

Appendices

Methodology Used:

Policy Analysis Matrix

Financial and Economic Analyses

Other economic indicator measured to compare these systems is Land Equivalent Value (LEV), Equivalent Annual Income (EAI) and Internal Rate of Return (IRR). The EAI parameter, which can simply be said as “annualized NPV”, is commonly used to measure the competitiveness of a perpetual land used management of tree farming. EAI can be obtained by using the formula as follow :

$$EAI = NPV \frac{i(1+i)^n}{(1+i)^n - 1}$$

As for the Land Equivalent Value can simply be obtained by following below formula:

$$LEV = \frac{EAI}{i} \text{ or } LEV = \frac{FV_n}{(1+i)^n}$$

where; FV_n = net future value at the end of the first rotation; i = interest rate and n = number of years in the rotation. Internal Rate of Return is on the other hand define as the discount rate that equates the present value of a project’s expected cash inflows to the present value of the project’s costs. Equivalently it is the rate that forces the NPV to equal zero.

Assumptions of the Assessment

Macro-Economic Assumptions

	Assessment of	
	2000	1997
Nominal interest rate (%)	20%	20%
Social interest rate (%)	15%	15%
Official exchange rate (Rp/\$)	8,374	2,400
Exchange premium (%)	0%	0%
Percent devaluation (%)	0%	0%
<i>Commodity Policies</i>		
Rice tariff (%)	0%	0%
Soybean tariff (%)	15%	15%
Urea export tax (%)	5%	5%
TSP export tax (%)	5%	5%
Net trade tax	0%	0%
Domestic subsidy	0%	0%
VAT	0%	0%
CPO Tarriff		
CPO Export Tax	5%	5%
Daily Labor Wage		
Private price	8,000	4,000
Social price	8,000	4,000

IRR, EAI and LEV Analyses over Shaded Coffee Systems

Table 1. IRR of Various Coffee Systems

Coffee Systems	IRR 1997		IRR 2000	
	Private	Social	Private	Social
High Input Monoculture	35.31%	28.95%	16.66%	15.24%
High Input Monoculture with Grafting	31.46%	25.04%	13.39%	12.71%
Shade Base	45.50%	37.92%	20.93%	20.16%
Shade Base with Surface Vegetation	63.06%	54.50%	31.04%	31.11%
Fruit Base	51.07%	44.78%	28.87%	28.19%
Fruit Base with Surface Vegetation	66.06%	58.11%	35.78%	35.62%
Timber Base	46.86%	39.47%	22.82%	21.96%
Timber Base with Surface Vegetation	62.98%	54.42%	31.41%	30.92%

Source: Primary data.

Table 2. Equivalent Annual Income (in Rp) of Various Coffee Systems

Multi-Strata Systems	EAI 1997		EAI 2000	
	Private	Social	Private	Social
High Input Monoculture	399,122	388,207	(227,767)	17,524
High Input Monoculture with Grafting	577,295	581,985	(399,956)	(162,047)
Shade Base	52,530	323,910	702,559	742,340
Shade Base with Surface Vegetation	682,102	1,135,459	1,334,044	1,437,270
Fruit Base	892,392	1,613,464	1,606,565	2,117,998
Fruit Base with Surface Vegetation	1,516,827	2,415,694	2,236,059	2,809,678
Timber Base	173,942	478,763	822,128	896,418
Timber Base with Surface Vegetation	733,534	1,155,243	1,382,010	1,508,755

Source: Primary data.

Table 3. Land Equivalent Value (in Rp) of Various Coffee Systems

Multi-Strata Systems	LEV 1997		LEV 2000	
	Private	Social	Private	Social
High Input Monoculture	1,995,609	2,588,046	(1,138,834)	116,828
High Input Monoculture with Grafting	2,886,477	3,879,900	(1,999,781)	(1,080,315)
Shade Base	3,512,793	3,711,700	262,649	1,619,552
Shade Base with Surface Vegetation	6,670,219	7,186,350	3,410,508	5,677,295
Fruit Base	8,032,824	10,589,988	4,461,960	8,067,322
Fruit Base with Surface Vegetation	11,180,296	14,048,390	7,584,135	12,078,470
Timber Base	4,110,638	4,482,088	869,711	2,393,815
Timber Base with Surface Vegetation	6,910,048	7,543,775	3,667,668	5,776,215

Source: Primary data.

Table 5. Condition of Coffee Systems Assessed in 2000

Systems	Shade-Base	Shade-Base (Var-1)	Timber-Base	Timber-Base (Var-1)	Fruit-Base	Fruit-Base (Var-1)	High Input Monoculture 1	High Input Monoculture 2
Private Price								
Return to Labor	8,239	11,101	8,794	11,348	11,773	14,382	7,137	6,463
Years to Positive Cash Flow	4	4	4	4	4	4	5	5
Establishment Phase								
<i>NPV to Establishment</i>	6,602,622	6,607,355	6,599,056	6,599,056	6,620,473	6,620,473	10,473,363	10,473,363
<i>Total Cost</i>	9,372,349	9,382,163	9,364,954	9,364,954	9,406,163	9,406,163	17,833,716	17,833,716
<i>Average Cost</i>	2,343,087	2,345,541	2,341,239	2,341,239	2,351,541	2,351,541	3,566,743	3,566,743
<i>Labor Requirement</i>	871	871	870	870	873	873	1,116	1,116
Labor for Operation	107	107	107	107	162	166	212	204
Social Price								
Return to Labor	9,630	13,698	10,415	13,824	15,296	18,835	8,069	7,348
Years to Positive Cash Flow	4	4	4	4	4	4	5	5
Establishment Phase								
<i>NPV to Establishment</i>	6,600,762	7,140,672	7,130,833	7,130,833	7,155,767	6,618,612	11,689,414	11,689,414
<i>Total Cost</i>	9,368,842	9,378,657	9,361,447	9,361,447	9,402,657	9,402,657	17,707,419	17,707,419
<i>Average Cost</i>	2,342,211	2,344,664	2,340,362	2,340,362	2,350,664	2,350,664	3,541,484	3,541,484
<i>Labor Requirement</i>	871	871	870	870	873	873	1,116	1,116
Labor for Operation	107	107	107	107	162	166	212	204

Note : The result of high input monoculture coffee systems are the updated version from Budidarsono, et. al. (2001)
 High Input Monoculture 1 refers to simple, secure high inputs but grafting does not use for rejuvenation
 High Input Monoculture 2 refers to simple, secure high inputs with grafting as a mean for rejuvenation
 Var 1 refers to the use of high economic value of under storey species
 Values for of Prices and Return to Labor are in Rupiah
 Labor related Parameters are in Man Days

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Table 4. Condition of Coffee Systems Assessed in 1997

Systems	Shade-Base	Shade-Base (Var-1)	Timber-Base	Timber-Base (Var-1)	Fruit-Base	Fruit-Base (Var-1)	High Input Monoculture 1	High Input Monoculture 2
Private Price								
Return to Labor	7,221	10,103	7,777	10,348	10,829	13,462	5,496	6,137
Years to Positive Cash Flow	4	3	4	3	4	3	5	5
Establishment Phase								
<i>NPV to Establishment</i>	3,503,054	2,899,289	3,501,271	2,899,289	3,511,979	2,903,919	6,625,105	6,621,042
<i>Total Cost</i>	5,036,904	3,784,938	5,033,206	3,784,938	5,053,811	3,792,938	11,859,905	11,855,346
<i>Average Cost</i>	1,259,226	1,261,646	1,258,302	1,261,646	1,263,453	1,264,313	2,371,981	2,371,069
<i>Labor Requirement</i>	3,503,054	2,899,289	3,501,271	2,899,289	3,511,979	2,903,919	6,625,105	6,621,042
Labor for Operation	107	110	107	109	162	165	204	208
Social Price								
Return to Labor	7,773	286	8,568	11,684	13,654	16,717	5,524	6,252
Years to Positive Cash Flow	4	3	4	3	4	3	5	5
Establishment Phase								
<i>NPV to Establishment</i>	3,499,095	3,079,363	3,790,146	3,079,363	3,802,613	2,902,421	7,579,205	7,575,015
<i>Total Cost</i>	5,029,823	3,782,961	5,026,126	3,782,961	5,046,731	3,790,961	11,931,876	11,927,316
<i>Average Cost</i>	1,257,456	1,260,987	1,256,531	1,260,987	1,261,683	1,263,654	2,386,375	2,385,463
<i>Labor Requirement</i>	871	703	870	703	873	704	1,116	1,116
Labor for Operation	107	110	107	109	162	165	204	208

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Table 6. Economically Valuable Species found in Shaded Coffee Systems

No	Local Name	Scientific Name	English Name
1	Dadap	<i>Erythrina subumbrans</i>	Indian Coral
2	Jarak	<i>Ricinus communis</i>	Castor Oil Plant
3	Kihujan	<i>Gliricidia sepium</i>	Nicaraguan Cocoa Shade
4	Hamerang	<i>Ficus fulva</i>	
5	Kayu afrika	<i>Maesopsis eminii</i>	
6	Murbei	<i>Morus alba</i>	
7	Petai cina	<i>Leucaena leucocephala</i>	Wild Tamarind
8	Teureup	<i>Artocarpus elasticus</i>	Wild Bread Fruit
9	Tisuk	<i>Hibiscus cannabinus</i>	Kenaf
10	Waru	<i>Hibiscus spp.</i>	Rose Mellow
11	Bayur	<i>Pterospermum spp.</i>	Wajoo; Bayur
12	Cemara	<i>Cryptomeria japonica</i>	Pine
13	Jati	<i>Tectona grandis</i>	Teak
14	Mahoni	<i>Swietenia mahagoni</i>	Mahogany
15	Pasang	<i>Quercus sundaica</i>	Oak
16	Sawo Manila	<i>Manilkara zapota</i>	Naseberry
17	Sengon	<i>Paraserianthes falkataria</i>	Albizzia
18	Trembesi	<i>Samanea saman</i>	Rain Tree
19	Suren	<i>Toona sureni</i>	Ingoo; Toona
20	Tenam	<i>Anisoptera spp.</i>	Mersawa
21	Sonokeling	<i>Dalbergia latifolia</i>	Indian Rosewood
22	Alpukat	<i>Persea americana</i>	Avocado
23	Asam	<i>Tamarindus indica</i>	Tamarind
24	Belimbing	<i>Averrhoa bilimbi</i>	Star Fruit
25	Cempedak	<i>Artocarpus integer</i>	Champedak; Lemasa
26	Duku	<i>Lansium domesticum</i>	Lanzoon
27	Durian	<i>Durio zibethinus</i>	Durian
28	Jambu air	<i>Syzigium aqueum</i>	Watery Rose Apple
29	Jambu batu	<i>Psidium guajava</i>	Guava
30	Jambu bol	<i>Eugenia malaccencis</i>	Malay Apple
31	Jengkol	<i>Pithecellobium jiringa</i>	Jering Tree
32	Jeruk	<i>Citrus nobilis</i>	Orange
33	Kedondong	<i>Spondias pinnata</i>	Hog Plum
34	Lengkeng	<i>Dimocarpus longan</i>	Longan
35	Limus	<i>Mangifera foetida</i>	Horse Mango
36	Mangga	<i>Mangifera indica</i>	Mango
37	Nangka	<i>Artocarpus heterophyllus</i>	Jack Fruit
38	Petai	<i>Parkia speciosa</i>	Parkia
39	Rambutan	<i>Nephelium lappaceum</i>	Rambutans

No	Local Name	Scientific Name	English Name
40	Sawo	<i>Manilkara kauki</i>	Khirni
41	Sirsak	<i>Annona muricata</i>	Soursop
42	Tangkil	<i>Gnetum gnemon</i>	Gnetum
43	Aren	<i>Arenga pinnata</i>	Palm Tree
44	Bambu	<i>Bambusoidea spp.</i>	Bamboo
45	Cengkeh	<i>Eugenia aromatica</i>	Clove
46	Coklat	<i>Theobroma cacao</i>	Cocoa
47	Kayu manis	<i>Cinnamomum burmanii</i>	Cinnamon
48	Kelapa	<i>Cocos Nucifera</i>	Coconut
49	Kemiri	<i>Aleurites moluccana</i>	Nutmeg
50	Kopi	<i>Coffea robusta</i>	Coffee
51	Lada	<i>Piper nigrum</i>	Pepper
52	Pepaya	<i>Carica papaya</i>	Papaya
53	Pinang	<i>Areca catechu</i>	Areca Nut
54	Pisang	<i>Musa sp.</i>	Banana
55	Randu	<i>Ceiba pentandra</i>	Kapok
56	Salam	<i>Eugenia polyantha</i>	
57	Cabe	<i>Capsicum frutescens</i>	Chili
58	Jahe	<i>Zingiber officinale</i>	Ginger
59	Kapulaga	<i>Amomum compactum</i>	Dwarf Cardamon
60	Kunyit	<i>Curcuma longa</i>	Turmeric
61	Laja	<i>Alpinia galanga</i>	Galangal
62	Nanas	<i>Annanas comosus</i>	Pineapple
63	Salak	<i>Salacca zalacca</i>	Snake Fruit
64	Singkong	<i>Manihot esculenta</i>	Cassava
65	Talas	<i>Colocasia esculenta</i>	Taro
66	Rambai	<i>Baccaurea motleyana</i>	Rambai

Source : Wulan (2002)

Note : Number 57 until 66 are high economic value under storey species