APPENDIX VII

ORGANIZATION AND MANAGEMENT

CHAPTER 1. ORGANIZATION FOR PROJECT EXECUTION

The Directorate General of Water Resources Development (hereinafter referred to as DGWRD), the Ministry of Public Works, the Government of the Republic of Indonesia would be the executing agency for implementation of the Batang Kumu Irrigation Project. DGWRD would be responsible for both the engineering works and the construction works of the Project. It would coordinate all activities of the relevant Government agencies and regional administrative organizations in connection with the project implementation.

The Directorate of Irrigation-II under the said DGWRD would direct responsibility for the project implementation. Riau Regional Public Works would coordinate the construction of the Project at the provincial level on behalf of Ministry of Public Works.

In order to implement the Project successfully, it is proposed to establish the Batang Kumu Irrigating Project Office under the superintendence of the Directorate of Irrigation-II. The main tasks of the Project Office would be as listed below.

a) Financial arrangements needed for the engineering and construction works of the Project.

b) Design and construction supervision of all the implementation activities.

c) Technical assistance and guidance for the on-farm development to be executed by the farmers.

d) Coordination between the Government authorities concerned with implementation of the Project; Transmigration Office, Agricultural Extension Office, Bureau of Estate, KUD and regional Governments.

e) Personnel arrangements for staff to be required during the construction and O&M stage.

f) Accounting and management of the engineering works and the construction works.

The Project Office during the construction stage will be established in the Project area. The organizational structure is proposed as presented in Fig. VII-1, taking into consideration similar project offices in Riau Province. The proposed organization comprises four sections; construction, engineering, operation and maintenance and administrative sections. A project manager would manage all field works of the Project, assisted by these sections. Necessary staff will be despatched from the Directorate of Irrigation-II and the Provincial Public Works.

CHAPTER 2. OPERATION AND MAINTENANCE OF THE PROJECT

2.1 Organization and Staffing

After completion of the construction works, the Project Office will be reorganized into the O&M office which will responsible for the operation and maintenance of all facilities down to inlets to tertiary blocks. The operation and maintenance of the tertiary blocks down to terminal facilities will be entrusted to the water user's association (P3A) and farmers themselves.

The proposed organizational structure of the O&M Office will have four sections: Operation Section, Repair and Maintenance Section, Farmers' Assistance Section and Administrative Section (see Fig. VII-2). The main tasks of these sections are summarized below.

a) Operation Section

- Planning of irrigation schedule
- Water distribution
- Control of water delivery
- Hydrological measurement
- Data collection and data processing

b) Repair and Maintenance Section

- Repair and maintenance of facilities and equipment
- Management and inspection of facilities and equipment

c) Farmers' Assistance Section

- Guidance and training to water users
- Monitoring and evaluation

d) Administrative Section

- Personnel services
- Accounting and cashiering
- General affair services

The O&M Office will be set up at the Project site. The Kumu river divides the irrigation service area. Taking into consideration the need for smooth and effective water supply, it is proposed that the service area for water management be divided into two areas; the left bank area and the right bank area. It is not proposed that any branch offices be established in these areas, because water management should be carried out through a short channel, though several working stations will be built in the areas. In short, irrigation scheduling and water delivery will be made separately within these areas, but these

planning and control must be done by one office.

The Irrigation Supervisor would be responsible for operation and management of the irrigation system through the above mentioned sections. The staff necessary for the O&M Office were estimated at 100 persons including water management engineers, hydrologist, mechanics, driver/operators, accountant, etc. The details are presented in Tables VII-1 and VII-2.

2.2 Management Plan for Operation and Maintenance

Major management works of the O&M office will consist of planning of the irrigation schedule, control of irrigation water delivery, maintenance and repair, assistance to water users and administration. Details of the proposed plans are given below.

2.2.1 Planning of Irrigation Schedule

Planning of the irrigation schedule will be made in three stages; long-term plan, yearly plan and seasonal plan.

a) Long-term Plan

The long-term plan will be prepared once every 3 to 4 years. This plan will define the targets such as total irrigation area, irrigation efficiency, operation cost and other specific targets for operation and maintenance.

b) Yearly Plan

Before the start of the wet season, the yearly plan will be prepared for the coming wet and dry seasons in accordance with the long-term plan. Several alternatives will be studied in this planning procedure by means of simulation studies made, for example, for combinations of irrigated crop area and irrigation schedules against a drought year, a normal year and a rainy year of appropriate probability.

c) Seasonal Plan

The seasonal plan will be prepared for every crop season in line with the yearly and long-term plans, but some adjustment will be made, depending on the actual hydrological conditions.

The operation section will be responsible for these plans. A hydrologist will be assigned in this section, and statistical analyses for previous seasons will be included in the evaluation

report which is issued yearly.

2.2.2 Control of Irrigation Water Delivery

In order to ensure efficient management of irrigation water delivery, it is recommended that centralized monitoring system be introduced. General concept of this system is presented in Fig. VII-4. The control of irrigation water delivery under this system will be realized by the following work flow:

a) Data Collection and Processing

The data required for operation are farming activities and hydrological data such as hourly rainfall, river water level, canal water level and gate opening records. As for the collection of data on farming activities, the field investigation will be done by field personnel. Major survey items consist of 1) kind of crops, 2) crop varieties, 3) planting area, 4) harvesting area and 5) start and end of transplanting. These data are compiled by each month.

The data processing is composed of three main items; 1) water balance simulation to be required for operation planning, 2) hydrological data processing and 3) processing of dimensions such as cropping area and canal discharge necessary for the operation. These are basic information for the preparation of water management and the operation plan mentioned below. If a micro computer is available, this processing can be done easily and accurately.

b) Water Management and Operation Plan

The water management and operation plan will be prepared for each irrigation block in accordance with the seasonal plan. The plan will consists of the following three items; 1) seasonal management plan, 2) monthly management plan and 3) weekly operation plan.

The seasonal management plan will clarify the proposed irrigation area, irrigation schedule, cropping calendar, etc. After irrigation starts, the seasonal management plan will always be checked and corrected by the daily water balance study.

The monthly management plan will indicate the water distribution, and will be prepared for the next month. The weekly operation plan will be made for the operation of the following week from the results of water balance study for the previous week based on the operation monitoring records. This plan will indicate the volume of irrigation water delivery required at each point of the field.

c) Operation and Monitoring

According to the weekly operation plan, the field personnel will set the irrigation facilities to control the water delivery. It should be noted that the minimum operation term is not a day but week. So that the control facilities will be set at the beginning of the week, and will not be changed except in case of an order from the Operation Section.

The irrigation water distribution and hydrological features will be monitored through the field personnel and field monitoring station, and will be reported immediately to the Operation Section through the wireless radio system.

2.2.3 Operation Rule

The establishment of the operation rule aims at achieving the highest irrigation efficiency, equitable distribution of irrigation water and equality of control between irrigation systems/blocks. The following several operation rules will be proposed to the O&M Office of the Project.

a) Unit operation period is one week. The control structures in a system should be set according to the weekly operation plan on the first day of the week (unit operation period), and there must be no change of control within the week unless daily rainfall exceeds 30 mm/day.

b) If rainfall of more than 30 mm/day is monitored, the irrigation water supply should be stopped in the appropriate irrigation system from the next day until the end of the week (unit operation period).

c) At the beginning of weekly operation, the daily water balance for the previous week should be reviewed on the basis of the data on farming activities (cropping area), daily rainfall and the volume of water supplied. At this time, some modifications will be made to the original weekly operation plan, if necessary. After review, the control order should be transmitted from the Operation Section to the field personnel through the wireless radio system.

d) For the collection of data on farming activities, the field investigation is done by the field personnel. Major survey items consist of i) kind of crops, ii) crop varieties, iii) planting area, iv) harvesting area and iv) start and end of transplanting.

e) The condition of flow and water distribution must be monitored by the patrol of field personnel. If the distribution is found to be skewed from the schedule,

the field personnel must report immediately to the Operation Section. Then necessary readjustment should be ordered from this section to the field personnel.

In addition to the above operation rules, it would be necessary to establish operation rules in case of emergency. Emergency operation will be considered for mismatching between the farming stage and operation period, troubles at major control points, etc.

In case of a large scale irrigation system, mismatching will often occur, especially at the transplanting stage when much paddling water is required. Owing chiefly to reasons of the farmers side, transplanting will be delayed beyond the scheduled staggering period. Under the emergency operation rule, the reasons for problems should be cleared through the field investigation, and in parallel with this, prompt readjustment of water scheduling is made by the Operation Section. Then, the proper time for transplanting is propagated to the water user's associations.

As for the troubles at major control points, detailed operation rules or an instruction manual for countermeasure must be prepared, assuming possible troubles which will occur at each major control points. Moreover, materials and spare parts necessary for repair should be stocked by the Repair and Maintenance Section.

2.2.4 Repair and Maintenance

The Repair and Maintenance Section is responsible for repair and maintenance of the facilities managed by the O&M Office. It is recommended that the daily maintenance activities should be intensified with cooperation between the Repair and Maintenance Section and the Operation Section. Namely, the field personnel under the Operation Section will be given responsibility for daily maintenance works which would always be required as soon as possible. The works of the Repair and Maintenance Section will be concentrated on major irrigation and drainage facilities.

2.2.5 Farmer's Assistance and Administrative Work

As mentioned in Chapter 3, seventeen water user's associations will be set up in the irrigation service area. For active and effective management, these associations will require assistance. The Farmer's Assistance Section will be responsible for this assistance. This Section will make periodic and specific plans for guidance and training in scheduling and arrangements, and actual assistance works such as training in water control on field and guidance in repair and maintenance of irrigation facilities will be done through this section with cooperation from the Operation Section and the Repair and Maintenance Section.

Monitoring and evaluation of the effects of irrigation services will also be conducted by this section through the Project Benefit Monitoring and Evaluation Survey (PBME). The results of evaluation will be fed back to the management of the O&M Office. At present, the Government envisages collection of an irrigation service fee (water charge) from the beneficiaries. Prior to the introduction of an irrigation service fee, however, it is necessary first identify the farmers' intentions. Their intentions will be clarified through PBME survey.

Administration work will consist of personnel services, accounting, cashiering and other general affairs services. These will be the responsibility of the Administration Section. Various data will be collected by the Operation Section and the Farmer's Assistance Section. Furthermore, all of reports and documents will be completed by the Administration Section. Through the operation and management, many reports and documents such as monthly and yearly reports for O&M, budgetary reports and texts for guidance and training will be issued by all sections. These data and documents are very important sources for the improvement and up-grading of the management of the O&M Office.

2.3 O&M Facilities and Equipment

The O&M equipment that will be required during the O&M stage are bulldozer, motor grader, vehicles, measuring instrument, etc. These are listed in Table VII-3.

For the control of irrigation water delivery, the introduction of a centralized monitoring system is proposed. This monitoring system is a remote monitoring system but not an automatic remote control system. The monitoring system will comprise a central station and several field stations.

The central station will be established in the Operation Section, and this station will be equipped with a micro computer and its accessories such as floppy-desk memory, disc drive and printer. The main functions of the station will be: i) collection of water management data from field stations and processing of these data, computer processing of water balance and other necessary calculations, iii) storing the water management data in the floppy-desk memory and iv) filing through printer.

The head of the Operation Section will be responsible for the central station, and overall water control will be carried out promptly by this section, based on the fresh data collected and processed by the central station.

As for the field stations, there are two types. One type includes the intake station, and major head gate stations which will work as field headquarters which will receive control orders from the central station, and transmit these to the field personnel. The other type covers stations equipped with measuring devices such as rainfall and water level gauges. The

function of these stations is only to collect and transmit data to the central station. The list of stations may be summarized as follows:

Location	MI*1	Rainfall Gauges	Water Level Gauges	Wireless Radio
Central Station				
SKP-C: DU	1	1	-	1
Field Station				
Intake Site	-	2*2	1	1
SKP-C: DU*3	-	-	-	-
SKP-D: DU	-	1	-	1
SKP-D: DK-III	-	1	-	1

*1 Meteorological measuring instrument.
*2 Two gauges are set in the catchment area.
*3 One field station will be established at same place with the central station.

In order to maintain good liaison between the central station and the field stations, the wireless radio system will be introduced as a communication network. The proposed system will be the VHF simplex wireless radio network. The data and information collected by the field staff will be reported by them through this radio network.

CHAPTER 3. WATER USER'S ASSOCIATION

The O&M of irrigation and drainage facilities in the tertiary block will be done by the water user's association (P3A). Before completion of construction of the project facilities, this association should be established in each village with guidance from the O&M Section*1/O&M Office and the agricultural extension office. In particular, the O&M Office will provide full technical guidance and advice for water supply management and maintenance of the facilities.

In order to ensure effective water supply and smooth operation and management of irrigation facilities, it is recommended that the water user's associations be established in the Project area, taking the following items into consideration.

a) Establishment of water user's associations should be on a village basis and covering several tertiary blocks, and such that every farmer who is either a land proprietor or a share-cropper in the tertiary block must be a member.

b) The management and operation of the water user's association should be conducted by a manager with technical assistance under supervision of the Public Works and Agricultural Services at both of Kabupaten and/or Kecamatan levels.

c) Good relationships with the concerned government agencies such as Public Works, Agricultural Service, Rural Extension Center and KUD will promote the successful performance of the activities of these associations.

The proposed organization of a water user's association is presented in Fig. VII-3. The association would have a Board, and be staffed by a manager, treasurer, secretary and several Ulu-Ulu (water masters). It is suggested that a unit water user's association be set up in each tertiary block, which will take overall responsibility for distributing irrigation water. One Ulu-Ulu would be appointed in each tertiary block in the association to carry out water management including preparation of irrigation calendar, handling of canal structures, diverting of the scheduled amount of water to supply quaternary canals, and supervision of maintenance works. A farmers' leader will be selected in each quaternary block to assist the Ulu-Ulu.

The activities of the Ulu-Ulu and farmers' leaders are important for proper water management both at farm level and at project level. In order to fulfill their missions, it is

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*1 O&M Section is established under the Project Office (see Fig. VII-1).

necessary that they have a through knowledge of water management in the Project as well as at farm level. They will, therefore, be trained by the staff of the O&M Office.

The number of water user's associations to be established in the Project area was estimated as follows:

Villages	Irrigation Service Area	P3A	Farm House-hold	Size of P3A*	
				Area	Household
1) Existing Transmigration Area	2,970	7	2,970	424	424
SKP-C: DU	570	1	570	570	570
DK-II, -III & -IV	1,130	3	1,130	377	377
SKP-D: DU	580	1	580	580	580
DK-I	260	1	260	260	260
DK-II	430	1	430	430	430
2) Existing Village: Rantau Kasai	100	1	100	100	100
3) New Transmigration Area	4,230	9	4,230	470	470
Total/Average	7,300	17	7,300	429	429

* Average size of one unit.

It is necessary to establish a communication channel (such as a coordination committee) between the O&M Office and the water use's associations, in order to ensure smooth and effective operation of water supply.

Table VII-1 PERSONNEL REQUIREMENT OF O&M OFFICE

Description	Number
General Manager	1
I. Operation Section	
(Central Station)	
1) Irrigation Superviser (Irri. Engineer)	1
2) Assistant Irrigation Supervisers	2
3) Hydrologist	1
4) Operator for Computer	1
5) Measurement Aide	1
(Field Station)	
6) Irrigation Inspectors*1	5
7) O & M personnel*2	57
8) Measurement Aide*3	3
II. Repaire and Maintenance Section	
1) Construction Engineer	1
2) Assist. Const. Engineer	1
3) Field Supervisor	2
4) Mechanic	1
5) Mechanic Aide	2
6) Driver/Operator	11
III. Farmer's Assistance Section	
1) Agronomist	1
2) Monitoring Expert/Assistant Agronomist	1
3) Enumerator*4	1
IV. Administrative Section	
1) Administrative Officer	1
2) Accountant	1
3) Clerk*5	1
4) Typist*6	1
5) Storekeeper	1
6) Janitor	2
Total	100

*1 Head of field station.
*2 Refer to Table VII-2
*3 One field station is established at same place with central station, and rainfall obserbation is done by the measurement aid of meteorological station in central station.
*4 PBME survey will be carried out by an enumerator with several temporary enumerators to be employed.
*5 All of the documents and data to be collected and issued by the sections will be filied by the clerk.
*6 Including typing work for manager and other sections.

Table VII-2 NUMBER OF STAFF NECESSARY FOR O & M

Items	Unit	Left Bank	Right Bank	No. of Staff Required		
				Left	Right	Total
				(persons)	(persons)	(persons)
Intake Weir		-	-	-	-	1
Net Irrigation Area	(ha)	4,500	2,800	6	4	10
Main Canal						
Length	(km)	25.61	18.68	5	4	9
Structure	(nos)	114	74	3	2	5
Secondary Canal						
Length	(km)	50.12	30.10	8	5	13
Structure	(nos)	236	144	4	2	6
Drainage Canal	(km)	27.74	28.71	3	3	6
Inspection Road						
Main	(km)	25.6	18.7	1	1	2
Secondary	(km)	50.1	30.1	3	2	5
					Total	57

Remarks: Standard coverage of activities for O & M staff is as follows:

Intake Weir	1 person
Operation irrigation water	1 person/700 ha
Check for canal	
Main canal	1 person/ 5 km
Secondary canal	1 person/ 6 km
Drainage canal	1 person/10 km
Check for structure	
Main canal	1 person/40 structures
Secondary canal	1 person/60 box
Check for inspection road	
Main	1 person/18 km
Secondary	1 person/15 km

These standard are based on the density of the O & M personnel in the Section Public Works Office in Jawa.

Table VII-3 O&M EQUIPMENT

	Equipments	Capacity	Numbers	
(1)	Backhoe	0.3 m3	1	
(2)	Bulldozer	6 tons	1	
(3)	Wheel Loader	0.6 m3	1	
(4)	Motor Grader	Blade 3 m	1	
(5)	Tire Roller	6-8 tons	1	
(6)	Tamper	80 kg	2	
(7)	Portable Concrete Mixer	0.2 m3	2	
(8)	Concrete Vibrator	Dia.45	2	
(9)	Submersible Pump	Dia.150	2	
(10)	Generator	10 kW	2	
(11)	Dump Truck	4 tons	2	
(12)	Truck with Crane	4 tons	1	
(13)	Jeep	4WD	3	
(14)	Motorcycle		20	
(15)	Micro Computer, Floppy Disc, Printer		1	Set
(16)	Automatic Rain Gauge		5	
(17)	Automatic Water Level Gauge		1	
(18)	Current Meter		2	
(19)	Meteorological Measuring Instrument		1	Set
(20)	Wireless Radio		4	
(21)	Tools and Equipment for Repair		LS	
(22)	Spare Parts (15 % of the above)		LS	

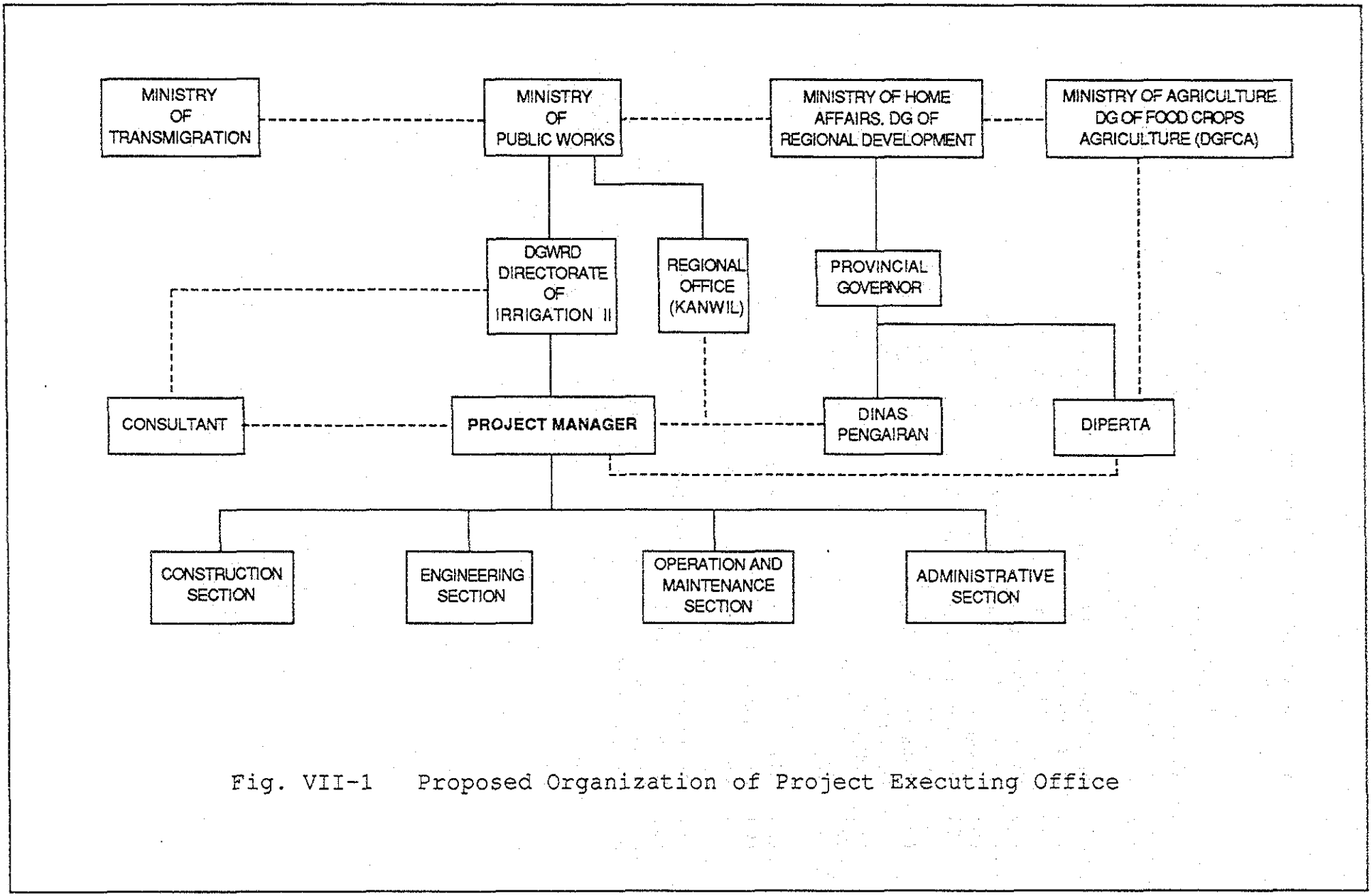


Fig. VII-1 Proposed Organization of Project Executing Office

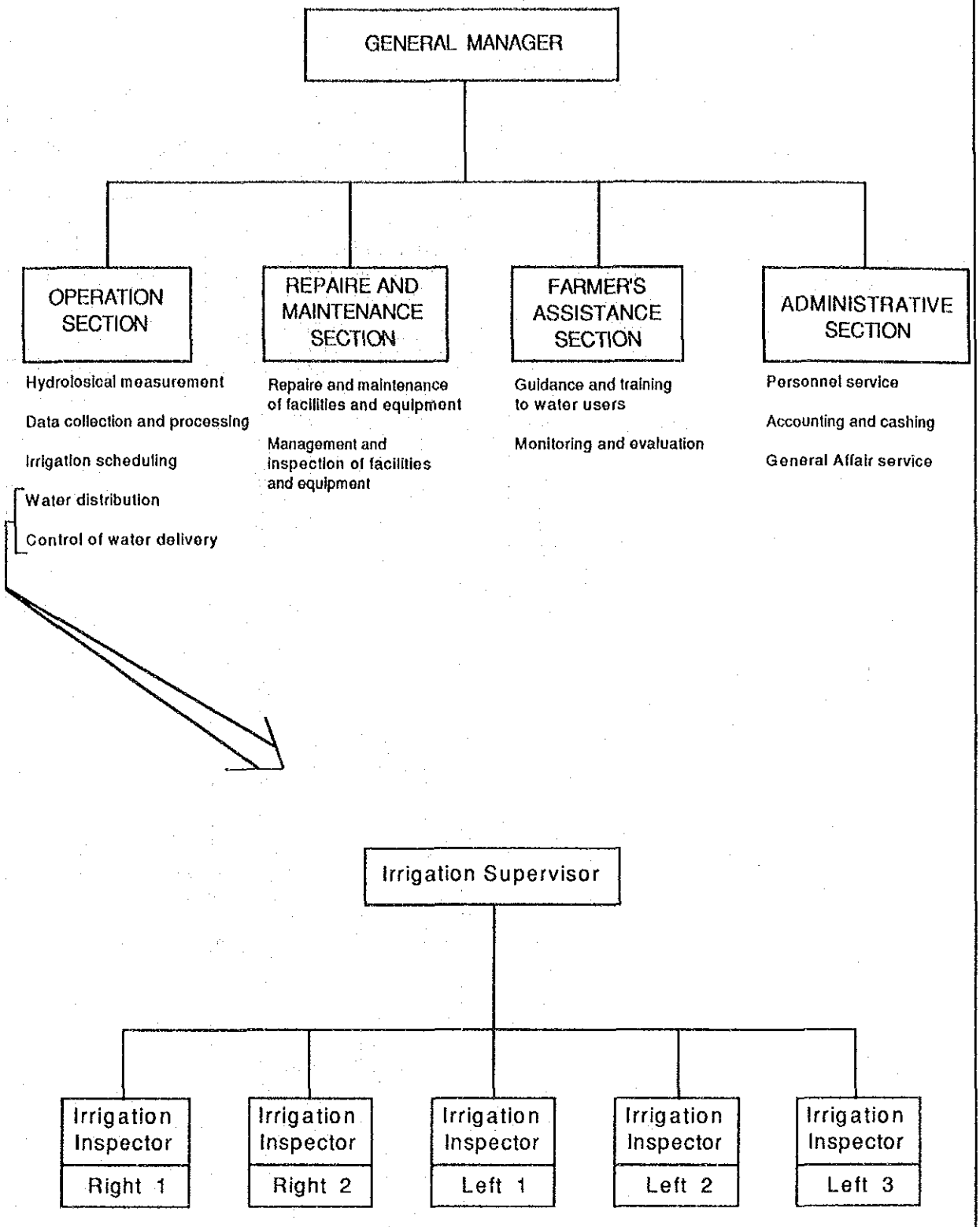
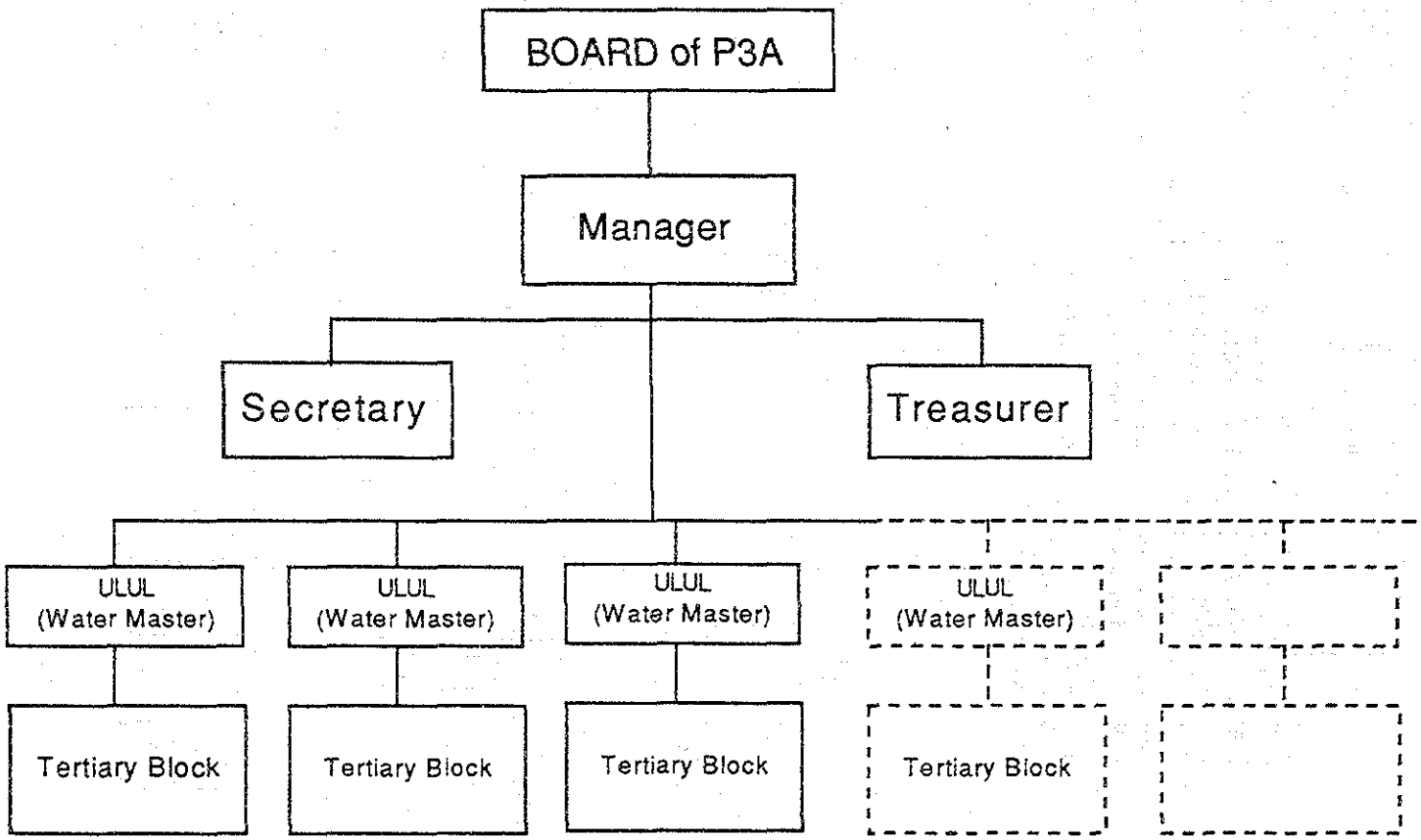


Fig.VII-2 Proposed Organization of O & M Office



VII-3 Proposed Organization of Water User's Association

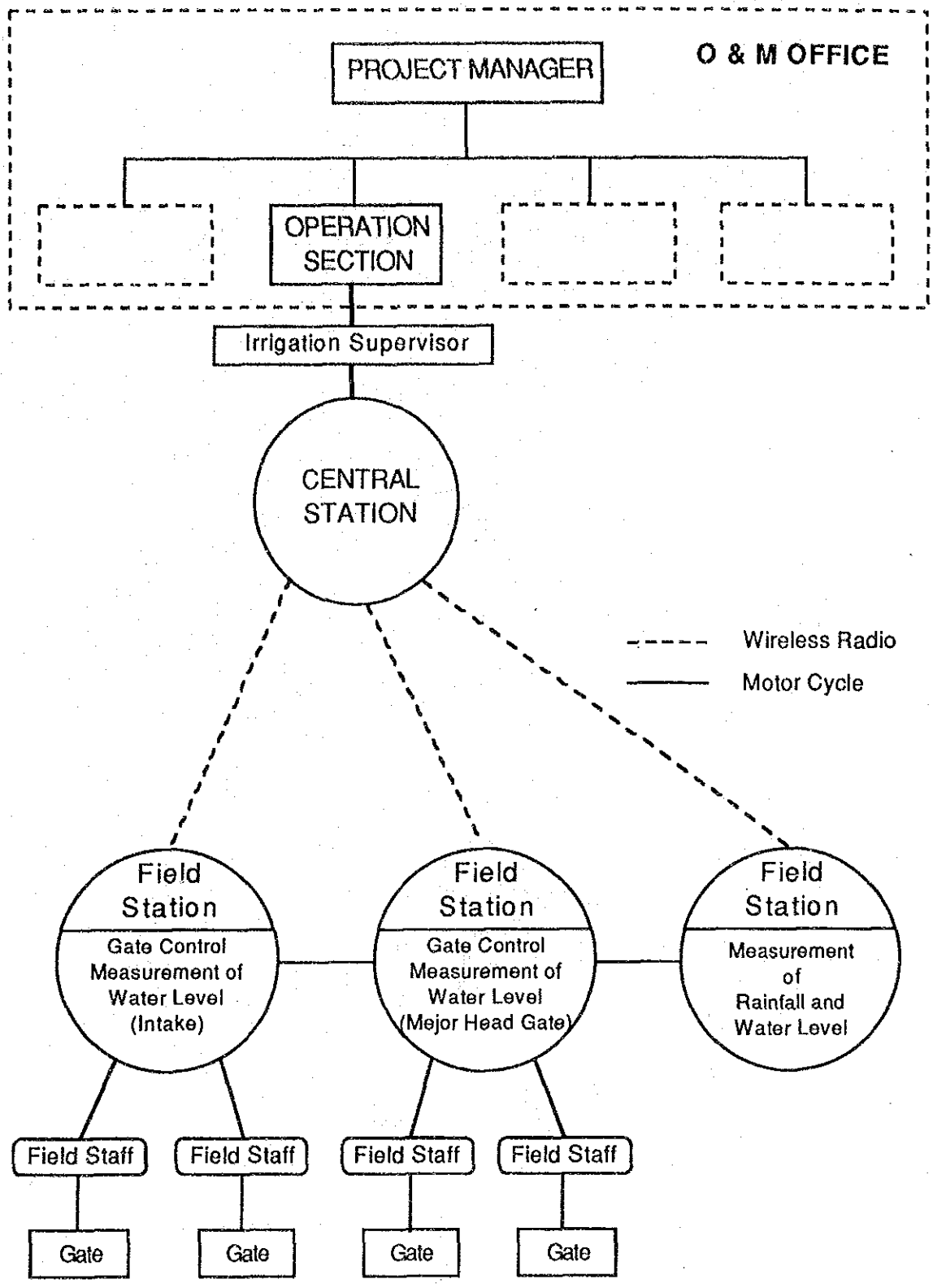


Fig.VII-4 General Concept of Centralized Monitoring System

APPENDIX VIII

PROJECT EVALUATION

CHAPTER 1. GENERAL

The objective of the project evaluation is to assess the economic and financial feasibility of the Batang Kumu Irrigation Project.

For the economic evaluation, three measures of project worth, namely, economic internal rate of return (EIRR), benefit-cost ratio (B/C) and benefit minus cost (B-C) were examined. In addition, a sensitivity analysis in terms of EIRR was made to evaluate the economic viability of the Project against possible changes in project costs, benefits and build-up period. For the financial evaluation, the repayment capability of the Project and the capacity to pay of the farmers were analyzed. The indirect benefits and socio-economic effects, which would impact on the regional and national economy, were also studied briefly.

The project evaluation was based on the following basic assumptions:

a) The useful life of the Project was taken as 50 years from project implementation;

b) For the calculation of EIRR, only direct benefits were counted, and no indirect and intangible benefits were taken into account;

c) The exchange rate of Indonesian Rupiah (Rp.) to US. Dollar (US$) was taken to be Rp. 1,710 equivalent to US$ 1.00 (as of October 29-31, 1988);

d) Constant prices at 1988 level were used in the economic evaluation; and

e) The economic conversion factors, which were estimated in the Guideline for Water Resources Projects PU, are used to convert financial to economic values in the economic evaluation.

CHAPTER 2. ECONOMIC EVALUATION

2.1 Project Costs

The project costs for economic evaluation would consist of construction cost, annual operation and maintenance (O&M) cost, replacement cost and transmigration cost, and these economic costs can be obtained by applying economic conversion factors (ECF) to the financial costs. The ECFs used to convert financial into economic costs are presented in Table VIII-1.

The construction cost for implementation of the Project includes the costs for (1) preparatory works, (2) construction of project facilities such as intake, irrigation and drainage canals and farm road, (3) tertiary development (on-farm development), (4) construction of office and quarters, (5) procurement of O&M equipment and (6) administration expenses and engineering services. The total construction cost would amount to Rp. 39.6 billion as shown in Table VIII-2, and its annual disbursement is scheduled as shown in Table VIII-3.

The annual O&M cost for project facilities was estimated at Rp. 175 million on the basis of the figures of similar irrigation project. The O&M cost would be initially disbursed in 1994/1995 when partial operation would be commenced, and would reach the full amount in 1997/1998 when full operation would start.

Regarding the replacement cost, the steel gates installed in the project facilities would be replaced once during the entire period of the project life. Their useful lives were estimated to be 30 years, and their replacement costs were estimated at Rp. 1.3 billion in total (see Table VIII-4). The O&M equipment would be replaced every 10 years.

The transmigration cost consists of five items; i.e. 1) construction cost of houses, 2) construction cost of shallow wells, 3) land clearing, village roads and related facilities in village area, 4) settlement cost including traveling expenses of transmigrants and 5) government subsidy for transmigrants. Their total cost was estimated at Rp 8.0 billion (see Table VIII-5 to VIII-7).

Land acquisition costs and price contingency were excluded from the project economic costs. Production foregone earmarked for negative benefit was evaluated, instead of the land acquisition cost. Since EIRR of the Project is measured at constant prices, provision for price contingency was excluded from the project costs.

2.2 Project Benefits

2.2.1 Economic Prices of Farm Inputs and Outputs

Economic prices of farm inputs and outputs were estimated in

order to evaluate the expected project benefits. Economic prices of trade goods such as rice, maize, soybeans, groundnuts and fertilizers were estimated on the basis of the projected world market prices of these commodities forecast by the World Bank in the long term range for the period from 1990 to 2000. The details are shown in Table VIII-8. Non-trade goods such as, cassava, seeds and animal power were valued at financial prices which were estimated on the basis of current market or farm gate prices prevailing in the Project area in September 1988. As for farm labor, it was valued at a shadow wage rate, based on the ECF of 0.75 (see Table VIII-1). Economic and financial prices of farm inputs and outputs used for project evaluation are summarized in Table VIII-9.

2.2.2 Project Benefits

The project benefits consist of irrigation benefits and negative benefits. The irrigation benefits will accrue primarily from increased crop production owing to stable irrigation water supply. Negative benefits will occur on lands to be occupied by project facilities.

(1) Irrigation Benefits

The irrigation benefits are defined as the difference in net return from crops between the future with and the future without project conditions. The net return per ha for each crop under the future with and the future without project conditions was estimated as shown in Tables VIII-10 and VIII-11. Applying the net return per ha for each crop to those harvested area, the total net return to accrue from crop production was calculated on both the future with and without project conditions. Then, annual irrigation benefit at full development stage was estimated at Rp 8.56 billion, as shown below. The details are shown in Table VIII-12. The benefits would start to accrue from 1995/1996, and would gradually increase up to the full benefit in 2002/2003.

(Unit: Rp 10^6/ha)

Crops	Total Net Return		Benefits
	Without Project	With Project	
Paddy (Irrigated) - Wet season	-	5,818	5,818
- Dry season	-	2,471	2,471
Paddy (Rainfed) - Wet land	44	-	-44
- Dry land	71	-	-71
Maize	-34	-52	-18
Groundnuts	93	471	378
Soybeans	-5	-7	-2
Green beans	22	107	85
Cassava	54	-	-54
Total	245	8,808	8,563

As shown in the above table, it was estimated that total net return under the future without project condition would remain at present level. The reasons of present low yields are due to water stress and soil constraints. Such problems in the area cannot be solved radically without the implementation of the irrigation project. Moreover, no drastic change in cultivation area of crops would be expected under the future without project condition. At present, the cultivation area per family was estimated at 1.03 ha. It is considered that upper limit of its area will be in the neighborhood of one hectare per family under present farming conditions which have been carried out by primitive practices such as mixed culture and seeding by stick.

(2) Negative Benefits

For the economic assessment, the opportunity cost of the land to be newly provided with project facilities is evaluated in distinction from the land acquisition cost which is used in the financial assessment. In the Project area, about 800 ha of farm land, grass land and forest would be required for right of way for the newly installed project facilities.

For the farm land, production foregone was evaluated as a negative benefit, instead of its land acquisition cost. This production foregone was already counted in the estimation of irrigation benefits by deducting this area from the paddy fields under the future with project condition. As regards the forest and grass lands, no opportunity cost in a national economic sense was evaluated, since there was no potential alternative.

2.3 Economic Evaluation

2.3.1 EIRR, B/C and B-C

In order to compute the EIRR, B/C and B-C, the annual economic costs and benefits flows were firstly prepared as shown in Table VIII-13. From this table, the EIRR was estimated to be 12.7%. In addition, the B/C and B-C at the discount rate of 10% were also estimated as follows:

EIRR	(%)	12.7
B/C		1.32
B-C	(Rp. 10^6)	10,520

As shown in the above table, these results indicate that the Project is economically viable.

2.3.2 Sensitivity Analysis

Project sensitivity in terms of the EIRR was analyzed in respect of changes in project costs and benefits. The results

of analysis are summarized below.

(EIRR: %)

Project costs increased	Benefits Decreased		Delay of 1 year in commencement of construction
	0%	-10%	
0%	12.7	11.6	11.6
+10%	11.7	10.7	10.7

As a result of sensitivity analysis, if project costs increase by 10% and project benefits decrease by 10%, the feasibility of the Project is economically marginal.

CHAPTER 3. FINANCIAL EVALUATION

3.1 Repayment Capability

The repayment capability of the Project was studied by preparing cash flow statements on the basis of an annual disbursement schedule of the construction cost, fund requirement and anticipated project revenue. The transmigration cost was excluded from this study, because the repayment capability was studied in relation to the project executing agency which construct the irrigation facilities.

The annual disbursement schedule of the construction cost was prepared as shown in Table VIII-14. The price contingency shown in this table was estimated on the basis of the world manufacturing unit value index forecast by the World Bank and recent trends of consumer price index in the country (see Table VIII-15). The total project cost including price contingency is summarized below.

(Unit: Rp. Million)

Item	F.C.	L.C.	Total
1) Preparatory Work	1,436	616	2,052
2) Civil Work for First Stage	18,669	12,002	30,671
3) Civil Work for Second Stage	4,892	2,789	7,681
4) O&M Facilities and Equipment	896	299	1,195
5) Land Acquisition	-	308	308
6) Administration	-	1,123	1,123
7) Engineering Service	6,156	684	6,840
8) Physical Contingency	1,602	891	2,493
Sub-Total	33,651	18,712	52,363
9) Price Contingency	7,286	13,065	20,351
Total	40,937	31,777	72,714

For the estimation of funding requirements, it was assumed that the capital required for project implementation would be arranged in terms of the following financial conditions.

Foreign Currency Portion

The capital will be financed by an international organization with the following loan conditions:

- Interest rate : 2.7 % per year
- Grace period : 10 years
- Repayment period : 30 years (including grace period)

Local Currency Portion

The capital is arranged by budget allocation of the Government with no interest and no repayment.

According to the above assumptions, the total fund requirement for construction of the Project was estimated at about Rp. 40.9 billion, with its yearly breakdown as shown below.

(Unit: Rp 10^6)

Year*1	International Fund	Government Budget	Total
1990	2,442	693	3,135
1991	1,759	853	2,612
1992	3,886	2,708	6,594
1993	11,146	9,364	20,510
1994	13,762	11,650	25,412
1995	5,763	4,648	10,411
1996	2,179	1,861	4,040
Total	40,937	31,777	72,714

*1 This is assumption in order to estimate the annual funding requirement and does not indicate its real year.

As for the anticipated project revenue, this will accrue from irrigation service fees. In general, it is understood that irrigation service fee will be imposed on water users (farmers), and the collected fees will be spent for payment of O&M expenditure. In Indonesia, however, farmers traditionally do not pay any fees except for the O&M costs of tertiary systems, though they contribute indirectly by paying the IPEDA tax.

According to DOI-II, on the other hand, a recent Government Degree and the agreement made with the international lending agencies has altered these conditions such that Government policy will now be to collect irrigation service fees and recover all O&M costs in main and secondary systems from the fees. Considering the above recent movement, cash flow statements of the Project executing agency were prepared for two cases, i.e. 1) with irrigation service fee and 2) without irrigation service fee. The fees to be collected from the water users would have to be within a reasonable range in the capacity to pay that could still give sufficient incentive to the farmers. With this view, the prospective fee is estimated to be Rp 30,000/ha/annum. The annual project revenue which accrue from the fees would amount to Rp. 219 million.

Cash flow statements of the Project executing agency shown in Tables VIII-16 and VIII-17. These statements indicate that the project revenue from the irrigation service fees cannot cover the annual repayment of the fund which is estimated at Rp. 2.6 billion on average during the repayment period. Repayment of the fund will have to be made by subsidy from the Government.

3.2 Capacity to Pay of the Farmers

In order to assess the capacity to pay of farmers, the analysis of their farm budget was made under the future with project condition.

(Unit: Rp 1,000/year)

Item	Without Project*1	With Project*2			
		With Palawija*3		Without Palawija*3	
		W. Rubber	W/O Rubber	W. Rubber	W/O Rubber
(Farm Size)	(1.01)	(1.75)	(1.00)	(1.75)	(1.00)
1) Gross Income	737	2,817	2,179	2,586	1,948
- Farm income	386	2,466	1,828	2,235	1,597
- Off-farm income	351	351	351	351	351
2) Gross Outgoing	732	1,384	1,234	1,335	1,186
- Production cost	70	501	351	452	303
- Living expenses*2	662	883	883	883	883
3) Net reserve/ Capacity to Pay	5	1,433	945	1,251	762
4) Irrigation Service Fee		30	30	30	30

*1 Include subsidy from WFP Project. *2 No WFP subsidy.
*3 Palawija crops are cultivated traditionally in the dry season.

The net reserve or capacity to pay of farmers would increase remarkably from Rp 5,000 under the future without project condition to Rp 0.76-1.43 million under the future with project condition. The increase in net reserve would enable farmers to pay the irrigation service fee, if it is imposed to them.

CHAPTER 4. INDIRECT BENEFITS AND SOCIO-ECONOMIC IMPACTS

After implementation of the Project, various indirect benefits and socio-economic impacts are expected as mentioned below.

(1) Employment Opportunities

The Project would create a demand for farm labor due to the increased farming activity, more intensive use of land and higher agricultural production. In the existing transmigration area, the incremental farm labor requirement was estimated to be about 426,000 man-days per annum. In addition, construction of the Project would increase employment opportunities in the area. During the construction stage, the majority of workers would be un-skilled laborers, most of whom would come from farmers and ordinary laborers in and around the Project area.

(2) Farmers' Income

After implementation of the Project, income of farmers estimated at 6,400 households is expected to increase considerably as a direct result of the increase in crop production. Such increase in income would contribute to improving farmers' living standards. Moreover, it is expected that farmers' purchasing power would increase along with improvement of their living standards, and this increased purchasing power would benefit the development of the regional economy.

(3) Marketing of Farm Inputs and Outputs

Future marketing in the area is likely expand as compared with the present condition. With anticipated higher agricultural production, more farm products could be marketed by the farmers and the proportion of sales would also increase relative to consumption. The merchants would have a larger turnover which could increase their incomes.

Marketing functions would not only be influenced by agricultural outputs. It is assumed that when agricultural production develops as a result of the Project, the Project area would be a good market for farm supplies. The farmers need to operate with farm supplies such as tools, equipment and bags. Both ends of marketing channels could, therefore, expect substantial beneficial impacts from the Project.

(4) Food Supply

Since the demand for rice in Riau Province will continue to increase with population growth, the Project area will have to be

a supply base to the province for this crop. The shortage of rice in the province in 2005 is forecast to be 317,000 tons, while the Project would produce a marketable surplus estimated at 30,000 tons of rice.

(5) Other Effects

Implementation of the Project would certainly lead to changes in rural socio-economy in the area. By the construction of inspection roads along the canals, the local transportation system would also be improved, which will contribute to the improvement of rural socio-economic activities.

Table VIII-1 ECONOMIC CONVERSION FACTORS (ECF)

Item	Coefficient used to convert financial into economic values
1) Preparatory Works	0.71
2) Weir	0.71
3) Irrigation System	0.71
4) Drainage System	0.71
5) Land Clearing	0.80
6) On-farm Development (Sawah Formation)	0.80
7) O&M Equipment	1.00
8) Design and Survey	0.90
9) Administration	0.90
10) Operation and Maintenance Cost	0.80
11) Replacement Cost	1.00
12) Unskilled Off-Farm Labor	0.75
13) Farm Labor	0.75

Source: Pedoman Pengamatan dan Evaluasi Proyek-Proyek Pengairan, Direktorato Jenderal Pengairan, 1985.

Table VIII-2 ECONOMIC CONSTRUCTION COST

(Unit: Rp Million)

Item	Financial Cost	ECF	Economic Cost
1) Preparatory Works	2,052	0.71	1,457
2) Civil Work for 1st Stage			
- Head Work and Link Canal*1	5,055	0.71	3,589
- Main and Secondary Canals*2	22,440	0.71	15,932
- Tertiary Canal*3	3,175	0.80	2,540
3) Civil Work for 2nd Stage			
- Secondary Canal*2	3,300	0.71	2,343
- Tertiary Canal*3	4,381	0.80	3,505
4) O&M Facilities and Equipment	1,195	1.00	1,195
5) Land Acquisition	308	-	-
6) Administration	1,123	0.90	1,011
7) Engineering Service	6,840	0.90	6,156
8) Physical Contingency	2,493	-	1,886
Sub-Total	52,362		39,614
9) Price Contingency	20,352	-	-
Total	72,714		39,614

Remarks: *1 Weir *2 Irrigation and drainage systems
*3 Land clearing and on-farm development
Note: US$ 1.00 = Rp. 1,710 (October 29-31, 1988)

Table VIII-3 ANNUAL DISBURSEMENT SCHEDULE OF ECONOMIC CONSTRUCTION COST

(Unit: Rp Million)

Item	Total Cost			*3 1990/1991	1991/1992	1992/1993	1993/1994	1994/1995	1995/1996	1996/1997
	F/C*1	ECF	E/C*2							
1) Preparatory Works	2,052	0.71	1,457	437	583	291	146	-	-	-
2) Civil Work for 1st Stage										
- Head Work and Link Canal*4	5,055	0.71	3,589	-	-	998	1,514	1,077	-	-
- Main and Secondary Canals*5	22,440	0.71	15,932	-	-	1,441	7,094	6,524	873	-
- Tertiary Canal*6	3,175	0.80	2,540	-	-	-	638	1,566	335	-
3) Civil Work for 2nd Stage										
- Secondary Canal*5	3,300	0.71	2,343	-	-	-	-	937	936	470
- Tertiary Canal*6	4,381	0.80	3,505	-	-	-	-	877	1,753	875
4) O&M Facilities and Equipment	1,195	1.00	1,195	-	-	-	-	299	597	299
5) Land Acquisition	308	-	-	-	-	-	-	-	-	-
6) Administration	1,123	0.90	1,011	152	152	152	152	152	152	97
7) Engineering Service	6,840	0.90	6,156	1,724	923	739	923	1,108	554	185
8) Physical Contingency	2,493	-	1,886	116	83	181	523	627	260	96
Sub-Total	52,362		39,614	2,429	1,741	3,802	10,990	13,167	5,460	2,022
9) Price Contingency	20,352	-	-	-	-	-	-	-	-	-
Total	72,714		39,614	2,429	1,741	3,802	10,990	13,167	5,460	2,022

(Unit: US$ 1,000)

Item	Total Cost			*3 1990/1991	1991/1992	1992/1993	1993/1994	1994/1995	1995/1996	1996/1997
	F/C*1	ECF	E/C*2							
1) Preparatory Works	1,200	0.71	852	256	341	170	85	-	-	-
2) Civil Work for 1st Stage										
- Head Work and Link Canal*4	2,956	0.71	2,099	-	-	584	885	630	-	-
- Main and Secondary Canals*5	13,123	0.71	9,317	-	-	843	4,149	3,816	510	-
- Tertiary Canal*6	1,857	0.80	1,486	-	-	-	374	916	196	-
3) Civil Work for 2nd Stage										
- Secondary Canal*5	1,930	0.71	1,370	-	-	-	-	548	547	275
- Tertiary Canal*6	2,562	0.80	2,050	-	-	-	-	513	1,025	512
4) O&M Facilities and Equipment	693	1.00	699	-	-	-	-	175	349	175
5) Land Acquisition	180	-	-	-	-	-	-	-	-	-
6) Administration	657	0.90	591	89	89	89	89	89	89	57
7) Engineering Service	4,000	0.90	3,600	1,008	540	432	540	648	324	108
8) Physical Contingency	1,458	-	1,103	68	49	106	306	367	152	56
Sub-Total	30,622		23,167	1,421	1,019	2,224	6,428	7,702	3,192	1,183
9) Price Contingency	11,902	-	-	-	-	-	-	-	-	-
Total	42,524		23,167	1,421	1,019	2,224	6,428	7,702	3,192	1,183

Remarks: *1 F/C Financial cost *2 E/C Economic cost

*3 Year is assumption in order to estimate the price contingency and dose not indicate its real year.

*4 Weir *5 Irrigation and drainage systems *6 Land clearing and on-farm development

Note: US$ 1.00 = Rp. 1,710 (October 29-31, 1988)

Table VIII-4 O&M AND REPLACEMENT COSTS

Item	Financial Cost (US$1,000)	Financial Cost (Rp Million)	ECF	Economic Cost (Rp Million)
(1) O&M Cost *1	-	219	0.80	175
(2) Replacement Cost *2				
- Steel gates of weir	235	401	1.00	401
- Steel gates of irrigation facilities	526	900	1.00	900
- O&M Equipment	582	996	1.00	996

*1 Rp 30,000/ha x 7,300 ha = Rp 219,000,000
*2 Useful Life
Steel gates of weir : 30 years
Steel gates of irrigation facilities : 30 years
O&M Equipment : 10 years

Table VIII-5 TRANSMIGRATION COST

Item	Q'ty	Unit Price (Rp)	Financial Cost (Rp Million)	ECF*1	Economic Cost (Rp Million)
(1) Houses (No.)	4,230	850,000	3,596	0.80	2,877
(2) Shallow Wells*3 (No.)	1,060	350,000	371	0.80	297
(3) Land Clearing, Road and Related Facilities in Village Area			1,744	0.80	1,395
(4) Settlement Cost (Family)	4,230	48,000	203	1.00	203
(5) Government Subsidy*4 (Family)	4,230		2,948	-	2,826
(6) Physical Contingency			443		380
Total			9,305		7,978

*1 ECF of (1), (2) and (3) were estimated at 0.80 with reference of the on-farm development (see Table VIII-1).
*2 Total families of new transmigrants.
*3 One shallow well per four houses.
*4 Financial cost: 4,230 families x Rp697,000/family
= Rp2,948,000,000
Economic cost: 4,230 families x Rp668,000/family
= Rp2,826,000,000
Government subsidy per family is shown in Table VIII-6.
Note: Transmigration cost was estimated on the basis of actual cost of transmigration project in Riau Province in 1987/88.

Table VIII-6 GOVERNMENT SUBSIDY FOR TRNASMIGRANTS

Item	Unit	Q'ty	Financial Cost		Economic Cost	
			Unit Price (Rp)	Amount (Rp/Family)	Unit Price (Rp)	Amount (Rp/Family
a) Foodstaff						
- Rice	(kg)	582	650	378,300	425	247,350
- Fish	(kg)	60	1,000	60,000	1,000	60,000
- Cooking Oil	(kg)	36	1,000	36,000	1,000	36,000
- Salt and sugar				36,000		36,000
b) Seed						
- Paddy	(kg)	30	220	6,600	220	6,600
- Maize	(kg)	5	210	1,050	210	1,050
- Groundnuts	(kg)	12	1,000	12,000	1,000	12,000
- Vegetables	(kg)	12	680	8,160	680	8,160
- Cassava and fruit tree				5,000		5,000
c) Fertilizers and Agro-chemicals						
- Urea	(kg)	200	135	27,000	394	78,800
- TSP	(kg)	100	135	13,500	495	49,500
- Pesticides	(Lit)	2.75	5,000	13,750	10,000	27,500
d) Others*1				100,000		100,000
Total				697,360		667,960

*1 Include costs for farm tools, equipment and clothes.

Table VIII-7 DISBURSEMENT SCHEDULE OF ECONOMIC TRANSMIGRATION COST

(Unit: Rp Million)

	Total	1992/93	1993/94	1994/95	1995/96
(1) Houses	2,877	721	1,435	721	-
(2) Shallow wells	297	74	149	74	-
(3) Land clearing, road and related facilities in village area	1,395	350	695	350	-
(4) Settlement cost	203	51	101	51	-
(5) Government subsidy	2,826	-	708	1,410	708
(6) Physical contingency	380	60	155	130	35
Total	7,978	1,256	3,243	2,736	743

Table VIII-8 ECONOMIC PRICE STRUCTURE (1/2)

			US$/ton	Rp/ton*2
RICE (IMPORT PARITY)				
1) Thai 5% broken, FOB Bangkok *1 (Constant 1985 price)			166	
2) Adjusted to 1988 constant	1.407		234	
3) Quality adjustment	10%		211	
4) Freight and insurance (Bangkok-Dumai)		+	30	
5) CIF Dumai			241	412,100
6) Port handling, storage and losse	5%	+		20,600
7) Transport: port to wholesaler		+		5,000
8) Transport: mill to wholesaler		-		3,000
9) Trade margins		-		10,000
10) Ex-mill price				424,700
11) Conversion to paddy	68%			288,800
12) Milling cost		-		31,000
13) Transport: farm to mill		-		15,000
14) Economic farm gate price				242,800
(Rounded)				(243,000)
MAIZE (EXPORT PARITY)				
1) FOB US Gulf ports*1 (Constant 1985 price)			73	
2) Adjusted to 1988 constant	1.407		103	
3) Quality adjustment	15%		88	
4) Freight and insurance			-	
5) FOB Dumai			88	150,500
6) Port handling, storage and losses	5%	-		7,500
7) Transport: port to wholesaler		-		5,000
8) Trade margins		-		10,000
9) Transport: farm to wholesaler		-		15,000
10) Economic farm gate price				113,000
(Rounded)				(113,000)
GROUNDNUTS (IMPORT PARITY)				
1) CIF Rotterdam: groundnuts oil price*1 (Constant 1985 price)			456	
2) Adjusted to 1988 constant	1.407		642	
3) Ratio Indonesian import/groundnuts oil price (1982-84)*3	72%		462	
4) Freight and insurance			-	
5) CIF Indonesia (shelled groundnuts)			462	790,000
6) Port handling, sotrage and losses	5%	+		39,500
7) Transport: port to wholesaler		+		5,000
8) Trade margins		-		10,000
9) Transport: farm to wholesaler		-		15,000
10) Economic farm gate price				809,500
(Rounded)				(810,000)

*1 Projected price in 2000 at constant 1985 price.
Source: Revision of Commodity Price Forecast and Quarterly Review of Commodity Markets - September 1988, The World Bank, October 1988.

*2 Exchange rate: US$ 1.00 = Rp 1,710

*3 Source: Irrigation Subsector Project, The World Bank, October 1987.

Table VIII-8 ECONOMIC PRICE STRUCTURE (2/2)

			US$/ton	Rp/ton*2
SOYBEANS (IMPORT PARITY)				
1) CIF Rotterdam*1				
(Constant 1985 price)			148	
2) Adjusted to 1988 constant	1.407		208	
3) Quality adjustment			208	
4) Freight and insurance				
5) CIF Dumai			208	355,700
6) Port handling, storage and losse	5%	+		17,800
7) Transport: port to wholesaler		+		5,000
8) Trade margins		-		10,000
9) Transport: farm to wholesaler		-		15,000
10) Economic farm gate price				353,500
(Rounded)				(354,000)
UREA (EXPORT PARITY)				
1) FOB Europe*1				
(Constant 1985 price)			132	
2) Adjusted to 1988 constant	1.407		186	
3) Freight and insurance		+	15	
4) Ex-factory Palembang			201	343,700
5) Transport to wholesaler		+		20,000
6) Storage and wholesalers' margins*3		+		15,000
7) Transport to farm		+		15,000
8) Economic farm gate price				393,700
(Rounded)				(394,000)
TSP (IMPORT PARITY)				
1) FOB US Gulf ports*1				
(Constant 1985 price)			146	
2) Adjusted to 1988 constant	1.407		205	
3) Freight and insurance		+	55	
4) CIF Dumai			260	444,600
5) Transport to wholesaler		+		20,000
6) Storage and wholesalers' margins*3		+		15,000
7) Transport to farm		+		15,000
8) Economic farm gate price				494,600
(Rounded)				(495,000)
POTASSIUM CHLORIDE (IMPORT PARITY)				
1) FOB Vancouver*1				
(Constant 1985 price)			75	
2) Adjusted to 1988 constant	1.407		106	
3) Freight and insurance		+	55	
4) CIF Dumai			161	275,300
5) Transport to wholesaler		+		20,000
6) Storage and wholesalers' margins*3		+		15,000
7) Transport to farm		+		15,000
8) Economic farm gate price				325,300
(Rounded)				(325,000)

*1 Projected price in 2000 at constant 1985 price.
Source: Revision of Commodity Price Forecast and Quarterly Review of Commodity Markets - September 1988, The World Bank, October 1988.

*2 US$ 1.00 = Rp 1,710 *3 Include port handling charge.

Table VIII-9 FINANCIAL AND ECONOMIC PRICES OF FARM INPUTS AND OUTPUTS

(Unit: Rp)

		Financial Price	Economic Price *1
1) Farm Outputs			
Paddy *2	(kg)	210	243
Maize *2	(kg)	175	113
Groundnuts *2	(kg)	680	810
Soybeans *2	(kg)	500	354
Green beans *2	(kg)	600	600
Cassava *3	(kg)	50	50
2) Seed			
Paddy	(kg)	220	220
Maize	(kg)	210	210
Groundnuts	(kg)	1,000	1,000
Soybeans	(kg)	640	640
Green beans	(kg)	680	680
Cassava	(picec)	2	2
3) Fertilizers			
Urea	(kg)	135	394
T.S.P.	(kg)	135	495
KCl	(kg)	135	325
4) Agro-chemicals			
Insecticide	(liter)	5,000	10,000
Fungicide	(liter)	5,000	10,000
Herbicide	(liter)	5,000	10,000
Rodenticide	(kg)	5,000	10,000
5) Hired Labor*4	(man-day)		
Land preparation		2,000	1,500
Nursery preparation		2,000	1,500
Seeding		1,500	1,100
Transplanting of paddy		1,500	1,100
Fertilizing		1,500	1,100
Weeding		1,500	1,100
Spraying		1,500	1,100
Harvesting/Drying		2,000	1,500
6) Hired animal	(day)	3,000	3,000

*1 Projected price in 2000 at 1988 constant price.
*2 Dry grain. *2 Fresh roots
*4 Includes cost for meals (two times).
Shadow wage rate: 0.75

Table VIII-10 ECONOMIC NET RETURN PER HECTARE - WITHOUT PROJECT

		Wet Land Paddy		Dry Land Paddy		Maize		Groundnuts		Soybeans		Green Beans		Cassava	
I. Gross Income															
1) Unit Yield	(ton/ha)		2.8		1.2		1.3		0.9		0.7		0.6		7.0
2) Unit Price	(Rp/ton)		243,000		243,000		113,000		810,000		354,000		600,000		50,000
3) Gross Income	(Rp)		680,400		291,600		146,900		729,000		247,800		360,000		350,000
		Unit Price (Rp)	Q'ty	Value (Rp)	Q'ty	Value (Rp)	Q'ty	Value (Rp)	Q'ty	Value (Rp)	Q'ty	Value (Rp)	Q'ty	Value (Rp)	Q'ty	Value (Rp)
II. Production Cost															
1) Seed	(kg)	- *1	29	6,400	38	8,400	28	5,900	31	31,000	27	17,300	25	17,000	10,000	20,000
2) Fertilizers																
- Urea	(kg)	394	91	35,900	63	24,800	51	20,100	20	7,900	39	15,400	4	1,600	-	-
- T.S.P.	(kg)	495	12	5,900	44	21,800	30	14,900	13	6,400	53	26,200	5	2,500	-	-
- KCl	(kg)	325	4	1,300	11	3,600	9	2,900	-	-	14	4,600	2	700	-	-
3) Agro-chemicals																
- Insecticides	(ltr.)	10,000	2.4	24,000	1.6	16,000	1.0	10,000	1.2	12,000	2.6	26,000	1.0	10,000	-	-
- Herbicides	(ltr.)	10,000	0.2	2,000	0.3	3,000	0.3	3,000	0.1	1,000	-	-	-	-	-	-
4) Labor	(man-day)															
- Land Preparation		1,500	17	25,500	29	43,500	29	43,500	19	28,500	31	46,500	23	34,500	22	33,000
- Nursery		1,500	1	1,500	-	-	-	-	-	-	-	-	-	-	-	-
- Seeding		1,100	1	1,100	18	19,800	14	15,400	16	17,600	14	15,400	5	5,500	15	16,500
- Transplanting		1,100	20	22,000	-	-	-	-	-	-	-	-	-	-	-	-
- Fertilizing		1,100	4	4,400	3	3,300	5	5,500	1	1,100	3	3,300	1	1,100	21	-
- Weeding		1,100	23	25,300	21	23,100	20	22,000	20	22,000	29	31,900	10	11,000	12	13,200
- Spraying		1,100	4	4,400	2	2,200	2	2,200	2	2,200	5	5,500	2	2,200	-	-
- Harvesting		1,500	34	51,000	25	37,500	26	39,000	24	36,000	23	34,500	15	22,500	21	31,500
5) Animal Power	(day)	3,000	10.3	30,900	5.0	15,000	3.6	10,800	10.1	30,300	8.0	24,000	3.3	9,900	1.1	3,300
6) Others (5%)				12,100		11,100		9,800		9,800		12,500		5,900		5,900
Total				253,700		233,100		205,000		205,800		263,100		124,400		123,400
III. Net Income				426,700		58,500		(58,100)		523,200		(15,300)		235,600		226,600

*1 Unit price of seed (Rp/kg)

Paddy:	220	Groundnuts:	1,000	Green beans:	680
Maize:	210	Soybeans:	640	Cassava (Rp/piece):	2

Table VIII-11 ECONOMIC NET RETURN PER HECTARE
- WITTH PROJECT (1/2)

		Unit Price (Rp)	Paddy (Wet Land) Wet Season Q'ty	Wet Season Value (Rp)	Dry Season Q'ty	Dry Season Value (Rp)
I. Gross Income						
1) Unit Yield	(ton/ha)			5.0		5.0
2) Unit Price	(Rp/ton)			243,000		243,000
3) Gross Income	(Rp)			1,215,000		1,215,000
II. Production Cost						
1) Seed	(kg)	220	30	6,600	30	6,600
2) Fertilizers						
- Urea	(kg)	394	200	78,800	200	78,800
- T.S.P.	(kg)	495	100	49,500	100	49,500
- KCl	(kg)	325	50	16,300	50	16,300
- Lime	(kg)	100	-	-	-	-
3) Agro-chemicals						
- Insecticides	(liter)	10,000	3.0	30,000	3.0	30,000
- Fungicides	(l/ha)	10,000	1.0	10,000	1.0	10,000
- Rodenticides	(kg)	10,000	0.1	1,000	0.1	1,000
4) Labor*1	(man-day)					
- Land Preparation		1,500	25	37,500	25	37,500
- Nursery		1,500	4	6,000	4	6,000
- Seeding		1,100	1	1,100	1	1,100
- Transplanting		1,100	25	27,500	25	27,500
- Fertilizing		1,100	6	6,600	6	6,600
- Weeding		1,100	25	27,500	25	27,500
- Spraying		1,100	4	4,400	4	4,400
- Harvesting		1,500	40	60,000	40	60,000
- Water management and others		1,100	5	5,500	5	5,500
5) Animal Power	(day)	3,000	10.0	30,000	10.0	30,000
6) Others (5%)				19,900		19,900
Total				418,200		418,200
III. Net Income				796,800		796,800

*1 Total labor requirement (man-day/ha):
Wet season paddy 135
Dry season paddy 135

Table VIII-11 ECONOMIC NET RETURN PER HECTARE - WITH PROJECT (2/2)

	Unit Price (Rp)	Maize Q'ty	Maize Value (Rp)	Groundnuts Q'ty	Groundnuts Value (Rp)	Soybeans Q'ty	Soybeans Value (Rp)	Green Beans Q'ty	Green Beans Value (Rp)
I. Gross Income									
1) Unit Yield (ton/ha)			1.3		0.9		0.7		0.6
2) Unit Price (Rp/ton)			113,000		810,000		354,000		600,000
3) Gross Income (Rp)			146,900		729,000		247,800		360,000
II. Production Cost									
1) Seed (kg)	- *1	28	5,900	31	31,000	27	17,300	25	17,000
2) Fertilizers									
- Urea (kg)	394	51	20,100	20	7,900	39	15,400	4	1,600
- T.S.P. (kg)	495	30	14,900	13	6,400	53	26,200	5	2,500
- KCl (kg)	325	9	2,900	-	-	14	4,600	2	700
3) Agro-chemicals									
- Insecticides (ltr.)	10,000	1.0	10,000	1.2	12,000	2.6	26,000	1.0	10,000
- Herbicides (ltr.)	10,000	0.3	3,000	0.1	1,000	-	-	-	-
4) Labor (man-day)									
- Land Preparation	1,500	29	43,500	19	28,500	31	46,500	23	34,500
- Nursery	1,500	-	-	-	-	-	-	-	-
- Seeding	1,100	14	15,400	16	17,600	14	15,400	5	5,500
- Transplanting	1,100	-	-	-	-	-	-	-	-
- Fertilizing	1,100	5	5,500	1	1,100	3	3,300	1	1,100
- Weeding	1,100	20	22,000	20	22,000	29	31,900	10	11,000
- Spraying	1,100	2	2,200	2	2,200	5	5,500	2	2,200
- Harvesting	1,500	26	39,000	24	36,000	23	34,500	15	22,500
5) Animal Power (day)	3,000	3.6	10,800	10.1	30,300	8.0	24,000	3.3	9,900
6) Others (5%)			9,800		9,800		12,500		5,900
Total			205,000		205,800		263,100		124,400
III. Net Income			(58,100)		523,200		(15,300)		235,600

*1 Unit price of seed (Rp/kg)

Maize:	210
Groundnuts:	1,000
Soybeans:	640
Green beans:	680

Table VIII-12 PROJECT BENEFITS

Crops	First Stage			Second Stage*			Total
	Harvested Area (ha)	Net Return per Hectare (Rp 1,000/ha)	Total Value (Rp Million)	Harvested Area (ha)	Net Return per Hectare (Rp 1,000/ha)	Total Value (Rp Million)	(Rp Million)
1) With Project							
Paddy (Irrigated)							
- Wet season	3,070	797	2,447	4,230	797	3,371	5,818
- Dry season	1,300	797	1,036	1,800	797	1,435	2,471
Maize	380	-58	-22	520	-58	-30	-52
Groundnuts	380	523	199	520	523	272	471
Soybeans/Green Beans	380	111	42	520	111	58	100
Total	5,510		3,702	7,590		5,106	8,808
2) Without Project							
Paddy (Rainfed)							
- Wet Land	102	427	44	-	427	-	44
- Dry Land	706	59	42	492	59	29	71
Maize	352	-58	-20	246	-58	-14	-34
Groundnuts	105	523	55	73	523	38	93
Soybeans	229	-15	-3	159	-15	-2	-5
Green Beans	57	236	13	40	236	9	22
Cassava	139	227	32	97	227	22	54
Total	1,690		163	1,107		82	245
Benefit			3,539			5,024	8,563

Remark: * Out of total upland field at present, about 990 ha are located outside of the existing transmigration area where is the first stage development area.

Table VIII-13 PROJECT COSTS AND BENEFITS FLOWS

(Unit: Rp Million)

Year	Year in Order	Project Costs					Project Benefits	Balance
		Construction	Replacement	O&M Cost	Transmigration	Total		
1990 /1991	(1)	2,429	-	-	-	2,429	-	(2,429)
1991 /1992	(2)	1,741	-	-	-	1,741	-	(1,741)
1992 /1993	(3)	3,802	-	-	1,256	5,058	-	(5,058)
1993 /1994	(4)	10,990	-	-	3,243	14,233	-	(14,233)
1994 /1995	(5)	13,167	-	99	2,736	16,002	-	(16,002)
1995 /1996	(6)	5,460	-	150	743	6,353	2,399	(3,954)
1996 /1997	(7)	2,022	-	175	-	2,197	4,131	1,934
1997 /1998	(8)	-	-	175	-	175	5,491	5,316
1998 /1999	(9)	-	-	175	-	175	6,347	6,172
1999 /2000	(10)	-	-	175	-	175	7,204	7,029
2000 /2001	(11)	-	-	175	-	175	8,060	7,885
2001 /2002	(12)	-	-	175	-	175	8,437	8,262
2002 /2003	(13)	-	-	175	-	175	8,563	8,388
2003 /2004	(14)	-	-	175	-	175	8,563	8,388
2004 /2005	(15)	-	-	175	-	175	8,563	8,388
2005 /2006	(16)	-	-	175	-	175	8,563	8,388
2006 /2007	(17)	-	996	175	-	1,171	8,563	7,392
2007 /2008	(18)	-	-	175	-	175	8,563	8,388
2008 /2009	(19)	-	-	175	-	175	8,563	8,388
2009 /2010	(20)	-	-	175	-	175	8,563	8,388
2010 /2011	(21)	-	-	175	-	175	8,563	8,388
2011 /2012	(22)	-	-	175	-	175	8,563	8,388
2012 /2013	(23)	-	-	175	-	175	8,563	8,388
2013 /2014	(24)	-	-	175	-	175	8,563	8,388
2014 /2015	(25)	-	-	175	-	175	8,563	8,388
2015 /2016	(26)	-	-	175	-	175	8,563	8,388
2016 /2017	(27)	-	996	175	-	1,171	8,563	7,392
2017 /2018	(28)	-	-	175	-	175	8,563	8,388
2018 /2019	(29)	-	-	175	-	175	8,563	8,388
2019 /2020	(30)	-	-	175	-	175	8,563	8,388
2020 /2021	(31)	-	-	175	-	175	8,563	8,388
2021 /2022	(32)	-	-	175	-	175	8,563	8,388
2022 /2023	(33)	-	-	175	-	175	8,563	8,388
2023 /2024	(34)	-	-	175	-	175	8,563	8,388
2024 /2025	(35)	-	-	175	-	175	8,563	8,388
2025 /2026	(36)	-	-	175	-	175	8,563	8,388
2026 /2027	(37)	-	2,297	175	-	2,472	8,563	6,091
2027 /2028	(38)	-	-	175	-	175	8,563	8,388
2028 /2029	(39)	-	-	175	-	175	8,563	8,388
2029 /2030	(40)	-	-	175	-	175	8,563	8,388
2030 /2031	(41)	-	-	175	-	175	8,563	8,388
2031 /2032	(42)	-	-	175	-	175	8,563	8,388
2032 /2033	(43)	-	-	175	-	175	8,563	8,388
2033 /2034	(44)	-	-	175	-	175	8,563	8,388
2034 /2035	(45)	-	-	175	-	175	8,563	8,388
2035 /2036	(46)	-	-	175	-	175	8,563	8,388
2036 /2037	(47)	-	996	175	-	1,171	8,563	7,392
2037 /2038	(48)	-	-	175	-	175	8,563	8,388
2038 /2039	(49)	-	-	175	-	175	8,563	8,388
2039 /2040	(50)	-	-	175	-	175	8,563	8,388

EIRR (%): 12.7 B/C (Discount Rate = 10%): 1.32 B-C (Discount Rate = 10%): 10,520

Table VIII-14 ANNUAL DISBURSEMENT SCHEDULE OF FINANCIAL CONSTRUCTION COST

(Unit: Rp Million)

Item	Total Cost			1990/1991*1		1991/1992		1992/1993		1993/1994		1994/1995		1995/1996		1996/1997	
	F.C.	L.C.	Total	F.C.	L.C.	F.C.	L.C.	F.C.	L.C.	F.C.	L.C.	F.C.	L.C.	F.C.	L.C.	F.C.	L.C.
1) Preparatory Works	1,436	616	2,052	431	185	575	246	287	123	144	62	-	-	-	-	-	-
2) Civil Work for 1st Stage																	
- Head Work and Link Canal*2	3,612	1,443	5,055	-	-	-	-	1,017	388	1,510	622	1,084	433	-	-	-	-
- Main and Secondary Canals*3	12,834	9,607	22,441	-	-	-	-	1,153	877	5,710	4,282	5,263	3,926	708	522	-	-
- Tertiary Canal*4	2,223	952	3,175	-	-	-	-	-	-	559	239	1,370	588	294	125	-	-
3) Civil Work for 2nd Stage																	
- Secondary Canal*3	1,826	1,474	3,300	-	-	-	-	-	-	-	-	730	590	730	588	366	296
- Tertiary Canal*4	3,066	1,315	4,381	-	-	-	-	-	-	-	-	766	330	1,534	657	766	328
4) O&M Facilities and Equipment	896	299	1,195	-	-	-	-	-	-	-	-	224	75	448	149	224	75
5) Land Acquisition	-	308	308	-	-	-	92	-	123	-	62	-	31	-	-	-	-
6) Administration	-	1,123	1,123	-	169	-	169	-	169	-	169	-	169	-	169	-	108
7) Engineering Service	6,156	684	6,840	1,724	192	923	103	739	82	923	103	1,108	123	554	62	185	21
8) Physical Contingency	1,602	891	2,493	108	27	75	31	160	88	442	277	527	313	213	114	77	41
Sub-Total	33,651	18,712	52,363	2,263	573	1,573	641	3,356	1,850	9,288	5,816	11,072	6,578	4,481	2,386	1,618	869
9) Price Contingency	7,286	13,065	20,351	179	120	186	212	530	858	1,858	3,548	2,690	5,072	1,282	2,262	561	993
Total	40,937	31,777	72,714	2,442	693	1,759	853	3,886	2,708	11,146	9,364	13,762	11,650	5,763	4,648	2,179	1,862

(Unit: US$ 1,000)

Item	Total Cost			1990/1991*1		1991/1992		1992/1993		1993/1994		1994/1995		1995/1996		1996/1997	
	F.C.	L.C.	Total	F.C.	L.C.	F.C.	L.C.	F.C.	L.C.	F.C.	L.C.	F.C.	L.C.	F.C.	L.C.	F.C.	L.C.
1) Preparatory Works	840	360	1,200	252	108	336	144	168	72	84	36	-	-	-	-	-	-
2) Civil Work for 1st Stage																	
- Head Work and Link Canal*2	2,112	844	2,956	-	-	-	-	595	227	883	364	634	253	-	-	-	-
- Main and Secondary Canals*3	7,505	5,618	13,123	-	-	-	-	674	513	3,339	2,504	3,078	2,296	414	305	-	-
- Tertiary Canal*4	1,300	557	1,857	-	-	-	-	-	-	327	140	801	344	172	73	-	-
3) Civil Work for 2nd Stage																	
- Secondary Canal*3	1,068	862	1,930	-	-	-	-	-	-	-	-	427	345	427	344	214	173
- Tertiary Canal*4	1,793	769	2,562	-	-	-	-	-	-	-	-	448	193	897	384	448	192
4) O&M Facilities and Equipment	524	175	699	-	-	-	-	-	-	-	-	131	44	262	87	131	44
5) Land Acquisition	-	180	180	-	-	-	54	-	72	-	36	-	18	-	-	-	-
6) Administration	-	657	657	-	99	-	99	-	99	-	99	-	99	-	99	-	63
7) Engineering Service	3,600	400	4,000	1,008	112	540	60	432	48	540	60	648	72	324	36	108	12
8) Physical Contingency	937	521	1,458	63	16	44	18	93	52	259	162	308	183	125	66	45	24
Sub-Total	19,679	10,943	30,622	1,323	335	920	375	1,962	1,083	5,432	3,401	6,475	3,847	2,621	1,394	946	508
9) Price Contingency	4,261	7,641	11,902	105	70	109	124	310	503	1,086	2,075	1,573	2,966	750	1,322	328	581
Total	23,940	18,584	42,524	1,428	405	1,029	499	2,272	1,586	6,518	5,476	8,048	6,813	3,371	2,716	1,274	1,089
Price Index (1988 = 100)				107.9	121.0	111.8	133.1	115.8	146.4	120.0	161.0	124.3	177.1	128.6	194.8	134.7	214.3

Remarks: *1 Year is assumption in order to estimate the price contingency and dose not indicate its real year.
*2 Weir *3 Irrigation and drainage systems *4 Land clearing and on-farm development

Note: US$ 1.00 = Rp. 1,710 (October 29-31, 1988)

Table VIII-15 PRICE CONTINGENCY

Year	World Manufacturing Unit Value Index*1 (1985=100)	(%)	Price Contingency For F.C.*2 (1988=100)	(%)	Combined Consumer Price Index of 17 Cities*3 (1978=100)*4	(%)	Price Contingency For L.C.*5 (1988=100)	(%)
1979	95.1	13.4	-	-	132.4	-	-	-
1980	104.3	9.7	-	-	156.3	18.1	-	-
1981	104.8	0.5	-	-	175.5	12.3	-	-
1982	103.3	-1.4	-	-	192.1	9.5	-	-
1983	100.7	-2.5	-	-	214.7	11.8	-	-
1984	99.0	-1.7	-	-	237.2	10.5	-	-
1985	100.0	1.1	-	-	248.4	4.7	-	-
1986	118.3	18.3	-	-	262.9	5.8	-	-
1987	130.0	9.8	-	-	287.3	9.3	-	-
1988	140.7	8.3	100.0	-	-	-	100.0	-
1989	149.5	6.3	106.3	6.3	-	-	110.0	10.0
1990	151.7	1.5	107.9	1.5	-	-	121.0	10.0
1991	157.2	3.6	111.8	3.6	-	-	133.1	10.0
1992	162.8	3.6	115.8	3.6	-	-	146.4	10.0
1993	168.7	3.6	120.0	3.6	-	-	161.0	10.0
1994	174.8	3.6	124.3	3.6	-	-	177.1	10.0
1995	181.0	3.6	128.8	3.6	-	-	194.8	10.0
1996	189.4	4.6	134.7	4.6	-	-	214.3	10.0
1997	198.1	4.6	140.9	4.6	-	-	235.7	10.0
1998	207.2	4.6	147.4	4.6	-	-	259.3	10.0
1999	216.7	4.6	154.1	4.6	-	-	285.2	10.0
2000	226.7	4.6	161.2	4.6	-	-	313.7	10.0

*1 Unit value index of manufactured exports from developed to developing countries.
Source: Half Yearly Revision of Commodity Price Forecasts, The World Bank, July, 1988.

*2 Apply the manufacturing unit value index to the price contingency for foreign currency (F.C.).

*3 Source: Statistik Indonesia 1985-1987, Biro Pusat Statistik.

*4 April 1977 - March 1978 = 100

*5 Price contingency for local currency (L.C.) was estimated at 10 % per annum on the basis of an average consumer price index from 1980 to 1987.

Table VIII-16 CASH FLOW STATEMENT - WITH IRRIGATION SERVICE FEE

(Unit: Rp Million)

Year	Year in Order	Cash Outflow							Cash Inflow					Balance
		Capital Cost		Loan Repayment#3		O&M Cost	Replacement Cost	Total	Construction Fund		Government			
		F.C.#1	L.C.#2	Interest	Principal				F.C.#1	L.C.#2	Revenue#4	Budget	Total	
1990	(1)	2,442	693	-	-	-	-	3,135	2,442	693	-	-	3,135	0
1991	(2)	1,759	853	66	-	-	-	2,678	1,759	853	-	66	2,678	0
1992	(3)	3,886	2,708	113	-	-	-	6,707	3,886	2,708	-	113	6,707	0
1993	(4)	11,146	9,364	218	-	-	-	20,728	11,146	9,364	-	218	20,728	0
1994	(5)	13,762	11,650	519	-	44	-	25,975	13,762	11,650	44	519	25,975	0
1995	(6)	5,763	4,648	891	-	88	-	11,390	5,763	4,648	88	891	11,390	0
1996	(7)	2,179	1,861	1,046	-	197	-	5,283	2,179	1,861	197	1,046	5,283	0
1997	(8)	-	-	1,105	-	219	-	1,324	-	-	219	1,105	1,324	0
1998	(9)	-	-	1,105	-	219	-	1,324	-	-	219	1,105	1,324	0
1999	(10)	-	-	1,105	-	219	-	1,324	-	-	219	1,105	1,324	0
2000	(11)	-	-	1,105	2,047	219	-	3,371	-	-	219	3,152	3,371	0
2001	(12)	-	-	1,050	2,047	219	-	3,316	-	-	219	3,097	3,316	0
2002	(13)	-	-	995	2,047	219	-	3,261	-	-	219	3,042	3,261	0
2003	(14)	-	-	939	2,047	219	-	3,205	-	-	219	2,986	3,205	0
2004	(15)	-	-	884	2,047	219	-	3,150	-	-	219	2,931	3,150	0
2005	(16)	-	-	829	2,047	219	-	3,095	-	-	219	2,876	3,095	0
2006	(17)	-	-	774	2,047	219	996	4,036	-	-	219	3,817	4,036	0
2007	(18)	-	-	718	2,047	219	-	2,984	-	-	219	2,765	2,984	0
2008	(19)	-	-	663	2,047	219	-	2,929	-	-	219	2,710	2,929	0
2009	(20)	-	-	608	2,047	219	-	2,874	-	-	219	2,655	2,874	0
2010	(21)	-	-	553	2,047	219	-	2,819	-	-	219	2,600	2,819	0
2011	(22)	-	-	497	2,047	219	-	2,763	-	-	219	2,544	2,763	0
2012	(23)	-	-	442	2,047	219	-	2,708	-	-	219	2,489	2,708	0
2013	(24)	-	-	387	2,047	219	-	2,653	-	-	219	2,434	2,653	0
2014	(25)	-	-	332	2,047	219	-	2,598	-	-	219	2,379	2,598	0
2015	(26)	-	-	276	2,047	219	-	2,542	-	-	219	2,323	2,542	0
2016	(27)	-	-	221	2,047	219	996	3,483	-	-	219	3,264	3,483	0
2017	(28)	-	-	166	2,047	219	-	2,432	-	-	219	2,213	2,432	0
2018	(29)	-	-	110	2,047	219	-	2,376	-	-	219	2,157	2,376	0
2019	(30)	-	-	55	2,047	219	-	2,321	-	-	219	2,102	2,321	0
2020	(31)	-	-	-	-	219	-	219	-	-	219	-	219	0
2021	(32)	-	-	-	-	219	-	219	-	-	219	-	219	0

Remarks: #1 Foreign Currency Portion #2 Local Currency Portion
#3 Interest: 2.7 % per year. Grace period: 10 years. Repayment period: 30 years (including grace period).
#4 Revenue from irrigation fee to be collected from farmers.

Note: The cash flow statement was prepared for the project executing agency of irrigation project, and investment costs for transmigration and rubber cultivation which were proposed in the agricultural development plan were excluded from this cash flow statement.

Table VIII-17 CASH FLOW STATEMENT - WITHOUT IRRIGATION SERVICE FEE

(Unit: Rp Million)

Year	Year In Order	Cash Outflow							Cash Inflow				Balance
		Capital Cost		Loan Repayment*3		O&M Cost	Replacement Cost	Total	Construction Fund		Government Budget	Total	
		F.C.*1	L.C.*2	Interest	Principal				F.C.*1	L.C.*2			
1990	(1)	2,442	693	-	-	-	-	3,135	2,442	693	-	3,135	0
1991	(2)	1,759	853	66	-	-	-	2,678	1,759	853	66	2,678	0
1992	(3)	3,886	2,708	113	-	-	-	6,707	3,886	2,708	113	6,707	0
1993	(4)	11,146	9,364	218	-	44	-	20,772	11,146	9,364	262	20,772	0
1994	(5)	13,762	11,650	519	-	88	-	26,019	13,762	11,650	607	26,019	0
1995	(6)	5,763	4,648	891	-	197	-	11,499	5,763	4,648	1,088	11,499	0
1996	(7)	2,179	1,861	1,046	-	219	-	5,305	2,179	1,861	1,265	5,305	0
1997	(8)	-	-	1,105	-	219	-	1,324	-	-	1,324	1,324	0
1998	(9)	-	-	1,105	-	219	-	1,324	-	-	1,324	1,324	0
1999	(10)	-	-	1,105	-	219	-	1,324	-	-	1,324	1,324	0
2000	(11)	-	-	1,105	2,047	219	-	3,371	-	-	3,371	3,371	0
2001	(12)	-	-	1,050	2,047	219	-	3,316	-	-	3,316	3,316	0
2002	(13)	-	-	995	2,047	219	-	3,261	-	-	3,261	3,261	0
2003	(14)	-	-	939	2,047	219	-	3,205	-	-	3,205	3,205	0
2004	(15)	-	-	884	2,047	219	-	3,150	-	-	3,150	3,150	0
2005	(16)	-	-	829	2,047	219	-	3,095	-	-	3,095	3,095	0
2006	(17)	-	-	774	2,047	219	996	4,036	-	-	4,036	4,036	0
2007	(18)	-	-	718	2,047	219	-	2,984	-	-	2,984	2,984	0
2008	(19)	-	-	663	2,047	219	-	2,929	-	-	2,929	2,929	0
2009	(20)	-	-	608	2,047	219	-	2,874	-	-	2,874	2,874	0
2010	(21)	-	-	553	2,047	219	-	2,819	-	-	2,819	2,819	0
2011	(22)	-	-	497	2,047	219	-	2,763	-	-	2,763	2,763	0
2012	(23)	-	-	442	2,047	219	-	2,708	-	-	2,708	2,708	0
2013	(24)	-	-	387	2,047	219	-	2,653	-	-	2,653	2,653	0
2014	(25)	-	-	332	2,047	219	-	2,598	-	-	2,598	2,598	0
2015	(26)	-	-	276	2,047	219	-	2,542	-	-	2,542	2,542	0
2016	(27)	-	-	221	2,047	219	996	3,483	-	-	3,483	3,483	0
2017	(28)	-	-	166	2,047	219	-	2,432	-	-	2,432	2,432	0
2018	(29)	-	-	110	2,047	219	-	2,376	-	-	2,376	2,376	0
2019	(30)	-	-	55	2,047	219	-	2,321	-	-	2,321	2,321	0
2020	(31)	-	-	-	-	219	-	219	-	-	219	219	0
2021	(32)	-	-	-	-	219	-	219	-	-	219	219	0

Remarks: *1 Foreign Currency Portion *2 Local Currency Portion
*3 Interest: 2.7 % per year. Grace period: 10 years. Repayment period: 30 years (including grace period).

Note: The cash flow statement was prepared for the project executing agency of irrigation project, and investment costs for transmigration and rubber cultivation which were proposed in the agricultural development plan were excluded from this cash flow statement.