ANNEX 4

PROJECTS BY FIELD AND PROVINCE

Projects by Field and Province

PROVINCE	Improved Seeds	Plant Protection	Regional Application	Irrigation	Post Harvest	Others
Aceh	F/S, Rice Seed Production Project (1981-82) 2KR 1983/84, Seed Pro-Processing Unit 2KR 1983/84, Strngthening Seed Farm LOAN, Construction of a Seed Processing Center (1985-89)	F/S, Crop Pest Surveillance and forecasting (1981-82)	US Agricultural Research	E/S Loan, Krueng Aceh Irrigation Project	F/S, Study on Post Harvest Losses (1981-82) FAO Prevention of Quality Deterioration of Harvested Rice (1982-84)	US Regional Development (1977-88) Netherlands Central and North Aceh Regional Development
South Sumatra	F/S, Rice Seed Production Project (1981-82) 2KR 1983/84, Strngthening Seed Farm LOAN, Construction of a Seed Processing Center (1985-89)	F/S, Crop Pest Surveillance and forecasting (1981-82) G.G. 1984/85, Equipment Supply of Rice Pest Forecasting and Control Project (1985)	US Agricultural Research	E/S Loan, Upper Komeing River Bsin Development Project (1983-88) 2KR 1984/85, Rehabilitation of Swampy Area	F/S, Study on Post Harvest Losses (1981-82)	Water Management 2KR 1984/85, Equipment for Rural Irrigation Development IBRD Transmigration
Lampung	F/S, Rice Seed Production Project (1981-82) 2KR 1983/84, Strngthening Seed Farm LOAN, Construction of a Seed Processing Center (1985-89)	F/S, Crop Pest Surveillance and forecasting (1981-82) G.G. 1984/85, Equipment Supply of Rice Pest Forecasting and Control Project (1985)	US Agricultural Research	2KR 1984/85, Rehabilitation of Swampy Area	F/S, Study on Post Harvest Losses (1981-82)	Water Management 2KR 1984/85, Equipment for Rural Irrigation Development

Projects by Field and Province

PROVINCE	Improved Seeds	Plant Protection	Regional Application	Irrigation	Post Harvest	Others
West Java	2KR 1982/83, Seed Pro-Processing Unit	F/S, Crop Pest Surveillance and forecasting (1981-82) T.A. (Project Type), Strengthening of Plant Protection Services (1980-87) G.G. 1984/85, Equipment Supply of Rice Pest Forecasting and Control Project (1985) G.G. 1984/85, Construction of Pest Forecasting Center (1985-86)		Pre F/S, North Banten KCC Irrigation Scheme (1982) F/S, Kalian Dam (1984) US Watershed Management of Citanduy Basin IBRD Jatilhur Irrigation IBRD Cisadane Irrigation	F/S, Study on Post Harvest Losses (1981-82) LOAN, Supply of Post Harvest Agricultural Equipment to KUD (1984-87)	
Central Java		F/S, Crop Pest Surveillance and forecasting (1981-82) G.G. 1984/85, Equipment Supply of Rice Pest Forecasting and Control Project (1985)		E/S Loan, Upper Solo and Madium River Flood Control Project Loan, Construction of Wonogirilrrigation Project IBRD Madium Irrigation IBRD Kalipurogo Irrigation ADB Grandwater Development Study US Citanduy I	F/S, Study on Post Harvest Losses (1981-82) LOAN, Supply of Post Harvest Agricultural Equipment to KUD (1984-87)	Water Management 2KR 1984/85, Equipment for Rural Irrigation Development US Regional Development (1977-88)

Projects by Field and Province

PROVINCE	Improved Seeds	Plant Protection	Regional Application	Irrigation	Post Harvest	Others
East Java		F/S, Crop Pest Surveillance and forecasting (1981-82) G.G. 1984/85, Equipment Supply of Rice Pest Forecasting and Control Project (1985)		F/S, Widas Flood Control (1984) 2KR 1983/84, Ground Water Development (1984)	F/S, Study on Post Harvest Losses (1981-82) LOAN, Supply of Post Harvest Agricultural Equipment to KUD (1984-87)	Water Management 2KR 1984/85, Equipment for Rural Irrigation Development US Regional Development (1979-1980)
South Kalimantan		F/S, Crop Pest Surveillance and forecasting (1981-82) G.G. 1984/85, Equipment Supply of Rice Pest Forecasting and Control Project (1985)		T.A., Photogrammetry Mapping for Land Reclamation, Negara River Basin (1983-85) LOAN, Riam Kanan Irrigation (1983-89) G.G., Riam Kanan Pilot Schoom (1982) 2KR 1984/85, Rehabilitation of Swampy Area	F/S, Food Losses after Harvesting (191-82)	Water Management T.A., Riam Kanan Pilot Scheme (1986)
South Sulawesi		F/S, Crop Pest Surveillance and forecasting (1981-82) G.G. 1984/85, Equipment Supply of Rice Pest Forecasting and Control Project (1985)		LOAN, Bila Irrigation Project :E/S (1983-86) LOAN, Langkeme Irrigation (1985-90)	F/S, Food Losses after Harvesting (191-82) LOAN, Supply of Post Harvest Agricultural Equipment to KUD (1984-87)	US Secondary Crop Development

Projects by Field and Province

PROVINCE	Improved Seeds	Plant Protection	Regional Application	Irrigation	Post Harvest	Others
Others	· 11 Provinces 2KR 1981/82, Strengthening of Seed Farm (1982) · North Sumatra 2KR 1982/83, Seed Processing Unit (1983) · Jakarta T.A., Individual Expert (1) for Seed Production (1984-86) · West Nusa Tenggara 2KR 1981/82, Seed Processing Unit · 11 Provinces 2KR 1983/84, Seed Control and Certification Service · Unknown IBRD Seed II	· Nationwide 2KR 1982/83, Plant Protection Brigades (1983) · Nationwide 2KR 1984/85, Establishment of New Crops Protection Brigades (1984) · North Sumatra · West Sumatra · Jakarta G.G. 1984/85, Equipment Supply of Rice Pest Forecasting and Control Project (1985) · Nationwide, ADB M/P, Crop Protection	T.A., Long Term Survey for FCADC and preliminary Discussion (1983) Switzland · West Kalimantan Agricultural Training Centre IBRD · Unknown Extension II US · West Sumatra Sumatra Agricultural Research	· Unknown F.G., Rehabilitation of Swampy Area (1985-86) ADB · North Sumatra, Improvement of Irrigation (1983-) ADB · Unknown, Second Irrigation Package (1983-) ADB · Kalimantan & Sumatra Irrigated Command Area Development (1985) ADB · North Sumatra Arakundo-Jamby Area Irrigation and Flood Control Switzeland · West Sumatra Irrigation Projects (1978-86) US · 23 Provinces Sedarhana II	· Yogyakarta, Bali, West Nusa Tenggara LOAN, Supply of Post Harvest Agricultural Equipment to KUD (1984-87) · 24 Provinces 2KR 1981/82, Development of Post Harvest Services at Cooperative Level (1982) · Unknown 2KR 1983/84, Improvement of Post Harvest Facili ties at Farmer Level (1984) · Ex ADB Areas 2KR 1984/85, Improvement of Pre and Post Harvest Technology of Food Production at Cooperative level (1985) · Transmigration Areas 2KR 1984/85, Improvement of Pre and Post Harvest Technology of Food Production at Cooperative level (1985) · ADB/Non ADB Area 2KR 1984/85, Strengthening of Processing Facilities for Cooperative ADB	· Jakarta T.A., Advisor (1982-84, 1984-86) Agricultural Mechanization · Jakarta G.G., Construction of National Center for Agricultulan Mechinery (1985-86) Water Management · Bali · South-east Sulawesi Equipment for Rural Irrigation Development US · East Timor Agricultural Development US · Bengkulu, Kalimantan East Nusa Tenggara Regional Development FRG · West Sumatra Area Development FRG · Jakarta Agricultural Marketing Information Project FRG · East Kalimantan Transmigration and Area Development

Projects by Field and Province

PROVINCE	Improved Seeds	Plant Protection	Regional Application	Irrigation	Post Harvest	Others
Others					UK - Jakarta Rice Handling and Storafge, BULOG	FAO - Jakarta Water Management Traning IBRD - East Kalimantan Transmigration Australia - Unknown Fertilizer Efficiency Project

ANNEX 5

CONCENTRATION OF THE COOPERATION

SHARE OF THE COOPERATION FOR INCREASING RICE PRODUCTION

IN JAPANESE COOPERATION FOR INDONESIA

I. Technical Cooperation

unit : thousand yen

(1) Development Study	'81	'82	'83	'84	Total
Increasing Rice Production	214,644 (47.4%)	311,134 (34.4%)	281,448 (90.3%)	596,511 (99.5%)	1,403,737 (61.9%)
Agricultural sector	452,729 (100.0%)	905,044 (100.0%)	311,573 (100.0%)	599,593 (100.0%)	2,268,939 (100.0%)
(2) Project Type Technical Cooperation					
Increasing Rice Production	41,497 (2.6%)	249,922 (13.4%)	133,854 (9.6%)	156,795 (11.0%)	582,068 (9.3%)
Agricultural sector	1,588,174 (100.0%)	1,859,087 (100.0%)	1,390,128 (100.0%)	1,430,696 (100.0%)	6,267,985 (100.0%)
(3) Individual Expert					
Increasing Rice Production	79,200 (8.4%)	83,800 (8.6%)	92,400 (8.2%)	105,600 (10.8%)	363,000 (9.0%)
Whole sector	937,626 (100.0%)	999,205 (100.0%)	1,129,033 (100.0%)	973,504 (100.0%)	4,045,368 (100.0%)
(4) Training in Japan					
Increasing Rice Production	26,325 (4.6%)	29,250 (4.6%)	23,400 (3.3%)	26,975 (2.9%)	105,950 (3.7%)
Whole sector	576,841 (100.0%)	631,873 (100.0%)	703,267 (100.0%)	920,353 (100.0%)	2,832,334 (100.0%)
(5) Total					
Increasing Rice Production	361,666 (5.9%)	676,106 (8.9%)	531,102 (7.4%)	885,881 (10.6%)	2,454,755 (8.4%)
Whole sector	6,081,542 (100.0%)	7,620,892 (100.0%)	7,214,477 (100.0%)	8,359,430 (100.0%)	29,276,341 (100.0%)

Ⅱ. Economic Cooperation

unit : million yen

(1) Grant Aid (E/N Base)	'81	'82	'83	'84	Total
Increasing Rice Production	760 (17.2%)	1,400 (33.1%)	2,200 (27.2%)	4,000 (43.8%)	8,360 (32.3%)
Whole sector	4,408 (100.0%)	4,225 (100.0%)	8,102 (100.0%)	9,128 (100.0%)	25,868 (100.0%)
(2) Loan Assistance					
Increasing Rice Production	805 (2.8%)	700 (1.2%)	6,980 (7.3%)	12,186 (10.9%)	20,671 (7.1%)
Whole sector	28,395 (100.0%)	58,000 (100.0%)	94,994 (100.0%)	111,298 (100.0%)	292,687 (100.0%)

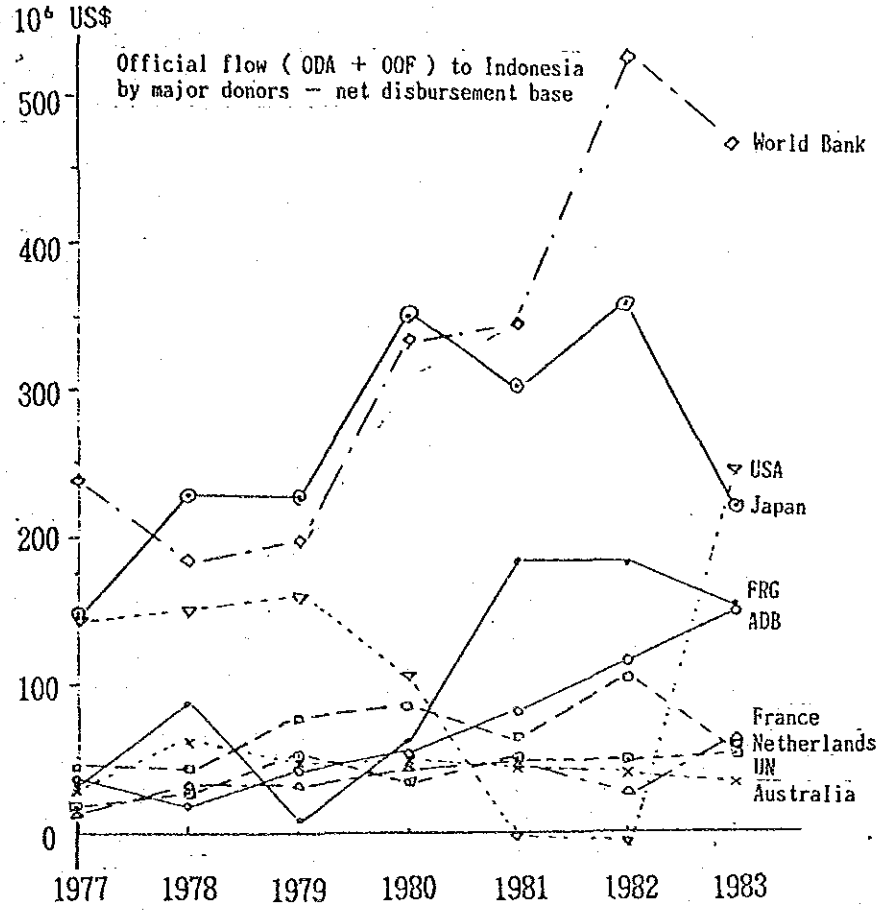
COMPARISON OF AMOUNT OF THE COOPERATION FOR INCREASING RICE PRODUCTION AND DEVELOPMENT BUDGET IN INDONESIA

	PELITA I					PELITA II				
	'79/80	'80/81	'81/82	'82/83	'83/84	'84/85	'85/86	'86/87	'87/88	'88/89
Programme for Increasing food crops in PELITA I and II (million rupiah)	157,538	209,896	279,625	372,516	496,265	537,351	563,592	591,742	621,300	652,333
(million yen)			98,460	133,041	127,903	122,823				
Cooperation for Increasing Rice Production by Japan (million yen)			276 (0.3%)	1,863 (1.4%)	8,170 (6.4%)	7,208 (5.9%)				
Irrigation Sub-sector in PELITA I and II (million rupiah)	261,865	282,421	305,110	329,623	356,106	518,312	672,720	873,101	1,133,168	1,470,699
(million yen)			107,433	117,723	91,780	118,471				
Cooperation for Increasing Rice Production by Japan (million yen)			1,651 (1.5%)	913 (0.8%)	1,541 (1.7%)	9,864 (8.3%)				
Total in PELITA I and II (million rupiah)	419,403	492,317	584,735	702,139	852,371	1,055,663	1,236,312	1,464,843	1,754,468	2,123,032
(million yen)			205,893	250,764	219,683	241,294				
Cooperation for Increasing Rice Production by Japan (million yen)			1,927 (0.9%)	2,776 (1.1%)	9,711 (4.4%)	17,072 (7.1%)				

ANNEX 6

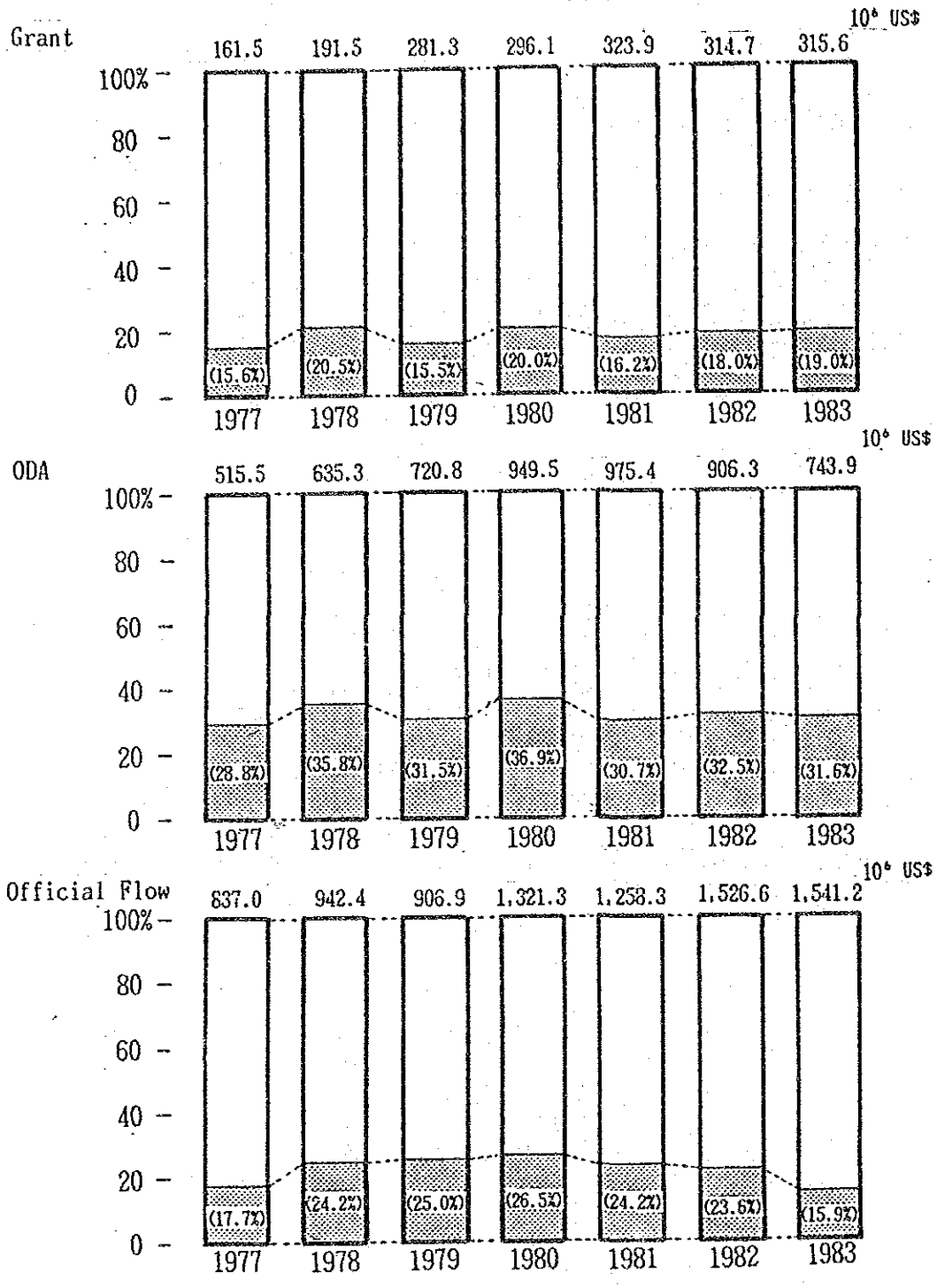
POSITION OF JAPANESE COOPERATION

Major countries and international agencies in cooperation to Indonesia



Source: Geographical Distribution of Financial Flows to Developing Countries, OECD

Share of Japanese cooperation



Source: Geographical Distribution of Financial Flows to Developing Countries, OECD

ANNEX 7

TRIAL ON THE DEVELOPMENT OF METHODOLOGY FOR THE EVALUATION OF IMPACTS

Trial on the Development of Methodology for the Evaluation of Impacts

1. Objectives

The cooperation is still under the initial stage through the Umbrella System. The Evaluation Team tried to develop the evaluation methodology on the potential impacts which would have been brought by the implementation of the Cooperation for Increasing Rice Production.

The methodology, which was developed during the Evaluation Study, should be completed based on the base line study together with the collection of more detail data and information.

2. Basic Principles of Impact Evaluation

(1) Indicators of Impacts

The Cooperation was evaluated from the national economic point of view and contribution to the increased production of rice.

Evaluation indicators are :

a. cost benefit ratio,

b. economic internal rate of return (EIRR),

c. production increase of rice per unit cost investment by the Cooperation.

In the study impacts at farm and at regional levels were not quantified because of the lack of base line data.

(2) Limitations of Impact Evaluation

a. Total real project cost, wich is composed of foreign and local portion of investment, could not be estimated due to insufficient data regarduing local portion. However, the cost in this analysis was only a part of the total project cost, e.g., foreign portion.

b. The benefit and increased rice production brought by the project implementation were estimated based on the master plan or feasibility study which were completed before implementation. In this analysis, only a part of the benefit and increased rice production caused by the foreign portion were calculated according to the cost allocation method of total investment.

c. Evaluation of impacts was implemented only for economic cooperation not for technical cooperation, due to a lack of concrete methodology to quantify the impact by technical cooperation, e.g., expert and/or training service and development study.

d. Impact is composed of the individual effect by each cooperation field and the integrated effect by all the fields of the Cooperation. In this study, the total increased rice production by economic cooperation was estimated by the simple aggrigate method of those in each respected fields.
Integrated effect was counted according to the "Policy Options and Strategies for Major Food Crops, April 1983, World Bank".

e. In the field of irrigation almost all feasibility studies were implemented before the initiation of the Umbrella System under the present R/D. It is difficult to update cost and benefit of each irigation project without further detailed study, and also almost all projects are still waiting for construction.
Therefore, in this field cost benefit analysis by real cost was omitted. Increased rice production was estimated as impacts by real investment, mainly by general grant and E/S loan and construction loan projects which are still L/A stage.

f. Economic cost and shadow price should be used for economic evaluation. In foreign portion of investment cost, the economic cost is the same as financial cost, because transfer cost in the national economy, such as tax and insurance is not included. However, market prices in Indonesia in 1983/84 were applied instead, because of the difficulties of calculating shadow price within the limited data available.

(3) Methodology of Economic Evaluation by Economic Cooperation

1) Multiplication and Distribution of Improved Seeds

a. Cost

The plan implemented in the F/S covered only 3 provinces, e.g., Aceh, South Sumatra and Lampung, but actual cooperation projects were extended to more than these three provinces. Foreign portions of construction cost estimated in the F/S and the actual amount of

cooperation under grant and loan basis are as follows:

	A. Plan Cost in F/S (1982 price)	B. Actual Amount of Cooperation (Grant/Loan)	B/A
	million yen	million yen	
Seed Farm	766	458	59.8%
Seed Processing Centre	4,445	3,501	78.8%
Central Cold Strage	20	13	65.0%
Seed Control and Certification Service	17	-	0%
Total	5,248	3,972	75.6%

Remarks : Table shows the foreign portion of construction cost.

All the fields have been progressed through loan and grant assistance except for seed control and certification services. The rate of progress is 75.6% in total. The Seed processing Centre, as a major field, is the most progressed project among all the projects in this field and the rate is 78.8%.

b. Benefit

The benefit is increased rice production using the improved seeds in the covered area under the project.

$$B_1 = A_1(Y_1(V_1 - C_1) - Y_0(V_0 - C_0))$$

where, B_1 : Benefits by the improved seeds
A_1 : Expected increased area harvested
Y_1 : Yield of improved seeds
Y_0 : Yield of existing seeds
V_1 : Market price of improved rice
V_0 : Market price of existing rice
C_1 : Production cost of improved rice
C_0 : Production cost of existing rice

2) Strengthening of Crop Protection

a. Cost

The development study was carried out in order to formulate a nationwide master plan for crop protection. The plan recommended building construction and equipment supply in the study. However, the actual cooperation has been done only for supply of equipment and pesticides under grant basis. As for building construction, only Pest Forecasting Centre will be constructed in West Java under General Grant. Foreign portion of the estimated cost for building construction and equipment supply in the study is shown below.

unit : million yen

	A. Plan Cost in F/S (1982 price)			B. Actual	A/B
	Bldg.	Equip.	Total	Equip.	
Food Crop Protection Centre (7)	800	397	1,197		
Forecasting Laboratory (20)	1,020	492	1,512		
Pest Observatory Unit (100)	648	139	787		
Pesticide Laboratory (3)	180	290	470		
Sub-total	2,648	1,318	3,966	445	11.2%
Directrate of Food Crop Protection	-	158	158	305	193.1%
Crop Protection Brigade	-	-	-	1,935	
Total	2,648	1,476	4,124	2,685	65.2%

Remarks : (1) Foreign portion of building is estimated as 34.6% of total building cost.

(2) Cost includes contingency.

Actual cooperation was implemented mainly by equipment supply under general grant and food production assistance, and building construction was the only Pest Forecasting Centre in East Java under general grant. The amount of equipment supply is 445 million yen for Plant Protection Centres, Observatory Laboratory and Pesticide Laboratory under general grant aid, 1,935 million yen for Plant Protection Brigades under food

production assistance, and 305 million yen for Strengthening of Plant Protection Services (ATA-162) under project type technical cooperation.

The actual total amount of cooperation is 2,685 million yen for equipment supply, which has exceeded the equipment cost in the plan and is only 65% of the total cost.

b. Benefit

Benefit by the crop protection is decrease in losses from pest and disease. At present, losses from pest and desease are estimated to be 20% of potential production without losses. According to the feasibility study, decreasing ratio of losses by the project is expected to be 0.1 to 1.0% of production in eight provinces covered by the project.

$B_2 = e \times (P / 0.8) \times V$

Where, B_2 : Benefit by the crop protection
e : Expected decreasing ratio of losses
P : Production of rice in case of without project
V : Market price of rice

3) Regional Application Trial and Extension of Agricultural Technology

The cooperation related to regional application has not been implemented in the last 5 years. This field was excluded from the analysis.

4) Irrigation

a. Cost

Irrigation development requires much time from preparation stage to operation stage after construction. In the field of irrigation, only Riam Kanan Pilot Scheme was completed under general grant aid. But most of irrigation projects are still in F/S stage, E/S stage and preparation stage of construction.

The change from the stage of F/S to implementation of irrigation projects are not clarified.

The actual amount of cooperation under grant and loan basis are as follows.

Projects		Amounts
		(million yen)
Food Production Assistance		
Ground Water Development	869	
Rehabilitation of Swampy Area		743
Swampy Area Development and Rehabilitation		560
Sub-total		2,172
General Grant Aid		
Riam Kanan Pilot Scheme		760
Loan		
Bila Irrigation Project (E/S)		550
Upper Komering Project (E/S)		1,180
Langkeme Irrigation Project (E/S)		320
Kurueng Aceh Irrigation Project (E/S)		330
Upper Solo and Madium River Flood Control Project (E/S)		805
Riam Kanan Irrigation Project		8,636
Langkeme Irrigation Project		5,200
Sub-total		17,021
Total		19,953

b. Benefit

Benefit by irrigation is shown by the increase of rice production due to the increased yield and harvested area not only in the wet season but also in the dry season.

$$B_4 = A_4(Y_4(V_4 - C_4) - Y_0(V_0 - C_0))$$

Where, B_4 : Benefit by the irrigation

A_4 : Area harvested

Y_4 : Yield with project

Y_0 : Yield without project

V_4 : Market price of rice with project

V_0 : Market price of rice without project

C_4 : Production cost of rice with project

C_0 : Production cost of rice without project

5) Improvement of Post Harvest Treatment and Processing

a. Cost

In this field, the study on post harvest losses was conducted. But the major objective of the study was to assess the post harvest losses of rice, and recommendations described were only discriptive. Therefore, the differences between the study and actual cooperation are not clarified.

The actual amount of cooperation under grant and loan basis are as follows.

Projects	Amounts (million yen)
Food Production Assistance	
Pre and Post Harvest Facilities at Cooperative Level	1,100
Development for Post Harvest Services at Cooperative Level	1,700
Improvement of Post Harvest Facilities at Farmer Level	271
Strentheneing of Processing Facilities for Cooperatives	636
Improvement of Pre and Post Harvest Technology at Cooperative Level	805
Integrated of Rice Processing Facilities	135
Improvement of Rice	520
Improvement of Pre and Post Harvest Equipment at Cooperative Level	590
Sub-total	5,757
Loan	
Supply of Post Harvest Agricultural Equipment to Cooperatives	5,800
Total	11,557

b. Benefit

Benefit by the improvement of post harvest is brought by the decrease of losses in quantity and quality of rice. According to the study, present loss is estimated to be 2.3 to 8.6% of the potential production without losses and decrease of quality to be 4 to 23% in the

storing stage, 7% in the drying stage and 1 to 9.5% in the milling stage. These losses are expected to be reduced.

$B_S = B_{S1} + B_{S2}$

$B_{S1} = (L_0 - L_S) \times P_0/(1 - L_0) \times V$

$B_{S2} = (l_0 - l_S) \times (P_0 + (L_0 - L_S) \times P_0(1 - L_0) \times V)$

where, B_S : Benefit by the improvement of post harvest

B_{S1}: Benefit of decreasing volume loss

B_{S2}: Benefit of increasing quality

L_0 : Ratio of loss in quantity in case of without project

L_S : Ratio of loss in quantity in case of with project

l_0 : Ratio of quality loss in case of without project

l_S : Ratio of quality loss in case of with project

P_0 : Rice production in case of without project

V : Market price of rice

(4) Methodology of Evaluation on the Contribution of Economic Cooperation to Increased Rice Production

Evaluation of this contribution was shown by the following indicators.

1) Annual average contribution within the project life

$e = P / C / y$

Where, e : Increased rice production per year by the unit cost of initial investment

P : Increased rice production per year by the project (only by foreign portion)

C : Project cost without any reinvestment

y : Project life in each field

2) Annual production increase of rice by individual and integrated effect

$P = \Sigma p(f) + p(i)$

p(f) : Individual effect of rice production increase in each field

p(i) : Integrated effect of rice production increase by all fields

$p(i) = 4 \times \Sigma p(f)$, according to the "Policy Options and Strategies for Major Food Crops, April 1983, World Bank"

3. Evaluation of the Progress Only for the Foreign Portion

3.1. Economic Evaluation

(1) Multiplication and distribution of improved seeds

a. Benefit

According to the F/S, increase in paddy production was estimated as 549 thousand tons as indicated bellow.

	Yield (tons/ha)	Project area (1,000 ha)	Total production (1,000 tons)
with project	3.73	1,112	4,142
without project	3.23	1,112	3,593
effects of projects	0.50	-	549

These effects were expected by total implementation cost of 28,310 million rupiah, (local portion: 13,118 million rupiah, foreign portion: 15,192 million rupiah), equivalent to 10,111 million yen. As mentioned in 2. (3), amount of actual cooperation in this field is 3,972 million yen or 39.3% of total implementation cost estimated in the F/S.

Based on the assumption that the affected area of rice planting has changed in proportion to the implementation cost, the actual cooperation has a potential to increase 437,000 ha of paddy planting area that would increase 218,000 tons of paddy. Farm gate price of paddy is Rp.130.85/kg (in 1983/84) and the value of increased paddy is equivalent to Rp.65,425/ha. Excluding production cost which is equivalent to 63.3% of price, net revenue is estimated as Rp.24,011/ha. The benefit of the cooperation in this field is summarized below.

		Actual	Potential
Effected area	(10 ha) :	437	1,112
Increased yield	(tons/ha) :	0.5	0.5
Increased paddy production	(10 tons) :	218	549
Increased value of paddy	(10 Rp.) :	28,525	71,837
Increased net revenue	(10 Rp.) :	10,469	26,364
	(10 yen) :	3,271*	

*) US$1.0=Rp.700 US$1.0=¥220.0 ¥1.0=Rp.3.2

b. Cost

In this field, the investment cost cooperated under grant and loan is 3,972 million yen. It is mainly for equipment supply. Assuming that the average life period of equipment is 5 years and social discount rate is 15%, the investment cost is equivalent to 1,185 million yen annually.

Annual operation cost is estimated as 3.5% of investment cost, 41 million yen. Therefore the total annual cost is 1,226 million yen.

c. Evaluation

The benefit will appear 2 years after investment, therefore annual benefit is discounted to 2,473 million yen.

B/C = (Annual Benefit)/(Annual Cost) = 2,473/1,226 = 2.04

IRR = 34.4%

(2) Strengthening of Crop Protection

a. Benefit

According to the F/S the total investment cost would be 10,804 million yen (foreign portion: 4,124 million yen, local portion: 6,680 million yen) for buildings and equipment, the affected area was expected to be7,330 thousand ha in 1983 the starting year for producing benefits. The benefits were estimated based upon the reduction of loss, as shown below.

	Loses caused by pest and desease		
	without project	with project	effect of project
1 to 5 years (construction period)	20%	20%	0%
after 6 years	20%	19.9%	0.1%
after 16 years	20%	19.5%	0.5%
after 31 years	20%	19.0%	1.0%

In real terms, cooperation was implemented mainly in the supply of equipment and fertilizers under general grant aid and food production assistance. The amount is 2,685 million yen.

Assuming that the affected area is changed in proportion to the implementation cost, the actual cooperation has a potential to affect 1,822 thousand ha of paddy planting area. The component of cooperation is mainly in the supply of equipment and fertilizers, therefore the benefit is expected to be produced soon and its ratio is 0.1 to 1.0%. Assuming that the ratio is 0.5%, the benefit is Rp.3,50/ha, if the average yield is 3.73 tons/ha without project and the farm gate price of paddy is Rp.130.85/kg.

The total annual benefit is expected to be 5,557 million rupiah or 1,736 million yen.

b. cost

In this field, investment cost under the cooperation is summarized below.

General Grant Aid	445 million yen
Food Production Assistance	1,935 million yen
Project Type Technical Cooperation	305 million yen
Total	2,685 million yen

The components of the cooperation are mainly equipment and fertilizers. Life span of equipment is only 3 years and fertilizers are consumption goods. Therefore the average project life is assumed to be 2 years.

Annual cost for investment is 1,652 million yen, with a discount rate of 15%. Operation cost is 67 million yen, 2.5% of investment cost, and total annual costs are 1,719 million yen.

c. Evaluation

B/C = (1,736 million yen)/(1,719 million yen) = 1.01
IRR = 15.8%

(3) Irrigation

Irrigation projects cooperated under the Umbrella System have not been implemented yet. Therefore, evaluation of irrigation will be carried out based on the results of the feasibility studies and engineering services.

According to the feasibility studies, IRRs are as shown below.

	IRR
Kalian Dam	14.3%
Bila rrigation	15.3%
Upper Komering Irrigation	16.2%
Langkeme Irrigation	14.7%
Riam Kanan Irrigation	13.5%

On the average IRR is 14.8%, therefore B/C is under 1.0 including 15% of annual discount rate.

An increase in rice production is also expected as indicated below in the feasibility study.

	Increasing Rice Production(tons/year)	Total Construction Cost(million yen)
Bila Irrigation	68,130	23,874
Upper Komering Irrigation	217,790	70,675
Langkeme Irrigation	28,813	7,612
Riam Kanan Irrigation	177,800	41,947

(4) Improvement of Post Harvest Treatment and Processing

a. Benefit

In this field, cooperated projects have been implemented under food production assistance and loan. The projects are composed of post harvest processing facilities, mainly rice milling facilities.

Details of facilities supplied under the loan project are not yet fixed. Under food production assistance, equipment supplied are as follows:

for P.T. Pertani (Ministry of Agriculture)

2KR 1983/84 : Testing Mill Units, Reaper and Binder

2KR 1984/85 : Testing Mill Units, Packing Units

2KR 1985/86 : Milling Units

for KUD (Ministry of Cooperative)

2KR 1981/82 : Tractors, Rice Milling Units

2KR 1982/83 : Rice Milling Units, Moisture Testers

2KR 1983/84 : Tractors, Rice Milling Units
2KR 1984/85 : Unknown
2KR 1985/86 : Unknown

Main facilities are rice milling units for KUD. Its capacities are as follows:

0.5 ton/hour : 49 units
1.0 ton/hour : 216 units
3.0 ton/hour : 75 units

Total capacity reaches a total of 465.5 ton/hour. Assuming that operation hours are 8 hours/day and operation days are 200 days/year, total annual capacity is 744.8 thousand tons.

According to the study, quantity losses of the existing milling system is 1.7% in average. Based on the assumption that quantity losses will be zero, benefit will be calculated as follows.

Benefit from saving quantity losses
= 744,800 tons x 1.7% x (130.85 Rp./kg / 0.68)
= Rp.2,436 million (¥761 million)

In addition to this, saving quality loss is also a benefit of the rice milling units, at least 1% of quality loss is caused by the existing milling system. Assuming that quality losses will be also zero, benefit will be calculated as follows.

Benefit from saving quality losses
= 744,800 tons x 1.0% x (130.85Rp./kg / 0.68)
= Rp.1,433 million (¥448 million)

b. Cost

During the period from 1981/82 to 1983/84, cooperated amount for KUD is 3,436 million yen. This is equivalent to 1,025 million yen annually including 15% per annum discount rate and 5 years of estimated equipment life period. Assuming that operation and maintenance cost is 5% of investment cost, it is 172 million yen per annum, and annual total cost is 1,197 million yen.

In addition to this cost, there are other cooperation projects

under 2KR and loans, but the components of these projects are not yet fixed. Therefore, the cost related to these projects are excluded in this analysis.

c. Evaluation

B/C = (761 million yen + 448 million yen) / 1,197 million yen
= 1.01

IRR = 15.5%

3.2. Contribution to Increase Rice Production

	B/C (discount rate = 15%)	IRR	Increased Rice Production caused by 1.0 million yen of investment for construction
Seed Production	1.35	29.2%	37.3 tons (5 years)
Crop Protection	1.01	15.8%	10.8 tons (3 years)
Irrigation	almost 1.0	14.8%	2.0 - 2.9 tons (50 years)
Post Harvest	1.01	15.5%	5.9 tons (5 years)

Seed production is expected to be the most contributable field to rice production increase among the fields, if additional investment and/or reinvestment are followed after five years of physical life of facilities and equipment. In order to gain continuous increase in rice production, operation cost has to be prepared in the field of seed production after the termination of the five years together with the replacement cost.

The effect of irrigation seems to be comparatively small. However, it continues for a long period without any significant amount of additional investment. As a result cumulative effect in the field of irrigation will be high.

During the period of the project life, the potential increase of rice is shown below by tonnage.

Seed Production	186.5	tons/¥ 1 million
Crop Protection	32.4	tons/¥ 1 million
Irrigation	100 - 145	tons/¥ 1 million
Post Harvest	29.5	tons/¥ 1 million

The most effective fields for rice production increase are those of seed production and irrigation.

The amount of cooperation by grant and loan is shown below, and the annual increase in rice production by the Japanese cooperation fund is estimated as shown below.

	Without Joint Effect	
Seed Production	4,162 million yen	155.2 thousand tons/year
Crop Protection	4,825	52.1
Irrigation	19,953	48.9
Post Harvest	11,557	68.2
Total	40,497	324.4

In addition to this, increasing rice production by local fund and joint effects in each field is expected to be significant.

According to "Policy Options and Strategies for Major Food Crops, April 1983, World Bank", it is promised that rice production increase will be brought about mostly by joint effect or various agricultural input. Considering the joint effect, total effect of the cooperation corresponding to about 1.3 million tons per annum, is expected to be 4 times that of individual effect.

4. Conclusion and Further Study

4.1. Conclusion

This study aimed to develop the evaluation methodology and analyzed the forign portion of economic cooperation from a national economic point of view and contribution to the production increase of rice.

However, it was recognized that the Cooperation would contribute to the increase production of rice. Joint effect was estimated as about 1.3 million tons/year by the foreign portion, which was equivalent to about one third of increased rice production during 1980 to 1983.

In order to analyse the total effects by the Cooperation, total cost data should be collected and the mechanism of joint effect should be clarified.

4.2. Further Study

(1) Collection of base line data

In order to clarify the effects of cooperation, base line data should be collected before implementation of the cooperation.

- Rice production at region level and at farmer level
- Agricultural input at region level and at farmer level
- Rice planted area and harvested area by region level
- Capacity of agricultural mechanization by region level
- Quality of rice by region level

(2) Monitoring of the Cooperation

- Actual cost of each project (local and foreign portion)
- Progress of each project
- Location of materials, equipment and facilities supplied by the Cooperation
- Results of each project
- Updated data of same items as base line data

(3) Analysis of impacts at farm and at region level by the Cooperation

- Farm income
- Cost benefit analysis by region
- Production increase of rice by region