

(unit : kip/ha)			
Crops	Without Project	With Project	Increment
Lowland Rice	356,000	391,000	35,000
Coffee	197,300	1,093,900	759,900
Tea	126,000	285,000	159,000
Cardamom	448,000	598,000	150,000
Cabbage	549,300	1,689,900	1,140,600
Potato	947,500	1,861,200	913,700
Groundnut	234,200	335,600	101,400

I-5.3.2 Agricultural Benefit for the projects

The anticipated agricultural production value increased by the project is evaluated as the agricultural benefit for the selected priority projects. The financial incremental benefits of each 16 project are estimated as shown in Table IV-9 and summarized as below :

Project No.	Without Project Net Income ('000kip)	With Project Net Income ('000kip)	Incremental Benefit (('000kip)	Incremental Benefit (('000 US\$)
1	138,400	726,600	588,300	806
2	0	96,300	96,300	132
3	98,600	1,073,500	974,900	1,335
4	26,500	754,900	728,500	998
5	67,200	1,021,100	954,000	1,307
6	55,900	363,300	307,400	421
7	6,700	469,400	462,700	634
8	70,400	1,978,500	1,908,100	2,614
9	219,800	1,052,000	832,100	1,140
10	89,700	636,800	547,100	749
11	309,000	2,030,900	1,721,800	2,359
12	47,900	1,120,000	1,072,100	1,469
13	470,500	2,302,900	1,832,400	2,510
14	47,000	344,100	297,100	407
15	34,500	2,246,100	2,211,600	3,030
16	3,500	266,600	263,100	360
Total	1,685,700	16,482,900	14,797,300	20,270

I-5.3.3 Farm Household Economy

The farm budget was analyzed to assess whether the 16 projects would bring about sufficient income increase in the farmers' economy. The farm budget analysis was carried out on the typical farmers in all project area and result is presented in Table IV-10 and, summarized as following table. In this estimation, coffee price is re-applied to the future price based on the World Bank Price Prospect.

(unit of income : '000kip)							
Main cropping type	Without Project Condition				With Project Condition		
	Coffee	S & B	Low. R	Ave.	Coffee	Low. R	Ave.
Ave. farm size (ha)	2.1	1.2	1.0	1.9	2.4	2.5	2.5
No. of benefit. (H.H)	1,634	1,012	2,025	4,671	1,740	8,244	9,984
1. Gross income	(564)	(417)	(432)	(475)	(3,573)	(2,454)	(2,694)
- Farm income	564	342	382	437	3,572	2,454	2,694
- Non-farm income	0	75	50	38	0	0	0
2. Production Cost	125	26	35	65	643	814	777
3. Net Income	<u>439</u>	<u>391</u>	<u>397</u>	<u>410</u>	<u>2,928</u>	<u>1,640</u>	<u>1,917</u>
4. Living expenses	(429)	(391)	(397)	(407)	(1,535)	(1,535)	(1,535)
- Food item	333	303	309	316	874	874	874
- Non-food item	96	87	89	91	661	661	661
5. Net reserve	10	0	0	3	1,393	104	382

Remark : S&B is slash & Burn farming. Low.R is Lowland Rice farming.

Note : Average family size is 5.7 persons per household

The future coffee price prospected by IBRD is used for the above estimation.

After implementing of the project, the slash and burn farmers will shift the farming type to lowland rice farming and/or coffee farming from the view points of sustainability and productivity. Net farm income for the farmer is drastically increased after implementation of the project. Living expense also drastically increase, consequently, the living condition of beneficial farmers will be substantially improved and farmer be able to try to operate intensive farming.

Tables

Table VIII-I-1 Price of Fertilizer (March, 1995)

Variety	unit	Pakse		Paxong	Laongam	Salavane	
		Private	S. Company			Private*1	Trade office
Urea (46-0-0)	kip/kg	190	152	350	375	500	174
Compound							
16-20-0	kip/kg	n.a.	157	350	n.a.	500	180
16-16-16	kip/kg	270	n.a.	n.a.	n.a.	n.a.	n.a.
15-15-15	kip/kg	240	n.a.	n.a.	n.a.	n.a.	n.a.
13-13-21	kip/kg	240	n.a.	n.a.	n.a.	n.a.	n.a.

Remarks : *1 : fertilizers are sold as one package of 100 g

: n.a. means "not available"

Source : surveyed by JICA study team, trade service offices of Champasak and Salavan Province

Table VIII-I-2 Price of Seed and Agro-chemicals (at Pakse market)

1. Seed	unit	Prices (kip)	2. Agro-chemicals	unit	Prices (kip)
Cabage	100g	14,500	Foridole	30g	750
Chinese Cabbage	20g	3,000	Phosphorine	100g	1,000
Cucumber	20g	250	DDT	14g	1,000
Maize	1kg	2,000	Tamarone	100g	1,300
Long bean	20g	250	Chlordane	50g	900
Tomato	20g	250	2-4-D	500g	1,700
Chilliy	20g	250	Corbsulfan	100g	1,000
Radish	20g	250	Thiodam	100ml	1,000

Note : Price of commodities is at march, 1995.

Source : surveyed by JICA study team

Table VIII-I-3 Retail Price of Agricultural Product (at Pakxe market)

		94												
	unit	1	2	3	4	5	6	7	8	9	10	11	12	Ave
Cereal														
Paddy (sticky rice)	kg	60	70	75	85	90	85	110	n.a	n.a	n.a	n.a	n.a	82
Paddy (ordinary rice)	kg	75	80	90	100	110	115	120	n.a	n.a	n.a	n.a	n.a	99
sticky rice 1st category	kg	150	150	160	170	180	180	200	200	220	200	210	210	186
mixed sticky rice	kg	140	140	150	160	160	165	180	180	200	160	160	160	163
ordinary rice 1st category	kg	170	170	250	250	280	300	300	300	350	215	255	255	258
mixed ordinary rice	kg	160	160	180	190	200	200	250	250	300	200	215	215	210
black bean	kg	600	550	600	650	650	700	700	500	500	n.a	n.a	n.a	606
mung bean	kg	600	600	600	650	650	700	700	600	600	625	650	625	633
soybean	kg	200	200	220	220	250	300	150	250	250	175	650	480	279
sesame	kg	1,000	1,110	1,000	1,000	1,000	1,200	1,000	1,200	1,500	n.a	675	1,000	1,062
coffee bean	kg	480	n.a	610	720	950	1,400	2,200	2,000	1,900	1,550	1,625	1,425	1,351
peanut (bean)	kg	550	550	550	550	600	600	600	500	600	575	500	675	571
Meat, Fish														
beef 1st category	kg	1,600	1,700	1,700	1,700	1,700	1,700	1,700	1,700	1,700	1,700	1,800	1,800	1,708
beef 2nd category	kg	1,500	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	n.a	n.a	n.a	1,589
buffalow 1st category	kg	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,600	1,600	1,700	1,533
buffalow 2nd category	kg	1,300	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	n.a	n.a	n.a	1,389
pork 1st category	kg	1,300	1,400	1,400	1,400	1,500	1,400	1,300	1,400	1,400	1,400	1,400	1,700	1,417
pork 2nd category	kg	1,000	1,200	1,200	1,200	1,300	1,300	1,200	1,300	1,300	n.a	n.a	n.a	1,222
chicken 1st category	kg	1,500	1,500	1,700	1,600	1,400	1,800	1,700	1,500	1,500	1,600	1,500	1,550	1,571
duck 1st category	kg	1,400	1,300	1,400	1,500	1,500	1,600	1,500	1,400	1,400	1,500	1,350	1,650	1,458
cat fish	kg	1,100	1,750	2,000	1,700	1,200	1,400	2,500	1,500	1,800	1,200	1,400	1,200	1,563
other fish	kg	900	1,500	1,800	1,500	1,000	1,000	1,700	1,400	1,700	1,150	1,050	1,400	1,342
chicken egg	piece	60	60	60	60	60	70	70	70	70	65	65	75	65
duck egg	piece	80	80	80	80	80	80	80	80	80	100	80	90	83
Vegetables														
cabbage	kg	100	100	150	200	200	200	200	100	100	200	200	125	156
morning glory	kg	400	300	350	300	200	300	300	300	300	250	350	350	308
dried garlic	kg	650	700	700	700	700	900	600	600	600	700	800	750	700
red onion	kg	650	600	700	600	600	900	600	700	700	800	750	850	704
dried chill	kg	900	1,000	1,100	1,100	1,500	1,700	1,600	1,700	1,800	1,650	1,650	2,150	1,488
salad	kg	200	250	400	400	400	400	500	600	700	n.a	n.a	n.a	428
long bean	kg	300	350	550	500	500	400	400	400	350	n.a	n.a	n.a	417
banana	bunch	300	350	350	350	400	350	350	400	400	n.a	n.a	n.a	361
Industry food														
powdered coffee	kg	900	900	900	1,200	1,200	1,500	2,000	2,000	2,000	1,750	2,000	2,200	1,546

Remark : n.a. indicats "no data available"

Source : Trade service Office, Champasak Province

Table VIII-I-4 Tax Rate for Each Type of Land

1. Paddy (unit : kip/kg)				
Land Types	Criteria of Field	Irrigated Fields		Non-irrigated Fields
		Single Crop	Double Crops	
(1) Plains	1	6,000	5,000	4,000
	2	5,000	4,000	3,000
	3	4,000	3,000	2,000
(2) Mountains	1	5,000	4,000	3,000
	2	4,000	3,000	2,000
	3	3,000	2,000	1,000

2. Orchards (unit : kip/kg)				
Land Types	Criteria of Field	Industrial Tree	Fruit Trees	Other Trees
(1) Plains	1	5,000	4,000	3,000
	2	4,000	3,000	2,000
	3	3,000	2,000	1,000
(2) Mountains	1	4,000	3,000	2,000
	2	3,000	2,000	1,000
	3	2,000	1,000	500

3. Upland Fields (unit : kip/kg)		
Land Types	Criteria of Field	Industrial Tree
(1) Plains	1	3,000
	2	4,000
	3	5,000
(2) Mountains	1	1,000
	2	1,500
	3	2,000

3. Other Types of Land or Undevelopment Land*1 (unit : kip/kg)		
Land Types	Criteria of Field	Industrial Tree
(1) Plains	1	6,000
	2	5,000
	3	4,000
(2) Mountains	1	3,000
	2	2,000
	3	1,000

Remarks : the other is situated outside areas of lowland fields, upland fields, orchards, that is land bordering the fields or orchards which have not been put under plantation of long-term crops.

Sources ; Ministry of Finance

Table VIII-I-5 Present Crop Budget in the Study Area

	Unit	Upland Rice			Lowland Rice			Coffee			Tea			Cardamom		
		Quantity	unit price (kip)	Amount (kip)	Quantity	unit price (kip)	Amount (kip)	Quantity	unit price (kip)	Amount (kip)	Quantity	unit price (kip)	Amount (kip)	Quantity	unit price (kip)	Amount (kip)
A. Gross Income																
(1) Yield	(kg)	1,500	150	225,000	2,600	150	390,000	300	1,450	435,000	260	500	130,000	300	1,500	450,000
B. Production Costs																
B-1 Farm Input																
(1) Seed	(kg)	80	150	12,000	50	150	7,500	625	0	0	12,000	0	0	0	0	0
(2) Fertilizer																
Urea	(kg)	0	230	0	0	230	0	0	230	0	0	230	0	0	230	0
16-20-0	(kg)	0	230	0	100	230	23,000	0	230	0	0	230	0	0	230	0
16-16-8	(kg)	0	270	0	0	270	0	0	270	0	0	270	0	0	270	0
(3) Agro-chemicals																
Insecticide	(kg)	0	9,500	0	0	9,500	0	0	9,500	0	0	9,500	0	0	9,500	0
Pesticide	(kg)	0	9,500	0	0	9,500	0	0	9,500	0	0	9,500	0	0	9,500	0
Sub total				12,000			30,500			0			0			0
B-2 Labour Requirement																
(1) Hired Labour	man-day	0	1,200	0	0	1,200	0	50	1,200	60,000	0	1,200	0	0	1,200	0
(2) Family Labour	man-day	198	0	0	148	0	0	120	0	0	190	0	0	60	0	0
B-3 Animal Power	head-day	0	2,400	0	0	2,400	0	0	2,400	0	0	2,400	0	0	2,400	0
B-4 Others				4,240			2,610			5,200			4,000			2,000
Total				16,240			33,110			65,200			4,000			2,000
C. Net Return (A-B)				208,760			356,890			369,800			126,000			448,000

Based on the Farm Interview Survey

Remark: Average farmgate price at 1995 is applied as unit price of crops.

	Unit	Cabbage			Potato			Maize			Soybeans			Groundnuts		
		Quantity	unit price (kip)	Amount (kip)	Quantity	unit price (kip)	Amount (kip)	Quantity	unit price (kip)	Amount (kip)	Quantity	unit price (kip)	Amount (kip)	Quantity	unit price (kip)	Amount (kip)
A. Gross Income																
(1) Yield	(kg)	8,000	100	800,000	10,000	113	1,130,000	1,000	103	103,000	1,000	156	156,000	1,000	250	250,000
B. Production Costs																
B-1 Farm Input																
(1) Seed	(kg)	1	145,000	145,000	200	113	22,600	15	2,000	30,000	60	156	9,360	45	250	11,250
(2) Fertilizer																
Urea	(kg)	200	230	46,000	0	230	0	0	230	0	0	230	0	0	230	0
16-20-0	(kg)	0	230	0	150	230	34,500	0	230	0	0	230	0	0	230	0
16-16-8	(kg)	200	270	54,000	0	270	0	0	270	0	0	270	0	0	270	0
(3) Agro-chemicals																
Insecticide	(kg)	2	9,500	19,000	1	9,500	9,500	0	9,500	0	0	9,500	0	0	9,500	0
Pesticide	(kg)	0	9,500	0	0	9,500	0	0	9,500	0	0	9,500	0	0	9,500	0
Sub total				235,000			123,100			30,000			9,360			11,250
B-2 Labour Requirement																
(1) Hired Labour	man-day	0	1,200	0	0	1,200	0	0	1,200	0	0	1,200	0	0	1,200	0
(2) Family Labour	man-day	95	0	0	67	0	0	75	0	0	90	0	0	90	0	0
B-3 Animal Power	head-day	0	2,400	0	0	2,400	0	0	2,400	0	0	2,400	0	0	2,400	0
B-4 Others				8,700			6,462			4,400			4,187			4,225
Total				243,700			129,562			34,400			13,547			15,475
C. Net Return (A-B)				556,300			1,000,438			68,600			142,453			234,525

Based on the Farm Interview Survey

Remark: Average farmgate price at 1995 is applied as unit price of crops.

Table VIII-I-6 Present Net Production Value in the Study Area

	Coffee	Tea	Upland rice	Lowland rice	Vegetable*1	Cardamom	Cattle	Buffalo	Horse	Pig	Poultry	Total
1. Unit Price (kip/kg)	1,450	500	150	150	100	1,500	61,731	108,429	11,581	19,297	1,500	-
2. Production (ton)												
Pakxong	5,700	100	590	50	5,500	250	17,900	2,220	530	5,930	22,000	60,770
Bachiang	130		3,740	1,380		120	5,660	2,110		5,150	21,000	39,290
Laongam	1,140		7,050	1,150		130	10,430	2,450		9,700	39,200	71,250
Salavan	20		300	7,160		10	4,130	4,630		3,700	29,700	49,650
Thateng	260		1,990	540		60	1,750	1,090	22	1,130	5,450	12,292
Total	7,250	100	13,670	10,280	5,500	570	39,870	12,500	552	25,610	117,350	233,252
3. Value (million kip)												
Pakxong	8,265	50	89	8	550	375	1,105	241	6	114	33	10,835
Bachiang	189	0	561	207	0	180	349	229	0	99	32	1,846
Laongam	1,653	0	1,058	173	0	195	644	266	0	187	59	4,233
Salavan	29	0	45	1,074	0	15	255	502	0	71	45	2,036
Thateng	377	0	299	81	0	90	108	118	0	22	8	1,103
Total	10,513	50	2,051	1,542	550	855	2,461	1,355	6	494	176	20,053
4. Value ('000 US\$)												
Pakxong	11,245	68	120	10	748	510	1,503	327	8	156	45	14,742
Bachiang	256	0	763	282	0	245	475	311	0	135	43	2,511
Laongam	2,249	0	1,439	235	0	265	876	361	0	255	80	5,760
Salavan	39	0	61	1,461	0	20	347	683	0	97	61	2,770
Thateng	513	0	406	110	0	122	147	161	0	30	11	1,501
Total	14,303	68	2,790	2,098	748	1,163	3,349	1,844	2	672	239	27,283
5. Ratio (%)												
Pakxong	76.3	0.5	0.8	0.1	5.1	3.5	10.2	2.2	0.1	1.1	0.3	100
Bachiang	10.2	0.0	30.4	11.2	0.0	9.8	18.9	12.4	0.0	5.4	1.7	100
Laongam	39.0	0.0	25.0	4.1	0.0	4.6	15.2	6.3	0.0	4.4	1.4	100
Salavan	1.4	0.0	2.2	52.8	0.0	0.7	12.5	24.7	0.0	3.5	2.2	100
Thateng	34.2	0.0	27.1	7.3	0.0	8.2	9.8	10.7	0.0	2.0	0.7	100
Total	52.4	0.2	10.2	7.7	2.7	4.3	12.3	6.8	0.0	2.5	0.9	100

Remarks: *1 Price of vegetables is represented by cabbage price.

Table VIII-I-7 Average Present Farm Household Economy in the Study Area

(Unit : Kip in Currency)

Main crop	Farm type											
	Coffee farmer				Upland Crops (Slash & Burn farmer)				Lowland Rice farmer			
	Upland crops	Tea	Vegetables	Average	-	Coffee	Lowland Rice	Fruits	Average	Upland Crops	Coffee	Average
No. of H.H.	(4,227)	(4,075)	(960)	(10,477)	(2,240)	(6,930)	(380)	(630)	(10,180)	(3,420)	(360)	(4,860)
Farm size	2.73 ha	2.18 ha	2.65 ha	2.61 ha	1.26 ha	1.11 ha	1.02 ha	1.49 ha	1.16 ha	0.84 ha	1.31 ha	0.89 ha
1. Gross Income	(1,161,600)	(852,100)	(1,060,100)	(940,115)	(412,340)	(428,430)	(445,050)	(402,570)	(423,910)	(406,925)	(507,500)	(416,592)
(1) Farm Income	1,161,600	852,100	1,060,100	940,115	362,340	378,430	395,050	352,570	373,910	306,925	507,500	323,999
(2) Non-farm Income	0	0	0	0	50,000	50,000	50,000	50,000	50,000	100,000	0	92,593
2. Production Cost	172,243	117,127	154,053	136,392	16,899	43,264	68,361	20,275	36,995	25,613	53,618	27,839
3. Net Income	989,357	734,973	906,047	803,724	395,441	385,166	376,189	382,295	386,914	381,312	453,882	388,753
4. Living Expenses	(919,627)	(722,867)	(864,417)	(777,985)	(395,441)	(385,166)	(376,189)	(382,295)	(386,914)	(381,312)	(448,878)	(388,383)
(1) food item	579,365	455,406	544,583	490,131	315,166	306,977	299,823	304,689	308,371	288,653	311,521	291,911
(2) Non-food item	340,262	267,461	319,834	287,855	80,275	78,189	76,366	77,606	78,544	92,659	137,357	96,472
5. Net Reserve	69,730	12,106	41,630	25,739	0	0	0	0	0	0	5,004	321

Note : Average is based on the weighted average.
Income and Expenses are including own consumptions.

Table VIII-1-8 Financial Crop Budget without Project Condition

	Unit	Upland Rice			Lowland Rice			Coffee <1			Tea		
		Quantity	unit price (kip)	Amount (kip)	Quantity	unit price (kip)	Amount (kip)	Quantity	unit price (kip)	Amount (kip)	Quantity	unit price (kip)	Amount (kip)
A. Gross Income													
(1) Yield	(kg)	1,500	150	225,000	2,600	150	390,000	300	881	264,300	260	500	130,000
B. Production Costs													
B-1 Farm Input													
(1) Seed	(kg)	80	150	12,000	50	150	7,500	625	0	0	12,000	0	0
(2) Fertilizer													
Urea	(kg)	0	230	0	0	230	0	0	230	0	0	230	0
16-20-0	(kg)	0	230	0	100	230	23,000	0	230	0	0	230	0
16-16-8	(kg)	0	270	0	0	270	0	0	270	0	0	270	0
(3) Agro-chemicals													
Insecticide	(kg)	0	9,500	0	0	9,500	0	0	9,500	0	0	9,500	0
Pesticide	(kg)	0	9,500	0	0	9,500	0	0	9,500	0	0	9,500	0
Sub total				12,000			30,500			0			0
B-2 Labour Requirement													
(1) Hired Labour	man-day	0	1,200	0	0	1,200	0	50	1,200	60,000	0	1,200	0
(2) Family Labour	man-day	198	0	0	148	0	0	120	0	0	190	0	0
B-3 Animal Power	head-day	0	2,400	0	0	2,400	0	0	2,400	0	0	2,400	0
B-4 Others				4,600			3,525			7,000			4,000
Total				16,600			34,025			67,000			4,000
C. Net Return (A-B)				208,400			355,975			197,300			126,000

Remark : <1 : Coffee price is converted to 2005 future price based on World Bank Price Prospect, due to the 1993 price was exceptional one.

	Unit	Cardamom			Cabbage			Potato			Groundnuts		
		Quantity	unit price (kip)	Amount (kip)	Quantity	unit price (kip)	Amount (kip)	Quantity	unit price (kip)	Amount (kip)	Quantity	unit price (kip)	Amount (kip)
A. Gross Income													
(1) Yield	(kg)	300	1,500	450,000	8,000	100	800,000	10,000	113	1,130,000	1,000	250	250,000
B. Production Costs													
B-1 Farm Input													
(1) Seed	(kg)	0	0	0	1	145,000	145,000	700	180	126,000	45	250	11,250
(2) Fertilizer													
Urea	(kg)	0	230	0	200	230	46,000	0	230	0	0	230	0
16-20-0	(kg)	0	230	0	0	230	0	150	230	34,500	0	230	0
16-16-8	(kg)	0	270	0	200	270	54,000	0	270	0	0	270	0
(3) Agro-chemicals													
Insecticide	(lit)	0	9,500	0	2	9,500	19,000	1	9,500	9,500	0	9,500	0
Pesticide	(lit)	0	9,500	0	0	9,500	0	0	9,500	0	0	9,500	0
Sub total				0			235,000			170,000			11,250
B-2 Labour Requirement													
(1) Hired Labour	man-day	0	1,200	0	0	1,200	0	0	1,200	0	0	1,200	0
(2) Family Labour	man-day	60	0	0	95	0	0	67	0	0	90	0	0
B-3 Animal Power	head-day	0	2,400	0	0	2,400	0	0	2,400	0	0	2,400	0
B-4 Others				2,000			15,750			12,500			4,563
Total				2,000			250,750			182,500			15,813
C. Net Return (A-B)				448,000			549,250			947,500			234,188

Table VIII-I-9 Financial Crop Budget with Project Condition

	Unit	Lowland Rice			Coffee #1			Tea			Cardamom		
		Quantity	unit price (kip)	Amount (kip)	Quantity	unit price (kip)	Amount (kip)	Quantity	unit price (kip)	Amount (kip)	Quantity	unit price (kip)	Amount (kip)
A. Gross Income													
(1) Yield	(kg)	4,000	150	600,000	1,500	881	1,321,500	1,000	500	500,000	400	1,500	600,000
B. Production Costs													
B-1 Farm Input													
(1) Seed	(kg)	50	150	7,500	625	0	0	12,000	0	0	20,000	0	0
(2) Fertilizer													
Urea	(kg)	70	230	16,100	0	230	0	0	230	0	0	230	0
16-20-0	(kg)	200	230	46,000	0	230	0	0	230	0	0	230	0
16-16-16	(kg)	0	270	0	300	270	81,000	300	270	81,000	0	270	0
(3) Agro-chemicals													
Insecticide	(kg)	4	9,500	38,000	0	9,500	0	0	9,500	0	0	9,500	0
Pesticide	(kg)	0	9,500	0	0	9,500	0	0	9,500	0	0	9,500	0
Sub total				107,600			81,000			81,000			0
B-2 Labour Requirement													
(1) Hired Labour	man-day	73	1,200	87,600	110	1,200	132,000	100	1,200	120,000	0	1,200	0
(2) Family Labour	man-day	80	0	0	95	0	0	115	0	0	55	0	0
B-3 Animals													
Bull or Cattle	machine-day	0	2,400	0	0	2,400	0	0	2,400	0	0	2,400	0
B-4 Others				13,760			14,650			14,050			2,000
Total				208,960			227,650			215,050			2,000
C. Net Return (A-B)				391,040			1,093,850			284,950			598,000

Remark: #1: Coffee price is converted to 2005 future price based on World Bank Price Prospect, due to the 1995 price was exceptional one.

	Unit	Cabbage			Potato			Maize			Soybeans			Groundnuts		
		Quantity	unit price (kip)	Amount (kip)	Quantity	unit price (kip)	Amount (kip)	Quantity	unit price (kip)	Amount (kip)	Quantity	unit price (kip)	Amount (kip)	Quantity	unit price (kip)	Amount (kip)
A. Gross Income																
(1) Yield	(kg)	20,000	100	2,000,000	20,000	113	2,260,000	3,000	103	309,000	2,000	156	312,000	2,000	250	500,000
B. Production Costs																
B-1 Farm Input																
(1) Seed	(kg)	1	145,000	145,000	1,500	180	270,000	15	2,000	30,000	60	156	9,360	45	250	11,250
(2) Fertilizer																
Urea	(kg)	250	230	57,500	0	230	0	0	230	0	0	230	0	0	230	0
16-20-0	(kg)	0	230	0	300	230	69,000	0	230	0	350	230	80,500	350	230	80,500
16-16-16	(kg)	300	270	81,000	0	270	0	0	270	0	0	270	0	0	270	0
(3) Agro-chemicals																
Insecticide	(lit)	2	9,500	19,000	2	9,500	19,000	0	9,500	0	2	9,500	19,000	2	9,500	19,000
Pesticide	(lit)	2	9,500	19,000	2	9,500	19,000	0	9,500	0	2	9,500	19,000	2	9,500	19,000
Sub total				292,500			377,000			30,000			127,860			129,750
B-2 Labour Requirement																
(1) Hired Labour	man-day	0	1,200	0	0	1,200	0	20	1,200	24,000	20	1,200	24,000	20	1,200	24,000
(2) Family Labour	man-day	95	0	0	80	0	0	55	0	0	60	0	0	65	0	0
B-3 Animals																
Bull or Cattle	head-day	0	2,400	0	0	2,400	0	0	2,400	0	0	2,400	0	0	2,400	0
B-4 Others				17,625			21,850			5,700			10,593			10,688
Total				310,125			398,850			59,700			162,453			164,438
C. Net Return (A-B)				1,689,875			1,861,150			249,300			149,547			335,563

Table VIII-I-10 Financial Incremental Irrigation Benefit for the Priority 16 Projects

Project No.	Crops	Without Project Condition				Crops	Without Project Condition				Incremental Benefit (000 kip)	Incremental Benefit (000 US\$)	
		Net Irrigated Area (ha)	Cropped Area (ha)	Prod. Value (000 kip)	Prod. Cost (000 kip)		Net Income (000 kip)	Cropped Area (ha)	Prod. Value (000 kip)	Prod. Cost (000 kip)			Net Income (000 kip)
1.	Coffee		640	169,087	42,864	126,223	Coffee	640	845,760	145,696	700,064		
	Tea		88	11,410	352	11,058	Tea	88	44,000	18,924	25,076		
	Upland rice		5	1,125	83	1,042	Field crops	10	3,120	1,625	1,495		
	Total	733	733	181,652	43,299	138,353	Total	738	892,880	166,245	726,635	588,282	806
2.	Coffee		0	0	0	0	Field crops	50	15,600	8,123	7,477		
	Vegetables		0	0	0	0	Vegetables	50	106,500	17,724	88,776		
	Total	50	0	0	0	0	Total	100	122,100	25,847	96,253	96,253	132
3.	Coffee		391	103,341	26,197	77,144	Coffee	647	855,011	147,290	707,721		
	Upland rice		103	23,175	1,710	21,465	Vegetables	206	438,780	73,024	365,756		
	Total	750	494	126,516	27,907	98,610	Total	853	1,293,791	220,314	1,073,477	974,867	1,335
4.	Coffee		132	34,888	8,844	26,044	Coffee	372	491,598	84,686	406,912		
	Upland rice		2	450	33	417	Vegetables	196	417,480	69,480	348,000		
	Total	470	134	35,338	8,877	26,460	Total	568	909,078	154,165	754,913	728,452	998
5.	Coffee		98	25,901	6,566	19,335	Coffee	98	129,507	22,310	107,197		
	Lowland rice		125	48,750	4,253	44,497	Lowland rice	457	274,200	95,495	178,705		
	Upland rice		16	3,600	266	3,334	Field crops	191	59,592	31,029	28,563		
	Total	621	239	78,251	11,085	67,167	Vegetables	398	847,740	141,086	706,654		
6.	Coffee		170	44,931	11,390	33,541	Total	1,141	1,311,039	289,919	1,021,120	953,953	1,307
	Upland rice		75	16,875	1,245	15,630	Coffee	170	224,655	38,701	185,955		
	Lowland rice		19	7,410	646	6,764	Vegetables	75	159,750	26,587	133,163		
	Total	264	264	69,216	13,281	55,935	Lowland rice	113	67,800	23,612	44,188		
7.	Coffee		18	4,757	1,206	3,551	Total	358	452,205	88,900	363,305	307,371	421
	Upland rice		15	3,375	249	3,126	Coffee	280	370,020	63,742	306,278		
	Total	341	33	8,132	1,455	6,677	Lowland rice	38	22,800	7,940	14,860		
	Coffee		10	2,613	670	1,973	Vegetables	84	177,855	29,600	148,255		
8.	Cardamom		7	3,150	14	3,136	Total	402	570,675	101,282	469,393	462,715	634
	Upland rice		76	17,100	1,262	15,838	Coffee	10	13,215	2,277	10,939		
	Lowland rice		139	54,210	4,729	49,481	Cardamom	7	4,200	14	4,186		
	Total	2,597	232	77,103	6,675	70,428	Lowland rice	4,180	2,508,000	873,453	1,634,547		
9.	Coffee		865	228,620	57,955	170,665	Field crops	980	490,000	161,149	328,851		
	Upland rice		236	53,100	3,918	49,182	Total	5,177	3,015,415	1,036,893	1,978,522	1,908,095	2,614
	Total	1,105	1,101	281,720	61,873	219,847	Coffee	865	1,143,098	196,917	946,180		
	Coffee		368	97,210	24,643	72,567	Lowland rice	240	144,000	50,150	93,850		
10.	Upland rice		82	18,489	1,364	17,125	Field crops	80	24,960	12,996	11,964		
	Total	450	450	115,699	26,007	89,692	Total	1,185	1,312,658	260,061	1,051,994	832,147	1,140
	Coffee		187	49,424	12,529	36,895	Coffee	368	486,082	83,736	402,347		
	Lowland rice		12	4,680	408	4,272	Lowland rice	41	24,600	8,567	16,033		
11.	Cardamom		282	126,900	564	126,336	Vegetables	123	261,990	43,602	218,388		
	Field crops		90	22,500	1,423	21,077	Total	532	772,672	135,905	636,767	547,075	749
	Upland rice		578	130,050	9,595	120,455	Coffee	187	247,121	42,571	204,550		
	Total	4,497	1,149	333,554	24,519	309,035	Lowland rice	4,310	2,586,000	900,618	1,685,382		
12.	Lowland rice		65	25,350	2,212	23,138	Field crops	420	210,000	69,064	140,936		
	Upland rice		2	450	33	417	Total	4,917	3,043,121	1,012,252	2,030,868	1,721,834	2,359
	Field crops		104	26,000	1,645	24,355	Lowland rice	1,860	1,080,000	376,128	703,872		
	Total	1,800	171	51,800	3,889	47,911	Field crops	1,240	620,000	203,903	416,097		
13.	Lowland rice		1,255	489,450	42,701	446,749	Total	3,040	1,700,000	580,031	1,119,969	1,072,058	1,469
	Upland rice		114	25,650	1,892	23,758	Lowland rice	5,340	3,204,000	1,115,846	2,088,154		
	Total	3,840	1,369	515,100	44,594	470,506	Field crops	640	320,000	105,240	214,760		
14.	Lowland rice		105	40,950	3,573	37,377	Total	5,980	3,524,000	1,221,087	2,302,913	1,832,407	2,510
	Field crops		41	10,250	648	9,602	Lowland rice	880	528,000	183,885	344,115		
	Total	640	146	51,200	4,221	46,979	Total	880	528,000	183,885	344,115	297,136	407
15.	Coffee		92	24,316	6,164	18,152	Coffee	92	121,578	20,944	100,634		
	Lowland rice		8	3,120	272	2,848	Lowland rice	4,704	2,822,400	982,948	1,839,452		
	Upland rice		65	14,625	1,079	13,546	Field crops	912	456,000	149,967	306,033		
	Total	2,900	165	42,061	7,515	34,545	Total	5,708	3,399,978	1,153,859	2,246,119	2,211,574	3,030
16.	Coffee		5	1,322	335	987	Coffee	5	6,608	1,138	5,469		
	Lowland rice		3	1,170	102	1,068	Lowland rice	524	314,400	109,495	204,905		
	Upland rice		7	1,575	116	1,459	Field crops	168	83,750	27,543	56,207		
	Total	351	15	4,067	553	3,513	Total	697	404,758	138,177	266,581	263,068	360
Whole 16 Project		21,408	6,695	1,971,408	285,750	1,685,658	32,278		21,251,768	6,768,824	16,482,944	14,797,266	20,270

Table VIII-I-11 Average Farm Household Economy without and with Project Conditions

(unit : '000 kip)

Main crop	Without Project Condition				With Project Condition		
	Coffee	Slash&Burn	Lowland Rice	Average	Coffee	Lowland Rice	Average
No. of H.H.*1	(1,634)	(1,012)	(2,025)	(4,671)	(1,893)	(6,898)	(8,791)
Farm size	2.07 ha	1.19 ha	1.00 ha	1.91 ha	2.46 ha	2.50 ha	2.49 ha
1. Gross Income	(564)	(417)	(432)	(475)	(3,572)	(2,454)	(2,694)
- Farm Income	564	342	382	437	3,572	2,454	2,694
- Non-farm Incc	0	75	50	38	0	0	0
2. Production Cost	125	26	35	65	643	814	777
3. Net Income	<u>439</u>	<u>390</u>	<u>397</u>	<u>410</u>	<u>2,928</u>	<u>1,640</u>	<u>1,917</u>
4. Living Expense:	(429)	(390)	(397)	(407)	(1,535)	(1,535)	(1,535)
- Food item	333	303	309	316	874	874	874
- Non-food item	96	87	89	91	661	661	661
5. Net Reserve	<u>10</u>	<u>0</u>	<u>0</u>	<u>3</u>	<u>1,393</u>	<u>104</u>	<u>382</u>

Note : Average is weight average based on No. of household (H.H)

Coffee price is using the 2005 future price based on the World Bank Price Prospect, 1994

Remarks : No. of H.H. is the number of beneficial farmers.

The living expense of farmers with project condition are applied the data of present average household expenditure in Urban area. (source : Agricultural Sector Memorandum, IBRD, 1995)

Figures

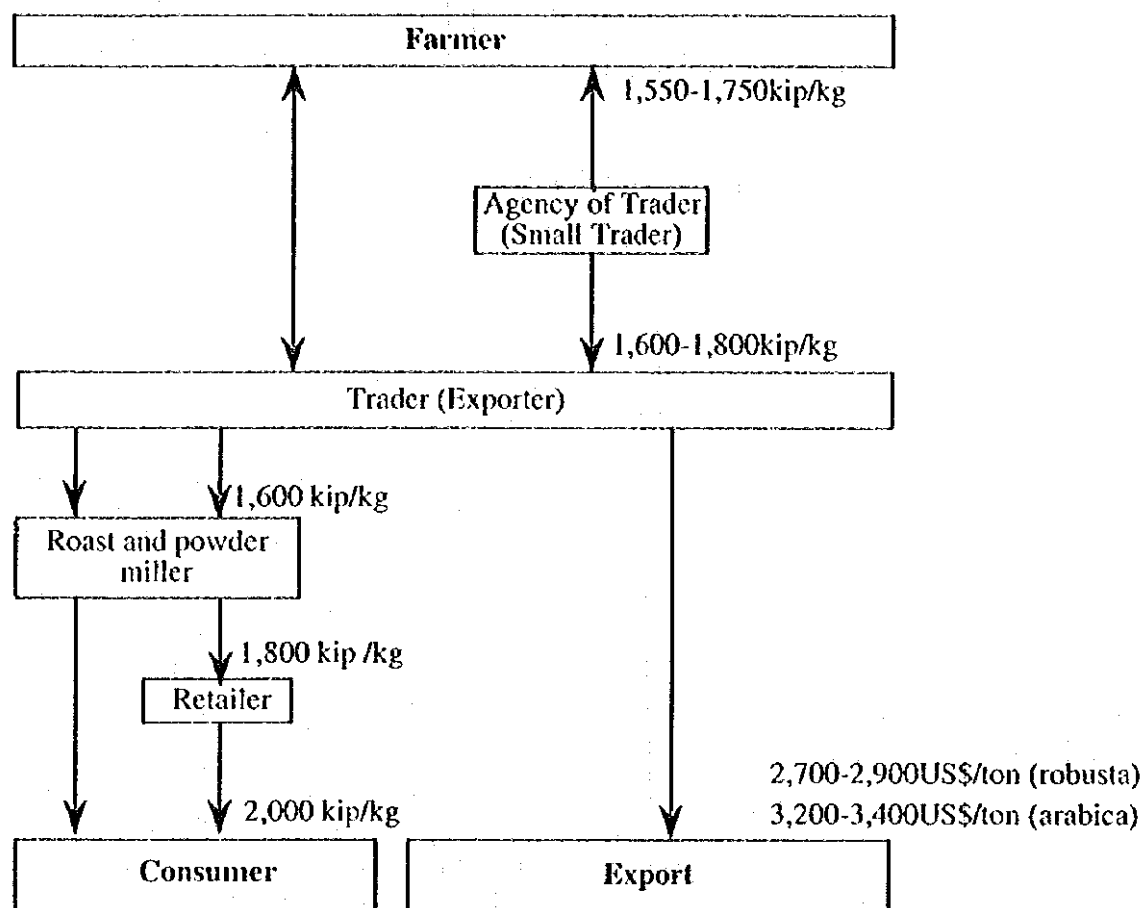


Fig. VIII-I-1 Marketing Channels for Coffee (Prices is for green beans on Feb. 1995)

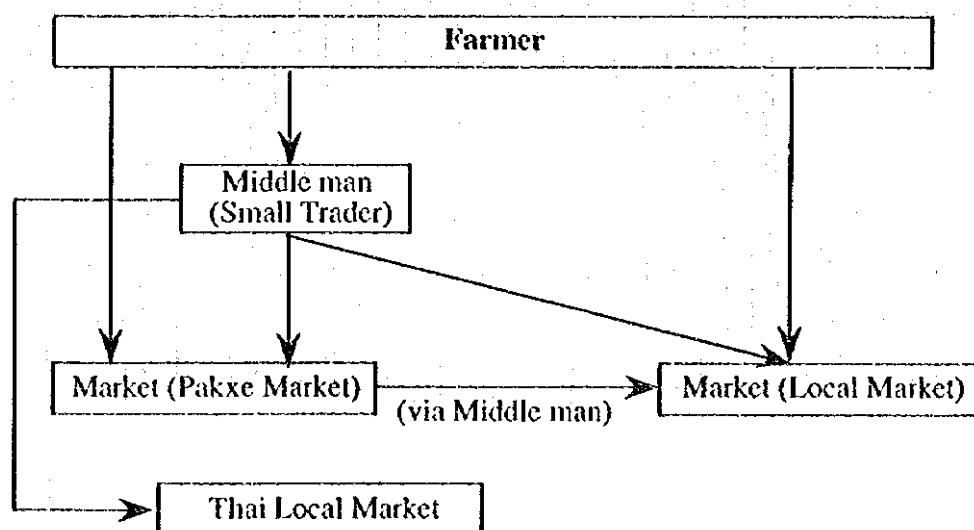
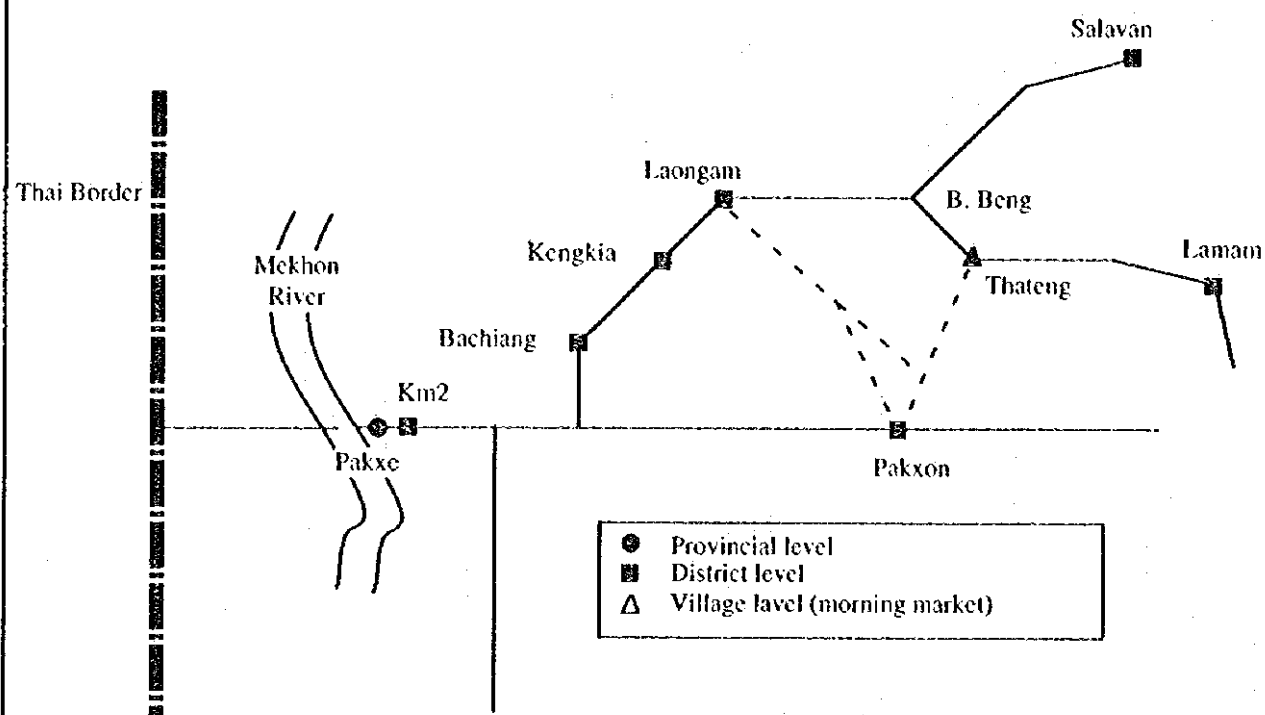


Fig. VIII-I-2 Marketing Channels for Vegetables, Rice



Market flow of Agricultural Products

Commodities	Production Region	Marketed Point		
		First	Second	Third
Rice	Champasak	Pakse	Pakxong Laongam Thateng	- - -
	Salavan	Salavan	Thateng Lamam	- -
Vegetables 1 (cabbage, potato, chayote, etc.)	Pakxong	Pakxong	Pakse	Bachiang Laongam Salavan Lamam Thateng
		Pakse	Bachiang Laongam Salavan Lamam Thateng	- - - - -
Vegetables 2 (onion, garlic, chili, etc.)	Thai	Pakse	Bachiang Laongam Salavan Lamam Thateng	- - - - -

Fig. VIII-I-3 Domestic Marketing Flow of Agricultural Products in the Study Area

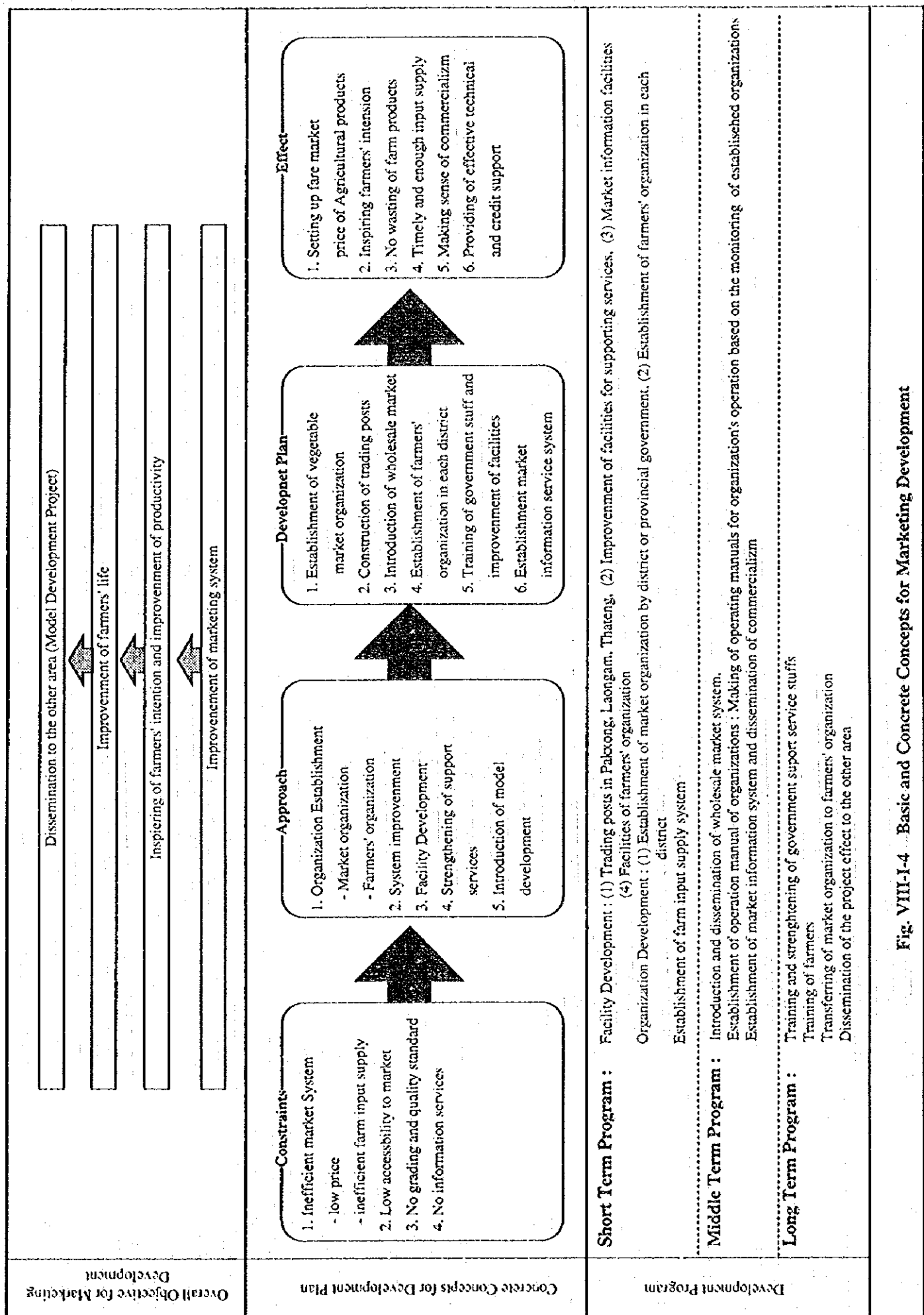


Fig. VIII-1-4 Basic and Concrete Concepts for Marketing Development

Part II Feasibility Study

II-1 PRESENT CONDITION OF THE FIVE PRIORITY SCHEMES

II-1.1 Marketing Condition

II-1.1.1 Marketed Crops

The following agricultural products are mainly traded in and around the each scheme area.

Scheme area	Major traded Product	
Upper Champi	Coffee	Tea
Upper Tapoung	Coffee	Cabbage
Upper Kaphou	Coffee	
Lower Xe Set	Groundnut	Chili
Upper Tay-Un	Coffee	

The following paragraphs explain the present marketing conditions of each traded product in 1995.

(a) Coffee

About 98 % of coffee produced in the Boloven plateau is exported. This is the major income source for the farmers of the Champi, Tapoung, Kaphou and Tay-Un scheme areas. The coffee is mostly sold to middlemen (small traders) at either as the unhusked (black bean) or husked beans (green bean) at the farmgate. Since some farmers in Upper Kaphou scheme know that they can sell their product at the highest price, they bring their husked cherry and sell to the exporter directly. Present minimum farm gate price (average of Jan. 96) is 950 kip/kg for Robusta coffee (husked bean) and 1,100 kip/kg for Arabica coffee (husked bean).

(b) Tea

Although tea had been exported to Vietnam and Cambodia previously, the tea trade has been declining due to the unstable quality and open market economy now practiced in Vietnam. In the domestic market, since there is no large demand for tea as is the Laotian custom, most of them are traded at lower price of 200 - 500 kip/kg. However, some farmers who produce high quality tea can sell at the high price of 2,000 kip/kg to Vietnamese and Chinese.

(c) Cabbages

The small traders play a major role in the cabbage trade. Most of the cabbages produced in the Upper Tapoung area are sold to Thailand and some of them are sent to Vientiane. The import duties for vegetables in Thailand is quite high as 40 % of total import values. Therefore, most export of cabbages from Laos to Thailand is carried out under illegal way at present.

According to the small traders, they export cabbage to Thailand in only the rainy season (May to September) because of the shortage of cabbage in Thailand. Presently, most farmers just wait for the traders' visits to sell their produce. Hence, they often waste their produce without selling, particularly after September. The farmgate price of cabbage also varies depending upon the season. The maximum price is 250 kip/kg in June and the minimum is 50 kip/kg in August and September.

(d) Upland crops (Groundnut, Chili, Cotton)

Groundnut is also mainly exported to Thailand, both officially and unofficially. Because of preparation of groundnut oil in Thailand, there is a significant demand for the product in Thai market. Reflecting Thai market, it is actively traded by the small traders. In fact, the farmers have several opportunities to sell their produce through the traders visits, even in the poorly accessible areas such as B. Nattou and B. Natou. The farmgate price of

groundnut in the area was around 250 to 450 kip/kg of shelled groundnut in 1995.

Most of chili in the domestic market is imported from Thailand. Therefore the chili produced in the area is traded in the domestic market. According to traders, the shortage and unstable production are the main problems for the chili trading. The present farmgate price of dried chili is about 2,000 kip/kg.

Since there is a state factory in Vientiane, the cotton is mainly traded with the buyer of the factory. Two buyers act in and around the scheme area. The farmgate price of seed cotton is 300 kip/kg at present.

(e) Rice (Upland rice and Lowland rice)

In addition to the above products, rice is also traded for consumption in the scheme areas. As the section below on the state of food balance in the each scheme area indicates, a significant amount of rice is traded in the each scheme area. Most of farmers buy rice in the market and some of them barter their products with trader, such as coffee and groundnut to rice. The present market price of local product is 250 to 300 kip/kg of rice and 150 to 180 kip/kg of paddy.

Because of differentiation of quality, imported rice is traded at high price of 450 - 500 kip/kg in Pakse market. Insufficient rice milling are resulted in high contamination of broken rice.

II-1.1.2 Farm Input Supply

Most of farmers have no habit to use fertilizer and agrochemical, except for the cabbage farmers and some of the coffee farmers, due to the poor knowledge and lack of budget. However, it is also one reason that there is no access to get the farm input in the scheme areas. At present, they should go to the Pakse market to purchase farm inputs. The prices of farm inputs sold at each market in 1996 are summarized as follows:

(unit : kip)						
	Unit	Pakse		Pakxong	Laongam	Salavan
		Private	S. Company			
Seed						
Cabbage (1st quality)	100g	18,500	n.a.	n.a.	n.a.	n.a.
Cabbage (low quality)	20g	300	n.a.	500	n.a.	n.a.
Ch. Cabbage (1st quality)	20g	4,500	n.a.	n.a.	n.a.	n.a.
Ch. Cabbage (low quality)	20g	300	n.a.	500	300	n.a.
Chili	20g	300	n.a.	n.a.	n.a.	n.a.
Fertilizer						
Urea	50kg	18,500	17,300	n.a.	n.a.	n.a.
Urea	small bag *1	-	-	600	200	200
16-20-0	50kg	17,000	16,000	n.a.	n.a.	n.a.
15-15-15	50kg	18,500	n.a.	n.a.	n.a.	n.a.
Agro-chemicals						
Foridol	100ml	1,200	n.a.	1,500	n.a.	1,500
Thiodam	100ml	1,400	n.a.	1,500	n.a.	n.a.

Remarks : *1 sold at small package, 600g in Pakxong, 270g in Laongam and 500g of last year's one in Salavan
n.a. is "not available".

II-1.1.3 Post Harvest

(1) Milling of coffee and rice

Most important agro-processing activity in each scheme area is rice milling and coffee milling. Most of villages have privately owned rice/coffee mills in their villages. The number

of rice/coffee mills in each scheme area is obtained from each village office concerned as follows:

Machine	(Capacity : ton/day in output)									
	Upper Champi		Upper Tapoung		Upper Kaphou		Lower Xe Set		Upper Tay-Un	
	No.	Capa.	No.	Capa.	No.	Capa.	No.	Capa.	No.	Capa.
Rice mill	-	-	-	-	9	26	7	4.2	-	-
Coffee mill	27	58	2	5	36	50	4	6	6	5
Total	27	-	2	-	45	-	11	-	6	-

There is no complains by farmers about milling quality, capacity and recovery rate, etc., but it was observed that the steel huller type mill is used for milling of rice and coffee. The recovery rate is about 60-62 % for rice, 50 - 60 % for coffee on average according to millers. Some of villagers are still using pounding method for milling rice for daily consumption.

(2) Drying of coffee

Presently, the farmers use the "natural drying method" for coffee drying. After harvesting, they dry the fresh cherry under sunshine condition for about 1 to 2 week depending on the climatic condition. At this time, most of them dry the cherry on the ground directly, however, some of them use vinyl mats or bamboo terraces. Therefore, the insufficient drying or fermentation of cherry are often resulted in during drying, and it becomes the main reason for low quality of Lao coffee.

(3) Tea processing

Tea is produced by roasting method using hot iron pan. The taste of it is close to Chinese tea. After harvesting, the leaves are roasted and dried, and this process is repeated for several times. The problems are in the roasting process. Because they use the firewood for its roasting, tea is smoked and the aroma of it is changed.

II-1.1.4 Quality

At present, there is no concept of quality standard, not only among farmers but also among traders (exporters). Even in case of coffee, there is no grading system. Hence, Lao coffee is classified into the low quality class in the European market, and fetches at low price which is 10 to 20 % below world market price. The vegetables also are sold freely in the market by farmers and/or retailers, where the price of vegetables is set by their weight and not quality.

It is important for future marketing development to establish quality standards or grading system of agricultural products and to establish the price system based on quality. This matter should be applied for not only export commodities but also for produce sold in the domestic market. If farmers know that there is difference depending on the quality, they will have an incentive of making high quality product.

The main problems of quality improvement are in the processing process as shown in above section, especially in case of coffee and tea.

II-1.2 Demand and Supply

The demand and supply balance of food in and around the schemes in 1995 is analyzed as follows:

Scheme Area	Total Population (person)	Rice demand (Paddy) (ton)	Production of paddy (ton)	Balance	
				Total (ton)	Per capita (kg/person)
Upper Champi	4,731	1,420	10	-1,410	-298
Upper Tapoung	1,478	440	10	-430	-290
Upper Kapheu	2,393	720	400	-320	-174
Lower Xe Set	2,218	670	480	-190	-86
Upper Tay-Un	871	260	190	-70	-80

Remark : Requirement of rice consumption is calculated at 300 kg of paddy/capita/year.

In the scheme areas, there is a shortage in rice production. Most of coffee farmers in the Upper Champi, Upper Tapoung and Upper Kapheu areas have established a trading system and also a consumption style, where farmers buy their food from their cash income. On the other hand, farmers in Lower Xe Set and Upper Tay-Un produce their rice by themselves. However, presently the amount of rice production is not sufficient.

II-1.3 Agro-economic Condition

II-1.3.1 Crop Budget

The present labor requirement for each crop is summarized as follows :

	(Unit : man-day / ha)						
	Coffee	Tea	Cabbages	Upland rice	Groundnut	Chili	Lowland rice
Required Labor							
(1) Hired Labor	22	0	0	0	0	0	0
(2) Family Labor	148	190	95	198	90	90	148
(3) Total Labor	170	190	95	198	90	90	148

Under the present condition of the priority schemes, the occupation of hired labor is a small share in the total labor requirement. In fact, the hired labor are mainly utilized for coffee harvesting in Champi and Tapoung schemes. The crop budgets of each crop are analyzed based on the price and cost in 1995 as shown in Table VIII-II-1, and summarized as follows :

	(Unit : kip)						
	Upper Champi		Upper Tapoung			Upper Kapheu	
	Coffee	Tea	Coffee	Cabbage	Up. R	Coffee	Up. R
1. Gross income	297,000	153,000	451,000	950,000	87,000	352,000	225,000
2. Production cost	27,400	0	31,200	250,000	12,000	6,400	12,000
3. Net income	269,600	153,000	419,800	700,000	75,000	345,600	213,000

	(Unit : kip)						
	Lower Xe Set				Upper Tay-Un		
	Up. R	Low. R	Groundnut	Chili	Up. R	Low. R.	Coffee
1. Gross income	307,500	396,000	470,400	160,000	207,000	250,500	253,000
2. Production cost	12,000	7,500	27,520	10,000	12,000	7,500	4,600
3. Net income	295,500	388,500	442,880	150,000	195,000	243,000	248,400

II-1.3.2 Present Agricultural Production Value

Present gross crop production value in the each priority area is estimated based on the farmgate prices in 1995, the result are summarized as follows:

	Upper Champi		Upper Kaphou		Lower Xe Set		Upper Tay-Un	
	Prod.	Value	Prod.	Value	Prod.	Value	Prod.	Value
Crops	(ton)	(000kip)	(ton)	(000kip)	(ton)	(000kip)	(ton)	(000kip)
Coffee	138	151,800	162	178,200	-	-	-	-
Tea	39	17,550	-	-	-	-	-	-
Upland rice	-	-	270	40,500	273	40,950	42	6,300
Upland crops	-	-	-	-	135	33,750	-	-
Lowland rice	-	-	-	-	260	39,000	34	5,100
Fruit	-	-	-	-	240	13,710	-	-
Total	177	169,350	432	218,700	908	127,410	76	11,400

Remark : Upper Tapoung area is excluded in the above table, because there is no farm land in the scheme area.

II-1.3.3 Farm Type and Average Holding Size

(1) Land Holding and Tennure System

As mentioned in Master Plan report, the land could be inherited, transferred, leased, or sold to Laotian national, all of which are legitimately recognized by the state at present. Each village is to maintain a land registry book for individual holdings, and submit this to the authority concerned.

Most of farmers has about 1 to 2 ha of farm land including slash and burn fields, but some of them occupy about 5 to 10 ha of farm land for coffee plantation. In addition, some fields in especially Upper Champi scheme are occupied by the investor as land concession area, which can be found around B. km 45 as an example. Tenured farm land from other farmers are hardly found in and around priority schemes. The average holding size of farmers in the priority schemes are shown below :

	Upper Champi	Upper Tapoung	Upper Kaphou	Lower Xe Set	Upper Tay-Un
Holding size (ha)	3.0	2.5	1.7	1.4	1.9

(2) Farm Type and Average Farm Size

The main farm types operated in the scheme areas and the average farm size for the each farming type are estimated on the basis of registration data for land tax. Most farmers depend on coffee cultivation. Besides coffee, they cultivate tea, upland crops or cabbage by the slash and burn method, and also lowland rice. The results are summarized as follows :

Scheme area	Farm type	Average holding size	(Breakdown of area)	Number of Household
Upper Champi	1. Coffee	2.7 ha	(coffee 2.7 ha)	12
	2. Coffee + Tea	3.0 ha	(coffee 2.3 ha, tea 0.7 ha)	186
Upper Tapoung	1. Coffee	1.5 ha	(coffee 1.5 ha)	76
	2. Coffee + Cabbage	2.9 ha	(coffee 2.0 ha, cabbage 0.9 ha)	160
	3. Coffee + Upland rice *1	2.8 ha	(coffee 2.1 ha, upland rice 0.7 ha)	26
Upper Kapheu	1. Coffee	1.6 ha	(coffee 1.6 ha)	131
	2. Coffee + Upland rice *1	1.7 ha	(coffee 1.1 ha, upland rice 0.6 ha)	300
Lower Xe Set	1. Lowland rice + Upland crops	1.5 ha	(lowland rice 0.7 ha, upland crops 0.8 ha)	129
	2. Upland rice and other crops	1.3 ha	(upland rice 0.5 ha, upland crops 0.7 ha)	156
Upper Tay-Un	1. Coffee + Lowland rice	2.4 ha	(coffee 1.3 ha, lowland rice 1.2 ha)	17
	2. Coffee + Upland rice *1	1.7 ha	(coffee 0.8 ha, upland rice 0.9 ha)	33

Remarks: *1 Upland rice is cultivated under slash and burn cultivation.

II-1.3.4 Farm Household Economy

The farm household economy for the farm types in the each scheme area are assessed based on the results of the farm interview survey. The following assumption and calculation are used for the estimation.

(1) Living Expense

Living expenditure are estimated on the basis of the result of farm interview survey. It is found that there is liner correlation between cash income without food purchasing cost and non-food item expenditure on the each four (4) scheme (Upper Champi, Upper Tapoung, Upper Kapheu and Upper Tay-Un). The living condition of farmers in the Lower Xe Set area is more primitive due to the lowest cash income, hence their buying amount of non-food items are fixed regardless of the cash income. It may indicate that the trading system in the Xe Set area are still remain the barter trading system. The liner correlations for four priority areas are shown in Figs.VIII-II-2.

Correlative formulation between cash income and non-food item expenditures

Upper Champi : Non-food Expenditure = $24335 + 0.6786 \times \text{Cash income}$ ($R^2 = 0.809$, sample 10)

Upper Tapoung : Non-food Expenditure = $32316 + 0.7090 \times \text{Cash income}$ ($R^2 = 0.987$, sample 5)

Upper Kapheu : Non-food Expenditure = $30428 + 0.3929 \times \text{Cash income}$ ($R^2 = 0.951$, sample 5)

Upper Tay-Un : Non-food Expenditure = $-9299.7 + 0.8567 \times \text{Cash income}$ ($R^2 = 0.955$, sample 4)

The cost for food items are found the some differentiation among the schemes, however, it mostly depends on the family number. Therefore, the expenditures for food items are estimated based on the data of average family number and average food consumption per one person in the each scheme.

(2) Off-farm Income

Most farmers get their income from only farm product. However, the farmers in the Lower Xe Set area, who operate their farm in marginal level, earn from other source such as casual labor, cutting wood, farm labor, etc.

(3) Household Economy

The average farm economy for each typical farmer in the schemes are shown in Table VIII-II-2 and summarized as follows :

Upper Champi & Upper Tapoung

Project Area	Upper Champi		Upper Tapoung		
Farm Type	Coffee only	Coffee & Tea	Coffee only	Coffee & Cabbage	Coffee & Upland R.
Holding Size (ha)	2.7	3.0	1.5	2.9	2.8
1. Gross Income	(802)	(796)	(677)	(1,762)	(1,022)
(1) Farm Income	802	796	677	1,762	1,022
(2) Non-farm Income	0	0	0	0	0
2. Production Cost	88	78	55	314	90
3. Net Income	<u>713</u>	<u>718</u>	<u>621</u>	<u>1,448</u>	<u>932</u>
4. Living Expense	609	612	581	1,145	779
5. Net Reserve	<u>105</u>	<u>106</u>	<u>41</u>	<u>303</u>	<u>153</u>

Upper Kaphou, Lower Xe Set & Upper Tay-Un

Project Area	Upper Kaphou		Lower Xeset		Upper Tayun	
Farm Type	Coffee only	Coffee & Upland R.	Lowland R & Upland crops	Upland R. & Upland crops	Coffee & Lowland R.	Coffee & Upland R.
Holding Size (ha)	1.6	1.7	1.5	1.3	2.4	1.7
1. Gross Income	(563)	(522)	(465)	(429)	(612)	(435)
(1) Farm Income	563	522	465	369	612	390
(2) Non-farm Income	0	0	0	60	0	45
2. Production Cost	17	22	20	21	25	22
3. Net Income	<u>546</u>	<u>500</u>	<u>444</u>	<u>408</u>	<u>587</u>	<u>413</u>
4. Living Expense	455	437	439	403	536	387
5. Net Reserve	<u>92</u>	<u>64</u>	<u>6</u>	<u>5</u>	<u>50</u>	<u>25</u>

Presently the farmer in Upper Champi and Upper Tapoung areas get a significant income and live in a certainly well condition from economical view point. In other hand, the farmer in the Lower Xe Set area is primitive level. They are in substantial level and hardly reserve the annual income.

II-2 CONSTRAINTS OF MARKETING DEVELOPMENT

II-2.1 Lack of Intention of Quality Control for Coffee (Upper Champi, Upper Tapoung, Upper Kapheu, Upper Tay-Un)

Coffee (green bean) is presently exported at lower price in comparison with world market price, due to the low quality. The main causes of low quality of coffee in the schemes are as follows:

Practice	Done by	Causes	Effects
Harvesting	Farmers	harvesting of not only mature (red) cherry but also immature (green) cherry at same time.	uneven roast and less uniformity
Drying	Farmers	drying of the cherry harvested on the ground directly.	damages by mold and fermentation.
Sorting	Exporters	insufficient sorting	mixing of size, incorporating of rotten beans

Although some of them have been changing harvesting and drying measures of coffee by the effort of LUADP and government extension works, most of them still continue the primitive and inappropriate way at present. One of main reasons for the stagnant of improvement is the sense of buyers (middlemen and exporters). Due to the no intention to improve the coffee quality in the buyers sense, the importance of quality control is never expand to the farmers mind. In fact, the buyers does not make the price differentiation based on the coffee quality.

It is recommended that the extension works with instruction for proper harvesting and drying should be carried out and grading (pricing) system based on the quality should be introduced and disseminated. Quality control on farmers' side will be attained through the extension works of LUADP, and the other on buyers' side also will be filtered in the exporter mind by the LCEA and government activities.

II-2.2 No Appropriate Market System for Vegetables (Upper Tapoung)

Due to no effective market system, the following limitations have been resulted in.

(1) Unstable market (Untimely market)

Farmers have no way of the market and information to trade of their production (especially cabbage) at present, hence they just wait for the trader's visit to sell their product. Since trader's visiting is not constant, farmers often miss their chance for selling and waste their product. In this connection, they have no production plan and schedule at present.

From a view point of trader's side, the vegetable market for traders is also limited in domestic and also in neighbor countries. It takes about two (2) days from Pakse to Vientiane by truck due to the poor road condition, when traders try to carry the product to Vientiane. In addition, the damage of product is also sever during the transportation. Thailand also is an important market. Many cabbages are exported to Thailand during rainy season (May to September) by border trading.

(2) Low Price

Since the fair market channel has not been established and also there is no providing system of market information as mentioned above, the initiative of trading is in the trader's side. Hence the farmers are often compelled to be sold the product at lower price.

(3) Lack of Grading (Pricing) System

There is no concepts of grading standard at the trading of agricultural products at present. In general the price is governed by quality and its marketability. But no farmer in the scheme intends to improve the quality of products, resulting in low income. Therefore, the introduction of the quality control and grading system is indispensable for the stable farm benefit and also future vegetable export.

II-2.3 Lack of Post Harvest Facilities for Rice (Lower Xe Set and Upper Tay-Un)

There are few rice mill machines in the above scheme area, but no farmer presently complains about rice milling. However the production will be drastically increased along with implementation of the project in Lower Xe Set and Upper Tay-Un schemes. Future rice produced is not only for self-consumption but also for earning of money. Therefore the improvement of quality of rice milled is very important from the marketing view point. If the quality is improved, the price also will be increased at same price of imported rice from Thailand.

II-2.4 Lack of Market Information System (All schemes)

Due to the poor condition of communication system and support organizations, the farmers are kept on without right information of the markets. The market information plays an important role to grow the farmers' sense on commercial system, to know the present marketing price of agricultural commodities and to know the market needs timely. For getting of bargaining power, farmers have to know the marketing information of commodities in advance.

II-2.5 Lack of Market Channel of Farm Input (All schemes)

Farm inputs of fertilizer and agro-chemical are only available in Pakse market. Hence, the most vegetable farmers in Upper Tapoung go to Pakse to get them. Under present farming practice, no use of farm inputs is prevailing except for vegetable farmers. The intensive farming and improved variety of crops will be introduced with project in future, however, application of farm inputs is indispensable.

It is suitable that the private sector is to operate the farm input delivery instead of government sector. In the priority areas, however, no such system prevails at present. For expansion of private sector activities for farm input supply, the government also should prepare some supporting systems for the investment, such as strengthening of credit system, providing of facilities, elimination of tax duties, etc.

II-3 BASIC DEVELOPMENT CONCEPT OF MARKETING

II-3.1 Introduction of Grading and Grading System

As mentioned in the before chapter, quality of Lao coffee is very low at present. The quality management is one of essential ways for development of coffee market. Perhaps, the exporters will be educated by the international corporation through the coffee trade. It is considered that the introduction of grading system is essential for infiltration of quality improvement to trader (including middlemen and exporters) and also farmers.

Firstly, the concepts for the grading system should be introduced into the exporters point. For that, the LCEA and government service office should check the exported beans before exporting about the following items; moisture contents, size, uniformity, color, and contamination of fermented beans. In the same time of coffee grading, LCEA will find the market for every grades for each exporter. Once the exporters notice the importance of quality management, they also will make difference in the farmgate price based on the quality. Finally, the importance of quality will be infiltrated to the farmers point. Through combination with the agricultural extension services of proper post harvest, quality improvement will be attained.

For establishment of quality checking procedure, it is recommended the staff of local government need to be trained the observation checking and cup test procedure for coffee quality at the coffee imported country such as French, Japan ,etc. In addition, it is recommended that the procedure of quality checking will be instructed to exporters to be able to check coffee by themselves.

The activities and planning for quality improvement of coffee based on the above concepts will be carried out by LUADP and concerned agencies such as LCEA, local government service office. The following figure shows the way of infiltration of quality control concepts to the buyers and farmers.

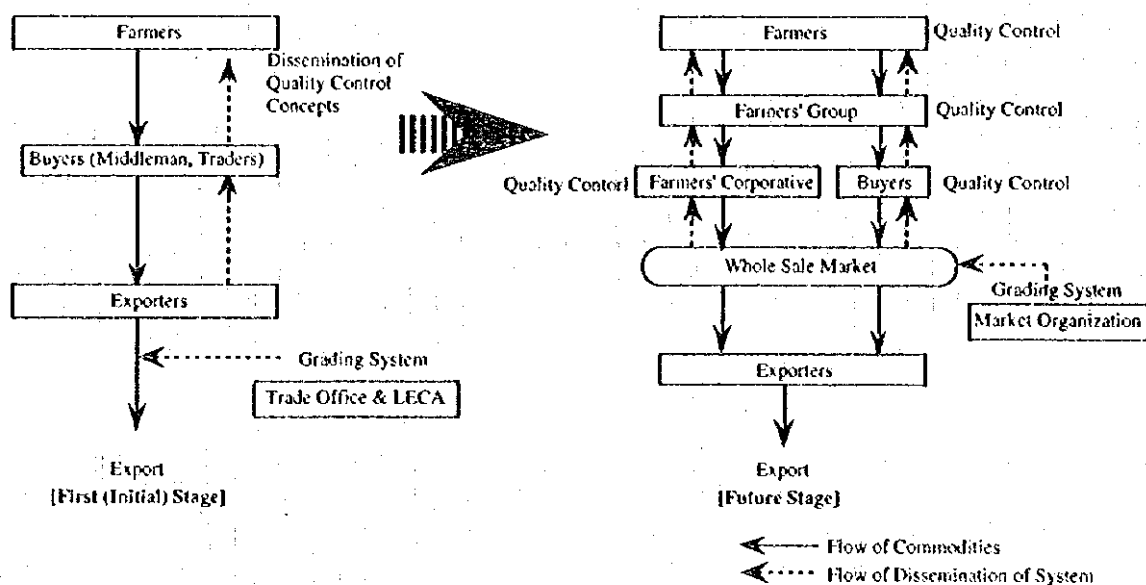


Figure Basic Concepts of Future Market System

II-3.2 Establishment of Wholesale Market for Vegetable

The marketing system should be changed for the effective promotion of the vegetable production and as incentives to farmers. The establishment of wholesale market is proposed as one of the ways in which farmers be able to have bargaining power and also have a desire of quality improvement for their products. In the wholesale market, any farmer, whenever ones want to sell products, will be able to do so under the wholesale (auction selling) marketing

system. Farmers are assumed to be encouraged to increase their product and also improve the quality of products by providing the chance to sell products and the place for fair trade to them. In addition, through the market will have the function of farm input supply and market information supply, the effective promotion of agriculture development will be attained.

In the other hand, the buyers side also will have profits for the wholesale market. Collection of better quality product and significant amount of them will be easily carried out, and they can know the information (condition) of the production area in advance.

In the initial stage, the organization of the wholesale market will be conducted by the staff of province and district office. However, the management and operation of the organization and also market will be transferred to the farmers at a final stage. Therefore, it is recommended that farmers establish small production groups at village level and also participate in the organization from the first stage themselves, in consultation with the local government.

The following functions are expected from the introduction of wholesale market system and facilities.

- (i) Fairly dealing
- (ii) Proper price
- (iii) Efficient goods collection
- (iv) Efficient goods distribution
- (v) Function of information center

The basic concept of the trading post is shown below :

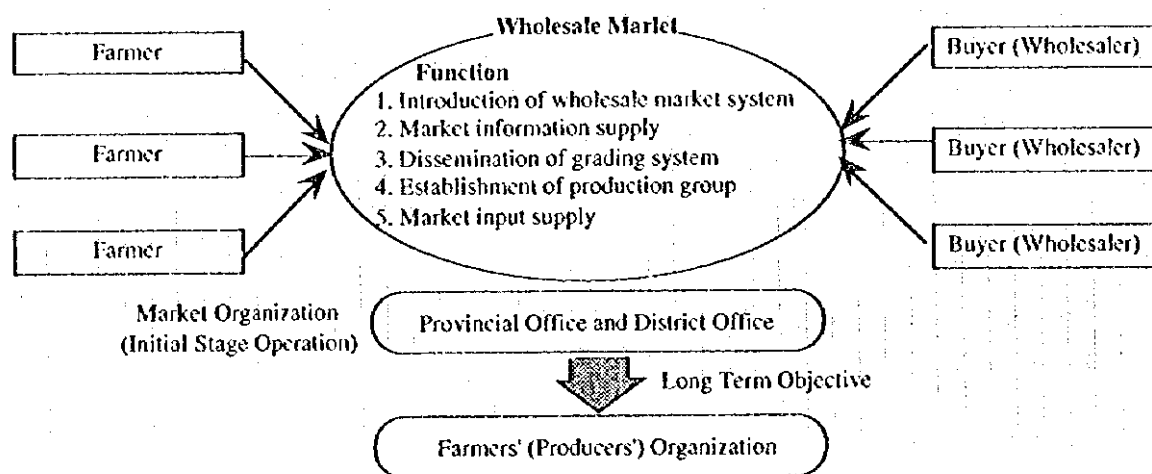


Figure Conceptual Figure for Proposed Wholesale Market

II-3.3 Strengthening of Post Harvest Activity (Establishment of Rice Bank System : Lower Xe Set and Upper Tay-Un)

The number of rice mill facility is short for the future agriculture development in Lower Xe Set and Upper Tay-Un schemes. For the improvement of milling capacity and quality of rice, the installation of new rice mill facilities is recommended along with the project implementation.

Rice bank is one of the existing organizations in the study area. This works for saving and credit for rice, and organized by the Women's Union. This organization can be found in few villages in the Lower Xe Set and Upper Tay-Un schemes. Since the farmers are familiar with the organization, improvement and additional establishment of the rice bank systems with necessary building and facilities such as processing facilities and storage in the above two (2) schemes are proposed. In this proposal, the rice bank has not only bank

activities (saving and credit) but also processing, storage and market information supplying activities.

The rice bank has another purpose of prototype of farmers' cooperatives in the first stage as the initial step of the marketing development. Through the further promotion of establishing farmers' cooperatives in future, it will help farmers to get reasonable return from farm products as well as to promote supply of farm input.

One rice bank will basically cover for two or three villages, although it is decided on the basis of consideration about number of beneficial villagers, amount of anticipated production, ethnic condition, etc. The organization of rice bank will be composed of concerned villages. The core for working of rice bank will be women in the villages.

The basic concept for the rice bank system is summarized as follows :

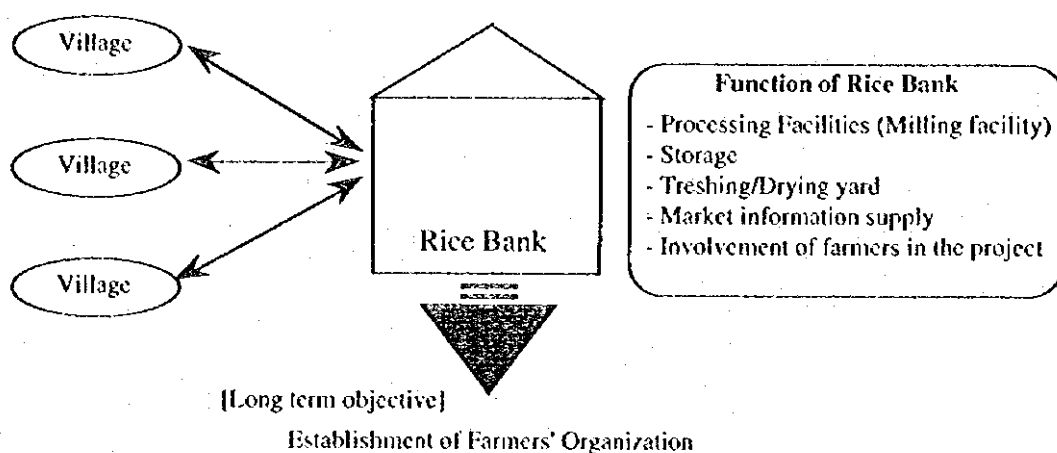


Figure Basic Concept for Rice Bank System

II-4. DEVELOPMENT PLAN

II-4.1 Market and Price Forecast

(1) Coffee

As mentioned in the before chapter, the present high price had been resulted from by the decrease in coffee production in Brazil, the price is assumed as exceptional case. The price of it will be decline at half price of the present one according to the IBRD forecasting (see below table). In addition of the forecasting, it is also noted the trend that demand of coffee in Europe and USA is decreasing (Commodity Market and the Developing Countries, IBRD, Feb. 1996). The following table shows a future international market price and anticipated farmgate price of coffee.

If the quality of coffee will be improved and recognized from the imported countries, the future market of Lao coffee is assumed to be stable even in the trend since the production amount has been at lowest level. The following table shows a future international market price and anticipated farmgate price of coffee.

	(Unit US\$/kg, Kip/kg)		
	1995	2000	2005
New York (US\$)	2.77	1.54	1.50
Farmgate (Kip)	950-1,100	700	670

Remarks: Price is for robusta coffee.

Price is indicated at 1995 constant price.

Farmgate price is floor price calculated the formulation of LCEA

Source: IBRD, Commodity Market and the Developing Countries, FEB. 1996

(2) Tea

If the quality of tea will be improved, it will be able to be sold at high price as be traded with Vietnamese and Chinese market in domestic. The market is not broad, however if the system of which high quality tea can be stably produced is established, it will be possible to export to Thailand, China and also an other international market.

(3) Vegetables

Vegetables produced in the priority area at present are traded at domestic market as Pakse, Vientiane, and at Thailand. Due to the poor road condition and the existing diet style of no eating of vegetables in Lao PDR, it is considered that the expansion of vegetable market is quite difficult. However, the diet style will be changed in future along developing of the country, and the road condition also will be improved under the existing plan.

The one of main limitations of the exportation is a high duty barrier at Thailand. In this connection, most vegetables are traded at the boarder, hence the amount of vegetables exported to Thailand is not stable. In future, the duty barrier will be disappered under the adovice of WTO (World Trade Organization). Therefore, it is considered that there is a high potential of market on the off crop season in Thailand. The future marketable vegetables and the marketable season of them are considered as follows :

Proposed vegetables	Domestic	Thailand
Potato	Dry season	Rainy season
Cabbage	Dry season	Rainy season
Chinese Cabbage	Dry season	Rainy season
Ginger	Dry season	All season
Carrot	Dry season	Rainy season

(4) Upland Crops

Presently, a significant amount of groundnut are exported to Thailand, since there is a processing factory of groundnut in Thailand. This trend for groundnut will be continued, and

the market of peanut will be stable. It is estimated that the demand for feed of livestock will be increased in future in line with the increase of demand for livestock. In addition of this condition, since it is planned that the Tha Ngon processing factory will be improved under the LUADP activities the markets of soybean, maize, and groundnut will be expanded in future.

(5) Rice

Total rice production in the plateau area is quite shortage as mentioned in the Master plan report. In addition, production in Sekon province has not been covered the demand in province as shown in below table. About 6000 ton of paddy was shortage at 1995. The shortage is covered by the aid in every year. Therefore, the rice produced in the priority area along the Project is traded at two (2) markets; plateau area and Sekong province. The price of rice in domestic market will be up if the quality of rice is improved.

Population (1994)	Demand (Th. tons)	Production(Th tons)	Balance (Th tons)
63,800	19.2	13.1	- 6.1

II-4.2 Marketing Development Plan

The market development plan is formulated by taking into consideration the basic development concepts. The following institutional development of marketing is proposed which includes construction of market facilities including warehouses and strengthening agricultural support and extension, farmers organization promotion, women's development and agricultural development.

II-4.2.1 Establishment of Wholesale Market in Pakxong

The establishment of wholesale market for vegetables in Pakxong area is one of the main components in promoting vegetable cultivation, not only in the project area but also other producing areas. When the grading system will be introduced at this market, a smooth competitive marketing system can be introduced.

(1) Proposed site

It is recommended to establish a wholesale market at Pakxong town, because it has main commercial activities, is at the center of the plateau and has easy accessibility to producers and traders. As shown in Fig. VIII-II-1, most vegetables produced in the Pakxong area are presently transported through Pakxong town to Pakse or another town. In addition, the two (2) schemes with potential for vegetable production, namely Upper Champi scheme and Upper Tapoung scheme are located near Pakxong town, and can benefit from the demonstration effects of a model vegetable marketing system.

It is recommended that the free land space adjoining the existing Pakxong market be used for the proposed wholesale market.

(2) Activity

This wholesale market shall have the following activities.

- i) operating of wholesale market,
- ii) introducing of grading system and quality control,
- iii) market information supply,
- iv) assistance of transporting,
- v) training of farmers, and
- vi) agro-input supply (by private sector)

(3) Facilities

The facilities to be constructed are planned as follows:

Facility and Equipment	Purpose
i) Working space :	collecting and selling products
ii) Storage :	products and farm inputs
iii) Loading space:	loading of products
iv) Parking lot :	
v) Office space :	for marketing board and wholesaler

(4) Size and space

Size and space of the proposed wholesale market is estimated on the basis of the following assumptions and also construction criteria of Japan (ST Procedure, Ministry of Agriculture and Forestry, Japan)

[Assumption]

- i) If the priority areas such as Upper Champi and Upper Tapoung areas are developed and the effective extension work is implemented in the next five years, the total amount of vegetable production in a season is estimated to be a maximum of 3,000 tons, out of which, about 60 %, estimated at about 1,800 tons, will be traded through the wholesale market.
- ii) On other hand, about 15% of total production from other villages surrounding such as Xepian, Tonset will also be transported to the wholesale market. Since this is estimated at about 650 tons in a season, the total amount to be traded in the wholesale market will be about 2,450 tons.
- iii) In case the working days in a harvest season is 60 days, the handled amount of vegetables per a day is estimated at about 40 ton.

[Criteria]

- i) The suitable amount to be treated in 1 m² is 40 kg.
- ii) The aisle space is about 20 % of the trading space.

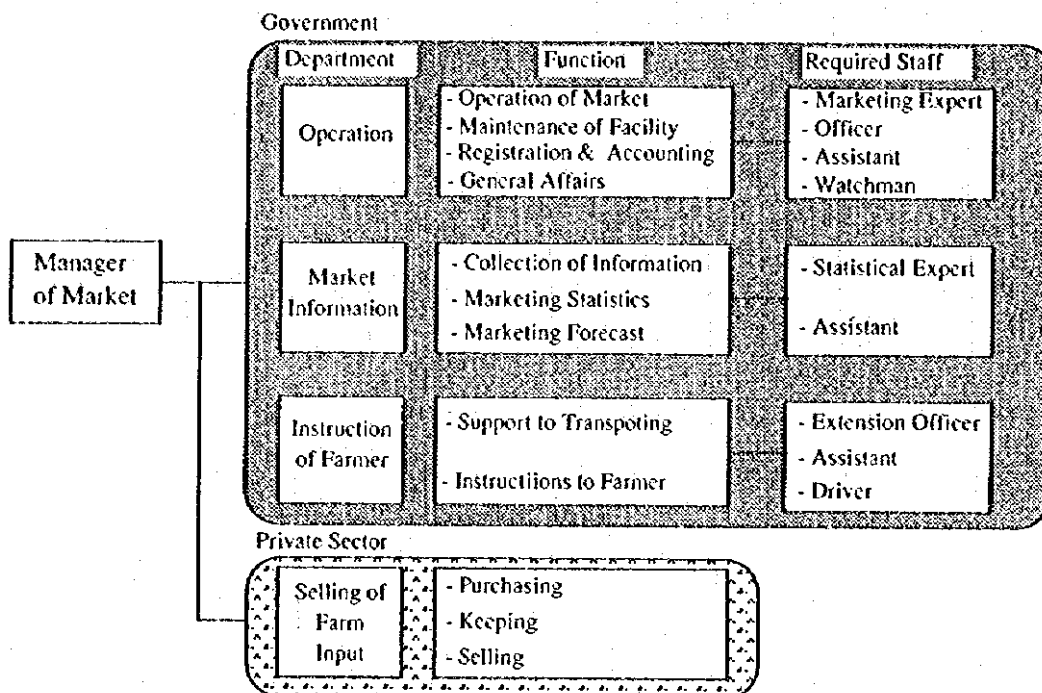
Based on the above, the general layout of the proposed wholesale market is set up as Fig. VIII-II-3, and summarized as follows:

Items	Specification	No
Working space	30 x 20 m of concrete floor of plat form type about 80 cm higher than loading space, steel frame with shade.	2
Warehouse	100 m ² of concrete type	1
Loading space	along the working space, 30 x 10 m of asphaltic pavement	4
Parking lot	800 m ² of gravel pavement	1
Building for office spaces	100m ² for marketing organization	1
	40 m ² for selling shop of farm inputs	1
	6 rooms of 3 x 4 m for buyers	2

(5) Organization

A marketing board (marketing organization) also should be established for the smooth operation of the market. In the first stage, the marketing board will be composed of government staff (provincial and district trade and agricultural section). However, farmers will also participate in the organization, and be trained for the future operations. Subsequently, technology of management shall be transferred to the farmers with the educational progress of farmers and finally the organization will be fully managed by the farmers themselves. The proposed marketing organization chart is illustrated as the following chart, and the number of

staff in each section are presented in the following table.



Position	Number
Director (Manager)	1
Marketing section	4
Information Section	2
Farmers Organization Section	3

(6) Operation Plan

(a) Operation Plan of Wholesale Market

The market will be held once or twice a week in the first stage, for effective operation. However, it will be operated everyday in the harvest season at the mature stage. The participant buyers will consist of retailers and large scale trader. Prior to participation, they will register at the market organization with payment of a registration fee. The effectiveness of the registration is available for a year; hence the buyers who want to participate at this market should register at every year. The buyers have a right to use the office building which is adjacent to the market on payment of a rental charge. On the other hand, agents or farmers can participate and sell their commodities at the market without limitation.

The related market information such as market price at Vientiane, Savanaket, Ubon, Bangkok, etc. will be supplied at the market for the fair trade and price stabilization. In addition, it is also important to provide information about production conditions such as prospected production, etc. to buyers to encourage them to join the market and reduce their risk for investigation.

The operation and maintenance cost of the market is mainly covered by the commission fee calculated on the basis of total sale value. One (1) percent of total sales value is charged to both sellers (farmers) and buyers.

(b) Farm Input Supply

It is recommended that farm input supply will be carried out by the private sector.

Although the facilities are planned to be constructed, the operation of this will be done by several private companies or state companies under the government guidance. The facilities will be rented by companies and the rental fee will be charged to the companies. The basic O&M will be the company's responsibility.

Purchasing ability of farm input of farmers will be increased along with the strengthening of farm credit system of APB. Therefore, the selling amount and timing will be set under discussion and coordination with APB and extension office in the district.

(c) Transportation Support

For supporting farmers for transportation of products, the organization will have a function of assistance of transportation. The organization rents its truck (about 5 ton), however, the farmers will have to load their produce by themselves. The rental charge of the truck is calculated on the basis of the fuel cost. An example of rental charge is shown as follows :

Distance from Pakxong Village	Rental charge (kip)
0 - 10 km	3,000
10 - 20 km	9,000
20 - 30 km	15,000
over 30 km	25,000

(d) Market Statistics

Through the operation of wholesale market, price data, production, treated amount, fluctuation of season and area, etc. can be collected for significant years. The data will be useful for the estimation of market forecast and also formulation of production plan. Therefore, an expert for statistics will be designed to attend in the market organization for constructing of database.

(e) Estimated Cost and Benefit

The cost and benefit from operation of the wholesale market is estimated in the following table. The benefit from commission fee is only calculated in the estimation because it is main source of benefit.

(000 kip)	
Items	Value
1. Commission (main income)	9,600
2. Total Cost	(7,600)
2-1 Salary	4,200
2-2 O&M	1,080
2-3 Fuel charge	2,160
2.4 Others	160
3. Balance	2,000

The above estimates show that annual net income of the wholesale market would be 2 million Kip without deducting the depreciation costs for buildings and equipment. The income to be expected from the rental charge of offices and transportation service is not included in these estimates. The depression costs for buildings and equipment will be covered by the rental and transportation service charges.

(7) Training of Local Government Staff

Since it is the first trial for introduction of wholesale system in the whole of the country, the staff to be worked at the market shall be trained sufficiently before operating of the market for smooth operation. The training through study of operation in the other countries is

considered to be the most effective training procedure. The training items to be considered are summarized as follows :

Subject	Trained Items	Trained Country	Number of Person
1. Wholesale System	- Auction system - Wholesale system - Grading of quality - Pricing system	Japan Thailand	1 or 2
2. Information Management	- Collection and supplying of market information - Market information statistics - Demand forecast	Japan Thailand	1 or 2
3. Supporting of Farmers	- Farmers' cooperation - Supporting system for shipping	Japan	1 or 2

(8) Other Required Equipment

The following equipment will be required for the operation of the above activities.

Main Required Equipment	Number
Truck of 5 ton capacity	1
Radio communication system	1
Personal computer	1
Printer	1
Generator of 5kw	1
Weighting machine	1

II-4.2.2 Improvement and Establishment of Rice Bank System

The objectives of rice bank development are to construct necessary buildings, to establish bank activities (saving and credit), to provide necessary facilities for marketing and post-harvesting of rice and other crops in and around the scheme areas, and to supply farm inputs to the farmers.

Such a rice bank will be a prototype of the farmers association in the short term development phase, as the initial step of marketing system development, and for further promotion of establishing farmers associations in the future stage so as to help farmers to get reasonable returns from farm produce, as well as to promote supply of farm inputs.

(1) Proposed site

Based on the number of villagers, accessibility, ethnic condition, etc., it is proposed that the rice banks will be established at B. Sengvang-gnai, B. Houakhoua, B. Sengvang-noi, B. Khonleng and B. Natou in Lower Xe Set scheme, and at B. Chamkamlit in Upper Tay-Un scheme as shown below.

Schemes	Proposed Site	Villages	No. of H.H.	Population
Xe Set	B. Sengvang-gnai	B. Sengvang-gnai	135	796
		B. Natou	32	149
	B. Houakhoua	B. Houakhoua	58	290
	B. Sengvang-noi	B. Sengvang-noi	74	454
	B. Khonleng	B. Khonleng	29	179
	B. Natou	B. Natou	58	350
Tay-Un	B. Chamkamlit	B. Chamkamlit	20	160
		B. Khamkok	50	470
		B. Chakam-mait	38	241

(2) Facility

The main facilities to be installed are summarized as follows :

- milling facility and building
- storage
- threshing and drying yard
- office and garage

(3) Production of Paddy in Priority Areas

The capacity of the facility for proposed rice bank is decided on the basis of future production. The amount of paddy to be produced in the priority schemes (Lower Xe Set and Upper Tay-Un) under with-project condition in future is estimated as shown in the following table.

Schemes	Proposed Site	Production	Demand*1	for market
Xe Set	B. Sengvang-gnai	2,080	320	1,760
	B. Houakhoua	720	100	620
	B. Sengvang-noi	920	160	760
	B. Khonleng	360	60	300
	B. Natou	720	120	600
Sub-total		4,800	760	4,040
Tay-Un	B. Chamkamlit	1,760	260	1,500

Remark : Demand is calculated on the basis of the population at 2000

The total production of paddy in the Lower Xe Set and Upper Tay-Un scheme areas in 2000 is estimated at about 4,800 tons and 1,760 tons of paddy, respectively. The total amount of paddy to be marketed in 2000 is estimated at 4,040 and 1,500 tons in the Lower Xe Set and Upper Tay-Un respectively.

(4) Size and Capacity of Facilities

(a) Existing Rice Mill

The existing rice and coffee mills are privately owned by villagers. The capacity of them is not sufficient for future production. In addition, the milling recovery rate and quality of output is quite low. Total number and capacity of existing rice mills in the priority areas are shown the following table.

Schemes	Proposed Site	No. of Existing Rice Mill	Capacity (ton / day)
Xe Set	B. Natteu	1	0.5
	B. Sengvang-gnai	3 (4)	2.1 (1.5)
	B. Houakhoua	0	0
	B. Sengvang-noi	2	0.6
	B. Khonleng	0	0
	B. Natou	1	1.0
Sub-total		7 (4)	4.2 (1.5)
Tay-Un	B. Chamkamlit	0 (6)	0 (5.0)

Remark : Number in () indicates the number of existing coffee mills

Because of the present low milling recovery and quality, however, the performance of the existing mills seems to be not satisfactory. In fact, the milled rice imported from Thailand is sold in Pakse market at twice the price of locally milled rice. This means that there is a possibility of selling even local rice at a more attractive prices, if it is milled to a good quality. Hence it is expected that the installation will be contribute to improving the farmers economy.

(b) Basic Assumption and Capacity of Rice Mill

The required milling capacity and number of mills are estimated on the basis of the following assumption and also availability of the rice mills in the local or Thai market.

- i) Annual operation days for rice mill are estimated 120 - 200 days in a year. Daily working hour is 6 hour per day.
- ii) The amount of paddy traded through the rice bank is assumed to be about 50 % of total marketed productions.
- iii) The capacity of rice mill which will be set up is 500 kg/hour of output, taking into consideration the future increase of paddy.

The required rice mill capacity and number of rice mills in the each proposed site are summarized as follows:

Scheme	Proposed Site	milled rice (ton/year)	Number of Mills
Lower Xe Set	B. Sengvang-gnai	880	1
	B. Houakhoua	310	1
	B. Sengvang-noi	380	1
	B. Khonleng	150	1
	B. Natou	300	1
Upper Tay-Un	B. Chamkamlit	750	1

(c) Storage and Drying Yard

Storage is inevitable for the work of the original function of bank and for temporary storing of marketable paddy. The drying yard will be used for further drying of paddy and sorting out impurities such as stone. The capacity of storage and space of dry yard is calculated on the following basis.

- i) Maximum amount of storing paddy is estimated on wet season paddy and reduced the milled paddy to be marketed.
- ii) Storing duration for milling rice is a temporary keeping.
- ii) Size of storage is estimated as 1.5 - 2.0 ton /m² and 1.2 times for open space.
- iii) Storage type to be installed is a concrete type.
- iv) Drying of paddy are basically made by individual farmers.
- v) The yard is used for only temporary (additional) drying and sorting of rice.
- vi) About 20 % of paddy brought by farmers is assumed to be dried at the yard.
- vii) It is set up that the yard is a concrete floor, and which has functions of the other purposes such as volley ball, tennis court, etc.

The floor space of storage and drying yard for the each proposed site are shown as follows :

(unit : m ²)			
Scheme	Proposed Site	Storage Space	Drying Yard Space
Lower Xe Set	B. Sengvang-gnai	250	200
	B. Houakhoua	150	200
	B. Sengvang-noi	150	200
	B. Khonleng	100	200
	B. Natou	150	200
Upper Tay-Un	B. Chamkamlit	250	200

(d) Office

The office building required for the bank should have space enough for routine work of managing the bank by a clerk, accountant, etc. The required floor space is about 50 m².

(5) Organization

The organization of rice bank should consist of the beneficial farmers as an initial step of farmers' organization. In addition, it should be considered to involve women's activity to the organization for women's development. The proposed staff and required number for the rice bank are presented in the following table.

Position	Number
Managing Director	1
Clerk	1-2
Assistant clerk	0-2
Rice mill operator	1-2
Assistant Operator	0-2
Store keeper	1-2

The staff will be employed, depending on the anticipated work volume. At the initial stage, some staff to be dispatched from the province or district will be necessary for training and guidance to the staff of new rice bank, especially for operation and management of the rice bank. Some casual laborers at peak operation time will be employed besides these permanent staff.

(6) Operation of Rice Bank

(a) Milling charge of rice

The milling charge of paddy is one of the main incomes for the rice bank. Present milling charge of rice in and around the priority schemes is about Kip 10-15 /kg of rice. In case of applying Kip 15/kg of rice traded through the rice bank, the annual gross income of milling charge is summarized as follows:

(unit : 000kip)

Scheme	Proposed Site	milling charge
Lower Xe Set	B. Sengvang-gnai	13,200
	B. Houakua	4,650
	B. Sengvang-noi	5,700
	B. Khonleng	2,250
	B. Natou	4,500
Upper Tay-Un	B. Chamkamlit	11,250

(b) Operation cost

Salary of staff, fuel charge of rice mills, others are considered as operation costs of the rice bank. The following table shows the annual cost of for each item.

(Unit : 000 kip)

Scheme	B. Sengvang-gnai	B. Houakua	B. Sengvang-noi	B. Khonleng	B. Natou	B. Chamkamlit
Personal expenses	3,000	1,680	1,680	1,200	1,680	3,000
Operation cost	315	155	190	75	145	375
Maintenance cost	2,560	900	1,100	440	870	2,180
Management cost	170	90	100	60	90	165
Total cost	6,045	2,825	3,070	1,775	2,785	5,720

(c) Balance of Income and Cost

Based n the above estimation of incomes and costs, the annual balance and net return at full development are evaluated as shown below :

(Unit : 000 kip)

Scheme	B. Sengvang-gnai	B. Houakua	B. Sengvang-noi	B. Khonleng	B. Natou	B. Chamkamlit
Gross Income	13,200	4,650	5,700	2,250	4,500	11,250
Annual Cost	6,045	2,825	3,070	1,775	2,785	5,720
Balance	7,155	1,825	2,630	475	1,715	5,530

The above estimations show that annual net income of the rice banks would be Kip 475 thousand to 7,155 thousand without deducting the depreciation costs for buildings and equipments. The income to be expected from the credit services is not included in these estimations. The depreciation costs for buildings and equipments will have to be subsidised by the government at the initial stage to promote further establishment of farmers' organizations in the future.

(d) Marketing of rice

In addition the above function, in the further stage, it is recommended that the rice bank has the function as an agent to sell rice to the market instead of farmers. About 50 % of total marketed rice will be traded through the rice bank, and the bank will get a commission from the farmers about 2 % of total selling value. The present farmgate price of paddy is about Kip 150/kg and the trader gate price of rice is about Kip 250 - 270/kg. Taking consideration into improvement of quality, the recommendable bank gate price will be a minimum Kip 300/kg. Based on the assumption, the gross income of the bank from the activity of selling rice at each proposed site is expected as follows :

(Unit : 000 kip)

Scheme	Proposed Site	gross income
Lower Xe Set	B. Sengvang-gnai	3,430
	B. Houakua	1,210
	B. Sengvang-noi	1,480
	B. Khonleng	590
	B. Natou	1,170
Upper Tay-Un	B. Chamkamlit	2,930

Remark : Marketed price of rice is set up at 300 kip/kg

II-5. FUTURE AGRO-ECONOMIC CONDITION

II-5.1. Crop Budget under With and Without Project Conditions

(1) Labor Requirement

The labor requirement is dependent on the farm size, cropping pattern, family numbers, etc. in addition of farming practice. The result of estimation of future labor requirement of crops in the each priority scheme, including the required animal power for lowland rice, are shown as following table.

	Coffee			Vegetables			Lowland rice				Upland crops		
	H.L.	F.L.	Total	H.L.	F.L.	Total	H.L.	F.L.	Total	Animal	H.L.	F.L.	Total
Upper Champi	70	135	205	-	-	-	-	-	-	-	-	-	-
Upper Tapoung	15	185	200	0	95	95	-	-	-	-	-	-	-
Upper Kaphu	0	205	205	-	-	-	0	153	153	15	0	85	85
Lower Xe Set	-	-	-	-	-	-	60	93	153	15	0	85	85
Upper Tay-Un	0	200	200	-	-	-	20	133	153	15	0	85	85

Remark : The number of required animal of lowland rice excludes the ones for transportation

In the Upper Champi and Lower Xe Set schemes, as shown in the above table, the hired labors are required at the harvest season of coffee in Champi and the transplanting and harvesting season of lowland rice in Xe Set scheme. In addition of human labors, the animal power will be more required for the land preparation of lowland rice field especially in Lower Xe Set scheme. Therefore, the farmers in the Lower Xe Set area will have to buy some buffaloes along the project implementation.

(2) Crop Budget under Without and With Project Conditions

Crop budget under without project condition is basically not changed from the ones of present crop budget as shown in Table VIII-II-1. Crop budget under with project conditions are estimated based on the production cost and value calculated by the financial prices as of 1995. The results are shown in Table VIII-II-3, and the increment of each crop are summarized as follows:

Crops	(Unit : 000 kip)		
	Without Project	With Project	Increment
Upland rice	230	0	-230
Coffee	303	1,464	1,161
Tea	149	333	184
Cabbage	684	1,589	905
Lowland rice	311	414	103
Upland crops *1	443	449	6

Remark : Upland crops are represented by groundnut.

II-5.2 Financial Irrigation Benefit

Irrigation benefit from the projects is difference of net return value from crops between future without and with project conditions. The financial irrigation benefit at full development stage in the each priority scheme area are shown in Table VIII-II-4, and summarized as follows :

(Unit : million in Kip, thousand in US \$)

Crops	Without Project Condition			With Project Condition			Incremental Benefit	
	Pro.value	Pro.cost	Net Benefit	Pro.value	Pro.cost	Net Benefit	by Kip	By US\$
1. Upper Champi	155	15	140	1,130	160	970	830	903
2. Upper Tapoung	0	0	0	185	50	135	135	149
3. Upper Kapheu	230	10	220	1,610	180	1,430	1,200	1,309
4. Lower Xe Set	120	5	115	1,230	340	890	770	839
5. Upper Tay-Un	10	0	10	290	80	210	200	219

II-5.3 Future Farm Household Economy

(I) Future Farm Type

After the implementation of the projects, the present farm types in the each priority scheme will be changed to the following farm types:

i) Upper Champi and Upper Tapoung

Priority Area	Upper Champi		Upper Tapoung		
Farm Type	Coffee	Coffee+Tea	Coffee+Vege.-1	Coffee+Vege.-2	Coffee+Vege.-3
Irrigated Field (Crop. Pattern)	Coffee : 2.7 ha -	Coffee : 2.3 ha Tea : 0.7 ha	Veg-Up.C : 0.3ha -	Veg-Up.C : 0.3ha -	Veg-Up.C : 0.3ha -
Rainfed fields	- -	- -	Coffee : 1.5 ha	Coffee : 2.5 ha Vege. : 0.3 ha	Coffee : 2.5 ha Up. rice : 0.3 ha
No. of H.H.	40 H.H.	186 H.H.	76 H.H.	160 H.H.	26 H.H.

ii) Upper Kapheu and Lower Xe Set

Priority Area	Upper Kapheu	Lower Xe Set	
Farm Type	Coffee+Low. R.	Lowland Rice-1	Lowland Rice-2
Irrigated Field (Crop. Pattern)	Coffee : 1.6 ha Lo.R-Up.C: 0.2ha	Lo.R-Low.R : 2.5ha -	Lo.R-Up.C: 2.5ha -
Rainfed fields	- -	- -	- -
No. of H.H.	431 H.H.	80 H.H.	320 H.H.

iii) Upper Tay-Un

Priority Area	Upper Tay-Un			
Farm Type	Lo. R +Coffee-1	Lo. R +Coffee-2	Lowland R-1	Lowland R-2
Irrigated Field (Crop. Pattern)	Lo.R-Low.R : 1.2ha -	Lo.R-Up.C: 1.2ha -	Lo.R-Up.C: 2.5ha -	Lo.R-P : 2.5ha -
Rainfed fields	Coffee : 1.3 ha -	Coffee : 0.8 ha -	- -	- -
No. of H.H.	17 H.H.	48 H.H.	29 H.H.	71 H.H.

Remark : Vege. means vegetables, Lo.R means lowland rice, Up.C means upland rice, respectively. Natural increasing of population is taken into consideration in the Upper Kapheu, Lower Xe Set and Upper Tay-Un. In addition, future transmigration is also considered in the Upper Tay-Un scheme

The farm types in the each scheme are basically followed present farming type. In fact, the farm type in the Upper Champi scheme will be not changed. In the Upper Tapoung area, the slash & burn cultivation farmers will reduce their slash & burn fields because of future

replacement by coffee plantation and operation of permanent irrigated fields in line with the project. While, the lowland rice farmer will be drastically increased instead of slash & burn farmers in the Lower Xe Set area and Upper Tay-Un area.

(2) Household Economy of Each Farm Type

The farm budget for the each farm type are evaluated and the results are shown in Table VIII-II-5, and summarized as follows :

Priority Area	Upper Champi		Upper Tapoung			Upper Kapheu
Farm Type	Coffee	Coffee+Tea	Coffee +Veg.-1	Coffee +Veg.-2	Coffee +Veg.-3	Coffee +Veg.
1. Gross Farm Income	4,455	4,110	1,520	2,256	1,997	2,888
2. Production Cost	600	594	179	351	276	308
3. Net Income	3,855	3,516	1,341	1,905	1,721	2,580
4. Living Expenses *	1,443	1,443	1,075	1,443	1,443	1,443
5. Net Reserve	2,412	2,073	267	462	278	1,137

Priority Area	Lower Xe Set		Upper Tay-Un			
Farm Type	Low. R.-1	Low. R.-2	Coffee+Lo. R - 1	Coffee+Lo. R-2	Low. R. 1	Low. R.-2
1. Gross Farm Income	3,000	3,100	1,769	1,690	3,100	1,500
2. Production Cost	1,105	1,030	441	451	925	448
3. Net Income	1,895	2,070	1,328	1,240	2,175	1,052
4. Living Expenses *	1,443	1,443	1,075	1,075	1,443	958
5. Net Reserve	452	627	253	165	732	95

Remark : * Living expense is estimated based on the average expenditure of national average, urban, and rural in Laos. (source : Agricultural Sector Memorandum, IBRD, 1994)

Note : A present farmgate price of coffee is applied as coffee price in the calculation.

The farm budget conditions are different in the each priority areas because of the difference in farm type and size. However, any households would receive substantial income which is sufficient to pay annual living expenses. Especially, farmers in the Lower Xe Set scheme will drastically change the living condition. While, since farmers in the Upper Tapoung scheme are presently in sufficient level, therefore some of them may not get substantial benefit from the project. However, constant benefits from the production resulting from the integrated irrigation farming will make them avoid the risk and stabilize their income. It is one of important points from agro-economical view even low economical impact for the beneficial farmers.

If the coffee price be decline as shown in the before chapter, the farm budget also will be economically down. The following table shows the one of the future cases of farm budget and the conditions of farm incomes and the capability of consumption, in which coffee price is assumed to be 670 kip/kg in line with the IBRD forecast.

Priority Area	Upper Champi		Upper Tapoung			Upper Kapheu
Farm Type	Coffee	Coffee+Tea	Coffee +Veg.-1	Coffee +Veg.-2	Coffee +Veg.-3	Coffee +Veg.
1. Gross Farm Income	2,714	2,627	1,256	1,815	1,556	1,856
2. Production Cost	600	594	179	351	276	308
3. Net Income	2,113	2,033	1,077	1,464	1,280	1,548

Priority Area	Lower Xe Set		Upper Tay-Un			
Farm Type	Low. R.-1	Low. R.-2	Coffee+Lo. R - 1	Coffee+Lo. R-2	Low. R. 1	Low. R.-2
1. Gross Farm Income	3,000	3,100	1,640	1,611	3,100	1,500
2. Production Cost	1,105	1,030	441	451	925	448
3. Net Income	1,895	2,070	1,199	1,160	2,175	1,052

Remark : * Living expense is estimated based on the average expenditure of national average, urban, and rural in Laos. (source : Agricultural Sector Memorandum, IBRD, 1994)

Note : A present farmgate price of coffee is applied as coffee price in the calculation.

As shown in the above table, the farm budget even in the unfortunate case will be satisfied, every farmers can use over 1.0 million kip per year. Since it is a stable income, the farm living condition also will be improved.

Tables

Table VIII-II-3 Present Crop Budget for 5 Priority Development Schemes

Unit	Upper Champ						Upper Tawong						
	Tea			Coffee			Cabbage			Upland Rice			
	Quantity	unit price (kip)	Amount (kip)	Quantity	unit price (kip)	Amount (kip)	Quantity	unit price (kip)	Amount (kip)	Quantity	unit price (kip)	Amount (kip)	
A. Gross Income													
(1) Yield	(kg)	340	450	153,000	270	1,100	297,000	9,500	100	950,000	580	150	87,000
B. Production Costs													
B-1 Farm Input													
(1) Seed	(kg)	12,000	0	0	625	0	0	1	200,000	160,000	80	150	12,000
(2) Fertilizer													
Urea	(kg)	0	360	0	0	360	0	0	360	0	0	360	
16-20-0	(kg)	0	330	0	0	330	0	200	330	66,000	0	330	0
(3) Agro-chemicals													
Insecticide	(lit)	0	12,000	0	0	12,000	0	2	12,000	24,000	0	12,000	0
Pesticide	(lit)	0	12,000	0	0	12,000	0	0	12,000	0	0	12,000	0
Sub total				0		0			250,000			12,000	0
B-2 Labour Requirement													
(1) Hired Labour	man-day	0	1,000	0	22	1,000	22,000	0	1,000	0	0	1,000	0
(2) Family Labour	man-day	190	0	0	148	0	0	95	0	0	158	0	0
B-3 Animal Power	head-day	0	2,000	0	0	2,000	0	0	2,000	0	0	2,000	0
B-4 Machinery Power	kg	0	0	0	270	20	5,400	0	0	0	0	0	0
B-5 Others				4,000			5,370			16,500			4,600
Total				4,000			32,770			266,500			16,600
C. Net Return (A-B)				149,000			264,230			683,500			414,240

Remark: Prices of each commodities are for 1995.

Items	Unit	Upper Kaphu						Upper Tawong					
		Upland Rice			Coffee			Upland Rice			Lowland Rice		
		Quantity	unit price (kip)	Amount (kip)	Quantity	unit price (kip)	Amount (kip)	Quantity	unit price (kip)	Amount (kip)	Quantity	unit price (kip)	Amount (kip)
A. Gross Income													
(1) Yield	(kg)	1,530	150	229,500	320	1,100	352,000	1,380	150	207,000	1,670	150	250,500
B. Production Costs													
B-1 Farm Input													
(1) Seed	(kg)	80	150	12,000	625	0	0	80	150	12,000	50	150	7,500
(2) Fertilizer													
Urea	(kg)	0	360	0	0	360	0	0	360	0	0	360	0
16-20-0	(kg)	0	330	0	0	330	0	0	330	0	0	330	0
(3) Agro-chemicals													
Insecticide	(kg)	0	12,000	0	0	12,000	0	0	12,000	0	0	12,000	0
Pesticide	(kg)	0	12,000	0	0	12,000	0	0	12,000	0	0	12,000	0
Sub total				12,000			0			12,000			7,500
B-2 Labour Requirement													
(1) Hired Labour	man-day	0	1,000	0	0	1,000	0	0	1,000	0	0	1,000	0
(2) Family Labour	man-day	198	0	0	170	0	0	198	0	0	148	0	0
B-3 Animal Power	head-day	0	2,000	0	0	2,000	0	0	2,000	0	0	2,000	0
B-4 Machinery Power					320	20	6,400						230
B-5 Others				4,600			4,320			4,600			4,325
Total				16,600			10,720			16,600			11,825
C. Net Return (A-B)				208,400			341,280			190,400			238,625

Remark: Prices of each commodities are for 1995.

Items	Unit	Lower Kaset														
		Upland Rice			Lowland Rice			Groundnuts			Coffee			Cotton		
		Quantity	unit price (kip)	Amount (kip)	Quantity	unit price (kip)	Amount (kip)	Quantity	unit price (kip)	Amount (kip)	Quantity	unit price (kip)	Amount (kip)	Quantity	unit price (kip)	Amount (kip)
A. Gross Income (1) Yield	(kg)	2,050	150	307,500	2,640	150	396,000	1,470	320	470,400	80	2,000	160,000	500	200	100,000
B. Production Costs																
B-1 Farm Input																
(1) Seed	(kg)	80	150	12,000	50	150	7,500	70	320	22,400	5	2,000	10,000	45	0	0
(2) Fertilizer																
Urea	(kg)	0	360	0	0	360	0	0	360	0	0	360	0	0	360	0
16-20-0	(kg)	0	330	0	0	330	0	0	330	0	0	330	0	0	330	0
(3) Agro-chemicals																
Insecticide	(lit)	0	12,000	0	0	12,000	0	0	12,000	0	0	12,000	0	0	12,000	0
Pesticide	(lit)	0	12,000	0	0	12,000	0	0	12,000	0	0	12,000	0	0	12,000	0
Sub total				12,000			2,500			22,400			10,000			0
B-2 Labour Requirement																
(1) Hired Labour	man-day	0	1,000	0	0	1,000	0	0	1,000	0	0	1,000	0	0	1,000	0
(2) Family Labour	man-day	198	0	0	148	0	0	90	0	0	90	0	0	90	0	0
B-3 Animal Power	head-day	0	2,000	0	0	2,000	0	0	2,000	0	0	2,000	0	0	2,000	0
B-4 Machinery Power				0												
B-5 Others				4,600			4,325			5,120			4,500			4,000
Total				16,600			11,825			23,520			14,500			4,000
C. Net Return (A-B)				290,900			384,125			412,880			145,500			96,000

Remark: Prices of each commodities are for 1995.

Table VIII-II-2 Present Farm Budget in Each Priority Scheme

Project Area	Upper Champi		Upper Tapoung		
Farm Type	Coffee only	Coffee & Tea	Coffee only	Coffee & Cabbage	Coffee & Upland rice
Holding Size (ha)	2.7	3.0	1.5	2.9	2.8
Cropping Pattern	Coffee : 2.7 ha	Coffee : 2.3 ha Tea : 0.7 ha	Coffee : 1.5 ha	Coffee : 2.0 ha Cabbage : 0.7 ha	Coffee : 2.1 ha Upland R : 0.7 ha
No. of Family member	5.7	5.7	5.8	5.8	5.8
1. Gross Income	(801,900)	(796,320)	(676,500)	(1,761,510)	(1,021,530)
(1) Farm Income	801,900	796,320	676,500	1,761,510	1,021,530
(2) Non-farm Income	0	0	0	0	0
2. Farm Expense	88,479	78,331	55,140	313,738	89,919
3. Net Income	<u>713,421</u>	<u>717,989</u>	<u>621,360</u>	<u>1,447,772</u>	<u>931,611</u>
4. Living Expenses	(608,810)	(611,910)	(580,774)	(1,145,072)	(779,108)
(1) Food items	463,620	463,620	466,821	518,583	518,583
(2) Non-food items	145,190	148,290	113,953	626,489	260,525
5. Net Reserve	<u>104,611</u>	<u>106,079</u>	<u>40,586</u>	<u>302,701</u>	<u>152,503</u>

Project Area	Upper Kapheu		Lower Xeset		Upper Tayun	
Farm Type	Coffee only	Coffee & Upland rice	Lowland rice & Upland crops	Lowland rice & Upland crops	Coffee & Lowland rice	Coffee & Upland rice
Holding Size (ha)	1.6	1.7	1.5	1.3	2.4	1.7
Cropping Pattern	Coffee : 1.6 ha	Coffee : 1.1 ha Upland R : 0.6 ha	Lowland R : 0.7 ha Upland C : 0.8 ha	Upland R : 0.5 ha Upland C : 0.7 ha	Coffee : 1.3 ha Lowland R : 1.2 ha	Coffee : 0.8 ha Upland R : 0.9 ha
No. of Family member	5.2	5.2	5.6	5.6	7.9	7.9
1. Gross Income	(563,200)	(522,200)	(464,880)	(429,103)	(611,865)	(434,850)
(1) Farm Income	563,200	522,200	464,880	369,103	611,865	389,850
(2) Non-farm Income	0	0	0	60,000	0	45,000
2. Farm Expense	17,152	21,752	20,419	21,124	25,020	22,325
3. Net Income	<u>546,048</u>	<u>500,448</u>	<u>444,462</u>	<u>407,979</u>	<u>586,845</u>	<u>412,525</u>
4. Living Expenses	(454,509)	(436,592)	(438,797)	(402,518)	(536,489)	(387,157)
(1) Food items	345,143	345,143	262,788	262,788	300,436	300,436
(2) Non-food items	109,366	91,449	176,009	139,730	236,053	86,721
5. Net Reserve	<u>91,539</u>	<u>63,856</u>	<u>5,665</u>	<u>5,461</u>	<u>50,356</u>	<u>25,368</u>

Table VIII-II-3 Financial Crop Budget with Project Condition for 5 Priority Development Schemes

Unit	Upper Change						Upper Topping					
	Tea			Coffee			Custard			Soybeans		
	Quantity (tup)	unit price Amount (tup)	Quantity (tup)	unit price Amount (tup)	Quantity (tup)	unit price Amount (tup)	Quantity (tup)	unit price Amount (tup)	Quantity (tup)	unit price Amount (tup)	Quantity (tup)	unit price Amount (tup)
A. Gross Income												
(1) Yield	1,000	450	450,000	1,500	1,100	1,650,000	2,000	156	312,000	2,000	156	312,000
B. Production Costs												
B-1 Farm Input												
(1) Seed	12,000	0	0	625	0	0	60	156	9,360	60	156	9,360
(2) Fertilizer	0	360	0	0	360	0	250	360	90,000	0	360	0
Urea	0	330	0	0	330	0	0	330	0	330	0	115,500
16-24-0	300	360	108,000	300	360	108,000	0	360	0	0	360	0
16-16-16	0	0	0	0	0	0	250	360	90,000	0	360	0
(3) Agro-chemicals	0	12,000	0	0	12,000	0	2	12,000	24,000	0	2	12,000
Insecticide	0	12,000	0	0	12,000	0	2	12,000	24,000	0	2	12,000
Fungicide	0	12,000	0	0	12,000	0	2	12,000	24,000	0	2	12,000
Sub total		108,000			108,000			384,000				172,860
B-2 Labour Requirement												
(1) Hired Labour man-day	0	1,000	0	70	1,000	70,000	0	1,000	0	15	1,000	15,000
(2) Family Labour man-day	215	0	0	135	0	0	95	0	0	190	0	0
B-3 Animal Power head-day	0	2,000	0	0	2,000	0	0	2,000	0	0	2,000	0
B-4 Machinery Power kg	0	0	0	15,000	20	30,000	0	0	0	1,500	20	30,000
B-5 Others		9,400			14,400			23,400				12,643
Total		117,400			222,400			411,400				185,503
C. Net Return (A-B)		332,600			1,427,600			1,465,550				126,497
Remark: Prices of each commodities are for 1995.												
Items	Upper Subarea						Lower Xs Set					
	Groundnuts			Coffee			Lowland Rice			Upland Rice		
	Quantity (tup)	unit price Amount (tup)	Quantity (tup)	unit price Amount (tup)	Quantity (tup)	unit price Amount (tup)	Quantity (tup)	unit price Amount (tup)	Quantity (tup)	unit price Amount (tup)	Quantity (tup)	unit price Amount (tup)
A. Gross Income												
(1) Yield	4,000	150	600,000	2,000	320	640,000	1,500	1,100	1,650,000	2,000	150	300,000
B. Production Costs												
B-1 Farm Input												
(1) Seed	50	150	7,500	45	320	14,400	625	0	0	50	150	7,500
(2) Fertilizer	0	360	0	0	360	0	0	360	0	70	360	25,200
Urea	0	330	0	0	330	0	0	330	0	0	330	115,500
16-24-0	300	360	108,000	300	360	108,000	0	360	0	0	360	0
16-16-16	0	0	0	0	0	0	250	360	90,000	0	360	0
(3) Agro-chemicals	0	12,000	0	0	12,000	0	2	12,000	24,000	0	2	12,000
Insecticide	0	12,000	0	0	12,000	0	2	12,000	24,000	0	2	12,000
Fungicide	0	12,000	0	0	12,000	0	2	12,000	24,000	0	2	12,000
Sub total		146,700			172,900			146,700				177,900
B-2 Labour Requirement												
(1) Hired Labour man-day	0	1,000	0	0	1,000	0	60	1,000	60,000	0	1,000	10,000
(2) Family Labour man-day	153	0	0	85	0	0	95	0	0	133	0	0
B-3 Animal Power head-day	0	2,000	0	0	2,000	0	0	2,000	0	0	2,000	0
B-4 Machinery Power kg	0	0	0	15,000	20	30,000	0	0	0	0	0	0
B-5 Others		12,335			12,395			14,335				12,895
Total		159,035			194,295			221,035				190,795
C. Net Return (A-B)		449,965			1,501,305			378,965				449,205
Remark: Prices of each commodities are for 1995.												

Table VIII-II-4 Incremental Benefit for Each Priority Scheme (Financial)

Crops	Without Project Condition					With Project Condition					Incremental Benefit	
	Cropped Area (ha)	Production (ton)	G. income (000kip)	Prod. cost (000kip)	Net Benefit (000kip)	Cropped Area (ha)	Production (ton)	G. income (000kip)	Prod. cost (000kip)	Net Benefit (000kip)	by Kip (000kip)	By US\$ (000US\$)
1. Upper Champi												
Coffee	460	138	136,620	15,074	121,546	500	1,500	825,000	82,325	742,675		
Tea	130	39	19,890	520	19,370	120	120	54,000	14,088	39,912		
Upland crops *1	0	-	-	-	-	110	330	34,320	20,405	13,915		
Vegetables *2	0	-	-	-	-	110	2,200	220,000	45,254	174,746		
Total	590	-	156,510	15,594	140,916	840	-	1,133,320	162,072	971,248	830,332	903
2. Upper Tapung												
Vegetables *2	-	-	-	-	-	80	1,600	160,000	32,912	127,088		
Upland crops *1	-	-	-	-	-	80	240	24,960	14,840	10,120		
Total	0	0	0	0	0	160	-	184,960	47,752	137,208	137,208	149
3. Upper Kapheu												
Coffee	540	162	190,080	5,789	184,291	900	2,700	1,485,000	148,185	1,336,815		
Upland crops *3	-	-	-	-	-	100	200	64,000	19,080	44,921		
Lowland Rice	-	-	-	-	-	100	400	60,000	15,904	44,097		
Upland Rice	180	270	40,500	2,988	37,512	-	-	-	-	-		
Total	720	-	230,580	8,777	221,803	1,100	-	1,609,000	183,168	1,425,832	1,204,029	1,309
4. Lower Xe Set												
Lowland Rice	100	260	39,600	1,188	38,413	1,200	4,800	720,000	190,842	529,158		
Upland crops *3	90	135	42,336	2,477	39,859	800	1,600	512,000	152,636	359,364		
Upland Rice	130	273	39,975	2,158	37,817	-	-	-	-	-		
Fruit *4	20	240	1,160	160	1,000	-	-	-	-	-		
Total	340	-	123,071	5,982	117,089	2,000	-	1,232,000	343,478	888,522	771,433	839
5. Upper Tay-Un												
Lowland Rice	20	34	5,010	238	4,773	400	1,600	240,000	63,614	176,386		
Upland crops *3	-	-	-	-	-	80	160	51,200	15,264	35,936		
Upland Rice	30	42	6,210	498	5,712	-	-	-	-	-		
Total	50	-	11,220	736	10,485	480	-	291,200	78,878	212,322	201,838	219

Remarks : *1 Upland crops are represented by groundnut.

*2 Vegetables are represented by cabbages.

*3 Upland crops are represented by soybeans.

*4 Fruits are represented by banana.

Table VIII-II-5 Future Farm Budget with Project Condition in Each Priority Scheme

(Unit of Income and Expense : thousand Kip)

Priority Area	Upper Champi		Upper Tapoung		Upper Kaphou	
Farm Type	Coffee	Coffee+Tea	Coffee+Vegetables	Coffee+Vegetables	Coffee+Vegetables	Coffee+Vegetables
Irrigated Field	Coffee : 2.7 ha	Coffee : 2.3 ha Tea : 0.7 ha	Vege.-Up.C : 0.3 ha	Vege.-Up.C : 0.3 ha	Vege.-Up.C : 0.3 ha	Coffee : 1.6 ha Low.R.-Up.C : 0.2 ha
(Cropping Pattern)						
Non-irrigated fields			Coffee 1.5 ha	Coffee 2.5 ha Vegetables 0.3 ha	Coffee 2.5 ha Upland rice 0.3 ha	
No. of Household	40 H.H.	186 H.H.	76 H.H.	160 H.H.	26 H.H.	431 H.H.
1. Gross Income	(4,455)	(4,110)	(1,520)	(2,256)	(1,997)	(2,888)
1-1 Farm Income	4,455	4,110	1,520	2,256	1,997	2,888
1-2 Non-farm Income	0	0	0	0	0	0
2. Production Cost	600	594	179	351	276	308
3. Net Income	3,855	3,516	1,341	1,905	1,721	2,580
4. Living Expenses	(1,443)	(1,443)	(1,075)	(1,443)	(1,443)	(1,443)
4-1 Food Items	820	820	623	820	820	820
4-2 Non-food Items	623	623	452	623	623	623
5. Net Reserve	2,412	2,073	267	462	278	1,137

Remarks : Future living expense level is classified into three type as satisfy, average in national level, and average in rural level, based on the data from Agricultural Sector Memorandum Report (IBRD, 1994)

Priority Area	Lower Xe Set		Upper Tay-Ua		Lower Xe Set	
Farm Type	Lowland Rie	Lowland Rie	Coffee+Lowland R	Coffee+Lowland R	Lowland R	Lowland R
Irrigated Field	Low.R.-Low.R : 2.5 ha	Low.R.-Up.C : 2.5 ha	Low.R.-Low.R : 1.2 ha	Low.R.-Up.C : 1.2 ha	Low.R.-Up.C : 2.5 ha	Low.R.-Fallow : 2.5 ha
(Cropping Pattern)						
Non-irrigated fields			Coffee 1.3 ha	Coffee 0.8 ha		
No. of Household	80 H.H.	320 H.H.	17 H.H.	48 H.H.	29 H.H.	71 H.H.
1. Gross Income	(3,000)	(3,100)	(1,769)	(1,690)	(3,100)	(1,500)
1-1 Farm Income	3,000	3,100	1,769	1,690	3,100	1,500
1-2 Non-farm Income	0	0	0	0	0	0
2. Production Cost	1,105	1,030	441	451	925	448
3. Net Income	1,895	2,070	1,328	1,239	2,175	1,052
4. Living Expenses	(1,443)	(1,443)	(1,075)	(1,075)	(1,443)	(958)
4-1 Food Items	820	820	623	623	820	623
4-2 Non-food Items	623	623	452	452	623	335
5. Net Reserve	452	627	253	163	732	95

Remarks : Future living expense level is classified into three type as satisfy, average in national level, and average in rural level, based on the data from Agricultural Sector Memorandum Report (IBRD, 1994)

Figures

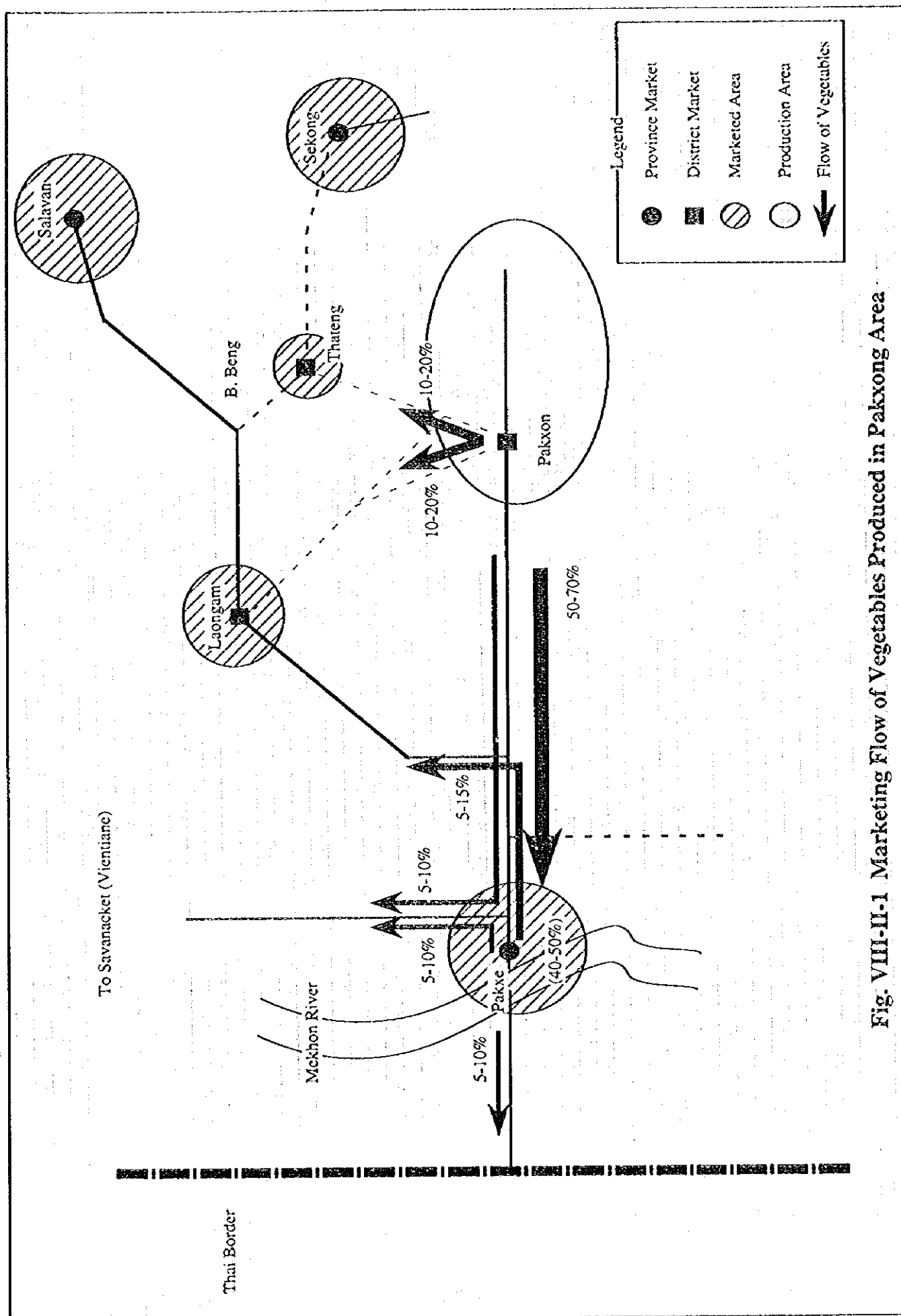
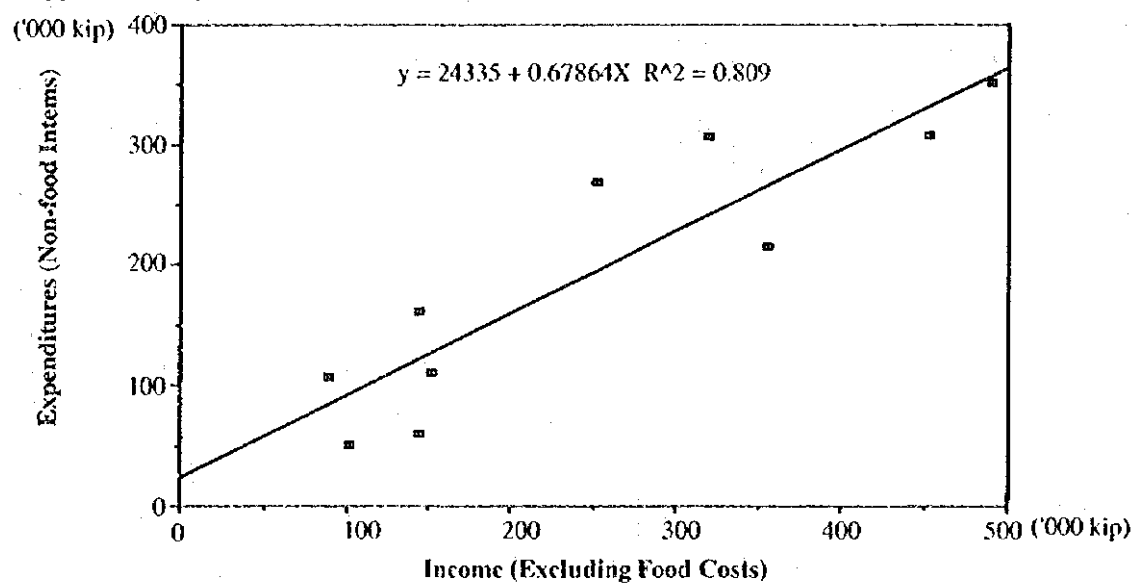
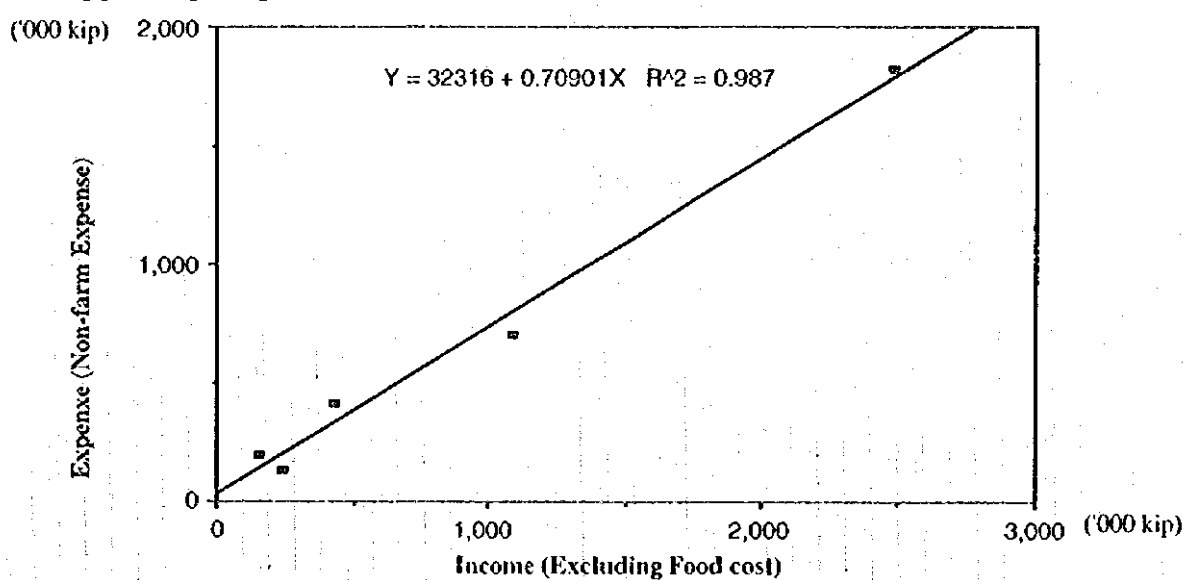


Fig. VIII-II-1 Marketing Flow of Vegetables Produced in Pakxong Area

(1) Upper Champl Scheme



(2) Upper Tapoung Scheme



(3) Upper Kapheu Scheme

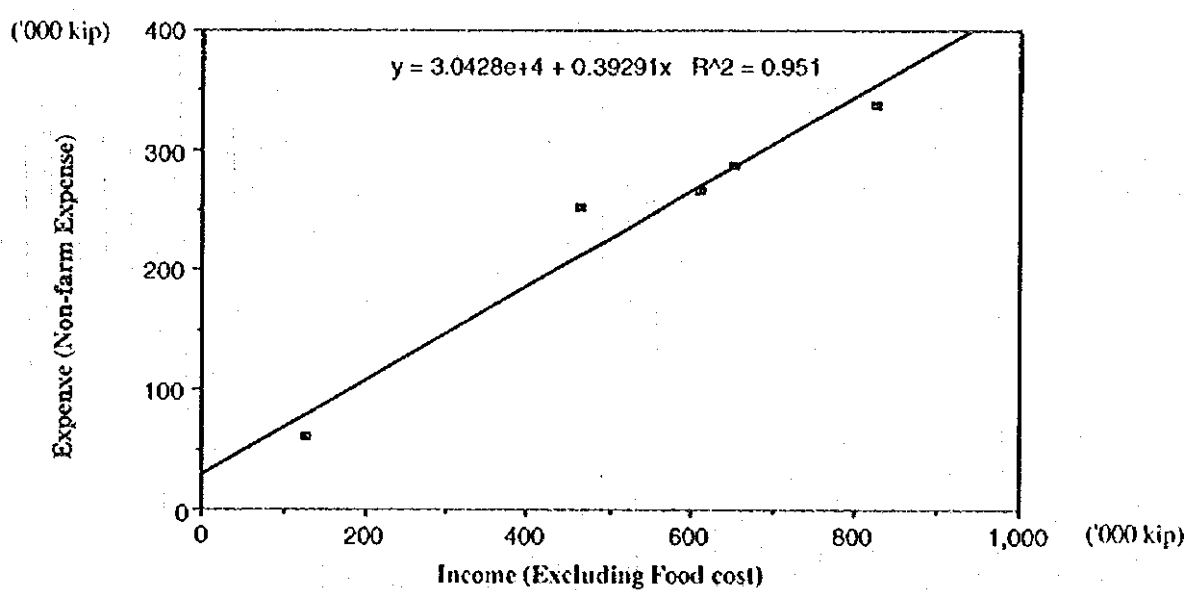
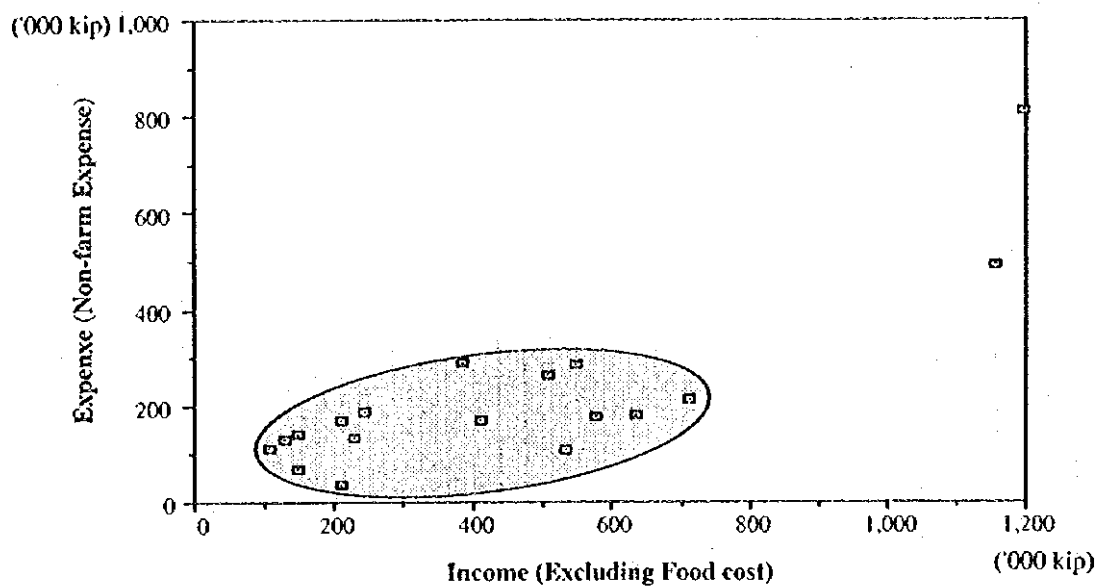


Fig. VIII-II-2 Correlation Line between Income and Non-food Item Expenditures (1/2)

(4) Lower Xe Set Scheme



(5) Upper Tay-Un Scheme

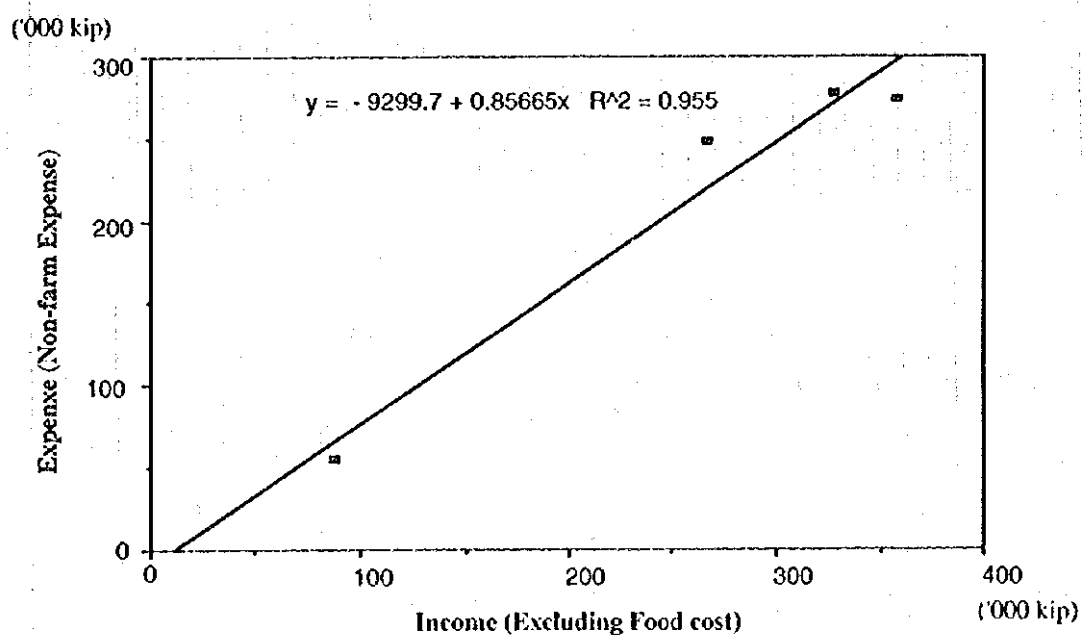


Fig. VIII-II-2 Correlation Line between Income and Non-food Item Expenditures (2/2)

ANNEX IX

**DESIGN AND COST
ESTIMATION**

MASTER PLAN

ANNEX-IX DESIGN AND COST ESTIMATION

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MASTER PLAN

1. DESIGN

1.1 Design Standard

The Project facilities are fundamentally designed based on the Japanese design standard published by Ministry of Agriculture, Forestry and Fishery, Japan. Because the authorized standards for plan and design in the Lao PDR are not confirmed yet, and it is judged that the general condition in the Study area is similar to Japan, during Phase I field reconnaissance. The outline of design plan on agricultural development facilities are as follows.

1.2 Irrigation and Drainage facilities

The irrigation and drainage canal divided into three (3) categories such as main canal, secondary canal and tertiary canal, according to purpose of facilities.

Main irrigation canal and secondary irrigation canal are lined by concrete which thickness is 0.05 m, in order to protect soil erosion, sliding of the canal and prevention of much water loss.

As for the operation of irrigation water supply time at the on-farm, the water supply is planed 24 hours for paddy field and 12 hours for upland crop field in consideration with water operation at the field excepted main irrigation canal. While the water supply for main irrigation canal is planed 24 hours for both of field. Farm pond is planed at the head of secondary irrigation canal to reserve water which occur due to deference of water supply time.

Existing rivers and streams are involved to drainage system as much as possible. The majority of main drainage are natural reveres and streams. Main and secondary drainage canal are planed complementary. And tertiary drainage canal is planed as one of on-farm facility to drain water of the field.

As for the canal size, the width and height are equal to reduce the facility area as much as possible. And the canal section is decided including free board in consideration with change of hydrological situation. In case of irrigation canal, the canal is designed to be able to divide into another canal or irrigate to field directly without dam up facilities. While the drainage canal which is excavated sufficiently, is designed to be drain surface water and under ground water smoothly. And the embankment for drainage canal is designed for paddy field since the paddy field have to keep water. The side slope of the irrigation and drainage canals are designed 1:1.5 according to soil condition. The designed canal section are as follows.

(Unit = m)

- Main irrigation canal for paddy field	BxH=0.5 x 0.4~1.8x1.5
- Main irrigation canal for upland crop field	BxH=0.5x 0.4 ~2.5x2.4
- Secondary irrigation canal for paddy field	BxH=0.3x 0.3 ~0.5x0.5
- Secondary irrigation canal for upland crop field	BxH=0.3x 0.3 ~0.5x0.5
- Main drainage canal for paddy field	BxH=1.0x 0.6 ~1.5x1.2
- Main drainage canal for upland crop field	BxH=0.6x 0.6 ~1.0x0.9
- Secondary drainage canal for paddy field	BxH=0.5x 0.4 ~1.0x0.8
- Secondary drainage canal for upland crop field	BxH=0.6x 0.6 ~1.0x0.8

1.3 Rural and Farm Road Facilities

The rural and farm roads will be divided into three (3) type of road for the purpose of utilization respectively, such as Village road, Farm road A and Farm road B.

Village road is planed to improve the existing road as the access road between national or principal regional road and village. Total width and effective width of village road are designed 5.50 m and 3.50 m respectively in view of transportation in future.

Farm road A is planed in view of smooth conveyance of the agricultural products and safety movement of agricultural machinery in future. Total width and effective width of Farm road A are designed 5.00 m and 3.00 m respectively.

Farm road B is designed with total width of 3.50 m and effective width of 2.50 m along to tertiary irrigation canal for easily field and water management, easily conveyance of agricultural material and equipment.

The side slope of these roads are designed 1:1.5 according to soil condition and additionally the shoulder is protected by sodding. The effective width of the road will be paved by the weathered rock which is near the site, in order to keep the situation of the transportation.

1.4 Head Works and Intake Facilities

The diversion weir are designed based on Japanese design standard basically. Additionally, gabion is planed in downstream from the rip rap to protect the scouring of the river bed according to situation of the existing river stream. The scouring sluice is designed beside intake facility. Slide gates are designed to provide at the scouring sluice of diversion weir for irrigation, but in case of diversion weir for domestic water supply, stop logs are designed instead of slide gate. Because it is assumed that the effect of sediment will be small since their water intake volume is so small compared another diversion weir.

The method of intake adopts the mountain stream intake works in accordance with natural condition of existing river at the Project area. The size of intake facilities is designed in consideration with following conditions. It is better that intake water height is within 40 % of dam up height from water surface in designed drought year to protect to flow sediment into the intake facility. And 0.60 ~1.00 m/sec is suitable for the velocity of the intake to protect the sediment and propagation of a waterweed. Dam up height is designed based on intake water height which have finished to decide the suitable section. The revelment planning of diversion weir is designed against the predicted flood discharge with five (5) years return period which is estimated by hydrologist of the team. Another structure concerned diversion weir such as downstream apron and rip rap protection, are designed based on the flood discharge too.

Water which is dam up by the diversion weir, flow into the settling basin through the box culvert which set up after the discharge control gate. Water flow into designed main irrigation canal or main pipe for domestic water supply after have settled the sediment.

1.5 Dam and Reservoir

Rock fill zone type dam is planed in Middle Lamphan selected priority development area. The scale of dam is assumed based on the existing map because of insufficient data of topography and geology. The designed dam height is 32 m and dam length is 250 m. While the crest width is assumed 8 m. Reservoir capacity is estimated at total capacity of 50 MCM consist

of the active capacity of 42 MCM and dead capacity of 18 MCM. The intake tower is selected as the intake method. The scale of the inlet tower is planned to be able to flow not only the required irrigation water but also the predicted flood discharge with five (5) years return period (337.3 m³/sec.) named normal discharge. And the predicted flood discharge with two hundred (200) years return period (707.4 m³/sec) which is subtracted the normal discharge, is planned to drain through the spill way. The designed width and length of the spillway is 46 m and 330 m respectively.

Water operation hours of Xeset dam is estimated at about three (3) hours per day in dry season, and the releasing water amount is estimated at approximately 147,000 m³/day in drought year with a reliability of 80 %. The regulation pond is designed to have the storage capacity of 130,000 m³. The regulation pond is lined by concrete to protect percolation. And side slope of the pond is designed 1:1.5.

Detailed topographical and geological surveys are necessary in order to make and confirm more technical soundness of plan and design for dam and reservoir.

1.6 On-farm Facilities

Unit irrigation block is designed to range 30 ha to 155 ha in accordance with topographical condition and the secondary irrigation canal and the drainage canals which size are mentioned before sides, are provided. Farm road A are designed along secondary irrigation canal and drainage canals. The tertiary irrigation and drainage canal are arranged every 100 m to cover one (1) tertiary irrigation block around 5 ha, and Farm road B is provided between tertiary irrigation canal and drainage canal as the on-farm facilities. The section of tertiary irrigation canal which is earth canal, is BxH = 0.30 m x 0.20 m in the paddy field and BxH = 0.30 m x 0.30 m in the upland crop field. And the section of the tertiary drainage canals which is earth canal, are BxH = 0.30 m x 0.30 m in both of fields. The embankment for drainage canal is designed for paddy field since the paddy field have to keep water. The farming management system is improved by this plan. The irrigation and drainage on the individual existing lot will be able to control easily near the farm road.

Turnout boxes are designed at the head of tertiary irrigation canals, and inlet facilities are provided tertiary irrigation canals with interval of approximately 100 m to supply water to a farm lot. And canal junction boxes are provided at canal junction of tertiary canals to protect the canal.

Additionally, the protection band is planned every 100 m to protect the soil erosion at the upland crop field. And alley farming system with small embankment and tree plantation, will be suggested to reinforce the above mentioned protection band if necessity.

II COST ESTIMATION

2.1 Cost Estimation

The Project costs are estimated under the following conditions:

- a. The exchange rate as of May 1995 used in the estimation, was US\$ 1.0 = Kip 730 based on ICP rate.
- b. Unit costs are divided into the foreign currency portion and local currency portion based on the following classification:

Local currency portion

- Labor force
- Wooden materials
- Sand and gravel, stone
- Administration expenses
- Land acquisition cost

Foreign currency portion

- Reinforcing bar
- Steel gate
- Pump
- Micro-hydro power equipment
- Pipe
- Cement
- Fuel
- Other material which is imported

- c. Unit material and labor cost which are surveyed during Phase I field reconnaissance, are used in the estimation of construction cost. Principal unit material and labor cost are as follows:

Labor cost

- Common labor	1,500 kip/man/day
- Skillful labor	5,000 kip/man/day
- Foreman	5,000 kip/man/day
- Carpenter	3,000 kip/man/day
- Steel bar worker	2,500 kip/man/day
- Mason	3,500 kip/man/day
- Operator	5,000 kip/man/day

Material cost

- Sand	4,000 kip/m ³
- Gravel	5,000 kip/m ³
- Crushed stone	8,000 kip/m ³
- Cement	100,000 kip/ton
- Reinforced iron bar	418,000 kip/ton
- Steel material	397,500 kip/ton
- Gasoline	250 kip/lit.
- Diesel oil	230 kip/lit.

- d. The four (4) kind of unit transportation cost are estimated in consideration with location of the projects. Because most of material and equipment have to be conveyed from Pakxe city.
- e. Land acquisition cost is estimated at five (5) US\$ per one (1) ha.
- f. Operation and maintenance costs is estimated at about two (2) % of the sum of the direct construction cost and the physical contingency at the full operation stage.
- g. The physical contingency, the engineering cost and the administration cost are assumed as follows:

Physical contingency	15 % of direct construction cost
Engineering cost	10 % of direct construction cost and the physical contingency
Administration cost	5 % of direct construction cost and the physical contingency

The total construction cost for the Project is estimated to be equivalent to US\$ 242 million, (US\$ 169 million of foreign currency portion and local currency portion equivalent to US\$ 73 million) as summarized in Table IX-1. Procurement cost of operation and maintenance equipment is estimated to be equivalent to US\$ 4,261,000 in Table IX-5 and cost for marketing development is equivalent to US\$ 279,000 shown in Table IX-6. While replacement cost is estimated to be equivalent to US\$ 14,122,000 in Table IX-7 and procurement cost for agriculture support and extension is summarized in Table IX-8. They are estimated based on above mentioned conditions.

Tables

(Unit: US\$)

Table IX-1 Total Construction cost of the Project

Description	Phase I		Phase II		Phase III		Ground Total	
	FC	LC	FC	LC	FC	LC	FC	LC
Agricultural Development	18,912,000	8,152,000	29,179,000	12,506,000	53,673,000	23,002,000	101,764,000	43,660,000
Rural Development	7,880,000	3,401,000	9,478,000	4,062,000	9,710,000	4,162,000	27,068,000	11,625,000
Sub-total	26,792,000	11,553,000	38,657,000	16,568,000	63,383,000	27,164,000	128,832,000	55,285,000
Physical Contingency	4,019,000	1,732,000	5,797,000	2,484,000	9,508,000	4,074,000	19,324,000	8,290,000
Engineering Cost	3,051,000	1,314,000	4,091,000	1,752,000	6,995,000	2,998,000	14,137,000	6,064,000
Administration Cost	1,526,000	658,000	2,046,000	876,000	3,500,000	1,499,000	7,072,000	3,033,000
Sub-total	8,596,000	3,704,000	11,934,000	5,112,000	20,003,000	8,571,000	40,533,000	17,387,000
Total	35,388,000	15,257,000	50,591,000	21,680,000	83,386,000	35,735,000	169,365,000	72,672,000
		50,645,000		72,271,000		119,121,000		242,037,000
Procurement cost of O&M	1,239,355	0	1,032,930	0	1,989,040	0	4,261,325	0
Cost for Marketing Development	109,000	0	109,000	0	61,000	0	279,000	0
Replacement cost	3,399,000	0	4,528,000	0	6,195,000	0	14,122,000	0
Sub-total	4,747,355	0	5,669,930	0	8,245,040	0	18,662,325	0
Ground Total	40,135,355	15,257,000	56,260,930	21,680,000	91,631,040	35,735,000	188,027,325	72,672,000

(Unit: US\$)

Table IX-2 Total Construction cost on Phase I

Description	Upper Champi		Upper Tapoung		Upper Kapheau		Lower Xeset		Upper Tavun		Ground Total	
	PC	I/C	PC	I/C	PC	I/C	PC	I/C	PC	I/C	PC	I/C
Agricultural Development	4,200,000	1,800,000	215,000	307,000	4,205,000	1,802,000	8,435,000	3,615,000	1,357,000	628,000	18,912,000	8,152,000
Rural Development	2,564,000	1,099,000	844,000	362,000	2,156,000	924,000	1,638,000	702,000	678,000	314,000	7,580,000	3,401,000
Sub-total	6,764,000	2,899,000	1,559,000	669,000	6,361,000	2,726,000	10,073,000	4,317,000	2,035,000	942,000	26,792,000	11,553,000
Physical Contingency	1,015,000	435,000	234,000	100,000	954,000	409,000	1,511,000	647,000	305,000	141,000	4,019,000	1,732,000
Engineering Cost	778,000	333,000	179,000	77,000	732,000	313,000	1,158,000	497,000	204,000	94,000	3,051,000	1,314,000
Administration Cost	389,000	167,000	90,000	39,000	366,000	157,000	579,000	248,000	102,000	47,000	1,526,000	638,000
Sub-total	2,182,000	935,000	503,000	216,000	2,052,000	879,000	3,248,000	1,392,000	611,000	282,000	8,596,000	3,704,000
Total	8,946,000	3,834,000	2,062,000	885,000	8,413,000	3,605,000	13,321,000	5,709,000	2,646,000	1,224,000	35,388,000	15,257,000
Procurement cost of O&M		12,780,000		2,947,000		12,018,000		19,050,000		3,870,000		50,645,000
Cost for Marketing Development											1,239,355	0
Replacement cost											109,000	0
											3,300,000	0
Ground Total											40,135,355	15,257,000

(Unit: US\$)

Table IX-3 Total Construction cost on Phase II

Description	Lower Xertian		Upper Maekchan		Middle Tapung		Lower Tapung		Upper Thon		Ground Total	
	PC	LC	PC	LC	PC	LC	PC	LC	PC	LC	PC	LC
Agricultural Development	3,579,000	1,534,000	3,840,000	1,663,000	2,586,000	1,108,000	16,757,000	7,182,000	2,377,000	1,019,000	29,179,000	12,506,000
Rural Development	3,192,000	1,348,000	709,000	304,000	970,000	416,000	3,419,000	1,465,000	1,188,000	509,000	9,478,000	4,062,000
Sub-total	6,771,000	2,902,000	4,549,000	1,967,000	3,556,000	1,524,000	20,176,000	8,647,000	3,565,000	1,528,000	38,657,000	16,568,000
Fiscal Contingency	1,016,000	435,000	688,000	295,000	533,000	228,000	3,026,000	1,297,000	534,000	229,000	5,797,000	2,484,000
Engineering Cost	779,000	333,000	528,000	226,000	409,000	175,000	2,018,000	865,000	357,000	153,000	4,091,000	1,752,000
Administration Cost	390,000	167,000	264,000	113,000	205,000	88,000	1,009,000	432,000	178,000	76,000	2,046,000	876,000
Sub-total	2,185,000	935,000	1,480,000	634,000	1,147,000	491,000	6,053,000	2,594,000	1,069,000	458,000	11,934,000	5,112,000
Total	8,956,000	3,837,000	6,069,000	2,601,000	4,703,000	2,015,000	26,229,000	11,241,000	4,634,000	1,986,000	50,591,000	21,680,000
Procurement cost of O&M		12,793,000		8,670,000		6,718,000		37,470,000		6,620,000		72,271,000
Cost for Marketing Development											1,032,930	0
Replacement cost											109,000	0
											4,528,000	0
Ground Total											56,260,930	21,680,000

(Unit: US\$)

Table IX-4 Total Construction cost on Phase III

Description	Middle Xelatum		Middle Namtag		Lower Muechan-Gnai		Lower Changri		Lower Namai		Middle Lamphan		Ground Total	
	RC	I/C	RC	I/C	RC	I/C	RC	I/C	RC	I/C	RC	I/C	RC	I/C
Agricultural Development	3,515,000	1,307,000	1,559,000	668,000	2,120,000	908,000	11,000,000	4,718,000	16,354,000	7,013,000	19,106,000	8,188,000	53,673,000	23,002,000
Rural Development	844,000	362,000	2,479,000	1,053,000	493,000	211,000	1,508,000	646,000	3,187,000	1,366,000	1,199,000	514,000	9,710,000	4,162,000
Sub-total	4,359,000	1,669,000	4,038,000	1,721,000	2,613,000	1,119,000	12,517,000	5,364,000	19,541,000	8,379,000	20,305,000	8,702,000	63,383,000	27,164,000
Facial Contingency	654,000	290,000	606,000	259,000	392,000	168,000	1,877,000	805,000	2,933,000	1,227,000	3,046,000	1,305,000	9,508,000	4,074,000
Engineering Cost	501,000	215,000	454,000	199,000	301,000	125,000	1,439,000	617,000	1,955,000	838,000	2,333,000	1,001,000	6,995,000	2,998,000
Administration Cost	251,000	108,000	233,000	98,000	150,000	64,000	720,000	308,000	978,000	419,000	1,168,000	501,000	3,560,000	1,499,000
Sub-total	1,406,000	603,000	1,303,000	557,000	843,000	350,000	4,036,000	1,720,000	5,866,000	2,514,000	6,549,000	2,807,000	20,003,000	8,571,000
Total	5,765,000	2,272,000	5,341,000	2,280,000	3,456,000	1,479,000	16,553,000	7,084,000	25,417,000	10,893,000	26,854,000	11,509,000	83,386,000	35,735,000
Procurement cost of O&M		8,237,000		7,629,000		4,935,000		23,647,000		36,310,000		38,363,000		119,121,000
Cost for Marketing Development													1,989,040	0
Replacement cost													61,000	0
													6,195,000	0
Ground Total													91,631,040	35,735,000

Table IX-5 Procurement cost of Operation and Maintenance Equipment

Phase	Equipment	Type	no.	unit cost (US\$)	Total cost (US\$)	Remarks
Phase I	Bulldozer	15t	1.0	178,400	178,400	
	Back hoe	0.50m ³	2.0	125,900	251,800	
	Tire roller	8~20t	1.0	100,200	100,200	
	Road roller	10~12t	1.0	88,900	88,900	
	Motor grader	3.1m	1.0	132,000	132,000	
	Water tanker	6000l	1.0	69,200	69,200	
	Dump truck	8t	3.0	78,800	236,400	
	Pick-up		1.0	20,800	20,800	
	Spare parts		15%		161,655	
	Sub-total				1,239,355	
Phase II	Bulldozer	15t	1.0	178,400	178,400	
	Back hoe	0.50m ³	2.0	125,900	251,800	
	Motor grader	3.1m	1.0	132,000	132,000	
	Dump truck	8t	4.0	78,800	315,200	
	Pick-up		1.0	20,800	20,800	
	Spare parts		15%		134,730	
	Sub-total				1,032,930	
Phase III	Bulldozer	15t	1.0	178,400	178,400	
	Back hoe	0.50m ³	3.0	125,900	377,700	
	Tire roller	8~20t	1.0	100,200	100,200	
	Road roller	10~12t	1.0	88,900	88,900	
	Motor grader	3.1m	2.0	132,000	264,000	
	Water tanker	6000l	1.0	69,200	69,200	
	Dump truck	8t	8.0	78,800	630,400	
	Pick-up		1.0	20,800	20,800	
	Spare parts		15%		259,440	
	Sub-total				1,989,040	
Total					4,261,325	

Table IX-6 Cost for Marketing Development

Phase	Item	Unit	Quantity	Value(US\$)
Phase I				
	1. Construction Cost at Pakxong (Including of working space, strage space, office space)	m ²	300.0	95,000
	2. Information system (radio, other equipmennt)	set	1.0	8,000
	3. Installed facilities (motor bicycle, personal computer, funiture, etc)	set	1.0	6,000
	<u>Sub-total</u>			109,000
Phase II				
	1. Construction Cost at Laongam (Including of working space, strage space, office space)	m ²	300.0	95,000
	2. Information system (radio, other equipmennt)	set	1.0	8,000
	3. Installed facilities (motor bicycle, personal computer, funiture, etc)	set	1.0	6,000
	<u>Sub-total</u>			109,000
Phase III				
	1. Construction Cost at Thateng (Including of working space, strage space, office space)	m ²	150.0	47,000
	2. Information system (radio, other equipmennt)	set	1.0	8,000
	3. Installed facilities (motor bicycle, personal computer, funiture, etc)	set	1.0	6,000
	<u>Sub-total</u>			61,000
	Total			279,000

Table IX-7 Replacement cost (1/3)

(Phase I)

No.	Name of project	Description	Quantity	Unit	Cost (US\$)
No.1	Upper Champi	[Agricultural Development] Gate	38.0	no.	597,000
		[Rural Development] Extension Line	1.0	km	4,000
		Total			601,000
No.2	Upper Tapoung	[Agricultural Development] Gate	12.0	no.	249,000
		[Rural Development] Pump	4.0	no.	32,000
		Extension Line	16.5	km	118,000
		Sub-total			150,000
		Total			399,000
No.9	Upper Kapheu	[Agricultural Development] Gate	28.0	no.	555,000
		[Rural Development] Extension Line	10.0	km	59,000
		Micro-Hydropower station	1.0	no.	536,000
		Sub-total			595,000
		Total			1,150,000
No.12	Lower Xeset	[Agricultural Development] Gate	53.0	no.	717,000
		[Rural Development] Extension Line	11.0	km	307,000
		Total			1,024,000
No.16	Upper Tayun	[Agricultural Development] Gate	12.0	no.	223,000
		[Rural Development] Extension Line	0.5	km	2,000
		Total			225,000
		Ground Total			3,399,000

Table IX-7 Replacement cost (2/3)

(Phase II)

No.	Name of project	Description	Quantity	Unit	Cost (US\$)
No.3	Lower Xepian	[Agricultural Development]			
		Gate	17.0	no.	314,000
		[Rural Development]			
		Pump	4.0	no.	33,000
		Extension Line	4.0	km	24,000
		Micro-Hydropower station	1.0	no.	637,000
		Sub-total			694,000
		Total			1,008,000
No.4	Upper Makchan	[Agricultural Development]			
		Gate	36.0	no.	572,000
		[Rural Development]			
		Pump	2.0	no.	11,000
		Extension Line	20.5	km	150,000
		Sub-total			161,000
		Total			733,000
No.10	Middle Tapoung	[Agricultural Development]			
		Gate	22.0	no.	402,000
		[Rural Development]			
		Extension Line	14.0	km	100,000
		Total			502,000
No.11	Lower Tapoung	[Agricultural Development]			
		Gate	103.0	no.	1,755,000
		[Rural Development]			
		Submerge Pump	6.0	no.	60,000
		Extension Line	26.0	km	181,000
		Sub-total			241,000
		Total			1,996,000
No.14	Upper Thon	[Agricultural Development]			
		Gate	4.0	no.	232,000
		[Rural Development]			
		Submerge Pump	2.0	no.	18,000
		Extension Line	6.0	km	39,000
		Sub-total			57,000
		Total			289,000
		Ground Total			4,528,000

Table IX-7 Replacement cost (3/3)

(Phase II)

No.	Name of project	Description	Quantity	Unit	Cost (US\$)
No.5	Middle Xekalam	[Agricultural Development]			
		Gate	4.0	no.	244,000
No.6	Middle Namtang	[Agricultural Development]			
		Gate	14.0	no.	276,000
		[Rural Development]			
		Pump	3.0	no.	38,000
		Extension Line	5.0	km	30,000
		Micro-Hydropower station	1.0	no.	736,000
		Sub-total			804,000
		Total			1,080,000
No.7	Lower Makchan-Gnai	[Agricultural Development]			
		Gate	15.0	no.	295,000
No.8	Lower Champi	[Agricultural Development]			
		Gate	63.0	no.	1,091,000
		[Rural Development]			
		Submerge Pump	6.0	no.	60,000
		Extension Line	16.5	km	115,000
		Sub-total			175,000
		Total			1,266,000
No.13	Lower Namsai	[Agricultural Development]			
		Gate	139.0	no.	2,418,000
		[Rural Development]			
		Submerge Pump	11.0	no.	137,000
		Extension Line	28.5	km	195,000
		Sub-total			332,000
		Total			2,750,000
No.15	Middle Lamphan	[Agricultural Development]			
		Gate	8.0	no.	472,000
		[Rural Development]			
		Submerge Pump	2.0	no.	18,000
		Extension Line	21.5	km	70,000
		Sub-total			88,000
		Total			560,000
		Ground Total			6,195,000

Table IX-8 Procurement cost for Agriculture Support and Extension (1/2)

(Unit : \$)

1. District AFS:

- Personal computer with printer	1set	10,500
- Copy machine	1set	6,300
- TV set	1set	2,100
- Video recorder	1set	2,100
- Video camera	1set	2,100
- Camera	1set	600
- Slide projector	1set	500
- Pick up truck	1set	12,600
- Motorcycle	3	9,500
Subtotal		46,300
Consumable materials		2,300
Total		48,600

2. Fruit-tree and Upland Crop Research Station

- Reconstruction of administrative office with storage and garage	60m2	22,000
- Construction of laboratory and training room	80m2	29,300
- Expansion of trial and demonstration farm for upland crops	16ha	100,400
- Construction of pond	50mx50m	58,900
- Irrigation facilities with sprinkler	3ha	95,300
- Irrigation facilities (canal, pipeline, etc)	10ha	62,700
- Laboratory equipment	1set	36,900
- Vehicles		
Minibus	1	20,000
Jeep	1	31,600
Pick-up trucks	2	25,300
Motorcycle	3	9,500
- Personal computer with printer	1set	10,500
- Copy machine	1set	6,300
- Camera	1set	600
- TV set	1set	2,100
- Video recorder	1set	2,100
- Video camera	1set	2,100
- Slide projector	1set	500
- Overhead projector	1set	1,100
- Farm machinery		
Tractor	2	31,600
Hand tractor	1	8,400
- Farm instrument	1set	4,000
- Land consolidation of existing seedling nursery	10ha	62,700
Subtotal		623,900
Consumable materials		31,200
Total		655,100

Table IX-8 Procurement cost for Agriculture Support and Extension (2/2)

3. Fishery Research and Extension Station

- Reconstruction of administrative office	1(40m2)	14,700
- Reconstruction of dormitory for staff	1(50m2)	18,300
- Reconstruction of the facilities		
Hatchery tank	1	8,900
Parental pond	1522m3	37,800
Nursery pond	1756m3	43,100
Young fish pond	3270m3	74,700
Meat fish pond	13687m3	262,900
Breeding pond	1	65,300
- Reconstruction of water source facilities	1	87,000
- Renovation and supplementary supply of laboratory equipment	1set	10,000
- Personal computer	1set	6,300
- Copy machine	1set	6,300
- TV set	1set	2,100
- Video recorder	1set	2,100
- Video camera	1set	2,100
- Pick-up truck	2	25,300
Subtotal		666,900
Consumable materials		33,300
Total		700,200

4. Vegetable Trial and Demonstration Farm

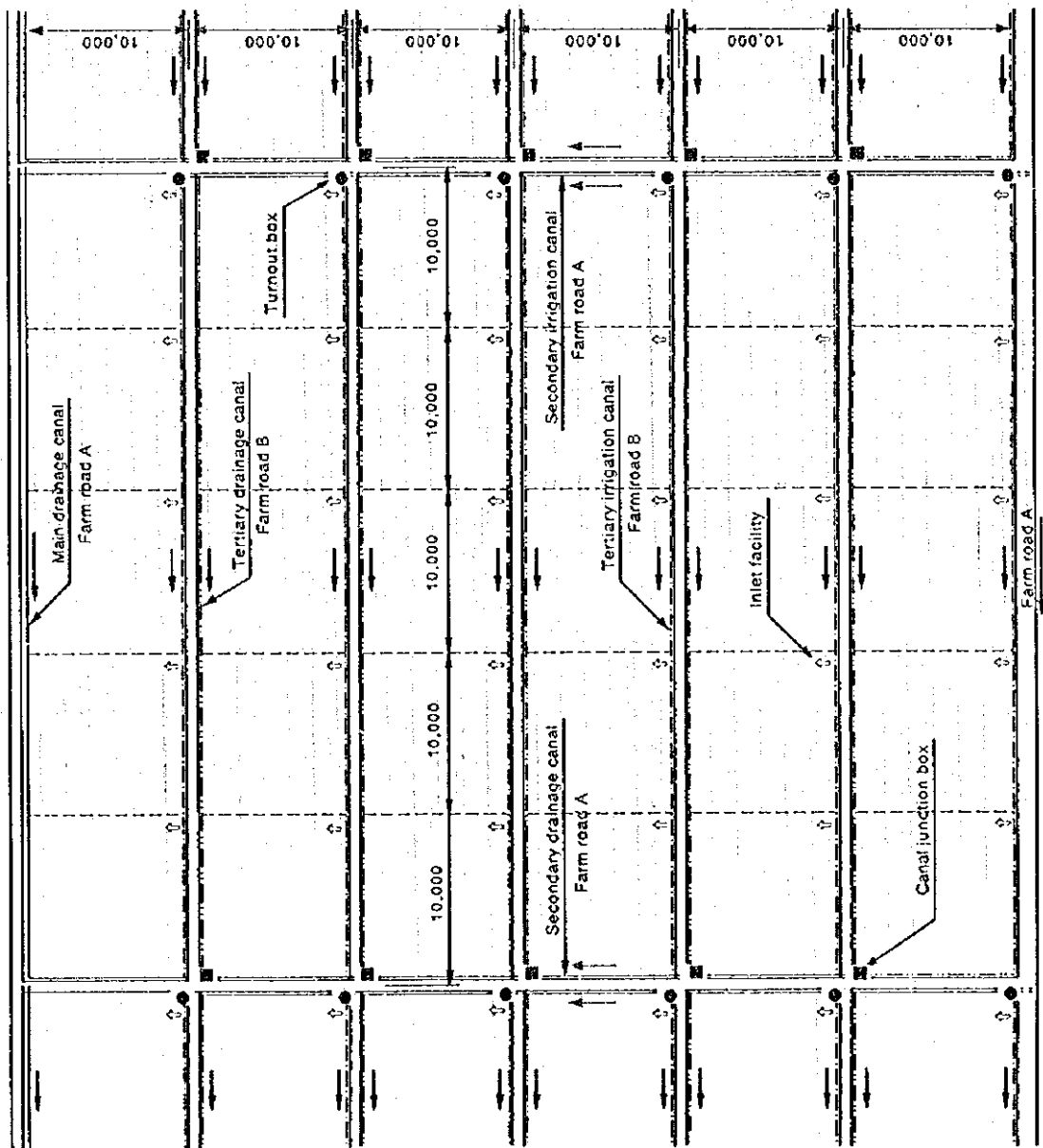
- Area = 10 ha		62,700
- Building		
Office	40m2	3,700
Laboratory and training room	35m2	12,800
Storage and garage	35m2	12,800
Staff quarter	50m2/4(houses)	18,300
Dormitory	50m2/1(building with 4rooms)	18,300
- Irrigation facilities(sprinkler)	2.0ha	69,500
(gravity)	7.0ha	43,900
- Pond	50mx50m	22,400
- Farm machinery		
Tractor	1	15,800
Hand tractor	1	8,400
- Farm instrument	1set	2,400
- Personal computer with printer	1set	10,500
- Copy machine	1set	6,300
- TV set	1set	2,100
- Video recorder	1set	2,100
- Video camera	1set	2,100
- Camera	1unit	600
- Slide Projector	1set	500
- Pick-up truck	2	25,300
- Motorcycle	2	6,300
Subtotal		346,800
Consumable materials		17,300
Total		364,100

5. Livestock and Veterinary Station

- Building and equipment	L.S	500,000
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Figures

PLAN



legend	
	Farm road
	Boundary of a farm block
	Tertiary irrigation canal
	Tertiary drainage canal
	Inlet facility
	Turnout box
	Canal junction box

THE LAO PEOPLE'S DEMOCRATIC REPUBLIC
MINISTRY OF AGRICULTURE AND FORESTRY

THE INTEGRATED AGRICULTURAL AND RURAL
DEVELOPMENT PROJECT IN ISOLATED PLATEAU

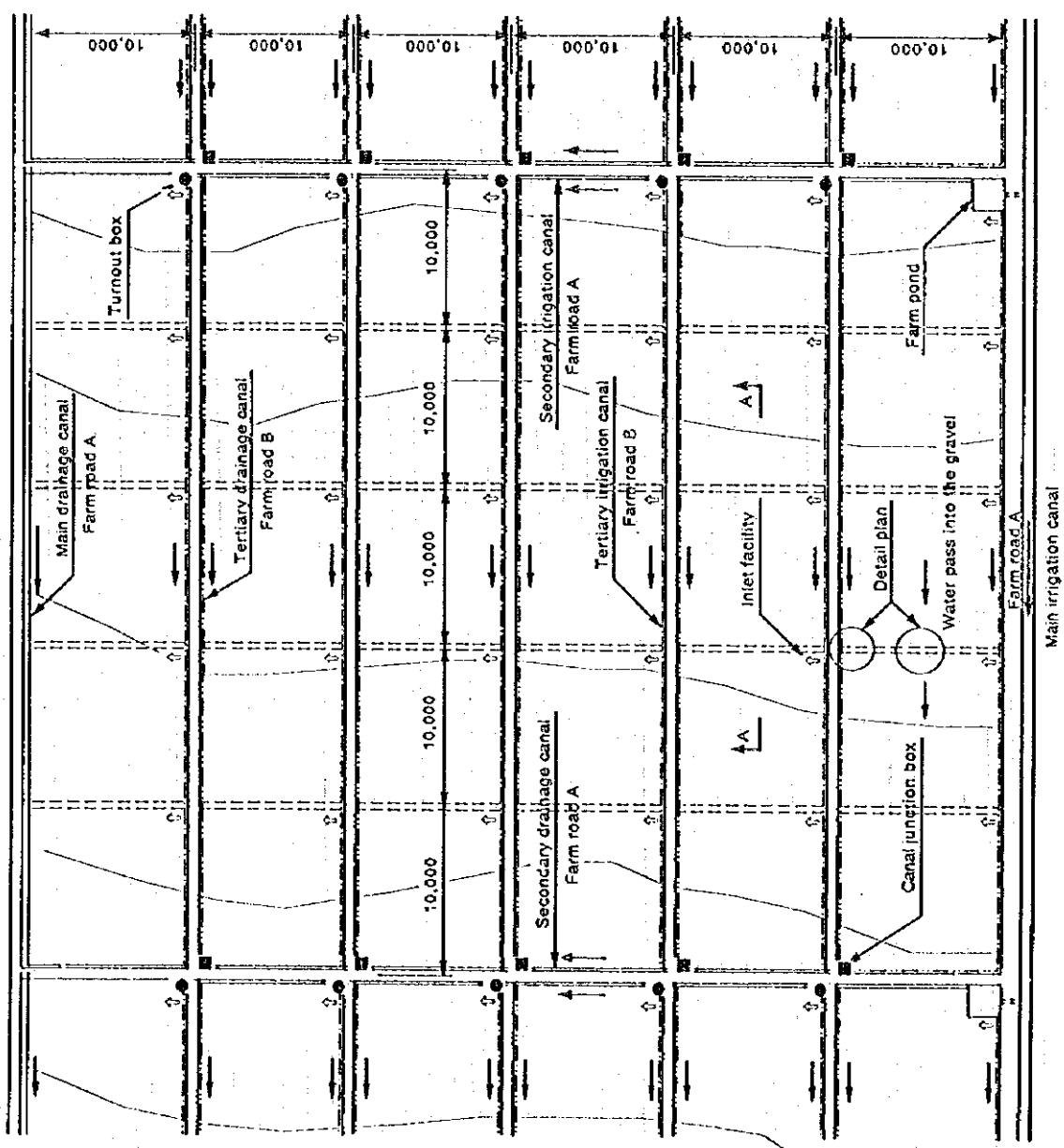
TITLE OF DRAWING

UNIT IRRIGATION NETWORK
FOR PADDY FIELD

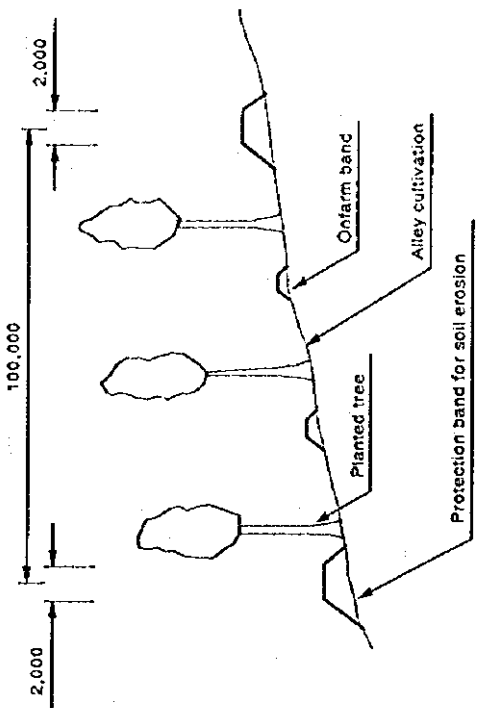
NIPON KOGI CO., LTD
NAGAI ENGINEERING CO., LTD

FIGURE IX-1

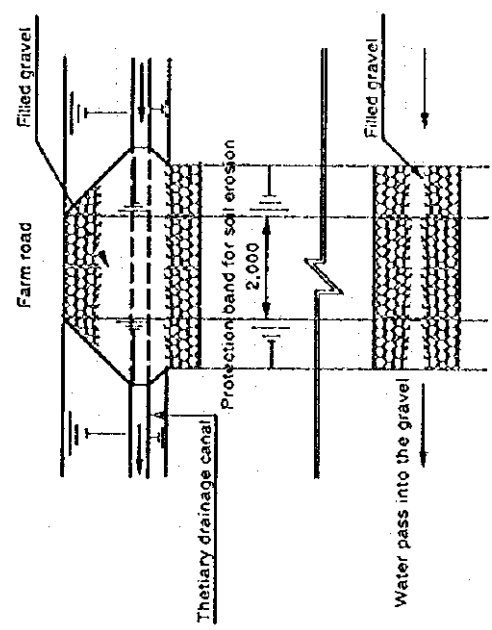
PLAN



A - A SECTION

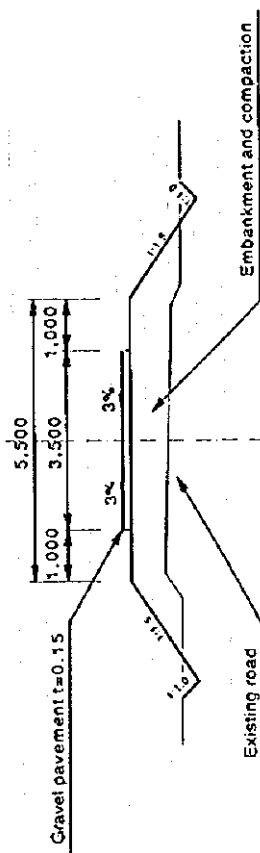


DETAIL PLAN

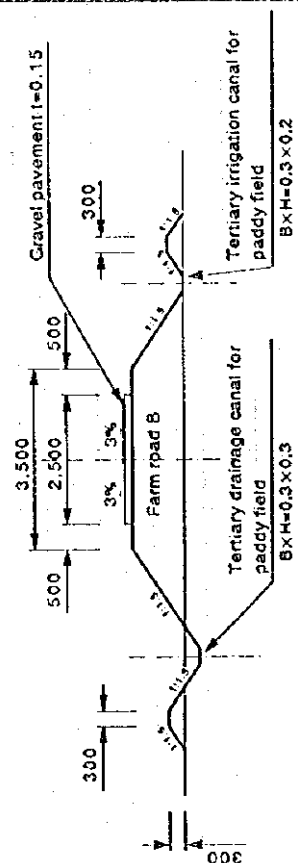


THE LAND PEOPLES DEMOCRATIC REPUBLIC MINISTRY OF AGRICULTURE AND FORESTRY THE INTEGRATED AGRICULTURAL AND RURAL DEVELOPMENT PROJECT IN BOLSHOIY PLAVAN	UNIT IRRIGATION NETWORK FOR UPLAND CROPS	Figure IX-2
TITLE OF DRAWING	MAPON KOSI CO. LTD NAGAL ENGINEERING CO. LTD	

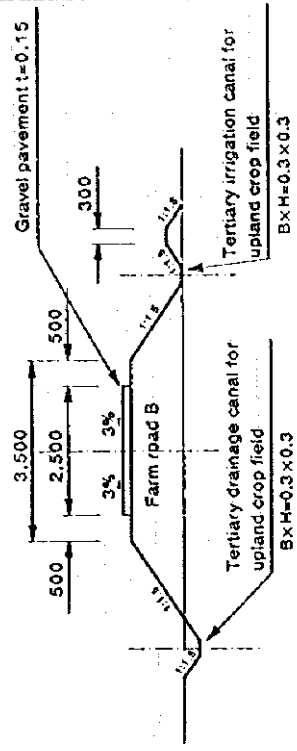
TYPICAL CROSS SECTION OF VILLAGE ROAD IMPROVEMENT



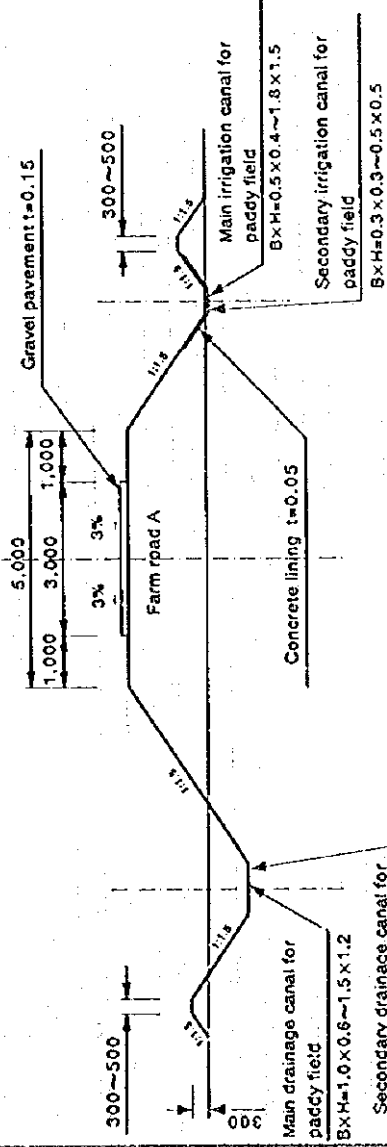
TYPICAL CROSS SECTION III



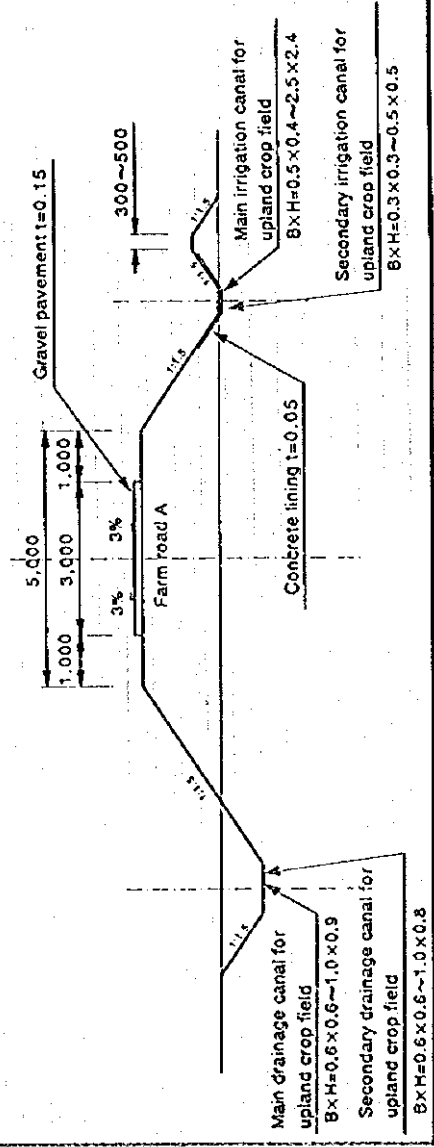
TYPICAL CROSS SECTION IV



TYPICAL CROSS SECTION I

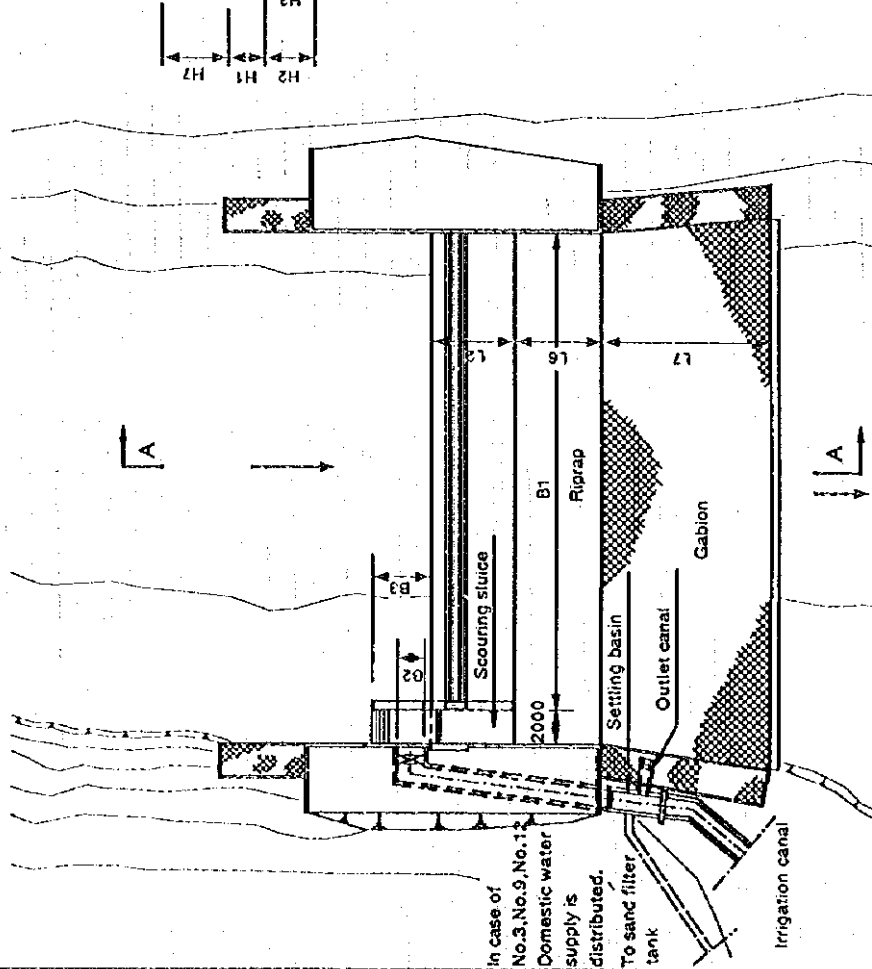


TYPICAL CROSS SECTION II

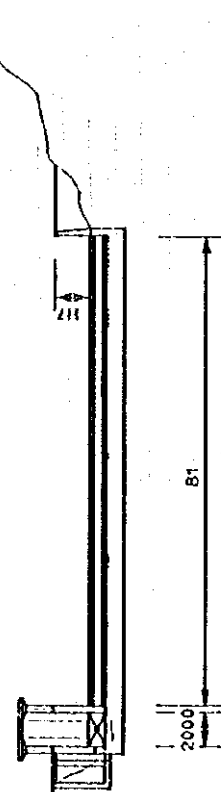


THE LIAO PEOPLE'S REPUBLIC OF CHINA MINISTRY OF AGRICULTURE AND FORESTRY THE INTEGRATED AGRICULTURAL AND RURAL DEVELOPMENT PROJECT IN BOLIVIAN PLATEAU	TITLE OF DRAWING
TYPICAL CROSS SECTION ON ROAD AND CANAL	
WAFON-ROD CO., LTD. NAGAI ENGINEERING CO., LTD.	Figure IX-3

PLAN



PROFILE



SECTION A-A

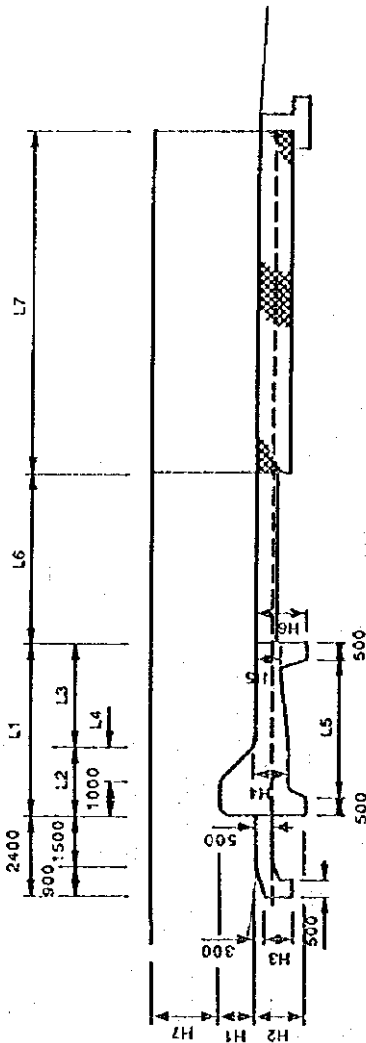


Table on size of facilities

No.	Site name	B1	B2	B3	H1	H2	H3	H4	H5	H6	H7
1	Upper Chantal	18,000	1,400	3,000	1,000	2,000	800	1,000	700	1,500	2,400
2	Lower Xephan	45,000	1,400	3,000	1,000	2,000	800	1,000	700	1,500	1,700
3	Middle Xephan	38,000	3,500	3,000	1,500	2,000	1,200	1,000	800	1,500	2,800
4	Lower Chantal	38,000	4,400	8,000	2,000	2,500	1,200	1,500	1,100	2,000	3,800
5	Upper Kaphu	13,000	3,300	3,000	1,000	2,000	800	1,000	700	1,500	2,200
6	Lower Xesat	48,000	4,000	5,500	1,500	2,000	1,200	1,000	800	1,500	3,400
7	Lower Nammas	48,000	9,800	11,500	2,500	3,000	1,700	1,700	1,300	2,000	3,100
8	Upper Thon	28,000	3,300	5,000	1,000	2,000	800	1,000	700	1,500	2,200
9	Middle Lamphan	48,000	6,000	7,500	2,500	3,000	1,700	1,700	1,300	2,000	3,000
10	Upper Tayun	28,000	1,800	2,500	1,000	2,000	800	1,000	700	1,500	1,000
No.	Site name	L1	L2	L3	L4	L5	L6	L7			
1	Upper Chantal	5,000	2,000	3,000	1,000	4,900	10,200	20,400			
2	Lower Xephan	5,000	2,000	3,000	1,000	4,900	4,300	8,600			
3	Middle Xephan	6,500	2,500	4,000	1,500	5,500	13,300	26,600			
4	Lower Chantal	7,500	3,000	4,500	2,000	6,500	22,700	45,400			
5	Upper Kaphu	5,000	2,000	3,000	1,000	4,900	8,200	16,400			
6	Lower Xesat	6,500	2,500	4,000	1,500	5,500	15,500	31,000			
7	Lower Nammas	6,500	3,500	5,000	2,500	7,500	17,000	34,000			
8	Upper Thon	5,000	2,000	3,000	1,000	4,900	8,100	16,200			
9	Middle Lamphan	6,500	3,500	5,000	2,500	7,500	15,700	31,400			
10	Upper Tayun	5,000	2,000	3,000	1,000	4,900	3,800	7,600			

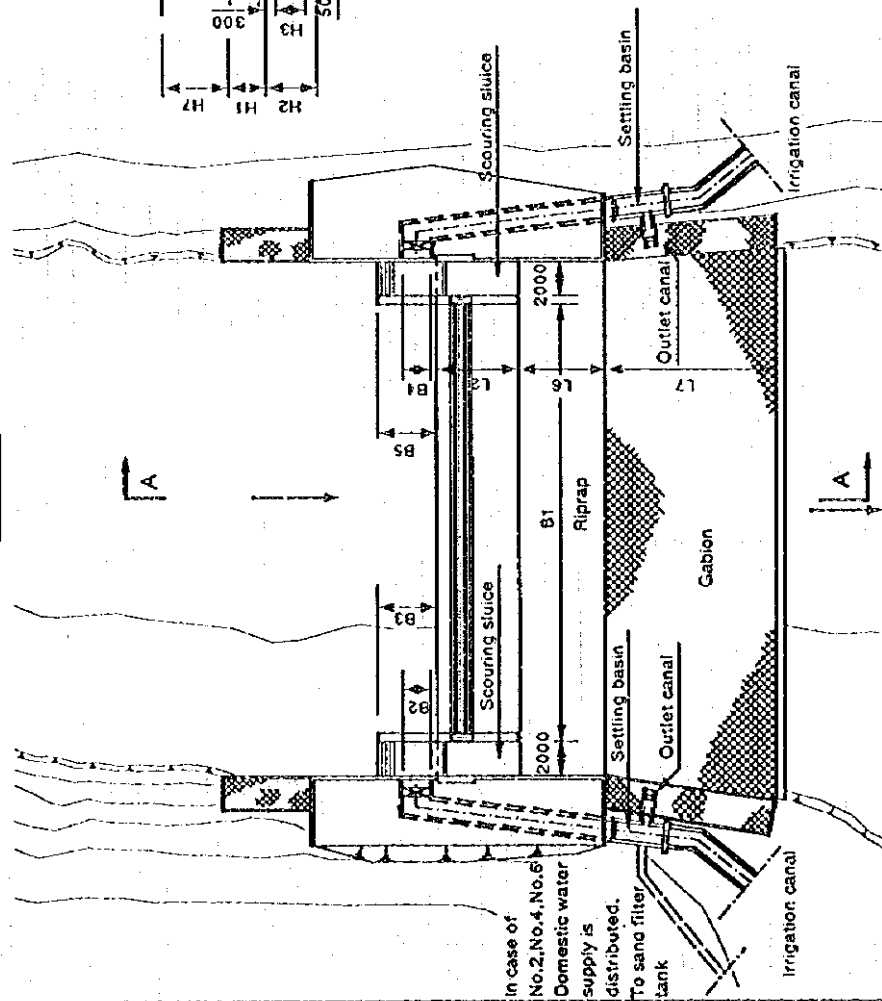
Unit : mm

THE LAO PEOPLE'S DEMOCRATIC REPUBLIC
MINISTRY OF AGRICULTURE AND FORESTRY
THE INTEGRATED AGRICULTURAL AND RURAL
DEVELOPMENT PROJECT IN BOLIVIAN PLATEAU

TITLE OF DRAWING
INTAKE FACILITIES
FOR IRRIGATION I

NAKON ROE CO., LTD.
NACAL ENGINEERING CO., LTD.
Figure IX-4

PLAN



SECTION A - A

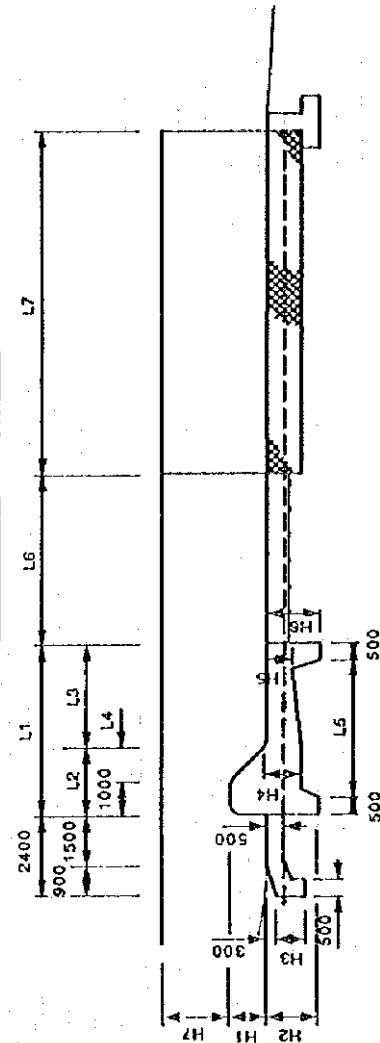
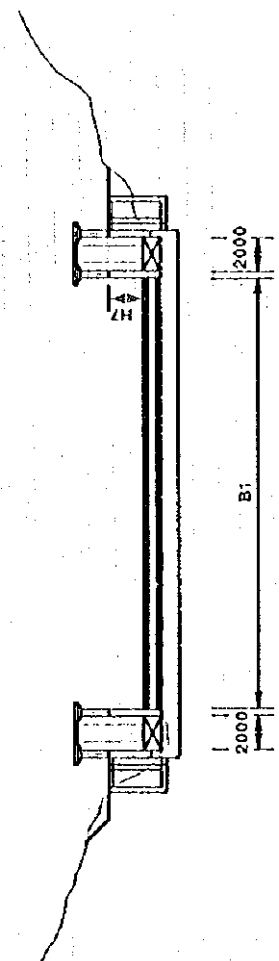


Table on size of facilities

No.	Site name	B1	B2	B3	B4	B5	H1	H2	H3	H4	H5
2	Upper Tapsun	18,000	1,000	2,500	1,000	2,500	1,000	2,000	800	1,000	700
4	Upper Matchan	28,000	1,000	2,500	1,000	2,500	1,000	2,000	800	1,000	700
6	Middle Matchan	38,000	1,000	2,500	1,000	2,500	1,500	2,000	1,200	1,000	800
7	Lower Matchan	28,000	1,000	2,500	1,100	2,800	1,000	2,500	600	1,000	700
10	Middle Tapsun	38,000	1,000	2,500	1,000	2,500	1,000	2,000	800	1,000	700
11	Lower Tapsun	38,000	5,700	7,500	1,100	2,800	2,000	2,500	1,200	1,500	1,100
No.	Site name	H6	H7	L1	L2	L3	L4	L5	L6	L7	
2	Upper Tapsun	1,800	2,500	5,000	2,000	3,000	1,000	4,000	1,000	2,800	
4	Upper Matchan	1,500	1,800	5,000	2,000	3,000	1,000	4,000	5,200	10,400	
6	Middle Matchan	1,500	1,700	6,500	2,500	4,000	1,500	5,500	4,800	9,200	
7	Lower Matchan	1,500	1,900	5,800	2,800	3,000	1,000	4,800	6,100	12,200	
10	Middle Tapsun	1,500	2,200	5,000	2,000	3,000	1,000	4,000	6,200	16,400	
11	Lower Tapsun	2,000	2,900	7,500	3,000	4,500	2,000	6,500	14,500	29,000	

Unit: mm

PROFILE



THE LAO PEOPLE'S DEMOCRATIC REPUBLIC
MINISTRY OF AGRICULTURE AND FORESTRY
THE INTEGRATED AGRICULTURAL AND RURAL
DEVELOPMENT PROJECT IN BOLIVIAN PLATEAU

TITLE OF DRAWING

INTAKE FACILITIES
FOR IRRIGATION II

INTEGRATED CO., LTD
NADAN ENGINEERING CO., LTD

Figure IX-5