage at the lagoons outlets to the open sea, or at the opening of rivers that flow into the lagoons, and to construct a huge pumping system to control water flows artificially when necessary for stabilizing the water quality at the most optimum level for intended aqua-culture. In addition to this, siltation would also pose further problems.

The ecosystem of the shallow lagoon like those in the Province is very delicate and vulnerable. Any change in environmental conditions artificially brought about could damage the existing ecosystem totally. It is really hard to foresee what would happen on the ecosystem with minor small changes in the environment and it could almost never be restored, should the ecosystem gets damaged once.

Just the inflow of river waters alone through River Song Huong, which carries ever-increasing household waste and sewage of a large city like Hue, would be detrimental enough to destroy the existing ecosystem of the lagoon system in no time. And this would pose immediate major problems in maintenance of the hygienic conditions against pollution and contamination of any aqua-culture farms.

The collection of shellfish is one of the major fishery activities in the lagoons and it would be advisable to introduce a system of regularly examining the quality of shellfish collected from various points of the lagoon bottoms, as the shellfish will be the first ones to be contaminated if there is any substance to cause contamination. And particular attention is drawn to detect any accumulation in the shellfish of heavy-metal items.

4) Quang Tri Province

The Province of Quang Tri has almost no specific features in its fishery sector. Marine fishery is most active, but its output is not very substantial. The aqua-culture operations are receiving encouragement and developing well, but at a level a little behind those in the other Provinces of the study area, as Quang Tri Province has smaller water surface areas inland when compared to other Provinces. The seafood processing operations are also growing, but in rather smaller scales than in other Provinces of the study area.

The marine fishery activities are centered at two fishing villages, Cua Tung in the north, and Cua Viet in the south, and in neither of the two fishing centers fishery-supporting infrastructure exists. These two fish landing centers are both at the mouth of rivers, where the fishing vessels stay in the stream of rivers off sandy beaches.

The fishing vessels in marine fishery of this Province are equipped with engines of minimal power capacities that range from 6 CV to 15 CV and they are hardly good enough to propel the vessels under unfavorable weather conditions. The range of fishing trips is also much restricted, because of the poor capacities of the fishing vessels and for this reason, the provincial fisheries authorities plan to upgrade the vessels' capacities or to replace the existing vessels with more capable new vessels. The plan for upgrading of the fishing vessels' power capacities is not aiming high, as the target of upgrading is to bring the average engine power up to 22 CV on average, but with more reliable engines like Yanmar engines from Japan.

The establishment of fishing port infrastructure at the fish landing centers is essential to support fishing activities particularly when the upgrading of fish capture efforts is being planned, as the effect of improvement in fishing efforts may not be well reflected in the increase in the production without the supporting infrastructure and facilities to serve the fishing vessels in turnover of fishing trips.

7.4 DEVELOPMENT PLANS

7.4.1 Basic Consideration

All four Provinces within the study area share in common constraints that retard development in the fishery sector. Amongst all the constraints, the most serious ones are:

- Absence of fundamental infrastructure and facilities to support fishery activities
- Inefficient capabilities and obsolete conditions of fishing vessels
- In-sufficient hatchery capacities and lack of facilities for aqua-culture
- Lack of capital accumulation and serious shortage of operating funds
- Inadequate facilities for distribution and marketing of fishery products.

The absence of infrastructure and facilities for supporting fishing activities, particularly in marine fishery, is indeed a serious problem, when over 90% of the annual fishery production

of the four Provinces in total is derived from marine fishery. In the Provinces of Quang Tri, Thua Thien Hue and Quang Ngai, there is none at all of any infrastructure that may be regarded as a fishing port. Quang Ngai Province is developing a "fishery settlement," where an area of approximately 4 hectares bordered by an embankment along river bank is being opened up for fishermen folks to move in and settle down, but no such structure for supporting fishing activities as jetties for fish landing or store loading, or transit sheds that may serve as a fish market, or ice-making plant, or freshwater supply system, or fuel depot exist. In Quang Tri and in Thua Thien Hue, it is a total absence of any infrastructure at all. Even in Quang Nam Da Nang Province, where there is a fishing port called Thuan Phuoc at the mouth of Song Han River, it yet lacks proper infrastructure for direct fish landing or for fish trading activities. Moreover, there are no facilities for maintaining proper hygienic conditions.

The fishery authorities in every Province see this situation as being most serious that requires immediate and effective measures of improvement. In all the four Provinces within the study area, it is indeed an urgent necessity that fishing port infrastructure be established immediately at the centers of fishing activities, a fishing port at one place at least in each Province, to remove the difficulties and hardship confronting fishermen in landing of fish catches or loading of fuel, water, ice or any other stores that are required in fishing trips, or for overhauling or repairing of machineries, and so on. The convenience and services that may be made available at fishing ports will certainly enhance the effect of improvement in fish-handling, preservation of freshness and value of fish catches, quicker turnover of fishing trips, fishing efficiency, safety in operation, and, most important of all earnings of fishermen. And achievement of improvement in fishing port infrastructure and facilities will immediately be reflected in greater output from the marine fishery sub-sector and an increase of fish and fishery products supply, not only to the domestic consumers but also to export-oriented seafood processors.

The aqua-culture sub-sector also experiences much of setback and hardship. The aqua-culture ponds, particularly the shrimp culture ponds, have been opened in the water surface areas where opening of such culture ponds did not require much of initial capital expenditure. Therefore, the areas for aqua-culture operations, mostly in coastal zones utilizing the natural conditions for water flow control, are mostly in flood plains and submerged areas that are in general not easily accessible and subjected to the natural hazardous conditions of weather, particularly during the typhoon season of the year. It often happens that the flood damages pond dividing banks and washes growing shrimps away, or that roads are flooded and become un-accessible. All these setbacks and hardships are reflected in the wide range of yield that varies from 150 kg to almost one ton per hectare per crop.

The aqua-culture operation will greatly improve its productivity if the structure of the ponds is fortified with more solid protection banks and lock-gates at water inlet, or if mechanized systems of water flow control and aeration equipments are provided, or if easier access to the trunk roads is made available for transport of operational requirements and harvested products.

For achieving further increase in the aqua-culture output, it is also absolutely essential that the capacities of hatchery stations for producing and supplying fish fries and shrimp larvae be extended. The hatchery stations are also located in the areas where access is not easy and the hatchery operation is also confronted with many hardships and setbacks. The current operation of hatchery stations are rather of small scales that tend to render the production cost of fish fries and shrimp larvae higher. Upgrading of hatchery facilities and improvement in hatchery operation will not only result in greater output but also contribute to reducing the prices of fish fries and shrimp larvae for supply to aqua-culture operators.

The lack of capital accumulation and the shortage of working funds are a problem that is very common in every sub-sector. And the solution to this problem will have to be carefully studied as the majority of the entities operating marine fishery or aqua-culture are individual household or small-holder operators. A system of providing funds or credit facilities needed for capital expenditure and operation finance for encouraging individual household or small-holder operators must be introduced and easy access to those facilities should be ensured. Along with the efforts for making such financial facilities available, efforts for promoting cooperative movements will have to be encouraged so that larger-scale, more cost-effective integrated

operations could be organized.

The lack of infrastructure and facilities for distribution and marketing of fish and fishery products is another major constraint that retards development in the fishery sector. This is where private fish merchants or brokers fit in and play important roles. It is a prevailing situation that the fishermen and the aqua-culture farm operators are very much dependent on the middlemen for supply of operational requirements, marketing of harvest products, and also for financial assistances. The state-owned seafood processing enterprises are dependent on those fish merchants for procurement of raw materials for processing. Here again, encouragement and introduction of cooperative movements is desired.

The plans to establish fishery-supporting infrastructure and facilities, or to improve and further develop aqua-culture are all for urgent implementation and for immediate utilization by existing fishing fleets or by aqua-culture operators. All these plans are of short-term nature. The upgrading of fishing fleets or the introduction of modern, larger-tonnage fishing vessels for exploration of high seas resources will, however, need further study and should be determined based on the economic viability of the distant-water fishing operations, as development in this direction requires heavy capital investment. It is, therefore, very important that any development plan for distant-water fishery will be worked out on the medium- to long-term concept of development that should be carefully but firmly formulated before venturing out in commercial operations.

The distribution and marketing network system to develop the domestic market will also require medium- to long-term planning and it must be implemented and developed as a part of an overall, integrated development scheme of food supply under the national strategy. The full-scale development of seafood processing industry should also be considered in line with the national strategy of integrated food processing development not only for promoting export trading, but also for creating and developing the domestic market under the market-oriented economy concept.

The financial facilities for supporting development in the fishery sector should also be a part of an overall national scheme for assisting the nationals in the primary industry, particularly in agriculture, forestry and agro-related sectors, although short-term, minor-scale plans may be worked out and introduced to meet the immediate, varying needs of each respective sector of the primary industry.

And for the reasons stated in the foregoing paragraphs, it is believed that in this study for development of fishery sector in the four Provinces within the study area, only short-term projects that are to meet the urgent needs to remove serious constraints retarding development should be recommended.

While holding discussion with the provincial authorities during the visits to the Provinces, it had been mentioned that upgrading and extension of seafood processing facilities in each and every Province would be much desired. The seafood facilities that exist in the four Provinces are all owned and operated by state-owned enterprises except in a very few instances and the study team considers that upgrading and extension of the facilities in this trade is the matter for each respective enterprise to study and take steps, if so concluded, for implementation. The matter remains as business proposition for corporate management to take decisions.

The processing factories in the Provinces have not been in full-scale operation and although the facilities for seafood processing in those factories need extensive upgrading, improvement and extension, whether to implement such improvement measures, or how to proceed, or how to raise fund is yet a business matter that should be looked into and decided upon by the management of the respective enterprises. By utilizing the existing facilities with improved management skills and operation efficiency, it is strongly believed, the factories could turn out much larger production without adding any facilities. Therefore, the study team feels that no project in this line is to be recommended in this study.

7.4.2 Brief Explanations on Projects Recommended

As briefly described in the attached three sets of Project Profile No. FISH-01, 02 and 03, short-term package projects are being recommended for immediate implementation in the three Provinces in the study area, namely, Quang Tri, Thua Thien Hue and Quang Ngai. For Quang Nam Da Nang Province, no project is being recommended to avoid duplication with projects of similar nature, as an ADB-funded project for rehabilitation and upgrading of the Thuan Phuoc-Song Han fishing port is in the process of finalization and will soon be implemented. A brief description of this ADB-funded project is given in the attached Project Profile No. FISH-04.

In the opinion of the study team, Quang Tri Province deserves extra uplifting for development of fishery, as the fishery sector of the Province, particularly the fishing fleet, is much backward behind that of the other three Provinces. The fishing vessels yet remain almost in the stage of subsistence fishery.

In Thua Thien Hue Province, establishment of fishing port infrastructure and facilities will greatly boost production increase with the convenience and services in fish landing and marketing to be made available at the proposed fishing port, as it will have a good access to an urban market of Hue City, where demand for high valued seafood would keep growing with the growth of population and of tourism industry.

Quang Ngai Province has a great potential in aqua-culture development and it is essential for the Province to develop facilities for distribution and marketing of fish, shrimp and fishery products, as marketing activities should be extended to other Provinces. The Province's efforts for developing fishery settlement at Co Luy should be supported and fortified by supplementing the facilities that are being established by the Province with more of fishery-supporting facilities. The Province has a large fishing fleet that do not go very far to the fishing areas of other Provinces and their productivity will be intensified when convenience and services of a fishing port are offered to them.

Quang Nam Da Nang Province has advantages with the Thuan Phuoc Fishing Port upgraded and extended, with the commercial port of Tien Sa serving as a direct export trading outlet, and, also with a large urban consumer market of Da Nang City. The upgraded and extended facilities at the Thuan Phuoc will certainly contribute to fishery output increase, which could easily be absorbed by the urban consumer market and by most advanced seafood processing industry. There again, the need for improving facilities for consumer marketing in this Province should be taken into consideration. The study team would recommend, if any recommendation of a project is necessary for this Province, a project for developing a distribution and marketing network that would include upgrading and extension of the public consumer market in Da Nang City will be recommended.

CHAPTER 8 MANUFACTURING INDUSTRY

8.1 OUTLINE OF MANUFACTURING INDUSTRY

Industrial gross output based on manufacturing activity was 23,170 billion Vietnamese Dong (VND) in 1994 (see Table 8-1). Gross output ratios were 0.15 % in Quang Tri, 0.70 % in Thua Thien-Hue in the Central Coast of Northland, 1.54 % of Quang Nam-Da Nang and 0.60 % in Quang Ngai in the Central Coast of Southland.

Among towns located on the Central Coast of Northland, total gross output for the region equaled VND 881.6 billion in 1993, the rate for Thua Thien-Hue was 18.25 %. In Quang Tri the figure was as low as 3.83 %. Of the Central Coast of Southland, whose total gross output was VND 1258.2 billion in 1993, Quang Nam-Da Nang was second to Thanh Hoa at 28.33 %, and Quang Ngai was 11.09 %.

8.1.1 Classification of Industry and Share of Total Production Value

Viet Nam's industrial sector is separated into two main parts, the state-owed industry and private industry.

A breakdown, based on the aforementioned classifications, of total gross output in 1993, revealed that central government's industry accounted for 51.94 % while the local government's industry was 19.79 %, showing that the government's industries made up for 71.73 % of overall manufacturing. Meanwhile, cooperative industries accounted for 2.13 %, private industrial enterprise 4.05 % and private household industry 22.09 %, revering that private industry accounted for a 28.27 % ratio.

By 1993, there were 463,500 enterprises, a breakdown of which is as follows: the central government's industry 522, the local government's industry 1,508, cooperative industry 5,287, private industrial enterprises 3,322, and private household industry 452,866. The total employed labor force of these enterprises was 3,521,800, meanwhile, Viet Nam's total population was 71,324,000 in 1993 and 72,500,000 in 1994.

Classified by industry, foodstuffs filled 30.76 %, followed by fuels at 16.38 %, chemical products such as fertilizers and rubber made up for 7.91 %, construction materials 7.84 %, textiles 7.05 % and electricity 6.28 % (see Table 8-2). Equipment and machinery were low at 3.75 % and 2.01 % for electrical and electronic products and 1.77 % for metallic products.

As shown above, Viet Nam's manufacturing industry is primarily predominated by industries that are oriented at taking advantage of regional resources, such as the processing of agricultural products and that of minerals. The percentage of industries which manufacture products maintaining a high value added are still at a minimum, this includes high technology industries such as electrical and electronic equipment, machinery and related components and metal products. However, Viet Nam's industry is showing major changes, moving away from the processing of agricultural goods and into the field of machine-manufactured products and also moving away from its role as an added value, such as electrical and electronic equipment and components.

Table 8-1 Gross Output of Industrial Activities (1/4)

Unit of Gross Output: Bill. VND
( ): State Enterprises

Industrial Sector	1989	1990	1991	1992	1993	1994
Electricity						
Number of Enterprises	90(64)	176(82)	78(25)	303(13)	314(9)	
Gross Output	941,737	1,046,133	1,100,780	1,160,973	1,281.50	1.515
	(941,723)	(1.045,975)	(1,100,363)	(1,160,329)	(1,280.60)	(1,514)
Number of Employee	29,631	31,726	33,008	40,048		
	(29,551)	(31,465)	(32,879)	(39,403)		
Fuels						
Number of Enterprises	71(39)	124(33)	109(32)	413(24)	742(28)	
Gross Output	621,766	1,551,273	2,140,960	2,963,287	3,343.90	3,675
	(961,435)	(1,549,250)	(2,134,491)	(2,957,721)	(3,337.40)	(3,668)
Number of Employee	48,694	48,459	57,743	58,457		
	(47,500)	(47,306)	(55,582)	(56,270)		
Ferrous metallurgy						
Number of Enterprises	430(13)	464(8)	700(9)	760(9)	697(11)	
Gross Output	119,155	119,593	187,761	220,833	287.50	332
	(110,763)	(110,651)	(171,989)	(220,427)	(264.30)	(307)
Number of Employee	20,068	19,492	18,549	20,145		
	(17,586)	(17,131)	(14,684)	(17,112)		
Non ferrous metallurgy						
Number of Enterprises	313(22)	566(12)	715(23)	854(41)	1,625(28)	
Gross Output	75,721	99,097	131,519	185,552	202.90	183
	(64,721)	(85,748)	(98,818)	(149,567)	(168.20)	(148)
Number of Employee	10,682	21,322	25,209	24,192		
	(8,945)	(10,888)	(9,660)	(11,725)		
Equipment and machinery						
Number of Enterprises	15,595(409)	18,836(377)	18,076(358)	10,988(287)	9,254(257)	
Gross Output	634,565	597,689	588,013	668,088	765.90	819
	(353,985)	(321,784)	(310,486)	(352,313)	(424.90)	(461)
Number of Employee	151,225	138,073	121,389	94,787		
	(92,728)	(79,703)	(62,052)	(57,234)		

Source: Industrial Data (Statistical Publishing House)

Table 8-1 Gross Output of Industrial Activities (2/4)

Unit of Gross Ou
( ): State Enterpr

Industrial Sector	1989	1990	1991	1992	1993	1994
Electric and electronic products						
Number of Enterprises	4,032(76)	5,370(61)	5,624(60)	3,587(67)	1,385(62)	
Gross Output	207,739	272,338	277,574	330,334	409.20	491
	(158,990)	(208,139)	(194,736)	(220,026)	(323.00)	(393)
Number of Employee	29,500	30,551	30,431	24,655		
	(18,903)	(18,010)	(15,700)	(15,606)		
Other metalic products						
Number of Enterprises	25,593(154)	28,165(136)	32,158(101)	18,832(88)	21,694(79)	
Gross Output	355,169	324,760	316,452	326,786	361.40	382
	(86,966)	(79,497)	(68,718)	(66,584)	(73.60)	(80)
Number of Employee	117,268	96,304	99,058	67,618		
	(24,628)	(19,223)	(16,737)	(12,104)		
Chemical products, fertilizer & rubber						
Number of Enterprises	4,965(251)	5,473(210)	5,213(217)	4,364(197)	4,213(180)	1937
Gross Output	839,525	920,467	1,113,985	1,355,163	1,614.60	1,459
	(595,271)	(658,577)	(828,170)	(1,009,384)	(1,191.40)	
Number of Employee	100,622	91,443	84,975	76,817		
	(61,821)	(59,429)	(53,982)	(50,209)		
Construction materials						
Number of Enterprises	27,864(493)	32,587(492)	39,903(439)	42,854(375)	55,792(325)	
Gross Output	879,794	1,000,231	1,165,110	1,383,456	1,601.00	1,793
	(551,294)	(608,956)	(740,508)	(902,392)	(1,094.40)	(1,211)
Number of Employee	296,456	249,532	248,461	258,442		
	(97,317)	(82,873)	(71,581)	(65,130)		
Wood and wood products						
Number of Enterprises	49,735(230)	61,267(200)	71,579(182)	64,780(140)	87,282(115)	
Gross Output	571,514	572,662	595,714	610,949	607.20	668
	(177,362)	(145,443)	(147,415)	(141,814)	(126.30)	(137)
Number of Employee	252,580	242,792	229,869	208,250		
	(30,512)	(26,796)	(23,529)	(19,476)		

Source: Industrial Data (Statistical Publishing House)

Table 8-1 Gross Output of Industrial Activities (3/4)

Unit of Gross Output: Bill, VND
( ): State Enterprises

Industrial Sector	1989	1990	1991	1992	1993	1994
Cellulose and paper						
Number of Enterprises	3,192(63)	1,857(53)	1,808(48)	2,192(43)	2,407(39)	
Gross Output	278,800	311,513	292,041	337,612	373.80	407
	(227,350)	(258,180)	(213,923)	(247,270)	(264.60)	(293)
Number of Employee	24,596	23,145	22,402	23,479		
	(15,465)	(14,005)	(13,001)	(13,505)		
Glass, earthenware and porcelain						
Number of Enterprises	3,431(83)	3,101(91)	3,935(78)	3,654(63)	3,523(54)	
Gross Output	148,830	146,132	178,288	205,013	238.60	235
	(67,833)	(61,750)	(82,118)	(95,677)	(116.50)	(115)
Number of Employee	42,834	38,561	37,685	36,033		
	(19,964)	(13,993)	(13,017)	(11,830)		
Food						
Number of Enterprises	38,336(94)	44,521(70)	54,858(65)	33,296(47)	39,126(31)	
Gross Output	520,627	469,148	512,538	561,959	562.50	619
	(148,332)	(118,342)	(131,116)	(98,121)	(90.40)	(98)
Number of Employee	122,216	124,960	135,580	107,001		
	(13,396)	(9,620)	(9,215)	(9,692)		
Foodstuffs						
Number of Enterprises	91,975(539)	95,313(447)	111,499(472)	116,391(472)	141,799(371)	
Gross Output	4,925,582	4,571,126	4,865,878	5,578,312	6,277.60	7,290
	(3,258,755)	(2,969,378)	(3,153,533)	(3,746,945)	(4,296.90)	(5,032)
Number of Employee	600,116	534,475	573,279	583,719		
	(108,599)	(111,386)	(106,575)	(93,305)		
Textile products						
Number of Enterprises	27,305(131)	36,466(118)	46,194(112)	45,755(110)	57,554(106)	
Gross Output	1,301,998	1,258,570	1,276,412	1,423,087	1,438.30	1,593
	(873,959)	(850,047)	(847,054)	(939,823)	(944.80)	(1,073)
Number of Employee	370,098	306,468	248,583	237,382		
	(103,809)	(104,203)	(98,403)	(96,176)		

Source: Industrial Data (Statistical Publishing House)

Table 8-1 Gross Output of Industrial Activities (4/4)

Unit of Gross Output: Bill, VND
( ): State Enterprises

Industrial Sector	1989	1990	1991	1992	1993	1994
Sewing products						
Number of Enterprises	38,292(85)	39,394(96)	40,309(99)	9,022(92)	6,652(92)	
Gross Output	216,580	202,527	219,135	171,790	367.70	441
	(137,677)	(124,102)	(125,475)	(25,393)	(253.20)	(308)
Number of Employee	174,001	136,422	152,095	104,365		
	(49,163)	(54,898)	(63,870)	(65,874)		
Tanning & manufacturings of leather products						
Number of Enterprises	2,103(26)	2,153(30)	3,783(36)	1,262(27)	1,195(26)	
Gross Output	107,617	93,710	56,342	78,435	128.30	155
	(65,525)	(57,127)	(18,378)	(35,493)	(75.30)	(91)
Number of Employee	21,459	23,426	19,528	14,086		
	(10,635)	(14,474)	(10,299)	(9,058)		
Printing						
Number of Enterprises	378(89)	212(101)	227(98)	279(102)	616(107)	
Gross Output	87,675	97,334	108,389	127,807	152.00	180
	(72,578)	(79,055)	(101,363)	(122,784)	(146.00)	(173)
Number of Employee	15,074	12,633	11,658	11,262		
	(13,468)	(11,964)	(10,989)	(10,201)		
Others						
Number of Enterprises	25,842(159)	17,473(145)	22,390(145)	16,515(116)	23,635(110)	
Gross Output	389,757	356,770	344,201	367,148	398.10	455
	(158,305)	(143,789)	(130,293)	(161,452)	(171.00)	(194)
Number of Employee	104,291	81,211	77,002	60,529		
	(18,043)	(16,477)	(15,387)	(13,641)		
Total						
Number of Enterprises	359,542(3,020)	393,518(2,762)	459,158(2,599)	377,105(2,368)	463,505(2,030)	
Gross Output	13,583,202	14,011,073	15,471,092	18,116,895	20,412.00	23,170
	(9,012,824)	(9,475,790)	(10,599,487)	(12,778,912)	(14,642.80)	(16,755)
Number of Employee	2,531,411	2,250,955	2,226,304	2,051,267		
	(782,033)	(743,844)	(697,147)	(667,551)		

Source: Industrial Data (Statistical Publishing House)

Table 8-2 Total Production Value by Industry Type

Industry Type	(%)
Electricity	6.28
Fuels	16.38
Ferrous metallurgy	1.41
Non-ferrous metallurgy	0.99
Equipment and machinery	3.75
Electrical and electronic products	2.01
Other metal products	1.77
Chemical products, fertilizer and rubber	7.91
Construction materials	7.84
Wood and wood products	2.97
Cellulose and paper	1.83
Glass, earthenware and porcelain	1.17
Food	2.76
Foodstuffs	30.76
Textile products	7.05
Sewing products	1.80
Tanning and manufacturers of leather products	0.63
Printing	0.75
Others	1.95
Total	100.01

Source: Industrial Data (Statistical Publishing House)

According to the general output statistics, Statistical Year Book 1994, during the period from 1990 to 1993, manufactured products that showed a year-on-year increase was assembled television sets by 4.15 times, followed by rolled steel at 2.41 times, electric motors 2.25 times, beer 2.30 times, cement 1.91 times and paper and covers 1.62 times (see Table 8-3). Some categories that have shown a significant rise in output during recent years include construction materials, cellulose and paper, equipment and machinery, electrical and electronic products, non-ferrous metallurgy and foodstuffs. Conversely, include textile products, wood and wooden products, ceramics, glass, earthenware and porcelain, tanning and manufacturing of leather products and so on.

It is common knowledge that industry in and around Ho Chi Minh (HCM) is well developed. Prosperous industries in the area are chemistry and petrochemicals, industrial machinery, mold, electrical and electronic machinery and apparatus, metal processing, transportation equipment ferrous metallurgy. Several Export Processing Zones (EPZs) and high technology industrial estates (IEs) are also being actively constructed.

Industries concentrating along the coastline of southern Viet Nam include light industries such as textile and fiber, ready made clothes, footwear, household articles and also those which are oriented at taking advantage of the region's resources. In the central area, developed industries exist which utilize resources indigenous to the region, as well as manufacturers of agricultural and construction machinery, electric equipment, textiles, apparel and foodstuffs.

In the area centering around Ha Noi and Hai Phong, development of industries partaking in the manufacture of steel, agricultural machinery, basic chemicals, transportation equipment and components production is evident.

Table 8-3 Main Industrial Products (1/3)

Main Industrial Products		1990	1991	1992	1993	1994	1993 /1990
Electricity	- mill. kwh	8,790	9,307	9,818	10,851	12,473	1.23
Central		8,772	9,285	9,797	10,830	-	1.23
Local		17	22	21	21	-	1.24
Fuels	- mill. tons						
Coal		5	5	5	6	6	1.28
Crude Oil		3	4	6	6	7	2.33
Ferrous metallurgy	- thousand tons						
Rolled Steel		101	149	196	243	280	2.41
Non-ferrous metallurgy							
Chromium ores	- thous. tons	5	6	4	7	-	1.50
Sticks of tin	- thous. tons	2	-	-	2	2	1.00
Electric wires	- thous. km	19	35	30	49	-	2.58
Production of equipments							
Machine tools	- piece	894	1,235	844	1,517	1,530	1.70
Hydraulic pumps	- piece	430	412	330	470	360	1.09
12 CV "Lotus" tractors	- piece	1,700	2,279	770	2,316	2,600	1.36
Insecticidal pumps	- thous. pieces	78	47	53	24	19	0.31
Thresing machines	- piece	43,316	39,461	30,153	30,882	-	0.71
Rice mills	- piece	1,013	657	706	284	-	0.28
Feed processing machines	- piece	796	483	624	1,459	-	1.83
Electric and electronic products							
Diesel motors	- piece	4,470	5,296	3,264	1,860	3,200	0.42
Electricity motor	- piece	10,596	9,550	13,923	23,888	29,300	2.25
Transformers	- piece	2,612	1,964	1,310	3,756	5,500	1.44
Electric fan	- thous. pieces	287	223	244	217	219	0.76
Radio cassette-installation	- thous. pieces	16	139	127	263	-	16.44
Televisions-installation	- thous. pieces	141	186	365	586	-	4.16
Other metallic products							
Railway carriage	- piece	11	19	12	-	-	
Bicycles	- thous. pieces	88	46	158	324	-	3.68
Bicycles-frame	- thous. pieces	107	82	48	56	-	0.52
Clocks	- thous. pieces	67	56	40	28	-	0.42
Locks	- thous. pieces	506	865	1,099	981	-	1.94
Metallic construction materials	- ton	6,178	5,803	6,066	7,754	-	1.26
Ploughs, rakes	- thous. pieces	172	190	188	126	-	0.73
Hand farming implements	- mill. pieces	16	16	16	15	15	0.94
Hand barrows	- thous. pieces	21	14	12	11	-	0.52
Utensils of sheet iron	- ton	3,302	3,574	2,997	3,026	-	0.92
Chemical products, fertilizers and rubber							
Chemical fertilizers	- thous. tons	354	450	530	714	790	2.02
Phosphatic ores	- thous. tons	274	319	290	362	400	1.32

Source: Statistical Year Book 1994 (Statistical Publishing House)

Table 8-3 Main Industrial Products (2/3)

Main Industrial Products		1990	1991	1992	1993	1994	1993 /1990
Insecticides	- thous. tons	9	12	11	14	12	1.56
Sulfuric acid	- thous. tons	8	9	7	4	8	0.50
Caustic soda 100%	- thous. tons	5	5	5	6	5	1.20
Recycled tyres for motor vehicles	- thous. pieces	10	13	10	7	-	0.70
Bicycle tyres	- thous. pieces	9,238	8,606	8,458	8,479	9,821	0.92
Bicycle tubes	- thous. pieces	8,349	8,533	9,177	9,514	9,800	1.14
Paints	- ton	4,852	4,754	5,810	2,600	3,400	0.54
Batteries (in 1.5 volt)	- mill. pieces	66	72	72	96	108	1.45
Soldering sticks	- ton	3,481	3,659	3,947	4,800	5,000	1.38
Medicinal ampoules	- mill. tubes	341	401	428	474	462	1.39
Medicinal tablets	- mill. pills	5,437	6,752	8,785	11,393	13,200	2.10
Liquid medicine	- thous. Litres	3,174	2,902	4,276	4,335	3,134	1.37
Washing preparations	- thous. tons	55	69	72	88	95	1.60
Toilet soap	- ton	597	834	1,644	178	-	0.30
Tooth pastes	- mill. tubes	15	20	28	31	-	2.07
Construction materials							
Cement	- thous. tons	2,534	3,127	3,926	4,849	5,161	1.91
Bricks	- mill. pieces	3,476	3,769	4,274	5,001	5,413	1.44
Tiles	- mill. pieces	405	455	431	466	473	1.15
Lime	- Thous. tons	663	665	693	787	-	1.19
Stones	- thous. cum	5,362	4,464	5,420	5,479	6,351	1.02
Sand, pebbles	- thous. cum	10,438	12,447	10,572	11,061	-	1.06
Fibro-cement-tiles	- thous. sq. m	6,705	4,283	4,672	5,694	-	0.85
Wood and wood products							
Sawlogs	- thous. cum	896	1,182	1,246	788	770	0.88
Matches	- mill. packets	94	153	184	145	145	1.54
Sedge mats	- thous. pairs	7,110	6,024	6,948	8,408	9,300	1.18
Cellulose and paper							
Paper, covers	- thous. tons	79	109	118	128	145	1.62
Glass, earthenware and porcelain							
Lamps	- thous. pieces	10,534	7,715	9,665	13,883	18,000	1.32
Thermos bottles	- thous pieces	164	462	614	862	880	5.26
Glass and glass products	- thous tons	39	32	37	51	35	1.31
Industrial porcelain	- mill. pieces	5	4	2	6	-	1.35
Personal porcelain	- mill. pieces	140	163	130	152	175	1.09
Building glass	- thous. sq. m	1,327	2,783	2,890	1,790	-	1.35
Food							
Milling rice, maize	- thous. tons	8,041	9,569	9,767	6,739	-	0.84
Foodstuffs							
Salt	- thous. tons	593	583	594	650	469	1.10
Fish	- thous. tons	667	668	685	847	-	1.27

Source: Statistical Year Book 1994 (Statistical Publishing House)

Table 8-3 Main Industrial Products (3/3)

Main Industrial Products		1990	1991	1992	1993	1994	1993 /1990
Fish sauce	- mill. liters	158	131	148	135	145	0.85
Other sauce	- mill. liters	25	24	21	26	22	1.04
Sugar, sugar syrups	- thous. tons	323	372	365	369	361	1.14
Granulated sugar	- thous. tons	27	50	72	84	90	3.11
Liquor	- mill. liters	80	39	40	43	43	0.54
Beer	- mill. liters	100	131	169	230	-	2.30
Cigarettes	- mill. packets	1,249	1,298	1,541	1,713	1,833	1.37
Tea	- thous. tons	24	24	22	32	31	1.33
Vegetable oils	- thous. tons	29	17	14	23	-	0.79
Tinned milks	- mill. tons	58	75	84	122	157	2.10
Canned fruits	- thous. tons	21	14	12	12	11	0.57
Bean curds	- thous. tons	16	16	16	17	-	1.06
Vermicelli of edible canna	- ton	6,884	6,053	5,441	8,341	-	1.21
Textile products							
Textile fibres	- thous. tons	58	40	44	38	43	0.66
Fabrics of all kinds	- mill. m	318	280	272	215	226	0.68
Canvas	- thous. m	3,303	1,870	2,131	2,419	-	0.73
Mosquito net	- mill. m	33	43	86	91	-	2.76
Hoisiery	- mill. pieces	29	26	18	31	27	1.07
Knitting wool	- ton	651	728	860	1,051	-	1.61
Carpet meaning wool	- ton	494	558	250	399	-	0.81
Woollen carpets	- thous. sq. m	213	270	285	12,194	-	57.25
Jute carpets	- thous. sq. m	2,988	604	235	269	-	0.09
Towels, handkerchiefs	- mill. pieces	109	109	209	153	-	1.40
Socks	- thous. pairs	2,574	2,726	2,698	2,307	-	0.90
Sewing products							
Ready made clothes	- mill. pieces	125	106	104	91	112	0.73
Tanning and manufactures of leather products							
Hard leathers	- ton	85	71	38	53	-	0.62
Soft leathers	- thous. sheets	310	458	478	812	-	2.62
Shoes and sandals	- thous. pairs	5,827	6,188	5,672	12,004	-	2.06
Printing							
Printed pages	- bill. pages	46	51	53	63	-	1.37
Others							
Running water	- mill. cum	462	406	394	401	431	0.87
Feeds	- thous. tons	118	98	47	68	101	0.58
Fountain pens	- thous. pieces	1,686	2,822	3,319	3,689	-	2.19

Source: Statistical Year Book 1994 (Statistical Publishing House)

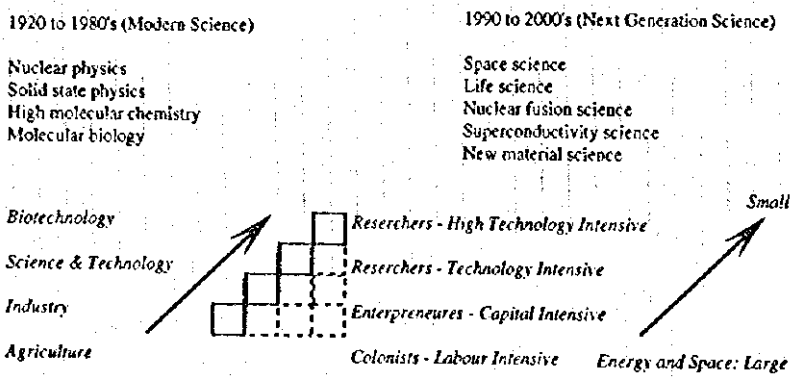
8.1.2 Industries with Potential Growth and Intrinsic Problems

Under the Viet Nam Plan 2000, the aforementioned industries are those, which have the highest growth potential and should be promoted in the future. Below is a general list of those industries for which future development is particularly expected:

- Petroleum refining
- Petrochemicals
- Iron and steel
- Non-ferrous metallurgy
- Ceramic, stones and clay products
- Fabricated metal products
- Machinery
- Electrical and electronic products, and
- Foodstuffs.

Anticipation of growth in these areas has led Viet Nam to plan to raise its rate of growth for mining and manufacturing output to 25-26%, up form 1993's 21%, by the year 2000. In connection with this, it must be pointed out that the country plans to hike agricultural production to 26-30% (37%) and service industries to 44-49% (42%). Generally speaking, the creation of an industrial infrastructure, especially the promotion of industrialization, is as shown in the Figure 8-1 diagram, but the patterns of development differ by theme.

Figure 8-1 Development of Industrialization



The basic policy of industrial development in Viet Nam calls for promoting the development of resources, such as follows:

- Oil investigation and exploitation
- Expansion of output for basic consumption goods
- Promote the processing of produce from primary industries, priority development of light industries
- Expansion of manufacturing industries for export under joint ventures with foreign enterprises, and
- Development of petroleum refinery and natural gas chemical industries.

The country intends to pinpoint key industries to be developed in the two main areas and formulate short-, mid-, and long-term development plans. Also, the Central Region with Da Nang as its focal point is designated as the third key area.

Viet Nam's industrialization based on its industrial development policies is progressing at a quick pace. However, there is evidence of some delay in aid for industrialization, and it can hardly be said that plans are being carried out smoothly. For achieving the goals, the following problems exist:

- The strengthening and nurturing of primary industries, such as agriculture
- The education and training of engineers and research scientists capable of dealing with highly-advanced technologies
- Construction and improvement on the energy supply, transportation systems, and relevant infrastructures. The adoption of measures to prevent the deterioration of the environment, due to industrialization and also preservation measures
- The creation of regulations to allow transactions to be performed on international markets and systems to meet changes of the markets, and
- The establishment of monetary and public finance systems as well as administrative procedures and relevant aid.

There are also problems to be solved with regard to the operation of enterprises and their affiliates:

- Renovation of obsolete machinery, equipment and facilities, the strengthening and nurturing of research and development activities
- Expansion and improvement of testing and inspection facilities for raw materials and products
- Improvement of working conditions
- Measures against environmental pollution
- Planned expansion and improvement of industrial complexes, and research and development facilities, and
- Promoting the entrance of foreign firms into the market and comprehensive advertising campaigns.

8.2 DEVELOPMENT PROGRAM FOR REACHING GOALS IN THE MINING AND MANUFACTURING INDUSTRIES

8.2.1 Basic Growth Target

According to the Ministry of Industry, a growth target of 15 % a year for the sector of the mining and manufacturing industries has been established in its new five year plan. The basic premise of the development program is the promotion of exports, targeting a manufacturing goal of US$ 3.1 billion by the year 2000. The items specifically planned in it are 2.2 billion for garments and 0.5 billion for leather.

A key element in this development program is the energy industry. One project is the establishment of a 3,600 MW hydroelectric power plant, including repairs and extensions to thermol-power stations which provide energy to 80% of the nation. Another project is to build Viet Nam's first full-scale petroleum refinery and petro-gas chemical plant. The refinery will produce 6.5 million tons annually, and the chemical plant will output 4.5 to 5 billion cu.m/year in petro-gas. Furthermore, it is planning to build cement and fertilizer plants and also to export 2 million tons of coal per year.

For this program, the operators of the mining and manufacturing industries are requesting that the government implement a suitable policy for financing to back the market, technology, training of engineers and mechanics, management which in turn will support production.

8.2.2 Concrete Growth Target

The Ministry of Industry is planning to play four major roles as follows:

(a) Vitalization of major industries in order to promote production particularly in the areas of electricity, coal, steel, farm machinery and equipment, bicycle and motorbike tires and tubes, electrical and electronic equipment, fertilizers, plastic ware, detergents, insecticide, consumer goods, textiles and garments, paper, shoes and sandals, beer and soft drinks.

(b) Introduction of modern technologies in order to operate under high efficiency and to expand production in correlation with the projects for which investment has been decided. Planning is also made for the enhancement of internal and external fund flows as well as the exploitation of investors for major projects. The following projects are included as the subjects for investment:

- The Phu My turbine-gas power station and liquefied nitrogen factory
- The Quang Ninh thermal power plant
- The Son La hydroelectric power station
- The exploitation of bauxite ores in southern Viet Nam
- The Thach Khe mining project
- The diammonium phosphate plant
- Expansion of the Ha Bac nitrogen fertilizer plant, and
- The upgrading and modernization of existent paper mills and textile factories.

(c) Expansion of export items and current markets to which products are already being exported to. Planning is also being done to promote investment in products that will substitute imports.

(d) Reinforcement of measures to suppress inflation. Controlled price increases, particularly in the three industries of steel, paper and fertilizers, that are under the Ministry's control.

Accordingly, the Ministry of Industry has set the following special targets in its new five year plan.

An expenditure of US$ 426.5 million is required in fiscal 1996. This is an increase of 9.8% from its 1995 level; since the total turnover of exports is estimated to have been 463 million, the amount is broken down into the export of 350 million in consumer goods, 83 million in coal and 30 million in chemicals and mining.

Meantime, the total turnover of imports is estimated to be US$ 903 million and the total industrial revenue is US$ 2,945 million.

8.2.3 Problems in Achieving Targets

The difficulty in achieving the above mentioned growth targets mentioned seems to be due to a hindrance caused by Viet Nam's current mining and manufacturing industries.

What is required most is the effective utilization of various domestic funds. For this purpose, it is essential to clarify the relationship between each government ministry and corporations and between corporations and their subsidiaries and also to establish a new system.

In addition, it is required to form a concrete plan concerning the upbringing and professional training of talented people such as engineers and to establish a system in which each industry is operated most efficiently.

It is true that, in 1991 through 1995, the annual average growth rate of 13.6 % was attained by restructuring and that enterprises directly controlled by the government also attained a 16.1 % growth rate. Incidentally, the growth rate of different industries during the same period was such that heavy industry was 15.4 %, centrally-controlled 18.5 %, consumer goods 10.6 % (16.0 %), electricity 14.25 %, fuel 22.6 %, coal 15.1 %, metallurgy 25.8 %, chemicals and fertilizers 20.1 %, clothing 26.2 %, and leather shoes 22.0 %.

Furthermore, among the centrally-managed industries, those enumerated as important are electricity, coal, machine tools, engines, processing industry, paper, textile and cigarettes, and each is expected to take on a leading role.

As to 1,508 enterprises under the control of local government contribution to the manufacturing production in Viet Nam is strongly expected, especially in such businesses as electric fans, farm hand-tools, garments, ceramics and confectioneries.

8.2.4 Outline of Measures for Promoting Development of the Mining and Manufacturing Industry

The development of the manufacturing industry in Viet Nam has attained a growth rate of higher than 10% annually since the implementation of the "Doi Moi" policy in 1986 for the two periods during 1987 to 1988 and 1991 to 1993. In addition, in a previous five year plan (1991-1995), the economic growth showed the actual rate of 13.3% against the target 8 to 11 % (see Table 8-4, 8-5 and 8-6).

Table 8-4 Economy under the Current Five Year Plan

(Actual result and target)

(Unit: %)

Item	1991	1992	1993	1994	1995
GDP	6.0	8.6	8.1	8.8	9.0-10.0
Agriculture	2.2	7.2	3.8	5.5	4.5-5.0
Manufacturing	9.9	14.6	12.1	12.1	13.0-14.0
Construtions	5.1	18.3	18.3	17.5	-
Service	8.3	9.4	9.4	9.3	-
Inflation rate	67.5	17.5	5.2	14.4	10.0
Growth in export	13.2	23.7	15.2	20.5	25.0
Food production (mil. tons)	22.0	24.2	25.0	26.0	26.0-26.5
Generated output (bn kWh)	9.3	9.8	10.9	12.2	15.0-16.0
Crude oil production (mil. tons)	4.0	5.5	6.3	7.0	7.0-8.0

Source: UNDP

Table 8-5 Five Year Plan in 1991-1995 and 1996-2000

Item	Targets (%)	1991-1995 Plan Result ('91-'94)	1996-2000 Plan targets (%)
Economic Growth Rate	25.5-6.0	7.8	10.0-11.0
Manufacturing	8.0-11.0	13.3	15.0-16.0
Agriculture	3.7-4.5	4.2	4.5-5.0
Service	10.0-12.0	12.3	13.0-15.0
GDP Structure			
Manufacturing	18.8 ('90)	22.0 ('94)	28.0-30.0 (2000)
Agriculture/Forestry	40.4 ('90)	35.0 ('94)	21.0-25.0 (2000)
Service	36.3 ('90)	39.0 ('94)	47.0-49.0 (2000)

Source: UNDP

Table 8-6 Vietnamese Economy in 2010

Item	1993	1995	2000	2010	2000-2010 (av. growth rate %)
Population (mil. persons)	72	75	82	95	1.5
Case I (10% growth)					
GDP per capita (US$)	263	297	440	986	8.4
GDP structure (%)	100.0	100.0	100.0	100.0	
Agriculture	36.5	31.2	26.3	14.3	3.5
Manufacuring	20.5	25.5	28.0	40.0	14.0
Service	43.0	43.3	45.7	45.7	10.0
Case II (9% growth)					
GDP per capita (US$)	263	295	415	848	7.4
GDP structure (%)	100.0	100.0	100.0	100.0	
Agriculture	36.5	34.4	27.9	17.4	4.0
Manufacuring	20.5	22.1	27.1	35.6	12.0
Service	43.0	43.5	45.0	47.0	9.5

Source: MPI

Since government subsidies were abolished for government enterprises in 1989, earnings results deteriorated for these government businesses as well as for related private firms in 1989 (-3.3%), with growth remaining as low as 3.1 % in 1990.

The target of the manufacturing sector in the five year plan (1991 to 1995) was to improve on the quality of products in the consumer goods sector in an attempt to increase exports and also push sales of electric power, petroleum and natural gas and developments in petroleum refinery in the capital goods sector. Moreover, importance is attached to the development of electric machinery, electronics, communication, building materials.

As mentioned earlier, the growth rate of the manufacturing sector has surpassed the nation's economic growth rate, indicating that growth in manufacturing production is on average 13 % due to the restructuring of the government enterprises. This growth rate in the manufacturing sector has always been higher than that of the agricultural sector, and the rate of growth has also been greatly increased over a short period of time.

A shift to the manufacturing sector has been intensified in recent years, and the sector has now become an industrial field supporting one third of the national income.

Further, in the external economy, the diversification of trading partners and the expansion of trading volume has made progress, resulting in the increase of direct foreign investment especially. Moreover, the nation has succeeded in controlling inflation keeping it at a low level.

In the meantime, Viet Nam's financial scale and deficit has enlarged, and has been dealt with through the utilization of foreign borrowing and domestic savings.

In the new five year plan 1996-2000, doubling of per capita Gross Domestic Product (GDP) is planned over the next ten years ending 2010, assuming that the population increases by 2.1% annually, and that the real economic growth rate is 10% resulting in the need for approximately US$ 50 billion in capital. The growth of the manufacturing sector is also estimated at 15 to 16 % annually from 1996 through 2000.

In promoting this new five year plan, the Prime Minister has pointed out the following:

- Problems exist in the quality and efficiency of the economy, possibly inviting instability to the economy
- The monetary and financial system are inadequate
- The administrative system of the nation is complex, causing complicated procedures, and
- A large number and variety of problems exist, interfering with external economic relations.

Furthermore, the actual results of the previous five year plan and the targets of the new five year plan are roughly as follows according to a report of the Government of the Socialist Republic of Viet Nam to the consultative group meeting.

8.3 DEVELOPMENT OF THE MANUFACTURING INDUSTRY IN THE FOUR CENTRAL PROVINCES

8.3.1 Introduction

In the Central Region consisting of four provinces, Quang Nam-Da Nang, Quang Ngai, Thua Thien-Hue and Quang Tri, the development of the manufacturing industry is an important subject following that of the development of the region around Ha Noi, the southern region around HCM and the north eastern region (see Table 8-7 and 8-8).

Table 8-7 Priority Ranking of Industries Based on Industrial Development Plan

Category of the Kind of Industry	Priority Ranking of Industries (kind of industries)			
	Whole Country	Northern Region	Southern Region	Central Region (4 provinces under planning)
Electricity	Electric power station			Electric power station
Fuels	Petroleum refinery Petro-gas chemicals	-	Petroleum refinery Petro-gas chemicals	Petroleum refinery Petro-chemicals Petro-gas chemicals
Ferrous metallurgy	Iron and steel products	Iron and steel products	Steel coil products	Iron and steel (Electric arc furnace) products
Non-ferrous metallurgy	-	-	-	-
Equipment & machinery	Machinery & equipment	Machinery & equipment	Machinery & equipment	Automobiles Ship building & repair, marine engine
Electric & electronic products	Electronic products	Electronic products		Electronic products
Other metallic products	Fabricated metal products	-	-	-
Chemical products fertilizers & rubber	Fertilizers	Chemical products (Consumer goods) Plastics	Fertilizers, basic & agrochemicals Plastics, Medicines	Chemical product Fertilizers
Construction materials	Cement Ceramic, stone & clay products	Cement	-	Cement Clay products
Wood & wood products	-	-	-	Wood & wood products
Cellulose & paper	-	-	-	-
Glass, glass ware & porcelain	-	-	Glass	-
Food	-	-	Food	Food
Foodstuffs	Foodstuff	Foodstuff	Foodstuff	Foodstuff
Textile products	Textile	Spinning	-	Textile
Sewing products	-	Sewing products	Sewing products	Sewing products
Tanning & manufactures of leather products	-	Shoes Leather products	Shoes Leather products	-
Printing	-	-	-	-

Source: Five Year Plan

Table 8-8 Main Products of the Industry (1/2)

Quang Tri Province						Thua Thien - Hue Province					
Main Products	1990	1991	1992	1993	1994	Main Products	1990	1991	1992	1993	1994
1 Electricity (Thous. kwh)	-	18,616	20,771	21,927	29,852	1 Ilmenite (Tons)	-	-	700	1,915	6,000
						2 Zirconium (Tons)	-	926	868	233	600
2 Car maintenance (Pieces)	-	32	201	227	231	3 Vehicles tubes (pieces)	-	12	14	-	32
						4 Vehicles manufacture	-	170	285	220	251
3 Agricultural tools	-	83	149	160	177	(Pieces)					
						5 Agricultural tools	-	311	221	506	693
4 Rice machine (Pieces)	-	242	372	250	108	(Thous. pieces)					
						6 Public fan (pieces)	-	499	100	-	-
5 Agricultural hand	-	1,067	795	486	215	7 Pine (Thous. pieces)	-	-	2,711	19,983	32,100
tools (Pieces)						8 Medicinal liquid	-	8	-	-	-
						(Thou. liters)					
6 Local cement (Tons)	-	3,373	11,495	19,782	21,883	9 Oil pipe (Tons)	-	24	14	25	16
						10 Cement Tons)	-	27,654	28,799	31,992	34,600
7 Bricks (Thous. pieces)	-	11,883	24,226	18,600	19,535	11 Lime stones (Tons)	-	26,863	28,615	30,290	31,500
						12 Bricks (Thous. pieces)	-	6,495	10,087	10,525	15,350
8 Tiles (Thous. pieces)	-	7,013	4,464	4,550	2,205	13 Tiles (Thous. pieces)	-	2,591	1,387	970	1,140
						14 Stones (Thous. cub. m)	-	21	-	107	100
9 Stones (Thous. cub. m)	-	34	65	112	230	15 Timber (Cub. m)	-	10,769	12,286	140,574	17,600
						16 Floor timber (Cub. m)	-	454	-	-	-
10 Lime stone (Tons)	-	1,305	4,590	6,448	6,411	17 Floor timber (Sq. m)	-	52,359	42,805	-	-
						18 Civil carpenter (Cub. m)	-	1,984	-	2,123	-
11 Timber (Cub. m)	-	12,000	-	649	12,850	19 Civil carpenter (sp)	-	-	-	26,250	16
						20 Rattan (Thous. sq. m)	-	6	-	-	-
12 Ceramics (Thous. pieces)	-	16	26	17	23	21 Rattan (Thous. C)	-	203	-	-	-
						22 Tobacco (Thous. g)	-	21,064	23,800	13,853	8,200
13 Beer (Thous. liters)	-	835	827	1,290	983	23 Beer (Thous. liters)	-	3,185	9,145	13,725	15,700
						24 Soft drink (Thous. liters)	-	790	1,407	52	-
14 Fish sauces (Thous. liter)	-	854	417	450	-	25 Fabrics (Thous. m)	-	98	153	131	150
						26 Garment (Thous. c)	-	105	78	72	-
15 Salt (Tons)	-	-	-	9,454	850	27 Kimono (bo)	-	662	2,200	2,100	2,700
						28 Carpets (sq. m)	-	8,000	2,699	4,234	4,500
16 Running water	-	1,065	1,025	1,200	1,315	29 Shoes (Thous. sp)	-	220	80	55	-
Thous. cub. m)						30 Frozen products (Tons)	-	703	567	531	485
						Crab	-	446	377	468	485
17 Sand (Thous. cub. m)	-	-	48,715	657	545	Meat	-	257	190	63	-
						31 Printing (Mill. pages)	-	450	408	412	1,250
18 Frozen seafood (Tons)	-	278	339	323	352	32 Running water	-	5,234	5,500	5,900	6,130
						(Thous. Cub. m)					

Source: Statistical Year Book in each Province

Table 8-8 Main Products of the Industry (2/2)

Quang Nam - Da Nang Province						Quang Ngai Province					
Main Products	1990	1991	1992	1993	1994	Main Products	1990	1991	1992	1993	1994
1 Electrical commodity (1000 kw)	123,857	137,048	154,437	180,244	212,450	1 Electricity (1,000 kwh)	-	-	6,476	5,405	5,432
2 Washing preparation (Tons)	1,432	1,514	1,528	1,392	1,214	2 Stones (Thous. cub. m)	-	-	22	33	36
3 Coal (Thous. tons)	-	45	44	48	52	3 Insecticides (Tons)	-	-	24	90	89
4 Hand farming implements(Thous. pieces)	844	414	476	719	762	4 Ferulizers (Tons)	-	-	2,652	1,143	404
5 Utensils of plastic (Tons)	271	708	955	1,322	1,704	5 Sugar and sugar syrups	-	-	20,465	20,671	21,781
6 Cement (Thous. tons)	3	30	48	75	83		-	-	13,291	12,459	13,500
7 Fish sauces (Thous. liters)	3,159	5,228	2,924	3,242	3,949	6 Alcohol (Thous. liters)	-	-	1,664	2,114	2,088
8 Sugar and sugar Syrups (Tons)	4,596	3,495	3,095	3,146	4,120	7 Fishing boat and ships (pieces) New	-	-	95	151	154
9 Fabrics (Thous. m)	4,911	3,699	9,001	10,093	14,793	8 Capital repairs of automobile (pieces)	-	-	261	342	335
10 Beer (Thous. liters)	3,023	5,331	8,600	12,126	13,453	9 Insecticides pump (pieces)	-	-	1,161	405	1,245
11 Frozen seafood (Tons)	628	673	1,201	1,650	5,039	10 Machines for pulling off rice (pieces) no engine	-	-	994	1,098	1,165
12 Carpets (Thous. sq. m)	24	38	18	17	19	11 Water pump (pieces)	-	-	1,114	1,745	3,258
13 Running water (Thous. cub. m)	12	12	13	15	15	12 Hand farming instruments (Thous. pieces)	-	-	345	315	330
14 Bricks (Mill. pieces)	83	88	67	74	75	13 Bicycle tire (Thous. pieces)	-	-	227	119	116
15 Tiles (Mill. pieces)	14	11	7	8	9	14 Washing powder (Tons)	-	-	43	91	105
						15 Bricks (Mill. pieces)	-	-	45	42	43
						16 Tiles (Mill. pieces)	-	-	21	21	21
						17 Sawlogs (Thous. cub. m)	-	-	9	6	5
						18 Frozen seafood	-	-	360	259	341
						19 Food oil (Tons)	-	-	90	132	160

Source: Statistical Year Book in each Province

Da Nang is the focal point of the Central Region, but it is not as active as Ha Noi or HCM in point of industrial development in manufacturing (see Figure 8-2). All four provinces are a region of primary industry on the basis of agriculture, forestry and fishery; in addition, they are tied in with tertiary industries, such as commerce, service and sightseeing industries. Consequently, secondary industries, such as manufacturing are only sporadically located throughout the city or an industrial zone in the suburbs and have not yet been developed as a leader of the local economy.

Furthermore, there is less land in this region compared with other parts of the nation. It provides a variety of natural resources, but in relatively small quantity, greatly restricting its industrial development especially in the manufacturing industry. In utilizing the land, the coastal zone of this region is taken by many lagoons and sand dunes, the flat land inland has already been used for cities, and terraces and the mountainous regions are utilized for agriculture, forestry and livestock industry. As a result, in order to develop the region for the manufacturing industry, it is necessary to pay attention first to the cities in the region, to give full consideration to the axis on which the cities depend for their support and to make adjustments with other industries.

Moreover, the region is regularly visited by monsoons, and this meteorological minus holds substantial influence over industrial activity. In connection with this, rice grown in this region accounts for only 9% of the entire nation's harvest, and the harvest of sugar cane is below the national average, which is a large factor affecting the primary industry.

Regarding the manufacturing industry, construction materials and textiles are mainly for local use; and almost all iron, steel, paper, clothing, various equipment, major chemical substances, are mostly imported from other regions.

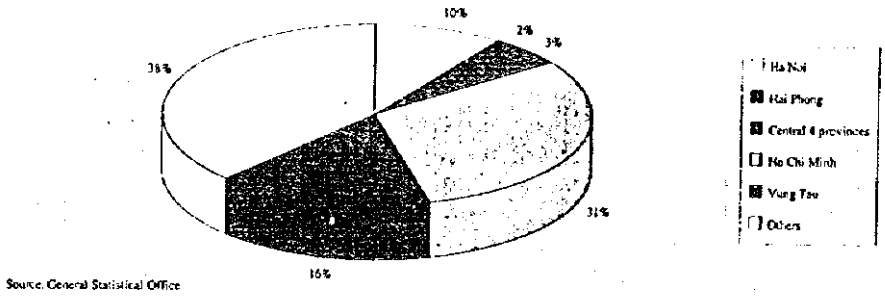
The share of production output by each of these four provinces in the Central Region is 52% for Quang Nam-Da Nang, 23% for Thua Thien-Hue, 20% for Quang Ngai and 5% for Quang Tri; and the industrial concentration is highest in Quang Nam-Da Nang (see Figure 8-3).

Thus, the industrial concentration of the four provinces in the Central Region is mainly for ore accompanying mining explorations and food or food processing related to agriculture, forestry, livestock, fishery industry.

For example, mineral resources such as limestone, clay, silica sand (Quang Nam-Da Nang); limestone, graphite, clay, silimanic (Quang Ngai); limestone, clay, mineral water (Thua Thien-Hue); limestone, silica sand, graphite, tin, titanium, clay, mineral water (Quang Tri); also, processing crops, plantation crops, forest products and other edible crops are produced, such as sugar cane, cinnamon, coffee, cocoa, tea, pepper, rubber, eucalyptus, coconut, peanut and soybeans. In addition, livestock and fishery resources are produced, including pigs, chicken, cows, shrimps, squids.

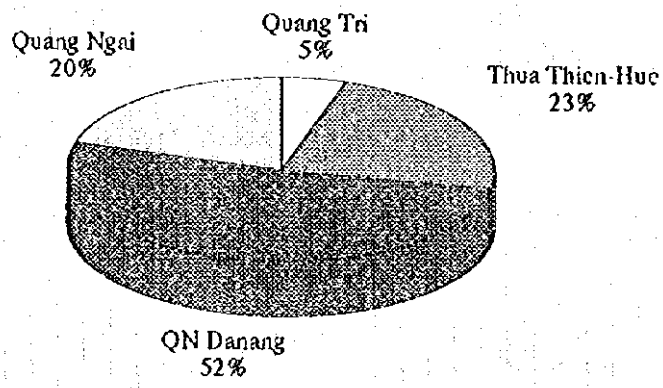
Consequently, the characteristics of these industries are found in largely the processing of primary products such as silica, bricks, mineral water, beer, sugar, sugar syrups, alcohol, frozen seafood, fish sauces, showing various resources. Other types of industries are hand farming implements, plastics, fertilizers, insecticides, water pumps, bicycle tire, rice harvesters, textiles and garments, carpets, construction machines, all kinds of electric equipment and new types of industries have gradually come to stay in recent years.

Figure 8-2 Share of Gross Industrial Output by Regions (1993)



Source: General Statistical Office

Figure 8-3 Share of Gross Industrial Output by Provinces (1993)



Source: General Statistical Office

8.3.2 Policy for Reorganization Program of the Central Four Provinces

(a) Quang Nam-Da Nang is about to go through the diversification of farm products; preparation of five industrial estates (Da Nang EPZ, Lien Chieu-Hoa Khanh IE and Dien Nam-Dien Ngoc IE); construction of national roads No.1 and No.14; servicing of two routes to HCM and Hai Van Pass; preparation of forest, readjustment of its harbor. Especially, an emphasis is being placed on the structuring of coastal zones from Chu Lai to Dung Quat.

In addition, tourist development through the installation of service between Da Nang and Hoi An and the improvement of the Da Nang airport has also been decided as an important subject to take action on.

(b) In Quang Ngai, the development of a large scale coastal industrial zone in Dung Quat is scheduled as well as the preparation of Tinh Phong IE, Quang Ngai Town IE and Pho Phong IE. In addition, an expansion of production is being planned for forest products such as cinnamon trees and eucalyptus and also for sugar cane.

(c) In Thua Thien-Hue, in addition to the conventional development of tourism, projects are being formed for reinforcing agriculture, raising livestock and forestry, for putting an urban traffic network in proper order, and for servicing Chan May Port, airport and industrial park. Furthermore, the preparation of several industrial estates has been planned with industrial, agricultural and service industries listed as other important industries along with tourism.

(d) In Quang Tri, agriculture and forestry are scheduled to be reinforced. The construction of an international road between Laos and Viet Nam is counted on as part of the infrastructure to be built in connection with the development of a new port. Industries are also going to be promoted such as cement, silica sand, and titanium.

8.4 INDUSTRY RELATED PROJECTS IN THE FOUR CENTRAL PROVINCES

8.4.1 Dung Quat Deep Sea Port and New Industrial Park Project

(1) Background of the Project

Dung Quat, Quang Ngai Province is located about 100 km south of Da Nang City. The area faces Dung Quat Bay and there is the Chu Lai Airport in the north. national road No.1, which connects Da Nang City in the north with Quang Ngai Town in the south, runs in the back of the inland.

This project aims at developing a port and new industrial estate at the coast and in the hinterland by utilizing a favorable deep sea feature. The development site extends from Dinh Phuoc near the Chu Lai Airport, and Binh Dong, Tuyet Diem and Mui Dai Vian Ka, beyond the Hai Ninh, Song Tri River, and Binh Thuan, Dong Le and Phoc Hoa on the side of the Viet Thanh Bay.

The Prime Minister proposed this development project when he visited Dung Quat, and he instructed a detailed study to the Minister of Construction. The proposal is to develop 400 hectare large coast industrial base in Binh Son District and Binh Thuan Village and Binh Dong Village with a total development area of about 1,800 hectares. The large-scaled port and the petroleum refinery industry are expected to take leading parts in the project.

(2) Project Outline

Target year:	the year of 2005
Total investment:	US$ 10.0 billion
Scale of the port:	the first phase: 20 to 30 million tons
The second phase:	80-100 million tons
Proposed Industries:	

Petroleum Refinery No. 1 = 6.5 million tons/year

Petroleum Refinery No. 2 = 6.5 million tons/year

The combined capacity of the both refineries will be 10-12 million tons/year

Ship Building and Repair 0.5 million tons/year

Thermal Electric Power Station 70 MW or 125 MW

Food Processing Production, 2.0 million tons/year.

- Others industries:
  Petroleum Gas Chemicals

  Various Chemistry

  Construction Materials Production: 0.5 million tons/year

  General Machinery

  Cement Production 1.0 million tons/year

  Metallurgy Industry

  Electronic Equipment and Apparatus

  Other Light Industry

  Local Products Industry

  Clinker Mill: 2.0 million tons/year

  Container Making: 10.0 million tons/year

  New City Construction (Van Tuong New Town): Population of in 2010 estimated of 50,000 people.

- Investment Cost
  It is quite uncertain how much investment is required for this project. According to hearings, the costs are estimated below. The amount of the investment cost will be revised when the project content and the development phases are clarified as a result of the feasibility study which is currently being implemented.

  The total investment cost to the target year of 2010: US$ 18,420 million

  Petroleum Refinery No.1 and No.2: US$ 5,000 million

  Iron and Steel Making: US$ 2,000 million

  Shipbuilding and Repair: US$ 1,000 million

  Harbor, Airport, Basic Infrastructure, New City, and so on: US$ 10,000 million

  Other Material Sector: US$ 400 million

  The Initial Harbor/pier Cost: US$ 20 million

At first, development of the port needs to be carried out to be started along the right line. Besides, Petroleum Refinery No. I and the related facilities, and Thermal Electric Power Station need to be constructed promptly after defining their scales.

Development of breakwater, offshore dike, petroleum products pier, shipyard and oil rig yard, single buoy mooring system are priorities to be developed, and construction of Petroleum Refinery No.1 should to be promoted actively. In case the product from Petroleum Refinery No.1 is for domestic consumption, availability of a railroad siding and of tank freight trains and tank freight cars will have to be established. Then, development of container terminal,

container transship yard, central cargo wharf, central cargo warehouse and port area need to be executed. Third, development of riverside green park, seaside green and park and Van Tuong New Town need to be implemented.

(3) Proposed Industry

a) Petroleum refinery No. I and No. 2

The land for both refineries will be 314 hectares at maximum. It is expected that the total production volume of petroleum refinery No. 1 and No. 2 will be 10-12 million tons/year. The scale of the refinery has to be designed in accordance with the study result. Despite the 6.5 million tons/year production is expected from Petroleum Refinery No. 1, the production volume at the initial stage depends on the domestic market.

As to petrochemicals, utilization of petro-gas chemicals will be a possible approach. In case undersea natural gas fields lying in front of Da Nang and Hue Cities are developed, petro-gas chemicals will be more promoted.

A type of Petroleum Refinery No.2 will be determined by a selection either petrochemicals, transformed from naphtha to ethylene, or petroleum gas chemicals. From the viewpoint of the market trend at present, a large scale of operation at the starting point for petrochemical industry seems to be uncertain.

b) Ship-building and repair

There are some 80,000 ships, which weigh totally 47,58 million tons in the world in 1994. Ship-building capacity of the whole world in 1994 is broken down into 46.9% by Japan and 22.2% by Korea, which occupy 69% of the total, while other countries account for only 16.4%. Although ship-building industry originally has close relationship with level of economic growth and mostly done in developed countries, the industry has been shifted to countries of less construction cost like Korea and China recently.

The present ship-building industry at large has the following problems:

- Marine pollution cases in recent years
- Over supply of ships
- Many tankers over their 25 years of life span, and
- Sub-standard bulk carriers which have had many accidents.

Most ship-building operation is done outdoor and requires favorable climatic conditions; thus calm bay area is suitable. Modern ship-building uses state-of-the art, high technology and thus needs high-skilled technicians and laborers. On July 1993, it became obligatory to build tankers double-structured, on July 1995, it also became obligatory for ships to be scrapped after 25 year of use. Such changes in ship-building business environment increased ship-repair and ship-breaking industries.

Demand for ships will be mainly met by replacement until 2000 or so. Demand for new ships has apparently been declining down to 20 million tons per year. With this low demand, it is difficult for a new ship-builder to emerge except in such countries as Russia and China, where enough domestic demand related to military use can be ensured.

Ships include oil tanker, bulk carrier, general cargo carrier, container carrier, liquid gas and chemical carrier, fishing boats, and others.

c) Iron and steel making

The scale of iron and steel making is 2.0 million tons/year. As known broadly, it is apparent that an increased demand boosted by a construction boom in Viet Nam will last for quite a long time.

The mainstream of a steel making method is changing from a conventional steel complex method from iron ore to an electric arc furnace method. In case of electric arc furnace, raw materials are scraps of construction materials and consumption goods, and return scraps from various factories, especially from ship-breaking factories. These scraps are processed to various sizes and types of steels.

On the other hand, high quality scrap is in short supply and deteriorates as value added steel products are requested. Under this circumstance, a demand for reduction iron, pure iron materials, is increased. While the use of natural gas is a major making method for reduction iron, a steel maker in Japan developed the reduction iron making method by the use of coal and tries to commercialize the method. The deposits of natural gas, coal and iron ore are rich in Viet Nam, so that steel making by such a method is possible.

As to a method of steel making, there is a question whether electric arc furnace or the above direct reduction is appropriate.

For example, an electric arc furnace, which is 2.0 million ton scale, consists of 4 units of 0.5 million tons/unit. A required land space for industries, composed of material yard, scrap yard, wire and bar mills, is generally 100 hectares.

At present, a detailed feasibility study is not carried out so that whether this 2.0 million ton/year production is appropriate is not certain. A feasibility study is curently being implemented under an ODA scheceme.

d) Thermal electric power station

Dung Quat Industrial Zone Development Plan with a new town in Van Tuong includes two petroleum refineries (No. 1. and No.2), iron & steel making, and cement production, which require much stable electric supply. There is an electric power station construction plan to supply 70 MW, mainly for industrial use.

Regarding electric power demand at this moment, Petroleum Refinery No.1 and No.2 demands 100 thousand KWh for 1.2 mil. ton/year. The total demand for electric power for industrial use is 327,600 KWh, though depending upon production size of the industries.

A 70-MW electric power station is generally requires some 266,000 sq.m of land area which is strongly subject to fuel kind, either coal, heavy oil, or natural gas.

e) Cement production

Cement is a major construction material as well as iron and steel. Although there are already large cement factories in the study area, a new cement factory is needed to meet future demand, one million tons a year.

The new factory will be made up of five units of furnaces which can produce 30 tons per hour each, totally 1,005,000 tons a year. Cement products are Portland and Portland-type-mixed cement, though mainly Portland.

Area of the factory of this size is some 165, 000 sq.m out of which areas of all buildings for raw material storing, sintering, finishing, shipment, dust collector, and power receiving are 27,370 sq.m.

f) Food processing and others

Some other industries like food processing is also planned in order to make best use of the local resources for industrialization of the study area. The following should be taken into consideration to select the type of industries to the area:

- Local-resource based industries
- Import substitution type industries, which produce commodities under-supplied and high priced in the area to complement the supply and lower the prices
- Industries to contribute to local employment
- Export oriented industries, and
- Industries to create value-added products by processing basic materials manufactured by oil, gas, iron & steel making industries which are to be located in Dung Quat for instance, high-quality resins, synthetic fibers or processed steels are of value-added type.

8.4.2 Da Nang EPZ Project

The following areas have been regarded as possible several industrial zones in Da Nang:

- Da Nang EPZ
- Dien Nam-Dien Ngoc IE, and
- Lien Chieu-Hoa Khanh IE.

Among the above possible sites, Da Nang Export Processing Zone (EPZ), Lien Chieu-Hoa Khanh, Dien Nam-Dien Ngoc have been considered as study areas. An Dong is expected as a site for the Da Nang EPZ which locates 14 km from the Da Nang City and 14 km from the Da Nang International Airport. The total area of the EPZ is 63 hectares. There are some requirements of infrastructure development such as access roads and bridges to the airport and the city. However, Da Nang EPZ has attracted only one candle factory since it opened in January 1994. The following are some reasons for the unsuccessful result.

- The EPZ is not known to investors
- The EPZs characteristic is not clear to investors
- A system to induce enterprises such as for foreign currency exchange, is not prepared well, and
- Functions of the Da Nang City is underdeveloped and less accumulated compared with those of Ha Noi and Ho Chi Minh.

In case Da Nang City proceeds with its industrial development in future, active publicity activities will be necessary not only for the EPZ but the IE. At present, although the Chamber of Commerce and Industry of Vietnam (VCCI) in Da Nang plays a key role to attract industries, inducement of enterprises in not successful. Institutional arrangements, so called "soft" dimensions, are important for further promotion.

8.4.3 Promotion of Foreign Direct Investment and Establishment of a Supporting System for Business Activities

(1) Introduction of FDI Supporting Agency

The Ministry of Planning and Investment (MPI) and the Chamber of Commerce and Industry of Vietnam (VCCI) are actively working to induce foreign direct investment (FDI) into Viet Nam. However, in order to be more effective, investment promotion activities need to be unified as much as possible.

For example, the Foreign Investment in Japan Development Corporation (FIND) was established in 1993, and it is highly valued (see Figure 8-4 and 8-5). This company is financed by both the government and private firms and it offers comprehensive consultancy services to foreign enterprises, which are interested in starting businesses or just started their businesses in Japan.

Major activities of the corporation are as follows:

- Market entry services
- Consulting services
- Support of employment
- Training and seminar services
- Substitute business services, and
- Arrangement of international technology forum.

Since Viet Nam is promoting the development of export processing zones (EPZs) and industrial estates (IEs), it is necessary to establish a comprehensive and quick-response system to deal with foreign investment issues. Especially to promote EPZs, where mainly foreign enterprises are introduced, establishment of the above system is very important. Despite various services that need to be prepared, major services are listed below:

- Mitigation of procedures on the foreign exchange law, and
- Provision of information on FDI.

The purpose to establish this system is as follows;

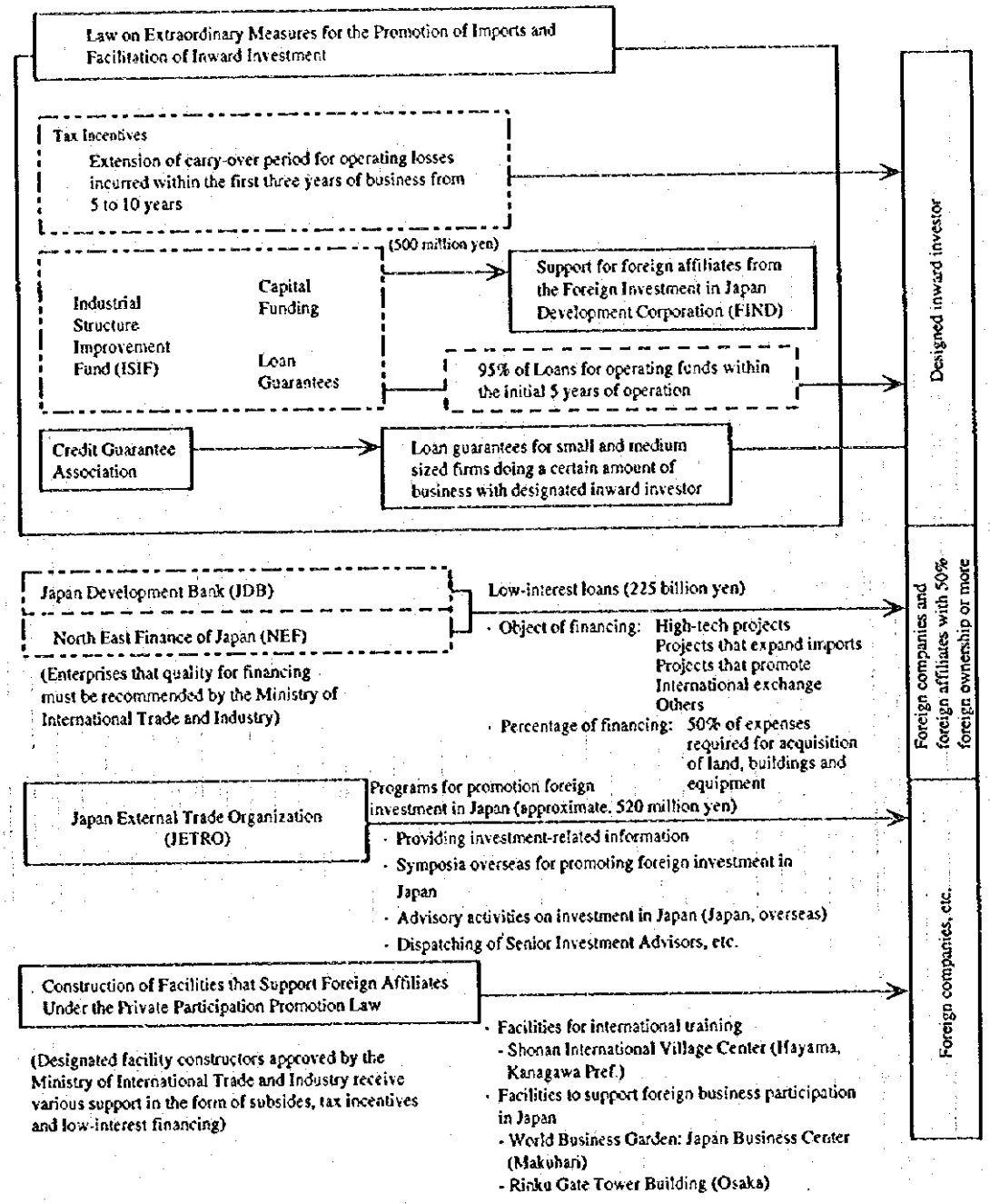
- Function of consultancy services (for example, provision of investment advisors)
- Facilitation of infrastructure development and capital procurement (for example, low interest rate by financial institutions, a credit by national funds and support for facility development based on the Viet Nam's law), and
- Reduction of an initial investment cost.

If the above system is prepared under cooperation between the government and the private sector, a new law or an amendment to the existing foreign capital law to endorse financial support by the government may be necessary.

(2) Strengthening of VCCI

Generally speaking, when entrepreneurs wish to invest in certain places, they contacted with foreign relation agency, banks and chamber of commerce and request the regional data namely economic information, finance information and IE and EPZ information.

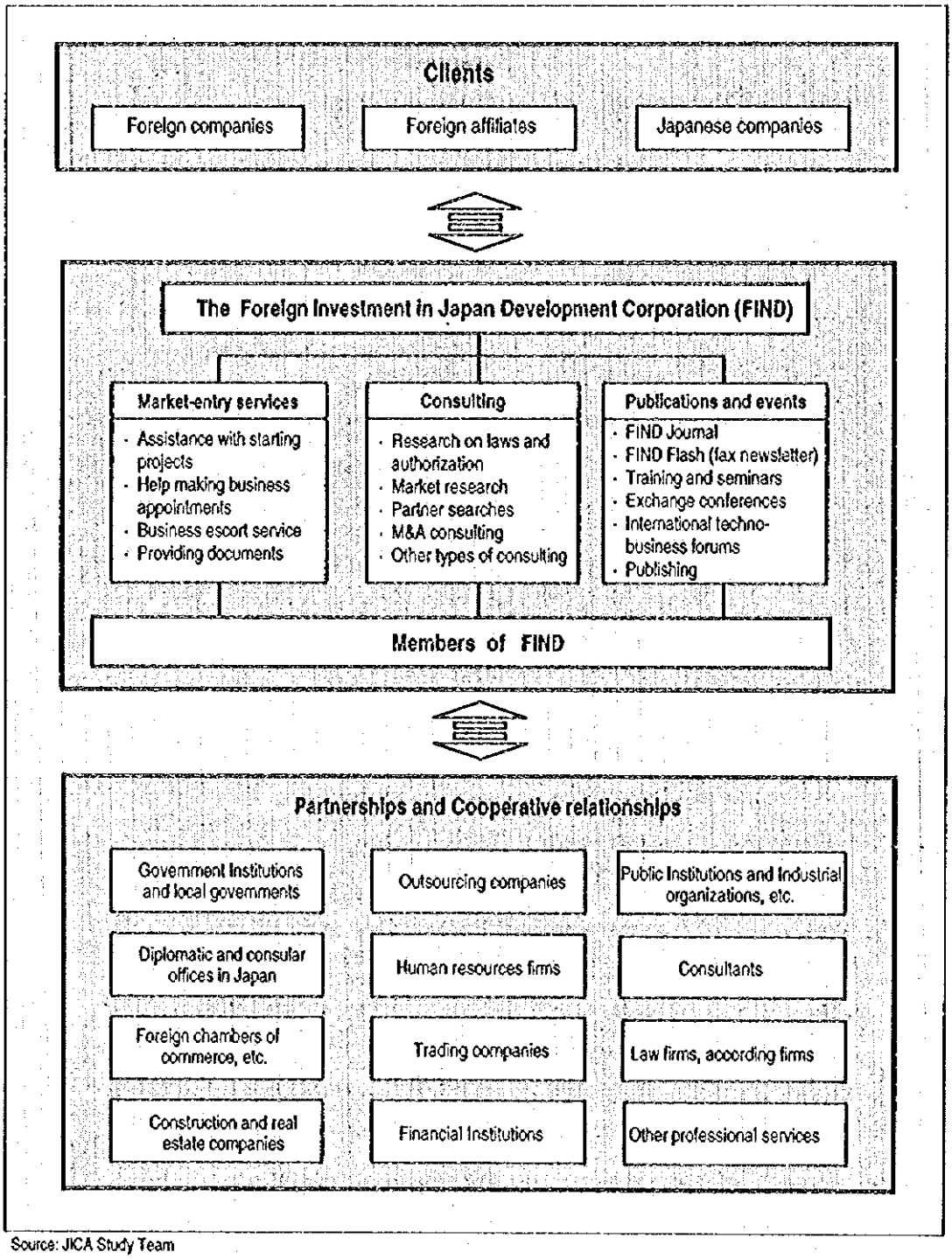
Figure 8-4 Measure for Promoting Foreign Direct Investment in Japan



* Designated inward investors are those investors that satisfy the following conditions and are approved by the Ministry of International Trade and Industry:
  1. To be a branch or a subsidiary (with a foreign capitalization ratio exceeding one-third), established in Japan by a foreign company
  2. To be a company which has been operating for less than 5 years since its establishment
  3. To be a company engaged in the manufacturing, wholesaling, retailing, or servicing sector in Japan

Source: JICA Study Team

Figure 8-5 Structure of the Foreign Investment in Japan Development Corporation



Source: JICA Study Team

There are a lot of organizations supplying that staff of information, however the chamber of commerce and industry is the main organization. Viet Nam is also the same, there is a head office in Ha Noi and six branches in Da Nang, Vinh, Hai Phong, Ho Chi Minh, Can Tho and Vung Tau. Their activities are not enough in the Central Region. In the future, it is required that the introduction activity of industries should be strengthening and it is required relationship between provincial government and VCCI.

The strengthening items for VCCI are:

- Collection of industrial data in the province
- Collection of requirement from the industries
- Take the measures to meet their demand
- Establishment of the sub-committee meeting by industrial sector
- Introduction of direction suggestion of management, financing and technology, and
- Information service for industrial data.

Those activities shall be done by the industrial experts, who have the following skills:

- Knowledge of the ripple effect on service and sales by consumption and expenses
- Knowledge of the ripple effect on procurement of raw material, and
- Knowledge of the ripple effect on regional development, accumulation of social capital, culture.

The activity on introduction of enterprises is shown in Figure 8-6.

Figure 8-6 Flow Chart for Introduction Activity for Company by VCCI