

Fig. 8-1-1 PLANTING SCHEDULE OF PADDY IN KIMUBU, PASIR MASS

WS : Supply of water - SEE : Sowing on nursery bed -
 TP : Transplanting - STW : Scop of water supply - HA : Harvest

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1st crop	WS SEE TP	WS SEE TP	WS SEE TP	WS SEE TP	WS SEE TP	WS SEE TP	WS SEE TP	WS SEE TP	WS SEE TP	WS SEE TP	WS SEE TP	WS SEE TP
2nd crop												
3rd crop												
4th crop												

PLANTING SCHEDULE OF PADDY IN IEMAL

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1st crop	WS SEE TP	WS SEE TP	WS SEE TP	WS SEE TP	WS SEE TP	WS SEE TP	WS SEE TP	WS SEE TP	WS SEE TP	WS SEE TP	WS SEE TP	WS SEE TP
2nd crop												
3rd crop												
4th crop												

Fig. 8-1-1 PLANTING SCHEDULE OF PADDY IN KEMUDU, PASIR MASS

Year	1980	1981	1982	1983	1984	1985
JAN						
FEB						
MAR						
APR						
MAY						
JUN						
JUL						
AUG						
SEP						
OCT						
NOV						
DEC						
1st crop						
2nd crop						
3rd crop						
4th crop						
5th crop						
6th crop						
7th crop						
8th crop						
9th crop						
10th crop						
11th crop						
12th crop						
13th crop						
14th crop						
15th crop						
16th crop						
17th crop						
18th crop						
19th crop						
20th crop						
21st crop						
22nd crop						
23rd crop						
24th crop						
25th crop						
26th crop						
27th crop						
28th crop						
29th crop						
30th crop						
31st crop						
32nd crop						
33rd crop						
34th crop						
35th crop						
36th crop						
37th crop						
38th crop						
39th crop						
40th crop						
41st crop						
42nd crop						
43rd crop						
44th crop						
45th crop						
46th crop						
47th crop						
48th crop						
49th crop						
50th crop						
51st crop						
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56th crop						
57th crop						
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66th crop						
67th crop						
68th crop						
69th crop						
70th crop						
71st crop						
72nd crop						
73rd crop						
74th crop						
75th crop						
76th crop						
77th crop						
78th crop						
79th crop						
80th crop						
81st crop						
82nd crop						
83rd crop						
84th crop						
85th crop						
86th crop						
87th crop						
88th crop						
89th crop						
90th crop						
91st crop						
92nd crop						
93rd crop						
94th crop						
95th crop						
96th crop						
97th crop						
98th crop						
99th crop						
100th crop						

Table 6-2-1(1) Reservoir Operation/Energy Production

L.W.L. = 50 ALPHA = 4

Item	NWL	Qf					
		50 m ³ /s	60 m ³ /s	70 m ³ /s	80 m ³ /s	90 m ³ /s	100 m ³ /s
Energy (GWh)	85	128.98	141.07	153.87	164.99	165.91	167.88
		230.84	236.32	236.75	227.21	211.91	205.15
		359.89	377.38	390.62	392.21	377.81	372.98
	80	118.87	128.75	139.73	147.63	146.52	147.75
		212.12	218.39	217.53	208.48	198.85	192.55
		331.01	347.14	357.27	356.13	345.37	340.30
	75	108.1	115.67	124.22	127.71	128.23	127.74
		193.45	198.89	196.63	191.13	186.69	181.22
		301.55	314.55	320.85	318.84	314.93	308.98
	70	96.54	102.2	107.41	110.53	110.41	109.36
		173.64	177.91	175.9	173.31	172.13	168.08
		270.18	280.09	283.32	283.83	282.55	277.45
Power (MW)	85	93.15	110.98	127.65	139.68	139.91	139.7
		93.43	111.35	127.88	139.41	139.96	140.51
		94.0	112.8	131.6	150.4	169.2	188.0
	80	84.38	100.2	114.63	123.4	122.0	123.25
		84.71	100.6	114.83	123.0	123.5	127.83
		85.4	102.4	119.5	136.6	153.6	170.7
	75	75.48	88.9	100.43	105.2	106.48	106.25
		75.91	89.5	100.66	106.71	110.96	114.5
		76.7	92.1	107.4	122.8	138.1	153.5
	70	66.45	78.15	85.41	90.3	91.48	90.53
		67.0	77.3	87.11	93.06	99.5	101.95
		68.1	81.7	95.4	109.0	122.6	136.2
Water Level (m)	85	81.0	78.0	73.9	67.1	51.1	50.1
		84.5	84.1	83.4	81.5	77.5	74.4
	80	75.1	71.0	64.2	52.3	50.9	50.1
		79.5	79.0	78.1	75.8	72.4	70.4
	75	68.2	62.5	52.6	50.5	50.1	50.2
		74.3	73.6	72.5	70.1	68.1	66.3
	70	60.9	51.6	51.2	50.0	50.3	50.0
		69.2	68.2	66.9	65.3	64.0	62.5

TWL = 27.0m

Legend: U = Upper Column
M = Middle Column
L = Lower Column

Item	Qf	50 m ³ /s	60 m ³ /s	70 m ³ /s	80 m ³ /s	90 m ³ /s	100 m ³ /s
	NWL						
Power Discharge (10 ³ m ³)	85 (3.2958)	2.5644 (0.7314)	2.0801 (1.2157)	1.5545 (1.7413)	0.9484 (2.3474)	0.1867 (3.1091)	0.1687 (3.1271)
	80 (2.392)	1.7004 (0.6916)	1.2665 (1.1255)	0.7452 (1.6468)	0.2149 (2.1771)	0.1840 (2.208)	0.1680 (2.224)
	75 (1.6858)	1.0290 (0.6568)	0.6408 (1.045)	0.2224 (1.4634)	0.1752 (1.5106)	0.1694 (1.5164)	0.1712 (1.5146)
	70 (1.177)	0.4589 (0.6281)	0.1970 (0.98)	0.1898 (0.9872)	0.1675 (1.0095)	0.1716 (1.0054)	0.1672 (1.0098)
Spilling Water (m ³ /s)	85	18.8	14.3	9.8	7.1	5.0	2.7
	80	19.0	14.2	10.4	7.3	5.4	3.7
	75	19.6	14.4	10.8	7.5	5.5	4.0
	70	19.9	14.7	11.3	8.2	6.2	4.5
Months of Generation Stop	85	0	0	0	0	7	23
	80	0	0	0	0	16	32
	75	0	0	1	7	24	40
	70	0	0	4	16	31	51
Possible Generating Hours (%)	85	100	100	100	100	98.3	94.5
	80	100	100	100	100	96.2	92.4
	75	100	100	99.8	98.3	94.3	90.5
	70	100	100	99.0	96.2	92.6	87.9

* Number of Months in percentage

Taking m (months) = number of months with generation stop,

$$\text{Possible Generating Hours} = \frac{35 \times 12 - m}{35 \times 12} \cdot 100$$

Table 6-2-1(2) Reservoir Operation/Energy Production

L.W.L. = 50

ALPHA = 5

Item	Qf NWL	50 m ³ /s	60 m ³ /s	70 m ³ /s	80 m ³ /s	90 m ³ /s	100 m ³ /s
		Energy (GWh) U : Dry M : Wet L : Total	85	129.16	141.07	153.87	164.99
248.85	251.25			249.13	236.51	248.99	209.32
377.84	392.30			403.00	401.51	384.88	377.16
80	119.01		128.75	139.73	147.63	146.52	148.84
	229.47		231.65	229.65	217.09	206.11	200.25
	348.48		360.41	369.39	364.73	352.66	349.09
75	108.23		115.67	124.22	127.71	128.23	127.74
	208.72		210.9	207.6	199.2	193.29	185.99
	316.94		326.55	331.83	326.91	321.52	313.74
70	96.67		102.2	107.41	110.53	110.41	109.36
	187.44		188.78	185.73	181.17	178.98	173.34
	284.10		290.96	293.16	291.68	289.4	282.69
Power (MW) U: Dry/Ave M: Wet/Ave L: Max.	85	116.4	138.73	159.55	174.56	174.9	174.61
		116.8	139.15	159.81	174.3	174.96	175.65
		117.5	141.0	164.5	188.0	211.5	235.0
	80	105.51	125.26	143.26	154.25	152.51	154.36
		105.91	125.73	143.53	153.73	154.36	160.03
		106.7	128.0	149.4	170.7	192.1	213.4
	75	94.35	111.18	125.56	131.5	133.13	132.81
		94.88	111.86	125.81	133.38	138.63	143.1
		95.9	115.1	134.3	153.5	172.7	191.8
	70	83.08	96.6	106.78	112.86	114.36	113.15
		83.76	97.71	108.93	116.33	124.38	127.4
		85.1	102.2	119.2	136.2	153.2	170.3
Water Level (m) U : Min. L : Ave.	85	81.0	78.0	73.9	67.1	51.1	50.1
		84.5	84.1	83.4	81.5	77.5	74.4
	80	75.1	71.0	64.2	52.3	51.1	51.4
		79.5	79.0	78.1	75.8	72.4	70.5
	75	68.2	62.5	61.0	50.5	50.1	50.2
		74.3	73.6	72.5	70.1	68.1	66.3
	70	60.9	51.6	51.2	50.4	50.3	50.0
		69.2	68.2	66.9	65.3	64.0	62.5

TWL = 27.0m

Legend: U = Upper Column

M = Middle Column

L = Lower Column

Item	Qf	50 m ² /s	60 m ² /s	70 m ² /s	80 m ² /s	90 m ² /s	100 m ² /s
	NWL						
Power Discharge (10 ³ m ²)	85 (3.2958)	2.5644 (0.7314)	2.0801	1.5545	0.9484	0.3364	0.1687
	80 (2.392)	1.7004	1.2665	0.7452	0.2149	0.1872	0.1942
	75 (1.6858)	1.2090	0.6408	0.5537	0.1752	0.1694	0.1712
	70 (1.177)	0.5489	0.1970	0.1898	0.1743	0.1726	0.1672
Spilling Water (m ² /s)	85	14.6	10.7	6.9	4.9	3.3	1.7
	80	14.9	10.7	7.2	5.0	3.5	2.2
	75	15.1	10.9	7.6	5.2	3.6	2.5
	70	15.4	11.1	8.0	5.6	3.9	2.7
Months of Generat'n Stop	85	0	0	0	0	7	23
	80	0	0	0	0	16	32
	75	0	0	1	7	24	39
	70	0	0	4	16	32	51

Table 6-2-1(3) Reservoir Operation/Energy Production

L.W.L. = 50

ALPHA = 6

Item	Qf NWL	50 m ³ /s	60 m ³ /s	70 m ³ /s	80 m ³ /s	90 m ³ /s	100 m ³ /s
		Energy (GWh) U : Dry M : wet L : Total	85	129.16	141.07	153.87	164.99
262.02	262.77			257.03	242.31	221.38	209.59
391.18	403.83			410.89	407.31	387.26	377.43
80	119.0		128.75	139.73	147.63	146.52	147.75
	240.54		241.57	237.45	222.51	208.5	197.88
	359.54		370.33	377.19	370.15	355.03	345.64
75	108.23		115.67	124.22	127.71	128.23	128.53
	219.81		219.91	215.3	204.29	195.61	188.18
	328.05		335.56	339.51	332.00	323.83	316.69
70	96.67		102.2	107.41	186.3	110.41	109.36
	197.46		196.85	192.73	110.53	181.61	173.85
	294.12		299.04	300.15	296.81	292.02	283.21
Power (HW) U: Dry/Ave M: Wet/Ave L: Max.	85	139.68	166.46	191.46	209.5	209.88	209.56
		140.13	166.98	191.8	209.16	209.93	210.76
		141.0	169.2	197.4	225.6	253.8	282.0
	80	126.55	150.3	171.93	185.13	183.0	184.83
		127.08	150.9	172.25	184.46	185.23	191.76
		128.0	153.6	179.3	204.9	230.5	256.1
	75	113.23	133.43	150.68	157.8	159.75	159.38
		113.86	134.23	150.96	160.06	166.38	171.83
	70	115.1	138.1	161.1	184.2	207.2	230.2
		99.71	117.25	128.15	135.45	137.23	135.76
		100.53	115.98	130.7	139.56	149.25	152.86
	Water Level (m) U : Min. L : Ave.	85	81.0	78.0	73.9	67.1	51.1
84.5			84.1	83.4	81.5	77.5	74.4
80		75.1	71.0	64.2	52.3	50.9	50.1
		79.5	79.0	78.1	75.8	72.4	70.4
75		68.2	62.5		51.3	50.1	50.2
		74.3	73.6	72.5	70.1	68.1	66.3
70	60.9	51.6	51.2	50.0	50.3	50.1	
		68.2	66.9	65.3	64.0	62.5	

TWL = 27.0m

Legend: U = Upper Column
M = Middle Column
L = Lower Column

Item	Qf	50 m ³ /s	60 m ³ /s	70 m ³ /s	80 m ³ /s	90 m ³ /s	100 m ³ /s
	NWL						
Power Discharge (10 ³ m ³)	85 (3.2958)	2.5644	2.0801	1.5545	0.9484	0.1867	0.1687
	80 (2.392)	1.7004	1.2665	0.7452	0.2149	0.1840	0.1680
	75 (1.6858)	1.0290	0.6408	0.5537	0.1914	0.1694	0.1712
	70 (1.177)	0.5489	0.1970	0.1898	0.1675	0.1716	0.1693
Spilling Water (m ³ /s)	85	11.4	8.0	5.0	3.5	2.8	1.7
	80	11.6	8.1	5.1	3.6	2.9	2.3
	75	11.9	8.3	5.3	3.7	2.9	2.1
	70	12.1	8.5	5.7	3.9	3.0	2.5
Months of Generat'n Stop	85	0	0	0	0	7	23
	80	0	0	0	0	16	32
	75	0	0	1	7	24	40
	70	0	0	4	16	33	51

Table 6-2-1(4) Reservoir Operation/Energy Production

L.W.L. = 60

ALPHA = 4

Item	Qf	50 m ³ /s	60 m ³ /s	70 m ³ /s	80 m ³ /s	90 m ³ /s	100 m ³ /s	
	NWL							
Energy (GWh) U : Dry M : Wet L : Total	85							
		80				124.8		
							211.34	
						359.19		
	75				20.71	149.68		
					32.92	174.06		
					321.79	323.75		
	70			16.98	18.21			
				29.65	34.20			
				279.77	314.45			
	Power (MW) U: Dry/Ave M: Wet/Ave L: Max.-	85						
			80				123.1	
							123.3	
						136.6		
75					100.4	106.95		
					100.7	108.88		
					107.4	122.8		
70				77.1	84.7			
				78.2	89.5			
				81.7	107.5			
Water Level (m) U : Min. L : Ave.		85						
		80				60.7		
						76.0		
	75			61.6	60.5			
					72.6	71.1		
	70			61.1	60.3			
				68.3	67.9			

TWL = 27.0

Legend: U = Upper Column
M = Middle Column
L = Lower Column

Item	Qf	50 m ³ /s	60 m ³ /s	70 m ³ /s	80 m ³ /s	90 m ³ /s	100 m ³ /s
	NWL						
Power Discharge (10 ⁹ m ³)	85						
	80 (2.392)				0.5408 (1.8512)		
	75 (1.6858)			0.5836 (1.1022)	0.5274 (1.1584)		
	70 (1.177)		0.5600 (0.617)	0.5158 (0.6612)			
Spilling Water (m ³ /s)	85						
	80				7.5		
	75			11.2	7.7		
	70		15.0	4.8			
Months of Generat'n Stop	85						
	80				4		
	75			99.3% 3	11		
	70		99.5% 2	96.9% 13			

Table 6-2-1(5) Reservoir Operation/Energy Production

L. W. L. = 60

ALPHA = 5

Item	Qf NWL	50 m ² /s	60 m ² /s	70 m ² /s	80 m ² /s	90 m ² /s	100 m ² /s	
		Energy (GWh) U : Dry M : Wet L : Total	85					
80						147.86		
						221.32		
					369.19			
75				20.71				
				34.84				
				333.31				
70			16.98	17.92				
			31.53	35.10				
			291.06	318.13				
Power (MW) U: Dry/Ave M: Wet/Ave L: Max.	85							
			80				153.85	
						154.15		
					170.7			
	75			125.4	133.72			
				125.9	136.08			
				134.3	153.5			
	70		96.4	105.5				
			97.7	111.0				
			102.2	120.1				
	Water Level (m) U : Min. L : Ave.	85						
80								
75				61.5				
				72.6				
70		60.9	60.3					
		68.3	67.7					

TWL = 27.0m

Legend : U = Upper Column
M = Middle Column
L = Lower Column

Item	Qf	50 m ³ /s	60 m ³ /s	70 m ³ /s	80 m ³ /s	90 m ³ /s	100 m ³ /s
	NWL						
Power Discharge (10 ³ m ²)	85						
	80						
	75 (1.6858)			0.5836 (1.1022)			
	70 (1.177)		0.5600 (0.617)	0.5157 (0.6612)			
Spilling Water (m ³ /s)	85						
	80						
	75			7.8			
	70		11.3	3.0			
Months of Generat'n Stop	85						
	80						
	75			3			
	70		2	13			

Table 6-2-1(6) Reservoir Operation/Energy Production

L.W.L. = 60 ALPHA = 6

Item	Qf NWL	50 m ³ /s	60 m ³ /s	70 m ³ /s	80 m ³ /s	90 m ³ /s	100 m ³ /s	
		Energy (GWh) U : Dry M : Wet L : Total	85					
80						147.86		
						227.15		
					375.00			
75				20.71				
				36.31				
				342.12				
70			16.98	17.89				
			32.94	35.34				
			299.56	319.37				
Power (MW) U: Dry/Ave M: Wet/Ave L: Max.	85							
			80				184.62	
						184.95		
					204.9			
	75			150.5	160.43			
				151.0	163.32			
				161.1	184.2			
	70		115.7	110.0				
			117.2	118.9				
			122.6	122.6				
	Water Level (m) U : Min. L : Ave.	85						
80								
75				61.6				
				72.6				
70		60.9	60.3					
		68.3	67.6					

TWL = 27.0m

Legend: U = Upper Column
M = Middle Column
L = Lower Column

Item	Qf	50 m ³ /s	60 m ³ /s	70 m ³ /s	80 m ³ /s	90 m ³ /s	100 m ³ /s
	NWL						
Power Discharge (10 ³ m ³)	85						
	80						
	75 (1.6858)			0.5836 (1.1022)			
	70		0.5600 (0.617)	0.5155 (0.6615)			
Spilling Water (m ³ /s)	85						
	80						
	75			5.2			
	70		8.5	2.2			
Months of Generat'ion Stop	85						
	80						
	75			3			
	70		2	96.4% 13			

Table 6-2-1(7) Reservoir Operation/Energy Production

L. W. L. = 65

ALPHA = 4

Item	Qf NWL	50 m ² /s	60 m ² /s	70 m ² /s	80 m ² /s	90 m ² /s	100 m ² /s	
		Energy (GWh) U : Dry M : Wet L : Total	85					
80					24.30			
					35.70			
					360.01			
75								
70				16.18				
			30.60					
			280.70					
Power (MW) U: Dry/Ave M: Wet/Ave L: Max.	85							
	80				122.1			
					124.1			
					136.6			
	75							
	70			73.3				
			79.3					
			81.7					
Water Level (m) U : Min. L : Ave.	85							
	80				65.1			
					76.3			
	75							
	70			66.1				
				68.9				

TWL = 27.0m

Legend: U = Upper Column
M = Middle Column
L = Lower Column

Item	Qf	50 m ² /s	60 m ² /s	70 m ² /s	80 m ² /s	90 m ² /s	100 m ² /s
	NWL						
Power Discharge (10 ³ m ²)	85						
	80 (2.392)				0.8024 (1.5896)		
	75						
	70		0.8722 (0.8136)				
Spilling Water (m ² /s)	85						
	80				7.3		
	75						
	70		15.7				
Months of Generation Stop	85						
	80				99.0% 4		
	75						
	70		96.2% 16				

Table 6-2-1(8) Reservoir Operation/Energy Production

L.W.L. = 65

ALPHA = 5

Item	Qf		50 m ³ /s	60 m ³ /s	70 m ³ /s	80 m ³ /s	90 m ³ /s	100 m ³ /s	
	NWL								
Energy (GWh) U : Dry M : Wet L : Total	85								
		80				24.30			
							37.14		
						368.61			
	75								
		70			16.18				
						32.60			
					292.70				
	Power (MW) U: Dry/Ave M: Wet/Ave L: Max..	85							
			80				152.65		
								155.17	
							170.17		
75									
		70			91.6				
						99.1			
					102.2				
Water Level (m) U : Min. L : Ave.		85							
			80				65.1		
							76.3		
		75							
	70				66.1				
					68.9				

TWL = 27.0m

Legend: U = Upper Column

M = Middle Column

L = Lower Column

Item	Qf	50 m ² /s	60 m ² /s	70 m ² /s	80 m ² /s	90 m ² /s	100 m ² /s
	NWL						
Power Discharge (10 ³ m ²)	85						
	80 (2.3920)				0.8024 (1.5896)		
	75						
	70		0.8010 (0.9690)				
Spilling Water (m ² /s)	85						
	80				5.0		
	75						
	70		11.8				
Months of Generat'n Stop	85						
	80				8		
	75						
	70		16				

Table 6-2-1(9) Reservoir Operation/Energy Production

L.W.L. = 65

ALPHA = 6

Item	Qf	50 m ³ /s	60 m ³ /s	70 m ³ /s	80 m ³ /s	90 m ³ /s	100 m ³ /s
	NWL						
Energy (GWh)	85						
		80				24.30	
						38.04	
	75				374.03		
	U : Dry M : Wet L : Total	70		16.18			
			34.06				
			301.46				
Power (MW)	85						
		80				183.17	
						186.22	
	U: Dry/Ave M: Wet/Ave	75				204.9	
	L: Max.	70		109.97			
			118.92				
			122.6				
Water Level (m)	85						
		80				61.5	
						76.3	
	U : Min. L : Ave.	75					
		70		65.1			
			68.9				

TWL = 27.0m

Legend: U = Upper Column
M = Middle Column
L = Lower Column

Item	Qf	50 m ² /s	60 m ² /s	70 m ² /s	80 m ² /s	90 m ² /s	100 m ² /s
	NWL						
Power Discharge (10 ³ m ²)	85						
	80 (2.3920)				0.8024 (1.5896)		
	75						
	70 (1.177)		0.2722 (0.8978)				
Spilling Water (m ² /s)	85						
	80				3.6		
	75						
	70		8.9				
Months of Generat'n Stop	85						
	80				7		
	75						
	70		19				

Table 6-2-1(10) Reservoir Operation/Energy Production

L.W.L. = 60,61 ALPHA = 4

Item	Qf	50 m ³ /s	60 m ³ /s	70 m ³ /s	80 m ³ /s	90 m ³ /s	100 m ³ /s
	NWL						
Energy (GWh)	85					167.85	
	LWL 60					219.79	
	80				146.63		
	LWL 61				211.82		
	80				358.44		
	LWL 60						
U : Dry							
M : Wet							
L : Total	70						
Power (MW)	85					140.9	
	LWL 60					142.5	
	80				122.8		
	LWL 61				123.4		
	75				136.6		
	LWL 60						
U: Dry/Ave							
M: Wet/Ave							
L: Max.	70						
Water Level (m)	85					60.7	
	LWL 60					78.3	
	80				61.3		
	LWL 61				76.1		
	75						
	LWL 60						
U : Min.							
L : Ave.	70						

TWL = 27.0m

Legend: U = Upper Column
M = Middle Column
L = Lower Column

Item	Qr	50 m ² /s	60 m ² /s	70 m ² /s	80 m ² /s	90 m ² /s	100 m ² /s
	NWL						
Power Discharge (10 ⁹ m ²)	85 LWL 60					0.5373 (2.7585)	
	80 LWL 61				0.5732 (1.8188)		
	75						
	70						
Spilling Water (m ² /s)	85 LWL 60					4.7	
	80 LWL 61				7.3		
	75						
	70						
Months of Generat'n Stop	85 LWL 60					97.1% 12	
	80 LWL 61				98.8% 5		
	75						
	70						

Table 6-2-1(11) Reservoir Operation/Energy Production

L.W.L. = 60.61 ALPHA = 5

Item	Qf	50 m ³ /s	60 m ³ /s	70 m ³ /s	80 m ³ /s	90 m ³ /s	100 m ³ /s
	NWL						
Energy (GWh)	85					167.86	
	LWL 60					226.99	
	80				146.63		
	LWL 61				220.43		
	75				367.05		
	70						
U : Dry M : Wet L : Total							
Power (MW)	85					176.2	
	LWL 60					178.18	
	80				153.5		
	LWL 61				154.2		
	75				170.7		
	70						
U: Dry/Ave M: Wet/Ave L: Max.							
Water Level (m)	85					60.7	
	LWL 60					78.3	
	80				61.3		
	LWL 61				76.1		
	75						
	70						
U : Min. L : Ave.							

TWL = 27.0m

Legend: U = Upper Column
M = Middle Column
L = Lower Column

Item	Qf	50 m ³ /s	60 m ³ /s	70 m ³ /s	80 m ³ /s	90 m ³ /s	100 m ³ /s
	NWL						
Power Discharge (10 ³ m ³)	85 LWL 60					0.5373 (2.7585)	
	80 LWL 61				0.5732 (1.8188)		
	75						
	70						
Spilling Water (m ³ /s)	85 LWL 60					3.0	
	80 LWL 61				5.0		
	75						
	70						
Months of Generat'n Stop	85 LWL 60					11	
	80 LWL 61				5		
	75						
	70						

Table 8-1 Occurrence of Ten Days Interval with the Remaining Discharge Less than 85/100 CMS

Irrigable Area	Water Release	Discharge Reserved	March		April		May		June		July		Aug.		Sep.	
			1-10	11-20	21-31	1-10	11-20	21-30	1-10	11-20	21-31	1-10	11-20	21-30		
Case I (46,800 ha)	0 CMS	85 t/s	-	-	-	2/17	2/17	-	-	-	-	-	-	-	-	-
	0 CMS	100 t/s	-	-	3/16	2/17	2/16	-	-	2/16	2/16	-	-	-	-	-
Case II (54,250 ha)	0	85	-	-	2/16	2/17	2/16	1/17	-	2/16	2/16	-	-	-	-	-
	0	100	-	-	3/16	2/17	2/16	2/17	-	2/16	2/16	-	-	-	-	-
Case II (54,250 ha)	70	85	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	70	100	-	-	-	-	1/16	-	-	-	-	-	-	-	-	-
Case II (54,250 ha)	80	85	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	80	100	-	-	-	-	1/16	-	-	-	-	-	-	-	-	-
Case III (78,826 ha)	0	85	-	1/17	4/16	4/17	2/17	2/16	2/17	2/16	2/17	-	-	-	-	-
	0	100	-	1/17	4/16	4/17	3/17	3/16	3/17	3/16	3/17	1/17	1/17	1/17	1/17	1/17
Case III (78,826 ha)	70	85	-	-	-	-	1/17	1/17	1/17	1/17	1/17	-	-	-	-	-
	70	100	-	-	-	2/17	3/17	1/16	3/17	1/16	1/17	-	-	-	-	-
Case III (78,826 ha)	80	85	-	-	-	-	1/17	1/16	1/17	1/16	-	-	-	-	-	-
	80	100	-	-	-	1/17	1/17	1/16	1/17	1/16	-	-	-	-	-	-
Case IV (65,326 ha)	0	85	-	-	3/16	2/17	3/17	2/16	3/17	2/16	2/17	-	-	-	-	-
	0	100	-	1/17	3/16	2/17	3/17	3/16	3/17	3/16	3/17	-	-	-	-	-
Case IV (65,326 ha)	70	85	-	-	-	-	1/17	1/16	-	1/16	-	-	-	-	-	-
	70	100	-	-	-	-	1/17	1/16	-	1/16	-	-	-	-	-	-
Case IV (65,326 ha)	80	85	-	-	-	-	1/17	1/16	1/17	1/16	-	-	-	-	-	-
	80	100	-	-	-	-	1/17	1/16	1/17	1/16	-	-	-	-	-	-

Note: 1. 3/16: three times/16 years

2. Discharge data of Kelantan river is obtained at 18 years from 1967 to 1984 at Guillemond bridge. 16 years or 17 years are not included years with lack of data.

Table 8-1-1 Occurrence of Ten Days Interval with the Remaining Discharge Less than 85/100 CMS

(Unit: MCM)

Note: Figures in parenthesis show those revised roughly considering the water requirement by Kemasin-Semerak and the difference of river discharge between Gillmerd and Kemubu.

Case	Water Release	Discharge Reserved	Month	Period	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984			
Case I	0 CMS	85 t/s	Mar.	1-10				n.a																	
				11-20				n.a																	
				21-31			51.70 (70.63)			n.a								n.a							
			Apr.	1-10				n.a																	
				11-20			12.20 (31.29)																		40.19 (55.14)
				21-30			7.01 (23.06)			n.a															45.05 (57.17)
Case I	0 CMS	100 t/s	Mar.	1-10				n.a																	
				11-20				n.a																	
				21-31			51.70 (70.63)											n.a							64.41 (82.61)
			Apr.	1-10			53.77 (73.75)																	47.60 (65.55)	
				11-20			51.26 (69.59)			n.a															40.19 (55.14)
				21-30			7.01 (23.06)			n.a															45.05 (57.17)
Case II	0 CMS	85 t/s	Mar.	1-10				n.a																	
				11-20				n.a																	
				21-31			39.09 (58.37)																		
			Apr.	1-10			40.52 (61.08)																	35.76 (53.93)	
				11-20			39.01 (57.87)			n.a															27.98 (45.34)
				21-30			-3.87 (12.46)			n.a															36.55 (48.84)
			May	1-10			49.90 (57.73)																		

Continue

<u>Case</u>	<u>Water Release</u>	<u>Discharge Reserved</u>	<u>Month</u>	<u>Period</u>	<u>1967</u>	<u>1968</u>	<u>1969</u>	<u>1970</u>	<u>1971</u>	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	
Case II	70	85	Mar. or Apr.	1-10 11-20 21-30 (31)			No-occurrence																
Case II	70	100	Apr.	1-10 11-20 21-30																			
																							54.70 (71.03)
Case II	80	85	Mar. or Apr.	1-10 11-20 21-30 (31)			No-occurrence																
Case II	80	100	Apr.	1-10 11-20 21-30																			
																							63.67 (79.67)

Continue

Case	Water Release	Discharge Reserved	Month	Period	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984								
Case II	0 CMS	100 t/s	Mar.	1-10			n.a	n.a																						
				11-20			n.a																							
				21-31			39.09 (58.37)												n.a				64.69 (73.95) (70.77)	72.43 (80.95)						
Case II	0 CMS	100 t/s	Apr.	1-10	40.52 (61.08)		n.a															35.76 (53.95)								
				11-20	39.01 (57.87)	-0.51 (19.14)	n.a																		29.98 (45.34)					
				21-30	-3.87 (12.46)		n.a																			36.52 (48.84)				
Case III	0 CMS	85 t/s	Mar.	1-10	49.90 (57.73)		n.a																74.51							
				11-20																										
				21-31			7.17 (25.96)		n.a																		47.99 (56.98)			
Case III	0 CMS	100 t/s	Apr.	1-10	6.98 (26.76)	48.17 (61.46)	n.a							34.79 (54.96)																
				11-20	8.01 (26.18)	-13.54 (32.68)	n.a																			4.14 (19.13)				
				21-30	-15.50 (31.40)		n.a																				15.03 (26.98)			
Case III	0 CMS	100 t/s	Mar.	1-10			21.02																	45.72						
				11-20																										
				21-31			7.17 (25.96)		n.a																				47.98 (56.98)	
Case III	0 CMS	100 t/s	Apr.	1-10	6.98 (26.76)	48.17 (61.46)	n.a							34.79 (54.96)																
				11-20	8.01 (26.18)	-13.54 (32.68)	n.a																					21.40 (66.47)	54.89 (74.22)	57.95
				21-30	-15.5 (31.40)		n.a																							

Continue

Case	Release	Reserved	Month	Period	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
Case III	0	0	CMS	100 t/s	May		21.02			n.a					45.72						66.13	
					11-20					n.a												
					21-30					n.a												
				Jul.	1-10				n.a	n.a		n.a										
					11-20				n.a													
					21-31		76.56 (77.78)		n.a				n.a									
				Aug.	1-10				n.a													
					11-20				n.a													70.98 (74.45)
					21-31				n.a													
				Sep.	1-10																	
					11-20																	
					21-30																	57.98 (74.73)
Case III	70	0	CMS	85 t/s	Mar.				n.a													
					11-20				n.a													
					21-31				n.a													
				Apr.	1-10				n.a													
					11-20		24.16 (43.30)		n.a													
					21-30		27.17 (43.07)		n.a				n.a									
				May	1-10		67.83															
Case III	70	0	CMS	100 t/s	Mar.				n.a													
					11-20				n.a													
					21-31				n.a													
				Apr.	1-10		53.32 (73.36)		n.a													
					11-20		56.17 (73.43)	24.16 (43.30)	n.a													
					21-30		27.17 (43.07)		n.a													
				May	1-10		67.83															
					11-20				n.a													
					21-31				n.a													
				Apr.	1-10		53.32 (73.36)		n.a													
					11-20		56.17 (73.43)	24.16 (43.30)	n.a													
					21-30		27.17 (43.07)		n.a													
				May	1-10		67.83															

Case	Water Release	Discharge Reserved	Month	Period	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984			
Case III	80 CMS	85 t/s	Apr	1-10				n.a.																	
				11-20		32.80	n.a.																		
				21-30		(51.94)		n.a.																	
Case III	80 CMS	100 t/s	Apr	1-10				n.a.															63.96 (81.61) 66.04 (81.04) 77.88 (89.83)		
				11-20		32.80	n.a.																		
				21-30		(51.94)		n.a.																	
Case IV	0 CMS	85 t/s	Mar	1-10				n.a.																	
				11-20				n.a.																	
				21-31		25.94	n.a.					n.a.													
Case I	0 CMS	85 t/s	Apr	1-10		26.70		n.a.															23.42 (41.07)		
				11-20		(44.69)		n.a.																	19.34 (34.29)
				21-30		26.24	-13.76	n.a.																	
Case V	0 CMS	100 t/s	May	1-10		38.00		n.a.															61.53		
Case IV	0 CMS	100 t/s	Mar	1-10				n.a.																	
				11-20				n.a.																	
				21-31		25.94	n.a.																		
Case IV	0 CMS	100 t/s	Apr	1-10		26.70		n.a.															23.42 (41.07)		
				11-20		(44.69)		n.a.																	

Continue

No. 6

Case No.	Case Name	Month	Period	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
	Case IV 0 CMS 100 t/s	Discharge Reserved	Apr 21-30	-15.21 (0.65)	n.a.	n.a.	n.a.	n.a.	62.10 (77.15)												27.68 (39.61)
	(continue)		May 1-10	38.00	n.a.				61.53												
	Case IV 70 CMS 85t/s		Apr 1-10				n.a.														
			11-20	43.08 (62.18)	n.a.																
			21-30	43.36 (59.22)	n.a.		n.a.														
	Case IV 70 CMS 100t/s		Apr 1-10				n.a.														
			11-20	43.08 (62.18)	n.a.																
			21-30	43.36 (59.22)	n.a.		n.a.														
	Case IV 80 CMS 85t/s		Apr 1-10				n.a.														
			11-20	51.72 (70.82)	n.a.																
			21-30	52.00 (67.89)	n.a.		n.a.														
	Case IV 80 CMS 100 t/s		Apr 1-10				n.a.														
			11-20	51.72 (70.82)	n.a.																
			21-30	52.00 (67.89)	n.a.		n.a.														

Table 8-2 The Planted, Harvested and Damaged Area of Paddy for Main Season
in Kelantan Province, 1970/71 to 1984/85

Year	Planted Area	Change in Planted Area		Harvested Area	Damaged Area	Causes of Damage						Others
		To Pre-ceeding Year	On the Basis of 1975			Flood	Pest	Diseas	Blast	Draught		
1970/71	68,670			67,128	1,452	1,257	132	-	2	-	-	61
1971/72	68,940	+ 270		66,734	2,206	1,939	78	-	-	34	-	155
1972/73	70,389	+ 1,449		68,070	2,319	1,888	164	-	-	-	-	267
1973/74	65,790	- 4,599		54,462	11,328	8,291	1,057	-	-	1,637	-	343
1974/75	70,286	+ 4,496	0	66,955	3,341	2,645	422	23	-	64	-	177
1975/76	66,459	- 3,827	- 3,827	64,825	1,634	78	322	-	-	1,181	-	53
1976/77	62,442	- 4,017	- 7,844	60,828	1,614	727	428	4	-	374	-	81
1977/78	69,106	+ 6,664	- 1,180	68,561	545	1	438	-	-	-	-	106
1978/79	64,470	- 4,636	- 5,816	63,639	831	8	445	-	10	304	-	64
1979/80	60,804	- 3,666	- 9,482	57,173	3,631	846	471	-	-	2,206	-	108
1980/81	59,605	- 1,199	-10,681	57,606	1,999	60	1,561	-	-	264	-	114
1981/82	43,602	-16,003	-26,787	34,890	8,712	451	918	24	-	7,319	-	-
1982/83	46,934	+ 3,332	-23,455	46,279	655	20	609	9	-	17	-	-
1983/84	24,951	-21,983	-45,438	18,788	6,163	4,630	680	-	-	-	-	853
1984/85	33,189	+ 8,238	-37,200	31,722	1,467	257	1,205	-	-	-	-	5

Source: Statistics of Paddy

Table 8-3 The Planted Area of Paddy by District for the Main Season

Year	Total Area (Kelantan)	Tumpat	Pasir Mas	Kota Bahru	Bachock	Pasir Puteh	Machang	Tanah Merah	Ulu Kelantan	K A D A	
										Area	%
1970/71	68,670	8,505	17,435	9,285	10,445	12,236	5,783	4,905	555		
1971/72	68,940	8,539	17,476	11,693	9,978	12,571	4,941	2,948	793		
1972/73	70,389	8,465	16,889	14,483	9,978	12,085	4,941	2,835	714		
1973/74	65,790	7,189	14,657	14,459	9,573	12,369	4,941	1,863	741		
1974/75	70,286	7,898	16,257	15,048	8,884	12,369	5,868	3,210	754	(31,826)	45.3
1975/76	66,459	7,108	15,400	14,513	7,237	11,693	4,941	4,814	753	(28,022)	42.2
1976/77	62,442	4,759	11,040	14,738	7,375	11,713	5,796	6,267	753	(22,374)	35.8
1977/78	69,106	5,730	16,261	14,738	7,655	12,140	5,851	6,038	893	(25,955)	37.6
1978/79	64,470	5,468	16,156	14,653	4,973	11,965	5,208	5,393	654	(23,015)	35.7
1979/80	60,804	5,164	13,262	14,584	5,242	11,534	5,010	5,354	654	(20,960)	34.5
1980/81	59,605	5,557	12,809	13,897	4,943	11,534	4,664	5,375	826	(22,251)	37.3
1981/82	43,602	1,506	5,517	13,520	4,227	10,462	3,827	4,088	455	(16,275)	37.3
1982/83	46,934	2,317	11,607	11,498	4,061	9,850	5,717	1,251	633	(21,550)	45.9
1983/84	24,951	1,906	4,139	1,285	665	6,457	4,275	1,505	367	4,091	16.4
1884/85	33,189	1,023	1,176	641	641	5,583	3,861	470	219	20,051	60.4
(A) Average 5 Year 1980/81 - 1984/85		2,462	7,050	8,168	2,907	8,777	4,469	2,538	400		
(B) Paddy Field Area Max.		8,539	17,476	15,048	10,445	12,571	5,868	6,267	893		
(C) Cropping Ratio A/B		29%	40%	54%	28%	70%	76%	40%	45%		

Table 8-4 The Planted Area of Paddy for Main Season
by KADA Area and the Remaining Area

(unit: ha)

Year	Province	KADA Area		Remaining Area	
		Area	%	Area	%
1974/75	70,286	31,826	45.3	38,460	54.7
1975/76	66,459	28,022	42.2	38,437	57.8
1976/77	62,442	22,374	35.8	40,068	64.2
1977/78	69,106	25,955	37.6	43,151	62.4
1978/79	64,470	23,015	35.7	41,455	64.3
1979/80	60,804	20,960	34.5	39,844	65.5
1980/81	59,605	22,251	37.3	37,354	62.7
1981/82	43,602	16,275	37.3	27,327	62.7
1982/83	46,934	21,550	45.9	25,384	54.1
1983/84	24,951	4,091	16.4	20,860	83.6
1984/85	33,189	20,051	60.4	13,138	39.6

Table 8-5. The Reduction of Planted Area of Paddy for Main Season
in Comparison with that in the Previous Year

(unit: ha)

Year	Province	KADA Area	Remaining Area
1974/75			
1975/76	-3,827	-3,804	- 23
1976/77	-4,017	-5,648	+1,631
1977/78	+6,664	+3,581	+3,083
1978/79	-4,636	-2,940	-1,696
1979/80	-3,666	-2,055	-1,611
1980/81	-1,199	+1,291	-2,490
1981/82	-16,003	-5,976	-10,027
1982/83	+3,332	+5,275	-1,943
1983/84	-21,983	-17,459	-4,524
1984/85	+8,238	+15,960	-7,722

Table 8-6 The Draught Area by District for Main Season

Year	Draught Total	Tumpang	Pasir Mas.	Kota Baharu			Pasir Puteh	Machang	Tanah Merah		Ulu Kelantan	
				Bachock	Bachock	Bachock			Machang	KDADA		
1970/71	-	-	-	-	-	-	-	-	-	-	-	-
1971/72	34	34	-	-	-	-	-	-	-	-	-	-
1972/73	-	-	-	-	-	-	-	-	-	-	-	-
1973/74	1,637	-	1,637	-	-	-	-	-	-	-	-	-
1974/75	64	-	-	64	-	-	-	-	-	-	-	-
1975/76	1,181	4	531	237	43	255	109	-	-	-	-	-
1976/77	374	59	115	4	46	93	-	57	-	-	-	-
1977/78	-	-	-	-	-	-	-	-	-	-	-	-
1978/79	304	37	-	-	67	197	3	-	-	-	-	-
1979/80	2,206	466	668	41	405	267	112	242	5	-	-	-
1980/81	264	-	-	-	210	32	20	-	2	-	-	-
1981/82	7,319	351	1,531	548	451	3,985	-	234	15	-	-	-
1982/83	17	-	7	-	10	-	-	-	-	-	-	-
1883/84	-	-	-	-	-	-	-	-	-	-	-	-
1984/85	-	-	-	-	-	-	-	-	-	-	-	-

Table 8-7 The Planted, Harvested and Damaged Area of Paddy for Off Season
in Kelantan Province, 1972 to 1985

(unit: ha)

Year	Planted Area	Change in Planted Area			Harvested Area	Damaged Area	Causes of Damage								
		To Pre-ceeding Year	On the Basis of 1975	Area			Flood	Pest	Diseas	Blast	Draught	Others			
1971	n.a			n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a
1972	17,283			17,195	88				38	19			8	23	
1973	21,033	+ 3,750		20,011	1,022				1,006					16	
1974	23,139	+ 2,106		22,655	484				484						
1975	27,338	+ 4,199	0	26,691	646				636					10	
1976	24,184	- 3,154	- 3,154	23,745	439			334	75				11	19	
1977	27,462	+ 3,278	+ 124	27,250	212				183					29	
1978	26,571	- 891	- 767	26,308	263				186					77	
1979	27,037	+ 466	- 301	26,125	912			534	287				36	55	
1980	19,390	- 7,648	- 7,948	19,125	265				191	6			45	23	
1981	21,870	+ 2,480	- 5,468	20,261	1,609			941	593				13	62	
1982	20,921	- 949	- 6,417	20,572	349			14	196	10			129		
1983	19,407	- 1,514	- 7,931	19,086	321			121	190				10		
1984	25,559	+ 6,152	- 1,779	25,070	489				365	14			110		
1985	24,412	- 1,147	- 2,926	24,318	94				71	20				3	

Table 8-8 The Planted Area of Paddy by District for the Off Season

Year	Total Area (Kelantan)	Pasir			Kota Bahru	Pasir			Ulu Kelantan	K A D A	
		Tumpat	Mas.	Bachock		Puteh	Machang	Tanah Merah		Area	%
1972	17,283	1,421	3,173	2,147	8,809	1,357	61	315	555		
1973	21,033	936	4,673	2,971	11,543	770	72	69	793		
1974	23,139	1,361	4,363	2,991	11,654	2,309	73	389	714		
1975	27,338	2,420	5,482	4,493	12,218	1,944	182	452	741	(22,293)	81.5
1976	24,184	3,401	5,482	1,924	12,277	235	156	608	754	(21,655)	89.5
1977	27,462	3,605	5,570	4,433	11,713	1,094	165	693	753	(25,434)	92.6
1978	26,571	3,422	5,628	3,296	11,729	1,478	157	822	754	(25,692)	96.7
1979	27,037	3,507	4,153	4,618	11,741	1,559	138	1,096	893	(21,322)	78.9
1980	19,390	870	1,843	2,734	11,060	1,676	89	1,118	654	(21,442)	110.6
1981	21,870	963	5,418	2,929	9,750	1,595	89	1,114	654	(18,993)	86.8
1982	20,921	1,195	4,417	4,195	10,150	621	132	211	-	(17,965)	85.9
1983	19,407	2,288	4,518	2,845	8,965	785	-	6	-	(18,721)	96.5
1984	25,559	280	1,175	530	-	217	818	383	20	22,136	86.6
1985	24,412	480	904	308	325	-	880	292	-	21,182	86.8
(A) Average 5 Year		1,041	3,286	2,161	5,838	644	384	401	135		
1980/81 - 1984/85											
(B) Paddy Field Area	8,539	17,476	15,048	10,445	12,571	5,868	6,267	893			
(C) Cropping Ratio	12%	19%	39%	21%	5%	7%	6%	15%			

Table 8-9 The Cropped Area of Paddy per Year in KADA

Sub Area Paddy Field	Kemubu/Salor		Lemal/Alor Pssir		Pasir Mas:		Total	
	Cropped	%	Cropped	%	Cropped	%	Cropped	%
	21,855		9,605		2,195		33,655	
1974/75	36,455	167	13,918	145	3,746	171	54,119	161
1975/76	34,027	156	11,904	124	3,745	171	49,676	148
1976/77	36,819	168	7,468	78	3,521	160	47,808	142
1977/78	35,989	165	11,936	124	3,723	170	51,648	153
1978/79	34,273	157	6,633	69	3,435	156	44,341	132
1979/80	32,232	147	7,195	75	2,975	136	42,402	126
1980/81	29,810	136	9,056	94	2,408	110	41,274	123
1981/82	26,800	123	5,832	61	1,608	73	34,240	102
1982/83	27,565	126	10,010	104	2,696	123	40,271	120
1983/84	16,284	75	7,335	76	2,608	119	26,227	78

Note: The cropped area are those of both season of main and off. Figures of percentage show the crop intensity of annual cropped area divided by the paddy field of Sub Area.

Source: Statistical Digest, KADA

Table 8-10 The Cropped Area of Paddy for Both Season in KADA

(unit: ha, %)

Sub-Area Paddy Field	Kemubu/Salor		Lemal/ Alor Pasir		Pasir Mas		Total	
	Cropped	%	Cropped	%	Cropped	%	Cropped	%
	21,855		9,605		2,195		33,655	
<u>Main Season</u>								
1974/75	19,866	90.9	9,872	102.8	2,087	95.1	31,826	94.6
1975/76	19,866	90.9	6,069	63.2	2,087	95.1	28,022	83.3
1976/77	18,976	86.8	1,618	16.8	1,780	81.1	22,374	66.5
1977/78	18,065	82.7	5,907	61.5	1,983	90.3	25,955	77.1
1978/79	18,045	82.6	3,194	33.3	1,776	80.9	23,015	68.4
1979/80	17,398	79.6	2,024	21.1	1,539	70.1	20,960	62.3
1980/81	16,807	76.9	4,108	42.8	1,366	62.2	22,251	66.1
1981/82	12,905	59.0	2,160	22.5	1,210	55.1	16,275	48.4
1982/83	14,970	68.5	5,248	54.6	1,332	60.7	21,550	64.0
1983/84	2,266	10.4	837	8.7	988	45.0	4,091	12.2
<u>Off Season</u>								
1975	16,589	83.7	4,046	42.3	1,659	79.4	22,293	70.8
1976	14,161	71.4	5,835	61.0	1,658	79.3	21,655	68.8
1977	17,843	90.0	5,850	61.1	1,741	83.3	25,434	80.8
1978	17,924	90.4	6,029	63.0	1,740	83.3	25,692	81.6
1979	16,228	81.9	3,439	35.9	1,659	79.4	21,322	67.7
1980	14,834	74.8	5,171	54.0	1,436	68.7	21,442	68.1
1981	13,003	65.6	4,948	51.7	1,042	49.9	18,993	60.3
1982	13,895	70.1	3,672	38.4	398	19.0	17,965	57.1
1983	12,595	63.5	4,762	49.8	1,364	65.3	18,721	59.5
1984	14,018	70.7	6,498	67.9	1,620	77.5	22,136	70.3

Note : Figures of percentage show the crop intensity of annual cropped area divided by the paddy field of Sub Area.

Source: Statistical Digest, KADA

Table 8-11 Basic Data for the Correlation Study between Paddy Yield and Rainfall/Pumping Discharge by Growing Stage of Paddy - Kemubu/Salor Area

Year	Month	Rainfall (mm)	Discharge (10 ⁶ t)	Dates of Growing Stage	Paddy Yield (t/ha)
1980	Jan.	44.1	35.11		
	Feb.	25.1	35.40		
	Mar.	17.5	24.43		
	Apr.	95.1	0.01		
	May	158.3	33.98	SW-7, SEE-17	
	Jun.	136.2	34.21	TP-12, RS	
	Jul.	223.5	36.26		
	Aug.	268.5	57.54	PS-5, BS-29	
	Sep.	218.5	13.79	STW-20	
	Oct.	256.0	0.38	HV-5	4.15
	Nov.	375.5	8.54	SW-2, SEE-12	
	Dec.	752.0	7.09	TP-7, RS	
1981	Jan.	24.5	31.03	PS-26	
	Feb.	52.5	25.21	RS-19	
	Mar.	22.1	33.58	STW-10 HV-26	2.92
	Apr.	82.5	11.40		
	May	275.5	9.54	SW-7 SEE-17	
	Jun.	105.8	22.67	TP-17, RS	
	Jul.	128.0	37.76	PS-22	
	Aug.	35.3	34.89	BS-15	
	Sep.	126.8	19.25	STW-7 HV-22	2.69
	Oct.	164.0	7.40	SW-22	
	Nov.	429.0	13.45	SEE-2, TP-27	
	Dec.	845.5	13.43	RS	
1982	Jan.	25.0	28.17	PS-26	
	Feb.	17.6	24.62	BS-19, STW-25	
	Mar.	50.0	18.42	HV-26	2.44
	Apr.	40.4	9.91	SW-16, SEE-26	
	May	100.5	29.83	TP-21, RS	
	Jun.	153.6	29.82	PS-16	
	Jul.	330.1	20.70	BS-12	
	Aug.	237.1	30.94	STW-19	
	Sep.	233.5	16.73	HV-18	3.62
	Oct.	242.9	9.73		
	Nov.	325.9	13.27	SW-20, SEE-30	
	Dec.	626.1	12.96	TP-25, RS	
1983	Jan.	86.6	37.51		
	Feb.	10.5	37.84	PS-30	
	Mar.	96.8	41.22	BS-23, STW-31	
	Apr.	51.7	9.43	HV-30	3.32
	May	62.4	15.64	SW-25	
	Jun.	142.5	39.33	SEE-5, TP-30	
	Jul.	306.0	34.08	RS	
	Aug.	203.5	39.61	PS-7	
	Sep.	244.9	26.05	BS-1	
	Oct.	176.0	16.56	STW-7, HV-27	4.04
	Nov.	331.5	2.07	non main season crop	
	Dec.	1,303.5	0.07	due to heavy flood	

Note: SW : Start of water supply SEE: Start of seeding nursery
 TP : Start of transplanting RS : Rooting stage
 PS : Panicle stage BS : Rooting stage
 STW: Stop of water supply HV : Harvesting

Source: KADA office

Table 8-12 Paddy Yield and Growth Rate - Kelantan

Year	Main Season Paddy Yield (t/ha)	Year	Off Season Paddy Yield (t/ha)
1975/76	1.972	1976	2.680
1976/77	2.432	1977	2.895
1977/78	2.510	1978	2.779
1978/79	2.368	1979	2.713
1979/80	2.508	1980	3.114
1980/81	2.478	1981	2.817
1981/82	2.161	1982	3.422
1982/83	2.357	1983	3.341
1983/84	2.221	1984	2.870
1984/85	2.783	1985	3.026
Average	2.384	Average	2.966

Note: $y = 2.232 + 0.026x$

$y = 2.713 + 0.046x$

$$GR = \frac{0.026}{2.232} = 0.0116 = 1.2\%$$

$$GR = \frac{0.046}{2.713} = 0.01695 = 1.7\%$$

Source: SEPU

Table 8-13. Paddy Yield and Growth Rate-Kelantan

Year	Main Season Paddy Yield (t/ha)	Year	Off Season Paddy Yield (t/ha)
1970	2.180	1970	2.662
1971	2.302	1971	2.795
1972	1.954	1972	2.936
1973	2.267	1973	2.475
1974	2.224	1974	2.852
1975	1.847	1975	2.567
1976	1.973	1976	2.681
1977	2.429	1977	2.896
1978	2.511	1978	2.780
1979	2.369	1979	2.715
1980	2.509	1980	3.114
Average	2.233	Average	2.770

Note: $y = 2.349 + 0.0444x$

$y = 2.653 + 0.0195x$

$$GR = \frac{0.044}{2.349} = 1.9\%$$

$$GR = \frac{0.0195}{2.653} = 0.7\%$$

Table B-14 Paddy Yield for Main Season

(unit: tons/ha harvested)

District	At Present (1985)	1998/1999	2000/2001	2002/2003	2004/2005	2005/2006	2006/2007	2007/2008	2008/2009	2009/2010	2010/2011	2011/2012	2012/2013	2013/2014	2014/2015	2015/2016	2016/2017	2017/2018	
Kota Bharu	2.71	3.20	3.24	3.28	3.32	3.36	3.40	3.44	3.48	3.52	3.56	3.60	3.64	3.68	3.73	3.76	3.76	3.76	3.76
Inside	2.93	3.46	3.50	3.54	3.59	3.63	3.67	3.72	3.76	3.76	3.76	3.76	3.76	3.76	3.76	3.76	3.76	3.76	3.76
Irrigation scheme	2.79	3.30	3.34	3.38	3.42	3.46	3.50	3.54	3.59	3.63	3.68	3.72	3.76	3.76	3.76	3.76	3.76	3.76	3.76
(irrigated)	2.96	3.50	3.54	3.58	3.63	3.67	3.72	3.76	3.76	3.76	3.76	3.76	3.76	3.76	3.76	3.76	3.76	3.76	3.76
Machang	2.71	3.20	3.24	3.28	3.32	3.36	3.40	3.44	3.48	3.52	3.56	3.60	3.64	3.68	3.73	3.76	3.76	3.76	3.76
Tanah Merah	2.79	3.30	3.34	3.38	3.42	3.46	3.50	3.54	3.59	3.63	3.68	3.72	3.76	3.76	3.76	3.76	3.76	3.76	3.76
	2.83	3.35	3.39	3.43	3.47	3.51	3.56	3.60	3.64	3.68	3.73	3.76	3.76	3.76	3.76	3.76	3.76	3.76	3.76
Kota Bharu	2.28	2.69	2.72	2.75	2.79	2.82	2.86	2.89	2.92	2.92	2.92	2.92	2.92	2.92	2.92	2.92	2.92	2.92	2.92
Pasir Mas	1.74	2.06	2.08	2.11	2.14	2.16	2.19	2.21	2.24	2.27	2.29	2.32	2.35	2.35	2.35	2.35	2.35	2.35	2.35
Outside	2.14	2.53	2.56	2.59	2.62	2.65	2.69	2.72	2.75	2.78	2.82	2.85	2.88	2.88	2.88	2.88	2.88	2.88	2.88
Irrigation scheme	2.13	2.52	2.55	2.58	2.61	2.64	2.67	2.71	2.74	2.77	2.81	2.84	2.87	2.87	2.87	2.87	2.87	2.87	2.87
(Rainfed)	2.01	2.38	2.41	2.44	2.47	2.50	2.53	2.56	2.59	2.62	2.65	2.68	2.72	2.72	2.72	2.72	2.72	2.72	2.72
Machang	2.36	2.79	2.82	2.86	2.89	2.93	2.96	3.00	3.03	3.03	3.03	3.03	3.03	3.03	3.03	3.03	3.03	3.03	3.03
Tanah Merah	2.43	2.87	2.90	2.94	2.97	3.01	3.05	3.08	3.12	3.12	3.12	3.12	3.12	3.12	3.12	3.12	3.12	3.12	3.12

Note: 1) Annual growth ratio is estimated at 1.2 percent using the production of paddy harvested from 1975/76 to 1984/85, sourced from the data of Kelantan Province (SEPU).

2) Paddy yield at present is calculated on yield by the district from 1978/79 to 1984/85 sourced from the SEPU.

3) Figures are yield with harvested area of paddy.

Table 8-15 Paddy Yield for Off Season

Districts	(unit: tons/ha harvested)																					
	At Present (1985)	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	
Kota Bharu	3.11	3.45	3.48	3.50	3.53	3.55	3.58	3.60	3.63	3.65	3.68	3.70	3.73	3.75	3.78	3.80	3.83	3.86	3.89	3.91		
Inside	2.90	3.20	3.22	3.24	3.27	3.29	3.31	3.34	3.36	3.38	3.41	3.43	3.46	3.48	3.51	3.53	3.56	3.58	3.61	3.63	3.66	
Irrigation scheme	2.82	3.11	3.13	3.15	3.18	3.20	3.22	3.24	3.27	3.29	3.32	3.34	3.36	3.38	3.41	3.43	3.46	3.48	3.50	3.52	3.55	
(irrigated)	3.36	3.71	3.74	3.76	3.79	3.81	3.84	3.87	3.90	3.93	3.95	3.95	3.95	3.95	3.95	3.95	3.95	3.95	3.95	3.95	3.95	
Bachoh	2.99	3.30	3.32	3.35	3.37	3.39	3.42	3.44	3.47	3.49	3.52	3.54	3.57	3.59	3.62	3.65	3.67	3.70	3.72	3.75	3.77	
Machang	3.27	3.61	3.64	3.66	3.69	3.71	3.74	3.76	3.79	3.82	3.84	3.87	3.90	3.93	3.95	3.95	3.95	3.95	3.95	3.95	3.95	
Tanah Merah	-																					
Kota Bharu	2.79	3.08	3.10	3.12	3.15	3.17	3.19	3.21	3.23	3.25	3.28	3.32	3.34	3.36	3.34	3.34	3.34	3.34	3.34	3.34	3.34	3.34
Pasir Mas	2.66	2.93	2.95	2.97	2.99	3.01	3.03	3.06	3.08	3.10	3.12	3.15	3.17	3.17	3.17	3.17	3.17	3.17	3.17	3.17	3.17	3.17
Outside	2.64	2.91	2.93	2.95	2.97	2.99	3.01	3.03	3.06	3.08	3.10	3.12	3.15	3.15	3.15	3.15	3.15	3.15	3.15	3.15	3.15	3.15
Irrigation scheme	3.11	3.43	3.45	3.48	3.50	3.53	3.55	3.58	3.60	3.63	3.65	3.68	3.70	3.70	3.70	3.70	3.70	3.70	3.70	3.70	3.70	3.70
(Mainfed)	2.66	2.93	2.95	2.97	2.99	3.01	3.06	3.06	3.08	3.10	3.12	3.15	3.17	3.17	3.17	3.17	3.17	3.17	3.17	3.17	3.17	3.17
Machang	2.87	3.17	3.19	3.21	3.24	3.26	3.28	3.31	3.33	3.35	3.38	3.40	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42
Tanah Merah	2.63	2.90	2.92	2.94	2.96	2.98	3.00	3.02	3.05	3.07	3.09	3.11	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14	3.14

Note: 1) Annual growth ratio is estimated at 0.7 percent using the production of paddy harvested from 1970 to 1980 sourced from the data of Kelantan Province (Department of Agricultural, Agricultural Basic Statistics).

2) Paddy yield at present is calculated on yield by the district from 1978/79 to 1984/85 sourced from the SEFU.

Table 8-16 Price Structure for Rice

Item	1986		1995		2000	
	Financial	Economic	Financial	Economic	Financial	Economic
1. Export price of Thai 5% broken, FOB. Bangkok 1/	177	177	212	212	216	216
2. Grade difference (less 10%) 2/	-18	-18	-21	-21	-21	-21
3. Ocean freight and insurance 3/	+30	+30	+30	+30	+30	+30
4. C.i.f. price, Port Klang M\$/mt (US\$1 = M\$2.50) 4/	189	189	221	221	225	225
5. C.i.f. price, Port Klang	473	473	553	553	563	563
6. Port handling 5/	+30	+22	+30	+22	+30	+22
7. Transport cost, Port Klang to Kota Bharu 6/	+140	+92	+140	+92	+140	+92
8. Wholesale price, Kota Bharu	643	587	723	667	733	677
9. Transport cost, KADA area to K.B.	-5	-4	-5	-4	-5	-4
10. Ex-mill price, KADA area	638	583	718	663	728	673
11. Paddy equivalent, KADA area 7/	415	379	467	431	473	437
12. Milling Cost 8/	-49	-44	-49	-44	-49	-44
13. Farm-gate price 9/	366	335	418	387	424	393

Note: 1/ Macro and Financial Assumption and Half-Yearly Revision of Commodity Price Forecasts, World Bank Memorandum Feb. 5, 1987.

2/ The grades produced in the projected area close in equality to 15% broken Thai rice according to W.B. data. Then the quality adjustment is reduced 10%.

3/ Based on the Kemasin-Semerak Integrated Rural Development Project Phase II, Economic Reevaluation of Project, 1986.

4/ Exchange rate is based on the rates which Consultants collected during the field survey.

5/ The charge is based on the Kemasin-Semerak Report, 1986.

6/ The transport cost is based on the Kemasin-Semerak Report, 1986.

7/ The rate of recovery is 65% based on the information from LPN, PERINGAT.

8/ The milling cost is based on the Kemasin-Semerak Report, 1986.

9/ A conversion factor of 0.89 applied for port handling.

Actual farm gate price of rice is 0.58 m\$/kg in 1986.

The converted price of paddy is 0.377 m\$/kg.

Table 8-17 Production Cost of Paddy per ha. (traditional)
- Market Price -

(unit: M\$)

Item	Materials	Family labor		Total Cost
		Labor day	Wage	
1. Preparation of nursery	-	5	45.00	45.00
2. Seed 1/	20.00	1	9.00	29.00
3. Plowing (contract)	-	-	-	200.00
4. Transplanting (contract)	-	-	-	225.00
5. Fertilizing 2/	170.00	3	27.00	197.00
6. Pesticiding & weeding 3/	134.00	7	63.00	197.00
7. Harvesting (contract)	-	-	-	330.00
8. Others 4/	-	-	-	74.00
<u>Total</u>	<u>338.00</u>	<u>16</u>	<u>144.00</u>	<u>1,297.00</u>

Note:

1/ Seed: 25 kg x \$0.75 = \$18.75 \approx \$20.00

2/ Fertilizer: Amophos 10 kg/ha
N 80 kg/ha
P₂O₅ 30 kg/ha
K₂O₅ 20 kg/ha

3/ Chemical (to be altered)

Furadan 3G 10, kg
Rumputox 2.2 kg
Sumidan 49.4 kg

4/ Transportation from paddy field to mill.

Source: KADA

Table 8-18. Production Cost of Paddy per ha. (traditional)
- Economic/Accounting Price -

(unit: M\$)

Item	Materials	Family labor		Total Cost
		Labor day	Wage	
1. Preparation of nursery	-	5	27	27
2. Seed	17	1	6	23
3. Plowing (contract)	-	-	-	172
4. Transplanting (contract)	-	-	-	135
5. Fertilizing	146	3	16	162
6. Pesticiding & weeding	115	7	38	153
7. Harvesting (contract)	-	-	-	198
8. Others	-	-	-	64
<u>Total</u>	<u>278</u>	<u>16</u>	<u>87</u>	<u>934</u>

Note: Conversion factor for agricultural inputs in 0.86.

Shadow rate of unskilled labor's wage in 0.6.

in 5.4 M\$.

Table 8-19 Production Cost of Paddy per ha (direct seeding)
- Market Price -

(unit: M\$)

Item	Materials	Family labor		Total Cost
		Labor day	Wage	
Land preparation	250	2	18	268
Seed <u>1/</u>	30	-	-	30
Broadcasting	-	3	27	27
Pesticide & weeding	140	11	99	239
Fertilizing <u>2/</u>	200	2	18	218
Harvesting (contract)	-	-	-	300
Others	-	-	-	54
<u>Total</u>	<u>620</u>	<u>18</u>	<u>162</u>	<u>1,136</u>

Note: 1/ Seeds 40 kg x 0.75\$ = \$30

2/ Fertilizer: N = 100 kg, P₂O₅ = 40 kg, K₂O = 30 kg

Source: KADA

Table 8-20. Production Cost of Paddy per ha. (direct seeding)
- Economic/Accounting Price -

(unit: M\$)

Item	Materials	Family labor		Total Cost
		Labor day	Wage	
Land preparation	215	2	11	226
Seed	26	-	-	26
Broadcasting	-	3	16	16
Pesticide & weeding	120	11	59	179
Fertilizing	172	2	11	183
Harvesting (contract)	-	-	-	180
Others	-	-	-	46
<u>Total</u>	<u>533</u>	<u>18</u>	<u>97</u>	<u>856</u>

Note: Conversion factor for agricultural inputs in 0.86.
Shadow rate of unskilled labor's wage in 0.6.

Table 8-20-1 Production Cost of Maize per ha.

Item	Materials	Unit:M\$		Total Cost
		Family Labor		
		Labor days	Wage	
1.Land preparation(contract)	-	-	-	250
2.Lime 1/	83	5	45	128
3.Seeds 2/	-	8	72	72
4.Seeding	200	-	-	200
5.Fertilizer3/	227	8	72	299
6.Weeding 4/	58	10	90	148
7.Pest control	60	10	90	150
8.Harvesting	-	10	90	90
<u>Total</u>	<u>628</u>	<u>51</u>	<u>459</u>	<u>1,337</u>

Note: 1/ 2.5 MT 3times

2/ Seeds 20 kg

3/ Urea 220 kg Triple Superphosphate 130 kg
Muriate of potash 70 kg

4/ Herbicide Mixed paraquat 1.6 kg, Atrazine 2.5 kg

Table 8-20-2 Production Cost Of Maize per ha.

Item	Materials	Unit:M\$		Total Cost
		Family Labor		
		Labor days	Wage	
1.Land preparation	-	-	-	215
2.Line	71	5	27	98
3.Seeds	-	8	43	43
4.Seedling	172	-	-	172
5.Fertilizer	195	8	43	238
6.Weeding	50	10	54	104
7.Pest Control	52	10	54	106
8.Harvesting	-	10	54	54
<u>Total</u>	<u>540</u>	<u>51</u>	<u>275</u>	<u>815</u>

Table 8-20-3 Production Cost of Ground nuts per ha.

Item	Materials	Unit:M\$		Total Cost
		Family Labor		
		Labor days	Wage	
1.Land preparation(contract)	-	-	-	250
2.Seeding	-	17	153	153
3.Seeds 1/	200	-	-	200
4.Fertilizer 2/	293	10	90	383
5.Pest control	65	7	63	128
6.Weeding 3/	105	20	180	289
7.Harvesting	-	47	423	423
<u>Total</u>	<u>667</u>	<u>101</u>	<u>909</u>	<u>1,826</u>

Note; 1/ Seeds 100 kg

2/ Fertilizer: Sulphate of Amonia 162 kg, Tripule Super-
phosphate 122 kg, Muriete of Potash 93 kg Kapor 1MT

3/ Herbicide: Lasso 4.6 liter

Table 8-20-4 Production Cost of Ground Nuts per ha.
-Economic Price - Unit:M\$

Item	Materials	Family Labor		Total Cost
		Labor days	Wage	
1.Land preparation(contract)	-	-	-	215
2.Seedling	-	17	92	92
3.Seeds	172	-	-	172
4.Fertilizer	252	10	54	306
5.Pest Control	56	7	38	94
6.Weeding	90	20	108	198
7.Harvesting	-	47	254	254
<u>Total</u>	<u>570</u>	<u>101</u>	<u>546</u>	<u>1,331</u>

Table 8-20-5 Production Cost of Tobacco per ha.
-Market Price - Unit:M\$

Item	Materials	Family Labor		Total Cost
		Labor days	Wage	
1.Nursery bed	39	18	162	201
2.Mengerek	49	94	846	895
3.Plastik	108	-	-	108
4.Land preparation	34	-	-	34
5.Planting	-	104	936	936
6.Watering	-	15	135	135
7.Fertilizer 1/	350	12	108	458
8.Pest control	244	15	135	379
9.Weeding	-	32	288	288
10.Mengasi	-	20	180	180
11.Harvest	-	37	333	333
10.Other	100	-	-	100
<u>Total</u>	<u>924</u>	<u>347</u>	<u>3,123</u>	<u>4,047</u>

Note: 1/ N= 20 kg/ha, p₂O₅=168 kg/ha, k₂O=134 kg/ha
MgO=27 kg/ha, B=3.5 kg/ha

Table 8-20-6 Production Cost of Tobacco per ha.
- Economic Price - unit: M\$

Item	Materials	Family Labor		Total Cost
		Labor days	Wage	
1.Nursery bed	34	18	97	131
2.Mengerek	42	94	508	550
3.Plastik	93	-	-	93
4.Land preparation	29	-	-	29
5.Planting	-	104	562	562
6.Watering	-	15	81	81
7.Fertilizing	301	12	65	366
8.Pest control	210	15	81	291
9.Weeding	-	32	173	173
10.Mengasi	-	20	108	108
11.Harvest	-	37	200	200
12.Other	86	-	-	86
<u>Total</u>	<u>795</u>	<u>347</u>	<u>1,875</u>	<u>2,670</u>

Table 8-20-7 Production Cost of Sorghum per ha.
-Market Price - Unit: M\$

Item	Materials	Family Labor		Total Cost
		Labor days	Wage	
1.Land preparation	-	-	-	250
2.Liming	42	3	27	69
3.Seedling	112	10	90	202
4.Fertilizer	339	8	72	411
5.Pest control	60	5	45	105
6.Weeding	58	3	27	85
7. Harvesting	-	10	90	90
<u>Total</u>	<u>611</u>	<u>39</u>	<u>351</u>	<u>1,212</u>

Table 8-20-8 Production Cost of Sorghum per ha.
-Economic Price - Unit:M\$

Item	Materials	Family Labor		Total Cost
		Labor days	Wage	
1.Land Preparation	-	-	-	215
2.Liming	36	3	16	52
3.Seedling	96	10	54	150
4.Fertilizer	292	8	43	335
5.Pest control	52	5	27	79
6.Weeding	50	3	16	66
7.Harvesting	-	10	54	54
<u>Total</u>	<u>526</u>	<u>39</u>	<u>210</u>	<u>951</u>

Table 8-20-9 Production Cost of Cabbage per ha.
-Economic Price - Unit:M\$

Item	Material	Family Labor		Total Cost
		Labor days	Wage	
1.Land preparation	-	40	360	360
2.Nursery bed	-	12	108	108
3.Seed 1/	90	-	-	90
4.Mengubah anak benih	-	25	225	225
5.Watering	-	12	108	108
6.Fertilizing (6x)2/	2,137	17	153	2,290
7.Pest control	937	40	360	1,295
8.Weeding	-	7	63	63
9.Mengganti pokok mati	-	7	63	63
10.Harvesting and prepare for selling	-	10	90	90
<u>Total</u>	<u>3,162</u>	<u>170</u>	<u>1,530</u>	<u>4,692</u>

Note: 1/ 0.2 kg x M\$ 90/200gm =M\$ 90

2/ Humus 5MT x M\$ 100/MT

Nitrophoska Blue Special 2MT x M\$ 800/MT ,Urea 80kg x M\$ 460/MT

Table 8-20-10 Production Cost of Cabbage per ha.

Item	Materials	unit:M\$		Total Cost
		Labor day	Family Labor Wage	
1.Land preparation	-	40	216	216
2.Nursery bed	-	12	65	65
3.Seed	77	-	-	77
4.Mengubah anak benih	-	25	135	135
5.Watering	-	12	65	65
6.Fertilizing	1,838	17	92	1,930
7.Pest control	804	40	216	1,020
8.Weeding	-	7	38	38
9.Mengganti pekok mati	-	7	38	38
10.Harvesting & prepare for selling	-	10	54	54
Total	2,719	170	919	3,638

Note: Conversion factor for agricultural inputs is 0.86.

Shadow rate of unskilled labor's wage is M\$9 x 0.6 = M\$5.4

Production costs mentioned above tables are estimated using these rates.

Table 8-21 Case - 5 Cropping Area With Project --- Paddy

(unit:ha)

Main Season	1998/99	99/2000	2000/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	08/09	09/10	10/11	11/12
Kemubu	693	693	693	693	693	693	693	693	693	693	693	693	693	693
Lemal & Pasir M.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sub-total	693	693	693	693	693	693	693	693	693	693	693	693	693	693
North Lemal	-	2,915	2,915	3,280	3,280	3,280	3,280	3,280	3,280	3,280	3,280	3,280	3,280	3,280
Ulu Lemal	-	3,045	3,045	3,425	3,425	3,425	3,425	3,425	3,425	3,425	3,425	3,425	3,425	3,425
Sg. Bagan	-	1,296	1,296	1,458	1,458	1,458	1,458	1,458	1,458	1,458	1,458	1,458	1,458	1,458
Tase Garu	-	-	-	-	-	-	14,920	14,920	14,920	16,785	16,785	16,785	16,785	16,785
Sg. Sat	-	-	-	-	-	-	-	-	-	1,458	1,458	1,640	1,640	1,640
Panyit	-	-	-	-	-	-	-	-	-	987	987	1,110	1,110	1,110
Kusial	-	-	-	-	-	-	-	-	-	1,000	1,000	1,125	1,125	1,125
Total	693	7,949	7,949	8,856	8,856	8,856	8,856	8,856	23,776	29,086	29,086	29,086	29,516	29,516
Off Season	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Kemubu	35	35	35	35	35	35	35	35	35	35	35	35	35	35
Lemal & Pasir M.	1,540	1,540	1,540	1,540	1,540	1,540	1,540	1,540	1,540	1,540	1,540	1,540	1,540	1,540
Sus-total	1,575	1,575	1,575	1,575	1,575	1,575	1,575	1,575	1,575	1,575	1,575	1,575	1,575	1,575
North Lemal	-	-	-	341	341	341	341	341	341	341	341	341	341	341
Ulu Lemal	-	-	-	341	341	341	341	341	341	341	341	341	341	341
Sg. Bagan	-	-	-	134	134	134	134	134	134	134	134	134	134	134
Tase Garu	-	-	-	-	-	-	-	3,374	5,239	5,239	7,104	7,104	7,104	7,104
Sg. Sat	-	-	-	-	-	-	-	-	-	-	144	326	326	507
Panyit	-	-	-	-	-	-	-	-	-	-	104	227	227	350
Kusial	-	-	-	-	-	-	-	-	-	-	750	875	875	1,000
Total	1,575	1,575	1,575	2,391	2,391	2,391	2,391	5,765	7,630	7,630	10,493	10,923	10,923	11,352
Grand Total	2,268	9,524	9,524	11,247	11,247	11,247	11,247	14,621	31,406	31,406	39,579	40,009	40,439	40,868

Table 8-22. Case 5 Cropping Area without Project --- Paddy

(unit: ha)

Main Season	1998/99	99/2000	2000/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	08/09	09/10	10/11	11/12
Kemubu	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lemal & Pasir M.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sub-total	-	-	-	-	-	-	-	-	-	-	-	-	-	-
North Lemal	-	1,057	1,057	1,057	1,057	1,057	1,057	1,057	1,057	1,057	1,057	1,057	1,057	1,057
Uln Lemal	-	1,522	1,522	1,522	1,522	1,522	1,522	1,522	1,522	1,522	1,522	1,522	1,522	1,522
Sg. Bagan	-	1,231	1,231	1,231	1,231	1,231	1,231	1,231	1,231	1,231	1,231	1,231	1,231	1,231
Tase. Garu	-	-	-	-	-	-	2,560	2,560	2,560	2,560	2,560	2,560	2,560	2,560
Sg. Sat	-	-	-	-	-	-	-	-	-	1,385	1,385	1,385	1,385	1,385
Panyit	-	-	-	-	-	-	-	-	-	938	938	938	938	938
Kusial	-	-	-	-	-	-	-	-	-	500	500	500	500	500
Total	-	3,810	3,810	3,810	3,810	3,810	3,810	6,370	6,370	9,193	9,193	9,193	9,193	9,193
Off Season	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Kemubu	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lemal & Pasir M.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sub-total	-	-	-	-	-	-	-	-	-	-	-	-	-	-
North Lemal	437	437	437	437	437	437	437	437	437	437	437	437	437	437
Uln Lemal	654	654	654	654	654	654	654	654	654	654	654	654	654	654
Sg. Bagan	103	103	103	103	103	103	103	103	103	103	103	103	103	103
Tase. Garu	-	-	-	-	-	-	800	800	800	800	800	800	800	800
Sg. Sat	-	-	-	-	-	-	-	-	-	-	128	128	128	128
Panyit	-	-	-	-	-	-	-	-	-	-	86	86	86	86
Kusial	-	-	-	-	-	-	-	-	-	-	75	75	75	75
Total	1,194	1,194	1,194	1,194	1,194	1,194	1,994	1,994	1,994	1,994	2,283	2,283	2,283	2,283
Grand Total (ha)	1,194	5,004	5,004	5,004	5,004	5,004	5,804	5,804	8,364	8,364	11,476	11,476	11,476	11,476

Table 8-22-1 Case-5 Cropped Area of the Upland Crops

Unit:ha

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
<u>Without Project</u>												
Maize	259	265	272	278	285	292	298	305	311	318	325	330
Groundnuts	340	340	340	340	340	340	340	340	340	340	340	340
Tobacco	1,393	1,423	1,450	1,479	1,507	1,535	1,565	1,593	1,621	1,649	1,677	1,708
Sorghum	-	-	-	-	-	-	-	-	-	-	-	-
Vegetable	292	292	292	292	292	292	292	292	292	292	292	292
Total	2,284	2,320	2,354	2,389	2,424	2,459	2,495	2,530	2,564	2,599	2,634	2,670
<u>With Project</u>												
Maize	816	821	823	827	830	834	837	1,501	1,503	1,505	1,508	1,511
Groundnuts	2,790	2,790	2,790	2,790	2,790	2,790	2,790	3,290	3,290	3,290	3,290	3,290
Tobacco	3,240	3,255	3,272	3,287	3,303	3,318	3,335	4,127	4,131	4,136	4,840	4,840
Sorghum	-	-	-	-	-	-	-	4,570	4,570	4,570	4,570	4,570
Vegetable	938	938	938	938	938	938	938	1,399	1,399	1,399	1,633	1,633
Total	7,784	7,803	7,823	7,842	7,861	7,880	7,900	14,887	14,893	14,900	15,841	15,844

Table 8-23 Case-1 Net Production Value (Unit: million M\$)
- Market Price -

	*1999	*2000	*2001	*2002	*2003	*2004	*2005	*2006	*2007	*2008	*2009	*2010	*2011	*2012	*2013	*2014	*2015	*2016	*2017	*2018	
With Project																					
G.P.V.	3.55	3.60	3.66	3.74	3.80	3.82	3.84	3.85	3.87	3.89	3.91	3.93	3.94	3.97	3.98	4.00	4.02	4.04	4.06	4.06	4.06
P.C.	2.58	2.58	2.58	2.58	2.58	2.58	2.58	2.58	2.58	2.58	2.58	2.58	2.58	2.58	2.58	2.58	2.58	2.58	2.58	2.58	2.58
N.P.V.	0.97	1.02	1.08	1.16	1.22	1.24	1.26	1.27	1.29	1.31	1.33	1.35	1.36	1.39	1.40	1.42	1.44	1.46	1.48	1.48	1.48
Without Project																					
G.P.V.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P.C.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N.P.V.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Incremental																					
N.P.V.	0.97	1.02	1.08	1.16	1.22	1.24	1.26	1.27	1.29	1.31	1.33	1.35	1.36	1.39	1.40	1.42	1.44	1.46	1.48	1.48	1.48

Table 8-24 Case-2 Net Production Value (Unit: million M\$)
- Market Price -

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	
With Project																					
G.P.V.	10.03	22.52	22.75	25.54	25.79	26.02	26.27	26.42	26.52	26.63	26.68	26.75	27.79	26.86	26.90	27.15	27.20	27.27	27.31	27.36	27.36
P.C.	6.52	15.27	15.27	16.87	16.87	16.87	16.87	16.87	16.87	16.87	16.87	16.87	16.87	16.87	16.87	16.87	16.87	16.87	16.87	16.87	16.87
N.P.V.	3.51	7.25	7.48	8.67	8.92	9.15	9.40	9.55	9.65	9.76	9.81	9.88	9.92	9.99	10.03	10.28	10.33	10.40	10.44	10.49	10.49
Without Project																					
G.P.V.	1.72	5.06	5.11	5.17	5.22	5.27	5.33	5.38	5.41	5.45	5.49	5.52	5.52	5.53	5.53	5.53	5.53	5.54	5.54	5.54	5.54
P.C.	1.42	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
N.P.V.	0.30	1.06	1.11	1.17	1.22	1.27	1.33	1.38	1.41	1.45	1.49	1.52	1.52	1.53	1.53	1.53	1.53	1.54	1.54	1.54	1.54
Incremental N.P.V.	3.21	6.19	6.37	7.50	7.70	7.88	8.07	8.17	8.24	8.51	8.32	8.36	8.40	8.46	8.50	8.75	8.80	8.87	8.91	8.95	8.95

Table 8-25 (Unit: million M\$)

Case-3 Net Production Value
- Market Price -

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	
With Project																					
G.P.V.	12.83	26.62	26.89	30.27	30.56	30.85	31.14	49.77	79.47	80.17	98.02	99.24	100.26	101.05	101.25	101.73	101.93	102.25	102.44	102.72	
P.C.	8.76	18.03	18.03	20.09	20.09	20.09	20.09	32.80	56.44	56.44	62.96	63.45	63.94	63.94	63.94	63.94	63.94	63.94	63.94	63.94	
N.P.V.	4.07	8.59	8.86	10.18	10.47	10.76	11.05	16.97	23.03	23.73	35.06	35.79	36.32	37.11	37.31	37.79	37.99	38.29	38.50	38.78	
Without Project																					
G.P.V.	1.90	7.12	7.20	7.23	7.35	7.43	7.51	8.82	12.56	12.64	17.93	17.99	18.05	18.06	18.06	18.06	18.07	18.07	18.08	18.08	
P.C.	1.55	6.49	6.49	6.49	6.49	6.49	6.49	7.53	10.85	10.85	14.88	14.88	14.88	14.88	14.88	14.88	14.88	14.88	14.88	14.88	
N.P.V.	0.35	0.63	0.71	0.74	0.86	0.94	1.02	1.29	1.71	1.79	3.05	3.11	3.17	3.18	3.18	3.19	3.19	3.19	3.20	3.20	
Incremental N.P.V.	3.72	7.96	8.15	9.44	9.61	9.82	10.03	15.68	21.32	21.94	32.01	32.68	33.15	33.93	34.13	34.60	34.80	35.09	35.50	35.57	

Table 8-26 (Unit: million M\$)

Case-4 Net Production Value
- Market Price -

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	
With Project																					
G.P.V.	12.83	26.62	26.89	30.27	30.56	30.85	31.14	37.67	47.95	48.30	58.59	59.44	60.13	62.57	62.67	62.99	63.09	63.23	63.35	63.45	
P.C.	8.76	18.03	18.03	20.09	20.09	20.09	20.09	24.45	31.00	31.00	37.31	37.66	38.00	38.46	38.36	38.36	38.36	38.36	38.36	38.36	
N.P.V.	4.07	8.59	8.86	10.18	10.47	10.76	11.05	13.22	16.95	17.30	21.28	21.78	22.13	24.21	24.31	24.63	24.73	24.87	24.97	25.09	
Without Project																					
G.P.V.	1.90	7.12	7.20	7.23	7.35	7.43	7.51	8.82	12.56	12.64	17.03	17.09	17.14	17.15	17.15	17.16	17.17	17.17	17.18	17.18	
P.C.	1.55	6.49	6.49	6.49	6.49	6.49	6.49	6.49	7.53	7.53	10.85	10.85	14.14	14.14	14.14	14.14	14.14	14.14	14.14	14.14	
N.P.V.	0.35	0.63	0.63	0.74	0.86	0.94	1.02	1.29	1.71	1.79	2.89	2.95	3.00	3.01	3.01	3.02	3.03	3.03	3.04	3.04	
Incremental N.P.V.	3.72	7.96	8.23	9.44	9.61	9.82	10.03	11.93	15.24	15.51	18.39	18.83	19.13	21.20	21.30	21.61	21.70	21.84	21.93	22.05	

Table 8-27 Case-5 Gross Production Value, Production Cost and Net Production Value
Unit: Million MS

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	
With Project																					
G.P.V. :																					
Paddy	3.56	15.72	15.95	19.14	19.38	19.57	19.77	23.46	55.00	55.51	70.23	71.26	72.15	73.09	73.19	73.55	73.45	75.58	75.68	75.80	
Upland Crop	29.75	31.86	34.14	35.22	37.01	37.10	37.19	60.55	60.57	60.60	66.18	66.19	66.19	66.19	66.19	66.19	66.19	66.19	66.19	66.19	66.19
Total	55.29	47.58	50.07	54.36	56.39	56.67	56.96	86.01	115.57	116.11	136.41	137.45	138.34	139.28	139.38	139.74	139.64	139.77	139.87	139.99	
P.C. :																					
Paddy	2.58	10.82	10.82	12.78	12.78	12.78	12.78	16.61	35.68	35.68	44.96	45.45	45.94	46.43	46.43	46.43	46.43	46.43	46.43	46.43	
Upland Crop	23.79	23.86	23.95	23.99	24.06	24.13	24.20	36.95	36.97	36.97	40.97	40.97	40.97	40.97	40.97	40.97	40.97	40.97	40.97	40.97	
Total	26.37	34.68	34.75	36.77	36.84	36.91	36.98	53.56	72.65	72.65	85.93	86.42	86.91	87.40	87.40	87.40	87.40	87.40	87.40	87.40	
N.P.V.	6.92	12.90	15.32	17.59	19.55	19.76	19.98	32.45	42.92	43.46	50.48	51.03	51.41	51.88	51.98	52.12	52.22	52.37	52.47	52.59	
Without Project																					
G.P.V. :																					
Paddy	1.90	7.12	7.20	7.23	7.35	7.45	7.51	8.82	12.56	12.64	17.95	17.99	18.05	18.06	18.06	18.07	18.08	18.08	18.08	18.09	
Upland Crop	8.59	8.75	8.84	8.97	9.10	9.22	9.36	9.48	9.61	9.73	9.86	9.98	9.99	9.99	9.99	9.99	9.99	9.99	9.99	9.99	
Total	10.49	15.85	16.04	16.02	16.45	16.65	16.87	18.30	22.17	22.37	27.79	27.97	28.04	28.05	28.05	28.06	28.07	28.07	28.07	28.08	
P.C. :																					
Paddy	1.55	6.49	6.49	6.49	6.49	6.49	6.49	7.55	10.85	10.85	14.88	14.88	14.88	14.88	14.88	14.88	14.88	14.88	14.88	14.88	
Upland Crop	7.98	8.11	8.35	8.36	8.48	8.60	8.75	8.85	8.97	9.10	9.22	9.35	9.35	9.35	9.35	9.35	9.35	9.35	9.35	9.35	
Total	9.53	14.60	14.72	14.85	14.97	15.09	15.22	16.38	19.82	19.95	24.10	24.23	24.23	24.23	24.23	24.23	24.23	24.23	24.23	24.23	
N.P.V.:	0.96	1.25	1.32	1.55	1.48	1.56	1.65	1.92	2.55	2.42	3.69	3.74	3.81	3.82	3.82	3.83	3.84	3.84	3.84	3.85	
Incremental																					
N.P.V.	5.96	11.65	14.00	16.24	18.07	18.20	18.33	30.53	40.57	41.04	46.79	47.29	47.60	48.06	48.16	48.29	48.38	48.55	48.55	48.74	

Table 8-28 Case-1 Net Production Value (unit: million M\$)
- Economic Price-

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	
With Project																					
G.P.V.	2.81	2.83	2.88	2.94	2.99	3.00	3.02	3.03	3.04	3.06	3.07	3.09	3.10	3.12	3.13	3.15	3.16	3.18	3.19	3.19	3.19
P.C.	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94
N.P.V.	0.87	0.89	0.94	1.00	1.05	1.06	1.08	1.09	1.10	1.12	1.13	1.15	1.16	1.18	1.19	1.21	1.22	1.24	1.25	1.25	1.25
Without Project																					
G.P.V.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
P.C.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N.P.V.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Incremental N.P.V.	0.87	0.89	0.94	1.00	1.05	1.06	1.08	1.09	1.10	1.12	1.13	1.15	1.16	1.18	1.19	1.21	1.22	1.24	1.25	1.25	1.25

Table 8-29 Case-2 Net Production Value (unit: million M\$)
- Economic Price-

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	
With Project																					
G.P.V.	7.88	17.70	17.88	20.07	20.27	20.45	20.65	20.77	20.85	20.93	20.97	21.07	21.06	21.11	21.14	21.34	21.38	21.43	21.47	21.50	21.50
P.C.	4.91	11.51	12.78	12.78	12.78	12.78	12.78	12.78	12.78	12.78	12.78	12.78	12.78	12.78	12.78	12.78	12.78	12.78	12.78	12.78	12.78
N.P.V.	2.97	6.29	6.37	7.29	7.49	7.67	7.87	7.99	8.07	8.15	8.19	8.24	8.28	8.33	8.36	8.56	8.60	8.65	8.69	8.72	8.72
Without Project																					
G.P.V.	1.35	3.98	4.02	4.06	4.10	4.10	4.14	4.19	4.23	4.26	4.28	4.31	4.34	4.34	4.35	4.35	4.35	4.35	4.35	4.35	4.35
P.C.	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02
N.P.V.	0.33	2.96	3.00	3.04	3.08	3.08	3.12	3.17	3.21	3.24	3.26	3.29	3.32	3.32	3.33	3.33	3.33	3.33	3.33	3.33	3.33
Incremental N.P.V.	2.64	3.33	3.37	4.25	4.41	4.59	4.75	4.82	4.86	4.91	4.93	4.95	4.96	5.01	5.03	5.23	5.27	5.32	5.36	5.39	5.39

Table 8-30. Case-3 Net Production Value (Unit: million HK\$)
- Economic Price -

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	
With Project																					
G.P.V.	10.08	20.93	21.13	23.79	24.02	24.24	24.47	39.12	62.46	63.01	77.04	78.00	78.81	79.42	79.58	79.96	80.12	80.36	80.51	80.73	
P.C.	6.60	13.59	13.59	15.14	15.14	15.14	24.71	39.09	39.09	47.44	47.81	48.18	48.55	48.55	48.55	48.55	48.55	48.55	48.55	48.55	48.55
N.P.V.	4.48	7.34	7.54	8.65	8.88	9.10	9.53	14.41	23.37	23.92	29.60	30.19	30.63	30.87	31.03	31.41	31.57	31.81	31.96	32.18	
Without Project																					
G.P.V.	1.49	5.60	5.66	5.68	5.78	5.84	5.91	6.94	9.87	9.91	14.09	14.14	14.19	14.19	14.20	14.20	14.20	14.21	14.21	14.22	
P.C.	1.12	4.67	4.67	4.67	4.67	4.67	4.67	5.42	7.81	7.81	10.72	10.72	10.72	10.72	10.72	10.72	10.72	10.72	10.72	10.72	
N.P.V.	0.37	0.93	0.99	1.01	1.11	1.17	1.24	1.52	2.06	2.10	3.37	3.42	3.47	3.47	3.48	3.48	3.48	3.49	3.49	3.49	
Incremental N.P.V.	4.11	6.41	6.55	7.64	7.77	7.93	8.09	12.89	21.31	21.82	26.23	26.77	27.16	27.40	27.55	27.93	28.09	28.32	28.47	28.69	

Table 8-31. Case-4 Net Production Value (Unit: million HK\$)
- Economic Price -

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
With Project																				
G.P.V.	10.08	20.93	21.13	23.79	24.02	24.24	24.47	29.61	37.69	37.96	46.05	46.72	47.26	49.18	49.26	49.51	49.59	49.70	49.78	49.87
P.C.	6.60	13.59	13.59	15.14	15.14	15.14	15.14	18.43	23.36	23.36	28.12	28.38	28.64	28.90	28.90	28.90	28.90	28.90	28.90	28.90
N.P.V.	3.48	7.34	7.54	8.65	8.88	9.10	9.53	11.18	14.33	14.60	17.93	18.34	18.62	20.28	20.36	20.61	20.69	20.80	20.88	20.88
Without Project																				
G.P.V.	1.49	5.60	5.66	5.68	5.78	5.84	5.91	6.94	9.87	9.93	13.38	13.43	13.47	13.48	13.48	13.49	13.49	13.50	13.50	13.50
P.C.	1.12	4.67	4.67	4.67	4.67	4.67	4.67	5.42	7.81	7.81	10.18	10.18	10.18	10.18	10.18	10.18	10.18	10.18	10.18	10.18
N.P.V.	0.37	0.93	0.99	1.01	1.11	1.17	1.24	1.52	2.06	2.12	3.20	3.25	3.29	3.30	3.30	3.31	3.31	3.32	3.32	3.32
Incremental N.P.V.	3.11	6.41	6.55	7.64	7.77	7.93	8.09	9.66	12.27	12.48	14.73	15.09	15.33	16.96	17.06	17.30	17.38	17.48	17.56	17.56

Table 8-32 Case-3 Gross Production Value, Production Cost and Net Production Value
 - Economic Price -
 Unit: Million MS

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
With Project																				
G.P.V.:																				
Paddy	3.02	13.53	15.51	16.23	16.44	16.60	16.77	21.59	46.64	47.07	59.56	60.42	61.16	61.98	62.06	62.19	62.27	62.39	62.48	62.58
Upland Crop	23.93	25.64	27.49	28.54	29.78	29.85	29.92	48.66	48.68	48.71	55.01	55.01	55.01	55.01	55.01	55.01	55.01	55.01	55.01	55.01
Total	26.95	38.97	41.00	44.57	46.22	46.45	46.69	70.25	95.32	95.78	112.57	115.43	114.17	114.99	115.07	115.20	115.28	115.40	115.49	115.59
P.C.:																				
Paddy	1.94	8.15	8.15	9.63	9.63	9.63	9.63	12.52	26.88	26.88	33.88	34.23	34.62	34.98	34.98	34.98	34.98	34.98	34.98	34.98
Upland Crop	16.53	16.57	16.42	16.46	16.51	16.55	16.60	35.89	25.90	25.91	28.61	28.62	28.62	28.62	28.62	28.62	28.62	28.62	28.62	28.62
Total	18.27	24.52	24.57	26.09	26.14	26.18	26.23	38.41	52.78	52.79	62.49	62.87	63.24	63.60	63.60	63.60	63.60	63.60	63.60	63.60
N.P.V.:	8.68	14.45	16.43	18.48	20.08	20.27	20.46	31.84	42.54	42.99	50.08	50.56	50.93	51.39	51.47	51.60	51.68	51.80	51.89	51.99
Without Project																				
G.P.V.:																				
Paddy	1.61	6.04	6.11	6.15	6.24	6.30	6.37	7.48	10.65	10.72	15.21	15.26	15.31	15.31	15.32	15.32	15.33	15.33	15.33	15.34
Upland Crop	6.91	7.01	7.11	7.21	7.32	7.42	7.52	7.62	7.72	7.82	7.93	8.03	8.03	8.03	8.03	8.03	8.03	8.03	8.03	8.03
Total	8.52	13.05	13.22	13.34	13.56	13.72	13.99	15.10	18.37	18.54	23.14	23.29	23.34	23.34	23.35	23.35	23.36	23.36	23.36	23.37
P.C.:																				
Paddy	1.12	4.67	4.67	4.67	4.67	4.67	4.67	5.42	7.81	7.81	10.72	10.72	10.72	10.72	10.72	10.72	10.72	10.72	10.72	10.72
Upland Crop	5.37	5.46	5.54	5.62	5.70	5.78	5.86	5.94	6.02	6.10	6.19	6.27	6.27	6.27	6.27	6.27	6.27	6.27	6.27	6.27
Total	6.49	10.13	10.21	10.29	10.37	10.45	10.53	11.36	13.83	13.91	16.91	16.99	16.99	16.99	16.99	16.99	16.99	16.99	16.99	16.99
N.P.V.:	2.03	2.92	3.01	3.05	3.19	3.27	3.46	3.74	4.54	4.63	6.23	6.30	6.33	6.33	6.33	6.36	6.37	6.37	6.37	6.38
Incremental																				
N.P.V.:	6.65	11.53	13.42	15.43	16.89	17.00	17.00	28.10	38.00	38.36	43.85	44.26	44.58	45.04	45.11	45.24	45.31	45.43	45.52	45.61

Table 8-33 Unit Capital Cost of Main Pump Station in 1977 Year's Price

- ENEX, KRBS -

KRBS Project	Peak Water Demand	Main P.S. Head	Capital Cost	Irrigation Area	Unit Cost
	Qp (m ³ /s)	H (m)	M\$1,000	(ha)	M\$/ha
North Lemal	10.9	7.2	2,836	9,265	306
Ulu Lemal	4.6	12.0	1,995	7,371	271
Upper Ulu Lemal	0.4	16.0	231	758	305
SG. Bagan	2.5	11.0	994	4,281	232
Tasek Garu	15.9	14.0	8,044	18,650	431
SG. Sat	3.5	16.5	2,087	6,652	314
Pertok & Putat Ex. (Panyit)	1.1	12.0	477	1,491	320

Note: 1. Name of KRBS Projects are based on the ENEX Main Report Vol.2: Drainage and Irrigation, Chapter 5. Irrigation Project. Page 23 - 29.

2. Peak water demand and irrigable area are based on Table 5.2, ENEX Main Report Vol.2.

3. Capital cost of main pump station is estimated using the following method.
ENEX Main Report Vol.2. Appendix 2. Pumping installation design parameters:-
The Capital cost of a pump station was assumed to be directly proportional to the installed power capacity of the plant.

$$\text{Installed power} = Qc \times H \times g / Ep$$

Qc: installed pumping capacity (m³/s), H: pumping head (m)

g : gravitational constant (m/s²), Ep: pumping efficiency (%)

Unit capital cost = model P.S cost M\$/installed power KW

Capital cost equations = unit capital cost x Qc x H x g/Ep

$$= 2,360 \times Qc \times H \times g / Ep = 2,360 \times (Qp/0.8) \times H \times 9.8/0.8$$

$$= M\$36,138 \times Qp \times H \text{ (QP: peak irrigation demand)}$$

Table 8-34 Reticulation System Unit Costs in 1977 Year's Price
- ENEX, KRBS -

KRBS Project	Unit Costs	
	(M\$ per ha Gross Scheme Area)	
North Lemal	3,035 x 0.4 (bris soil) + 2,455 x 0.6 = 2,687	
Ulu Lemal	2,455	
Upper Ulu Lemal	2,455	
Sg. Bagan	2,455	
Tasek Garu	3,035 x 0.16 (bris soil) + 2,455 x 0.84 = 2,548	
Sg. Sat	2,455	
Pertok & Putat Ex. (Panyit)	2,455	

Note: Basin irrigation reticulation system costs are based on the ENEX Main Report Vol.2: Drainage and Irrigation, Appendix 8.

	Cost (\$ per ha Gross Scheme Area)
Electrical and mechanical	90
Civil	
Primary, secondary and tertiary canals (unlined)	469
Primary, secondary and tertiary canals (lined) ^{1/}	836
Primary, secondary and tertiary drains	44
Canal structure	379
Drain structure	219
Bridges	23
Operation and maintenance facilities	45
Sub-total (unlined canals)	1,269
x 1.58 multiplier ^{2/}	2,005
Sub-total (lined canals)	1,636
x 1.58 multiplier ^{2/}	2,585
Land acquisition (4.5% gross scheme area)	450
Total (unlined canals)	2,455
Total (lined canals)	3,035

^{1/}: Based on earth lining

^{2/}: Multiplier covers preliminaries and unscheduled items (20%), contingencies (20%), design and supervision (20%)

Table 8-35 On-Farm System Unit Costs in 1977 Year's Price

- ENEX, KRBS -

KRBS Project	Unit Costs (M\$ per ha Irrigation)
North Lemal	833 x 0.4 (bris soil) + 445 x 0.6 = 601
Ulu Lemal	455
Upper Ulu Lemal	455
Sg. Bagan	455
Tasek Garu	833 x 0.16 (bris soil) + 445 x 0.84 = 507
Sg. Sat	455
Pertok & Putat Ex.(Panyit)	455

Note: On-Farm system unit costs are based on the ENEX Main Report Vol.2: Drainage and Irrigation, Appendix 9.

1. Distribution systems are classified by flood, furrow, sprinkler and trickle irrigation type.
2. Costs component consist of unlined or lined canal (class 1, 2 and 3), drains (class 1, 2 and 3), structures (turnouts, flow, water level) and land acquisition.
3. Costs include the preliminaries & unscheduled items of 20%, contingency of 20% and survey, design & supervision of 10%.
4. Distribution system costs are tabulated as follows.

\$ per ha irrigated	Unlined Canals	Lined Canals
Flood	445	833
Furrow	1,507	2,863
Sprinkler	2,387	3,448
Trickle	2,869	3,930

Table 8-36 Operation and Maintenance Unit Cost in 1981 Year's Price

- KADA II East Bank Area -

<u>Item</u>	<u>Financial Cost</u>	<u>Conversion Factor</u>	<u>Economic Cost</u>
1. Labour Cost	M\$1,000		M\$1,000
Canal	703		
Farm Road	442		
On-Farm	804		
Sub-Total	1,949	0.6	1,169
2. Pump			
(Kemubu, Booster, Salor)	365	0.8	292
<u>Total</u>	<u>2,314</u>		<u>1,461</u>
Irrigable Area	20,092 ha		20,092 ha
O & M Cost/ha	115 M\$		73 M\$

Note : Depreciation cost of equipment is excluded because of estimation of replacement costs of pump.

Source: Final Report, KADA II Improvement Project, Kelantan, MOA, Malaysia, 1982, Page 4.7.

Table 8-37 Consumer Price Index, Peninsular Malaysia

<u>Basic Year</u>	<u>Year</u>	<u>Price Index</u>	<u>Price Index 1986/1977</u>	
1967	1967	100.0		
	1970	101.3		
	1975	144.0		
	1976	147.7		
	1977	154.8	100.0	
	1978	162.4		
	1979	168.3		
	1980	179.5	115.95 (179.5/154.8)	
	1980	1980	100.0	
		1981	109.7	
1982		116.1		
1983		120.4		
1984		125.1		
1985		125.5		
1986		126.8	147.0 (115.95x126.8)	

Table 8-38 Capital Cost in 1977 Year's Price - Market Price

Irrigation Project Associated with Lebir Dam Project	Irrigable Area (ha)	Main Pump Station Capital		Reticulation System Capital		On-Farm System Cost Capital		Total Cost (M\$1,000)
		Unit Cost (M\$/ha)	Cost (M\$1,000)	Unit Cost (M\$/ha)	Cost (M\$1,000)	Unit Cost (M\$/ha)	Cost (M\$1,000)	
North Lemal Phase I	3,644	306	1,115	2,687	9,791	601	2,190	13,096
Ulu Lemal	3,806	274	1,043	2,455	9,344	445	1,693	12,080
Sg. Bagan	1,620	232	376	2,455	3,977	445	721	5,074
Tasek Garu	18,650	431	8,038	2,548	47,520	507	9,456	65,014
Sg. Sat	1,822	314	572	2,455	4,473	445	811	5,856
Panyit	1,234	320	395	2,455	3,029	445	549	3,973
Kusial	1,250	320	400	2,455	3,069	445	556	4,025
Total	32,060		11,939		81,203		15,976	109,118

Table 8-39 Operation and Maintenance Cost in 1981 Price
- Market Price -

Project	Irrigable Area (ha)	Unit Cost		O & M Cost (M\$1,000)
		(M\$/ha)	(M\$1,000)	
North Lemal Phase I	3,644	115	419	
Ulu Lemal	3,806	115	438	
Sg. Bagan	1,620	115	186	
Tasek Garu	18,650	115	2,145	
Sg. Sat	1,822	115	210	
Panyit	1,234	115	142	
Kusial	1,250	115	144	
Total	32,060		3,684	

Table 8-40 Capital Cost in 1986 Year's Price

-- Market Price --

(unit: M\$1,000)

<u>Irrigation Project Associated with Lebir Dam Project</u>	<u>Capital Cost in 1977 Prices</u>	<u>Price Index 1986/1977</u>	<u>Capital Cost in 1986 Prices</u>
North Lemal Phase I	13,096	1.47	19,251
Ulu Lemal	12,080	1.47	17,758
Sg. Bagan	5,074	1.47	7,459
Tasek Garu	65,014	1.47	95,570
Sg. Sat	5,856	1.47	8,608
Panyit	3,973	1.47	5,840
Kusial	4,025	1.47	5,917

Table 8-41 Operation and Maintenance Cost in 1986 Year's Price

-- Market Price --

(unit: M\$1,000)

<u>Irrigation Project Associated with Lebir Dam Project</u>	<u>O & M Cost in 1981 Price</u>	<u>Price Index 1986/1981</u>	<u>O & M Cost in 1986 Prices</u>
North Lemal Phase I	419	1.16	486
Ulu Lemal	438	1.16	508
Sg. Bagan	186	1.16	216
Tasek Garu	2,145	1.16	2,488
Sg. Sat	210	1.16	244
Panyit	142	1.16	165
Kusial	144	1.16	167

Table 8-42 Economic Capital Cost in 1986 Year's Price

(unit: M\$1,000)

Project	Financial Cost			Economic Cost		
	F.C	L.C	Total	F.C	L.C	Total
North Lemal Phase I	7,700	11,551	19,251	7,700	8,894	16,594
Ulu Lemal	7,103	10,655	17,758	7,103	8,204	15,307
Sg. Bagan	2,984	4,475	7,459	2,984	3,446	6,430
Tasek Garu	38,228	57,342	95,570	38,228	44,153	82,381
Sg. Sat	3,443	5,165	8,608	3,443	3,977	7,420
Panyit	2,336	3,504	5,840	2,336	2,698	5,034
Kusial	2,367	3,550	5,917	2,367	2,734	5,101

Note: 1. Ratio between foreign currency and local currency is assumed at 40% and 60% based on KADA II Main Report, Table 4-24, Page 4-123.

2. Conversion factor for construction cost to be used in local currency is 0.77.

3. F.C: Foreign Currency L.C: Local Currency

Table 8-43 Economic O & M Cost

(unit: M\$1,000)

Project	Financial Cost	Economic Cost
North Lemal Phase I	486	389
Ulu Lemal	508	406
Sg. Bagan	216	173
Tasek Garu	2,488	1,990
Sg. Sat	244	195
Panyit	165	132
Kusial	167	134

Note: Economic costs are estimated using general conversion factor of 0.8.

Table 8-44 Economic Analysis --- Market Price Base
(Case 5) (unit: M\$ million)

Project Year	Project Cost	O & M Cost	Repl. Cost	Total Cost	Incre. NPV	Benefit	Present Worth Value	
							18%	19%
1. 1994	4.450	-	-	4,450	-	-4.450	-3.771	-3.739
2. 1995	11.115	-	-	11.115	-	-11.115	-7.983	-7.849
3. 1996	11.115	-	-	11.115	-	-11.115	-6.765	-6.596
4. 1997	11.115	-	-	11.115	-	-11.115	-5.733	-5.543
5. 1998	6.673	-	-	6.673	-	6.673	-2.917	-2.797
6. 1999	-	1.342	-	1.342	5.96	4.618	1.711	1.626
7. 2000	9.55	1.342	-	10.892	11.65	0.758	0.238	0.224
8. 2001	9.55	1.342	-	10.892	14.00	3.108	0.827	0.773
9. 2002	19.10	1.342	-	20.442	16.24	-4.202	-0.948	-0.878
10. 2003	19.10	1.342	-	20.442	18.07	-2.372	-0.453	-0.417
11. 2204	25.93	1.342	-	27.272	18.20	-9.072	-1.469	-1.339
12. 2005	18.44	1.342	-	19.782	18.33	-1.452	-0.199	-0.180
13. 2006	4.07	3.830	-	7.900	30.53	22.630	2.632	2.358
14. 2007	6.105	3.830	-	9.935	40.57	30.635	3.021	2.684
15. 2008	4.09	3.830	-	7.920	41.04	33.120	2.766	2.438
16. 2009	-	4.406	-	4.406	46.79	42.384	3.000	2.619
17. 2010	-	4.406	-	4.406	47.29	42.884	2.573	2.230
18. 2011	-	4.406	-	4.406	47.60	43.194	2.194	1.888
19. 2012	-	4.406	-	4.406	48.06	43.654	1.881	1.602
20. 2013	-	4.406	-	4.406	48.16	43.754	1.597	1.348
21. 2014	-	4.406	-	4.406	48.29	43.884	1.356	1.137
22. 2015	-	4.406	-	4.406	48.38	43.974	1.152	0.959
23. 2016	-	4.406	-	4.406	48.53	44.124	0.980	0.807
24. 2017	-	4.406	-	4.406	48.63	44.224	0.831	0.681
25. 2018	-	4.406	2.534	6.940	48.74	41.800	0.669	0.539
26. 2019	-	4.406	-	4.406	48.74	44.334	0.599	0.483
27. 2020	-	4.406	-	4.406	48.74	44.334	0.510	0.403
28. 2021	-	4.406	-	4.406	48.74	44.334	0.430	0.341
29. 2022	-	4.406	-	4.406	48.74	44.334	0.364	0.284
30. 2023	-	4.406	-	4.406	48.74	44.334	0.310	0.239
31. 2024	-	4.406	-	4.406	48.74	44.334	0.262	0.204
32. 2025	-	4.406	8.038	12.444	48.74	36.296	0.181	0.138
33. 2026	-	4.406	-	4.406	48.74	44.334	0.186	0.142
34. 2027	-	4.406	-	4.406	48.74	44.334	0.160	0.120
35. 2028	-	4.406	1.367	5.773	48.74	42.967	0.129	0.099
36. 2029	-	4.406	-	4.406	48.74	44.334	0.115	0.084
37. 2030	-	4.406	-	4.406	48.74	44.334	0.098	0.071
38. 2031	-	4.406	-	4.406	48.74	44.334	0.084	0.058
39. 2032	-	4.406	-	4.406	48.74	44.334	0.071	0.049
40. 2033	-	4.406	-	4.406	48.74	44.334	0.058	0.044
41. 2034	-	4.406	-	4.406	48.74	44.334	0.049	0.035
42. 2035	-	4.406	-	4.406	48.74	44.334	0.044	0.031
43. 2036	-	4.406	-	4.406	48.74	44.334	0.035	0.027
44. 2037	-	4.406	-	4.406	48.74	44.334	0.031	0.022
45. 2038	-	4.406	2.534	6.940	48.74	41.80	0.027	0.018
46. 2039	-	4.406	-	4.406	48.74	44.334	0.022	0.013
47. 2040	-	4.406	-	4.406	48.74	44.334	0.018	0.013
48. 2041	-	4.406	-	4.406	48.74	44.334	0.018	0.009
49. 2042	-	4.406	-	4.406	48.74	44.334	0.013	0.009
50. 2043	-	4.406	-	4.406	48.74	44.334	0.013	0.009
Total							+1.014	-2.480

$$EIRR = 0.18 + 0.01 \times \frac{1.014}{1.014 + 2.480} = 18.29\%$$

Table 8-45 Economic Analysis --- Economic Price Base
(Case 5) (unit: M\$ million)

Project Year	Project Cost	O & M Cost	Repl. Cost	Total Cost	Incre. NPV	Benefit	Present Worth Value	
							18%	19%
1. 1994	3.835	-	-	3.835	-	-3.835	-3.223	-3.196
2. 1995	9.580	-	-	9.580	-	-9.580	-6.765	-6.652
3. 1996	9.580	-	-	9.580	-	-9.580	-5.685	-5.544
4. 1997	9.580	-	-	9.580	-	-9.580	-4.778	-4.620
5. 1998	5.756	-	-	5.756	-	5.756	-2.412	-2.313
6. 1999	-	1.074	-	1.074	6.65	5.576	1.963	1.867
7. 2000	8.240	1.074	-	9.314	11.53	2.216	0.656	0.618
8. 2001	8.240	1.074	-	9.314	13.42	4.106	1.021	0.955
9. 2002	16.480	1.074	-	17.554	15.43	-2.124	-0.444	-0.412
10. 2003	16.480	1.074	-	17.554	16.89	-0.664	-0.117	-0.107
11. 2204	22.350	1.074	-	23.424	17.00	-6.424	-0.948	-0.865
12. 2005	15.856	1.074	-	16.93	17.00	-0.007	-0.001	-0.001
13. 2006	3.510	3.064	-	6.574	28.10	21.526	2.243	2.013
14. 2007	5.265	3.064	-	8.329	38.00	29.675	2.600	2.311
15. 2008	3.515	3.064	-	6.579	38.36	31.781	2.339	2.063
16. 2009	-	3.525	-	3.525	43.85	40.325	2.492	2.182
17. 2010	-	3.535	-	3.525	44.26	40.735	2.118	1.837
18. 2011	-	3.535	-	3.525	44.58	41.055	1.794	1.544
19. 2012	-	3.535	-	3.525	44.04	41.515	1.524	1.299
20. 2013	-	3.535	-	3.525	45.11	41.585	1.281	1.085
21. 2014	-	3.535	-	3.525	45.24	41.815	1.080	1.905
22. 2015	-	3.535	-	3.525	45.31	41.785	0.911	0.756
23. 2016	-	3.535	-	3.525	45.43	41.905	0.767	0.633
24. 2017	-	3.535	-	3.525	45.52	41.995	0.647	0.529
25. 2018	-	3.525	2.476	6.001	45.61	39.609	0.511	0.416
26. 2019	-	3.525	-	3.525	45.61	42.085	0.459	0.366
27. 2020	-	3.525	-	3.525	45.61	42.085	0.383	0.307
28. 2021	-	3.525	-	3.525	45.61	42.085	0.324	0.257
29. 2022	-	3.525	-	3.525	45.61	42.085	0.269	0.215
30. 2023	-	3.525	-	3.525	45.61	42.085	0.227	0.177
31. 2024	-	3.525	-	3.525	45.61	42.085	0.194	0.147
32. 2025	-	3.525	7.853	11.378	45.61	34.232	0.130	0.099
33. 2026	-	3.525	-	3.525	45.61	42.085	-0.135	0.101
34. 2027	-	3.525	-	3.525	45.61	42.085	0.114	0.084
35. 2028	-	3.525	1.335	4.860	45.61	40.750	0.094	0.069
36. 2029	-	3.525	-	3.525	45.61	42.086	0.080	0.059
37. 2030	-	3.525	-	3.525	45.61	42.085	0.067	0.051
38. 2031	-	3.525	-	3.525	45.61	42.085	0.055	0.042
39. 2032	-	3.525	-	3.525	45.61	42.085	0.046	0.034
40. 2033	-	3.525	-	3.525	45.61	42.085	0.042	0.029
41. 2034	-	3.525	-	3.525	45.61	42.085	0.034	0.025
42. 2035	-	3.525	-	3.525	45.61	42.085	0.029	0.021
43. 2036	-	3.525	-	3.525	45.61	42.085	0.025	0.017
44. 2037	-	3.525	-	3.525	45.61	42.085	0.021	0.013
45. 2038	-	3.525	2.476	6.001	45.61	39.609	0.016	0.019
46. 2039	-	3.525	-	3.525	45.61	42.095	0.013	0.008
47. 2040	-	3.525	-	3.525	45.61	42.095	0.013	0.008
48. 2041	-	3.525	-	3.525	45.61	42.095	0.008	0.004
49. 2042	-	3.525	-	3.525	45.61	42.095	0.008	0.004
50. 2043	-	3.525	-	3.525	45.61	42.095	0.008	0.004
Total							+2.359	-0.239

$$EIRR = 0.19 + 0.01 \times \frac{2.359}{2.359 + 0.239} = 19.91\%$$

Table 13-1 UNIT RATE BUILD-UP

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT RATE (Ringgit)	AMOUNT (Ringgit)	REMARKS
1. Quarry rock extraction (V=4,090,000m ³)						
(1). Drilling equipment						
(1)-1	Crawler drill	hr	45,444.00	72.15	3,278,784.60	
(1)-2	Compressor	hr	45,444.00	21.87	993,860.28	
(1)-3	Allowance	(1)-1*3%			98,363.54	
	Subtotal (1)				4,371,008.42	
(2). Heavy equipment						
(2)-1	Tractor shovel 988B	hr	4,085.00	137.31	560,911.35	
(2)-2	Dump truck 769B	hr	70,466.00	108.02	7,611,737.32	
(2)-3	Bulldozer D8	hr	18,836.00	86.67	1,632,516.12	
	Subtotal (2)				9,805,164.79	
(3). Blasting materials						
(3)-1	Dynamite	kg	286,000.00	14.08	4,026,880.00	
(3)-2	An-Fo	kg	1,146,000.00	0.96	1,100,160.00	
(3)-3	Detonator (electric)	No	114,520.00	1.70	194,684.00	
	Subtotal (3)				5,321,724.00	
(4). Fuel Lubricant & Electricity						
(4)-1	Fuel	litter	3,375,915.60	0.40	1,350,366.24	
(4)-2	Lubricant	(5)-1*20%			270,073.25	
	Subtotal (4)				1,620,439.49	
(5). Labour						
(5)-1	Foreman	hr	3,351.00	10.04	33,644.04	
(5)-2	Ganger	hr	13,404.00	4.81	64,473.24	
(5)-3	Crawler drill Operator	hr	45,444.00	5.23	237,672.12	
(5)-4	Ditto ,Assistant	hr	22,722.00	3.03	68,847.66	
(5)-5	Operator (Equipment)	hr	25,239.00	4.81	121,399.59	
(5)-6	Ditto ,Assistant	hr	4,085.00	3.44	14,052.40	
(5)-7	General labour	hr	25,239.00	2.48	62,592.72	
	Subtotal (5)				602,681.77	
(6). Subtotal (1) to (5)					21,721,018.47	
(7). Rock production total (5)/4,700,000					4.62	