

physical conditions such as soil, water, climate, etc. have almostly not been studied. Accordingly, such approach is required as starting from review of surveying method and method of analysing the surveyed results, then expanding the research and experimental subjects based on the analysed results of survey, and undertaking the re-verification of experimental result on the field. For such purpose, some model farms on which it is easy to undertake the periodical and continuous surveys, are to be selected, and the extension services are also reinforced centering on such model farm.

Besides, the seed production is also to be systemized for enabling supply of good quality of seed establishing a seed multiplication center which can provide some varieties of the seed suitable for the characteristics of different districts.

(4) Study Items for Project Implementation

For implementing this project, the arrangement of basic data related to the physical conditions is required, but the following studies and plannings are to be undertaken in parallel.

- 1) To carry out a basic survey related to land use, cropping area, etc.
- 2) To survey the actual situation of farming practice by crops and to analyse the relation with physical conditions.
- 3) To carry out the agro-economical survey related to quantity of production, marketability, etc.
- 4) Planning of cropping area by districts and by suitable variety of crops taking these above mentioned items into account.
- 5) To provide research/experiment program related to introduction of new kind and/or new variety of crops which are respondent to the change of market requirement, etc.
- 6) To study the method of introduction of advanced technology which have been developed at other regions or elsewhere.
- 7) To study the research/experiment - extension services system including the establishment of model farms.

5.5.5. Post Harvesting Improvement Project

(1) Project Components

The present paddy production in the Project Area is assumed as about 370,000 tons/ha, and about 280 rice mills are under operation (1,320 t/annum/one rice mill). The rice milling is the largest rural industry in the Project Area, but the room of improvement including the marketing system is considerably large. Furthermore, the production is expected to reach to 460,000 t in the Project Area in case of acceleration of rice production increase scheme, and, consequently, lowering of rate of loss and wastage at the post harvesting procedures can influence largely on the self-sufficient supply plan of rice as well as the implementation of other projects, therefore the post harvesting practice including the marketing system of rice are to be reviewed in this project.

(2) Purpose of Project

The initial purpose of this project is to lower the rate of loss and wastage in the rice milling process. At the same time, there is such purpose as effective use of available resources by means of production of edible oil which has been greatly depending on the importation providing material bran suitable for rice bran oil extraction with the improvement of rice milling practice.

(3) Method of Project Implementation

This project will be implemented, as explained in the above para. 5.3.4, as improvement of existing facilities and introduction of new facilities. In both cases, the pilot project is to be implemented in the first instance and extend the obtained results to others. At the establishment of new facilities, the application of rural cooperative operation system is recommended.

LOGICAL FRAMEWORK OF POST HARVESTING IMPROVEMENT PROJECT

SOCIO-ECONOMIC GOALS

1. Contribution in self-sufficient supply of rice.
2. Contribution in self-sufficient supply of edible oil.

MEASURES GOAL ACHIEVEMENT

1. Production increase due to improvement of yield rate 60% → 65%
2. Increase of income due to lowering mix ratio of broken rice 30 riata/kg *
3. Production of material bran for rice bran oil 50 kg/t of paddy

* Present ratio of mixture of broken rice 26% Amol-3
Planned ratio of mixture of broken rice 15%

NECESSARY ASSUMPTIONS for GOALS

1. Application of Rural Cooperative operation system for new rice mills.
2. Security of paddy/rice pricing policy.
3. Introduction of facilities for rice bran oil extraction & refinery.

IF PURPOSES plus ASSUMPTIONS, then GOALS

PROJECT PURPOSES

1. Increase of yield rate of rice milling by mean of improvement of existing rice mills (actual increase of rice production)
2. Accelerating rice milling practice improvement by mean of introduction of new rice milling facilities
3. To avail rice bran oil extraction producing material bran.
4. To meet the requirement caused from mechanization of paddy harvesting.

END-OF-PROJECT STATUS

	Present Production	Planned Production
1. Increase due to improvement of existing mills	14,800t	13,000t
2. Increase due to renovation of old facilities	5,200	7,800
3. Increase due to introduction of new facilities	-	6,700
4. Total (Increase with Project)	20,000	27,500
Note:	Present Production = 370,000t	Planned Production = 460,000t

NECESSARY ASSUMPTIONS for PURPOSES

1. Stagnous revision of contracted rice milling system and security of paddy dealing system.
2. Upbringing of rice mill engineering specialist.
3. Establishment of rice milling standard.
4. Arousing interest of farmer on rice milling problem.

IF OUTPUTS plus ASSUMPTIONS, then PURPOSES

PROJECT OUTPUTS

1. Improvement works of existing rice mills
2. Renovational works of superannuated rice mills (including consolidation)
3. Installation of new rice milling facilities

COMPONENTS and QUANTITIES

1. Rice mill which need additional facilities 20 mills *
2. Rice mill with partial replacement 60 *
3. Rice mill with large replacement 70 *
4. Rice mill with large scale improvement 80 *
5. Rice mill to be renovated 50 *
6. Newly installed 18 **

* Assumed number — to be confirmed later.
** Installation Capacity = 5,000t/annum (paddy basis)

NECESSARY ASSUMPTIONS for OUTPUTS

1. Enlightenment and guidance to rice millers.
2. Revision on conditions for permitting rice mill installation by Dept. of industries and establishment of facilities standard including life time of equipment.
3. Providing required materials and equipment.
4. Implementation of pilot projects of improvement of existing rice mills and introduction of new facilities.

IF INPUTS plus ASSUMPTIONS, then OUTPUTS

PROJECT INPUTS

1. Survey of actual situations of existing rice mills 30 man.month
2. Consulting Services F/S Detailed plan & design of existing rice mill 60 man.month
Detailed design of new facilities 30 man.month
Detailed design of new facilities 30 man.month

* per each pilot project

COSTS and SCHEDULE

WORK ITEMS	Cost (10 ⁶ Riata)	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1. Survey of actual situation of existing rice mills											
2. F/S											
3. Detailed plan & design of existing rice mill improvement											
4. Construction of pilot project for existing rice mill											
5. Construction of pilot project for new rice mill											

(4) Study Item for Project Implementation

In the implementation of this Project, a feasibility study is requested including such items of studies as mentioned below;

- 1) To survey the actuality of loss and wastage in the procedures of harvesting, threshing, transporting, storing of paddy and rice, rice milling, marketing, etc.
- 2) Classification of existing rice mills by types as mentioned in the above para. 5.3.4. (1).
- 3) To provide the plan of improvement of existing facilities in short and medium terms based on the above classification. A rationalization plan including consolidation of facilities is also to be provided for medium and long term.
- 4) To compute cost and benefit related to the improvement of existing facilities, and to select the pilot project site as well as preparation of a detailed plan for the pilot project.
- 5) Selection of pilot project site for introducing new rice milling facilities as well as preparation of the detailed plan of the said pilot project.

5.5.6. Livestock Farming Promotion Project

(1) Project Components

Forage crop cultivation as second crop after harvesting paddy will be encouraged to increase forage production by the implementation of those projects of area drainage, terminal facilities improvement and farming practice/farm management improvement. With those projects, necessary facilities for livestock farming promotion have to be consolidated, and also the improved feeding techniques should be diffused in order to realize the paddy - livestock combined agriculture in the Project Area. For the purpose, concrete measures are studied and the livestock farming promotion project is composed of the consolidation of the infrastructures for animal husbandry by the governmental investments and improvement of managing and feeding techniques by the farmers themselves. As for the latter, the pilot project method will be adopted.

(2) Purpose of Project

The purpose of the project is to supply livestock products such as butter and meat which have been depending on import at high rate by efficient and rational utilization of the forage resources in the Project Area and by increasing productivity of the livestock. The contribution of the Project Area itself is not so high, but in considering the extending effects of the results in the Project Area to the surrounding areas, the Project will be able to contribute greatly to raising self-sufficiency of those livestock products in the country.

(3) Method of Project Implementation

The project will be implemented according to the following sub-projects;

1) Livestock Improvement Project

Livestock improvement will be made through the establishment of the breeding station and improvement of feeding conditions.

Objectives of the cow improvement are as shown below.

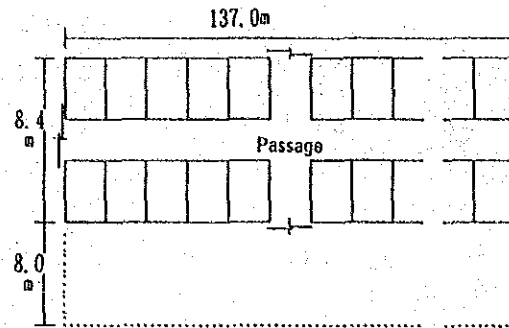
	Local Cows		Hybrid Cows		Pure Holsteins	
	Present	Project	Present	Project	Present	Project
Milk production (kg)	500	700	2,000	2,500	4,000	4,300
Calving rate (%)	50	60	70	75	80	85
Mortality rate (%)	7	5	7	5	5	5

In order to reach those targets, execution of the feeding which is met to feeding standard as shown in Table C.3.12 in Appendix C-3 and establishment of the breeding station is projected. The outlines of the breeding station is as follows.

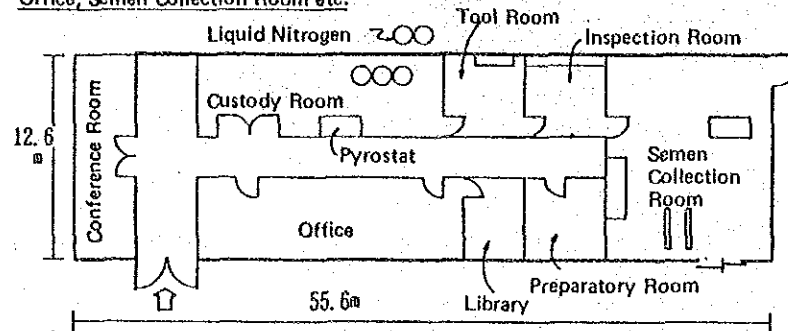
Location : Inside the Project Area
 Facilities : Cattle shed for 30 bulls (1,150m²)
 Office and semen collection room etc. (700m²)
 Staff : Administration - 2 persons
 Veterinarian - 3 persons
 Inseminator - 5 persons

Layout of the Station;

Cattle Shed for Bulls



Office, Semen Collection Room etc.



By the execution of livestock improvement, the annual milk production can be forecasted to increase from about 40,000 tons to 104,000 tons and the meat production will be 4,600 tons per annum.

2) Forage Production Project

It is projected to crop berseem in 50% of paddy fields of 68,460 ha which is proposed in land use in order to improve feeds and feeding conditions in the Project Area. The target yield of berseem is set up at 60 tons/ha. Therefore, in case of 50% of crop intensity, the amount of berseem production is estimated at 2.05 million tons and the seed requirement is about 1,027 tons, in assuming 30 kg seeds per ha.

3) Animal Product Processing Project

Present annual milk production is estimated at about 40,000 tons and projected milk production at 104,000 tons in case of 50% crop intensity for berseem, and about 94,000 tons milk will be processed. About 1,000 tons of milk is for calves suckling. As a result, daily capacity of the milk factory is accounted as 314 tons/day and the products are UHT (long Life Milk), yoghurt, butter, and dough.

The slaughterhouse with a daily capacity of 150 heads of cattle and 200 heads of sheep/goats is planned, and the processing facilities for bone and blood are also equipped for processing into animal feeds in the site.

The leather factory for raw hide processing is planned to be established in the Project Area according to the number of slaughtered livestock.

(4) Study Items for Project Implementation

Necessary items and plans for the project implementation are prepared as follows based on previous descriptions.

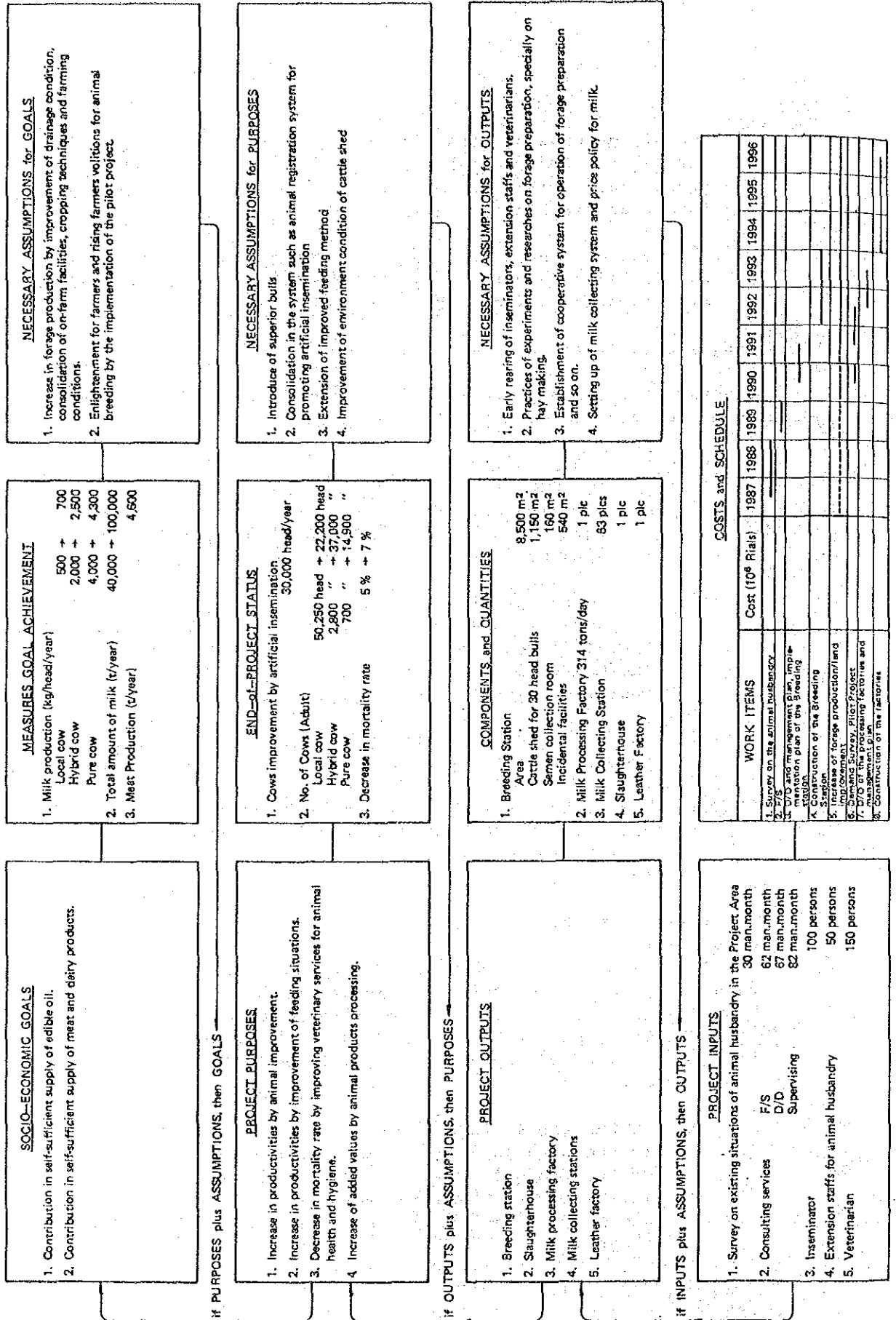
1) Breeding Station Plan

- i) A map of the site with the scale of 1:1,000 is to be provided for preparing layout and designs of the facilities.
- ii) Demand for the frozen semen in the Project Area and surrounding areas will be grasped through the demand survey. Then production plan will be prepared including production cost and details of the operation plan of the station.
- iii) Based on the above, the preliminary design will be prepared and the project cost will be also estimated.
- iv) The study report on this project will be prepared and after the discussion with the Animal Husbandry Office and the Veterinary Office implementation plan will be prepared.

2) Forage Production Plan

- i) In order to produce necessary berseem seeds, which is a basic factor for improving feeding condition in the Project Area, the seed farms will be established in Gorgan or Khuzestan, and the related facility design and operating plan will be made with cost estimation.
- ii) In the early stage, berseem cropping will be extended in the high land taking the influences to other areas of the Project Area into consideration. As for the low land area, berseem cropping will be spread according to the progress of drainage improvement project.

LOGICAL FRAMEWORK OF THE LIVESTOCK FARMING PROMOTION PROJECT



3) Animal Product Processing Plan

- i) Necessary survey to grasp the demand for processed animal products in the Project Area and surrounding areas will be conducted.
- ii) Based on the results of the aforesaid survey, the suitable capacity of the factories will be decided, and then the necessary facility design and operation plan will be prepared with cost and benefit estimation.
- iii) As for milk collecting stations, the suitable disposition plan will be made taking into consideration the effective distribution of milk production.

5.5.7. Village Modernization Project

(1) Project Components

This project aims to promote the rural industries which are to meet the requirement of agricultural activities and to add the market value of crop and livestock products in parallel with the improvement of living environment responding to the increase of agricultural productivities in the Project Area. Furthermore, to study the applicable method of reinforcement of cooperative and self-governing activities by the farmers and/or rural inhabitants to realize the above targets. For such purpose, the application of pilot project system is suggested considering the necessity of acceleration of participation of inhabitants in the project implementation, viz., the model area is to be selected firstly, and the project is to be implemented therein to arouse the interest of inhabitants of the surrounding areas.

(2) Purpose of Project

The conclusive purpose of this project is to absorb the surplus labor which will appear due to the rationalization of farming works to be accelerated with the introduction of advanced technology and others within the Project Area as much as possible, and, in parallel, to endeavour the qualitative improvement of labor and its maintenance which are required for increasing agricultural productivity by means of improvement at social infrastructures, promotion of rural industries, reinforcement of farmers' institution, etc.

(3) Method of Project Implementation

It is foreseen that the implementation of those projects related to the increase of productivity will provide great impact to the social and economic structures of the Project Area. Therefore, the implementation of this project is to be decided in accordance with the progress of implementation of other projects.

However, materialization of this project requires considerably long preparatory period because the upbringing of required staff for rendering social services such as educational and medical services needs a long period effort. Therefore, the preparatory works of this project are to be commenced in the soonest opportunity.

Taking the above into account, the survey of actual situation of the existing rural facilities is to be carried out in parallel with the early establishment of Social Infrastructural Improvement Committee explained in the above para. 5.4.3. The survey of actual situation is to be carried out on the appropriate number of sample villages which are to be selected from viewpoints of location, scale of village, situation of availability of social infrastructures, etc. based on the results of the Village Survey - 1364, and the layout map of existing facilities, etc. are also to be provided in parallel. The model area is to be selected based on such sample survey after confirming the intention and interest of the inhabitants, then the model village plan is to be prepared. The experience of implementation of village modernization project in Iran is recorded as the "Rural Town Plan" in 1350s. The Project was almostly failure because of negligence of actual situation of agriculture and farmer's intention, but forcing the inhabitants to remove to the newly built rural towns. The village plan is to be prepared in such form as the inhabitants assent the expected changes in their own village taking the study of "how to expand and improve the facilities required by the inhabitants" into account. Therefore, it is necessary not to hesitate to make the amendment and supplement on the initially prepared plans based on the exchange of views with the inhabitants even in case of employment of the specialist such as consulting engineers.

On the other hand, as explained in the above para. 5.4.4, the operation of rural industries on economic basis is rather difficult without active support or participation of beneficiary or producer of material crops. Therefore, the required research and experiment and/or improvement of relative facilities are to be undertaken with special consideration on the potential supply (both qualitative and quantitative) of material in parallel with the study on the measures for reinforcing and expanding the activities of farmers' institutions for the promotion of rural industries in the Project Area.

(4) Study Items for Project Implementation

The required survey and planning for the implementation of this project are as below:

1) Model Village Plan

The implementation program of this plan is to be provided for the model area selected by the Social Infrastructural Improvement Committee providing the followings and foreseeing the socio-economical changes of the selected model area;

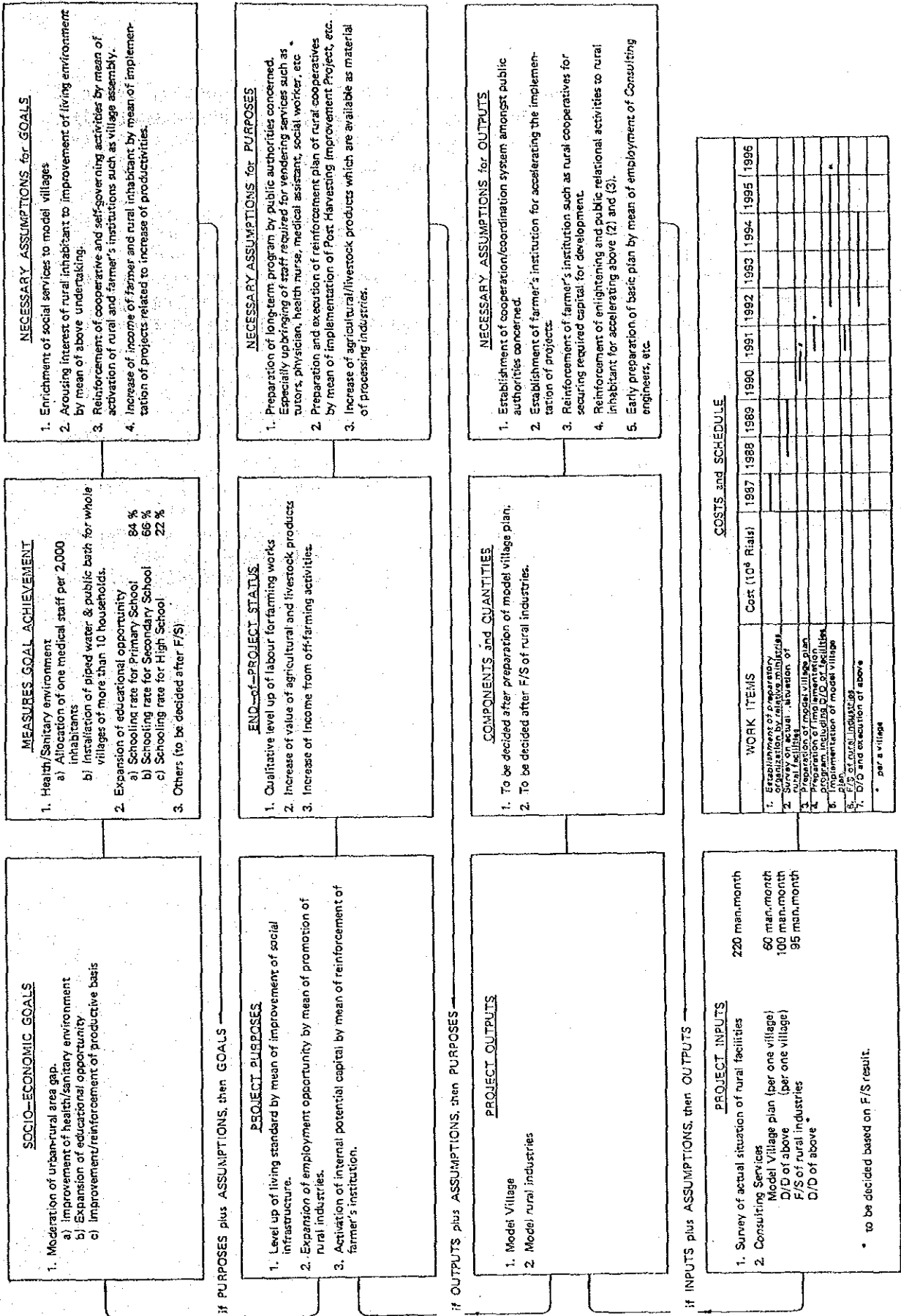
- i) To provide a 1/1,000 map of the project site clarifying the land ownership, present land use, layout of existing facilities, etc. on the map.
- ii) To clarify the details of use, management, operation and maintenance of existing facilities.
- iii) To study the required capacity, allocation, scale and dimension of each facility, etc. based on the target rate of improvement of social infrastructure taking the relation with surrounding areas and change of future population into consideration.
- iv) To provide preliminary design of each facility and to estimate the required cost, then to appraise the required social services qualitatively and quantitatively.
- v) To provide planning report based on the above and to discuss with the Social Infrastructural Improvement Committee. The implementation program is to be provided taking the requested amendment by the Committee into account.

2) Model Rural Industry Plan

This plan is to be provided centering around the model village and based on the following survey and study considering the progress of implementation of the projects related to the increase of productivities of crops and livestock.

- i) To clarify the expected production of crop and livestock in and around the project site, kind and capacity of relative industries, quality and quantity of available materials for processing, etc.
- ii) To select feasible rural industries based on the above survey, then to study the economic scale at each industry.

LOGICAL FRAMEWORK OF VILLAGE MODERNIZATION PROJECT



SOCIO-ECONOMIC GOALS

- Moderation of urban-rural area gap.
 - Improvement of health/sanitary environment
 - Expansion of educational opportunity
 - Improvement/reinforcement of productive basis

MEASURES GOAL ACHIEVEMENT

- Health/Sanitary environment
 - Allocation of one medical staff per 2,000 inhabitants
 - Installation of piped water & public bath for whole villages of more than 10 households.
- Expansion of educational opportunity
 - Schooling rate for Primary School 84 %
 - Schooling rate for Secondary School 66 %
 - Schooling rate for High School 22 %
- Others (to be decided after F/S)

PROJECT PURPOSES

- Level up of living standard by mean of improvement of social infrastructure.
- Expansion of employment opportunity by mean of promotion of rural industries.
- Activation of internal potential capital by mean of reinforcement of farmer's institution.

END-OF-PROJECT STATUS

- Qualitative level up of labour for farming works
- Increase of value of agricultural and livestock products
- Increase of income from off-farming activities.

PROJECT OUTPUTS

- Model Village
- Model rural industries

COMPONENTS and QUANTITIES

- To be decided after preparation of model village plan.
- To be decided after F/S of rural industries.

PROJECT INPUTS

- Survey of actual situation of rural facilities 220 man.month
- Consulting Services
 - Model Village plan (per one village) 60 man.month
 - D/D of above (per one village) 100 man.month
 - F/S of rural industries (per one village) 95 man.month
 - D/D of above *

* to be decided based on F/S result.

COSTS and SCHEDULE

WORK ITEMS	Cost (10 ⁶ Riats)	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1. Establishment of farmer's institution for accelerating the implementation of projects											
2. Survey of actual situation of rural facilities											
3. Preparation of model village plan											
4. D/D of above (per one village)											
5. Implementation of model village plan											
6. F/S of rural industries											
7. D/D and execution of above *											
* per a village											

- iii) To decide the allocation (kind of industry, scale, etc.) to the project site and to study the capacity of facilities, cost, benefit, etc. of the allocated industries taking the total demand in the Project Area into consideration.

(5) Additional Development Plans in Future

As one of the measures to create more employment opportunities, the fish breeding plan in the abbandans mentioned in paragraph 5.3.6. (2) is considered to be recommendable although an economic study on this plan shall be conducted based on survey results in future. The annual catch is estimated at 180 tons assuming that fish culture is made in 80 % of the existing abbandans, that is, 3,000 ha, that the productivity by natural feeding is 200 kg/ha/annum, and that the catching rate of fish is 30 %. The plan would result in an income of 90,000,000 Rls. assuming price per kilogram at 500 Rls. If the pen fish culture is adopted in parallel with this plan, the catch would increase to such an extent as full-time fish raisers would grow in the Project Area. The future development plans for the Project Area shall be studied from different angles including the feasibility of fish breeding plan mentioned above and others.

5.5.8. Project Cost and Implementation Program

(1) Conditions of Cost Estimation

- 1) The unit costs of the construction works are based on the Estimation Data Books, which were collected during the field survey in 1364. The Data Books were published in Farvardin, 1363 by Government of Islamic Republic of Iran.
- 2) The construction works will be executed by the awarded contractor through local competitive bidding. Since the contractor should prepare construction equipment, the depreciation of the equipment shall be included in the construction costs.
- 3) The overhead costs are estimated at 40 percent of the direct construction cost.
- 4) Engineering and administration costs are estimated at 15 percent of the costs of civil works.
- 5) Physical contingency is estimated at 15 percent of the total project cost.
- 6) The annual rate of price escalation is estimated at 12% of the prices in the previous year according to the average value for the past six years. (refer to Table E.1.4 in Appendix)
- 7) The costs of land acquisition are not included in this estimation because the land lots for the main facilities are acquired by land expropriation law and the land for on-farm facilities are offered by the farmers concerned.
- 8) The currency exchange rate is as follows.
100 Yen = 40 Rials (as of Aban, 1364)

(2) Outline of Construction Works and Construction Method

1) Outline of Construction Works

The major construction works in each project are summarized as follows:

i) Area Drainage Project

- ° Main Drainage Canal Works (Including operation and maintenance roads with width by 4.00 m)

Sub Area		Bottom Width (m)	Canal Height (m)	Length		Total (km)
				New (km)	Improvement (km)	
Kari Rud	Low	9.5	3.0	49.0	111.1	160
Kari Rud	Middle	4.0	2.7	69.2	89.9	159
Haraz Left Bank	Low	5.0	2.7	34.0	77.0	111
Haraz Left Bank	Middle	2.5	2.7	35.0	45.4	80
<u>Total</u>		-	-	187.	323.	510

- ° Related Structures to Main Drainage Canal

Structure	Description	Quantities (places)
- Drop	Drop height H=1.00m	240
- Bridge (Kari Rud, Low)	Span L=8.00m x 2 Width W=4.00m	66
(Kari Rud, Middle)	L=10.00m W=4.00	84
(Haraz, Low)	L=5.50m x 2 W=4.00	96
(Haraz, Middle)	L=8.00 W=4.00	138
- Check (Dual-purpose canal)		55

- ° Abbandan Improvement Works (Spillway and dredging works) 138

ii) Land Improvement Project

° Intake Works (Main canal to secondary canal)

<u>Main Canal</u>	<u>Intake Discharge</u> (cu.m/sec)	<u>Quantities</u> (places)
Kari Rud	Q = 2.0	10
	Q = 1.0	30
Haraz Rud		
Left Bank	Q = 4.0	11
Right Bank	Q = 2.0	11

° Settling Basin Works

<u>Canal</u>	<u>Intake Discharge</u> (cu.m/sec)	<u>Quantities</u> (places)
Kari Rud	Q = 40.0	1
Zanne Mard	Q = 3.5	1
Sag Rud	Q = 1.5	1

° Division Works

- Secondary Canal to Tertiary Canal

<u>Area</u>	<u>Type</u>	<u>Discharge</u> (cu.m/sec)	<u>Quantities</u> (places)
High, Middle Land	Jet Flow	Q = 0.50	175
Low Land	Gate-controlled and parshall flume	Q = 0.50	65

- Tertiary Canal

<u>Type</u>	<u>Discharge</u> (cu.m/sec)	<u>Quantities</u> (place)
Gate-controlled and parshall flume	Q = 0.25	720

- Tertiary or Quaternary Canal to On-farm Ditches

<u>Type</u>	<u>Discharge</u> (cu.m/sec)	<u>Quantities</u> (place)
Gate-controlled and parshall flume	Q = 0.125	985

° On-farm Works

<u>Area</u>	<u>Quantities</u>
High Land	21,180 ha
Middle Land	28,330
Low Land	22,080
<u>Total</u>	<u>71,590 ha</u>

The aforesaid quantity includes the area of the right-of-way for the farm.

° Pipe Drainage (ø75 mm) Works

<u>Area</u>	<u>Construction Area</u> (ha)	<u>Construction Length</u> (km)
Middle Land	13,500	2,254.5
Low Land	10,500	1,753.5
<u>Total</u>	<u>24,000</u>	<u>4,008.0</u>

iii) Rural Road Improvement Works

<u>Road Width</u>		<u>Pavement</u>	<u>Construction Length</u> (km)
<u>Total</u> (m)	<u>Effective</u> (m)		
5.00	4.00	Gravel	700

iv) Animal Husbandry Facilities Works

<u>Facilities</u>	<u>Quantities</u> (Places)
Milk Processing Factory (Production 315 t/day)	1
Milk Collecting Station	63
Slaughterhouse	1
Leather Factory (Building Area = 1,000 sq.m)	1
Breeding Station (Building Area = 1,150 sq.m)	1

2) Construction Method

i) Earth Works

- Main Drainage Canal Works

The works consist mainly of canal excavation, and therefore, it is comparatively easy to execute the works even in the rainy winter as well as in the dry summer. The excavated materials are hauled by bulldozers or damp trucks and used for the rural road improvement works and on-farm works.

- On-farm Works

The works should be completed within six month period between the end of harvest of paddy and the beginning of land preparation. Available working days during the aforesaid construction period are estimated at 120 days according to rainfall data. The embankment materials for the irrigation ditches and farm roads will be collected from the high lying farmland and/or from the main and lateral drainage canals as well as drainage ditches.

For land levelling works, swampy type bulldozer (16 tons) should be provided in addition to the standard type (21 tons) because it is unavoidable to execute the works even in the wet conditions after rainfall or in the ill-drained areas of middle and low land.

ii) Concrete Works

The concrete works such as canal structures are executed by using concrete mixer of 0.5 cu.m class; however, concrete is poured by manpower. Concrete aggregate can be collected from the riverbed of Haraz river.

(3) Construction Unit Cost

The construction unit costs consist of the following components.

- Labour cost
- Material cost
- Operation cost of construction equipment

Labour, materials and major construction unit costs are shown in Table E.1.1 to Table E.1.3 of Appendix.

Construction costs are composed of the following:

Construction Costs = Direct Construction Costs
= Unit Costs x Designed Quantities
Overhead Costs

The overhead costs include the following components.

- Temporary works	5%
- Extra costs by the areas	5% (in case of Mazandaran)
- Overhead	30%
<u>Total</u>	<u>40%</u>

(4) Components of Project Costs

The components of project costs are as follows.

- 1) Civil Works
 - a. Area Drainage Works
 - b. Land Improvement Works
 - c. Rural Road Improvement Works
 - d. Animal Husbandry Facilities Works
- 2) Engineering and Administration
- 3) Physical Contingency
- 4) Price Escalation (2 years from Farvardin 1363 to Farvardin 1365)

(5) Project Costs

Project costs are estimated at 80,200,000,000 Rls. which can be broken down as shown below; moreover, the breakdown for each sub-area is shown in Table E.1.5 in Appendix.

Table 5.5.1. Project Cost

(Unit: 1,000 Rls.)

Item	Unit
1. Civil Works	
1.1. Area Drainage Works	
1) Main Drainage Canal	6,310,100
2) Abbandan Improvement	819,000
3) Dike (Babol)	154,900
<u>Sub-total</u>	<u>7,284,000</u>
1.2. Land Improvement Works	
1) Intake	540,200
2) Settling Basin	270,600
3) Division Works	2,105,400
4) Canal Improvement	80,700
5) On-farm	30,433,400
6) Pipe Drainage	1,697,200
<u>Sub-total</u>	<u>35,127,500</u>
1.3. Rural Road Improvement Works	2,317,700 3,759,100
1.4. Animal Husbandry Facilities Works	
<u>Sub-total</u>	<u>48,488,300</u>
2. Engineering and Administration	7,273,200
<u>Sub-total of 1 and 2</u>	<u>55,761,500</u>
3. Physical Contingency	8,364,300
<u>Sub-total of 1, 2 and 3</u>	<u>64,125,800</u>
4. Price Escalation	16,074,200
5. Project Costs (Farvardin 1365)	80,200,000

(6) Project Implementation Schedule

The feasibility study and detailed design for the area drainage construction works will need about 3 years, and the feasibility study of the terminal facilities improvement work will also need some 3 year period including the preparation of new topo maps, therefore the construction works are expected to be started thereafter.

Figure 5.5.1 Project Implementation Program

Item	Quantity	Year																								
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1. Area Drainage Works																										
1.1 Haraz Right Bank																										
1) F/S, D/D	319 km																									
2) Construction	"																									
1.2 Haraz Left Bank																										
1) F/S, D/D	191 km																									
2) Construction	"																									
2. Land Improvement Works																										
2.1 Haraz Left Bank (High)																										
1) F/S	8,070 ha																									
2) D/D and Construction	"																									
2.2 Haraz Left Bank (Middle)																										
1) F/S	9,340 ha																									
2) D/D and Construction	"																									
2.3 Haraz Left Bank (Low)																										
1) F/S	9,440 ha																									
2) D/D and Construction	"																									
2.4 Haraz Right Bank (High)																										
1) F/S	4,720 ha																									
2) D/D and Construction	"																									
2.5 Haraz Right Bank (Middle)																										
1) F/S	5,350 ha																									
2) D/D and Construction	"																									
2.6 Haraz Right Bank (Low)																										
1) F/S	3,900 ha																									
2) D/D and Construction	"																									
2.7 Kari (High)																										
1) F/S	8,390 ha																									
2) D/D and Construction	"																									
2.8 Kari (Middle)																										
1) F/S	13,640 ha																									
2) D/D and Construction	"																									
2.9 Kari (Low)																										
1) F/S	8,740 ha																									
2) D/D and Construction	"																									
3. Animal Husbandry Facilities Works																										
1) F/S, D/D	L.S.																									
2) Construction	"																									

Note: F/S Feasibility Study
D/D Detailed Design

The land improvement works in middle and low land will be started after finishing the area drainage works. A project implementation program is shown in Figure 5.5.1.

According to the program, a disbursement schedule is prepared and shown in Table E.2.6 in Appendix.

5.5.9. Project Benefits

1. Incremental Net Production Value

Evaluation of economic effect for development investments in the Project Area has been carried out by incremental benefits in rice and animal husbandry production that occurred by implementation of area drainage project in the middle and low land, terminal facilities improvement project throughout the Project Area, farming practice/farm management improvement and livestock farming promotion projects. The mechanism of these economic effect occurrences has been already mentioned in the paras. 5.3.2, 3, 5 and 5.5.6, then these annual incremental net production values can be estimated as follows.

(1) Rice

1) Incremental Net Production Value per Hectare

This is shown below:

Table 5.5.2 Incremental Net Production Value in the High Land (per hectare)

		(Unit: Rls)		
Variety	Items	Without Project	With Project	Incremental Net Production Value
Amol-3	Gross production value	1,037,400	1,037,400	
	Production cost	433,873	393,474	
	Net production value	603,527	643,926	40,399 = 40,400
Tarom	Gross production value	873,600	873,600	
	Production cost	365,735	325,743	
	Net production value	502,865	547,857	39,992 = 39,990

- Note: 1. About estimating basis, see Tables E.3.1-E.3.10 in Appendix E-3.
2. In the paddy fields on the high land, introduction of farm mechanization would be possible as they are dry at present, so that the effect of reducing production cost through mechanization could be estimated as the difference in machines' efficiency between without Project and with Project.

3. Although some effect on yield is deemed to be expected by the proper control of standing water in the field, yields of "without project" and "with project" are assumed as same as taking the prudent view to estimate yield increase brought by cultivation practice improvement into consideration.

Table 5.5.3. Incremental Net Production Value in the Middle and Low Land (per hectare)

				(Unit: Rls)
Variety	Items	Without Project	With Project	Incremental Net Production Value
Amol-3	Gross production value	913,900	1,037,400	
	Production cost	457,958	393,474	
	Net production value	455,942	643,926	187,984 ₹ 187,980
Tarom	Gross production value	811,200	873,600	
	Production cost	409,857	325,743	
	Net production value	401,343	547,857	146,514 ₹146,510

- Note: 1. About estimating basis, see Tables E.3.1 - E.3.10, in the Appendix E-3.
2. As the paddy fields on the middle and low land where are wet, it is impossible to introduce farm mechanization in the case of without Project, so that the effect of reducing production cost through farm mechanization can be estimated as the difference in production cost between at present and with Project.
3. Increase of yield per hectare can be estimated as increased production quantity based on progress of cultivation practice and drainage improvement in the case of with Project.

2) Annual Incremental Net Production Value in the Project Area

Annual incremental net production value occurred after completion of the Project implementation is estimated according to the above; as a result, it is 10,360 million Rls. as shown below,

Table 5.5.4 Annual Net Production Value

(Unit: thousand Rls)

Project Area	Area (ha)		Net Production Value			Incremental Net Production Value
	Amol-3	Tarom	Amol-3	Tarom	Sub-Total	
High Land						
Without Project	11,230	7,487	6,777,608	3,802,385	10,579,993	1,918,662
With Project	16,006	4,001	10,306,680	2,192,275	12,498,655	
Middle Land						
Without Project	16,338	10,891	7,449,180	4,371,027	11,820,207	4,882,665
With Project	21,389	5,348	13,772,939	2,929,939	16,702,872	
Low Land						
Without Project	12,623	8,416	5,755,356	3,377,702	9,133,058	3,877,217
With Project	16,661	4,165	10,728,451	2,281,824	13,010,275	
Overall						
Without Project	40,191	26,794	19,982,144	11,551,114	31,533,258	10,678,544
With Project	54,056	13,514	34,808,064	2,404,038	42,211,802	

Note: 1. Paddy field area is beneficial net area excluding border ridge.

(2) Animal Husbandry

As described in the para. 5.3.2, second crops will be introduced after the completion of the Project in 53% of paddy fields in the Project Area, of which 50% will be occupied as forage crop (berseem). Therefore, economic effect by introduction of second crops is estimated by calculating of the benefit from animal husbandry (cows).

Benefits originated from animal husbandry is on the basis of the stable supply of forage crop and raising in productivity of cows by livestock improvement. Incremental benefit is estimated by calculating difference between present net production value and projected net production value.

In the assumption that the constituting of ratio of local, hybrid and pure cows are 30%, 50% and 20%, the incremental net production value is estimated at 7,176 million Rls. as shown in Table 5.5.5 below.

Table 5.5.5. Annual Net Production Value (Animal Husbandry)

(Unit: Million Rls.)

	Without Project	With Project	Incremental Net Production Value
Cows	1,401	8,618	7,217
Sheep & Goat	154	111	43
Total	1,555	8,729	7,174

Table 5.5.6. Benefits from Animal Husbandry

	Proposed Crop Intensity					
	20%	30%	40%	50%	60%	70%
1. Area for Second Crop (ha)	13,692	20,538	27,384	34,230	41,076	47,922

Note: Proposed area for paddy fields 68,460 ha

2. Berseem Production (tons)	821,520	1,232,280	1,643,040	2,053,800	2,464,560	2,875,320
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Note: Berseem yield 60 tons/ha

3. Feedable Number of Cows (head)

Case-1	32,600	48,900	65,200	81,500	97,900	114,200
Case-2	29,600	44,400	59,300	74,100	88,900	103,800
Case-3	33,800	50,700	67,700	84,600	101,500	118,500

Note: Number of cows mean the productive adult female cows and additionally heifers and calves are also feedable.

4. Projected Number of Cows (head)

Crop Intensity for Berseem	Local Cows	Hybrid Cows	Holstein	Local Cows	Hybrid Cows	Holstein	Local Cows	Hybrid Cows	Holstein
20%	16,300	13,000	3,300	8,800	14,800	6,000	20,200	10,100	3,500
30	24,400	19,500	5,000	13,300	22,200	8,900	30,400	15,200	5,100
40	32,600	26,000	6,600	17,800	29,600	11,900	40,600	20,300	6,800
50	40,700	32,600	8,200	22,200	37,000	14,900	50,700	25,300	8,600
60	48,900	39,100	9,900	26,600	44,400	17,900	60,900	30,400	10,200
70	57,100	45,600	11,500	31,100	51,900	20,800	71,100	35,500	11,900

Note: Number of cows mean the number of productive adult female cows

5. Estimated Benefit from Animal Husbandry (NPV - Million Rs.)

Crop Intensity for Berseem	Case-1	Case-2	Case-3
20%	2,622	3,456	2,412
30	3,946	5,159	3,584
40	5,245	6,889	4,784
50	6,552	8,618	5,999
60	7,852	10,348	7,172
70	9,176	12,061	8,371

Sheep & Goats 111

Note: NPV: Net Production Value
NPV of each cows are shown in Appendix C-3.

6. Present Benefit from Animal Husbandry (NPV - Million Rs.)

Items	NPV
Local Cows	1,052
Hybrid Cows	204
Holstein	145
Sub-total	1,401
Sheep & Goats	154
Total	1,555

Note: NPV of each cows are shown in Appendix C-3.

7. Incremental Benefit from Animal Husbandry (Million Rs.)

Crop Intensity for Berseem	Case-1	Case-2	Case-3
20%	1,178	2,012	968
30	2,502	3,715	2,140
40	3,801	5,445	3,340
50	5,108	7,174	4,555
60	6,408	8,904	5,728
70	7,732	10,617	6,927

In the study of benefits, the following three alternative plans are compared. One of them is to set up crop intensity for berseem from 20% to 70% of the paddy fields and another is to set up constituting ratio of cows as shown below taking the decrease of local cows and increase of hybrid and pure cows in the future into consideration.

	<u>Local Cows</u>	<u>Hybrid Cows</u>	<u>Pure Cows</u>
Case-1	50%	40%	10%
Case-2	30	50	20
Case-3	60	30	10

Sheep and goats are now competing with cows in the aspect of forage resources and they graze grasses up to near growth point of the grasses resulting in desolation of wild grassland.

Therefore, "20 Year Plan for Animal Husbandry" recommends to keep sheep and goats at the mountainous area at the elevation of 1,800 m to 3,000 m. Considering the decrease of the number of sheep and goats in the Project Area, benefit from those livestock should be accounted as negative one.

Estimated incremental benefit from animal husbandry in each crop intensity for berseem and each constituting ratio of cows are shown in Table 5.5.6.

2. Economic Evaluation

As for the rice which generates main benefit through the project, it is assumed that the Government of the Islamic Republic of Iran will continue to adopt the policy for encouraging the rice production increase and the policy for high or stable rice price for a long term which have been applying in practice at present, aiming at the perfect self-sufficiency of rice. Under this assumption, in order to evaluate this Project economically, Financial Internal Rate of Return (FIRR) and Benefit Cost Ratio (B/C) (capital interest 8 percent*) which are the index of analysis for estimating potential return of a project are adopted, then the profitability, the necessity and the urgency of the Project would be appraised with them.

The economic evaluation for the project is computed as shown in Table 5.5.7. Besides, the standing up period of the project benefits is assumed as 3 years after the completion of the terminal facilities improvement works, therefore the project benefit will reach to its target value of 28th year after the commencement of the project implementation.

* The interest of deposit of the commercial banks in Iran is at 7.2 percent. (See Section 3.4)

Table 5.5.7. Economic Evaluation

(Unit : Million RIs)

YEAR	PROJECT COST		TOTAL	BENEFITS		RETURN	6 %		WORTH VALUE BY DISCOUNT RATE		10 %
	CAPITAL	O & M		(COST)	(BENEFITS)		(COST)	(BENEFITS)	(COST)	(BENEFITS)	
1 1987	1187.500	0.0	1187.500	0.0	1187.500	-1187.500	1187.500	0.0	1187.500	0.0	1187.500
2 1988	1187.500	0.0	1187.500	0.0	1056.872	-1187.500	1056.872	0.0	1018.090	0.0	901.406
3 1989	1322.600	0.0	1322.600	0.0	1110.483	-1322.600	1110.483	0.0	1049.923	0.0	993.691
4 1990	5661.400	0.0	5661.400	0.0	4484.373	-5661.400	4484.373	0.0	4161.304	0.0	3866.825
5 1991	8294.200	36.400	8330.600	41.100	6225.137	-8289.500	6225.137	30.712	5669.678	27.972	5172.666
6 1992	8583.600	160.200	8743.800	260.600	6164.068	-8483.200	6164.068	183.714	5510.095	164.223	4935.672
7 1993	470.200	280.500	750.700	612.300	3026.494	-3938.600	3026.494	407.217	2658.299	357.272	2335.242
8 1994	3039.600	372.000	3411.600	1176.500	2140.496	-2235.100	2140.496	738.156	1843.189	635.624	1591.547
9 1995	3349.200	387.800	3737.000	1929.800	2211.942	-1807.100	2211.942	1142.314	1869.440	985.435	1584.865
10 1996	3649.200	404.600	4053.800	2902.800	2263.642	-1151.000	2263.642	1620.924	1877.704	1384.565	1582.929
11 1997	3649.200	423.100	4072.300	4024.000	2145.258	-48.500	2145.258	2119.814	1746.550	1427.330	1410.401
12 1998	3649.200	441.600	4090.800	5205.800	2033.025	1115.000	2033.025	2587.152	1624.524	2067.309	1303.468
13 1999	3649.200	460.100	4109.300	6469.800	1926.624	3360.500	1926.624	3033.332	1510.992	2378.950	1190.331
14 2000	3649.200	478.600	4127.800	7630.200	1730.088	3502.400	1730.088	3374.891	1403.366	2597.806	1086.992
15 2001	3649.200	497.000	4146.200	8842.500	1639.483	8696.200	1639.483	3689.675	1307.066	2787.517	992.580
16 2002	3649.200	515.600	4164.800	10056.500	1581.500	5891.500	1581.500	3958.686	1215.677	2937.365	906.395
17 2003	3473.600	534.100	4007.700	11266.700	1488.416	7258.800	1488.416	4184.120	1083.221	3045.058	792.953
18 2004	3373.600	551.700	3925.300	12452.100	1375.229	8526.800	1375.229	4362.592	982.313	3116.158	706.011
19 2005	2990.000	568.900	3558.900	13617.500	1176.784	10059.000	1176.784	4500.974	824.649	3153.466	581.918
20 2006	2224.600	584.100	2808.700	14655.200	875.743	11846.500	875.743	4569.649	602.609	3144.283	417.503
21 2007	2041.800	595.400	2637.200	15542.200	775.762	12905.000	775.762	4571.914	523.901	3087.585	356.373
22 2008	1403.700	605.700	2009.400	16183.300	557.631	14173.900	557.631	4495.279	317.387	2976.802	246.851
23 2009	1250.500	613.000	1863.500	16788.500	487.870	14925.000	487.870	4391.047	184.942	2859.377	208.117
24 2010	552.600	619.500	1172.100	17213.400	289.490	16041.500	289.490	4251.440	156.446	2714.580	119.001
25 2011	449.200	622.200	1071.400	17502.600	249.641	16431.200	249.641	4078.180	150.446	2595.730	98.888
26 2012	0.0	624.500	624.500	17709.700	137.275	17085.200	137.275	3892.868	84.635	2394.419	52.400
27 2013	0.0	624.500	624.500	17852.500	129.505	17228.000	129.505	3693.630	78.180	2259.800	47.637
28 2014	0.0	624.500	624.500	17852.500	122.174	17228.000	122.174	3492.583	73.389	2069.384	43.306
29 2015	0.0	624.500	624.500	17852.500	115.259	17228.000	115.259	3294.891	67.027	1916.097	39.369
30 2016	0.0	624.500	624.500	17852.500	108.135	17228.000	108.135	3108.394	62.062	1774.165	35.790
31 2017	0.0	624.500	624.500	17852.500	102.580	17228.000	102.580	2932.447	57.465	1642.746	32.537
32 2018	0.0	624.500	624.500	17852.500	96.774	17228.000	96.774	2766.464	53.208	1521.063	29.579
33 2019	0.0	624.500	624.500	17852.500	91.296	17228.000	91.296	2609.873	49.267	1408.392	26.890
34 2020	0.0	624.500	624.500	17852.500	86.129	17228.000	86.129	2462.148	45.618	1304.067	24.445
35 2021	0.0	624.500	624.500	17852.500	81.233	17228.000	81.233	2322.782	42.239	1207.470	22.223
36 2022	0.0	624.500	624.500	17852.500	76.634	17228.000	76.634	2191.307	39.110	1118.029	20.203
37 2023	0.0	624.500	624.500	17852.500	72.315	17228.000	72.315	2067.272	36.213	1035.212	18.366
38 2024	0.0	624.500	624.500	17852.500	68.222	17228.000	68.222	1950.260	33.530	958.531	16.696
39 2025	0.0	624.500	624.500	17852.500	64.361	17228.000	64.361	1839.868	31.047	887.529	15.179
40 2026	0.0	624.500	624.500	17852.500	60.718	17228.000	60.718	1735.727	28.747	821.787	13.799
41 2027	0.0	624.500	624.500	17852.500	57.281	17228.000	57.281	1637.480	26.618	760.914	12.544
42 2028	0.0	624.500	624.500	17852.500	54.039	17228.000	54.039	1544.794	24.646	704.550	11.404
43 2029	0.0	624.500	624.500	17852.500	50.980	17228.000	50.980	1457.354	22.820	652.362	10.367
44 2030	0.0	624.500	624.500	17852.500	48.094	17228.000	48.094	1374.864	21.130	604.039	9.425
45 2031	0.0	624.500	624.500	17852.500	45.372	17228.000	45.372	1291.042	19.565	559.296	8.568
46 2032	0.0	624.500	624.500	17852.500	42.804	17228.000	42.804	1223.627	18.116	517.867	7.789
47 2033	0.0	624.500	624.500	17852.500	40.381	17228.000	40.381	1154.365	16.774	479.988	7.081
48 2034	0.0	624.500	624.500	17852.500	38.095	17228.000	38.095	1089.025	15.531	443.968	6.437
49 2035	0.0	624.500	624.500	17852.500	35.939	17228.000	35.939	1027.383	14.381	411.100	5.852
50 2036	0.0	624.500	624.500	17852.500	33.905	17228.000	33.905	969.231	13.316	380.649	5.320
TOTAL	80200.000	25364.600	105564.600	630502.300	50307.484	524937.100	50307.484	115427.461	41670.811	72449.891	35170.259

BENEFIT COST RATIO BY DISCOUNT RATE (B/C) = 2.29 (6%), 1.74 (8%), 1.35 (10%)
INTERNAL RATE OF RETURN (IRR) = 12.6 %

As shown in Table 5.5.7, the economic evaluation for the project is estimated as 12.6% of FIRR or 1.74 of B/C Ratio, so it can be said that the project has acceptable potential return for implementing the project.

The Financial Internal Rate of Return and Benefit Cost Ratio by the nine sub-areas are estimated as the measure for comparison and to appraise priority of the project implementation among them as follows.

Table 5.5.8 Economic Evaluation of the Project by Sub-Areas

Sub-Areas	IFRR(%)	B/C Ratio	(Reference)	
			Project Cost (per ha)	Project Benefits (per ha)
Thousand Rls				
Haraz River Left Bank				
High Land	15.4	2.14	975	239
Middle Land	12.7	1.81	1,221	287
Low Land	14.0	1.99	1,141	280
Haraz River Right Bank				
High Land	11.4	1.44	1,001	162
Middle Land	13.3	1.88	1,271	286
Low Land	11.9	1.63	1,317	281
Kari Rud				
High Land	12.1	1.56	1,008	182
Middle Land	11.9	1.67	1,227	283
Low Land	11.4	1.56	1,397	301

Note: 1. About the basis for this estimation, see Table E.3.1 - E.3.17 of Appendix E-3.

2. It is due to the increase of the paddy field (reduction of fallow fields) with the implementation of the Project that the numerical values for the Project of the high land in Haraz river Left Bank show higher ones than those of the high land in Haraz Right Bank and Kari Rud.

The profitability and the necessity of the Project are seemed sufficient in any of these nine sub-areas. If the priority of the project implementation among the sub-areas is enforced to indicate from the economic point of view only, it is said that the necessity and urgency of the project implementation in the high land show higher values than those in the middle and low land excluding the high land on Haraz river right bank, and that the middle and low land in Haraz river left and right banks have higher values among sub-areas of the middle and low land. But in any case, it is difficult to indicate the priority of the project implementation among sub-areas with this result alone, and in deciding the priority of the project implementation, it is necessary to investigate synthetically from many directions including economic evaluation.

Furthermore, in economic evaluation of the Project, it is suggested that the additional investment to the aforesaid Project Cost may be required in future for the environmental control against the water pollution by mass-dosing of agri-chemicals/fertilizers as a result of improvement of the paddy cropping techniques as well as against public nuisance by the wastage of animal husbandry.

5.5.10. Strategy of Development

In general, the implementation of those projects explained in the above paras. 5.5.2 - 5.5.4 are mainly undertaken as public works, but it is considered that the application of such development system as based on the beneficiary's self-supporting is to be taken into account for the Project Area limiting the public investment as little as possible. Because the Project Area is one of most developed areas in the country and it is judged that the sufficient potential internal capital for the development is available, at least at present, therein. Therefore, the development strategy of the Project Area is to be studied from the following 3 points:

- (1) Which projects or which parts of each project will promise the most effective result of the public investment?
- (2) How to make the potential internal capital be useful for the development to accelerate the capital reproductive type of development?
- (3) What are the required preparatory works for accelerating the development? and how to provide such requirement?

As for the first point, it is to be decided comparing the categories of beneficiary, prevailing method of implementation, quality and quantity of technical services required in each stage of project implementation, efficiency of investment, etc. by the component of each project as shown in the Table 5.5.9 below.

Table 5.5.9. Comparison of Implementation Method by Project

Project	Project Components	Direct Beneficiary	Prevailing Implement, Method			Planned Implement Method					
			F/S	D/D	Const.	O.M	Invest. Efficiency	F/S	D/D	Const.	O.M
Area Drainage	Main Drainage	Farmer of	MOE-E	MOE-E	MOE-C	MOE			MOE-E	MOE-C	MOE
	Lateral Drainage	Low & Mid	-	-	Farmer	Farmer					
	Pond Improvement	Land	-	-	Farmer	Farmer					
Terminal Facilities Improvement	Terminal Irrigation	Farmer of	MOE-E	MOE-E	(MOE-C)	Farmer		MOA	MOA	Farmer Farmer	
	Terminal Drainage	Project	(MOA-E)	(MOA-E)	(Farmer)	(Farmer)					(Subsidy)
	Farm Road	Sites			(MOA-C)						
	Farm Re-adjustment				Farmer						
Farming Practice/Farm Management Improvement	Farm Mechanization	Farmer of	MOA-E	MOA		Farmer			IFRR =		Farmer Farmer
	Improvement of Farming Practice	project							12.6%		
Livestock Farming Promotion	Improvement of Forage Production	Individual Farmer				Farmer					
	Animal Improvement										
	Improvement of Animal Sanitation	Farmer of Project Area	MOA	MOA	MOA	MOA		MOA	MOA	MOA	Farmer Farmer
Post Harvesting Improvement	Improvement of Existing Mills	Rice Miller (Rural cooperative)	-	(MOI)		Miller Miller		MOA	MOA	MOA	Miller Miller
	New Rice Mill		(MOI)	(MOI)		Miller Miller					Coop- erative
	Social Infra.	Rural	-	R.M	R.M	investor investor		MOA	R.M	R.M	R.M
Village Modernization	Rural Industries	Inhabitant (cooperative, etc)	(MOI)	(MOI)	investor investor						R.M investor
											investor

F/S ... Feasibility Study, MOE ... Ministry of Energy RM ... Relative ministries
D/D ... Detailed Design MOA ... Ministry of Agriculture -E ... by Consulting Engineers
O.M ... Operation & Maintenance (MOI) ... Permission of Ministry -C ... by Contractor
of Industries

Note: The detailed Investment Efficiency by each project is to be computed in the stage of Feasibility Study.

For the second point, the form of the holding of the potential internal capital or its availability is to be verified first of all. It is assumed that the potential internal capital is classified in the following two types in case of the Project Area;

- (a) The capital which is held by farmers themselves as a surplus of farmer's economy. The amount of holding of individual farmer is not so large, but it is useful for the development if collected together. The surplus of farmer's economy is expected to increase at the progress of development by means of farm mechanization, cooperative works, through-year-work of farming activities, etc.
- (b) A part of benefits related to agriculture which are presently gained or absorbed by non-farming person, mainly the benefit from rice milling and marketing of rice, may be returned to the farmers. For instance, for the expected quantity of production increase under the development, hereafter, the farmers are encouraged to participate in the rice milling and marketing of rice centering around the rural cooperatives to use the benefit therefrom effectively as development capital.

The third point is the most important factor to materialize the development of Project Area. The required preparatory works by each project are shown in the logical framework as the assumption to achieve the project purpose, but the main lines are as below;

(a) Establishment of Development Organization

To accelerate the development of Project Area, each project is to be implemented in accordance with the approved schedule providing proper organizations which have required functions at both sides of public authority and of the beneficiary of the development project and keeping close mutual cooperation of two sides.

The functions required to the public authority are to enable to coordinate the activities by the relative authorities, to provide required services, and to encourage the participation of beneficiary to the development. On the other hand, the required functions of the beneficiary are to enable them to solve the internal problems of the beneficiaries such as agreement related to land consolidation, method of providing the development fund, measures for cooperative works of farming activities, etc. and to apply the required services to the public authority appraising the quality and quantity of such services during the progress of development under such recognition as the development is undertaken for the beneficiary's own benefit.

(b) Provision of required staff for rendering services

To function the aforementioned development organization, the qualitative and quantitative provision of staff is the essential problem to be solved for rendering required services timely. The required services for the development of Project Area are covering various fields, and will be classified into; those services which have already proper basis and good results of supply and receive even in the past such as the improvement of farming practice, and those services which request more specialized engineering knowhow and field experience. The specialists are to be employed in rather long period like the improvement of terminal facilities. Most of those staffs are deemed to be provided by the public authority.

(c) Collection and Arrangement of Basic Data

The basic data required for the development is not judged as sufficiently arranged in case of the Project Area. Moreover, the changes in the progress of development will request further arrangement of data. It means that the basic data shall be collected, analysed and arranged continuously. Following items of data are considered as required basic data for the development of Project Area;

- ° A 1/5000 topo-map with the latest aero-photo survey
- ° Cadastral survey to clarify the land ownership and preparation of a Cadastral Map
- ° Preparation of a semi-detailed soil survey map
- ° Establishment of meteorological observation network to apply higher level of farming practice confirming the climatic difference at each part in the Project Area, and collection of long period data.
- ° Establishment of hydrological observation network for rationalizing the irrigation and drainage control, and collection of long period data.
- ° Improvement of survey method for cropping and yield to grasp the actuality of agriculture in the Project Area, and collection of long period data with the improved method.
- ° Establishment of survey method to grasp the social and economical changes in the Project Area, and collection of periodical data.

Among the above three items, the establishment of development organizations is, in principle, to be planned as practical use of the existing organizations within the framework of prevailing system, and such organizational arrangement as shown in the Figure 5.5.2. may be suggested. Under this plan, a Secretarial Office for Development is established as organization on the public authority side, and the office takes the duty of promotion of the development, but the project

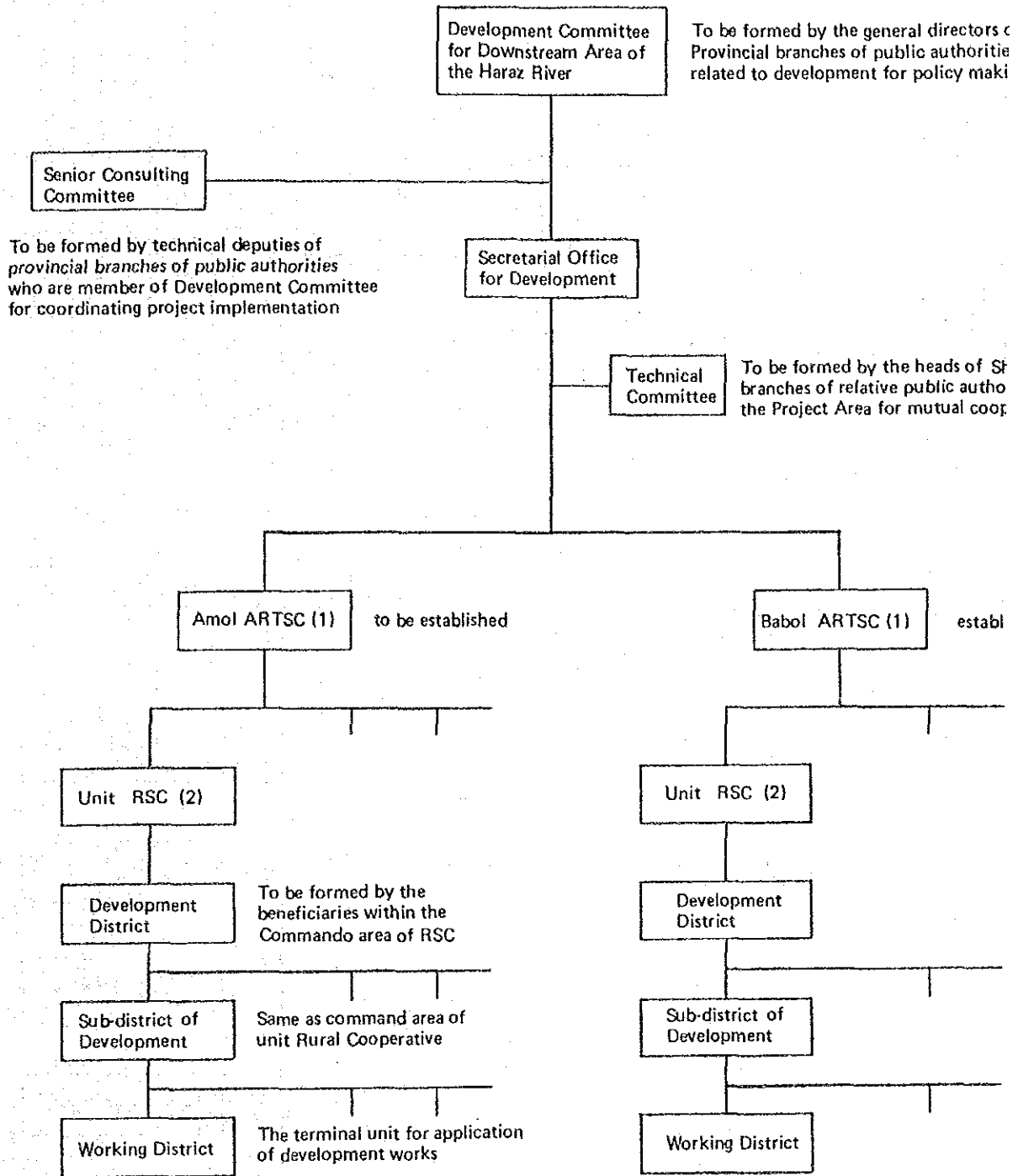
implementation is undertaken by the ARTSC as executive body. The beneficiary side organization are set forth as Working District - Sub-district of Development - Development District, and the Development District connect to the Rural Service Center Unit. To function such organizations, it is requested to solve the problems pointed out in the paras. 4.4.3. and 4.4.7.(a)(b), 4.4.9(b), etc., but those problems will basically be solvable within the prevailing system.

The problem of provision of required staff is not only problem of the Project Area, but it is also deemed as common bottle neck for accelerating the development of paddy cultivation zone of the Caspian Sea Coastal Area. As for the ARTSC which is appraised as very unique system, it is obliged to say that the actual situation of the existing ARTSC is not so active as expected due to qualitative and quantitative shortage of the staff. Especially, the upbringing of staff for planning, designing and guiding the construction works of the Terminal Facilities Improvement Project is to be started urgently, and, furthermore, the technical level of farming or raising practices are also increasing day by day at present. Therefore the retraining of staff who renders relative services for improving such practices is not avoidable to respond to the growth of technology. Considering such requirement, the establishment of an institution for upbringing staff is unavoidable for the development. Therefore the establishment of Caspian Sea Coastal Area Agricultural Development - Pilot Implementation Center (hereafter referred as the CAPIC) is recommended. The organizational position of the CAPIC is possible to be set forth under the Secretarial Office for Development as shown in the Figure 5.5.3.

The collection and arrangement of basic data are to be taken into the function of the Secretarial Office of Development. The organizational chart shown as the Figure 5.5.3. includes such function.

The development of the Project Area is to be accelerated under such preconditions as these aforementioned preparatory works which are to be carried out timely, and the schedule of implementation of each project is drawn considering the project benefit, interrelation of projects explained in the para, 5.5.1 and other factors as shown in the Figure 5.5.4.

Figure 5.5.2. PLANNED ORGANIZATION FOR DEVELOPMENT



(1) ARTSC – AGRICULTURAL RURAL TRIBAL SERVICE CENTER
(To be established at each Shahrestan)

(2) RSC – RURAL SERVICE CENTER
(To be established in rural area as branches of ARTSC.)

Figure 5.5.3. PLANNED SECRETARIAL OFFICE FOR DEVELOPMENT

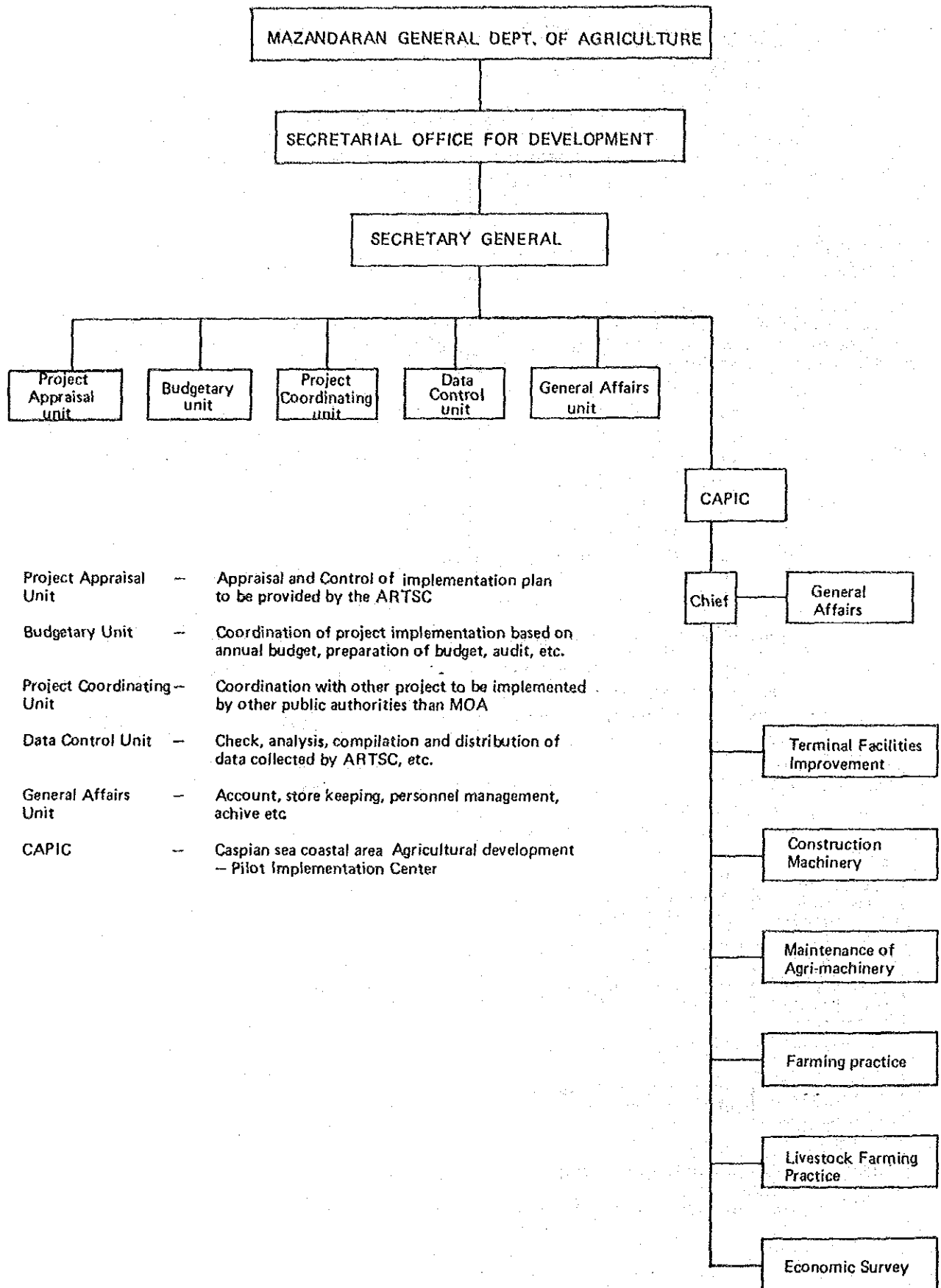


FIG. 5.5.4. TENTATIVE SCHEDULE OF PROJECT IMPLEMENTATION FOR CASPIAN SEA COASTAL AREA AGRICULTURAL DEVELOPMENT

Year	1365	1366	1367	1368	1369	1370	1371	1372	1373	1374
Submittal of Master Plan Report	▽									
Study & Decision on Project Implementation										
Preparation for Establishing Development Organization										
Activities of Secretarial Office for Development										
Preparation for Establishing CAPIC										
Design of CAPIC's Facilities					Farm Building & Facilities					
Construction of CAPIC's Facilities					Farm Building & Facilities					
Upbringing CAPIC's Instructors										
Aero-photo Survey & Mapping				Grand-survey-Photographing	Mapping					
Cadastral Survey & Mapping										
Soil Survey & Mapping										
Meteorological Observation Network				Installation	Observation					
Hydrological Observation Network										
Area Drainage Project				F/S						
Right Bank Area of the Haraz				D/D		Construction				
Left Bank Area of the Haraz				D/D		Construction				
Terminal Facilities Improvement Project				F/S						
Highland Pilot Project				United Studios	Site Selection D/D	Construction				
Middleland Pilot Project					Site Selection D/D	Construction				
Lowland Pilot Project					Site Selection D/D	Construction				
Farming Practice/Farm Management Improvement Project				F/S						
Seed Multiplication, etc.						D/D	Construction	2 places	3 places	3 places
Model Farm										
Livestock Farming Promotion Project						F/S				
Improvement Public Facilities										
Pilot Project						D/D	Construction			
Post Harvesting Improvement Project						F/S				
Pilot Project of Existing Facilities Improvement						D/D	Execution			
Pilot Project of New Facilities						D/D	Execution			
Village Modernization Project							Planning			
Pilot Project of Model Village									Execution	
Pilot Project of Model Rural Industries									F/S	Execution

References

1. Lar-Mazandaran Pole Project, Ministry of Agriculture & Rural Development Booker & Rakshab
2. Lar Dam and Mazandaran Irrigation Project, Interim Report, Vol. 3, Soil of the Project Area in Mazandaran, Tehran Regional Water Board Sir Alexander Gibb
Nov. 1969
3. Lar Dam and Mazandaran Irrigation Project, Interim Report, Vol. 7, Irrigation Works. Mazandaran, Tehran Regional Water Board Sir Alexander Gibb
Nov. 1969
4. Lar Dam and Mazandaran Irrigation Project, Final Report, Vol. 1, Tehran Regional Water Board Sir Alexander Gibb
Mar. 1972
5. The Report on the Geo-electric Prospecting Study for Amol, Babol and Shahi Plain in Mazandaran Province Abkav. 1352
6. The Report on the Reconnaissance Study of Groundwater MOE, 1362
7. Data of Springs, Artesian Wells and Wells MOE, 1364
8. General Increase of the Caspian Sea Surface Amiri, 10/6/1364
9. Main Irrigation Link Canal Sir Alexander Gibb
10. Drainage Manual USBR
11. FAO Irrigation and Drainage Paper No.24
"Crop Water Requirement" FAO
12. Irrigation Principles and Practices (4th Edition) Wiley Wiley
13. Hourly Rainfall Intensity Study The Technical
Engineering
Societies of the
University of
Jihad 1363
14. Rice: Soil, Water & Land F.R. Moormann,
IRRI, 1978

SCHEDULE OF STUDY AND LIST OF PERSONS ENGAGED IN STUDY

1. Duration of Study

- (1) First Survey:
Field Survey September 21, 1984 - December 4, 1984
Home Office Study December 5, 1984 - February 17, 1985
- (2) Second Survey:
Field Survey August 21, 1985 - November 27, 1985
Home Office Study November 28, 1985 - February 28, 1986
- (3) Third Survey:
Field Survey May 28, 1986 - July 27, 1986
Home Office Study July 28, 1986 - August 21, 1986
- (4) Explanation on the Report at the site:
October 22, 1986 - November 9, 1986

2. Member List of Supervisory Committee

Chairman	Kenichi FUJINO	Chief, Integrated Rural Development Office, Ministry of Agriculture, Forestry and Fisheries (MAFF)
Agricultural Infrastructure	Shuhei SEYAMA	Deputy Chief, Planning Division, Planning Department, MAFF
Crop/Soil	Takehiko TAKAYA	Chief Researcher, Mechanized Farming Research Office, Tohoku Agricultural Research Station, MAFF
Agro-economy	Keiji OKAMOTO	Senior Officer, Regional Planning Div., Kinki Regional Agricultural Bureau, MAFF

3. Member List and Duration of Field Supervisory Team

- (1) First Survey:
(i) September 21, 1984 - September 30, 1984
Kenichi FUJINO (ref. above 4)
Noriaki NIWA Technical Affairs Div., Agricultural, Forestry and Fisheries Planning & Survey Department, Japan International Cooperation Agency (JICA)

- (11) November 25, 1984 - December 4, 1984
 Shuhei SEYAMA (ref. above 4)
 Keiji OKAMOTO (ref. above 4)
 Noriaki NIWA (ref. above 5 -1 -1)

(2) Second Survey:

October 5, 1985 - October 16, 1985

- | | |
|--------------------|---|
| Haruo TSUCHIYA | Director, Agricultural, Forestry and Fisheries Planning & Survey Department, JICA |
| Sannosuke TSUCHIYA | Deputy Chief, International Cooperation Div., Economy Bureau, MAFF |
| Shuhei SEYAMA | (ref. above 4) |
| Kenji YOKOYAMA | Development Cooperation Div., Economic Cooperation Bureau, Ministry of Foreign Affairs |
| Hiroyuki ARAI | Technical Affairs Div., Agricultural, Forestry and Fisheries Planning & Survey Department, JICA |

(3) Third Survey:

June 14, 1986 - June 25, 1986

- | | |
|----------------|--|
| Haruo TSUCHIYA | (ref. above 5-2) |
| Nobusuke OHTA | Official, International Cooperation Div., Economy Bureau, MAFF |
| Kozo INABA | Development Cooperation Div., Economic Cooperation Bureau, Ministry of Foreign Affairs |
| Hiroyuki ARAI | (ref. above 5-2) |

4. Member List of Iranian Counterparts

(1) First Survey:

- | | | |
|--------|------------------------|---|
| Leader | Hamidreza ASKARI | Expert, Extension Bureau, MOA |
| | Ahmad NABAVI | Expert, Engineering Department Mazandaran General Dept. of Agriculture (MGDA) |
| | Mohmadreza SHARIFZADEH | Expert, Extension Section, Amol Agriculture Office (AAO) |

Hassan ABBASKHANI DAVANLOU	Chief, Crop Improvement Div., MGDA
Isa KAZEMI	Expert, Extension Section, AAO
Aliasghar TULUI	Expert, Babol Agriculture, Rural and Tribal Service Center (BARTSC)
Mohmad Bagher YUSEFIAN	Expert, Extension Section, AAO
Naghi BAGHERZADEH	Technician, BARTSC
Gholamreza FAZELI DENAN	Extension Crew, AAO
Rostamali LALEHABADI	Extension Crew, AAO

(2) Second Survey:

Leader	Jamil ALIZADEH SHAEGH	Chief, Extension Div., MGDA
	Ahmad NABAVI	(ref. above 6-1)
	Mohmadreza SHARIFZADEH	(ditto)
	Mohmad Bagher YUSEFIAN	(ditto)
	Hojjatallah ZARINEH	Senior Officer, Ostan Bank
	ENAYATI	Expert, Livestock Div., MGDA
	FULADI	Officer, Ostan Bank
	AKHAVAN	Expert, Gorgan Agriculture Office
	Aliasghar TULUI	(ref. above 6-1)
	ESHRAGHI	Expert, Amol Rice Research Station
	Gholamreza FAZELI DENAN	(ref. above 6-1)
	Rostamali LALEHABADI	(ditto)
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(3) Third Survey:

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	Ahmad NABAVI	(ref. above 6-1)
	Mohmadreza SHARIFZADEH	(ditto)
	Mohmad Bagher YUSEFIAN	(ditto)
	Aliasghar TULUI	(ditto)
	ESHRAGHI	(ref. above 6-2)
	Gholamreza FAZELI DENAN	(ref. above 6-1)
	Rostamali LALEHABADI	(ditto)
	Ahmad YUSEFIAN	(ref. above 6-2)

5. Member List of Coordinating/Consulting Group-Iran

Irrigation/ Drainage	JAVAN	Professor, Shiraz Uni- versity
	Seyyed Mohmad BAGHERI MALZUNI	Engineer, Mazandaran Regional Water Board
	Abbasali GHOBADI	Engineer, YEKOM Con- sulting Engineers

	Karim SIATI	Engineer, YEKOM Consulting Engineers
	Khosrow BANDARI	Engineer, MAHAB-GOTZ Consulting Engineers
	Ruzbeh PARVIN	-ditto-
Land Consolidation	Hassan ASKARZADEH	Chief, Farm Engineering Div., Gilan General Dept. of Agriculture (GGDA)
Crop/Soil	Mohmad Javad MOIN	Chief, Crop Improvement Div., GGDA
	Jafar BABAPUR	Chief, Amol Rice Research Station
	Valimohmad FALLAH	Chief, Soil & Water Research Institute, MGDA
Coordination	Kambiz PIRUZIAN	Foreign Relation Div., MOA

Besides, Mr. YAHYAZADEH, ex-Director of MGDA, his successor Mr. AMROLLAHI, Messrs. NARIMAN, Technical Deputy to Governor General of Mazandaran Province, EBRAHIMI, Director of Plan and Budget General Dept., SHIRAGHAI, ZAKERI and OMURANI of Plan and Budget General Dept., HASHEMI, Chief of Amol Agriculture Office, and many other persons had attended at the meetings held at the site to cooperate to the survey, study and planning compiled as this report.

6. Member List of JICA Survey Team

(1) First Survey Team:

Team Leader	Hejiro YOSHIHARA
Rural Development	Mitsuru KAKIZAKI
Crop/Soil	Kazuo NAKABAYASHI
Hydrology/Irrigation	Yasuo MATSUBARA
Groundwater	Hiroshi KAWAI
Land Consolidation	Ken ISHIMARU
Research/Experiment	Kenichi HAYASHI
Rural Industries	Norio KOIWA
Agri-institution	Tetsuo DOKIYA

(2) Second Survey Team:

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Rural Development	Mitsuru KAKIZAKI
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Agro-economy	Sho INADA

(3) Third Survey Team:

Team Leader	Mitsutoshi YAMADA
Rural Development	Mitsuru KAKIZAKI
Irrigation/Drainage	Yasuo MATSUBARA
Paddy-Culture/Research	Isamu OHTA

7. Submittals

(1) First Survey Team:

- ° Inception Report - at the commencement of field survey
- ° Field Report - at the end of field survey
- ° Interim Report - at the end of home office study

(2) Second Survey Team:

- ° Field Report - at the end of field survey
- ° Draft Final Report (I) - at the end of home office study

(3) Third Survey Team:

- ° Explanatory Report to comment on Draft Final Report (I)
- ° Draft Final Report (II) - at the end of home office study.

JICA