6.2 Industrial Promotion and Development Plan

In order to realize the industrial development potentials stated in 2.2.1 in line with the urban development of IRM, a promotion and development plan has been established for each industry.

6.2.1 Agriculture

The role of agriculture in IRM is as follows: (i) Ensure and maintain self-sufficiency in food supply with emphasis placed on rice; and (ii) Ensure stable supply of industrial raw materials including coconut as the major material.

Through the efforts mentioned above, the income of farmers must be maintained and/or raised so that no income gap shall arise compared with other industries.

As indicated earlier, rice and coconut productions are currently done without proper management skill which makes it difficult to attain the above mentioned goals unless such productions are switched over to intensive and modernized production.

The government is also striving for the implementation of various measures for improvement, but the following development plans should be implemented in order to facilitate such measures:

Rice Productivity Improvement Program

It shall not be easy to ensure a self-sufficient supply of rice for the future population of 150,000 in IRM, and that of the wider area including the Polillo Islands. The plains of Infanta and General Nakar, the chief production center of rice of the East Coast, must be maintained absolutely as the rice production center in the future, and small scale coconut forests with low productivity, etc., should be converted into rice production fields.

As indicated in the section describing development potentials, the improvement and expansion of the Agos River irrigation system shall be promoted and the productivity of rice production shall be raised (4,950 kg/ha for 1990 and 10,000 kg/ha in 2000).

Furthermore, machinery aided agriculture and intensive agriculture shall be promoted, and reorganization of present cultivation lands shall be done in order to maximize the utilization of plains for rice production.

The total crop lands in the future shall be 2,565 ha due to the conversion of coconut production land into rice croplands and the loss of such lands due to urban development, etc. The present gross area of the agricultural lands is 2,819 ha, and net area is 2,360 ha. Therefore, the ratio of net to gross agricultural lands amounts to 83.7%.

This rate shall be increased to 92% through the intensification of agricultural lands and higher utilization of such lands (by 2000). The total area of rice production volume should become 11,500 MT/year (1992) and 23,600 MT/year (2000) against the current rice production volume of 5,413 MT/year (1983), taking account of the improvement in productivity mentioned in the foregoing. This shall allow the self-sufficient supply of rice for 150,000 people.

Coconut Productivity Improvement Program

As mentioned in the section of development potentials, the coconut production in the three (3) municipalities and Polillo Island shall be boosted through the implementation of fertilization, diffusion of agricultural chemicals, etc., replantation, and the introduction of new varieties (5% production increase per year).

According to the above, the production volume shall be increased from a volume of 41,628 tons (copra base) in 1983 to 63,754 tons in 1992, and 93,312 tons in 2000.

In the planned area, approximately 1,000 ha coconut forest shall be demolished or converted for the urban development and rice production increase, but the replantation and the introduction of new varieties shall be implemented intensively for the coconut forest estate to remain collectively.

6.2.2 Fishery

For the maximum realization of fishery development potentials, and to make the marine product industry one of the leading industries of IRM, the promotion and operation plan of surface fishery, fishery base construction for the landing of fish, and the aqua culture promotion and operation plan shall be implemented, as follows:

Surface Fishery Promotion Plan

Trial operation shall be carried out in the Pacific Ocean and municipal fishery areas, and the training project for fishing technology and skills shall be implemented for the municipal fishery. The ocean resources investigation and study project shall be promoted for the Pacific Ocean fishery (commercial fishery).

1) Investigation on Marine Resources (Ocean Area and Municipal Sea Area)

In the Pacific Ocean area, multi-purpose fishery development investigation vessels of 100 ton class and 20 ton class (1 vessel each) shall be used to carry out trial fishing operation using round haul nets, longlining, bag netting, gill netting, upright longlining, pole-and-line fishing, and trawling in order to catch bonito, tuna, sardines, horse mackerel, mackerel, etc.

For the redevelopment of the municipal fishing operation, 5-ton class and 3-ton class investigation vessels shall be used to carry out trial fishing operations with the use of gill netting, longlining, pole-and-line fishing, and trawling.

2) Training and Education Project for Municipal Fishery Instructors/Managers

A fishery training center shall be constructed for the training and education of municipal fishing operation instructors/managers, and training on the operation of fishing vessels, the art of navigation, maintenance, control, and repair of engines and other equipment, and marine product skills shall be carried out.

3) Marine Resources Research Project

For the development and protection of marine resources in the Pacific Ocean area, a bonito/tuna resources research institute shall be constructed to carry out permanent research and studies.

Surface Fishery Operation Project

If redevelopment potentials can be verified through sources in the Pacific Ocean area, the trial fishing operations for the municipal fishery mentioned above, and the use of new fishing vessels shall be accelerated which shall allow the operation with the assumed haul of fish at 3,200 tons/year using 3 to 5 ton class vessels.

If the productivity is increased to a certain extent by the above operation, adding to the current haul of 5000 MT/year, the municipal fishing industry shall have the total of 9000 MT/year.

If the feasibility of the development for the fishery in the Pacific Ocean area, especially the fishing operation using round haul nets without payau, tuna longlining, and the pole-and-line fishing device, can be demonstrated, the fishing operation shall be carried out with an assumed haul of 3,500 tons/year using 40 ton class vessels through the introduction of commercial fishing vessels.

Fishery Base Plan

In order to facilitate the accommodation of fishing vessels, operation, landing and distribution of marine products, facilities for the port/harbor base (including the landing site, field storage site, net drying facilities, offices, radio room, oil/water refilling stations, slipways, ice making facilities, fish markets, etc.), shall be improved, and marine product distribution industries (wholesale/retail industry, freezing/refrigeration warehouse industry, etc.), and related service industries (repair shops for nets, ship fittings, engines, etc.), shall be developed and promoted.

The hauls and quantities of fish to be distributed according to destination, handled by this fishery base are projected as follows:

Prawn Culture Promotion Plan

A marine and brackish culture center shall be constructed as a guidance/assistance body related with the technology/engineering and management for the diffusion of prawn culture in IRM. The center shall be engaged in the testing and research related with the prawn culture and production of prawn fry which shall be delivered to parwn culture development projects. Technical guidance/instructions shall also be provided on the cultivation and other overall technical aids from production to distribution of prawn shall be given which shall include the control of the production timing for the prevention of the concentration of hauling, collection of prawn hauled, implementation of primary treatment such as the washing/cleaning, etc. of such products.

Prawn Culture Development Plan

Surface fishery, which depends on fishing operation, is subject to the natural conditions of resources. The prawn culture is certain to gain outputs corresponding to input efforts. Therefore, a 1,5000 ha intensive prawn culture business site shall be implemented to make the utmost use of the cultivation potentials mentioned above in order to provide one of the vital props and stays for the development of IRM.

The total area of existing and new cultivation ponds amounting to 1,500 ha shall be reorganized by dividing it into 150 prawn culture business establishments each consisting of 10 ha on average which shall then be operated in the form of a cooperative union.

As indicated earlier, the maturization of the parent prawn, the artificial incubation and the supply of fry shall be done by the Marine and Brackish Culture Center to cultivate mainly tiger prawn (Renaeuo Monodon).

The improvement of cultivation ponds at present shall be done by modifying existing cultivation ponds into medium size intensive prawn cultivation ponds. In the future, however, the readjustment of lots shall be done for the 1500 ha cultivation site including the existing ponds in order to create a large scale intensive cultivation complex. For the effective water circulation and transportation within this complex, an artery waterway shall be constructed to connect existing creeks. In addition, pen cultivation and gauge cultivation businesses shall also be implemented in IRM and the Polillo Islands.

6.2.3 Manufacturing Industries

An industrial development plan has been established for each industry taking into account the industrial development potentials (Section 2, Chapter 2) as follows:

No particular plans are set for the population response type of industries that may establish themselves as long as the scale of population reaches a certain level. Since wood processing industries such as lumbering, plywood processing, etc., are not feasible due to the prohibition of wood cutting, they are not included in the new projects.

Development plans, therefore, shall be aimed mainly at coconut oil extraction industry and marine product processing industries based on their development potentials (Section 2, Chapter 2), and a paper pulp integrated plant shall be constructed in the light of the large scale development of tree planting to be done over the entire area of the East Coast which shall amount to 3,470 ha.

Agro-Processing Industry Development Plan

The coconut oil extraction industry (80,700 tons/year by the year 200) shall be developed to collect coconuts from production in the three (3) municipalities and the Polillo Islands. There is a possibility of developing the active carbon plant as an industry related with the agriculture produce, which shall be subject to further study in the future. As for rice, the major agricultural product of IRM, its cleaning shall be necessary, and six rice cleaning mills for a cleaning volume of 1,770 tons/year shall be constructed.

Fishery Processing Industry Development Plan

Using prawn shipped from the prawn culture complex and catches from the Pacific Ocean waters as raw materials, the following facilities shall be constructed:

(i) Prawn processing factory (3,000 tons/year); and

(ii) Canned food factory (32,000 tons/year).

In addition, the following facilities required for fishing port shall be constructed:

(i) Ice Plant (300 tons/day); and

(ii) Cold/freezing storage (12,000 tons/year.

Paper and Pulp Integrated Industry Development Plan

In line with the progress of forestry works in the east coast region, the development of the paper and pulp integrated industry shall be implemented to produce pulp (by craft method) with production volumes of 70,000 tons/year (year 2000).

6.2.4 Tourism

The following development plans shall be promoted in order to construct a beach resort recreation center in IRM as the sole resort center near Manila and in the east coast for international and domestic tourists by developing the Dinahican Peninsula and General Nakar coast and hill zones as a comprehensive tourism development plan.

Marine Research Park Development Plan

A park/green belt zone of very high quality shall be created in Dinahican located at the pointed end of the peninsula aimed at attracting international tourists. Development works for facilties of research, related closely with oceanography (the research institute mentioned in the section of marine development, etc.), academic and cultural facilties, high quality lodging/hotel accommodation facilities and a coastal research park to accommodate oceanic and outdoor sports activities, shall be promoted.

Beach Recreation Center Development Plan

It is a center for recreation activities including sea bathing, etc., along the coastal zone which shall include various beneficial facilities in addition to the following: (a) a beach-type leisure center (sea world); and (b) an amusement center shall be constructed.

The sea world is a leisure land with ocean and fish as the main theme in which an aquarium, game fishing facilities, anchorage for exploration searoute, etc., shall be constructed amounting to 18 ha or more.

The amusement center shall amount to about 25 ha in which the following facilities shall be constructed. A shopping area, sea food restaurants, etc., shall be constructed around the central square facing the beach as the core of the amusement center and a point of gathering and departure of people. In the future, movie theaters, game centers, outdoor theater, pools, mini-golf center, various grounds, gymnasiums and other sports facilities shall be constructed. Including the future expansion plans, an area of 3,000 square meters for a shopping center, additional area of 3,000 square meters for a shopping center, additional area of 3,000 square meters for variety stores, 1,500 square meters for restaurants, 4,000 square meters for the gymnasium, etc., shall be procured amounting to 24 ha or so.

Coast and Hill Zone Resort Development Plan

In the natural environments of the coast (Infanta and General Nakar) and hills (General Nakar), construction/improvement works shall be implemented for lodging/hotel accommodation facilities, outdoor sports facilities, etc.

In the Infanta Beach area, a comprehensive resort complex shall be built around the two (2) recreational spots mentioned in the foregoing. In General Nakar, the coast and hill zones shall be connected to accommodate golf courses, condominium, resort center, cottages, etc., to create a resort complex.

6.2.5 Tertiary Industry

Based on the development potentials recognized in Section 2.2, and in the light of the strategic location of IRM in the region, the regional center type shopping area development plan as the expansion of commercial and service industries shall be promoted. At the same time, the distribution industry and its allied industries development and promotion plan shall be implemented in order to provide a distribution base in the East Coast.

Regional Center Commercial Development/Promotion Plan

As mentioned in 6.1.2 on the land use plan, the central shopping center shall be constructed in line with the growth of IRM as regional center.

This means the construction of a commercial center capable of providing commercial services that may be physically and mentally satisfactory to the people in the IRM and the East Coast region, and the elimination of the necessity to go all the way down to Manila for such needs.

For this purpose, a central commercial area consisting of various shops and stores, recreational, and service facilities of 28.2 ha shall be constructed.

Distribution and related Industries Promotion and Development Plan

Behind the fishing port and harbor of Real, the following industries shall be promoted and developed to support the port and harbor, cargo and passenger transport industry, financial and insurance industry, real estate industry, tourism (fishing, fish markets, local crafts, etc.), sales and service industries for port employees (lodging facilities, restaurants, stores selling daily commodities, various individual services, entertainment facilities).

6.3 Social Services Improvement Plan

6.3.1 Basic Policies of Facilities Development

The development of social services facilities shall be realized basically in accordance with the policies described in the Structure Plan. However, when viewed from the standpoint of facilities development, the policies shall be translated into the following strategies:

Facilities Development in Accordance with the Development Stages of IRM

The social services facilities development shall be carried out into the following four periods in accordance with urban development stages (Fig. 6.3.1):

(i) Preceeding Development Period. To cope with the expected urbanization and industrialization of the next period, facilities development centering on the improvement of existing system and facilities shall be carried out.

(ii) Integrated System Preparation Period. A focus shall be placed on facilities development at the community level for coping with intensive immigration and industrialization. A development of sectoral inter-relation and network shall begin.

(iii) Intensive Facilities Development Period. Formation of an integrated system for each socio service sector shall be provided, and development of facilities with advanced/regional function shall be started for a city with a population of 100,000.

(iv) Regional Facilities Expansion Period. A distinctive social environment relative to a center city of the East Coast Area shall be formed based on the completion of the integrated system and on the development of facilities with advanced regional functions.

Comprehensive Facilities Development in accordance with the Settlement Hierarchy

Development cost of social services facilities occupies a large portion of the area's public capital investment (National, Provincial, Municipal). When facilities are to be developed, it shall be beneficial to integrate or consolidate facilities of different sectors as much as possible taking into consideration the extent of service area, characteristics of service population, and allocation of responsibility among implementation agencies.

Presently, the East Coast area is spatially isolated from Lucena City which is the center of advanced social services in Quezon Province. However, through this IRM development, a social services facilities area shall be developed to integrate advanced social services serving the East Coast area.

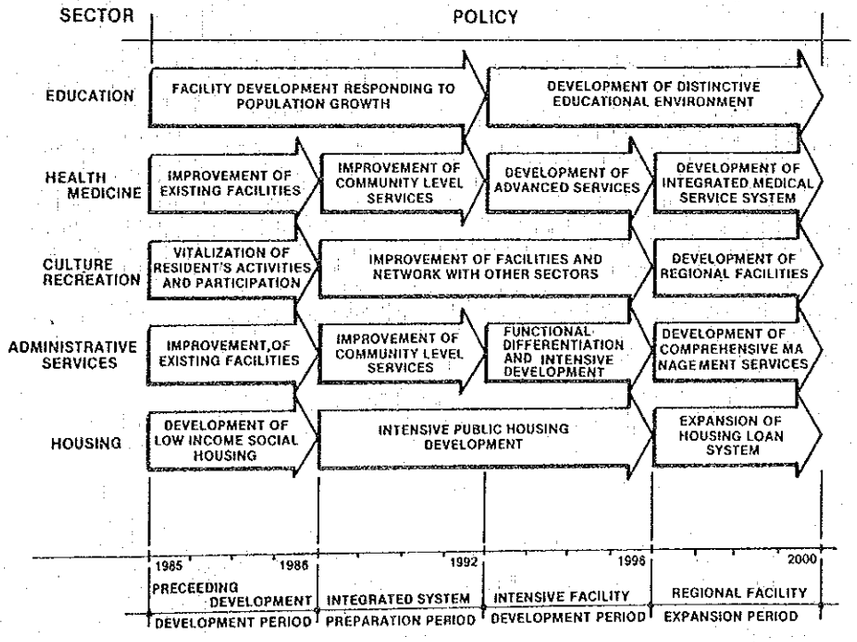


FIG. 6.3.1 BASIC POLICY OF SOCIAL SERVICE FACILITIES DEVELOPMENT

6.3.2 Educational of Facilities Development Plan

The basic policy of the education sector is that a facilities development plan shall be formulated for the following: Elementary and Secondary Education, Higher Education, and Distinctive Education.

Elementary and Secondary Educational Facilities Development Plan

1) Basic Policy

According to the population distribution by district in the population plan, up to 77% of future population increment shall take place in the urbanized areas. Therefore, basic educational infrastructure such as elementary and secondary schools shall have an urban-oriented development in order to cope with this urban population growth.

Growth of built-up areas shall be classified into sprawl of existing built-up area, and development of new urban area. In either case, a transition of a low density built-up area into a high density urban area is foreseen. Therefore, the development of elementary and secondary schools shall have a system that would have flexibility to adjust itself with the transition.

In consideration of the above condition, a basic neighborhood settlement unit of a certain size (5,000 persons to 10,000 persons) shall be assumed, and a high shool and two or three elementary schools shall be located in this unit.

Population growth (density increase) of the unit shall be responded to by expansion of each facility.

2) Demand Forecast

Forecast population of elementary and secondary schools was estimated based on the school age population derived from the population plan multiplied by the attendance ratio (estimated average of 1988).

Facility demand was derived based on the above forecast population using the standard class size of the Ministry of Local Governments and Community Development (MLGCD) (Elementary 40 students/classroom, Secondary 50 students/classroom), and school size of 10 classrooms/school (the national average 7 classrooms/school, 1981).

Although many of the existing schools in the area have lower standards, it is assumed that the existing schools shall maintain the above mentioned MLGCD standard by the improvement and expansion of facilities.

Demand in each target year of new construction is shown in Table 6.3.1.

3) Development Plan

Development plan of elementary and secondary education facilities in 2000 is shown in Table 6.3.2.

Location of the facilities shall be based principally on the provision pattern previously explained, and shall conform to the following policies:

(i) In suburban areas, improvement of existing facilities and maintenance of settlement shall be emphasized;

(ii) In urbanized areas, the facilities shall be located, in consideration for the basic neighborhood settlement unit, according to the MHS standard maximum distance (elementary school - 0.8 km max., secondary school - 1.6 km max.). Furthermore, network formation with other sector's facilities (barangay district centers, cultural recreational facilities) and safe/suitable commuting routes shall be specially considered.

The total estimated demand for the secondary schools is 6. However, taking into consideration the density, size of basic settlement units, and the possibility of urban population growth in Infanta New Urban Area, a total of 8 schools shall be proposed (Table 6.3.2, Fig. 6.3.2).

Table 6.3.1 ESTIMATED DEMAND OF ELEMENTARY AND SECONDARY SCHOOLS

(school)

Year / Facility	Existing (1983)	1993	2000	Planning Period Total
Elementary	(22)	9	5	14
Secondary	(9)	3	3	6

Source: JICA Study Team

Table 6.3.2 ELEMENTARY AND SECONDARY SCHOOLS DEVELOPMENT (YEAR2000)

(school)

	Elementary School			Secondary School		
Area / Facility	Existing	Proposed	Total	Existing	Proposed	Total
Central Urban Area						
Gen. Nakar	1	—	1	1	—	1
Infanta	1	2	3	2	1	3
Real	2	—	2	2	—	2
New Urban Area						
Infanta	—	8	8	—	5	5
Real	—	3	3	—	2	2
Suburb	18	1	19	4	1	5
Total	22	14	36	9	9	18

Source: JICA Study Team

Higher Educational Facilities Development Plan

1) Basic Policy

The development of higher education facilities shall be necessary due to the following: IRM area is to function as an education center in the East Coast Area; integration of the area's system of education; and development of manpower to contribute to the future urban development.

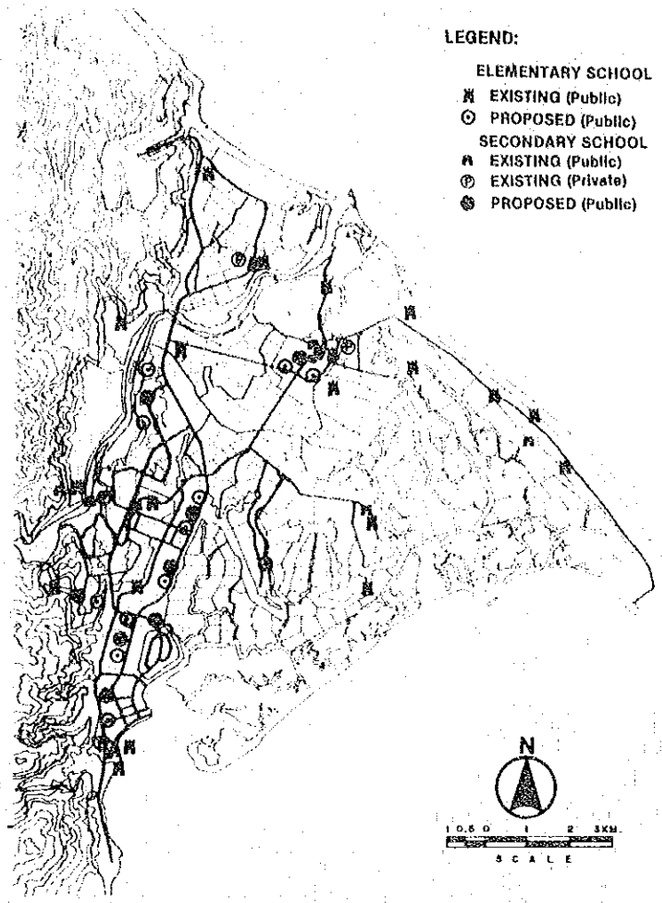


FIG. 6.3.2 ELEMENTARY & SECONDARY EDUCATIONAL FACILITIES DEV'T PLAN (YEAR 2000)

This development shall become an important factor of the advanced social services facilities area explained in Section 6.3.1, and shall contribute to the formation of a distinctive educational environment in the area, as described in the latter portion of this chapter.

2) Development Plan

Facilities development shall be carried out by stages in the Regional Center of Infanta New Urban Area. The components of the development shall be the following: a liberal arts department developed in the area of the existing Infanta Community College; and a fishery/agriculture department based on the characteristics of local industries with an attached medical training school to train para-medical manpower to serve the future medical needs of IRM.

Forecast of the future enrollment size was done with the following considerations:

(i) The planning population shall include the population of Polillo Islands and the three (3) municipalities (150,000 in 1992 and 200,000 in 2000). The subject population bracket (17 years old - 24 years old) is based on the demographic composition estimated in the population plan which is 18% of the total population.

(ii) The national average of the participation rate in 1990's has been estimated at 17% by MECS. However, in consideration of increment due to the area's fishery and agricultural characteristics, the rate shall be adjusted to 20%.

As a result of the forecast, the enrollment demand shall total 5,400 students in 1992, and 7,200 students in 2000 (no outflow of students to other areas was considered).

A college shall be constructed by 1992 in relation to the fishery research facility with focus on the fishery and agriculture departments. During the comprehensive development period of the Regional Center (1993-1996), a university with a comprehensive curriculum, including the aforementioned para-medical school, shall be developed.

To achieve the establishment and management of this university utilizing the area's development characteristics, such system that could induce the public capital investment from the education sector (for example, location of the U.P.'s fishery and agriculture branch departments on research facilities, etc.) as well as to introduce other public money should be examined.

Distinctive Educational Facilities Development Plan

In the manpower development of the area, not only the higher education facilities, but also the development of special secondary education facilities, vocational schools, and vocational training facilities shall be promoted in order to facilitate the establishment of the comprehensive manpower development system.

The facilities development shall be done on the basis described in Fig. 6.3.3 with a focus on the area's main industries: fishery and agriculture.

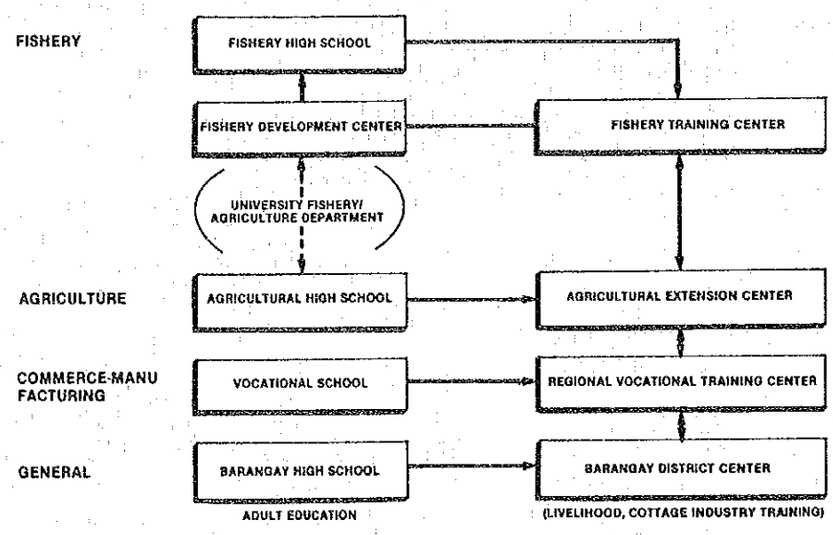


FIG. 6.3.3 INTEGRATED SYSTEM OF MANPOWER DEV'T.

The outline of the main facilities shall be as follows:

1) Fishery Sector

(i) Fishery high-school - in relation to the fishery department, the fishery research facility and the fishery training center shall be constructed in Real New Urban area.

(ii) Fishery Research Institute - a national level facility which mainly conducts research activities for tuna, bonito (refer to Fishery Development Plan for details), shall be constructed at the Marine Research Park in Dinahican.

(iii) Fishery Training Center - a training center to develop fishery related manpower, coordinating with the above institute (refer to Fishery Development Plan for details) shall be constructed in Real New Urban Area.

2) Agriculture Sector

(i) Agriculture High School - a special high school which educates and trains future manpower for the agriculture industry such as rice crop, livestock, coconut, etc., in coordination with the agricultural extension center, shall be constructed at the suburb of Infanta built-up area.

(ii) Agricultural Extension Center - a Ministry of Agriculture (MOA) facility which extends technical services to rice cropping, livestock raising, coconut growing, forestation, etc., shall be developed and constructed near the existing facilities at the suburb of Infanta built-up area.

3) Commercial-Manufacturing Sector

(i) Commercial Vocational School - a vocational school which trains and develops future manpower for the distribution business industry in the port area, and generally for the future leading sector of the area, tertiary industry, shall be constructed in Infanta New Urban Area.

(ii) Regional Vocational Training Center - a facility which diffuses basic industrial technologies to the population of the East Coast area, shall be constructed by national level public capital investment (National Manpower and Youth Council - NMYC, etc.) at Infanta New Urban Area.

4) General Sector

In addition to the above facilities, adult education class utilizing barangay high schools, basic livelihood technology training for local cottage industries in line with the activities of the above training center at the barangay district center shall be conducted to raise the quality of manpower at the community level.

6.3.3 Health/Medical Facilities Development Plan

Basic Policy of Health/Medical Facilities Development

The establishment of the region's over all medical service system is expected to contribute, to a great extent, to the improvement of the quality of life.

The public health medical service system in the Philippines has already been established to a considerable extent which shall inevitably show its effect in the Region.

This development plan, which acknowledges the role that the private medical service shall play in the future, proposes that the health/medical service facilities shall be developed based on the existing framework shown in Fig. 6.3.4.

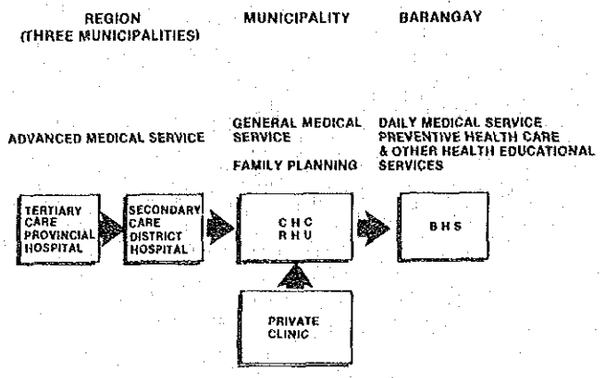


FIG. 6.3.4 FUNCTIONAL ALLOCATION OF MEDICAL SYSTEM

Barangay Health Station Development Plan

Among those facilities described in Fig. 6.3.4, Health Stations which provide such services as preventive health/medical services, mother-child care, family planning, sanitary education, etc., at municipal and barangay levels shall be considered in this section.

These facilities shall be developed according to this functional demarcation. Rural Health Unit (RHU) provides municipal level services and supervises Barangay Health Station (BHS), while BHS provides barangay level services.

Each municipality is obliged to have one RHU. There is already one RHU in each of the following municipalities: Infanta, Real and General Nakar. In principle, therefore, improvement and expansion of each facility shall be done to respond to the future increase of population.

However, service coverage of one unit is limited to 5000 persons so that a new unit shall be constructed in the Regional Center service. The municipality of Infanta shall exceed the limit by the year 2000, thus, the need for a new RHU.

Since the purpose of the BHS is to provide the daily services at the barangay level, one station in each basic neighborhood unit with a secondary education facility, and a Barangay District Center (to be explained) at the center of the unit, shall be provided.

In the provision, MOH standards of 5000 persons/service unit population, and 3 to 5 km radius service area coverage, shall be satisfied. However, two (2) units shall be constructed in such suburban neighborhood units that have large coverage and low population densities.

The development plan in year 2000 is described in Table 6.3.3 and Fig. 6.3.5.

Hospital Development Plan

Assuming that the medical service population of the East Coast Area including the Polillo Islands totals 250,000 in 2000, the total bed requirement is estimated at 500 beds.

Considering bed allotment among RHU and the private sector (RHU 10 beds - MOH standard, private - 20 % of the total requirement), the over all public hospital requirement in the area shall total 350 beds.

Among the various medical services, daily community level services shall be provided by RHU, BHS, and private clinics. On the other hand, advanced medical services shall materialize by the improvement of the existing hospital facilities, and construction of a tertiary care regional hospital. To provide municipal level services (especially for Infanta and General Nakar), the existing hospital shall be expanded to a 100 bed capacity hospital. To provide regional level services, a tertiary care regional hospital of 250 beds shall be constructed in Infanta New Urban Area.

The development schedule is that expansion shall be done during the Initial Period of Urban Development (1985-1988), and the new construction shall be carried out by phase responding to the demand increase during the period 1992 to 2000.

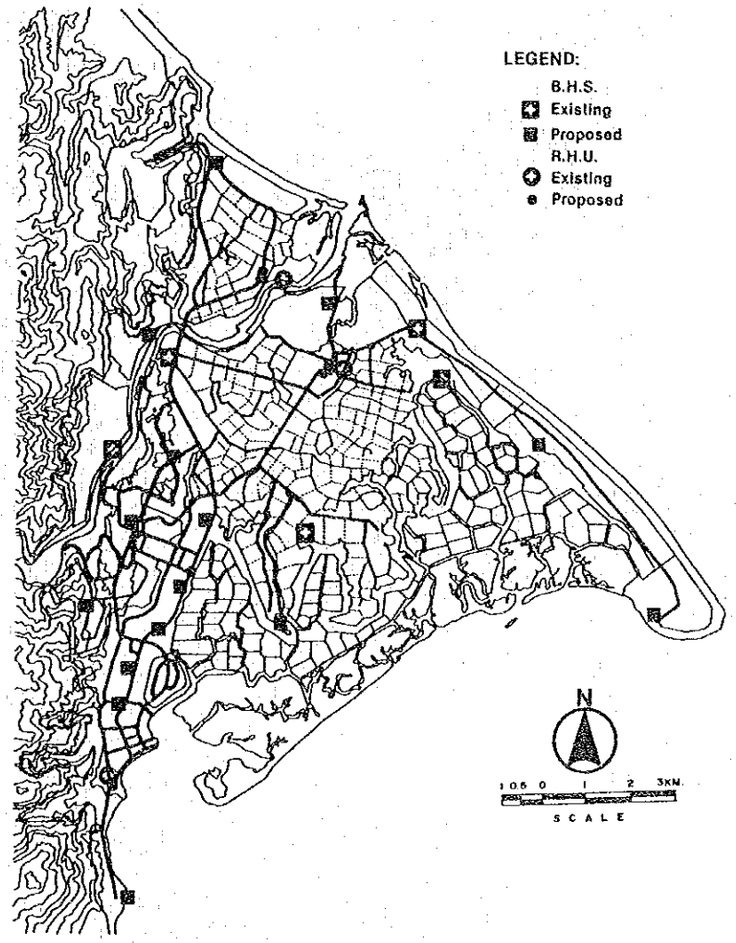


FIG. 6.3.5 DEV'T. PLAN OF B.H.S. AND R.H.U. (YEAR 2000)

Table 6.3.3 RHU, BHS DEVELOPMENT PLAN (YEAR 2000)

(unit)

Area / Facility	RHU			BHS		
	Existing	Proposed	Total	Existing	Proposed	Total
Central Urban Area						
Gen. Nakar	1	—	1	—	—	—
Infanta	1	—	1	—	1	1
Real	1	—	1	—	—	—
New Urban Area						
Infanta	—	1	1	—	5	5
Real	—	—	—	—	2	2
Suburb						
Gen. Nakar	—	—	—	1	3	4
Infanta	—	—	—	5	5	10
Real	—	—	—	—	1	1
Total	3	1	4	6	17	23

Source: JICA Study Team

6.3.4 Cultural and Recreational Facilities Development Plan

Basic Policy of Cultural/Recreational Facilities Development

The basic policy of the cultural and recreational facilities development is "the establishment of overall environment for cultural and recreational activities which correspond to the settlement hierarchy, and forms a network with other social services facilities"

Cultural and recreational activities involve various aspects. However, when viewed from the facilities development standpoint, the following three (3) kinds of facilities development shall be emphasized: cultural-sector facilities such as library and assembly hall; educational sector facilities such as a university, high schools, and elementary schools; and sports and park facilities such as sports center and municipal parks.

A development plan concerning educational facilities already exists. Therefore, in this section, the development plan formulated shall focus on cultural and sports/park facilities.

Corresponding to the settlement hierarchy, the cultural and sports/park facilities shall be developed based on the linkage utilizing effectively the already formed system of educational facilities as shown in Fig. 6.3.6.

Cultural Facilities Development Plan

The cultural facilities development shall emphasize the following: library service facilites linked with the educational facilities; and cultural/assembly facilities which provide a place for cultural activities.

Library services at the basic neighborhood level shall principally be provided by opening the libraries of educational facilities to the public. Supplementary community libraries shall be placed at barangay district centers as needed, and if possible it shall be operated by the residents.

A provincial library in the Regional Center, and a municipal library in each municipality shall be constructed after 1992 when the population of IRM area shall exceed 100,000 and, consequently, an overall library service system shall be established.

The central library shall serve the entire East Coast Area, and shall be developed in combination with the cultural center to supply not only literary information to the residents, but also to provide international and national level cultural information.

The municipal libraries shall be developed (possibly in line with a new municipal hall) at the center of each municipality, and shall provide library services for the area between the central and community libraries.

The cultural and assembly facilities shall have the same hierarchy as the libraries. After 1992, a cultural center to be established in the Regional Center shall introduce international cultural activities (play, music, fine arts, etc.), promote the growth of regional culture, conduct lectures and adult education, etc.

At the municipal level, assembly facilities shall be prepared either within the municipal hall or municipal library. At the basic settlement level, assembly facilities shall be prepared in the barangay district center to provide an opportunity for cultural activities for the area's residents (refer to Barangay District Center Development Plan for the facilities location).

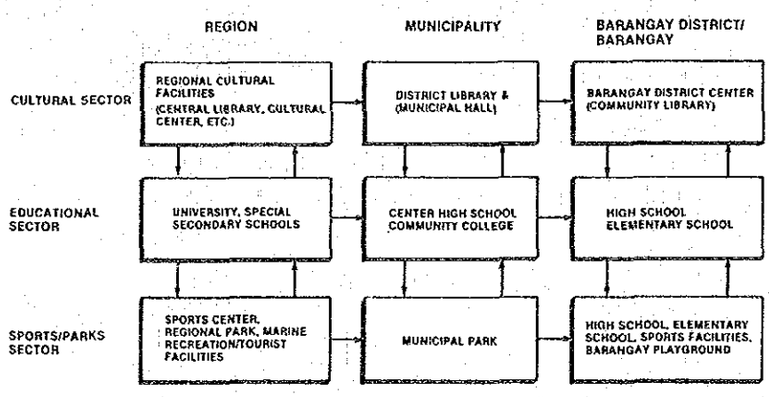


FIG. 6.3.6 DEV'T SYSTEM OF CULTURAL/RECREATIONAL FACILITIES

Park/Sports Facilities Development Plan

The abundance of nature is one of IRM's major resources. For purposes of its preservation and harmony with the development, the following three (3) major zones has been delineated in the Land Use Plan: Preservation Green; Natural Environmental Preservation Area; and Park area.

The park-sports facilities shall be developed in such a way that the resource can be fully utilized within the framework of open spaces that shall be created by the above zoning. The development shall be done according to the basic policy of forming a facility network with the cultural and educational sectors.

1) Park Facilities

For the park facilities, the development shall be done by the following area levels:

(i) As a regional level park facility the entire public facilities zone (classified as the Natural Environmental Preservation Area) shall be developed into a natural park in line with the development of other public facilities. Consequently, a regional level park environment serving the East Coast Area and at the same time the center of advanced social services shall be created. For marine recreation which is linked with the facilities developed in the Park Area, the public beach facilities (bathing house, camping site, etc.) shall be developed in order to provide inexpensive marine recreational opportunities to the residents.

(ii) At the municipal level, a municipal park shall be constructed in each high density urban area (General Nakar, Old Infanta, New Infanta, Old Real, New Real). The park size shall be, by the MLGCD standards, as described in Table 6.3.4. The municipal park of Real New Urban area, which is expected to experience the early urbanization, shall be developed during the period 1988 to 1992, while the parks of Infanta and Real Poblacion area shall be developed from 1993 to 1976. Finally, parks in the Infanta New Urban Area and General Nakar Poblacion area shall be developed during the period 1997 to 2000.

Table 6.3.4 PARK-SPORTS FACILITIES DEVELOPMENT PLAN (YEAR 2000)

Area/Facility	Municipal Park (Size)	Barangay Playground
Central Urban Area		
Gen Nakar	1 (0.25 ha)	1
Infanta	1 (1.0 ha)	1
Real	1 (0.75 ha)	1
New Urban Area		
Infanta	1 (regional)	
	1 (2.5 ha)	6
Real	1 (0.75 ha)	2
Suburb		
Gen. Nakar	—	3
Infanta	—	8
Real	—	—

Source: JICA Study Team

2) Sports Facilities

As for the sports facilities, the opening of play ground of community level educational facilities shall basically provide the opportunity of sports activities to the people. However, for the regional level and barangay level sports activities, the following facilities development shall be carried out (Fig. 6.3.7):

(i) As a focal sports facility of the East Coast Area, a sports center shall be constructed in the Regional Park which shall include an athletic field and track, swimming pool, an indoor gymnasium, and other outdoor sports facilities such as a baseball field, basketball courts, etc.

(ii) At the barangay level, a barangay playground of 0.5 to 1.0 ha which is designated by the MLGCD community planning standard shall be provided in each barangay district center to cater daily to the residents (especially children). Based on this development, a playground of about 0.25 ha. shall ultimately be constructed in each barangay.

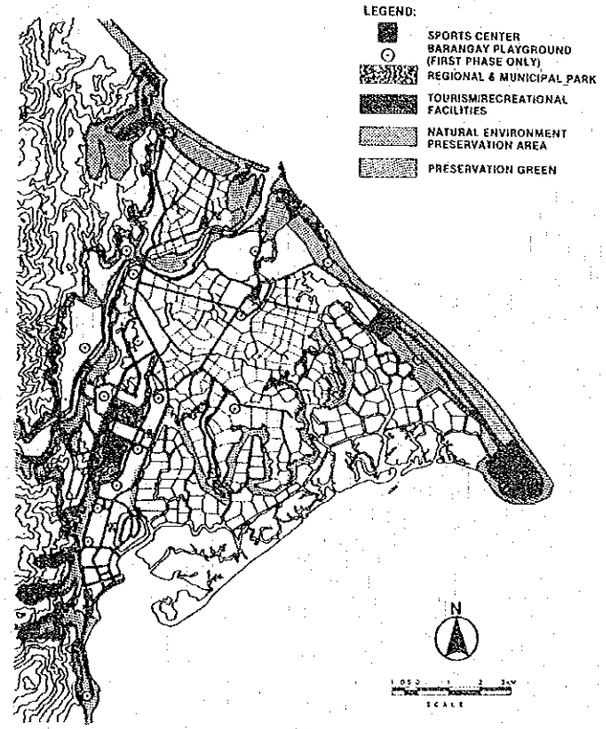


FIG. 6.3.7 PARK & SPORTS FACILITIES DEVELOPMENT PLAN (YEAR 2000)

6.3.5 Administrative Services Facilities Development Plan

Basic Policy of Administrative Services Facilities Development

Having a linkage with social service facilities, management shall be established. Administrative facilities are vital parts of IRM's future city. The administrative services that are dealt with in this section shall be divided into the following: Administration and Police and Fire Protection Services. The facilities development plan shall be formulated at each settlement level as described in Fig. 6.3.8.

Barangay District Center Development Plan

It is positively essential for raising the living standards of IRM residents to establish a system that could effectively provide social services at basic settlement levels.

The network and linkage formation among the services such as education, health/medical service, and culture/recreation should contribute to the effective provision of quality social services (concentration of service, systematization, convenience), and to the reduction of investment cost in facilities development (effective land utilization, and reduction of construction cost).

Provision of social services shall be consolidated in the IRM development. By adding other facilities, a community center called "Barangay District Center" shall be constructed in each barangay district serving as the center of daily living.

This center shall have facilities such as a BHS, assembly hall, community library, and day care center as core of the center. Furthermore, playgrounds, and KADIWA centers could be provided with appropriate linkages to elementary and high schools. The management and operation of this center, as a community level administrative facility, shall be done by each municipality. As much as possible, however, resident participation shall be adopted in its operation.

At places (Barangay District) where the functions of traffic nodes and the center of local industries are specifically strong, and high population concentration is expected, a barangay district center shall be developed in combination with urban land development and cottage industry development.

To summarize, facilities proposed in the Barangay District Centers are listed and described as follows:

(i) Barangay Health Station (BHS) - Community level medical/health services, and social welfare service such as day care center;

(ii) Elementary School and High School - possibly located in relation with the center (Opening of playground and library to the public);

(iii) Community Library - at one corner of the center, library service shall be provided through the residents participation, which is linked with the municipal library;

(iv) Assembly Facility - for residents' assembly cultural activities, mobile administrative service, and agricultural/fishery seminars (including barangay court);

(v) Sports Facilities - barangay playground, basketball court, etc.;

(vi) Retail Store - Public retail stores such as KADIWA centers;

(vii) Cottage Industry - aims at providing unstable underemployed residents during the slack season with employment opportunities. (for example, nipa wine manufacturing, rattan craft, etc.); and

(viii) Agricultural/Fishery Cooperative Services - provides cooperative services at local industry districts (purchase of implements, fertilizer, seminars, etc.).

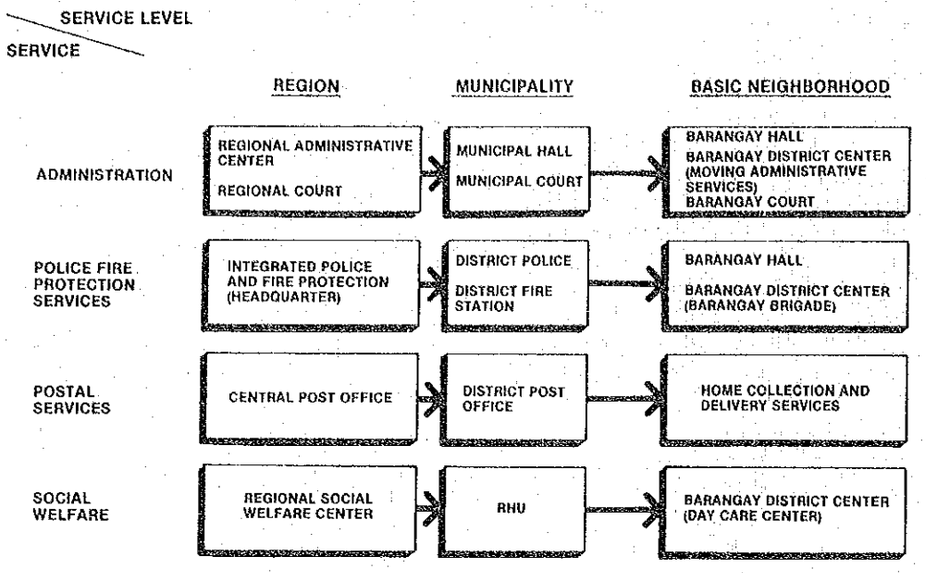


FIG. 6.3.8 DEV'T SYSTEM OF ADM. SERVICES FACILITIES

General Administrative Services Facilities Development Plan

The facilities development plan at the municipality level shall be formulated in this section. Facilities at this level are the municipal hall and municipal court. The demand shall be basically satisfied up to 1992 by the expansion of the existing facilities. When urbanization proceeds considerably after 1992, a new municipal hall combined with a municipal court shall be constructed in the central area of each municipality. In addition, a new branch office shall be placed in the Infanta New Urban Area which shall require a considerable amount of administrative services for its large population.

Size of each facility shall be determined following the staffing manual of MLGCD, General Nakar (officials and clerks 35 persons, floor area 120 m^2, site area 0.5 ha), Infanta (officials and clerks 90 persons, floor area 300 m^2, site area 1 ha), Real (officials and clerks 60 persons, floor area 200 m^2, site area 0.75 ha).

The existing police and fire station of each municipality in the same way shall be expanded to meet the demand before 1992, and a new complex with combined district police and fire stations shall be constructed in each municipality after 1993.

As for the postal service, the existing post office in each municipal hall shall be expanded by 1992, and with each municipal hall to be constructed, a post office shall be included.

The social services together with health services at municipality level shall be provided through RHUs.

Regional Administrative Service Facilities Development Plan

The regional administrative service facilities shall have to function as a base of regional administrative services for the residents of the entire East Coast area, and as a central and coordinative facility among those administrative service facilities described in the preceeding section.

The facilities shall be developed after 1993, when the area's population reaches 100,000 in the public facilities zone in close coordination with regional facilities of education, Health, cultural sports/park to be built in order to realize its role as the center of social services of the East Coast area.

The following facilities are proposed:

1) Administrative Services

(i) Regional Administrative Center - Presently, major administrative services are being carried out directly by the national government as its project due to the inadequacy of local government. Therefore, in order to coordinate these projects and to consolidate them in the IRM urban development, a regional administrative center is proposed.

(ii) Regional Court - In order to promote autonomy in function not only the administrative function but also the judicial function (Regional Court) shall be developed in line with the above facility.

Table 6.3.5 ADMINISTRATIVE SERVICE FACILITIES DEVELOPMENT PLAN (YEAR 2000)

Facility		Administration		Police/Fire Protection		Postal Service		Social Welfare*
Area	BDC	District	Regional	District	Regional	District	Regional	Regional only
Central Urban Area								
Gen. Nakar		1		1		1		
Infanta	1	1		1		1		
Real		1		1		1		
New Urban Area								
Infanta	6	1	1		1		1	1
Real	2							
Suburb								
Gen. Nakar	3							
Infanta	8							
Real	1							
Total	21	4	1	3	1	3	1	1

Source: JICA Study Team
Note:* Barangay level social welfare facility (day care center) shall be included in BDC.

2) Disaster Prevention/Police and Fire Protection - Integrated Headquarters of Police and Fire Protection. An integrated headquarters is proposed in order to supervise and coordinate district stations of police and fire protection. Linked with the coast guard, this center shall promote the establishment of the area's disaster prevention system.

3) Postal Services - Central Post Office - a central post office to oversee and manage the services of district post offices, and gain effective and fast postal services shall be developed.

4) Social Welfare Services - Integrated Regional Social Welfare Center - a social welfare center which shall provide low income and handicapped people, in cooperation with the educational and health/medical facilities, with social welfare services and shall promote the establishment of an integrated social welfare service system with help from the private sector is to be established.

The development plan of major administrative services facilities is shown in Table 6.3.5 and Fig. 6.3.9.

6.3.6 Public Housing Development Plan

Role of Public Housing Development in IRM Urban Development

The importance of the role which the public housing development plays

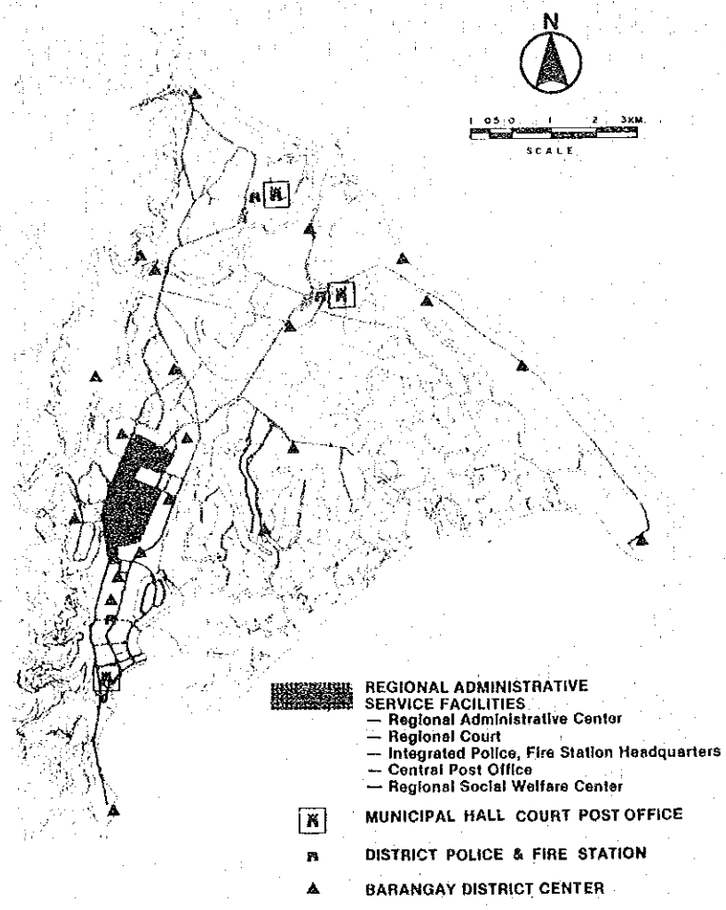


FIG. 6.3.9 ADMINISTRATIVE SERVICES FACILITIES DEVELOPMENT PLAN (YEAR 2000)

in the IRM urban development is evident as seen in the Social Development plan. But again, in the social development target and the direction of the urban development, the role is further categorized as follows:

(i) Provision of Inexpensive Housing for the Low Income Group (low cost housing, sites and services, multi-dwelling apartment units, etc.). Provision of public housing for the immigrating low income group, and the existing squatters shall be planned in such a manner as to alleviate and prevent the occurrence of disorderly squatter areas, the Philippines' common urban problem. At the same time, the level of living environment shall be raised by the provision centering on the low income group. Furthermore, the development shall bear the role of improving the existing urban environment preceeding full urbanization.

(ii) Provision of Inexpensive Housing for the Middle-Income Group and Facilitation of Soft term Housing Loan. The provision of inexpensive and quality housing shall be done for the middle income group, which shall be the majority of the future population. For the upper middle income group, the soft term housing loan shall be facilitated in order to encourage self-financed housing constructions, and create core housing developments to raise the living standard.

(iii) Housing Loan System to renovate and reconstruct the existing old and low standard housing. Among the existing housing (7859 units, 1983), about 75% are low standard housing called "Barong Barong", nipa or cogon hut. As mentioned in the "National Shelter Program" by MHS, these kinds of housing shall be replaced in line with the sanitary and disaster prevention standpoint.

Therefore, the soft term loan system shall be introduced in order to improve or replace more housing with more durable and fire proof permanent structures at their proper replacement periods under administrative instructions and initiative.

(iv) Public Housing District Development in order to induce proper urban area development. The most important role of the public housing development in urban development is believed to be the inducing function in urban land area formation.

In the past, urban land development in the Philippines has been dependent on private sector investments. However, in order to achieve the ultimate target of achieving a model growth city, the planned public housing district has to play the role of inducing the urban structure and basic land use to conform to the Master Plan (based on the proper zoning) with associated infrastructure development.

Specifically, the planned public housing development in the Real old and new urban area and the port area where the large housing demand shall be expected in the early period, and in the Infanta new urban area which shall form a large urban area (low flat land and vicinity of the Regional Center), shall become a very important factor of this urban development.

Basic Policy of Housing Development

The basic policy of public housing development are summarized, based on the roles discussed above, as follows:

1) Public Housing Development for Low and Middle Income Group

Based on the Philippine's national policy and the role discussed above, the beneficiaries of the Public Housing Development shall be the low and middle income groups (80% of the total excluding the high income bracket (Fig. 6.3.10).

2) Measures responding to the income hierarchy

The above income group shall be divided into the following: i) Low income group (25%); ii) Average Middle income group (50%); and iii) Upper Middle Income Group (25%) as shown in Fig. 6.3.10, then according to the Philippine classification, social housing, economic housing, and open market housing shall be provided respectively.

Social housing shall consist of providing low cost housing sites, service improvement, and multi-dwelling rental units provision supported considerably by public subsidy and constructed directly by a government agency.

Economic housing is subdivided into the following two (2) categories: direct construction of subsidized housing by the government; and people's self-financed construction based on the soft-term housing loan system. The ratio on the amount of housing in the above two (2) categories shall be at 50% each.

Open market housing means high quality subdivision type housing by the private sector. However, in this IRM development considering the future income level, open market housing shall be defined as relatively low cost housing developed by joint venture between the public and private sectors, and housing constructed through soft-term housing loan system for open market housing.

Therefore, in this development plan, not only mere construction of housing units but also housing units constructed indirectly by soft term housing loan system shall be considered as a part of the Public Housing Development.

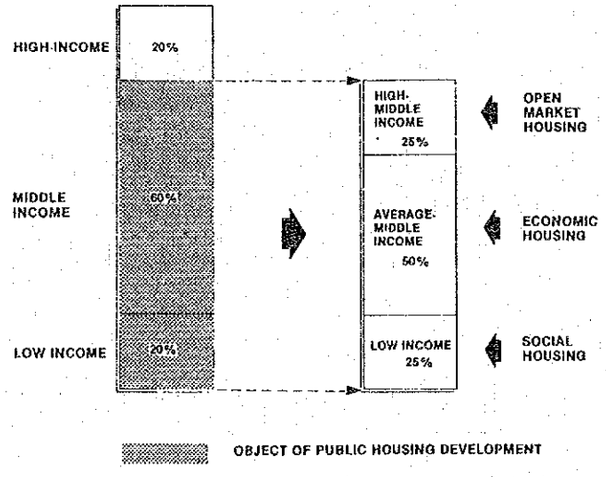


FIG. 6.3.10 MEASURES & OBJECT OF PUBLIC HOUSING DEV'T

3) Planning Supply Ratio of 25%

Emphasizing the role that public housing development shall play in IRM development, the planning supply ratio of public housing against the total housing demand is set at 25% just above the national target set by the "National Shelter Program", which is at 20%.

4) Housing Measures considering the growth of the area's average household income.

The area's average household income shall be, at present values, 23,700 Pesos in 1992 and 32200 pesos in 2000 according to estimates based on the planning framework. Assuming that the share of the high income group (upper 20%) in the areas total income to be 35%, (national average 50%) considering the future levelling of the income disparity in IRM development, the average household income of the subject middle and low income group shall be 19,300 pesos in 1992 and 26200 pesos in 2000 (Table 6.3.6).

Table 6.3.6 GROWTH OF AVERAGE ANNUAL HOUSEHOLD INCOME IN THE FUTURE

(₱1,000 / year at 1983 price level)

	1992	2000
Area's Average	23.7	32.2
Subject Group Average	19.3	26.2

Source: JICA Study Team

According to the information prepared by the Private Development Corporation of the Philippines (PDCP), the affordable ranges (average annual income) for social, economic and open market housing are estimated and shown in Table 6.3.7.

The prerequisite shall be to reduce construction cost of one housing unit as much as possible utilizing local materials, labor and, consequently, to lower the above affordable ranges. Taking that in consideration, the public housing development shall be implemented as illustrated in Fig. 6.3.11.

Before 1992, social housing and economic housing by direct construction shall be developed. After 1993, when the average household income portion of the subject group reaches the affordable range for the loan type economic housing (self-financed construction or purchase), the full development of soft-term housing loan system for economic and open market housing shall commence.

Forecast of Public Housing Demand

The housing demand in 2000 was estimated assuming the decrease of average household size from the present 5.65 persons/household to 5.0 persons/household due to the decrease of birth rate and the young population ratio (1 housing unit = 1 household).

From the total demand the number of existing housing units was subtracted to get the housing demand corresponding to the population increase during the planning period.

To this, the number of housing units to be replaced including immigration adjustment (90% of the existing housing units - old and unacceptable nipa, cogon, wooden houses) was added in order to forecast the total housing demand during the planning period.

$$\text{Total Demand} = \left(\frac{\text{Pop. in 2000}}{\text{Ave.Household in 2000}} - \text{No.of existing housing unit} \right) + \text{No. of units to be Replaced by 2000}$$

As a result of the forecast, the total housing demand of 29,300 units was arrived at.

Based on the basic policy, and assuming the planning provision ratio to be at 25%, the total demand of public housing development during the entire period (1983 to 2000) including both direct construction and indirect construction by loan shall be 7,300 housing units.

Table 6.3.7 AFFORDABLE RANGES* BY DIFFERENT HOUSING TYPE (AVERAGE ANNUAL INCOME AT 1983 PRICE LEVEL)

Social Housing	11,000 — 25,000 Pesos
Economic Housing (loan type)	25,000 — 66,000 Pesos
Open Market Housing	66,001 —

Source: PDCP
Note:* 1977 Value has been adjusted by price deflater at 1983 value

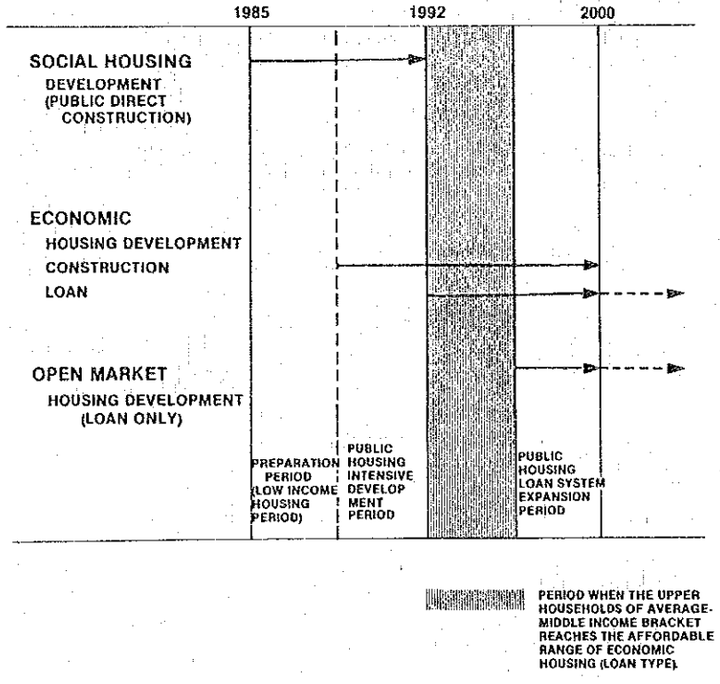


FIG. 6.3.11 BASIC POLICY OF PUBLIC HOUSING DEVELOPMENT

This total demand shall be according to the basic policy, classified as shown in Table 6.3.8.

Of the total demand, the number of housing units to be constructed directly by the government shall be 3650 housing units.

The public housing development plan shall be formulated mainly for this group of housing.

Housing Development Plan

1) Housing Types

Social housing and economic housing are the two (2) major housing classification. The breakdown proposed is illustrated in Table 6.3.9.

Concerning the housing size, the Philippines' existing program is referred to for the social housing. For the economic housing, the size is determined by taking the average income level and the construction cost into consideration with a target to raise the existing living standard (the present average unit size: 50 to 60 m^2).

Furthermore, a rental system of social as well as economic housing centering on row housing shall be introduced during the early stage of the IRM development.

2) Policy on Density and Location

The density of public housing development districts shall basically be determined based on the policy of the residential land use plan, though it shall inevitably be a little higher due to the limitation of capital investment and affordability of the subject income group.

However, integrated housing development linked with parks, barangay district centers, educational facilities, etc., shall all together decrease the gross density and, thereby, contribute to the formation of a good living environment.

The policy of housing provision by area shall be as follows:

(i) General Nakar Central Urban Area - Because the growth of urban area starts at the latter half of the planning period (when the income level shall have improved), the flexi-home type housing shall be developed in line with the park and educational facilities on the urban fringe.

(ii) Infanta Central Urban Area - Because the income level is high and the urbanization proceeds in the early period, the occurrence of a disorderly urban sprawl is feared. Therefore, the planned development of the public housing district shall be implemented on the fringe area to induce proper urbanization. Furthermore, multi-dwelling units shall be developed surrounding the central business area in order to control the disorderly expansion of commercial land use.

For the existing squatters and low income group, sites and services and low cost housing development shall be implemented to improve the land use of the central urban area and to promote the relocation of squatters.

(iii) Real Central Urban Area - The housing demand shall arise in the earliest period from this area along with the port area development. Preceeding the urbanization, with the purpose of improving the urban structure, the social housing development sites and services and low cost housing for the squatters and low income group shall be carried out. At the same time, the development of economic housing (flexi-home type) shall be done in the area where the improvement of the urban structure is emphasized.

Table 6.3.8 BREAKDOWN OF PUBLIC HOUSING DEMAND BY HOUSING TYPE AND BY CONSTRUCTION METHOD (1983-2000)

Housing Type	Percentage	Direct Construction (unit)	Public Loan (unit)	Total (unit)
Social Housing	25%	1,825	—	1,825
Economic Housing	50%	1,825	1,825	3,650
Open Market Housing	25%	—	1,825	1,825
Total	100%	3,650	3,650	7,300

Source: JICA Study Team

Table 6.3.9 BREAKDOWN OF HOUSING TYPES

Housing Type	Size	Ratio (%)	No. of Units
Social Housing			
Site & Service (self-built)	—	25	900
Los Cost Housing	50m^2, 2-bedroom Lot (100m^2)	25	900
Economic Housing			
Row Housing (multi dwelling)	60m^2, 3-bedroom	10	400
Flexi-home	70m^2, 3-bedroom Lot (150m^2)	40	1,450

Source: JICA Study Team

(iv) Infanta New Urban Area (Includes Infanta Real Belt) - Because the area shall be developed when the income level is improved to a considerable extent, and of the necessity of forming new urban areas, the model public housing districts combined with flexi-home and row housing development shall be carried out with educational facilities and the barangay district center as the core of basic settlement units.

(v) Real New Urban Area - The integrated public housing district for the people employed at the port/distribution district and the agro-fishery processing industry district shall be developed with social housing development (low cost housing), and economic housing (flexi-home housing and row housing).

(vi) Suburban Area - At the traffic node and local industry base in the suburb, where a small scale poblacion area is likely to form, the development of low cost housing and flexi-home type housing shall be done in accordance with the barangay district center in order to strengthen the area's function as the settlement center.

3) Development Plan

Based on the aforementioned policies, the public housing development shall be implemented as illustrated in Fig. 6.3.12.

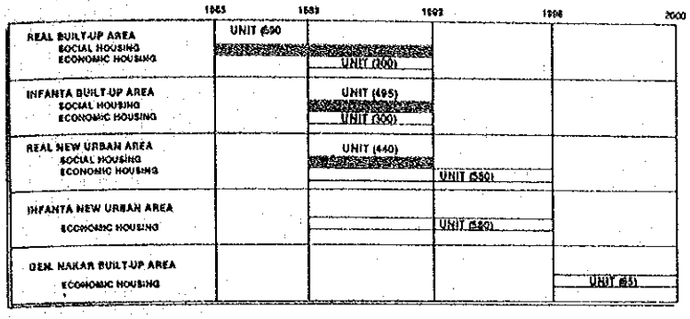


FIG. 6.3.12 PUBLIC HOUSING DEVELOPMENT PLAN

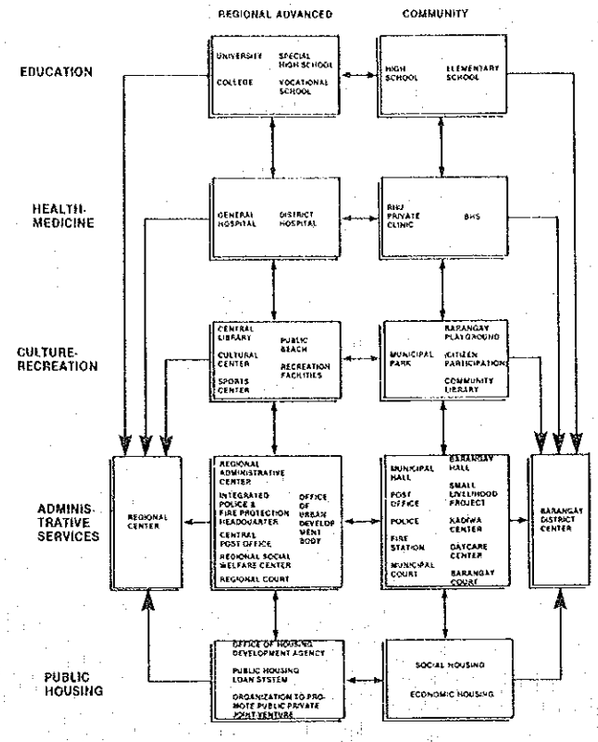


FIG. 6.3.13 INTEGRATED SYSTEM OF SOCIAL SERVICE FACILITIES DEVELOPMENT

6.3.7 Integrated System of Social Services Facilities Development

To orchestrate the development of social service facilities which has been mentioned in the preceeding sections, an integrated system as a part of the IRM Urban Development shall be proposed for 2000 corresponding to the different settlement levels: Regional/advanced, and community level (municipality, barangay district, barangay) (Fig. 6.3.13).

The location of major facilities based on this system is shown in Fig. 6.3.14.

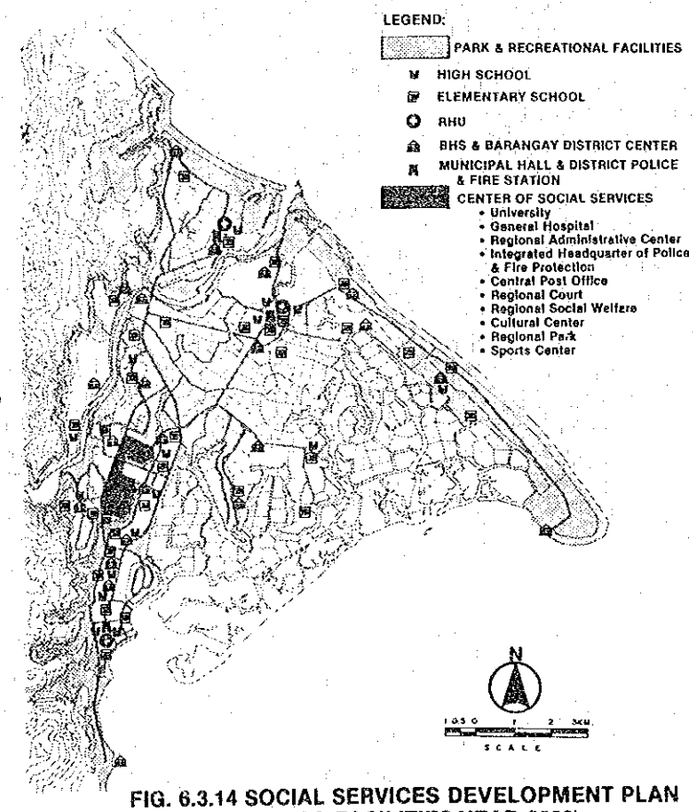


FIG. 6.3.14 SOCIAL SERVICES DEVELOPMENT PLAN (MAJOR FACILITIES-YEAR 2000)

6.4 Phase Development Program

6.4.1 An Overall Flow of Urban Development

In order to promote the urban growth of IRM and to materialize this master plan, the following three (3) steps are necessary:

(i) A core of urban society and industries shall be needed to trigger a self supporting progress and development of IRM;

(ii) Based on this core, the self supporting growth and concentrations of urban functions shall be enhanced in order to form an adequate urban structure; and

(iii) Upon this base, further urban concentrations shall be developed and advanced urban functions shall be accommodated, thus, enabling IRM to function as a regional urban center.

According to the above policies, the entire planning period is phased into three (3) periods and a flow diagram of IRM urban development has been formulated as illustrated in Fig. 6.4.1.

The first period called Base Preparation Period (1985 to 1988) shall be designated to prepare and meet the conditions for the base preparation of the urban core. The second period called the Take-Off Period shall be in stages to start the operation of processing industries promoting an autonomous urban growth up to a population of 100,000 by 1992. Furthermore, a foundation shall be laid for this urban center to grow into the center of the east coast region with a population of 150,000 during the Third Period (1993-2000), otherwise known as the Advancement Period.

When a development plan is to be implemented by phase, it shall be phased according to the development strategy and principle inherent to the early sector of the development. At the same time, because each sector develops depending on each other, the interrelation among the sectors in time sequences shall be systematized in order to achieve the goals of each development period described above.

In consequence, the flow diagram has been formulated based on first defining the development process of each sector then by interrelating these processes of each sector.

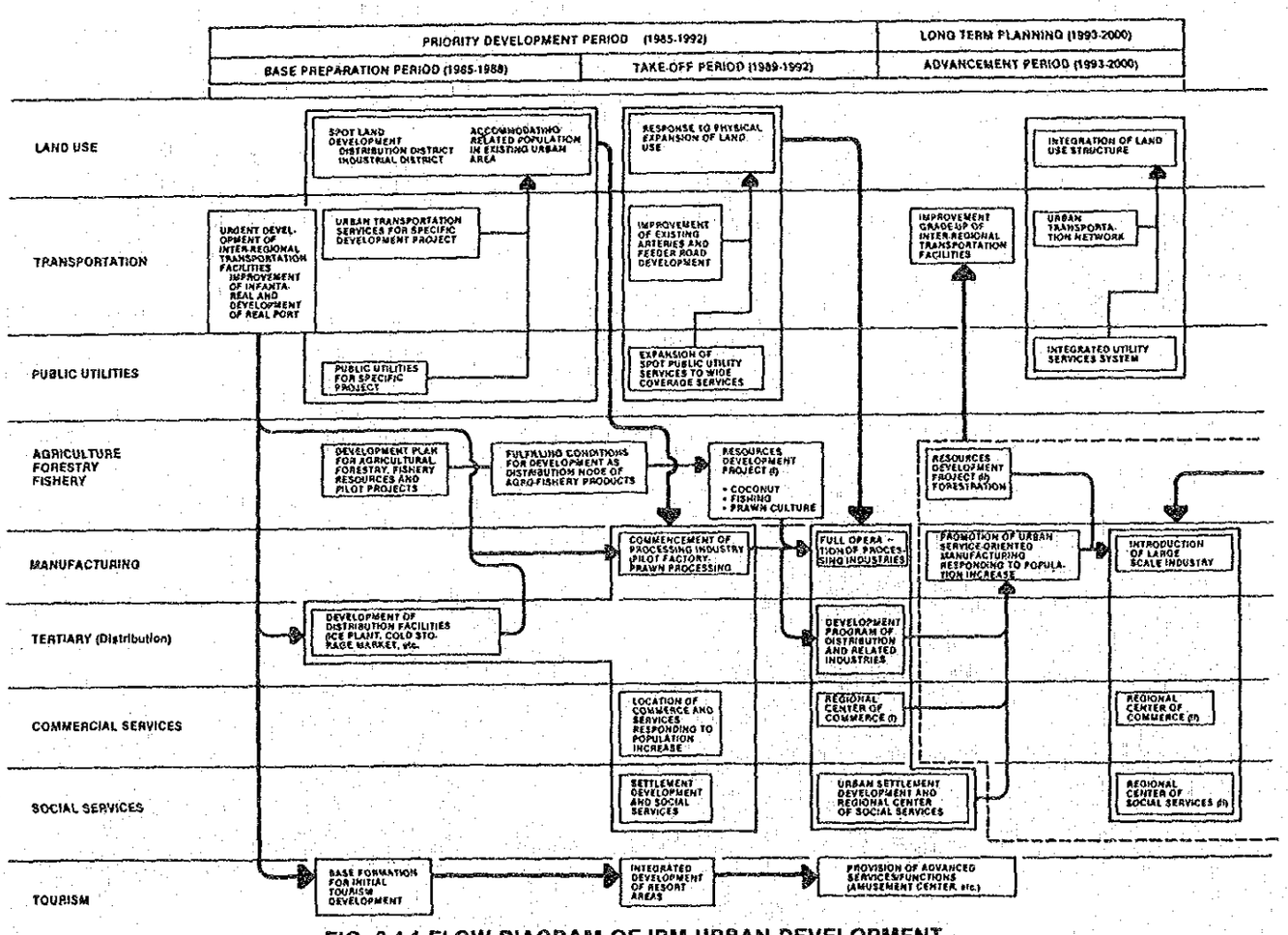


FIG. 6.4.1 FLOW DIAGRAM OF IRM URBAN DEVELOPMENT

Development Process by Sector

1) Urban Development

In the first period, the development shall be accommodated on the basis of the existing urban framework with some specific projects identified. The second period is designated for the transformation to a new urban structure which shall be firmly established centered on the regional center. In this transition towards the urban structure, the following phased development of land use, transportation and public utilities are proposed:

(a) Land Use

In the first period, several projects at the Real Port area and Dinahican Port shall be implemented individually and related increase of population and some urban functions shall be accommodated within the existing urban areas. The second period is phased for said transition towards a new urban structure and for expansion of the urban residential areas, while during the third period, urban land use shall be nurtured to achieve the new urban structure.

(b) Transportation

In order to realize the development potentials at the early stages, the first period shall be assigned for the urgent improvement of interregional transport facilities (first improvement) and in the urban area, transportation service shall be provided only for some specific development projects. In the second period, improvement of urban arteries and development of branch feeder roads shall be carried out to systematize the urban transport network. The third period shall be devoted to the formation of said urban transport network and upgrade the interregional transport facilities (second improvement).

(c) Public Utilities

In the first period, public utilities services shall be provided only for the above mentioned specific projects at the early stages. A spatial expansion of services shall be carried out in the second period while an integrated system of public utilities shall be completed with facility improvement responding to the needs of both quantity and quality during the third period.

2) Industrial and Social Development

Various promotion and development measures shall be implemented for natural resources development in the first period. Based on this development, the total development shall be enhanced and the operation of processing industry for agro-forestry and fishery products shall be commenced during the second period. Then a full scale manufacturing industry shall be introduced on the basis of the above concentrations in the third period.

(a) Resources Development of Agro-Forestry and Fishery Industries

Research on natural resources (especially fishery resources) and a pilot project for fishery development shall first commence (the first period), and then an expansion of said project shall be made (in the second period), while a stable supply of natural resources shall be realized (in the third period).

(b) Manufacturing Industrial Development

In line with the progress of the above development of natural resources, industrialization shall start in the second period. Location of natural resource processing industry shall be promoted and expanded. Because IRM shall be fully developed as an urban center in the third period, urban service related manufacturing industry serving the urban population shall be necessary, and upon the concentration of industries, a full scale manufacturing industry shall be introduced.

(c) Commerce/Services

Industries which shall initiate the IRM development are the tourism and distribution industries. As for tourism, spot development shall start to form a base of the industry in the first period and based on the above, resort development shall be induced in the second period. After completing a considerable scale of concentration, advanced facilities such as an amusement center shall be developed.

In parallel with the natural resources development, the distribution industry shall be promoted. The first period shall be designated for the basic facility development (freezing and cold storage, ice plant and fish market), and various functions required for the emergence of a distribution node of the east coast region shall be strengthened in the second period.

(d) Social Services

Provision of urban social services shall be commenced during the second period when urban population shall begin to settle as a consequence of industrial development. Within this period provision of necessary social services shall be materialized for the population of 100,000 (regional center of social services I).

In the third period, advanced social service facilities shall be developed to serve the east coast region (regional center of social services II).

Phases of IRM Urban Development

On the premise of the above described developments of each sector, an overall flow of IRM urban development has been formulated.

1) Base Preparation Period

(i) As mentioned, the necessity has been identified for the development of the interregional transport facilities in the initial stages which consist of a nodal port development for the east coast region, and trunk road development to directly connect IRM with its base of existence in MMA.

(ii) The above development shall be as follows: conditions to function as a distribution node for the east coast region shall be satisfied adding the related facilities (freezing cold storage for marine products, market, etc., and basic conditions for the initiating industry, the tourism development, shall also be met. As a result, the construction of the Marine Research Park which is expected to give momentum to the tourism development shall be able to begin.

(iii) Another essential factor of the IRM development, which is the natural resource development shall be commenced.

Marine resources research and study for the promotion of surface fishing, marine and brackish culture center for the promotion of culture industry and a feasibility study of the coconut oil factory shall all be needed to implement actual development and utilization of the natural resources (operation of surface fishing, prawn culture, increase of coconut production) during the second period.

On the other hand, it is desirable that the prawn culture industry shall commence at early stages (pilot project). This is because there already exists fish ponds in the area, therefore, it is easy to convert them to prawn culture, and its large development impact and high economic feasibility can be advantageous.

It can also supply the much needed raw material (prawn) to the processing industry scheduled to be developed at an early stage of the second period.

(iv) An adequate urban land with required utilities and urban transportation services shall initially be developed in order to accommodate the above manufacturing industry, residential area for the increased urban population, social services facilities, and commercial and other service industries (development of about 100 ha urban land).

2) Take-Off Period

(i) Based on the above development, a socio-economic core shall be constructed composed of processing industries, etc.

(ii) Furthermore, due to the full operation of prawn culture industry to fishing operations in the Pacific waters, and the increased production and collection of coconuts, the output of the primary industrial products shall drastically expand.

To respond to the above, distribution and related industries shall be promoted (regional distribution node), and agro-forestry and fishing processing industries shall commence their full operation.

(iii) Together with the above growth, urban population shall rapidly increase (55,000 persons) and development of a center for regional commerce and a regional center for social services (both at the regional center) shall be required.

(iv) For tourism development, focusing on the initial tourism development described above, the resort development shall be expanded. Furthermore, advanced facilities development such as the Public Beach Recreation Center shall be carried out to accelerate the tourism development of IRM.

(v) To cope with such full scale urbanization, integrated development of urban arteries and feeder roads, and public utilities service shall be necessary together with the urban land development (713.8 ha).

3) Advancement Period

(i) Development of service manufacturing industries shall be promoted and accelerated to serve the concentrations of 100,000 urban population and various establishments.

(ii) Furthermore, on the basis of such industrial concentrations (various urban services shall already be available in IRM), partial introduction of full scale manufacturing industry (Paper pulp full line factory) in line with the forestation project in the east coast region shall be examined.

(iii) Both commerce and social services shall have their central function in the east coast region; and

(iv) In addition to such urban functions, the population shall grow to 150,000. This requires the integration of the transport network for the efficient mobility of urban traffic, and the improvement of public utility services in order to efficiently serve the increasing demand in terms of both quality and quantity.

This integration of urban transport network and public utilities shall, thus, integrate the land use of the IRM urban development.

(v) On the other hand, higher standard transport services serving linkages with MMA shall be necessary as a result of such concentrations of population and industrial activities. Therefore, in order to meet such demand, considerable improvement and redesigning with higher standards of interregional transport facilities shall become necessary.

6.4.2 Phase Development Plan by Sector

To further refine the phases of IRM urban development, a necessary adjustment have been made among the sectors. Thus, the phase development plan by sector as illustrated in Fig. 6.4.2 shall be proposed.

The target output of these sectoral development, planning target figures, indices, and standards to be achieved by the years 1992 and 2000 are tabulated in Table 6.4.1.

Table 6.4.1 PLANNING TARGET OF SECTORAL DEVELOPMENT PLAN(1)

	1983	1992	2000
1. Agro-Forestry and Fishery Resource Development			
(1) Rice Production			
Cropping Area	2,823ha (gross) 2,279ha (net)	2,682 2,330	2,565 12,360
Unit Yield	2,375 kg/ha	4,950	10,000
Total Production	5,413 mt	11,500	23,600
Workers	4,610 persons	5,545	5,091
(2) Coconut Production			
IRM			
Cropping Area	3,250 ha	2,629	2,178
Total Production (Copra base)	3,169 mt	3,965	4,867
3. Municipalities and Polilio			
Cropping Area	44,658 ha	44,037	43,856
Total Production (Copra base)	41,628 mt	63,754	93,312
Workers	931 persons	1,022	1,086
(3) Vegetable and Livestock Production			
Workers	17 persons	137	137
(4) Surface Fishing			
No. of Boats	591 Bancas 3-5t 40t	58 3-5t 5 40t	90 5
Fishermen	1,230 pesons	1,562	1,720
Total Catch (IRM)			
Municipal	5,150 tons	7,470	9,040
Commercial		2,800	3,500
Total	5,150 tons	10,270	12,540
(5) Prawn Culture			
Area of Culture Pond	978 ha	1,200	1,500
Workers	— Persons	1,440	3,000
Production (prawn)	30 mt	2,400	5,000
2. Manufacturing Industry			
(1) Coconut Oil Mill			
Workers	— Persons	160	250

Table 6.4.1 PLANNING TARGET OF SECTORAL DEVELOPMENT PLAN (2)

	1983	1992	2000
Production			
Coconut	4,387 mt/ha	6,805	10,055
Oil	— mt	41,400	60,700
Total Shipment (P1000)	—	190,100	296,800
(2) Canning Factory			
Workers	— Persons	1,440	1,800
Production	— mt	25,000	32,200
Total Shipment (P1000)	—	274,200	342,700
(3) Cold Storage			
Workers	— Persons	140	170
Production	— mt	9,600	12,000
Total Shipment (P1000)	—	95,600	119,500
(4) Prawn Processing Factory			
Workers	— Persons	120	150
Production	— mt	2,400	3,000
Total Shipment (P1000)	—	172,900	215,500
(5) Paper Pulp Factory			
Workers	— Persons	—	2,600
Production	— mt	—	70,000
Total Shipment (P1000)	—	—	453,500
3. Commerce Services			
(1) Tourism Development			
No. of Tourist			
Marine Research Park	— Persons	49,800	49,800
Public Beach Recreation Center	— Persons	81,200	81,200
Infanta Resort			
Gen. Nakar Resort	— Persons	—	15,000
Total	—	117,000	146,000
Workers	— Persons	800	1,000
(2) Commerce			
Workers	842 Persons (7.3%)	7,200 (25.1%)	11,000 (24.4%)
Commercial Land Area (Urban only)	8.63 ha	33.1	53.6
4. Transportation			
(1) Road			
Total Length	226	250.1	266.3
Road Ratio (Urban Area only)	12.0	13.2	15.1
Pavement Ratio	3.0	23.3	28.2
Registered No. of Vehicles			
Vehicle	294	1,016	1,563
Vehicle/1000 pop.	4.94	10.16	10.42
Traffic Volume			
Famy-Real (AADT)	250	6,134	9,603
Bus	12 trips	30	52
	570 persons/day	1,500	2,600
(2) Port			
Real Port Berth	26 m	750	750
Type of Vessel (max. ton)	—	1,500t class	1,500t class
Water depth (m)	-2 to 3	-5.5	-5.5
Handling Cargo (ton)			
Fish Landing	—	52,000	65,000
Agricultural Product	—	18,000	27,000
Manufacturing Product	3,500	37,000	50,000
General Merchandising	4,500	20,000	80,000

Table 6.4.1 PLANNING TARGET OF SECTORAL DEVELOPMENT PLAN (3)

	1983	1992	2000
Total	—	127,000	172,000
Ferry Passenger	1 trip (1 way)	3	3
	120 person/day	290	315
No. of Passenger per year	—	210,000	230,000
5 Public Utilities			
(1) Water Supply			
Water Demand (m^3/s)			
Domestic	0.068m^3/second	0.168 (135/day)	0.278 (160)
Commercial	0.008	0.279 (1.3 m^3/day)	0.374 (1.6)
Manufacturing	0.001	0.088 (4.5 m^3/day)	0.828 (6.0)
Agriculture	6,990	7,430	7,400
Total	6,977	7,965	9,102
(2) Power Supply			
Electrification Rate	43.8		
Infanta	47.1	100	100
Real	46.3		
Gen. Nakar	21.9		
Power Demand			
Domestic		5,200	12,300
Commercial		6,100	9,900
Manufacturing		12,000	27,800
Utility		1,000	3,000
Total	157.2 kwh/month	24,350 kw (32,500)	53,000 kw (70,500) peak factor 0.75
(3) Telephone			
Telephone Exchange	— Exchange	2	1 Central 3 Sub-exchange
(4) Sanitary Service			
Service Area	—	—	Infanta, Real Central and New Urban Area
System	—	—	Early Period: Centralized or Individual Septic tank. Latter Period: Separate Sewer
Treatment Volume (m^3/day)	—	—	10,000
6. Social Service			
(1) Education			
a. Elementary Education			
No. of Schools	22	9 (Total 31)	9 (Total 36)
b. Secondary Education			
No. of Schools	9	6 (Total 15)	3 (Total 18)
c. High Education			
No. of Schools		1 (college)	1 (university)
(2) Health and Medical Services			
BHS	8	9 (Total 17)	5 (Total 22)
RHU	3	—	—

Table 6.4.1 PLANNING TARGET OF SECTORAL DEVELOPMENT PLAN (4)

	1983	1992	2000
Hospital	1 (25 beds)	Expansion (100 beds)	(Total 4) Reg. hospital (250 beds)
Total			350 beds
(3) Culture, Administrative			
Library	—	—	3 1 central
Culture Center	—	—	1
Barangay District Center	—	14	7
Municipal Hall	3	—	4 new construction
Post Office	3	—	4 new construction (one central)
Fire Station	1	—	4 new construction (one headquarter)
Police Station	3	—	4 new construction (one headquarter)
Social Welfare Center	—	—	1
Administrative Center	—	—	1
(4) Other Community Facilities			
Municipal Park	2	1	3 (one regional) (total 4)
Barangay Playground	22	17	34
Sports Center	—	—	1
8. Land Use			
(1) Land Use			
Coconut	3,248.9 ha (21.3%)	—	1,265.0 ha (8.3%)
Mangrove	1,996.0 (13.1)	—	1,381.5 (9.0)
Nipa	589.0 (3.9)	—	—
Forest	4,279.7 (28.0)	—	—
Paddy	2,822.9 (18.5)	—	2,565.0 (16.8)
Swamp	395.9 (2.6)	—	—
Fish Pond	742.4 (4.9)	—	1,677.2 (11.0)
Other Crop	374.8 (2.5)	—	—
Residential	141.9 (0.9)	—	282.5 (1.9)
Commercial	—	—	173.7 (1.1)
Institutional (Regional Center)	—	—	199.1 (1.3)
Industry	—	—	88.0 (0.6)
Port and Resort Area	—	—	995.6 (6.5)
Green	—	—	2,949.6 (19.3)
Livestock	—	—	1,816.9 (18.5)
	675.7 (4.4)	—	87.5 (9.6)
Total	15,267.2 (100.0)	—	15,266.9 (100.0)
(2) Land Demand			
Residential	42.9 ha	302.5 ha	595.8 ha
Manufacturing	0.7	62.2	83.1
Commerce, Services	8.6	33.1	53.6
Institutional	12.7	108.2	234.8
Transport	11.3	86.8	148.8
Green, Vacant	12.0	121.0	328.2
Total	94.2	713.8	1,444.3

Table 6.4.1 PLANNING TARGET OF SECTORAL DEVELOPMENT PLAN (5)

	1983	1992	2000
8. Urban Development			
(1) Residential			
a. Population			
Infanta Central	3,994 Person (202 person/ha)	15,000 (200)	20,000 (200)
Real Central	7,671 (416)	10,000 (240)	10,000 (240)
G. Nakar Central	532 (145)	1,000 (150)	5,000 (150)
Regional Center	—	7,000 (80)	21,000 (80)
Distribution District	—	2,000 (240)	2,000 (240)
Urban Belt	—	20,000 (240)	36,000 (240)
Suburb	32,226	45,000	56,000
Total (Urban only)	12,197	55,000	94,000
b. Land Demand			
Infanta Central	46.8 ha	75.0	100.0
Real Central	35.6	41.7	41.7
Gen. Nakar Central	11.8	6.7	33.3
Regional Center		87.5	262.5
Distribution District		8.3	8.3
Urban Belt		83.3	150.0
total	94.2	302.5	595.8
(2) Manufacturing			
Workers	*350 Persons	2,317	5,985
Density (person/ha)		37	72
Land Demand (ha)	0.7	62.2	83.1
(3) Commerce Service			
Workers (person)	*3,850	4,380	7,110
Density (person/ha)		132	133
Land Demand (ha)	8.6	33.1	53.6

*Three Municipalities Total in 1983

Source: JICA Study Team

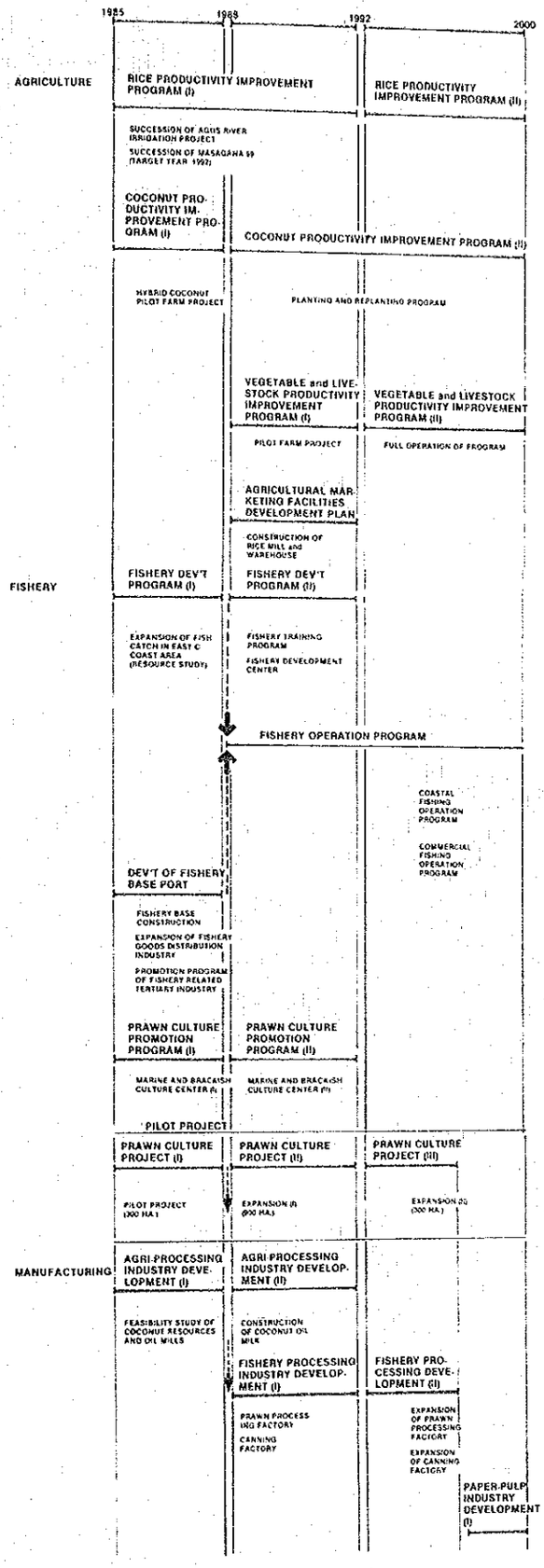


FIG. 6.4.2 PHASED DEVELOPMENT PLAN BY SECTOR (1)

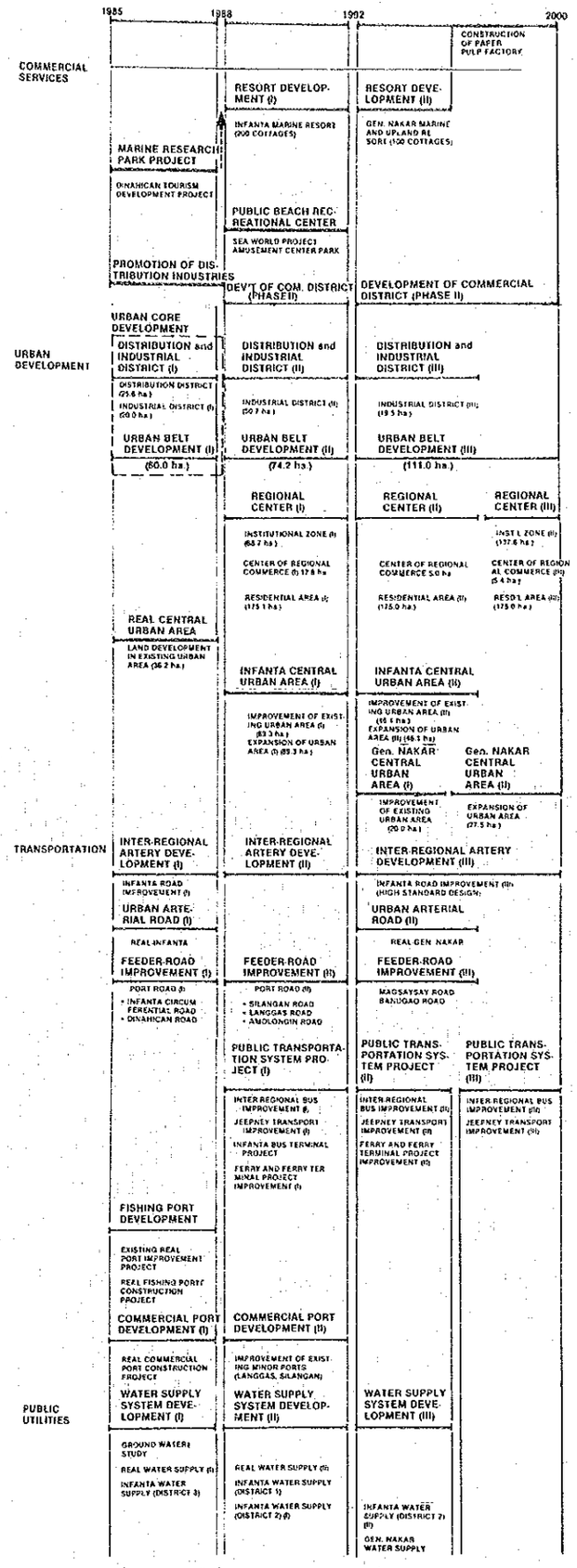


FIG. 6.4.2 PHASED DEVELOPMENT PLAN BY SECTOR (2)

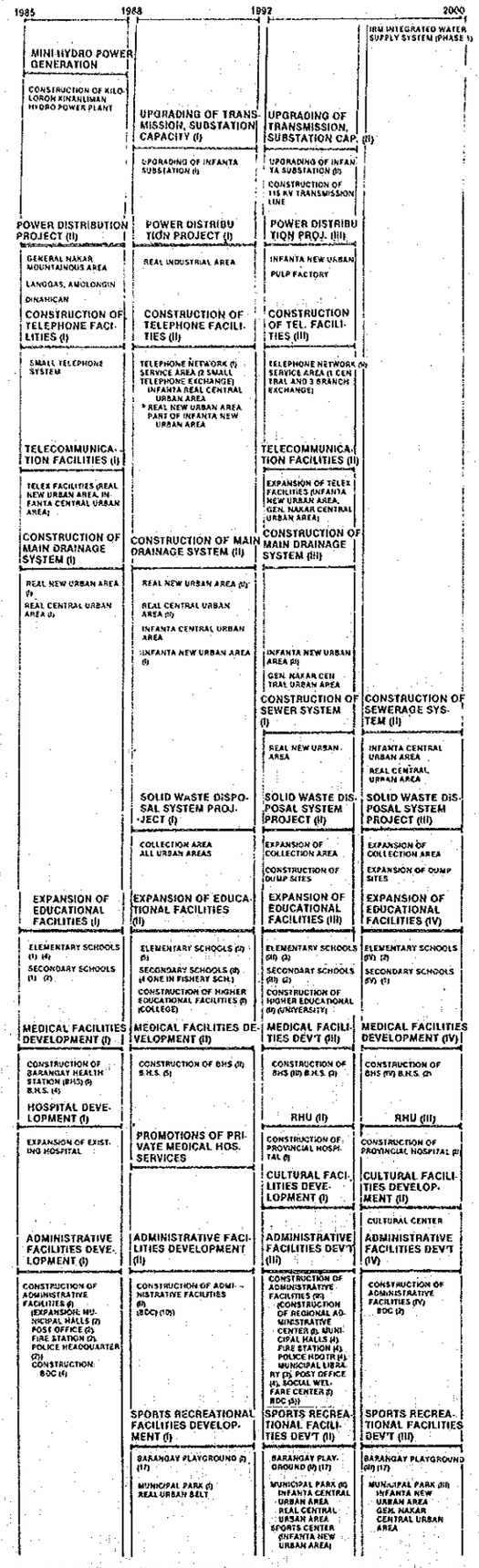


FIG. 6.4.2 PHASED DEVELOPMENT PLAN BY SECTOR (3)

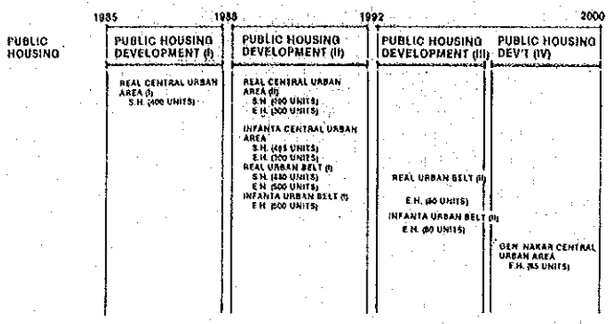


FIG. 6.4.2 PHASED DEVELOPMENT PLAN BY SECTOR (4)

6.5 Master Plan Proposals

Based on the framework of the structure plan on Chapter 5, a master plan of IRM urban development has been proposed elaborating and integrating the sector wise and sequential aspects of the development as seen in this chapter. As such, 124 development and improvement projects have been proposed as the structural elements of the said master plan as listed in Table 6.5.1. For project discription, see Table 6.5.2.

The master plan is outlined by Urban Development Plan, transportation plan, public utilities plan, and social service facilities development plan (Fig. 6.5.1 to 4).

The basic composition of the IRM development which embraces the above projects shall be as follows:

(i) Construction of an urban core based on port development shall be carried out;

(ii) A new urban core at the regional center shall be developed; and

(iii) Finally, on the center of this core urban area, the structure of an urban center with a population of 150,000 shall be established.

Table 6.5.1 NUMBER OF PROJECTS

Project	No. of Projects
A. Industrial Development Project	34
1. Agricultural Development	7
2. Fishery Development	12
3. Manufacturing Development	8
4. Commerce & Other Services Development	7
B. Social Development Project	31
1. Educational, Medical, Cultural Facilities	15
2. Administrative Facilities	4
3. Other Community Facilities & Housing	12
C. Urban Facilities Development Project	28
1. Power Supply	6
2. Water Supply	9
3. Drainage, Sewer	5
4. Others	8
D. Transportation Facilities Development Project	17
1. Road (Regional)	3
2. Road (I.R.M.)	5
3. Fishing Port	2
4. Commercial Port and Other Port	2
5. Others	5
E. Urban Development Project	14
1. Urban Land Development	14
Total	124

Source: JICA Study Team

Table 6.5.2 PROJECT DESCRIPTION (1)

No mark: Capital Inv. only
* : Capital Inv. & Operation Cost
° : Operation Cost only

Project Number	Title	Description	Possible Implementing Agency	Schedule	Cost (MP)
I. INDUSTRIAL DEVELOPMENT PROJECT					
(1) Agriculture					
101	Productivity Improvement Program (I)	A program which improves the rice productivity and cropping techniques in order to increase rice production. (Agricultural infrastructure is being developed by the Agos River Irrigation Project). An expansion of Masagana 99 Program.	MA, BAE, NIA	'85-'92	45.9*

Table 6.5.2 PROJECT DESCRIPTION (2)

Project Number	Title	Description	Possible Implementing Agency	Schedule	Cost (MP)
102	Productivity Improvement Program (II)	The second phase of Project 101	MA, BAE, NIA	'93-'99	38.7°
103	Coconut Productivity Improvement Program (I)	Promotion of hybrid coconut pilot farm and regional nursery program,	PCA	'85-'88	23.6*
104	Coconut Productivity Improvement Program (II)	Promotion of planting and replanting program and improvement of productivity.	PCA	'89-'99	4.9°
105	Vegetable and Livestock Productivity Improvement Program (I)	Promotion of pilot farm projects to increase vegetable and livestock production for the increasing areas urban population.	BAI, MA, BPI, KKK	'85-'92	20.0*
106	Vegetable and Livestock Productivity Improvement Program (II)	The second phase of Project 105. Expansion of vegetable and livestock production. The farm development shall be concentrated in General Nakar Area.	BAI, MA,	'93-'99	20.8
107	Agricultural Marketing Facilities Development	Development of marketing facilities as rice mill and storages related with promotion of agriculture.	NFA	'88-'89	7.2
(2) Fishery					
108	Expansion of Fish Catch in East Coast Area	Experimental fishing activities by the fishery development research boat and development of fishing grounds (research boats: 100 ton, 20 ton)	SEAFDEC, BFAR	'85-'87	5.1
109	Fishery Training Program	Construction of fishery training center to supply manpower for the fishery industry.	SEAFDEC, BFAR	'88-'99	3.8
110	Fishery Development Center	Construction in the Marine Research Park a comprehensive center to support fishery technology research upon the development of Real Port as a fishery base (tuna/bonito resource research institute, etc.)	SEAFDEC, BFAR	'87-'89	15.6
111	Development of Fishery Base Port	Introduction and fosteration of privately operated facilities (such as repair shop) needed for the fishing port.	Private	'87	186.0
112	Expansion of Fishery Goods Distribution Industry	Development of fishery products distribution channels upon the construction of a fish market.	Private	'87	28.5
113	Promotion Program of Fishery-Related Tertiary Industry	Promotion of fishery-related tertiary industry to be located in the port are to support the fishery development.	Private	'87	0.5°
114	Development of Fish Catch in East Coast Area	Increase of fish catch in the Pacific water by introduction of 5 ton boat (40) 3 ton boat (50) 40 ton boat (5).	Private (SEAFDEC, BFAR)	'88-'89	140.5
115	Marine and Brackish Culture Center (I)	A pilot project of prawn frys culture center.	SEAFDEC, BFAR	'86-'87	10.2
116	Marine and Brackish Culture Center (II)	Expansion of the center (60 10m×10m×2m hatching tanks) to support full scale prawn culture business.	Private (SEAFDEC, BFAR)	'88-'91	30.6
117	Prawn Culture Pilot Project	A pilot project of prawn in the swamp area (300 ha). Frys for culturing area to be supplied by the marine and brackish culture center.	Private (BFAR)	'85-'87	36.8
118	Prawn Culture Project (I)	A prawn culture project of 1,500 hectares (including the existing ponds) under cooperative system to supply raw materials for the prawn processing factory project. The project involves large-scale rearrangement of fishponds and channel improvement (Phase I: 900 ha).	Private (BFAR)	'88-'91	218.2
119	Prawn Culture Project (II)	Expansion of the cooperative production area to supply prawns for the prawn processing factory project (Phase II: 300 ha).	Private (BFAR)	'92-'96	72.7

Table 6.5.2 PROJECT DESCRIPTION (3)

Project Number	Title	Description	Possible Implementing Agency	Schedule	Cost (MP)
(3) Manufacturing and Forestry					
120	Forestry Development	Development of forest area (pilot farm: 70 ha) which supplies raw materials to the pulp and paper full-line factory by planting in General Nakar upland area (including construction of logging road).	BFD, FORI, MNR	'93-'95	0.5*
121	Development of Coconut Oil Mill	Feasibility study of coconut resources in East Coast Area.	PCA	'86-'87	7.7
122	Coconut Oil Mill Factory	Introduction of establishment of coconut oil extraction industry in accordance with the findings of the study under Project 121, and the construction of a coconut oil mill in agro-fishery processing area.	Private	'88-'89	82.8
123	Prawn Processing Factory (I)	Construction in the agro-fishery processing area, a factory for the processing of prawn cultivated in the swamp area.	Private	'88-'89	7.0
124	Prawn Processing Factory (II)	Expansion of the prawn processing factory in line with the development of prawn cultivation cooperative.	Private	'92-'94	1.8
125	Canning Factory (I)	Construction in the agro-fishery processing area of a cannery to process tuna, bonito, etc., catch in the east coast waters and landed at Real fishing port.	Private	'88-'89	40.2
126	Canning Factory (II)	Expansion of the cannery in accordance with the full-operation of the fishing port.	Private	'92-'94	10.0
127	Pulp-Paper, Fall-Line Factory	Commencement of construction of pulp-paper manufacturing factory at a suitable location along Agos River (First Phase).	Private	'96-'99	1210.0
(4) Commerce and Other Services					
128	Marine Research Park	Development of a park with academic and research facilities related to fishery and accommodations at Dinahican Point. (28.3 ha) (including Project No. 110).	Private (SEAFDEC, BFAR)	'85-'87	505.0
129	Public Beach Recreation Center	Construction of various facilities for marine recreation at a focal point of Infanta beach area (Abiawin), (46 ha).	Private	'88-'91	539.0
130	Infanta Marine Resort	Promotion of locating hotel industry along Infanta beach area.	Private	'89-'91	99.6
131	General Nakar Marine and Upland Resort	Construction of beach resort facilities in General Nakar beach area and construction of a resort area with a golf course, clubhouse, accommodations in the upland of General Nakar.	Private	'92-'95	462.0
132	Promotion of Distribution Industries	Promotion of distribution and wholesale industries in public markets area of Infanta.	MTI, BOI	'86-'87	40.0
133	Development of Commercial District (Phase I)	Development of commercial district in the regional center.	Municipality of Infanta	'88-'91	9.6
134	Development of Commercial District (Phase II)	Expansion of the commercial district of 133 and establishment of shopping center for the area's 150,000 population.	Municipality of Infanta	'92-'99	19.2
II. SOCIAL DEVELOPMENT PROJECTS					
(1) Education, Medical Care, Culture					
201	Expansion of Educational Facilities (I)	Construction of elementary and secondary schools in accordance with the growing population (elementary schools; 4, secondary schools; 2)	MEC, MPWH	'85-'87	1.9
202	Expansion of Educational Facilities (II)	Phase II of Project 201. (Elementary schools; 5, Secondary schools; 4 .	MEC, MPWH	'88-'91	2.9
203	Expansion of Educational Facilities (III)	Phase III of Project 201. (Elementary schools; 3, Secondary schools; 2)	MEC, MPWH	'92-'95	1.6

Table 6.5.2 PROJECT DESCRIPTION (4)

Project Number	Title	Description	Possible Implementing Agency	Schedule	Cost (MP)
204	Expansion of Educational Facilities (IV)	Phase IV of Project 201. (Elementary schools; 2, Secondary schools; 1).	MEC, MPWH	'96-'99	0.9
205	Construction of Higher Educational Facilities (I)	Construction of an agro-fishery college in the Regional Center.	MEC, MPWH	'90-'91	1.3
206	Construction of Higher Educational Facilities (II)	Construction of a university to provide with the opportunity of higher education in the IRM region. (15 ha, enrollment 10,000).	MEC, MPWH	'92-'94	0.6
207	Construction of Barangay Health Station (BHS) (I)	Construction of BHS in each barangay district (several barangays). (Phase I: 4 units)	MOH, MPWH	'85-'87	0.2
208	Construction of BHS (II)	Phase II of Project 207. (5 units)	MOH, MPWH	'88-'91	0.2
209	Construction of BHS (III)	Phase III of Project 207. (BHS; 3 units, RHU; 1 unit)	MOH, MPWH	'92-'95	0.3
210	Construction of BHS (IV)	Phase IV of Project 207. (2 units)	MOH, MPWH	'96-'99	0.1
211	Expansion of Existing Hospital	Expansion of Claro M. Recto Memorial Hospital (an addition of 100 beds) in the Infanta Poblacion.	MOH, MPWH	'86	15.0
212	Construction of Provincial Hospital (I)	Construction of a tertiary care provincial hospital in the Regional Center to serve the IRM Region (First Phase 4 ha) in the medical zone.	MOH, MPWH	'93-'95	7.5
213	Construction of Provincial Hospital (II)	Expansion of the provincial hospital in the Regional Center. (150 beds)	MOH, MPWH	'97-'99	15.0
214	Infanta Regional Library Project	Construction of a regional library in the Infanta new urban area (cultural zones) to service the IRM region.	MEC, National Historical Com. (NHC), National Library (NL)	'95	1.8
215	Cultural Center Project	Construction of a cultural center in the regional center (cultural zone) complex with assembly facility, theater, etc., to serve in IRM region.	MEC, NHC, NL	'97	1.8
(2) Administration					
216	Construction of Administrative Facilities (I)	Construction of various administrative facilities including barangay center. (Expansion of Municipal Halls; 2 Post Offices; 2 Fire Stations; 2 Police Headquarters; 2 and construction of Barangay District Center (BDC); 3.	Municipality of Infanta & Real (MPWH)	'85-'87	4.8
217	Construction of Administrative Facilities (II)	Phase II of Project 216 (BDC: 4)	Municipality of Infanta, Real, G. Nakar (MPWH)	'88-'91	0.1
218	Construction of Administrative Facilities (III)	Phase III of Project 216. Construction of various facilities. (Regional Administrative Center; 1, Municipal Halls; 4, Fire Stations; 4, Police Headquarters; 4, Library; 3, Post Offices; 4, Social Welfare Center; 1, BDC; 5.	Municipality of Infanta, Real, G. Nakar (MPWH)	'92-'95	18.9
219	Construction of Administrative Facilities (IV)	Phase IV of Project 216. (BDC; 3)	Municipality of Infanta, Real, G. Nakar	'96-'99	0.5
(3) Other Community and Housing					
220	Barangay Playground (BPG) and Municipal Park (I)	Construction of barangay playground in each barangay and of municipal park (BPG; 17, Municipal Park, Real New Urban Area).	Municipality of Infanta, Real, G. Nakar	'88-'91	2.2
221	Barangay Playground and Municipal Park (II)	Phase II of Project 220 (BPG; 17, Municipal Park, Infanta Real Poblacion)	Municipality of Infanta, Real	'92-'95	4.2
222	Barangay Playground and Municipal Park (III)	Phase III of Project 220. (BPG; 17, Municipal Park, Infanta New Urban Area, G. Nakar Poblacion).	Municipality of Infanta, Real, G. Nakar	'96-'99	6.2
223	Construction of Athletic Field Complex	Construction of athletic field complex in regional center.	Municipality of Infanta	'94-'95	2.9

Table 6.5.2 PROJECT DESCRIPTION (5)

Project Number	Title	Description	Possible Implementing Agency	Schedule	Cost (MP)
224	Housing Development in Real Built-up Area (I)	Construction of social housing in Real built-up area (S.H.: 400).	HSDC, NHA	'85-'88	27.0
225	Housing Development in Real Built-up Area (II)	Construction of social and economic housing in Real built-up area (S.H.: 490, E.H.: 500).	HSDC, NHA	'89-'92	123.3
226	Housing Development in Real New Urban Area (I)	Construction of social and economic housing in Real new urban area (E.H.: 80).	HSDC, NHA	'89-'92	180.0
227	Housing Development in Real New Urban Area (II)	Construction of economic housing in Real new urban area. (E.H.: 80)	HSDC, NHA	'93-'96	4.8
228	Housing Development in Infanta New Urban Area (I)	Construction of economic housing in Infanta new urban area (E.H.: 500).	HSDC, NHA	'89-'92	150.3
229	Housing Development in Infanta New Urban Area (II)	Construction of economic housing in Infanta new urban area (E.H.: 80).	HSDC, NHA	'93-'96	24.0
230	Housing Development in Infanta Built-up Area	Construction of social and economic housing in Infanta built-up area (S.H.: 495, E.H.: 300).	HSDC, NHA	'89-'92	123.7
231	Housing Development in General Nakar Built-up Area	Construction of economic housing in General Nakar built-up area.	HSDC, NHA	'97-'99	19.6
III. URBAN UTILITIES					
(1) Power					
301	Real Mini-Hydro Power Generation Project	Construction of a mini-hydro power generation plant utilizing the discharge of Kiloloron and Kinanliman Rivers located near the Poblacion, which shall be a possible water source for the future water supply.	NEA	'85-'87	86.7
302	Power Distribution Project (I)	Construction of power distribution lines in mountain area of General Nakar (7.62KV), in prawn culture area (13.2KV), in marine research park area (69KV) from Infanta substation.	NEA QUEZELCO II	'85-'86	5.2
303	Power Distribution Project (II)	Phase II of Project 302. Real industrial area (69KV & 20MVA substation).	NEA QUEZELCO II	'88-'89	7.0
304	Power Distribution Project (III)	Phase III of Project 302. Infanta new urban area (13.2KV), pulp factory (69KV).	NEA	'90-'91 '98-'99	2.3
305	Upgrading of Infanta Substation	Addition of 3 5MVA units and one (1) 20MVA unit to the substation.	NEA, QUEZELCO II	'88	12.5
306	High Voltage Transmission Line Project	Construction of a 115KV transmission line from Luzon Grid and reconstruction of Infanta substation to meet the increase power demand in year 2000.	NEA, QUEZELCO II NPC	'88-'91	225.6
(2) Water Supply					
307	Ground Water Study	Study for estimating available amount of ground water by conducting test boring, pump-test, etc.	LWUA, NWRC, MPWH	'85	7.7
308	Real Water Supply (I)	Construction of new water supply facilities for the Real fishing port and the processing zone. The sources are Kawayan and Balibaguhin Rivers (reservoir, treatment, distribution facilities).	LWUA, MPWH, Municipality of Real	'87	5.4
309	Real Water Supply (II)	The second phase of Project 308. Expansion of the system to supply water for the whole Real area. (Ground water source).	LWUA, MPWH, Municipality of Real	'90-'91	20.7
310	Infanta Water Supply (District 3)	Construction of water supply system to supply water mainly for marine research park area (Ground water source).	LWUA, MPWH, Municipality of Infanta	'86-'87	16.6
311	Infanta Water Supply (District 1)	Rehabilitation and expansion of the existing water supply system of Infanta (Ground water source).	LWUA, MPWH, Municipality of Infanta	'89-'91	8.0
312	Infanta Water Supply (District 2) (I)	Construction of water supply system for a part of Regional Center (Commercial & Residential area) (Ground water source).	LWUA, MPWH, Municipality of Infanta	'90-'91	8.6
313	Infanta Water Supply (District 2) (II)	Phase II of Project 312. Expansion of the system to supply water for the whole Infanta new urban area (Surface water source — Agos River).	LWUA, MPWH, Municipality of Infanta	'93-'95	18.6

Table 6.5.2 PROJECT DESCRIPTION (6)

Number	Title	Description	Possible Implementing Agency	Project Schedule	Cost (MP)
314	General Nakar Water Supply	Construction of water supply system for General Nakar (ground water source)	LWUA, MPWH, Municipality of G. Nakar	'94-'95	1.7
315	IRM Integrated Water Supply System (Phase I)	Phase I of constructing an integrated water supply for the whole IRM area by expanding intake, transmission, treatment facilities of the system of 313.	LWUA, MPWH, Municipality of Infanta, Real, G. Nakar	'97-'99	17.7
(3) Drainage and Sewer					
316	Construction of Main Drainage System (I)	Construction of main drainage channel in Real new urban area and Real built-up area.	MPWH	'86-'87	10.9
317	Construction of Main Drainage System (II)	Phase II of Project 316. Construction of main drainage channel in the Real new urban area, Real built-up area, Infanta built-up area, Infanta new urban area.	MPWH	'90-'91	54.5
318	Construction of Main Drainage System (III)	Construction of main drainage channel in the Infanta new urban area and General Nakar built-up area.	MPWH	'92-'95	50.0
319	Construction of Sewer System (I)	Construction of a closed separate sewer system for the Real new urban area and sewerage treatment plant.	MPWH	'93-'95	4.6
320	Construction of Sewerage System (II)	Construction of a closed-separate sewer system and sewerage treatment plant for the Real, Infanta built-up areas.	MPWH	'96-'99	6.3
(1) Others					
321	Telecommunication Facilities (I)	Construction of telex facilities in Real Port Area and Infanta built-up area	Private (MOTC)	'88	1.7
322	Telecommunication Facilities (II)	Construction of telex facilities in Infanta new urban area and General Nakar.	Private (MOTC)	'94	1.0
323	Construction of Telephone Facilities (I)	Construction of a small telephone system in the Real new urban area	PLDT (Private) (MOTC)	'86-'87	1.1
324	Construction of Telephone Facilities (II)	Expansion of the system of 323 and construction of telephone system for Infanta built-up area.	PLDT (Private) (MOTC)	'88-'91	38.8
325	Construction of Telephone Facilities (III)	Construction of main telephone exchange in Infanta new urban area and small telephone system in General Nakar for the integrated telephone system serving the whole IRM area.	PLDT (Private) (MOTC)	'92-'95	74.4
326	Solid Waste Disposal System Project (I)	Establishment of solid waste disposal system utilizing the existing dump sites.	Municipality of Infanta, Real, G. Nakar	'89-'91	0.8
327	Solid Waste Disposal System Project (II)	Expansion of collection area and construction of dump site for each municipality (Infanta, Real, G. Nakar)	Municipality of Infanta, Real, G. Nakar (MPWH)	'92-'93	2.1
328	Solid Waste Disposal System Project (III)	Phase III of Project 326. Expansion of the system of 327.	Municipality of Infanta, Real G. Nakar (MPWH)	'96-'99	5.2
IV. TRANSPORTATION FACILITIES IMPROVEMENT PROJECTS					
(1) Road (Regional)					
401	Infanta Road Improvement(I)	Widening of about 4 kilometers of the narrow section (cutting part) in the mountain along the Tignoan River near Binangonan Point.	MPWH (PEO)	'85-'87	164.4
402	Infanta Road Improvement(II)	Widening Infanta Road succeeding Project 401 Drainage, illumination (partial section) facilities improvement.	MPWH (PEO)	'88-'91	29.0
403	Infanta Road Improvement (III)	Alignment, improvement between Famy and Lumber Camp. (2-lane asphalt road completed for all sections of Infanta Road).	MPWH	'92-'99	27.5

Table 6.5.2 PROJECT DESCRIPTION (7)

Project Number	Title	Description	Possible Implementing Agency	Schedule	Cost (MP)
(2) Road (IRM)					
404	Urban Arterial Road (I)	Road improvement including drainage and lighting facilities and bus stops of about 11 kilometers between Infanta and Real built-up area.	MPWH (PEO)	'86-'87	69.0
405	Urban Arterial Road (II)	Construction of urban arterial road connecting Infanta new urban area with General Nakar built-up area (11.5 kilometers including construction of Agos River bridge and river enbankment) and construction of road between Agos River and Infanta built-up area.	MPWH (PEO)	'92-'95	90.7
406	Feeder Road Improvement (I)	Construction of access road from Infanta Road to Real Port area and industrial area and improvement of road from Infanta built-up area to Dinahican Point (9 km including the circumferential road).	PEO (MPWH)	'86-'87	79.6
407	Feeder Road Improvement (II)	Construction of access road from Infanta Road to Real new urban area and of feeder road to Silangan, Langgas and Amolongin.	PEO (MPWH)	'89-'91	44.4
408	Feeder Road Improvement (III)	Construction of road network in Infanta new urban area and General Nakar built-up area and resort area (3 km).	PEO (MPWH)	'92-'93	96.3
(3) Fishing Port					
409	Existing Real Port Improvement Project	Improvement and expansion of existing 26 wharves (wharf, landing area) for fishing activities in short term.	MPWH, PPA, PEDA, BFAR	'85	2.3
410	Real Fishing Port Construction Project	Construction of new fishing port (reclamation of 12.5 hectares swamp area, construction of 500 meter wharf, dredging of 17.5 hectares (-5.5m), realignment of creeks, construction of a 500 meter breakwater, landing yard and stockpile yard).	MPWH, PPA, PFDA, BFAR	'85-'87	309.8
(4) Commercial Port					
411	Real Commercial Port Construction Project	Construction of a 250 meter wharf on the fishing port (construction of landing yard, stockpile yard, reclamation of 6.25 hectares swamp area, dredging).	MPWH, PPA MOTC	'85-'87	60.2
412	Improvement of Existing Minor Ports	Improvement of existing Langgas and Silangan Ports with construction of 30 meter wharf, landing yard and stockpile yard.	PPA, MPWH, PEO	'88-'89	0.6
(5) Others					
413	Public Transportation System Project (I)	Expansion of public transportation system (bus, jeepney) for development of road and industry.	Private	'88-'91	19.3
414	Public Transportation System Project (II)	The second phase of Project 413	Private	'92-'95	15.2
415	Public Transportation System Project (III)	The third phase of Project 413	Private	'96-'99	15.2
416	Infanta Bus Terminal Project	Transfer of existing Infanta bus terminal location to the outlying area upon the redevelopment of existing Poblacion areas (15 berths and service facilities)	Private	'90-'91	1.5
417	Ferry and Ferry Terminal Project	Improvement of ferry service and construction of ferry terminal and bus terminal (ferry; 1 berth, 5 bus berths, and other facilities).	Private	'90-'91	7.3
V. URBAN DEVELOPMENT PROJECTS					
501	Distribution and Industrial District Development Project (I)	In conjunction with development of fishery/ commercial ports in Real, sites are prepared for distribution activities (Development area; 46 ha).	MA, HSRC MTI	'85-'87	220.7

Table 6.5.2 PROJECT DESCRIPTION (8)

Project Number	Title	Description	Possible Implementing Agency	Schedule	Cost (MP)
502	Distribution and Industrial District Development Project (II)	The second phase of Project 501. (Development area: 51 ha)	MA, HSRC MTI	'88-'91	245.4
503	Distribution and Industrial District (III)	The third phase of Project 501 (Development area: 20 ha)	MA, HSRC	'92-'95	94.4
504	Urban Belt Development Project (I)	Residential area along Infanta Road (Social/ economic housing) is developed to provide housing lot for the industrial/commercial and fishery workers' families (Development area: 60 ha)	HSRC, BI, HSDC	'85-'87	182.4
505	Urban Belt Development Project (II)	The second phase of Project 504. (Development area: 74 ha)	HSRC, BI, HSDC	'88-'92	225.6
506	Urban Belt Development Project (III)	The third phase of Project 504. (Development area: 111 ha)	HSRC, BI, HSDC	'93-'99	337.4
507	Regional Center Development Project (I)	Land development of Infanta new urban area (Institutional area, commercial center area, residential area = 262 ha)	HSRC, BI, HSDC	'88-'91	701.1
508	Regional Center Development Project (II)	The second phase of Project 507. (Development area: 180 ha)	HSRC, BI, HSDC	'92-'94	486.4
509	Regional Center Development Project (III)	The third phase of Project 507. (Development area: 318 ha)	HSRC, BI, HSDC	'96-'99	804.5
510	Expansion Project of the Real Central Urban Area	The built-up area of Real is moderately expanded in the planned manner to avoid disordered urban sprawl (Expansion area: 36 ha)	HSRC, BI, HSDC	'85-'87	139.0
511	Expansion Project of the Infanta Central Urban Area (I)	The built-up area of the Infanta is moderately expanded in the planned manner to avoid disordered urban sprawl (Expansion area: 89 ha)	HSRC, BI, HSDC	'88-'91	342.9
512	Expansion Project of the Infanta Central Urban Area (II)	The second phase of Project 511. (Expansion area: 46 ha)	HSRC, BI, HSDC	'92-'95	177.0
513	Expansion Project of the General Nakar Urban Area (I)	The built-up area of the General Nakar is moderately expanded in the planned manner to avoid disordered urban sprawl (Expansion area: 20 ha)	HSRC, BI, HSDC	'92-'95	56.8
514	Expansion Project of the General Nakar Urban Area (II)	The second phase of Project 513. (Expansion area: 28 ha)	HSRC, BI, HSDC	'96-'99	78.1

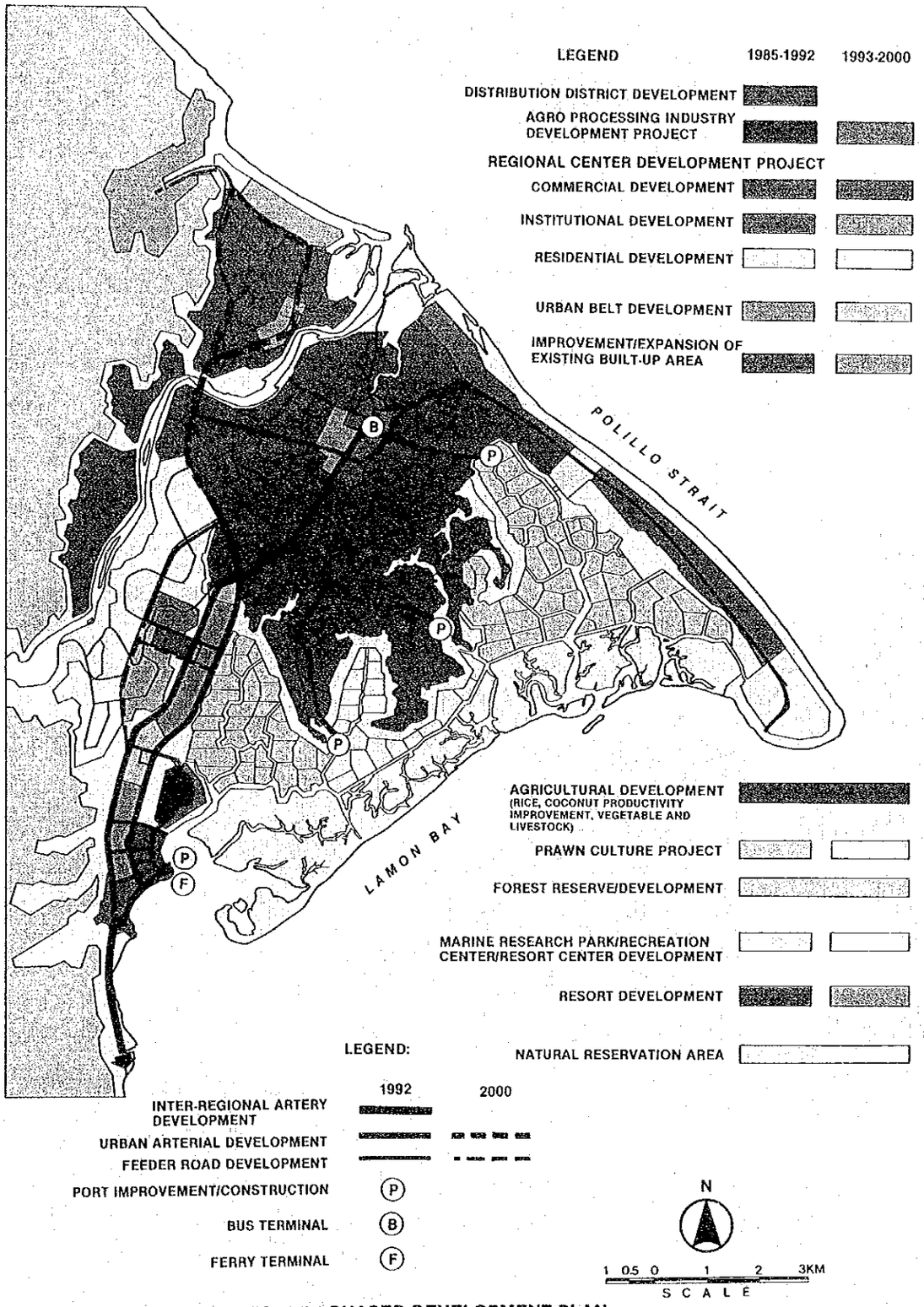


FIG. 6.5.1 PHASED DEVELOPMENT PLAN

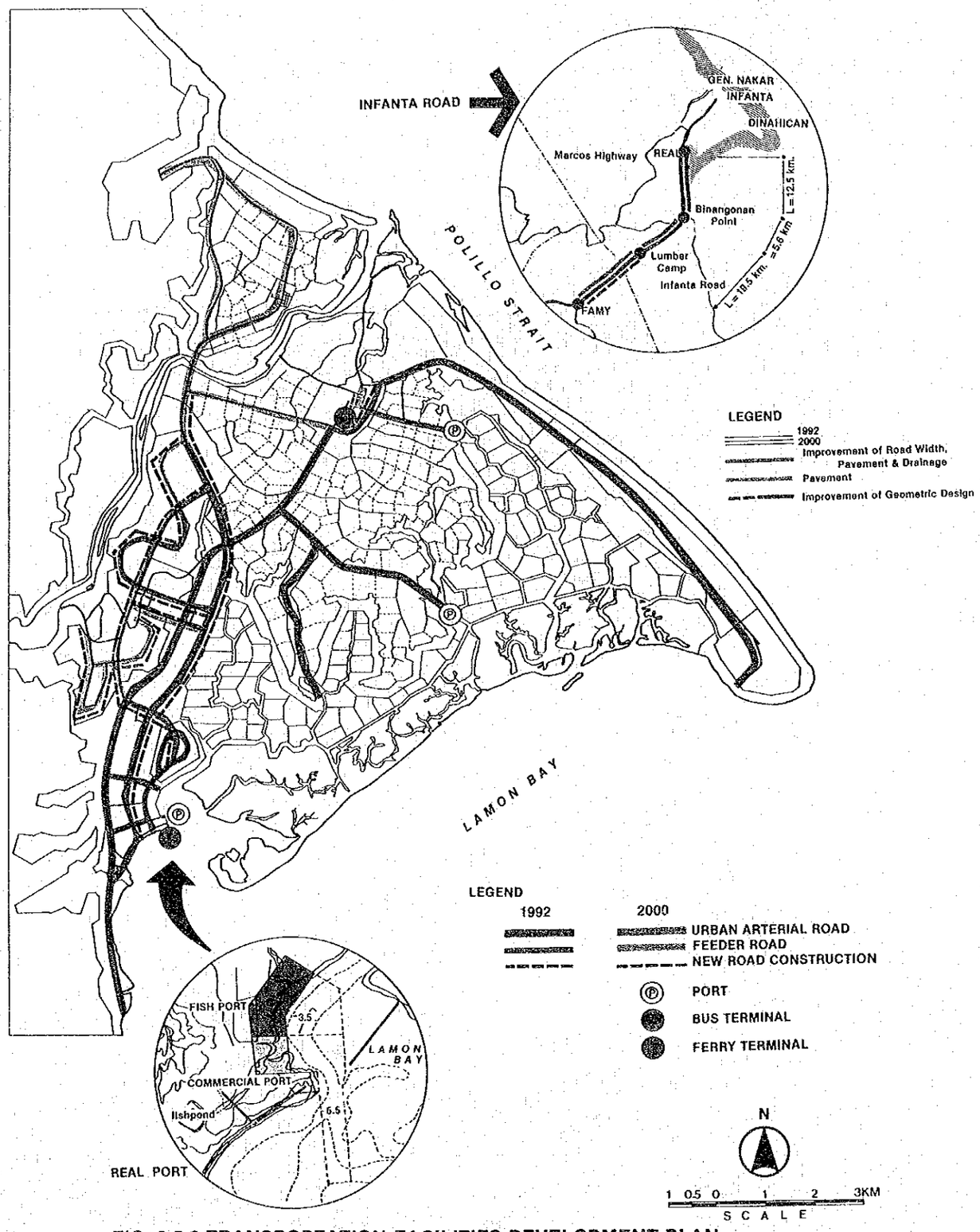


FIG. 6.5.2 TRANSPORTATION FACILITIES DEVELOPMENT PLAN

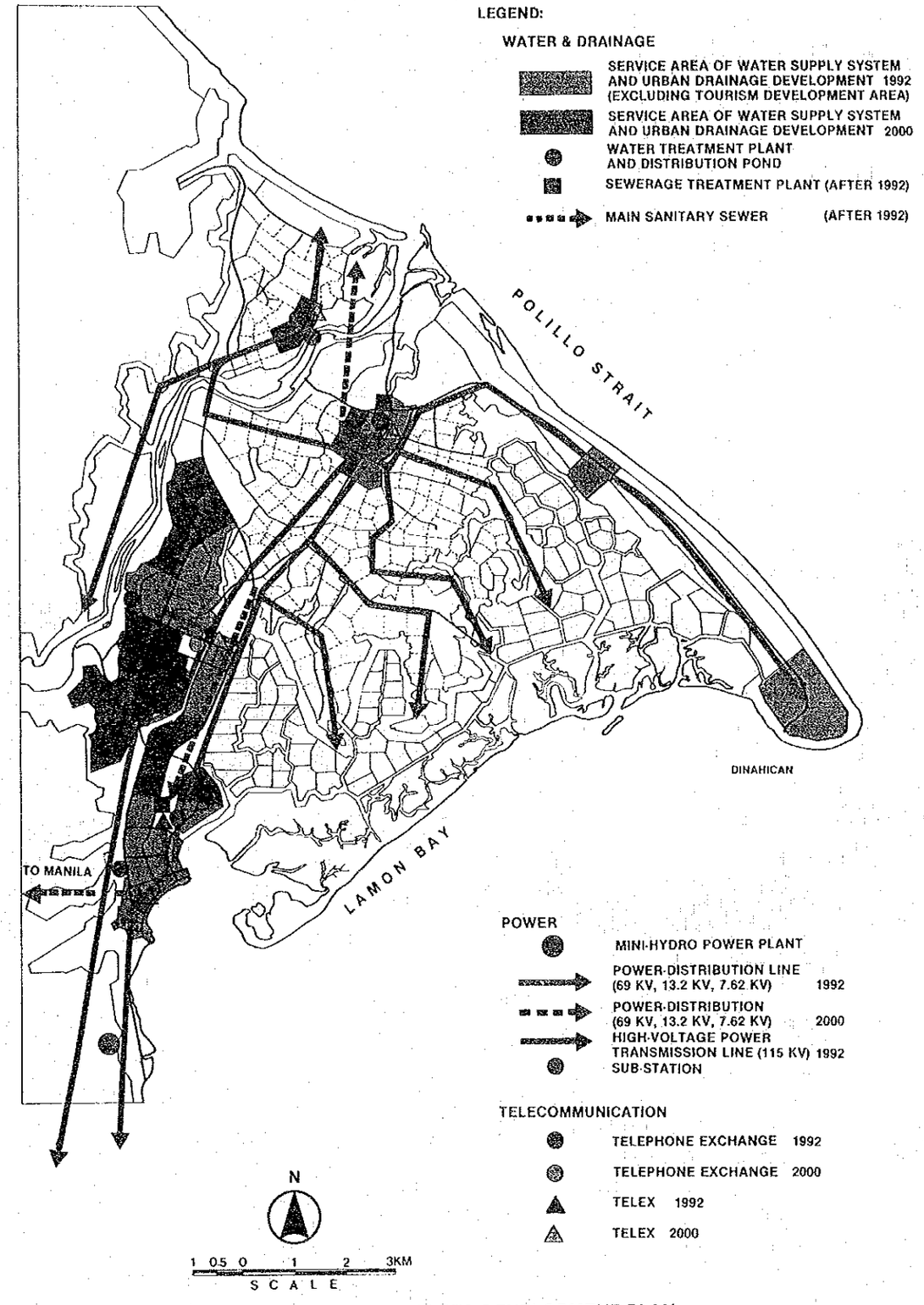


FIG. 6.5.3 PUBLIC UTILITIES DEVELOPMENT PLAN

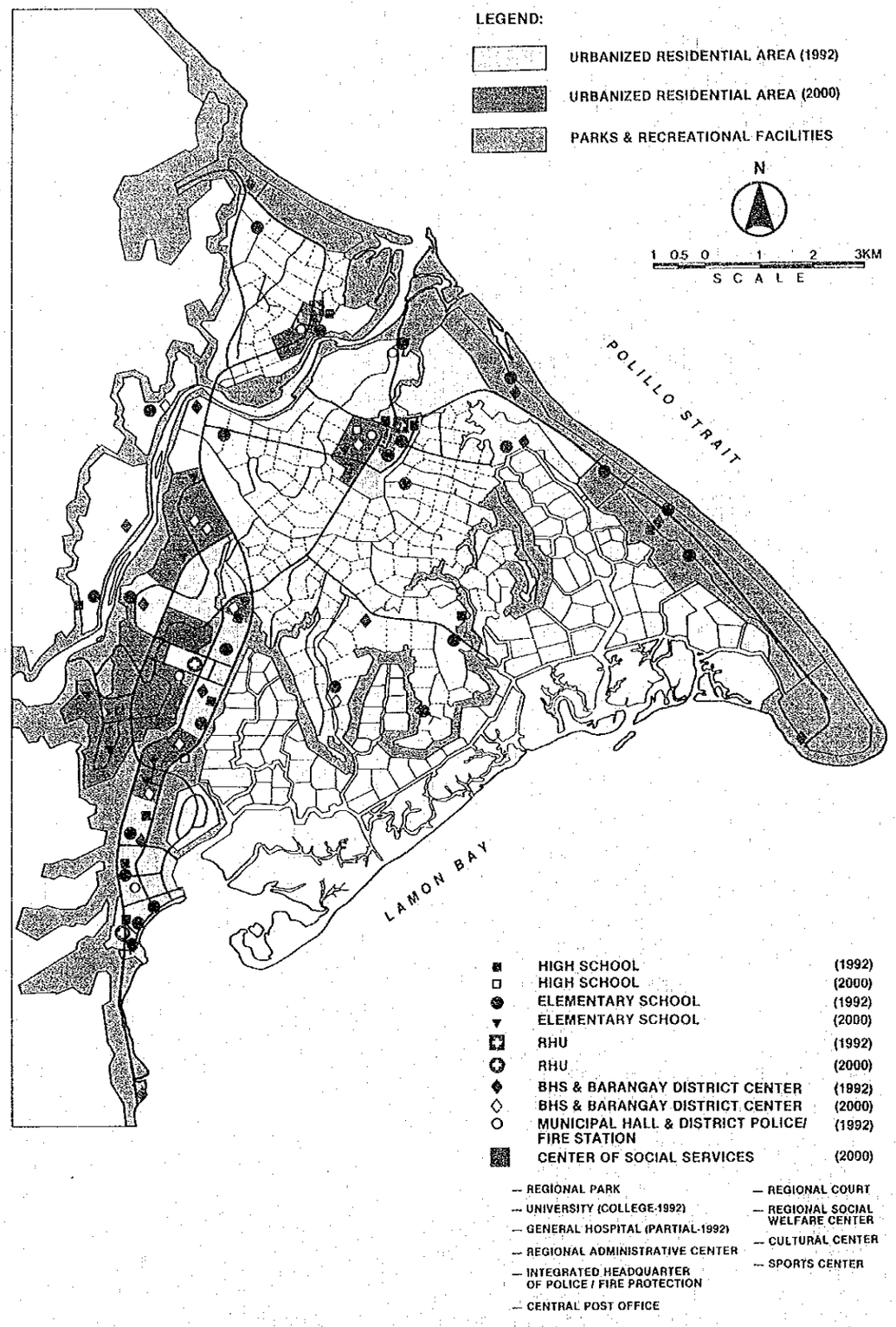


FIG. 6.5.4 SOCIAL SERVICES FACILITIES

6.6 City Planning System in IRM Urban Development

In the Philippines, local governments are required to submit their existing land use plans, zoning ordinances, enforcement systems and procedures to the Ministry of Human Settlements (MHS) for review and ratification. Then, MHS shall issue the translation of approved land use plans and zoning implementing guidelines into official zoning maps and regulations which shall be printed and posted before the public. The approved land use plans and the implementation guidelines shall be officially implemented through the issuance by the Ministry of Development Permits.

However, for special or critical areas such as designated urban land reform zones and Bagong Lipunan Sites, the MHS shall recommend for the President's approval appropriate land use and zoning implementing guidelines, land resource management mechanism, and techniques such as joint ventures, expropriation, and land readjustment.

The following authority for planning and implementation has been vested on HSDC (PD No. 1396):

(i) Prepare and implement development and/or renewal project plans;

(ii) Administer, operate and/or manage estates of New-town projects;

(iii) Provide or operate utilities services;

(iv) Engage in real property management (acquire, purchase, mortgage, manage, dispose and pre-exempt);

(v) Engage in the transfer of property right;

(vi) Construct or cause to be constructed, acquire, own, lease, operate and maintain infrastructure facilities, housing units, factory, buildings, utilities, and services;

(vii) Fix, assess, and collect charges and fees including rentals for the lease, use or occupancy of lands, buildings, structures, and all the facilities owned and administered by the Corporation.

(viii) Recommend to the President the transfer to the Corporation of all foreclosed properties held by government agencies;

(ix) Issue bonds or constract loans, credits or indebtedness (domestic or foreign) - government guarantee; and

(x) Prescribe its by-laws, adopt, alter, and use a corporate seal, make contracts, lease, own or otherwise dispose of personal and real property.

This special area Bagong Lipunan site is designated by the Office of the President. The first site designated as such is Lungsod Silangan Townsites which shall be scheduled to include IRM in the future.

Accordingly, HSDC is expected to become the implementing agency which (the Corporation itself or its subsidiary organization) shall carry out the projects in coordination with other related agencies (national and/or local government).

In the Philippines, 80% of urban land development (subdivision) are done by the private sector and the government controls the development by development and land use regulations.

However, in order to achieve the proposed land use plan of IRM, not only shall the private sector participation be induced and controlled but also direct participation and initiation of the public sector shall be required in urban land development further explained as follows:

(i) In the area along Infanta Road where location is preferrable and land development cost is low, private industry and other establishments shall expectedly concentrate. But disorderly high density land use of residence, industry, warehouses, etc., can be foreseen. Therefore, more urban land shall be created in order to avoid aggravation of urban environment by developing distribution and industrial districts although its land development cost shall be higher due to reclamation.

As such, development of the distribution and industrial district which shall contribute to alleviating negative environmental impact and help to allocate more residential land along Infanta Road cannot be made possible only by private sector participation. Thus, public initiation shall be needed.

Realization of the proposed land use shall be done by a combination of regulation and direct participation of public sector as described above.

(ii) In general, the private sector is reluctant to be involved in subdivision development unless considerable demand for such shall be made available. Therefore, as in the case of new urban development like the IRM development, the direct participation of the public sector in land development seems necessary during the early stages, and after the urban development takes-off, private sector participation can be included.

Concluding from the above discussion, construction of the Urban Core during the initial stages should be carried out through publicly initiated urban land development projects.

Although majority of publicly initiated urban land developments are done by expropriation in the Philippines, alternative method of urban land development such as development through land owner participation shall be examined for the IRM development.

Urban land development in the Philippines is controlled and regulated, as mentioned before, by such regulation systems as Development Permits and Locational Clearances, Zoning Ordinances, and Subdivision and Condominium Regulations. The same systems shall be adopted in IRM, however, the following points should be kept in mind:

(a) Expansion of Urban Area by Stage
(Urbanization During the Next Decade)

Urbanization area shall be clearly delineated and outside of which no urban land development shall be permitted. This area is so delineated as to accommodate the land demand and urbanization up to only the next decade. After ten (10) years, this area shall be expanded to conform to the master plan at the year 2000.

Thus, when the masterplan is translated into an official zoning map, only the urban land demand up to 1992 at 713.8 ha, shall be designated.

If possible, zoning shall be limited to only areas where implementation of planned urban land development is proven feasible (public and/or private sectors).

This shall avoid the urban land development without adequate infrastructure and by developing by phase, the efficiency of facility provision shall increase and sporadic distribution of urban land can be avoided, thus, creating a continuance of efficient urban land development.

(b) Zoning Designation in Accordance with Detailed Land Use Plan

The proposed land use of master plan only indicates dominant use of land and accommodation capacity of each district. Accordingly, when translated into an official zoning map, detailed conditions of each district (topography, land ownership, etc.) should be examined in order to formulate development plan of each district. Based on this breakdown of land uses, detailed zoning shall be designated.

(c) From Compound Land Use to Specialized Land Use

During the early stages of IRM development, mixed land uses which are conflicting and adjacent each other shall be experienced due to urban land development of a restricted and compact nature.

Therefore, relatively lax regulations shall be applied in terms of land use zoning. This may be applied to the existing built-up area where land use is mixed at present, and to the urban core which shall intensively be accommodating various functions during the early period. Specialized land use shall gradually be achieved at the later stage of the urban development.

Thus, in the urban areas with mixed land uses, a land use plan and zoning designation should be carried out after making proper adjustment among the different uses of land based on elaboration on detailed land use plan.

7

EVALUATION

7.1 An Overall Evaluation

The master plan has proposed a total of 124 projects. This impact exerted by these projects is evaluated as a whole in this section.

A model for socio-economic structure analysis has been designed and constructed to achieve the quantitative measurement of dynamic changes in IRM as a consequence of the implementation of these projects. It is also used to obtain a financial internal rate of return on the basis of analyzing the balance between the investment and cost recovery foctors (tax revenue) by systems dynamics simulation. This enables an evaluation of the following:

(i) Future development forecast;

(ii) Testing of an appropriateness of future socio-economic frameworks, as defined; and

(iii) Measurement of project implementation effects.

The model covers the entire planning area of IRM and the projection period from the years 1984 to 2000.

7.1.1 Model Structure

The model consists of four (4) sectors: Population Sector, Industrial Sector, Project Sector, and Financial Sector

The inter-relation among these sectors is shown in Fig. 7.1.1, and flow diagrams of each sector are shown in Figs. 7.1.2 to 7.1.5.

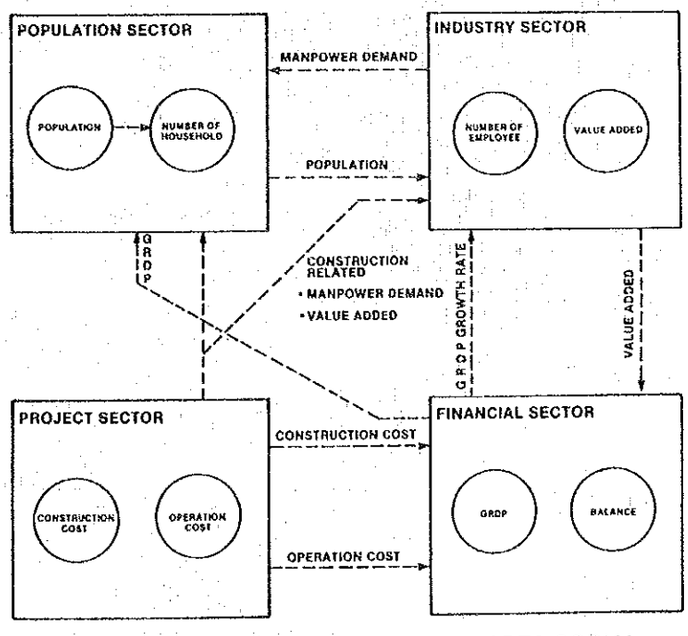


FIG. 7.1.1 BASIC STRUCTURE OF I.R.M AREA SOCIAL STRUCTURE MODEL

Population Section (See Fig. 7.1.2)

The population sector consists of projections of population and number of households by year. For each succeeding year, population is estimated by adding or subtracting from the annual population, both natural increase and decrease (using NCSO estimated birth rate and mortality up to the year 2000), and social increase and decrease (by a mechanism using multipliers as a function of attractiveness designated by the increase of employment opportunities and by comparison of per capita GRDP with other areas).

The number of households is obtained by dividing population by the average family size of the respective years.

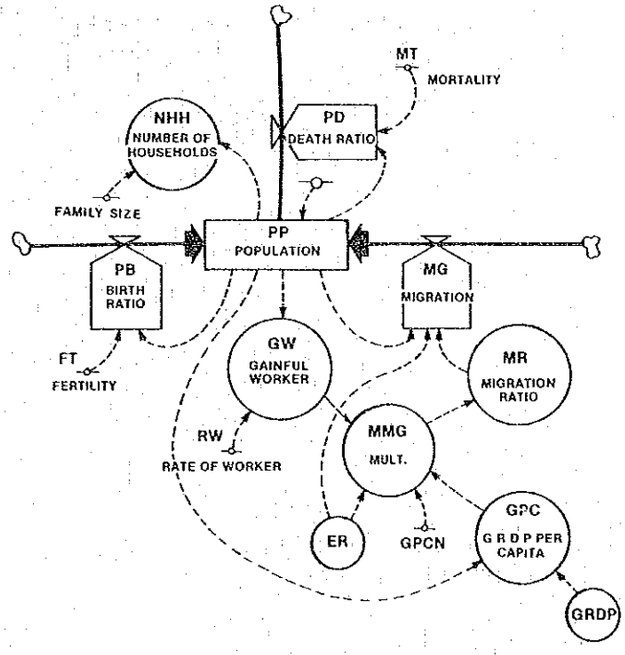


FIG. 7.1.2 ILLUSTRATION OF POPULATION SECTOR MECHANISM

Industrial Sector (See Fig. 7.1.3)

Industrial sector consists of five (5) sub-sectors: crops, livestock, and poultry; fishery and forestry; manufacturing; non-basic industry; and tourism. Of these, those which pertain to the subject projects are postulated while others are estimated on the following assumptions:

(i) That existing manufacturing industry production shall increase in proportion to the previous year's population increase;

(ii) That non-basic industry production shall increase in proportion to the previous year's GRDP increase; and

(iii) That tourism shall induce tertiary industrial activities in proportion to the number of visitors.

• CROPS, LIVE STOCK & POULTRY

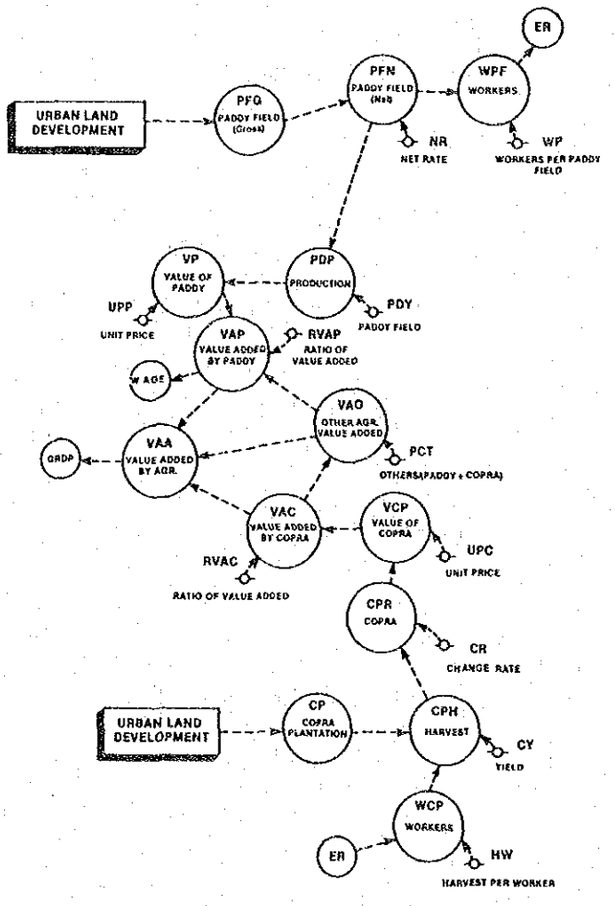
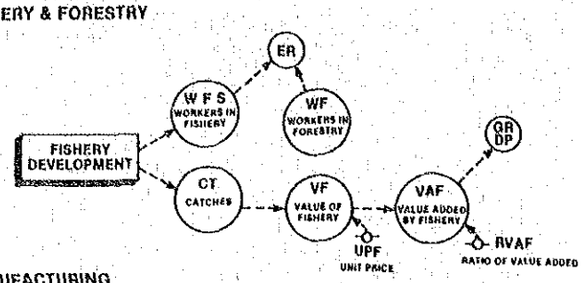
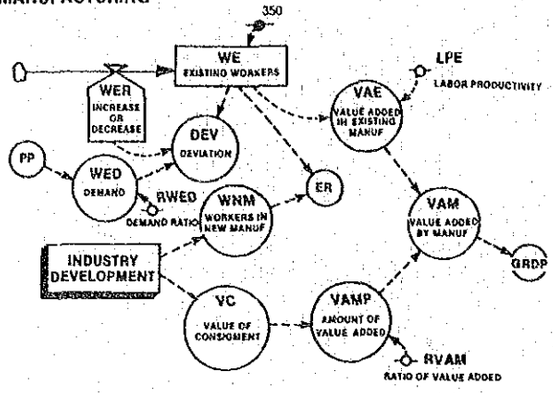


FIG. 7.1.3 ILLUSTRATION OF INDUSTRIAL SECTOR MECHANISM (1)

• FISHERY & FORESTRY



• MANUFACTURING



• NON-BASIC INDUSTRIAL SECTOR

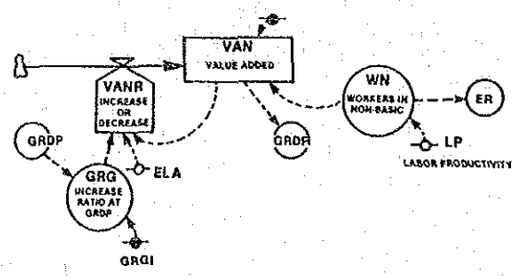


FIG. 7.1.3 ILLUSTRATION OF INDUSTRIAL SECTOR MECHANISM (2)

• TOURISM

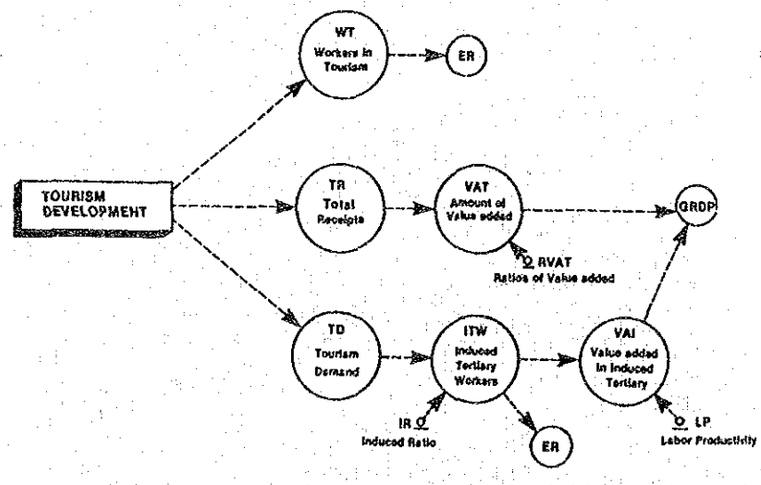


FIG. 7.1.3 ILLUSTRATION OF INDUSTRIAL SECTOR MECHANISM (3)

Project Sector (See Fig. 7.1.4)

Yearly labor demand and value added by industrial sectors are estimated taking into consideration the effects of project implementation upon the construction sector, related tertiary sector, and labor market.

Financial Sector (See Fig. 7.1.5)

The Financial Sector consists of computations on GRDP and public financial balance. GRDP is calculated as the total of value added by all industrial sectors each year. In calculating the annual receipts and disbursements, and cumulative revenues and expenditures of the government, the cost is understood as the total of construction cost and maintenance cost, while the revenue is conceived as the total of tax and non-tax revenues. The income tax revenue is estimated using a ratio of its share against GRDP and total revenue is estimated based on value of income tax.

Excluded from the above calculation are the public enterprises which charge fees (tolls, charges, etc.) because disregarding such enterprises does not affect the estimation result in any way, inasmuch as such enterprises are designed to break even.

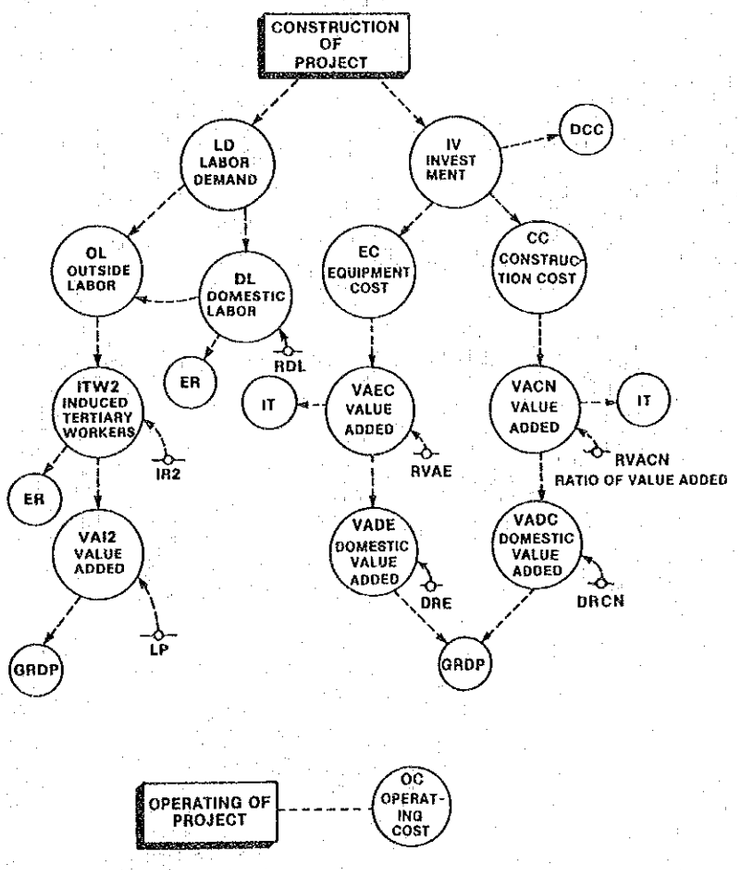


FIG. 7.1.4 ILLUSTRATION OF PROJECT SECTOR MECHANISM

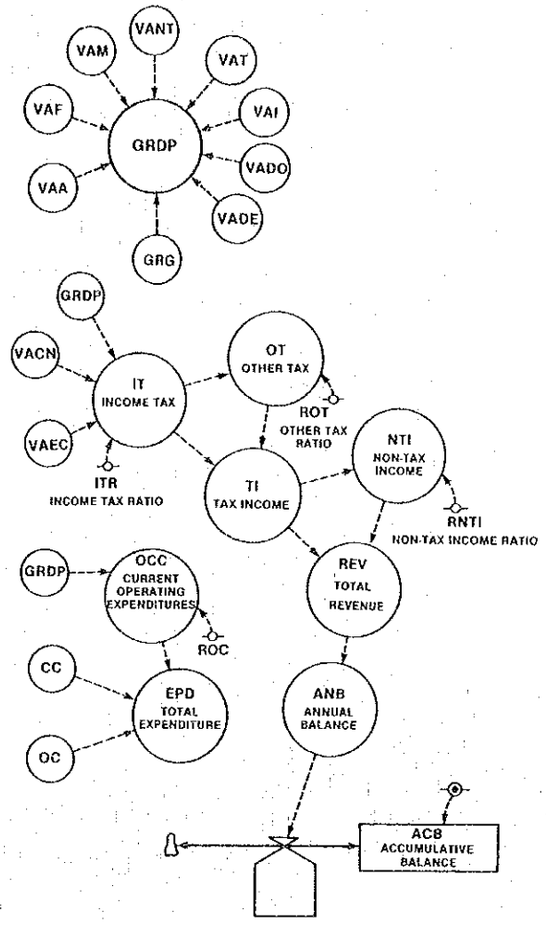


FIG. 7.1.5 ILLUSTRATION OF FINANCIAL SECTOR MECHANISM

7.1.2 Coefficients and Initial Values

Major coefficients and initial values used in this model are tabulated in Table 7.1.1.

Table 7.1.1 COEFFICIENTS AND INITIAL VALUES (1)

Name of Coefficient	Value	Remarks
(1) Population Sector		
1) Birth Rate (PB) Death Rate (PD)	(%) 1980 / 1990 / 2000 Birth Rate: 3.511 / 2.560 / 1.830 Death Rate: 0.788 / 0.652 / 0.609	Based on the NCSO Projections for Region IV.
2) Ratio of Employed Persons to Total Population (RW)	(%) Ratio of Employed Persons 1983: 26.1 1992: 28.7 2000: 30.0	Obtained by applying the worker ratio (defined as the fixed ratio of employed persons to population of 15 years old and over; 42.9%) to the ratio of population of 15 years old and over to total population, which is projected to rise gradually from 60.9% to 70% in 2000.
3) Migration Multiplier (MMG)	$\frac{\text{Labor Demand}}{\text{Number of Employed persons}} \times \frac{\text{GRDP per capita}}{\text{GRDP per capita of Region IV} \times 0.318}$	The GRDP per capita of Region IV is estimated assuming that the growth up to 1987 under the 10-year Plan for Region IV shall continue until 2000. The value 0.318 is the coefficient which makes the value of migration multiplier 1.0 when the ratio of labor demands to number of employed persons is 1.0.
4) Migration Rate (MR)	1.5 x MMG - 3 (MMG < 1.0) 8.25 x MMG - 9.75 (1.0 ≦ MMG < 3.0) 15 (3.0 ≧ MMG)	
(2) Industrial Sector Agriculture Sub-Sector		
1) Paddy Field Area (PFG) Coconut Plantation Area (CP)	(ha) 1983 / 1992 / 2000 Paddy Field: 2,819 / 2,682 / 2,565 Coco Plantation: 3,250 / 2,629 / 2,178	6.1.2 Land Use Plan
2) Net Paddy Cultivation Rate (NR)	(%) 1983: 80.8 1992: 87.0 2000: 92.0	6.1.2. Land Use Plan
3) Paddy Farmers per Unit of Land (WP)	Paddy Farmers per Unit of Land / Annual Growth Rate 1983: 2.02 person/ha / 1.9 % 1992: 2.39 2000: 2.15 / -1.25	The average number of paddy farmers per unit is estimated to increase at a rate of 1.9% per annum up to 1992 as a result of farmer increase by rice cultivation intensification, and thereafter to decrease at an annual rate of 1.25% because of the rapid advancement of mechanization.
4) Palay Yield per Unit of Land (PDY)	(kg/ha) 1983: 2,375 1992: 4,950 2000: 10,000	6.2 Industrial Promotion and Development Plan

Table 7.1.1 COEFFICIENTS AND INITIAL VALUES (2)

Name of Coefficient	Value	Remarks
5) Unit Producer Price of Palay (UPP)	2,028 Pesos/ton (at 1984 price)	Obtained from the value and quantity of palay production in Region IV given in the Philippine Year Book 1983.
6) Coconut Yield per Unit of Land (CY)	(nuts/ha) 1983: 4,387 — 1992: 6,806 — 2000: 10,055	6.2 Industrial Promotion and Development Plan
7) Coconut Production Per Worker (HW)	(1000 nuts/person) 1983: 15.31 — 1992: 17.45 — 2000: 19.35	The 10-year Plan (Region IV) estimates a 1.14 times improvement in labor productivity in the agricultural sector from 1983 to 1987. In view of the backwardness of IRM, it is estimated that this improvement shall be achieved by 1992, rather than by 1987. Then the improvement is predicted to continue at the same pace after 1992.
8) Coconut-Copra Conversion Ratio (CR)	4.5 coconuts = 1 kg	
9) Unit Producer Price of Coconut (UPC)	2,125 Pesos/ton	Obtained from the value and quantity of coconut production given in the Philippine Yearbook, 1983.
10) Agricultural Value Added Ratio (VAA)	0.826	Estimated on the basis of the input-output table in the 1983 Philippine Statistical Yearbook.
11) Ratio of Miscellaneous Agricultural GRDP to GRDP from Palay and Coconut (PCT)	1.8	Estimated on the basis of present estimate of GRDP
Fishery and Forestry Sector		
1) Fishermen Population (WFS)	1983: Commercial Fishing 1,230 — 1992: Municipal Fishing 1,562; Fishponds 1,440; Total 1,230 + 3,002 — 2000: Municipal Fishing 1,720; Fishponds 3,000; Total 4,720	6.2 Industrial Promotion and Development Plan
2) Fish Land (CT)	(ton) 1983 / 1992 / 2000 Municipal Fishing: 5,150 / 7,470 / 9,040 Commercial Fishing: 0 / 2,800 / 3,500 Fishpond (Prawn): 30 / 2,400 / 5,000	6.2 Industrial Promotion and Development Plan
3) Fishery Product Unit Price (at 1984) (UPF)	(pesos/kg) Municipal Fishing: 11.58 Commercial Fishing: 14.52 Fishponds (prawn): 100.00	Obtained from the value and quantity of fishery production given in the Philippine Yearbook, 1983, for municipal and commercial fishing, and by interview survey for prawn culture.
4) Fishery Value Added Ratio (RVAF)	0.868	Estimated on the basis of the input-output table in the 1983 Philippine Statistical Yearbook.
5) Forestry Workers (WF)	(person) 1983: 17 — 1992: 137 — 2000: 137	6.2 Industrial Promotion and Development Plan

Table 7.1.1 COEFFICIENTS AND INITIAL VALUES (3)

Name of Coefficient	Value	Remarks
Manufacturing Sub-Sector		
1) Population Dependent Industrial Workers Ratio to Population (RWED)	6.3 (workers per population of 1000)	The present ratio in IRM is assumed to to remain unchanged.
2) Labor Productivity (LPE)	(persons/1000 pesos) 1983: 0.0138 — 1992: 0.0138 — 2000: 0.0109	The long term prospect given in the 10-year Plan for Region IV envisages almost constant level of manufacturing labor productivity until 1987. For the present purpose, such productivity is estimated to remain constant until 1992 and be improved at a rate of 3% annually thereafter.
3) Development Projects: Workers (WNM), Shipment Value (VC) and Value Added Ratio (RVAM)	(person, million pesos)	The number of workers and the value of shipment are based on 6.2 Industrial Promotion and Development Plan. The value added ratio is obtained from the input-output table in the 1983 Philippine Statistical Yearbook.
	Coconut Oil Extraction: Workers 250, Shipment Value 296.8, Value Added Ratio 0.371	
	Cannery: Workers 1,800, Shipment Value 342.7, Value Added Ratio 0.254	
	Refrigeration: Workers 170, Shipment Value 119.5, Value Added Ratio 0.254	
	Prawn Processing: Workers 150, Shipment Value 215.5, Value Added Ratio 0.254	
	Paper & Pulp: Workers 2,600, Shipment Value 453.5, Value Added Ratio 0.371	
Non-Basic Industry Sub-Sector		
1) Ratio of GRDP in 1983 to that in 1982 (GRGI)	1.079	Obtained by multiplying the average annual ratio of GRDP growth to the average annual ratio of population growth in the 10-year Plan for Region IV to that of the population growth for IRM between 1982 and 1983.
2) Ratio of Sectoral Value Added Growth to GRDP Growth to (ELA)	Construction: 1.044 Others: 0.993	Obtained from the GRDP and sectoral value added given in the 10-year Plan for Region IV.
3) Labor Productivity (LP)	(persons/1000 pesos) Utility, Construction: 1983 1.043, 1992 0.695, 2000 0.528 Commercial, Financing: 1983 0.031, 1992 0.019, 2000 0.015 Transport, Communication: 1983 0.053, 1992 0.033, 2000 0.035 Service: 1983 0.310, 1992 0.194, 2000 0.146	The increases in labor productivity projected until 1987 in the 10-year Plan for Region IV is assumed to be achieved by 1992 in IRM, rather than by 1987, and shall continue at the same pace thereafter.
Tourism Sub-Sector		
1) Workers (WT), Revenue (TR) and Demand (TD)	1992: Workers (person) 800; Revenue (million pesos) 153; Demand (1,000 visitors) 117 2000: Workers (person) 1,000; Revenue (million pesos) 191.2; Demand (1,000 visitors) 146	6.2 Industrial Promotion and Development Plan

Table 7.1.1 COEFFICIENTS AND INITIAL VALUES(4)

Name of Coefficient	Value	Remarks
2) Tertiary Industry Induction Ratio (IR)	4 persons per 1,000 visitors	The number of staying tourists (4 days stay average) and that of day tourists are projected at 53 thousand and 93 thousand, respectively. Assuming that every tourist spends 20 pesos a day, the annual total revenue can be expected to reach 6.1 million pesos. Average per capita sale of tourism workers is estimated at 10 thousand pesos annually. Thus, the number of tourism workers are predicted to be at about 600. It means that 4 tourism workers are required for every 1000 tourists.
(3) Project Sector		
1) Value Added Ratios to Construction and Equipment Value (RVAC, RVAE)	0.578, 0.371	Estimated on the basis of the input-output table in the 1983 Philippine Statistical Yearbook.
2) Local Procurement Ratios (DRCN, DRE)	50% of employment engaged in the project construction are procured inside IRM	
(4) Financial Sub-Sector		
1) Income Tax Ratio (ITR)	2.66% of GRDP	The average ratio of income tax revenue to GDP of the Philippines between 1975 and 1980.
2) Miscellaneous Tax Ratio (ROT), Non-Tax Revenue Ratio (RNTI)	ROT: 2.2 to income tax revenue RNTI: 0.154 to total tax revenue	Both as the averages of yearly ratios from 1975 through 1980.
3) Current Operating Cost (OCC)	Personnel expenses plus maintenance expenses	The personnel expenses are expected to increase in proportion to the population growth and the yearly maintenance expenses are estimated at 5% of the accumulated amount of project investments. The initial value of the current expenditure is estimated at 8.17%, of which 55% is for personnel and 45% for maintenance, based on the average of such yearly rate for the entire Republic from 1971 through 1981.

Source: JICA Study Team

7.1.3 Project Schedules

In order to structure and run the model, a tentative project implementation schedule has been determined. The project implementation schedule broken down by project and year is shown in Fig. 7.1.6.

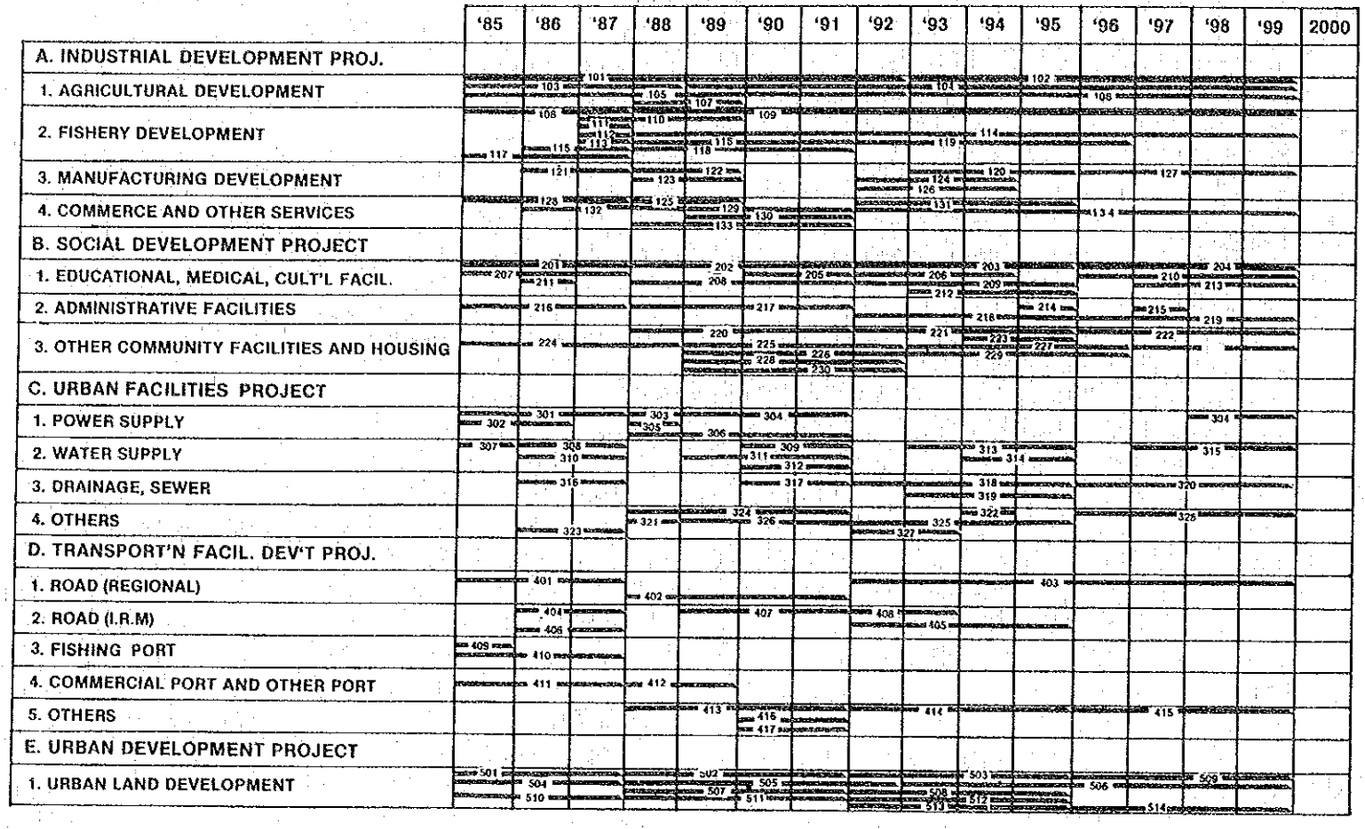


FIG. 7.1.6 PROJECT SCHEDULE

7.1.4 Estimation Result

Base Case

1) Population (See Tables 7.1.2 and Fig. 7.1.7)

As estimated, population shall swell from 44,000 in 1983 and 96,000 by 1992 to 158,000 by 2000 meeting the estimated population frameworks of 100,000 and 150,000 of its respective years. Cumulative natural increase and social increase from 1983 to 1992 is estimated at 11,000 persons and 40,000 persons respectively, while the same figures from 1983 to 2000 are 15,000 for natural increase and 47,000 for social increase. Immigration shall continue steadily while investments shall be active during project implementation until 1993. But as the investments shall subsequently wane, population influx shall gradually diminish.

Net natural increase shall grow gradually, the total population increase being offset by lowering birth and mortality rates (birth rate shall decrease at a greater pace). The increment of natural increase in each year, the difference between the number of births and deaths, shall maintain its level throughout the planning period at the range of 1000 persons/year to 2000 persons/year.

Accordingly, the future population increase in the area shall be affected to a large extent by the increment of social increase. A very high population growth rate of more than 104 shall be indicated during the first half of the planning period (1987-1994) in which very active project investments shall be carried out.

Table 7.1.2 POPULATION, HOUSEHOLD, NUMBER OF WORKERS AND GRDP

Year	Population	Household	Number of Workers				Gross Regional Domestic Product				
			Primary	Secondary	Tertiary	Total	Primary	Secondary	Tertiary	Total	Per Capita
1983	44,423	7,862	6,779	1,016	3,786	11,582	95,314	26,001	50,116	171,431	3,859
1984	44,847	7,994	6,953	1,049	3,903	11,905	100,073	26,049	53,967	180,089	4,016
1985	45,228	8,120	7,073	6,275	3,979	17,327	104,373	52,586	59,059	216,019	4,776
1986	47,765	8,622	7,191	10,452	4,700	22,343	108,541	73,413	88,317	270,270	5,658
1987	52,607	9,565	7,445	11,310	5,752	24,507	130,392	78,170	124,165	332,728	6,325
1988	58,279	10,674	7,740	10,596	6,834	25,170	159,627	78,646	161,999	400,272	6,868
1989	63,887	11,787	8,146	13,269	7,873	29,287	178,783	133,273	203,774	515,829	8,074
1990	71,833	13,352	8,595	14,141	9,582	32,318	263,113	202,023	259,151	724,287	10,083
1991	82,828	15,511	9,088	15,446	12,543	36,987	288,725	271,705	344,596	905,025	10,927
1992	95,545	17,993	9,741	16,968	14,534	41,243	392,409	287,361	421,561	1101,331	11,527
1993	109,087	20,700	9,972	16,167	17,055	43,194	476,439	335,923	487,658	1300,019	11,917
1994	121,794	23,288	10,227	16,061	19,536	45,824	509,059	349,855	552,026	1410,940	11,585
1995	132,679	25,564	10,489	16,010	20,158	46,656	541,519	365,569	591,075	1498,162	11,292
1996	141,116	27,401	10,634	14,842	20,578	46,055	573,998	375,060	622,259	1571,317	11,135
1997	147,122	28,791	10,750	15,235	20,698	46,683	606,494	392,437	650,578	1649,510	11,212
1998	151,834	29,888	10,868	15,261	21,089	47,219	638,973	407,234	677,830	1724,037	11,355
1999	155,441	30,841	10,979	14,742	20,998	46,720	671,300	418,240	706,030	1795,570	11,551

Source: JICA Study Team

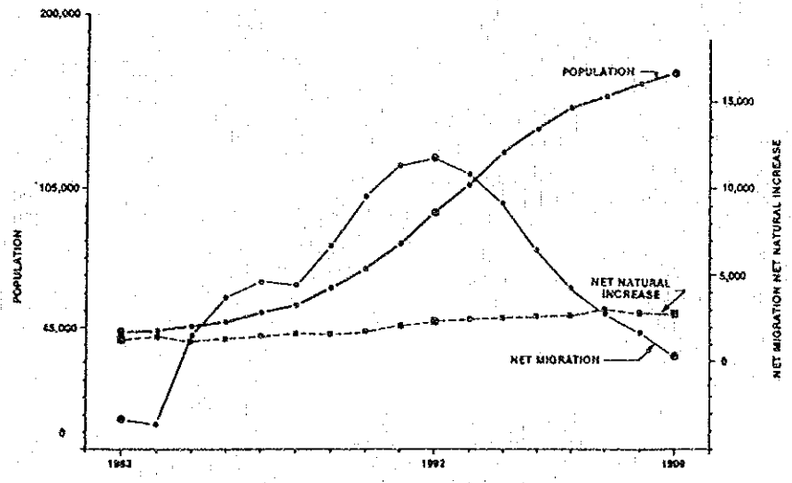


FIG. 7.1.7 POPULATION, NET MIGRATION & NET NATURAL INCREASE

2) Working Population (See Tables 7.1.2 and Fig. 7.1.8)

Working population in the primary sector shall gradually increase from 6,800 to 9,700 by 1992, but after which its growth shall level off considerably. This is due to the fact that the productivity of the primary industry shall exceed the labor productivity, thus, causing the increase of its working population during the early stages of development. Therefore, an equilibrium between the growth of industrial productivity and improvement of labor productivity shall maintain their respective working populations at a steady level.

The number of workers in the secondary industrial sector which shall be largely affected by the presence of construction workers during project implementation, is estimated to swell from 1,000 in 1983 to 17,000 in 1992, and then decrease to 10,600 by 2000 when all the projects shall be completed.

Working population of the tertiary industrial sector shall increase smoothly by 1994, and then level off due to the relative improvement of labor productivity.

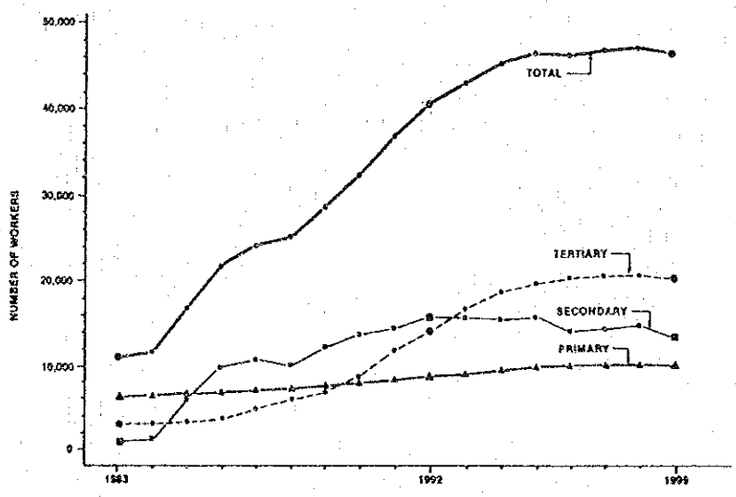


FIG. 7.1.8 NUMBER OF WORKERS BY THREE INDUSTRY GROUP

Table 7.1.3 shows the estimated working population by sector in each year and its industrial composition. It indicates that the composition shall shift from the present rural type with a 60% share of primary industrial workers to an urban type structure in the future with an increased ratio of the secondary and tertiary industrial workers.

Table 7.1.3 FUTURE NUMBER OF WORKERS IN INDUSTRIAL SECTOR

Unit: (person; %)

	1983		1992		2000	
Primary Industry	6,779	(58.5)	9,741	(33.0)	11,086	(26.1)
Agriculture	5,332	(47.8)	6,602	(22.4)	6,229	(14.7)
Fishery	1,230	(10.6)	3,002	(10.2)	4,720	(11.1)
Forestry	17	(0.1)	137	(0.5)	137	(0.3)
Secondary Industry	1,016	(8.8)	5,219	(17.7)	10,620	(25.0)
Manufacturing	350	(3.0)	2,452	(8.3)	6,019	(14.2)
Construction, Utilities	666	(5.8)	2,767	(9.4)	4,601	(10.8)
Tertiary Industry	3,786	(32.7)	14,535	(49.3)	20,787	(48.9)
Commerce, Financing	902	(7.8)	3,651	(12.4)	5,020	(11.8)
Transportation, Communication	749	(6.5)	2,609	(8.8)	3,859	(9.1)
Services	2,135	(18.4)	8,275	(28.1)	11,908	(28.0)
Total	11,581	(100.0)	29,495	(100.0)	42,493	(100.0)

Source: JICA Study Team

Note: Workers in Secondary Industry do not include project construction workers

3) GRDP (See Table 7.1.2 and Fig 7.1.9)

GRDP of IRM shall grow from 171 million pesos in 1983 to 1,101 million pesos in 1992, and finally to 1,998 million pesos in 2000.

GRDP per capita shall reach 11,900 pesos in 1993 level off for a short period and then shall begin its growth again to reach 12,700 pesos in 2000.

This implies that the rate of population growth shall catch up with the rate of GRDP growth in 1993 and indicates the drastic growth of GRDP in the period before 1993.

The share of the tertiary industry in the GRDP shall become the largest among other industrial sectors in 1988. Thus, the tertiary industry shall turn into a leading sector as the area becomes urbanized.

4) Impact of Project Construction on GRDP

(See Table 7.1.4 and Fig. 7.1.10)

The project construction activities shall vitalize the local industry of IRM. Consequently, the model considers such aspects as increase of employment opportunity, increase of GRDP, and induced increase of tertiary industrial workers from the project constructions.

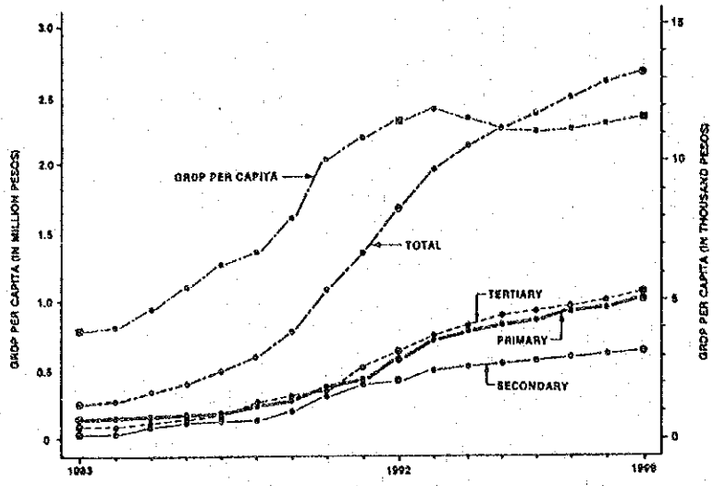


FIG. 7.1.9 GROSS REGIONAL DOMESTIC PRODUCT BY INDUSTRIAL ORIGIN

Table 7.1.4 INPACT ON GRDP BY PROJECT CONSTRUCTION

(in thousand pesos)

Year	(A) Labor Demand	(B) Investment	(C) Domestic Value Added	(D) GRDP	(E) (C)/(D)
1985	8,681	444,800	28,782	216,019	0.133
1986	15,445	774,900	51,373	270,270	0.190
1987	16,556	796,300	55,255	332,728	0.166
1988	14,978	823,500	50,175	400,272	0.125
1989	18,456	989,700	62,338	515,829	0.121
1990	18,369	974,300	62,334	724,287	0.086
1991	18,117	958,900	62,138	905,025	0.069
1992	19,582	955,100	67,576	1,101,331	0.061
1993	17,114	837,700	59,059	1,300,019	0.045
1994	15,814	782,100	54,572	1,410,940	0.039
1995	15,091	747,500	52,429	1,498,162	0.035
1996	12,650	758,200	44,281	1,571,317	0.028
1997	12,934	769,900	45,655	1,649,510	0.028
1998	12,627	757,500	44,572	1,724,037	0.026
1999	11,455	704,800	40,817	1,795,570	0.023

Source: JICA Study Team

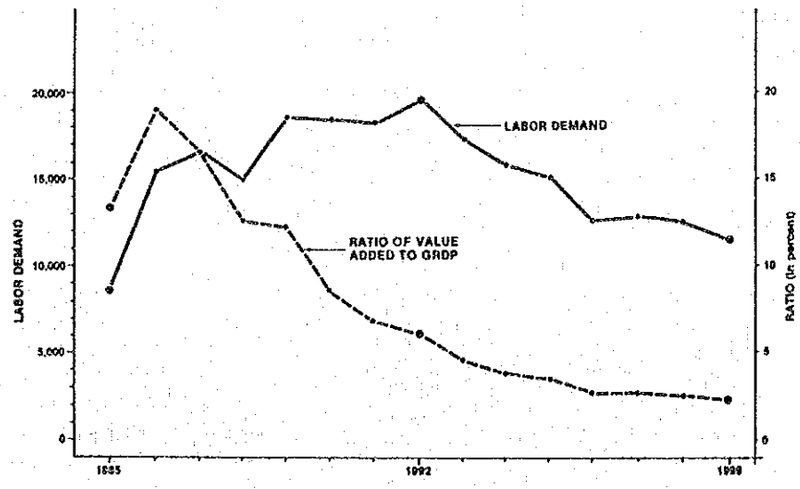


FIG. 7.1.10 IMPACT ON GRDP BY PROJECT CONSTRUCTION

Annual increment of GRDP caused by project constructions shall be around 29 to 68 million pesos, and its ratio in GRDP shall grow up to 19% in 1986 gradually decreasing thereafter.

As illustrated in Fig. 7.1.4, although the annual increment of GRDP caused by the project constructions shall maintain the same level throughout the planning period, its impact shall be greater during the early period because GRDP shall then be relatively small.

This indicates that at the early stages, the project construction activity shall contribute more to the vitalization of local economy than does the implementation and operation of the projects, thus, playing an important role in the take-off of the IRM economy. In this sense, the actual impact of project construction activities on GRDP growth shall be considered greater than what the figure indicates.

5) Finance (See Table 7.1.5 and Fig. 7.1.11)

A deficit annual balance shall be experienced during the first three (3) years. However, the balance shall turn to profit affecting cumulative deficits. Thus, a surplus balance shall result in the fifteenth year. An overall financial internal rate of return shall be at 20.5%, assuming an inflation rate of 15%.

Therefore, the resulting analysis proves that the implementation of the master plan shall be able to achieve a satisfactory public financial balance. However, the following conditions shall have to be considered:

The model excludes from its financial analysis such publicity dependent projects which shall base its operations on collections, charges, rentals, etc., assuming the operation of these projects shall financially break even. If some of the projects were proven financially difficult, a subsidy must be introduced.

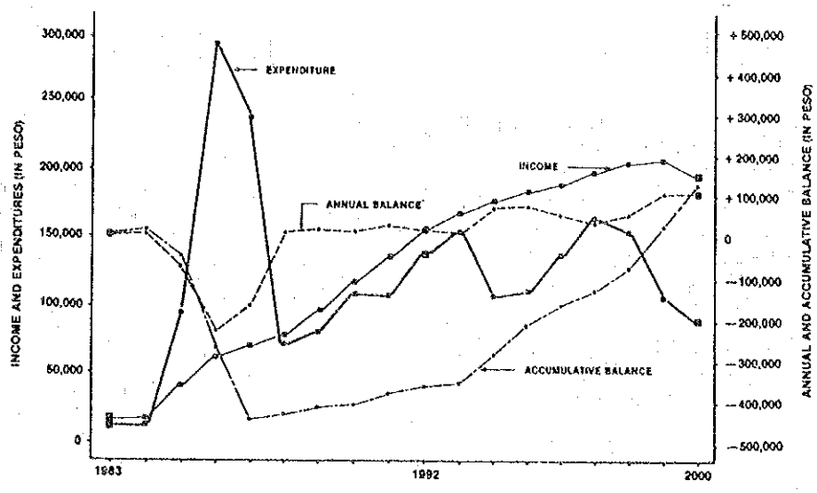


FIG. 7.1.11 PUBLIC INCOME AND EXPENDITURES

Projects excluded from the financial analysis are indicated in Table 7.1.6, the major ones are public utilities service projects (power, water, and sewer), urban land development projects, and the port development project. Financial analysis of these projects shall be necessary to confirm their financial feasibility and sound operation as a publicly financed project.

Table 7.1.5 PUBLIC INCOME AND EXPENDITURE

(in thousand pesos)

Year	Income Tax	Other Taxes	Non-Tax Income	Total Income	Expenditure	Annual Balance	Accumulative Bal.
1983	4,560	10,032	2,247	16,839	14,000	2,839	2,839
1984	4,790	10,539	2,361	17,690	14,100	3,590	6,429
1985	11,524	25,353	5,679	42,556	95,300	— 52,744	— 46,315
1986	17,307	38,074	8,529	63,910	291,900	—227,990	—274,305
1987	19,357	42,585	9,539	71,480	238,000	—166,520	—440,825
1988	21,170	46,573	10,432	78,175	72,000	6,175	—434,650
1989	26,440	58,167	13,029	97,636	80,100	17,536	—417,113
1990	31,819	70,001	15,680	117,500	109,600	7,900	—409,213
1991	36,434	80,155	17,955	134,544	109,400	25,144	—384,069
1992	41,853	92,076	20,625	154,554	139,600	14,954	—369,115
1993	45,585	100,286	22,464	168,335	154,000	14,335	—354,781
1994	47,778	105,113	23,545	176,436	108,900	67,536	—287,244
1995	49,641	109,211	24,463	183,316	111,300	72,014	—215,229
1996	51,303	112,866	25,282	189,450	138,800	50,650	—164,578
1997	53,543	117,796	86,386	197.725	164,500	33,225	—131,353
1998	55,354	121,780	27,279	204,413	152,800	51,613	— 79,741
1999	56,550	124,409	27,868	208,826	107,300	101,526	21,786

Source: JICA Study Team

Table 7.1.6. PROJECTS DISCUSSED IN THE MODEL

Project No.	Items Discussed in the Model		
	Construction Cost	Operation Cost	Financial Bal.
101-110	O	O	O
111-112	O		
114-120	O		
121		O	O
122-131	O		
132-134	O	O	O
201-223	O		O
224-231	O		
301-306	O		
307	O		O
308-315	O		
316-318	O		O
319-328	O		
401-408	O		O
409 412	O		
413-417	O		
501-512	O		

Source: JICA Study Team

Sensitivity Analysis

1) Case Setting

To measure the effects caused by changes in external conditions and by project implementation, the following assumptions were made:

(a) Changes of External Conditions

(i) Growth Rate of Outside Economy (GRDP Per Capita) - The ratio of GRDP per capita of IRM against that of the outside area, Region IV, shall work as a factor of social movement and, therefore, the change of growth rate of the outside economy shall affect the IRM's future population. Two (2) cases have been assumed for the purpose of analysis, namely: the growth rate of the outside economy is greater than that of the base case from 5.9% in the base case to 8.0% in Case 1; and the rate is smaller than that of the base case (from 5.9% to 4.0% in Case 2).

(ii) Construction Cost - Construction cost is increased by 20% and by 40% (Cases 3 and 4 respectively). Increased construction cost shall put a burden on public financial balance; however, it shall contribute to the vitalization of the local economy.

(iii) Fish Catch - The change of fish catch shall largely affect the operation of both municipal and commercial fishing, consequently, affecting the shipment value and employment of the canning and cold storage industries. The decrease of fish catch by 50% from the base as is assumed in Case 5.

(iv) Agricultural Productivity - The leveling off of rice and coconut productivity after 1992 is assumed (Cases 6 and 7 respectively).

(b) Effects of Project Implementation

Among the proposed projects of the master plan, the suspension of implementing the following projects, which seem essential to the development of local industry, are assumed for the purpose of analyzing their implementation effects:

(i) Prawn Culture Project (Case 8);

(ii) Coconut Oil Factory (Case 9);

(iii) Canning Factory (Case 10);

(iv) Cold Storage (Case 11);

(v) Prawn Processing Factory (Case 12);

(vi) Pulp-Paper Factory (Case 13); and

(vii) Tourism Development Project (Case 14)

2) Analysis Results

(a) Changes of External Conditions
(See Table 7.1.7)

(i) When growth rate of outside economy exceeds the assumed level (Case 1) - The population shall reach 90,000 in 1992 (93.8% of the base case) and 138,000 in 2000 (87.6% of the base case). Its growth shall stagnate after 1992 as compared with the base case. Thus, by 1992 even though the population growth shall be smaller than that of the base case, the industries shall grow very rapidly during the said period, increasing employment opportunities and GRDP per capita to offset the condition of population growth. However, during the period thereafter, the growth of employment oppportunities and of GRDP per capita shall stagnate making the effect of the outside economy relatively large and causing the stagnation of population growth.

Table 7.1.7 IMPACT CAUSED BY THE CHANGES OF EXTERNAL CONDITIONS

Case No.	Population (person)	GRDP (1,000 Pesos)	FIRR (%)
0	95,545 (1.000) 157,787 (1.000)	1,101,331 (1.000) 1,998,355 (1.000)	20.5
1	89,599 (0.938) 138,184 (0.876)	1,100,610 (0.999) 1,983,849 (0.993)	20.7
2	101,255 (1.060) 177,870 (1.127)	1,102,014 (1.001) 2,013,038 (1.007)	20.3
3	100,391 (1.051) 162,352 (1.029)	1,121,461 (1.018) 2,006,115 (1.004)	16.7
4	105,215 (1.101) 166,891 (1.058)	1,141,596 (1.037) 2,013,851 (1.008)	13.4
5	90,836 (0.951) 145,851 (0.923)	992,429 (0.901) 1,836,898 (0.919)	18.6
6	95,531 (1.000) 155,254 (0.984)	1,101,322 (1.000) 1,920,390 (0.961)	20.8
7	95,457 (0.999) 155,373 (0.985)	1,101,271 (1.000) 1,938,431 (0.970)	20.1

Source: JICA Study Team

Note: 1. Upper Row: Value for 1992, Low Row: Value for 2000
2. Figures in parentheses are ratios to the base case
3. Characteristics of each case are as follows:
Case 1: Increase of growth rate of external economy by 2% points.
Case 2: Decrease of growth rate of external economy by 2% points
Case 3: Increase of construction cost by 20%
Case 4: Increase of construction cost by 40%
Case 5: Decrease of fish catch by 50%
Case 6: Rice productivity levels off from 1992
Case 7: Coconut productivity levels off from 1992.

(ii) When growth rate of outside economy shall be lower than assumed level (Case 2) - The population shall reach 101,000 in 1992 (106.0% of the base case) and 178,000 in 2000 (112.7% of base case) indicating a rapid increase after 1992. The population growth rate in both cases (Cases 1 and 2) are higher during the period up to 1992, implying that the population growth up to 1992 shall be almost nearing its limit of growth.

On the other hand, GRDP shall not be affected. This indicates that the growth of local industries shall be achieved, focusing on the primary and secondary industries, the growth of which does not depend on population concentrations. Consequently, in order to further develop the local economy, the promotion of tertiary industries which does not depend on the project investments shall be necessary.

(iii) When construction cost is increased by 20% (Case 3) - The population shall grow larger than the base case in year 2000 by 5,000 persons but GRDP shall remain almost unchanged. This means that although the impact of project construction activities, as explained before, shall be great during the early stages, it's impact shall decrease on GRDP at the later stages.

But on the other hand, the financial internal rate of return (FIRR) shall decrease from 20.5% of the base case to 16.7% due to the consequent increase in public expenditure.

(iv) When construction cost is increased by 40% (Case 4) - The FIRR of IRM shall decrease more than it does in Case 3 to 13.4%. This implies a considerable difficulty in public finance because it shall be very impractical to consider that the interest rate of bank loans shall be lower than the assumed rate of inflation of 15%.

(v) When Fish Catch is decreased by 50% (Case 5) - The change of fish catch, the output of the area's leading industry, shall affect not only the fishing industry alone but shall also affect such industries as canning, cold storage and ice plants, and shall ultimately affect the tertiary industry.

Both population and GRDP shall grow up to 92% of the base case and FIRR shall decrease to 18.6% from the 20.5% of the base case.

(vi) When rice productivity is levelled-off after 1992 (Case 6) - The population shall decrease by 1.6% in 2000 and GRDP by 3.9% as compared with the base case. Therefore, the levelling off of rice productivity shall not affect the development very much and this is due to rice productions relative decrease of contribution to GRDP in the future.

(vii) When coconut productivity is levelled-off after the year 1992 (Case 7) - Likewise, coconut productions relative decrease of contribution to GRDP has little effect because the population shall also decrease by only 1.5% and GRDP by 3.0% from the base core in 2000.

(b) Effects of Project Implementation (See Table 7.1.8)

A usual method of measuring project benefits can be classified into two (2) methods: method by measuring benefits when a project is implemented; and method by measuring losses as benefits when a project is not implemented (Fig. 7.1.12).

The latter method shall be adopted here for the measurement of benefits derived from the following major projects:

(i) When Prawn culture project is not implemented (Case 8) - The project has the greatest impact on both population and GRDP implying the need for it to be on the master plan. FIRR without this project shall be very low at 9.2% and as a result, a more viable version of the master plan would be necessary.

(ii) When the pulp paper factory is not constructed (Case 13) - Because of its late introduction to the IRM development, the effect of implementation shall be very small during the planning period. However, this project should play an important role in the late development of IRM. Consequently, its benefit cannot be measured thoroughly at this stage.

(iii) When tourism development is not implemented (Case 14) - This development shall have the second largest impact on population and GRDP next to prawn culture project. Likewise, without this development, a revision of the master plan would be necessary.

(iv) Other Projects - The effect of the other projects shall be minimal. However, the coconut oil and the canning factory projects having decisively large employment and shipment values shall have a relatively large impact on the IRM development.

Table 7.1.8 EFFECT OF PROJECT IMPLEMENTATION

Case No.	Population (person)	GRDP (1,000 Pesos)	FIRR (%)
0	95,545 (1.000) 157,787 (1.000)	1,101,331 (1.000) 1,998,355 (1.000)	20.5
8	83,712 (0.876) 111,708 (0.708)	778,108 (0.707) 1,258,168 (0.630)	9.2
9	92,751 (0.971) 148,889 (0.944)	1,019,645 (0.926) 1,853,420 (0.927)	19.0
10	91,318 (0.956) 145,212 (0.920)	996,873 (0.905) 1,845,869 (0.924)	18.4
11	94,192 (0.986) 154,098 (0.977)	1,064,888 (0.967) 1,945,697 (0.974)	19.8
12	93,493 (0.979) 151,428 (0.960)	1,035,711 (0.940) 1,903,787 (0.953)	19.2
13	95,545 (1.000) 155,458 (0.985)	1,101,323 (1.000) 1,824,335 (0.913)	19.4
14	81,209 (0.850) 136,291 (0.864)	909,344 (0.826) 1,723,705 (0.863)	14.6

Source: JICA Study Team

Note: 1. Upper Row: Value for 1992. Lower Row: Value for 2000
2. Figures in parentheses are ratios to the base case.
3. Characteristics of each case are as follows:
Case 8: Without Implementing Prawn Culture Project
Case 9: Without Implementing Coconut Oil Mill
Case 10: Without Implementing Canning Factory Project
Case 11: Without Implementing Ice Plant Project
Case 12: Without Implementing Prawn Processing Project
Case 13: Without Implementing Paper Pulp Factory Project
Case 14: Without Implementing Tourism Development Project

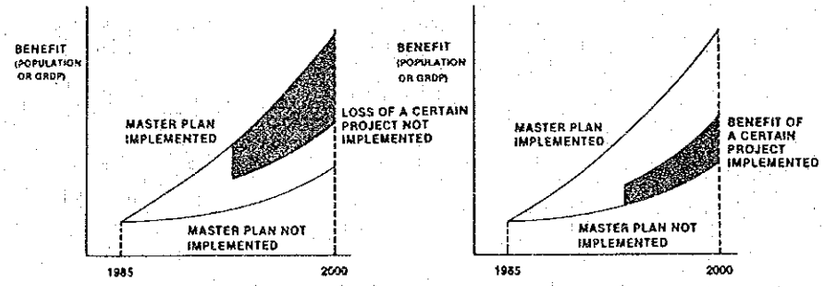


FIG. 7.1.12 METHOD OF MEASURING PROJECT BENEFIT

7.2 Evaluation of Priority Projects

7.2.1 Project Package

The purpose of packaging the proposed projects is to accomplish a systematic and efficient facilities development program enjoying the collective effects due to grouping of the related projects, and the efficiency in the simultaneous consideration of interrelated proposal projects.

Subject to packaging are the projects which shall be completed by 1992 taking into consideration the urgency of the projects.

Fig. 7.2.1 shows the inter-relation among those projects clarified on the basis of ISM[1] method.

Note 1: ISM (Interpretive Structural Modeling)

A method which deals with complicated social problems. Patterns of interrelation among various factors can be illustrated by Multi-level directed graphs in order to clarify a structure of complicated systems.

In this figure, two (2) projects which are connected with an arrow line have a cause and effect relation. The project at the superior level vs the cause (or premise) of the project at the lower level connected to it by an arrow line. Therefore, the higher the project level, the higher the priority of implementation that the project has. The following are the descriptions of the priority levels:

(i) Levels 7 and 8 - Infanta road improvement I and II (Project numbers 401 and 402) shall be included in this level. This improvement shall considerably shorten the travel time to MMA, thus, having a great impact on the development of local industries and, therefore, it has the highest priority of implementation.

(ii) Levels 4, 5, and 6 - Infrastructure development for such industries as fishing, fishery product processing, tourism, and prawn culture shall become the leading industries in the future IRM economy.

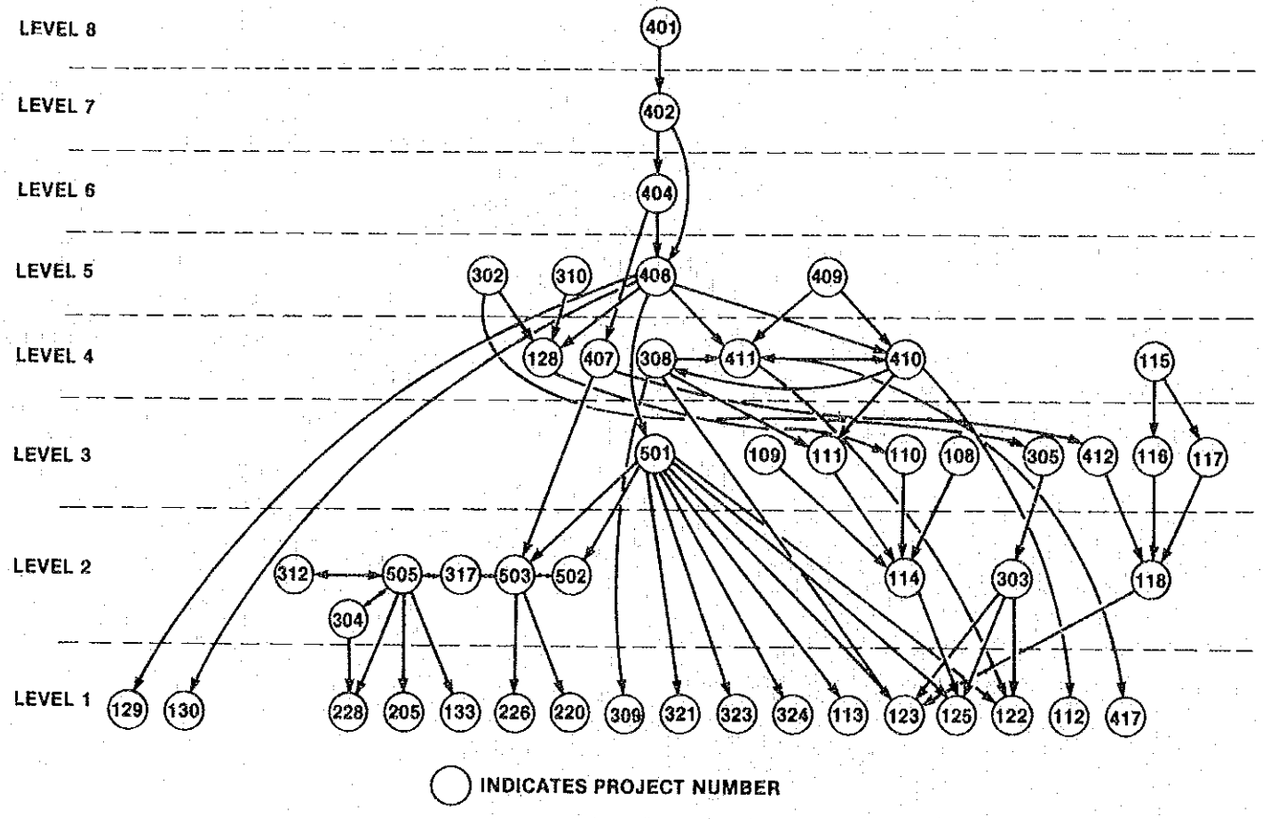


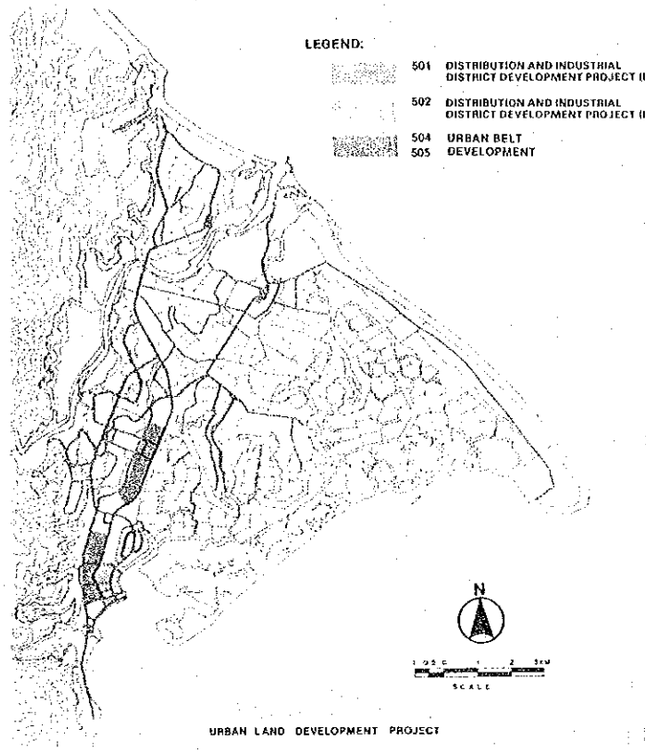
FIG. 7.2.1 INTER-RELATION AMONG PROJECTS

In particular, these are the water supply projects for the port area (project number 308), feeder road development (406), port development (409, 410, and 411), water supply project for Real industrial district (also 308). Other feeder road developments (406 and 407), power supply project for tourism development at Infanta beach area (302) water supply for the same area (310), road development (404 and 406), marine research park development (128), marine and brackish culture center (115), and feeder and urban arterial road development (404 and 407).

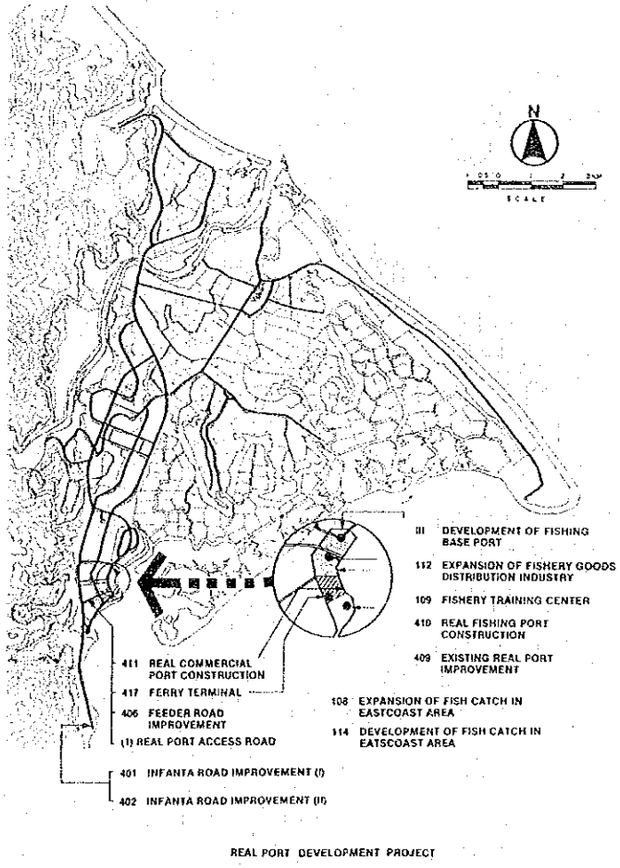
(iii) Level 3 - This level includes such projects as the research activity for expansion of fish catch (108), fishery training program (109), fishery development center (110), upgrading of substation for the operation of fishing port and Real industrial district (305), development of fishery base port (111), land development for the distribution and processing industrial district, pilot project of prawn culturing (117), and improvement of existing minor ports for full scale operation of the prawn culture industry.

Ranking of the priority levels are based on ISM which places its emphasis on the analysis of the inter-relationship among the projects. Therefore, economic importance of each project has not been considered in ISM.

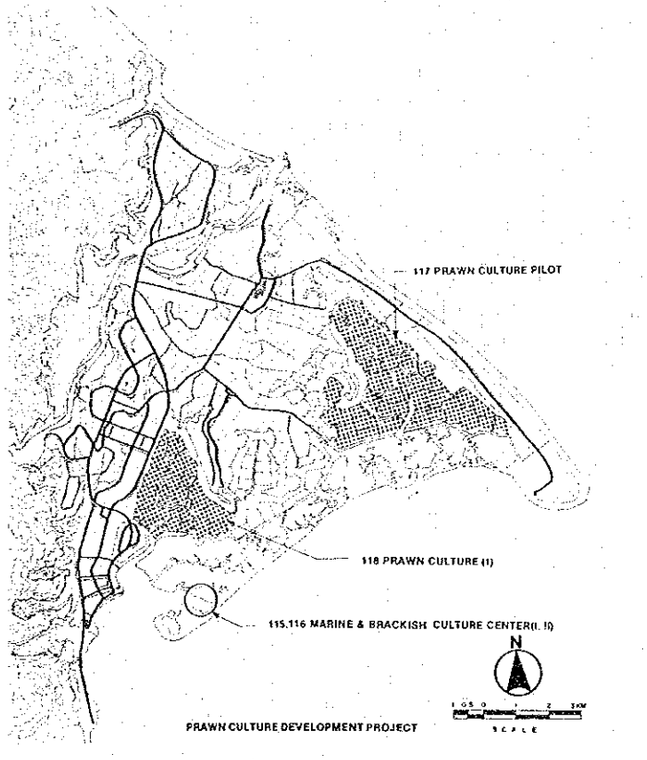
In addition to this ISM analysis, importance of each project in terms of the area's economic development has been examined (see sensitivity analysis of overall evaluation in the last section) to propose the following priority project packages (Fig. 7.2.2): Real Port Development Project Package; Urban Land Development Project Package; Prawn Culture Project Package; and Tourism Development Project Package.



Priority Project (2)

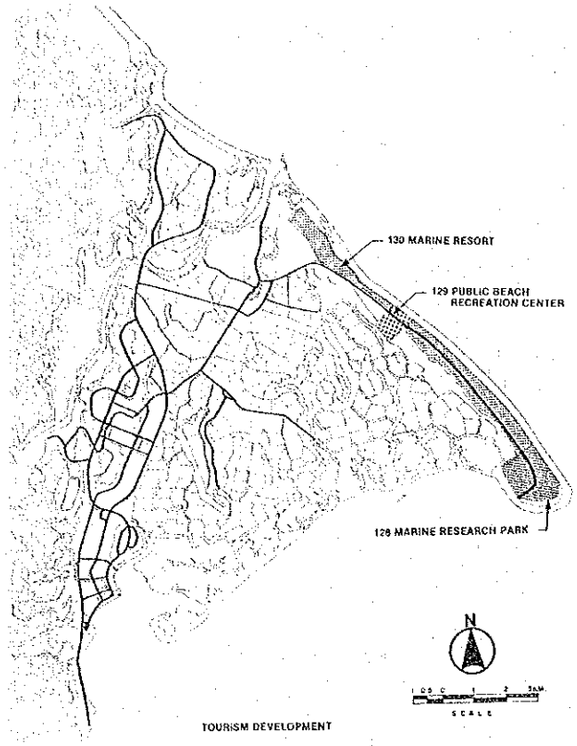


Priority Project (1)



Priority Project (3)

FIG. 7.2.2 PRIORITY PROJECTS



Priority Project (4)

FIG. 7.2.2 PRIORITY PROJECTS

7.2.2 Economic and Financial Analysis of Project Packages

Basic Policies of Analysis

(i) Subject to analysis are the projects which are to be completed by 1992 and are grouped together on the basis of project packaging;

(ii) Total project life for analysis shall be the time duration up to the year 2000. In addition, for those projects whose project life exceed this time duration, the same shall be cut off in 2000. However, their residual value shall be considered in such cases. The project life of each package, for calculating the residual value, are set in Table 7.2.1, and the fixed amount method shall be used for depreciation. For the Land Development Project Package, depreciation shall not necessarily be considered since the developed land shall be sold out by 2000.

(iii) All prices shall be set at 1984 Price levels.

(iv) The main evaluation criteria shall be an internal rate of return for each package. However, the present value and cost benefit ratio shall also be computed assuming a discount rate of 15%. For the Urban Land Development Project Package, because the price system of other areas cannot be used here as a reference for price setting, for the purpose of analysis a price system which is financially feasible shall be established. The appropriateness of the price system shall also be examined.

(v) Financial analysis shall be done for all the packages, but economic analysis shall be applied only for the Real Port Development Project Package because of its relative importance in the National economy. The Real Port Development Project Package has two (2) components; namely, the Port Package and the Road Package. For the financial analysis of this package, only the Port Package shall be analyzed since only this position is commercial oriented. However, both Road and Port Packages shall be considered as a whole for economic analysis because the producer's surplus cannot clearly be divided between the two (2) packages. The above discussion is summarized in Table 7.2.2.

Table 7.2.1. PROJECT LIFE OF PROJECT PACKAGE

Package Name	Project Life (years)
Prawn Culture Project Package	15
Real Port Development Project Package	30
Tourism Development Project Package	15
Urban Land Development Project Package	—

Source: JICA Study Team

Table 7.2.2 METHOD OF ANALYSIS BY PACKAGE

Package Name	Economic Analysis	Financial Analysis
1. Prawn Culture Project Package	X	O
2. Real Port Development Project Package		
a) Port Package		O
b) Road Package	O	X
3. Tourism Development Project Package	X	O
4. Urban Land Development Project Package	X	O

Source: JICA Study Team

Note: O; Subject to Analysis
X; Not subject to Analysis

The policies discussed above are mutual for both economic and financial analysis. The following policies are for financial analysis only:

(vi) Escalation rate shall be set at 15% from MPWH standards.

(vii) Although it is necessary to consider various taxes for analysis of operation and revenue of private enterprises, the taxes shall not be included here because the implementing and operating body cannot be determined at this stage.

On the other hand, the following are applied only for economic analysis:

(viii) Inflation shall not be considered in economic analysis whereas it shall be considered in financial analysis.

(ix) Only direct benefits shall be considered.

(x) In economic analysis, economic cost, a cost system to measure the achievement of economic efficiency (on the assumption of free competition and free choice) is usually adopted. However, in the analysis, actual market price is used because the strict and detailed cost analysis is difficult at this master plan stage and, consequently, when economic cost is applied the degree of error would become greater. Yet empirical conversion ratio is generally known as 0.8 (economic cost § actual market cost x 0.8). Thus, the difference can be estimated and analyzed in the sensitivity analyses.

Real Port Development Project Package

This group of projects can be divided as the improvement of Real Port itself and, as a subject of economic analysis, expansion of fishing port called "Port Package". For easier understanding, the packages shall be described separately and later combining the two (2) packages for evaluation as a whole:

1) Port Package

(a) Composition of Port Package - The Port package consists of eleven (11) projects as shown in Table 7.2.3. However, for Project 406, Feeder Road Improvement (I), only the improvement of the access road to Real Port shall be considered. The following projects are considered for economic analysis only: 108 Expansion of Fish Catch in East Coast Area, 109 Fishery Training Program, 110 Fishery Development Center, 114 Development of Fish Catch in the East Coast Area.

Table 7.2.3 PORT PACKAGE PROJECTS

Project No.	Project Name
Port and Supporting Infrastructure	
409	Existing Real Port Improvement Project
410	Real Fishing Port Construction Project
411	Real Commercial Port Construction Project
417	Ferry and Ferry Terminal Project
406 (part)*	Feeder Road Improvement (I)
Fishery and Related Industries	
111 (part)	Development of Fishery Base Port
112	Expansion of Fishery Goods Distribution Industry
108*	Expansion of Fish Catch in East Coast Area
109*	Fishery Training Program
110*	Fishery Development Center
114*	Development of Fish Catch in Fast Coast Area

Note:* Economic analysis only

Source: JICA Study Team

(b) Assumptions - Necessary assumptions to analysis are tabulated in Table 7.2.4.

(c) Cost Benefit Analysis - Cost Benefit for financial and economic analysis are shown in Table 7.2.27.

Table 7.2.4 PRECONDITIONS FOR ECONOMIC AND FINANCIAL ANALYSIS OF REAL PORT DEVELOPMENT PACKAGE (I)

Item — **Precondition**

(1) Port Activities

1) Number of Ferry Passenger and Volume of Cargoes

Year	Number of Passengers (1000 pers)	Tonnage of Cargoes (1000 tons)			Fish Landing (100 tons)		
		Copra	Lumber	Miscellaneous	1st Class	2nd Class	3rd Class
1986	82.1	4.8	—	2.7	—	—	—
1992	137.0	13.5	37.0	20.0	16.0	8.0	24.0
2000	157.0	18.9	50.0	30.0	20.0	10.0	30.0

(2) Data for Financial Analysis

1) Investment Program

(thousand pesos at 1984 prices)

1985	1986	1987	1990	1991	Total
113,254	148,000	208,026	3,655	3,655	476,590

2) Operating Cost

The values are set for the year 2000. For obtaining values for each year up to the year 2000, the following formula is used:

$$OC_i = OC_{2000} \sqrt{\frac{TCG_i}{TCG_{2000}}}$$

Where OC_i: Operating Cost in year i

TCG_{2000}: Total Cargoes handled at the Port in the year 2000

a. Direct Personnel Expenses

	Number of Personnel	Wages (pesos/year)	Direct Personnel Expense (1000 pesos/year)
Manager	5	50,000	250
Clerks, Engineers	15	25,000	375
Laborers	30	10,000	300
Total	50	18,500*	925

Note*: Per capita average annual wage

b. Facility Maintenance Cost — 1% of Direct Investment Cost

c. Utilities — 500 (thousand pesos per year)

d. Overhead — Equal to direct Personnel Expense

Table 7.2.4 PRECONDITIONS FOR ECONOMIC AND FINANCIAL ANALYSIS OFREAL PORT DEVELOPMENT PACKAGE (2)

Item	Precondition
3) Revenue of Fishery Port	* Apply the unit prices of Navotas Fishery Port in 1984
a. Fishery Port Charge	0.06 (pesos per ton)
b. Commission for Landing	1.00 (pesos per tub)
c. Rent for Fish Market	First Class Fish 0.30 (pesos per tub) Second Class Fish 0.22 (pesos per tub) Third Class Fish 0.15 (pesos per tub)
d. Parking Charge	2.00 (pesos per vehicle)
e. Broker Royalty	0.25 (pesos per tub)
f. Sales of Fuel	1.26 (pesos per liter). The following data relating to fuel consumption are based on the weight of fishing boat:

	40 GRT	5 GRT	3 GRT
Days of Navigation	20	1	1
Average Daily Operating hour	12	4	4
Consumption of fuel (liter/hour)	45	8	5.5

g. Wharf Charge

Gross Tonnage of Boat	GR ≦ 10	10 < GRT ≦ 100
Unit Price (pesos)	1.00	2.00

h. Sales of Ice — 58.8 (pesos/ton) Data for ice consumption are as follows:

	3 GRT and 5 GRT	40 GRT
Ice Consumption (at sea)	0.5	—
Ice Consumption (on land)	0.5	0.5

i. Sales of Water — 8.00 (pesos/ton), Data for water consumption are as follows:

	40 GRT	5 GRT	3 GRT
Water Consumption (liter per day)	20	20	20
Number of Crew Members	18	5	4
Days of Navigation	20	1	1

j. Rent of Site — 5.00 (pesos/m²/month)

4) Distribution Port Charge — 1.5% of the value of cargo unloaded at the port

5) Ferry Facility Charge — 1.5% of ferry boat fare (25 pesos per passenger)

(3) Data for Economic Analysis

1) Investment Program — Following costs are added in the economic analysis:

(thousand pesos at 1984 prices)

1985	1986	1987	1988	1989	Total
1,536	11,753	15,921	8,185	6,626	44,021

2) Operating cost — Following costs are added in the economic analysis:

(thousand pesos at 1984 prices)

1988	1989	1990 & after
233	233	2,945

3) Benefit from Fishery Port

Gross Sales Increase Caused by Fish Production increase

$B_1 = (Q^1-Q^0)[r^0 P_f + (1-r^0)P_s]$

Gross Sales Increased Caused by Freshness Gain of Products

$B_2 = q^1(r^1-r^0)(P_f-P_s)$

Where:

Q^1 : Product in "With Fishery Port" Case
Q^0 : Production in "Without Fishery Port" Case
r^1 : Fresh Fish Ratio in "With Fishery Port" Case
r^0 : Fresh Fish Ratio in "Without Fishery Port" Case
P_f : Price of Fresh Fish
P_s : Price of Non-Fresh Fish

a. Production in "Without Fishery Port" Case — Basic Conditions for calculating are as follows: 200 (ton/year)

b. Price of fish

Market Price (1984)
First Class : 16 pesos/kg
Second Class: 12 pesos/kg
Third Class : 8 pesos/kg

Prices Assumed
Price of Fresh Fish : Equal to Market Price
Price of Non-Fresh Fish: 30% Market Price

c) Building Cost and Maintenance Cost of Fishing Boat

(thousand pesos)

	Building Cost	Annual Maintenance Cost
3 GRT Banca	50	10
5 GRT Banca	70	15
40 GRT FRP Boat	800	134

TABLE 7.2.4 PRECONDITIONS FOR ECONOMIC AND FINANCIAL ANALYSIS OF REAL PORT DEVELOPMENT PACKAGE (3)

Item | **Precondition**

d) Operating Cost of Fishing Boat

	3 GRT	5 GRT	40 GRT
Days of Navigation	1	1	20
Number of Crew Member	4	5	18
Average Yearly Numbers of Navigation	150	150	10
Personnel Expenses per Navigation	120	150	24,000
Water Consumption			
liter	80	100	7,200
pesos	0.64	0.8	57.6
Average Daily Operating Hour	4	4	12
Fuel Consumption			
liter	22	32	10,800
pesos	138.6	201.6	68,040

4) Benefit from Distribution Port

a. Saving in Passenger Transportation Cost

The passenger transportation cost of the ferry boat is 31.4 pesos per person less than that of the banca.

b. Savings in Barge Transportation Cost

The time distance between Real Port and Manila shall be shorter with the improvement of the Infanta Road. This road improvement shall result in the change of barge route from Mauban Port to Real Port. A transportation cost of 9 pesos per ton can be saved from this route. The percentage of cargo volume transferred from Mauban route to Real route is assumed at 68.4% for copra and 35.5% for lumber.

5) Benefits from Road

The benefits derived from the Infanta Road improvement are as follows:
(1) Savings in the fixed vehicle operating cost; and
(2) Savings in travel time of passengers and drivers.

a. Savings in Fixed Vehicle Operating Cost

Vehicle Type	Fixed Costs (₱/hour)
Car	2.08
Bus	19.58
Jeepney	14.48
Truck under 3-ton	19.43
Truck over 3-ton	25.50

b. Savings in Travel Time

Vehicle Type	Time Costs (₱/hour)
Car	40.53
Bus	214.96
Jeepney	51.66
Truck under 3-ton	18.96
Truck over 3-ton	18.96

Source: JICA Study Team

2) Road Package

(a) Composition of Road Package - The Road Package consists of two groups of projects as shown in Table 7.2.5. Since the Road Package shall not be considered for financial analysis, only the data required for economic analysis shall be prepared.

(b) Assumptions - Necessary assumption are tabulated in Table 7.2.6.

(c) Benefit - The following two benefits shall be considered: savings on Fixed Vehicle Cost; and time Savings of Passengers and Drivers.

There exists two (2) reasons why the producer's surplus is not considered here. The first is that the Port Package analysis already considers the increase in fish catch as its benefit, which cannot be realized without the improvement of said road. Thus, the producer's surplus has already been counted in that package. The second is that the MPWH, in its Highway Planning Manual", is reluctant to consider producer's surplus as benefit. The assumptions for this package is the same as those tabulated in Table 7.2.4.

(d) Cost Benefit Analysis - In summary, the cost benefit analysis of the Infanta Road Package is shown in Table 7.2.27.

Table 7.2.5 ROAD PROJECT

Project No.	Project Name
401	Infanta Road Improvement (I)
402	Infanta Road Improvement (II)

Source: JICA Study Team

Table 7.2.6 PRECONDITIONS FOR ECONOMIC ANALYSIS OF ROAD PACKAGE

Item	Preconditions					
(1) Traffic Volume	(vehicles per day)					
	Year	Car	Bus	Jeepney	Truck	Total
	1988	529	75	100	418	1,122
	1992	2,747	217	155	3,015	6,134
	2000	4,165	331	281	4,826	9,603
(2) Cost						
1) Investment Program	(thousand pesos at 1984 prices)					
	1985		1986	1987	Total	
	58,026		77,369	58,026	193,421	
2) Maintenance Cost	12% of total Investment Cost					

Source: JICA Study Team

3) Economic Evaluation

The result of economic analysis of the Real Port Development Project Package is described in Table 7.2.7 and Fig. 7.2.3. The base case outputs a very high EIRR of 41%, thus, proving its high economic feasibility. Furthermore, even with doubled construction cost and decreased benefits by 40%, EIRR maintains a rate of 19.3%. Therefore, it shall be concluded that this package seems feasible even under such aggravated conditions.

Table 7.2.7 RESULT OF ECONOMIC ANALYSIS OF REAL PORT DEVELOPMENT PROJECT PACKAGE

	Investment Cost (Base Case = 100)	Benefit (Base Case = 100)	Internal Rate of Return (%)	Net Present Value (MP)	Benefit/ Cost Ratio
Base Case	100	100	41.0	2,034.3	4.47
Case 1	100	80	36.2	1,510.2	3.58
Case 2	100	60	30.5	986.2	2.68
Case 3	150	100	32.7	1,756.9	3.04
Case 4	150	80	28.5	1,232.8	2.43
Case 5	150	60	23.6	708.8	1.82
Case 6	200	100	27.5	1,479.5	2.30
Case 7	200	80	23.7	955.4	1.84
Case 8	200	60	19.3	431.4	1.38

Source: JICA Study Team

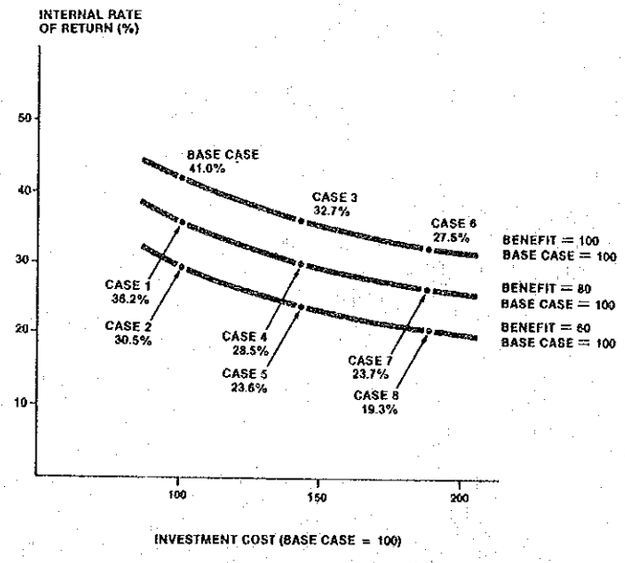


FIG. 7.2.3 ECONOMIC INTERNAL RATE OF RETURN FOR REAL PORT DEVELOPMENT PROJECT PACKAGE

Tables 7.2.8 and 7.2.9 and Figs. 7.2.4 and 7.2.5 show the results of economic analyses when the Port Package and Road Package are considered separately. Analysis of the Port Package alone indicates a higher value than otherwise implying its good feasibility. In addition, the analysis of the Road Package alone indicates a relatively high IRR at 26.7%. Thus, supporting the importance of its implementation.

4) Financial Evaluation

The financial analysis only considers the Port Package as explained earlier. Its FIRR at 5.7% implies difficulty in its operation. However, it should be noted that the fee set up (revenue) used here is based on that

Table 7.2.8 RESULT OF ECONOMIC ANALYSIS OF REAL PORT DEVELOPMENT PROJECT (Without Road)

	Investment Cost (Base Case = 100)	Benefit (Base Case = 100)	Internal Rate of Return (%)	Net Present Value (MP)	Benefit/ Cost Ratio
Base Case	100	100	44.9	1,868.1	5.23
Case 1	100	80	39.7	1,406.2	4.19
Case 2	100	60	33.6	944.4	3.14
Case 3	150	100	35.9	1,658.8	3.55
Case 4	150	80	31.5	1,196.9	2.84
Case 5	150	60	26.3	735.0	2.13
Case 6	200	100	30.3	1,449.4	2.69
Case 7	200	80	26.4	987.5	2.15
Case 8	200	60	21.7	525.7	1.61

Source: JICA Study Team

Table 7.2.9 RESULT OF ECONOMIC ANALYSIS OF INFANTA ROAD IMPROVEMENT PROJECT

	Investment Cost (Base Case = 100)	Benefit (Base Case = 100)	Internal Rate of Return (%)	Net Present Value (MP)	Benefit/ Cost Ratio
Base Case	100	100	26.7	116.2	2.15
Case 1	100	80	22.9	104.0	1.72
Case 2	100	60	18.5	41.8	1.29
Case 3	150	100	20.3	98.1	1.46
Case 4	150	80	17.1	36.0	1.17
Case 5	150	60	13.4	-26.2	0.88
Case 6	200	100	16.3	30.1	1.11
Case 7	200	80	13.5	-32.1	0.89
Case 8	200	60	10.2	-94.2	0.66

Source: JICA Study Team

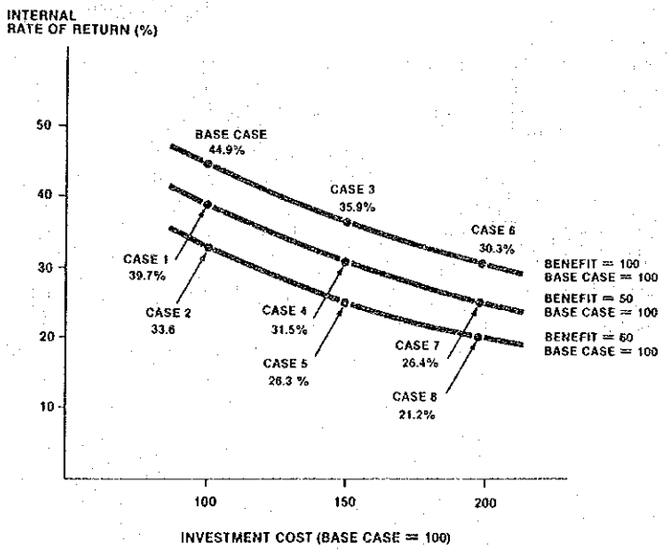


FIG. 7.2.4 ECONOMIC INTERNAL RATE OF RETURN FOR REAL PORT DEVELOPMENT PROJECT (WITHOUT ROAD)

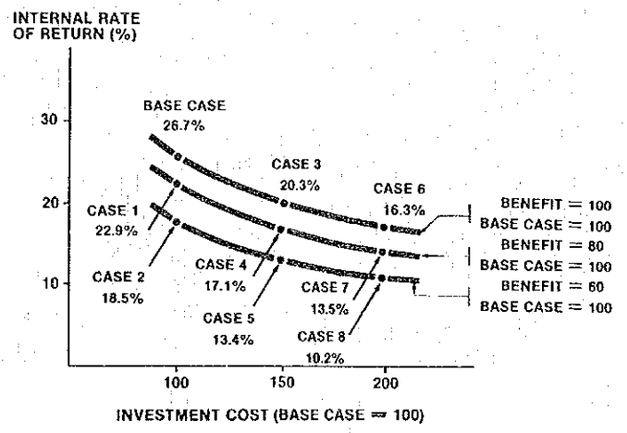


FIG. 7.2.5 ECONOMIC INTERNAL RATE OF RETURN FOR INFANTA ROAD IMPROVEMENT PROJECT

of Navotas Port which has not changed its asking rates since 1981 due to government control so that revenue increase by about 50% here can easily be justified in the future.

In such case, its FIRR would increase up to 10%, which is relatively low.

However, as proven earlier, this Real Port Development Project Package shall have a great economic impact on IRM's future development and the investment shall be evaluated as essential. It seems necessary that in order to make its operations financially feasible such as government aid in construction, and cross subsidy from other project shall be necessary.

Table 7.2.10 RESULT OF FINANCIAL ANALYSIS OF REAL PORT DEVELOPMENT PROJECT PACKAGE

	Investment Cost (Base Case = 100)	Benefit (Base Case = 100)	Internal Rate of Return (%)	Net Present Value (MP)	Benefit/ Cost Ratio
Base Case	100	100	5.7	-279.5	0.41
Case 1	100	130	8.2	-220.4	0.54
Case 2	100	160	10.3	-161.3	0.66
Case 3	80	100	7.4	-191.9	0.51
Case 4	80	130	10.2	-132.8	0.66
Case 5	80	160	12.5	- 73.7	0.81
Case 6	60	200	9.9	-104.3	0.65
Case 7	60	130	13.0	- 45.2	0.85
Case 8	60	160	15.6	- 13.9	1.05

Source: JICA Study Team

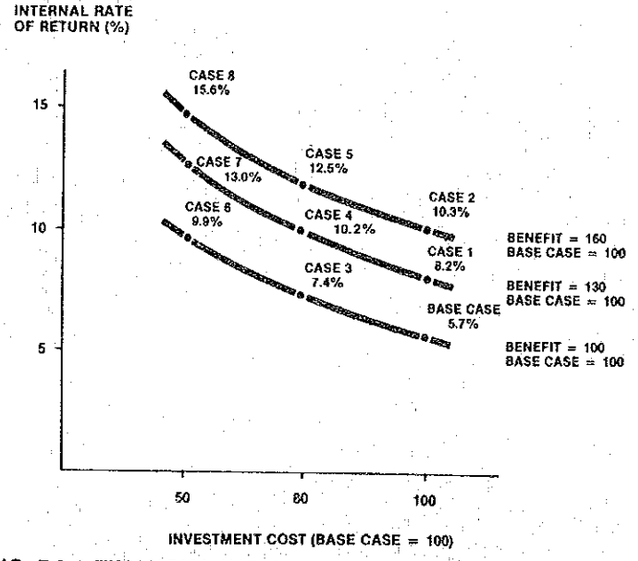


FIG. 7.2.6 FINANCIAL INTERNAL RATE OF RETURN FOR REAL PORT DEVELOPMENT PROJECT PACKAGE

Urban Land Development Project Package

1) Outline of the Package

The master plan sets up urban land development projects which shall provide lots for housing for the increasing number of urban population, promotes basic industries and improves social services (Table 7.2.11, Fig. 7.2.2).

The area of land prepared in years 1992 and 2000 totals 617.6 and 1339.7 ha respectively, and usable land at 433.2 and 889.1 ha respectively.

Table 7.2.11 URBAN LAND DEVELOPMENT PROJECTS

Project Number	Project Name	1992	
		Development Area	Area for Sale
501	Distribution and Industrial District Development Project (I)	25.6 ha.	20.5 ha.
502	Distribution and Industrial District Development Project (II)	70.7	56.6
504, 505	Urban Belt Development Project (I), (II)	134.2	107.4

Source: JICA Study Team

2) Schedule of site preparation and disposition

As shown in Fig. 7.2.7 and 7.2.8, in line with the regional development strategy of IRM, site preparation and disposition shall be started in Real where such leading industries as distribution and manufacturing are to be developed. Following it are Infanta and General Nakar which shall be developed not earlier than the second phase of the development period.

3) Cost of Land Development

(a) Labor Cost - Land development projects shall require one employee per hectare (salary is set at 20,000 pesos per person)

(b) Overhead Expenses - This cost is equal to 100% of direct personal expenditures.

(c) Cost of Stock Maintenance - This cost shall equal 1% of site preparation cost.

4) Financial Analysis

(a) Methodology Analysis

Profitability of land development projects naturally depend on the selling price of lots.

In this study, the selling price is computed to cover all costs of development and examined from the viewpoint of affordability of families and establishments to be located in IRM.

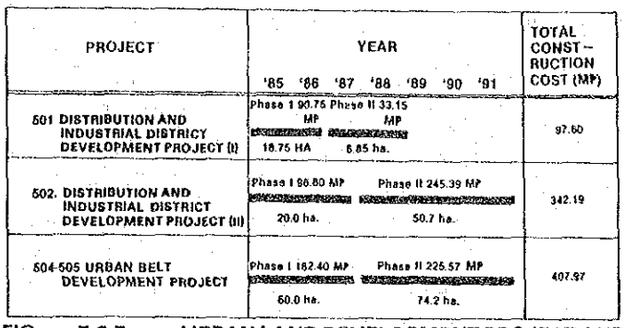


FIG 7.2.7 URBAN LAND DEVELOPMENT PROJECT AND CONSTRUCTION COST

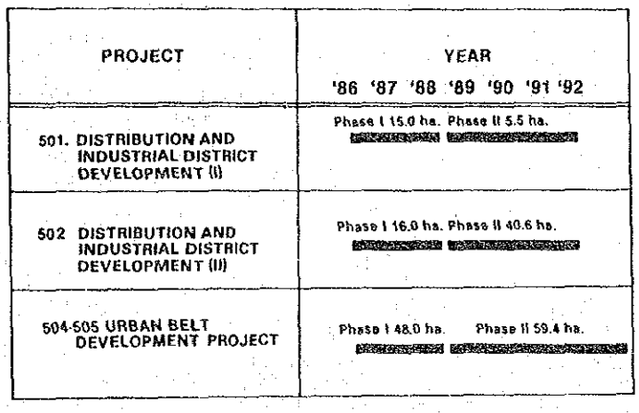


FIG. 7.2.8 MARKETING PLAN OF URBAN LAND DEVELOPMENT PROJECT

(b) Pricing

Table 7.2.12 shows pricing to make IRR, 0% and 15%. 0% IRR implies that within the project life, revenue is expected to cover the cost for which only equity capital can make up and that deficit may amount to as much as interest of funds borrowed when equity capital is not available.

Therefore, the selling price of lots may be set higher to make IRR not less than 15% even though low interest money is available.

The selling prices of lots are separately calculated by project. But taking into account all urban development projects of IRM falling into the hands of one developer, the pricing system may apply on the basis of proposed land use of the area to be developed and not on the cost of each project so as to cover aggregate cost of all urban land development projects of IRM.

Selling prices which makes IRR 15% are estimated at 310 pesos/m^2 in industrial areas, 460 pesos/m^2 in residential areas and 1830 pesos/m^2 in commercial areas, provided that land values of residential areas and commercial areas are 1.5 and 6 times as much as that of industrial areas. (the ratio of land value by land use is determined by referring to that in Japan).

Table 7.2.12 SELLING PRICE BY IRR

(pesos/m^2)

	Project	IRR 0%	IRR 15%
501	Distribution and Industrial District Development Project (I)	460	620
502	Distribution and Industrial District Development Project (II)	560	610
504 & 505	Urban Belt Development Project (I), (II)	330	390

Source: JICA Study Team

(c) Lease System

Selling price of the lots developed by the above mentioned urban land development project is estimated at a range of 400 pesos to 500 pesos/m^2 depending on the level of loan interest and construction cost. The equivalent minimum rent to the estimated selling price range varies according to the interest level as shown in Table 7.2.13 (without consideration for the maintenance cost of holding land).

Table 7.2.13 EQUIVALENT MINIMUM RENT TO SELLING PRICE CORRESPONDING TO INTEREST LEVEL

(in Pesos/m^2-month)

Interest Level (%)	Selling Price (pesos/m^2) 400	450	500
8	2.7	3.0	3.3
10	3.3	3.8	4.2
12	4.0	4.5	5.0
15	5.0	5.6	6.3

Source: JICA Study Team

The rents for existing and proposed EPZs are shown in Table 7.2.14.

Considering the rather disadvantageous location of IRM, the rent shall be set a little lower than those of proposed EPZs. It means that the level of loan interest is preferably below 10% and if possible, 8%.

Table 7.2.14 RENTS OF EPZ

(in pesos/m²-month)

EPZ	Rent
Operating	
Bataan	1.0
Mactan	1.5
Baguio City	2.0
Studying	
Batangas	4.5
San Fernando	4.5
Malilipot	4.5

Source: JICA Study Team

On the other hand, the relationship between the building cost and the equivalent minimum floor rent fluctuates depending on the interest level as shown in Table 7.2.15.

The floor rent for studying EPZs are 20 pesos/m^2/month for factories and 45 pesos/m^2/month for commercial facilities. Table 7.2.15 shows that it is necessary to get the interest level below 8%, and the building cost below 3000 pesos/m^2 in order to set the floor rent at a level of 20 pesos/m^2/month.

Table 7.2.15 EQUIVALENT MINIMUM FLOOR RENT TO BUILDING COST CORRESPONDING TO INTEREST LEVEL

Interest Level (%)	Building Cost (pesos/m²)		
	3,000	4,000	5,000
8	20	27	33
10	24	32	40
12	29	38	48
15	35	47	58

Source: JICA Study Team

The future ability of the middle class in IRM to pay house rent is estimated between 1,200 and 1,500 pesos/month which is 10% of monthly family income between 4000 and 5000 pesos/month. The minimum rent for a house of 50 m^2 floor area on a lot of 100 m^2 shall be at 1,270 pesos/month which is included in the ability to pay range with a building unit cost of 3000 pesos/m^2 and a land price of 400 pesos/m^2 on the condition that it is constructed using a soft loan of 8% interest.

If it is considered that the collection of such uniform rent is difficult especially at the early stage of development, the escalating rent system is worth introducing. For example, the initial rent can be set at a level of 60 to 70% of the uniform rent with an escalation rate of 3% per annum and a loan interest rate of 8 to 10%.

5) Conclusion

The urban land development project in IRM shall become feasible by carrying out the following measures:

(i) Price setting responding to affordability and forbearance of land and facility users;

(ii) Procurement of soft term loans with interest levels of less than 8%;

(iii) Minimizing land development and facilities construction cost; and

(iv) Introduction of the escalating rent system.

Prawn Culture Development Project Package

1) Outline of the Package

(a) Current Condition of Aqua Culture.

A 900 ha of fishponds in mangrove swamp area has been developed mainly devoted to the sabahi product and partially to prawn culture which are not fully developed due to shortage of prawn fry.

(b) Outline of the Project

Prawn culture development projects shall consist of four (4) components as follows:

Phase I: Prawn culture pilot projects shall develop 300 ha of fish ponds for three (3) years (1985-1987) reconstructing existing fish ponds and adding the necessary equipment so that primitively managed fishponds are converted into intensively or semi-intensively managed fish ponds.

The marine brackish center should be constructed and its operation started in order to provide prawn fry for the prawn culture development stated above.

Second Phase: The fish pond developed in the First Phase should subsequently be expanded by 900 ha for the next coming four (4) years (1988-1991).

The marine brackish center shall also be expanded to meet the demand of prawn frys which shall be increased by the expansion project of fish ponds. The sizes of prawn culture ponds and the marine brackish center to be developed are shown in Table 7.2.16, and the component projects and their project numbers are tabulated in Table 7.2.17.

2) Investment Program

The investment requirement for this project amounts to around 269 m pesos (at 1984 prices) which is divided by year as shown in Table 7.2.18.

Table 7.2.16 PRAWN CULTURE POND AND HATCHERY CENTER

	Construction Period	The Area of Prawn Culture Ponds (ha)	The Amount of Production of prawn frys in the center (1000 pesos)
Prawn Culture Pilot Project			
Phase I Stage (I)	1985-1986	200	27,200
Stage (II)	1987	100	13,600
Phase II Stage (I)	1988-1989	450	61,200
Stage (II)	1990-1991	450	61,200
Total		1,200	163,200

Source: JICA Study Team

Remark: The amount of prawn fry production shown on the table shall be required for the production of prawn in the developed fish pond in year 2000.

Table 7.2.17 PRAWN CULTURE PROJECT PACKAGE

Project No.	Project Name
115	Marine and Brackish Culture Center (I)
116	Marine and Brackish Culture Center (II)
117	Prawn Culture Pilot Project
118	Prawn Culture Pilot Project (I) Expansion

Source: JICA Study Team

Table 7.2.18 INVESTMENT PROGRAM OF PRAWN CULTURE PROJECT PACKAGE

(P1000, 1984 price)

Year	Amount of Investment
1985	11,040
1986	19,820
1987	16,140
1988	62,200
1989	62,200
1990	62,200
1991	62,000
Total	295,800

Source: JICA Study Team

3) Annual Operation Expenses

(a) Prawn Culture Pond

Item and amount necessary expenses for the operation of 1 hectare of prawn culture pond are tabulated in Table 7.2.19 (1984 price levels).

The annual operational expenses in the table are calculated assuming a 100% productivity rate (namely a yield of 3333 kgs per hectare).

Annual operational expenses of each year shall be estimated assuming the following relationship existing between the operational expense rate and the productivity rate of each year throughout the total project period:

Operational Expense Rate § (Productivity Rate)$^{1/2}$

Table 7.2.19 COST ITEMS AND AMOUNT OF EXPENSES PER 1 HA. PRAWN CULTURE POND

Cost Item	Amount of Cost (P)/Year	Remarks
1. Preparatory Cost	5,200	Fertilizing fish pond/getting rid of harmful species of fish
2. Feed Cost	57,200	Purchasing feed
3. Harvesting Cost	2,000	Labor cost for catching/packaging prawn
4. Utility Cost	29,500	Mainly cost of electricity for pumping
5. Maintenance Cost	1,000	Maintenance of pond and machines
6. Salary	12,000	Salary of personnel
Total	106,900	

Source: JICA Study Team

(b) Hatchery Center

Expense items and corresponding amounts for a unit facility (production capacity of 600,000 prawn) are tabulated in Fig. 7.2.20 fry (1984 price levels). A method of estimating the operational expense of each year is same as the method applied for the prawn culture pond.

Table 7.2.20 COST ITEMS AND AMOUNT OF EXPENSES PER UNIT OF FACILITY OF HATCHERY CENTER

Cost Item	Amount	Remarks
1. Personnel Salary	35,800	Salary of Employee
2. Facility Maintenance	12,000	Maintenance and repair cost of facilities
3. Feeds and Others	36,000	Feeds and necessary equipments
4. Parent Prawn Purchase	60,000	
5. Utilities	7,000	Power, Water
Total	150,800	

Source JICA Study Team

4) Production and Revenue Estimates

(a) Estimate of Prawn Production

A target annual yield of 3333 kgs per hectare in the year 2000 is assumed and this figure is set as 100% productivity.

The productivity in 1987 when the partial operation of the prawn culture pilot project shall commence, shall be set at 35% (1167 kgs/ha[1]) and it shall increase by 5% each year up to 2000.

(b) Estimate of Prawn Fry Production

The required number of fry from the prawn culture project shall be estimated by the following equation:

$$\text{Number of Prawn Fry} = \frac{\text{Total Prawn Production (kg)} \times 100}{\text{Ave. Wt. of Prawn}^{1} \times \text{survival ratio of fry}^{2}}$$

Note: 1 Average weight shall be 35 gms.

2 70% is used based on SEAFDEC data.

(c) Revenue Estimate

The revenue shall be estimated assuming an average prawn at 35 grams is priced at 100 pesos/kg.

5) Cost Benefit Analysis

A cost benefit analysis is shown in Table 7.2.27.

6) Result of Financial Analysis and its Evaluation

The results of analysis on the basis of the above discussed premises are tabulated in Table 7.2.21 and Fig. 7.2.9. An FIRR of the base case is computed at a very high rate of 53.6% implying its rigid financial feasibility. When construction investment and revenue are changed for

Table 7.2.21 RESULT OF FINANCIAL ANALYSIS OF PRAWN CULTURE DEVELOPMENT PROJECT

	Investment Cost (Base Case = 100)	Benefit (Base Case = 100)	Internal Rate of Return (%)	Net Present Value (MP)	Benefit/ Cost Ratio
Base Case	100	100	53.6	1,390.2	1.75
Case 1	100	80	38.5	740.0	1.40
Case 2	100	60	18.7	89.9	1.05
Case 3	150	100	42.1	1,251.6	1.63
Case 4	150	80	30.0	601.4	1.30
Case 5	150	60	13.4	-43.7	0.98
Case 6	200	100	35.2	1,113.0	1.52
Case 7	200	80	24.7	462.9	1.22
Case 8	200	60	10.0	-187.3	0.91

Source: JICA Study Team

Note 1: Productivity of extensive prawn culturing at present is 200 to 400 kgs/ha and with semi-intensive experimental culturing, 1000 to 1300 kgs/ha.

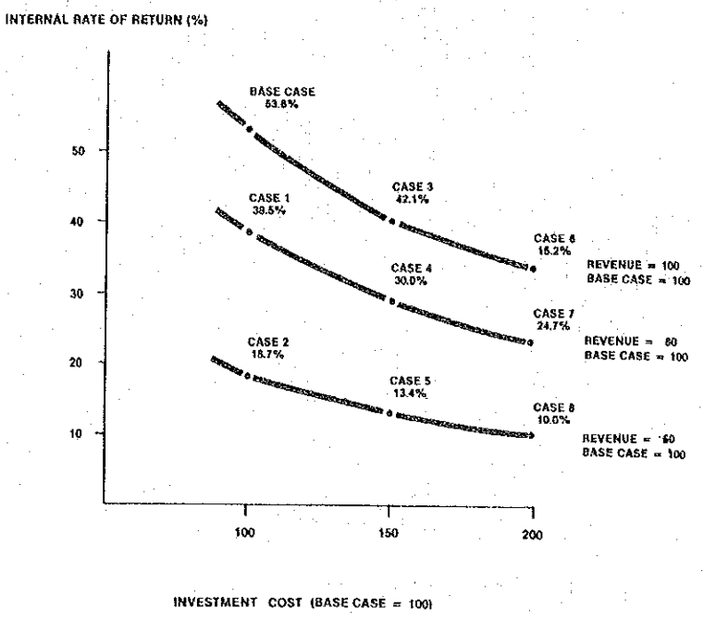


FIG. 7.2.9 FINANCIAL INTERNAL RATE OF RETURN FOR PRAWN CULTURE PROJECT PACKAGE

sensitivity analysis, the change of revenue particularly, shall largely affect its profitability. Thus, if the revenue is decreased to 60% of that of the base case, the FIRR shall go down to 18.7% which indicates the financial difficulty in Project operation. However, even with a doubled construction cost, it shall only lower the FIRR to 35.2% which can still be considered as profitable.

Consequently, it shall be concluded that this package on conversion of mangrove swamp areas of IRM into prawn culture ponds and consequent operations of prawn culturing shall be financially profitable, provided, that there is no large fluctuation in construction cost, and at least 70% of the estimated production and revenue, namely sales price, shall be maintained.

Tourism Development Project Package

As stated before, only the financial analysis shall be carried out for the package.

1) Outline of the Package

This package is composed of a group of three (3) projects as shown in Table 7.2.22.

2) Investment Program

The total construction investment shall amount to 1.097 million pesos (at 1984 price levels). The investment program is shown in Table 7.2.23.

Table 7.2.22 TOURISM DEVELOPMENT PROJECT PACKAGE

Project No.	Project Name
128	Marine Research Park
129	Public Beach Recreation Center
130	Infanta Marine Resort

Source: JICA Study Team

Table 7.2.23 TOURISM DEVELOPMENT INVESTMENT PROGRAM

(1,000 pesos at 1984 prices)

Year	Amount of Investment
1985	137,400
1986	183,200
1987	137,400
1988	134,750
1989	164,630
1990	174,590
1991	164,630
Total	1,096,600

Source: JICA Study Team

3) Cost Estimates

The required cost of its operation shall be classified as:

(a) Personnnel Expenses for Operation of Tourist Facilities

The personnel expenses discussed here is the required salary of employees who are directly involved in the management and operation of tourist industries. Total annual salary required, number of employees, and average annual salary by employment class are tabulated in Table 7.2.24.

The figures in the table are computed on the basis of projected number of tourists in 2000.

(b) Operational Expenses

Operational expenses here includes all the necessary expenses besides personnel expenses such as maintenance cost facilities, expenses of facilities operations, and logistic costs of facilities operations.

The operational expenses are estimated at 2% of the total facility construction costs.

Personnel expenses and operational expenses of each year by facility shall be computed by multiplying the required personnel expenses and operational expenses by facility in 2000 by the square root of the facility occupancy rate for each year. The facility occupany rate here is defined as the ratio of the number of tourists per facility in each year by the projected number of tourists per facility in 2000.

4) Revenue Estimates

(a) Projection of number of tourists

The following assumptions are considered:

(i) Famy-Real section of Infanta Road shall be improved by 1986;

(ii) Beaches and related bathing facilities for day time visitors shall be developed between 1988 through 1991;

(iii) Hotel facilities shall be constructed; 300 rooms by 1987 and 400 rooms by 1991; and

(iv) Projection of tourists after the completion of all facilities shall be: day time (short stay) visitors at 93000 persons and overnight (long stay visitors) 175,200 persons.

(b) Projections of Day Time (Short Stay) Visitors

(i) The improvement of Infanta Road shall encourage people to the area so that a new beach resort area shall be developed with daily trips from MMA (1987 - 10% of target number of tourists, 1988 - 20%).

(ii) As facilities shall be developed, the number of day time visitors shall gradually increase (1989-30%, 1990-40%, 1991-50%).

(iii) When all the facilities are completed and bus package tours promoted, the number of day time visitors shall drastically increase (1992 - 75% of target number of tourists. 1993 and after - 100%).

(c) Projections of Overnight (Long Stay) Visitors

(i) Growth in the number of tourists shall largely depend in the sales promotion effort. However, assuming the majority of overnight visitors shall come by package group tours (dominantly from

Table 7.2.24 PERSONNEL EXPENSES

	Persons	Average Annual Salary (₱)	Total Personnel Expenses (₱1,000)
Manager Class	32	50,000	1,500
Clerical, Engineer	168	25,000	4,200
Laborer	600	10,000	6,000
Total	800	14,750*	11,800

Source: JICA Study Team

Note: Average Annual Salary of all Employees

Japan), an unknown resort shall presumably have a difficult time in attracting tourists.

(ii) According to the above mentioned views, the increase rate of tourists shall be estimated conservatively.

(iii) An occupancy rate in the following year (1988) after the construction of the initial facilities shall be 20%.

(iv) Therefore, the rate shall increase by 20% each year (1989-40%, 1990-60%).

(v) An occupancy rate of 60% shall be maintained after 1990.

(d) Revenue

The composition of day time visitors being considered here are those residents of MMA from the upper and middle income brackets. In particular, these are families whose household head earns an income of about 110,000 pesos/month and above, and those single persons with an income of 3,000 pesos per month.

Based on the results of interviews on these income groups, an average of 100 pesos/person/day of local sales can be expected. This amount equals the average amount spent on other beach resorts, and includes the tourist bus fare (a round trip of 80 pesos based on existing bus fares of 30 pesos for one way), it shall still be within the range of their budget or their "willingness to pay". A majority of overnight visitors shall presumably be from abroad, and average sales is estimated at 800 pesos/person/day, including 500 pesos for lodging, 200 pesos for food, and the rest for souvenirs and other items.

The total annual revenue shall be obtained by multiplying the projected number of visitors in each year by the above mentioned unit sales (Table 7.2.25).

Table 7.2.25 TOURISM DEVELOPMENT YEARLY REVENUE

	1987	1988	1989	1990	1991	1992	1993 & After
Day Tourist							
(1000 persons)	9.3	18.6	27.9	37.2	46.5	69.8	93.0
(1000 pesos)	930	1,860	2,790	3,720	4,650	6,980	9,300
Staying Tourist							
(1000 persons stays)		43.8	87.6	131.4	131.4	175.2	175.2
(1000 pesos)		35,040	70,090	105,120	105,120	140,160	140,160
Total							
(1000 persons)	9.3	62.4	115.3	168.6	177.9	245.0	268.2
(1000 pesos)	930	36,900	72,870	108,940	109,770	147,140	149,450

Source: JICA Study Team

5) Result of Financial Analysis and its Evaluation

To summarize all the discussions above, the cost benefit analysis of this package is tabulated in table 7.2.27 and the result of the financial analysis is shown in Table 7.2.26 and Fig. 7.2.10.

The FIRR is computed at 18.2% which is relatively low for operating the package on the basis of loans from commercial banks.

The result of the sensitivity analysis indicates that a change of construction cost and revenue shall affect its financial feasibility to a considerable extent.

Table 7.2.26 RESULT OF FINANCIAL ANALYSIS OF TOURISM DEVELOPMENT PROJECT

	Investment Cost (Base Case = 100)	Benefit (Base Case = 100)	Internal Rate of Return (%)	Net Present Value (MP)	Benefit/ Cost Ratio
Base Case	100	100	18.2	229.7	1.16
Case 1	100	80	13.4	-104.8	0.93
Case 2	100	60	7.5	-439.2	0.70
Case 3	120	100	15.3	20.8	1.01
Case 4	120	80	10.8	-313.6	0.81
Case 5	120	60	5.3	-648.1	0.61
Case 6	140	100	12.9	-188.1	0.90
Case 7	140	80	8.7	522.5	0.72
Case 8	140	60	3.5	-856.9	0.54

Source: JICA Study Team

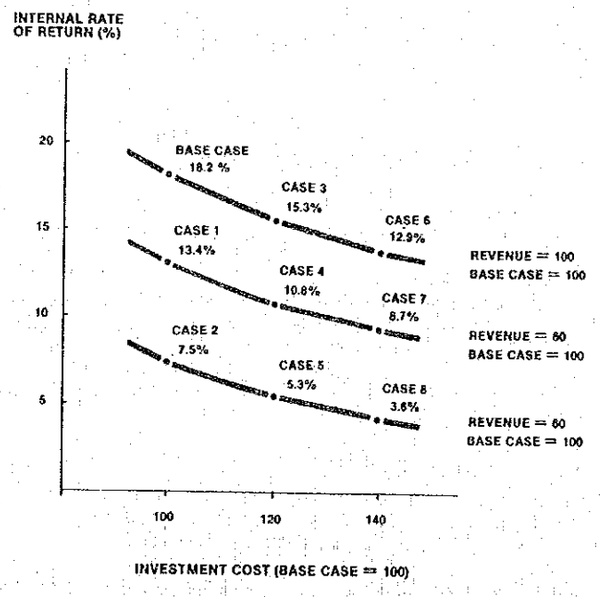


FIG. 7.2.10 FINANCIAL INTERNAL RATE OF RETURN FOR TOURISM DEVELOPMENT PROJECT PACKAGE

Table 7.2.27 COST-BENEFIT STREAM BY PROJECT

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Real Port Package (Economic Analysis)																
Cost	114,790	160,211	342,090	11,519	10,125	10,061	10,315	7,080	7,125	7,166	7,207	7,247	7,293	7,334	7,379	7,402
Construction	114,790	159,753	341,559	8,185	6,626	3,655	3,655									
Operation		458	531	3,334	3,499	6,406	6,660	7,080	7,125	7,166	7,207	7,247	7,293	7,334	7,379	7,402
Benefit		1,101	23,928	98,316	143,741	300,585	422,192	841,992	964,576	1,004,765	1,056,454	1,096,314	1,150,934	1,192,748	1,245,001	1,288,650
Fishing Port			22,432	96,636	142,227	298,727	419,662	838,705	961,189	1,001,276	1,052,858	1,092,611	1,147,120	1,188,824	1,240,960	1,284,515
Savings on Passenger Transportation Cost		1,071	1,335	448	1,234	1,529	2,129	2,795	2,870	2,945	3,024	3,102	3,181	3,259	3,341	3,423
Savings on Barge		30	37	87	109	126	159	201	211	222	234	245	258	271	285	276
Road Benefit			124	145	171	203	242	291	306	322	338	356	375	394	415	436
Real Port Package (Financial Analysis)																
Expenditure	113,254	148,458	208,557	1,964	2,129	5,979	6,233	2,998	3,043	3,084	3,125	3,165	3,211	3,252	3,297	3,320
Construction	113,254	148,000	208,026			3,655	3,655									
Operation		458	531	1,964	2,129	2,324	2,578	2,998	3,043	3,084	3,125	3,165	3,211	3,252	3,297	3,320
Revenue		90	134	4,556	5,653	7,256	9,990	16,857	17,418	17,800	18,294	18,783	19,221	19,768	20,316	20,862
Fishing Port			20	4,131	5,107	6,558	9,085	15,678	16,191	16,520	16,959	17,392	17,769	18,255	18,739	19,232
Commercial Port		59	80	396	513	662	862	1,128	1,175	1,227	1,281	1,336	1,396	1,456	1,519	1,571
Ferry		31	34	29	33	36	43	51	52	53	54	55	56	57	58	59
Infanta Road Package																
Cost	58,026	77,369	58,026	2,321	2,321	2,321	2,321	2,321	2,321	2,321	2,321	2,321	2,321	2,321	2,321	2,321
Construction	58,026	77,369	58,026													
Maintenance				2,321	2,321	2,321	2,321	2,321	2,321	2,321	2,321	2,321	2,321	2,321	2,321	2,321
Benefit				22,920	33,093	48,441	78,252	107,286	113,454	119,893	126,765	134,027	141,762	149,846	158,428	167,516
Savings on Fixed Vehicle Operation				4,431	6,751	10,449	22,951	25,837	27,397	29,035	30,787	32,636	34,610	36,690	38,893	41,238
Time Saving Benefit				18,489	26,342	37,992	55,301	81,449	86,057	90,858	95,978	101,391	107,152	113,156	119,535	126,258
Prawn Culture Package																
Expenditure	11,040	19,820	32,833	88,968	90,592	137,019	140,671	131,137	136,492	141,645	146,616	151,424	156,084	160,610	165,011	169,298
Construction	11,040	19,820	16,140	62,200	62,200	62,200	62,200									
Operation			16,693	26,768	28,392	74,819	78,471	131,137	136,492	141,645	146,616	151,424	156,084	160,610	165,011	169,298
Revenue			23,333	40,000	45,000	125,000	137,500	240,000	260,000	280,000	300,000	320,000	340,000	360,000	380,000	400,000
Tourism Development Package																
Expenditure	137,400	183,200	141,484	150,265	186,004	200,529	193,254	32,762	33,732	33,732	33,732	33,732	33,732	33,732	33,732	33,732
Construction	137,400	183,200	137,400	134,750	164,630	174,590	164,630									
Operation			4,084	15,515	21,374	25,939	28,624	32,762	33,732	33,732	33,732	33,732	33,732	33,732	33,732	33,732
Revenue			930	36,900	72,870	108,840	109,770	147,140	149,460	149,460	149,460	149,460	149,460	149,460	149,460	149,460

8

CONCLUSION AND PROPOSALS

8.1 Study Result and Conclusions

The necessity of the Lungsod Silangan Development, termed Eastern Corridor Development in this study, and the importance of IRM's urban development to create a coastal growth center are discussed in Chapter 1.

Its future population size, as center of the east coast region, has been determined in comparison with the existing urban centers to be 100,000 for the immediate future and ultimately to become 150,000 in the year 2000 (Chapter 3).

Although IRM has a considerable potential in fishery and prawn culture industries, it is at present and as illustrated in Chapter 2, a small-scale agricultural distribution base on the east coast of Luzon Island.

In order to construct a regional urban center in such an undeveloped area, a well-prepared scenario, based on which a considerable amount of investment by the government, shall be required.

IRM urban development has its emphasis, as discussed in Chapter 6, on achieving a model urban center for the agro-forestry and marine product industries in the Philippines. The development is phased into the following three (3) periods: Base Preparation Period (1985-1988), Take-off Period (1989-1992), and Advancement Period (1993-2000).

Fishery resources development shall begin initially and in parallel with this development, the fishery processing industry shall be promoted at the same time as basic distribution facilities such as cold storage, ice plant, fish market, warehouse, etc., shall be constructed. The facilities development shall be implemented by phase, ultimately enabling IRM to function as the distribution base of the east coast region.

The urban development plan initially aims at absorbing increased population and industrial activities by specific spot developments on the existing urban framework. The transition to a new urban structure shall begin in the Take-Off Period, and the firm structure shall be established by the year 2000.

Specifically for transportation, the IRM's role as the coastal distribution base shall require an urgent improvement/development of the interregional transport facilities (Infanta Road and Real Port). Then starting from the Take-off Period, a systematization of urban road network shall be carried out. Likewise, public utilities shall initially serve for the spot developments and their service shall be expanded later from the Take-off Period to an integrated system of public utilities in IRM.

The total investment cost (estimated in Chapter 6 at 1984 prices) of the IRM urban development are as follows:

(i)	Base Preparation Period	2,906 million pesos
(ii)	Take-Off Period	3,919 million pesos
(iii)	Advancement Period	5,459 million pesos
		Total 12,284 million pesos

This amount is considered by no means small, although tracing the general process of transformation across the dichotomy from rural to an urban center and its required amount of projects (the content of projects are described in the project list at the end of Chapter 6), the size of investment estimated above could be easily justified.

Therefore, it is not the total investment cost that should be examined but whether the investment can be paid off profitably or not in the long term, and how to procure the necessary project fund to evaluate the former aspect. This investment is originally not only for the vitalization of the economy and urbanization of IRM alone, but also for the vitalization of the regional economy of the east coast region as a whole.

However, it is very difficult to measure the development's impact on the vitalization of the entire regional economy. Accordingly, the former aspect has been examined by comparing the total investment cost with total tax revenue derived from the IRM economy which shall be expanded on the basis of the investment. The result of this examination indicated that the total urban management shall have a financial internal rate of return of 20.5% assuming an escalation rate of 15%. It is also shown that even though the total fish catch, the output of fishing industry which contains the most indefinite factors among the industrial development of IRM is decreased by 50%, a financial internal rate of return can still be maintained at 18.6%.

Considering these facts, the urban development which this master plan is aiming to accomplish shall have a satisfactory economic feasibility even when it is limited within IRM itself. Furthermore, its effect to vitalize the eonomy of the east coast region by transforming IRM into a self-contained regional center should insure the urgent implementation of this master plan and should ultimately alleviate the regional disparity of Luzon Island.

To clarify a required process of project initiation, urgent and essential projects for the realization of the master plan, called priority projects, have been identified for examination of their feasibility.

Infanta Road Improvement and Real Port Development Projects Package, the most essential group of projects that enhance the IRM's role as the coastal urban base, has an economic internal rate of return of 41% whereas, the Urban Land Development Project Package implies, on the basis of sales price on developed land and buildings and their rent, determined in comparison with existing Export Processing Zone Projects, a financial internal rate of return of 8%, prawn culture project package with a rate of 54%, and Tourism Development Package with a rate of 18%.

Based on these figures, the following conclusions have been derived:

(i) Infanta Road Improvement and Real Port Development Projects Package has by itself, a sufficient level of economic feasibility, therefore, should be implemented with highest priority by the public sector.

(ii) Urban Land Development Project Package, although in the Philippines is a kind of project in which private investment and initiative are generally involved, indicated a low rate of 8%, thus, should be implemented by the public sector, restricting its project component and land area to a necessary but minimal level.

(iii) Prawn Culture Project Package has a sufficient level of financial feasibility and therefore, shall be implemented by the private sector.

(iv) Tourism Development Project Package has a low rate of 18% in the master plan indicating a difficulty of implementation by the present sector. Therefore, it shall be subdivided into smaller components so that it can be implemented by the private sector successively, starting from

the most profitable sub-component.

The inter-relations and mutual causes and effects among the projects are clarified by means of the multi-level directed graph illustrated in Fig. 7.2.1 (Chapter 7: Evaluation).

According to this graph it is apparent that basic infrastructural development such as Infanta Road improvement, existing Real Port improvement, and new Real Port construction should be implemented with first priority.

On the other hand, with respect to economic impact on regional development (7.1 An Overall Evaluation of Chapter 7), the contribution of the prawn culture project shall mark as much as 30% in terms of population and 37% in terms of GRDP (decrease without said project by the year 2000). In addition, the contribution of tourism development shall be 14% both in terms of population and GRDP (by the year 2000).

Based on the above discussion, the following shall be selected as priority project packages and their internal rates of return were calculated respectively as shown below:

(i) Real Port and Infanta Road Improvement Project Package: 6%(FIRR) 41%(EIRR)

(ii) Real Urban Land Development Project Package: 8%(FIRR)

(iii) Prawn Culture Project Package: 54%(FIRR)

(iv) Tourism Development Project Package: 18%(FIRR)

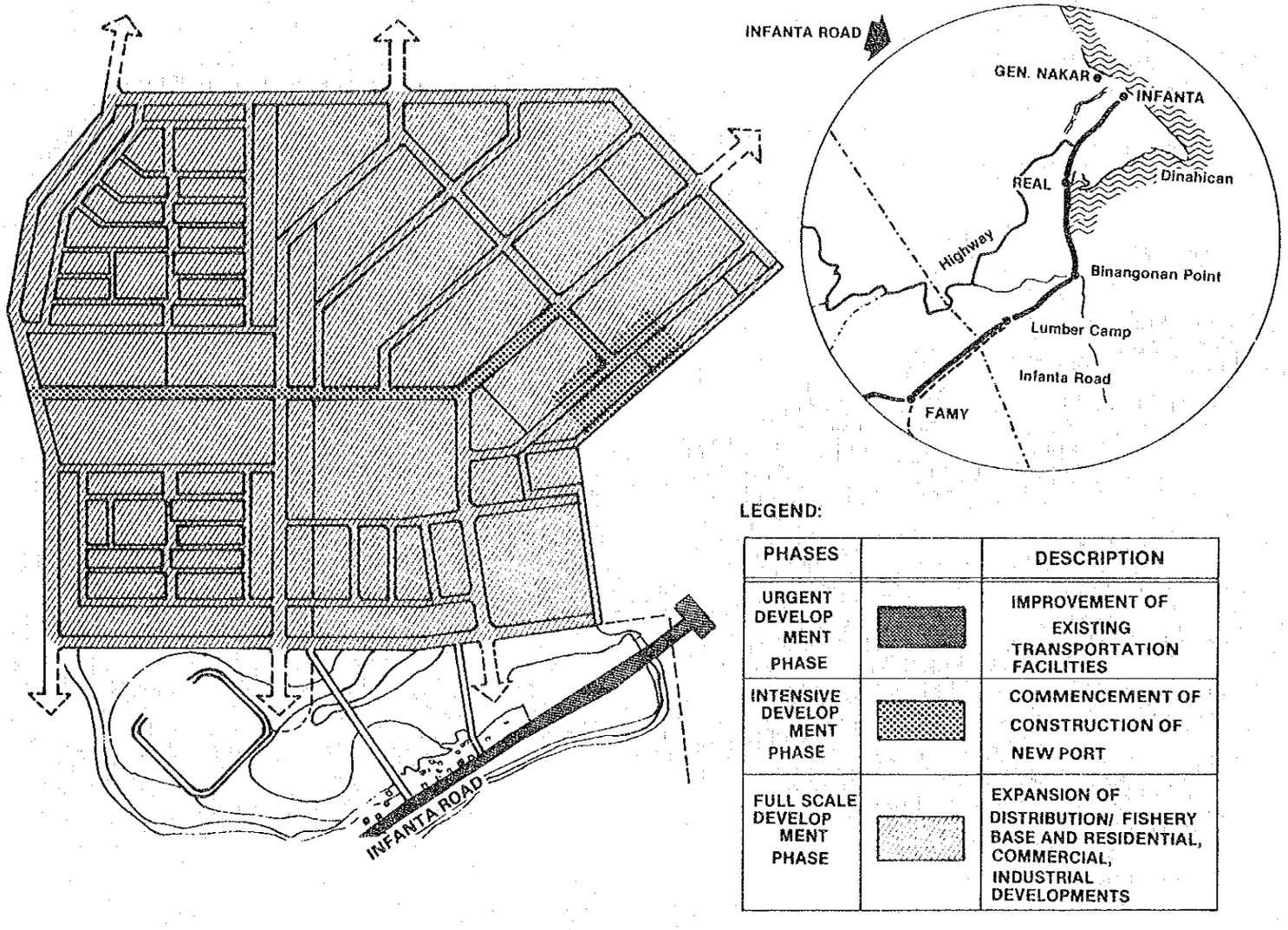
8.2 Proposals

In order to implement projects (i) Real Port Development and Infanta Road Improvement Project Package: and (ii) Urban Land Development Project Package: as the Master Plan recommended, 1.4 billion pesos shall be required. This amount (even though it can be guaranteed to be paid off ultimately) shall be an excessive expenditure in the present Philippine economy.

Therefore, the phasing and partial implementation of these priority project packages shall be proposed taking financial feasibility into consideration. The proposal is illustrated in Fig. 8.2.1 and Table 8.2.1. The basic policy of the phasing is: firstly, that the urgent need for transportation services of at least local standard shall be satisfied through the improvement of existing facilities (Infanta Road and Real Port); secondly, that a minimal but essential level of new port development shall be commenced ; and finally, based on this that full-scale land development shall be implemented.

The above proposals emphasize infrastructural development; however, in addition, industrial development shall be similarly essential. Namely, (i) inducement of private capital into the essential sectors of development such as agro-forestry, fishery, aqua-culture and tourism; (ii) resource studies as prerequisite to the above; (iii) implementation of prototype and pilot projects; (iv) establishment of distribution / marketing systems for production materials (including juvenile prawns, etc) and products shall necessarily be carried out in line with infrastructural development.

Furthermore, to provide an effective and efficient entity for the smooth implementation of proposed developments and projects within IRM and other contiguous areas, the establishment of a Development Authority is proposed.



LEGEND:

PHASES		DESCRIPTION
URGENT DEVELOP MENT PHASE		IMPROVEMENT OF EXISTING TRANSPORTATION FACILITIES
INTENSIVE DEVELOP MENT PHASE		COMMENCEMENT OF CONSTRUCTION OF NEW PORT
FULL SCALE DEVELOP MENT PHASE		EXPANSION OF DISTRIBUTION/ FISHERY BASE AND RESIDENTIAL, COMMERCIAL, INDUSTRIAL DEVELOPMENTS

FIG. 8.2.1. PHASED DEVELOPMENT SCHEME

Table 8.2.1 PROPOSED PHASING OF PRIORITY PROJECTS

(IN 1984 MILLION PESOS)

PRIORITY PROJECT COMPONENT (MASTER PLAN)			URGENT DEVELOPMENT PHASE		INTENSIVE DEVELOPMENT PHASE		FULLSCALE DEVELOPMENT PHASE	
1. INFANTA ROAD IMPROVEMENT AND REAL PORT DEVELOPMENT PROJECTS PACKAGE (PHASED)								
(1) INFANTA ROAD IMPROVEMENT PROJECT (FAMY-REAL)		**COST (MP)**						
a Inprovement of Road and Horizontal Alignment	Lumber Camp-Binangonan point (15.3^{km}) Widening, horizontal alignment, drainage, A.C Pavement	104.3	a Road Improvement of 8.8^{km} (Pavement, Drainage)	31.4	a Road Improvement of 6.5^{km} (Widening of 3.0^{km}, horizontal alignment of 3.5^{km}, Pavement Drainage of 6.5^{km})	68.7	a Safety facilities	4.2
b Imporvement of Road	Binangonan Point-Real (118.Km) widening drainage, A.C.Pavement	44.3	b Road Improvement of 11.8^{km} (Widening horizontal alignment Drainage)	42.7	b Safety facilities	1.6		
c Imporvement of Bridges	Construction of Five Box Culvert Bridges and one P.C.Bridge	15.7	c Construction of bridges (5 Box culverts, 1 P.C Bridge)	15.7				
d Pavement (Bituminous Pavement)	Famy-Lumber Camp (18.1Km)	29.1	d Pavement of 18.1^{km}	29.1				
SUB-TOTAL		193.4		118.9		70.3		4.2
(2) REAL PORT CONSTRUCTION PROJECT								
a Existing REAL Port Improvement	Improvement and Expansion of existing 26^{m} wharf	2.3	a Improvement of existing Port	2.3				
b Constraction of wharf	Fishing Port (500 m) Commercial Port (250 m)	58.5			b Construction of wharf(I) (fishing port 250^{m})	19.5	b Construction of wharf (II) (fishing port 250^{m}, Commercial port 250^{m})	39.0
c Dredging	Dredging of 17.5 ha (max depth - 5.5 m)	139.4			c Dredging for fishing port (9.5^{ha} x 3.5^{m})	33.5	c Dredging for commercial port (8.0^{ha} x 5.5^{m})	105.9
d Construction of Breakwater	Construction of Breakwater (500^{m})	48.0					d Constracion of Breakwater (500 m)	48.0
e Construction of Landing / Stockpile Yard and Slip Way	Development of 2.7 ha	37.2					e Landing Yard, Stockpile Yard Slipway	37.2
SUB-TOTAL		285.4		2.3		53.0		230.1
TOTAL		478.8		121.2		123.3		234.3
2. URBAN LAND DEVELOPMENT PROJECT PACKAGE (PHASE I)								
a Land Development	Land Development (Distribution/Industry 45.6ha Residential 60.0ha)	403.1			a Land Development (Land Development 2.5 ha, Construction of access road 1.2km)	15.5	a Land Development (aprox 100^{ha})	387.6
b Construction of Port Related Facilities	Ice Plant, cold storage, fuel depot, office	69.8			b Ice Plant, Coldstorage, fuel depot, office	69.8		
TOTAL		472.9				85.3		387.6
3. MARINE AND BRACKISH CULTURE CENTER (PHASE I)								
a Prawn Juvenile Culture Center	Construction of Hatchery tanks for prawn fry	20.4			a Project on Prawn Juvenile culture Center	20.4		
TOTAL		20.4				20.4		
GRAND TOTAL		972.1		121.2		229.0		621.9