A Profitability Assessment of Robusta Coffee Systems in Sumberjaya Watershed, Lampung, Sumatra Indonesia

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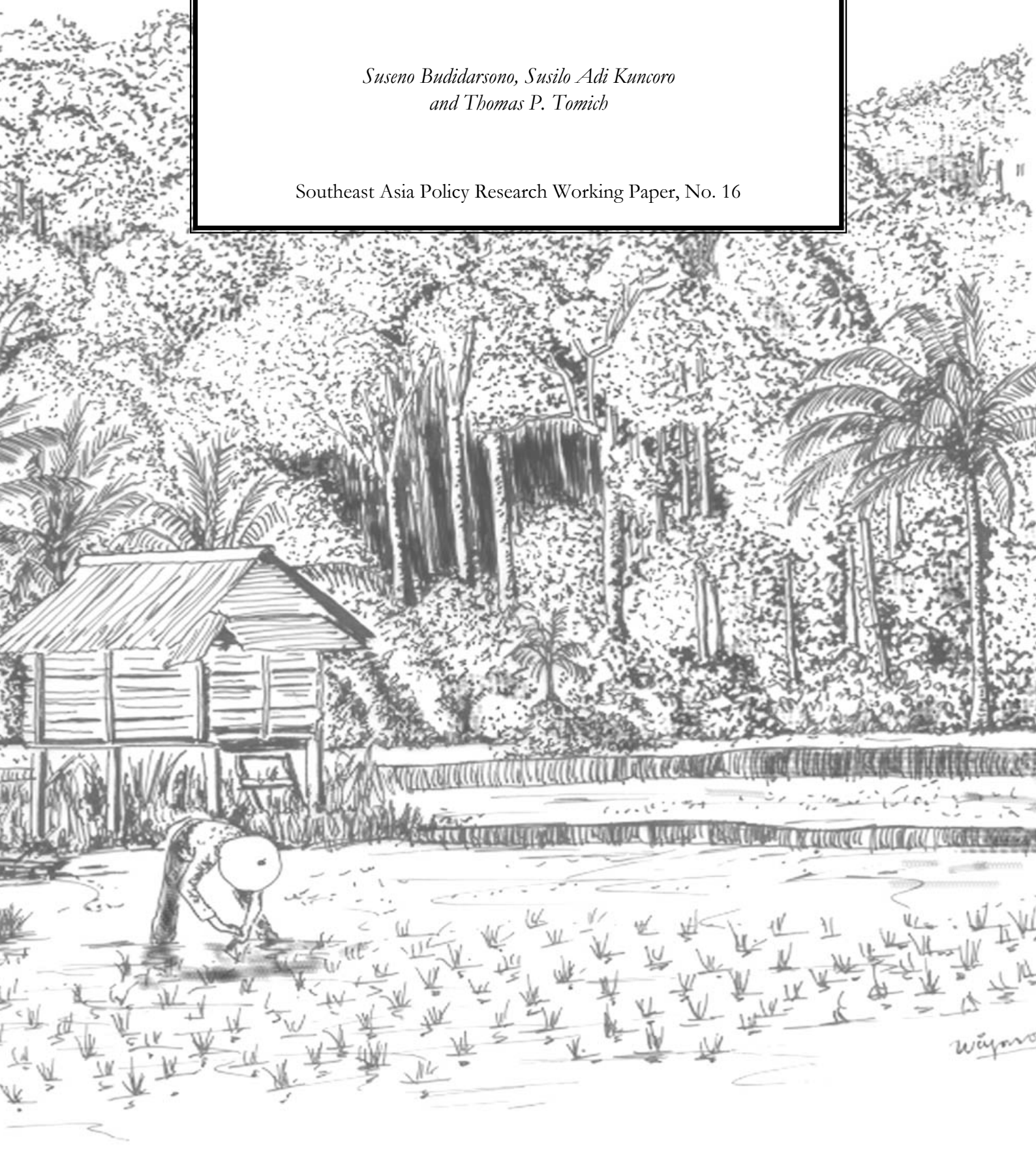

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A Profitability Assessment of Robusta coffee systems in Sumberjaya watershed, Lampung, Sumatra Indonesia

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Abstract

Forest encroachment for coffee farming practices in Sumberjaya, Lampung province, Sumatra, Indonesia, has created serious problems in controlling state forestland in the province. Conflict of interest regarding land status and land uses has created multi-dimensional problems in controlling the utilization of state forestland. Efforts to rehabilitate state forestland that have been used for agriculture purposes (coffee) and settlements, not only hard to meet its objectives, but also create another problem. Conflicts between government apparatus (forestry officer) and the dwellers living within state forestlands in Sumberjaya area are among the problems. Yet, the existence of administratively recognized villages within protection forest, have brought the problems beyond the domain of Forest and Estate Ministry. There are also other ecological issues such as biodiversity losses, soil erosion etc., which are filling list of debatable environmental issues. The increasing rate of forest conversion for coffee farming in Sumberjaya area since early 1980's, however, indicates that coffee farming in this area is attractive for farmers to cultivate.

Profitability assessment of coffee farming systems as a mean to understand the attractiveness of such system practiced by farmers in Sumberjaya gives a hint that coffee systems under study provide high return to land and higher return to labor than the average agricultural wage rate in Sumatra. The return of coffee system enjoyed by coffee growers in Sumberjaya constitutes pull factor to other farmers and transmigrants living in the neighboring area, particularly within peneplain zone in North Lampung and other similar area that relies on dry-land food crop farming. Without any consistent policy implementation to protect state forestland, especially the intact primary forest, forest encroachment for coffee cultivation could not be restrained.

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I. Introduction

1.1. Coffee farming in Sumberjaya : a portray of land use in question

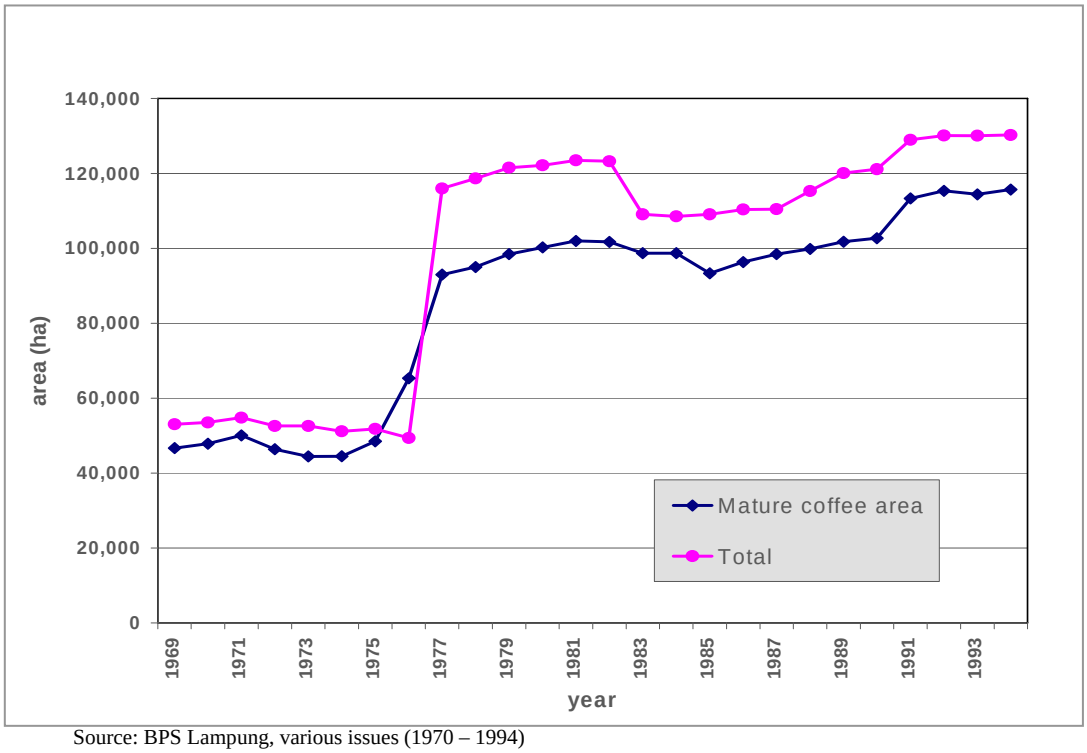
Forest conversion into agricultural purposes has been taking place and increasing along with the increase of population growth in many tropical countries. The practice of coffee farming within state forestland of Lampung province, Sumatra, Indonesia, is an example of forest conversion over quite fast area, especially during the last two decade (Suyanto, 1999; Gintings, 1999). Statistics of coffee area in Lampung province shows that annual growth rate of coffee area during 1970 –1980 was 8.25%, while annual growth rate during 1970-1994 was 3.7% (BPS Lampung). There was a sharp increased in 1977, which was 134.9% from 49,375 ha in 1976 (Figure 1.1)

The latest assessment carried out by *Tim Kopi* [1] estimates that in July 1998 there are about 115 thousands ha (out of 410 thousands ha) of state forestland in Lampung province have been cultivated for coffee farming (Gintings, 1999). Protection forest and the Bukit Barisan Selatan national park are among the forest that also been converted for coffee farming. These have caused serious problems in the province. Conflict of interest regarding land status and land uses created problems to control the use of state forestland. Efforts to rehabilitate forest area that have been used for agriculture purposes (coffee) and settlements, not only hard to meet its objective, but also create another problem. Conflicts between government apparatus and the dweller in Dwikora settlements portrays the difficulties of such efforts to

[1] *Tim Kopi* is a task force set up by Minister Forestry and Estate (under the Ministry Decree No. 584/Kpts-II/1998) to pursue an investigation of the issue of coffee farming in state forestland of Lampung (Gintings et al, 1999)

relocate people to other places out of forest areas and to rehabilitate the forest status (Kusworo, 2000). In some cases the efforts have hurt both parties. At present, since 1998 almost all *kebun* that have been reforested in late 1980s to early 1990s, are being reopened massively, and to be used for coffee farming.

Figure 1.1
Coffee Area in Lampung Province 1969 - 1994 (on non state forestland)



Source: BPS Lampung, various issues (1970 – 1994)

The problems are not merely focused on land status issues. It's spreading beyond the domain of Forest and Estate Ministry. The existence of administratively recognized villages within protection forest is an example that the problem is already under the domain of Internal Affair Ministry. There are other ecological issues such as biodiversity losses, soil erosion etc. filling up the list of debatable environmental issues.

The increasing rate of forest conversion for coffee farming in Sumberjaya area since early 1980's, however, indicates that coffee farming in this area is attractive for farmers to cultivate. Many farmers are willing to take the risk of uncertain tenurial status of state forestland to cultivate coffee that is characterized by long-term type of farm investment. Research question can be addressed in this regards, therefore, how profitable is coffee system that practiced by farmers in Sumberjaya both financially (from private perspective) and economically (social profitability)? The answer of this question will contribute to the knowledge of how attractive the coffee system is, from economics point of view.

1.2. Methodology

1.2.1. Policy Analysis Matrix

The assessment employ the same technique that is applied in other profitability assessment that was done under ASB Indonesia project (Tomich et al, 1998; Budidarsono et al, 1998, 2000), that is Policy Analysis Matrix (PAM).

The PAM is a matrix of information about agricultural and natural resource policies and market imperfections that is created by comparing multi-year land use system budget calculated at private and social prices (Monke and Pearson, 1995). Private prices are the prices that farm households are facing (local or domestic market price of input and output). Therefore, profitability or NPV valued at private prices, so called private profitability, is an indicator for production incentive (Tomich et al, 1998). Social prices are the economic prices that removes the impact of policy distortion (taxes, subsidy and other local levies) and market imperfections. Usually it

is derived from export or import parity prices of particular inputs or outputs. Profitability measured at social prices, so called social profitability, is an indicator of potential profitability.

The divergence between private and social profitability shows how policies and market imperfections affect the financial incentives faced by smallholder farmers. Appendix A summarizes the approach used in this assessment.

As long as profitability calculation is concerned, the appropriate measure of profitability for long term investment is net present value *(NPV), i.e.*, the present worth of benefit (revenues) less the present worth of the cost of tradable inputs and domestic factors of productions (Gittinger, 1992). Mathematically it is defined as:

$$NPV = \sum_{t=0}^{t=n} \frac{(B_t - C_t)}{(1+i)^t}$$

where B_t is benefit at year t, C_t cost at year t, t is time denoting year and i is discount rate. An investment (the practiced of coffee farming over 25 years since its establishment) is appraised as profitable if NPV is greater than 0.

Tomich et al (1998, p 64) argues that in areas where land is scarce, the NPV calculation over the 25-year period can be interpreted as the 'returns to land' for the selected land use activity unit under study. Although land abundance and labor scarcity historically prevailed in many areas of Sumatra, making it an attractive focus of government sponsored transmigration programs, this relationship seems to be shifting in Sumatra. Much of this abundance land has been subsequently granted to

industrial plantations or has been settled by spontaneous migrants as it's been taking place in Sumberjaya region since the past two decades. Sumberjaya area has been an attractive destination for many spontaneous migrants, especially for coffee growers.

The study also presents a measure of 'return to labor' that is the wage rate that sets the NPV equal to zero. Adjusting the wage rate until NPV goes to zero can be used as a proxy for 'returns to labor' since this calculation converts the surplus to a wage rate. Returns to labor that exceed the average daily wage rate, indicate that individuals with their own land will prefer this activity to off-farm activities and it also justifies hiring non-family labor. Returns to labor valued at private prices can thus be viewed as the primary of indicator of profitability for smallholder's production incentives

1.2.2. Pricing the Costs and Returns

Concerning profitability assessment that needs a detail-farm budget calculation, it is necessary to clarify the proper prices for calculating the cost and return and the macroeconomic assumption used in this assessment. The study makes two farm budget calculations based on two difference macroeconomic conditions prevailing in Indonesia.

Firstly, farm budget calculation based on the macroeconomic parameters of July 1997 (before monetary crisis wave hit the country). As it is argued in Tomich *et al* (1998, pp. 62-63), macroeconomic parameters of July 1997 are considered as a better guide to assess a land use system over the longer term, than those have prevailed during the crisis. ***Secondly***, farm budget calculation based on the macroeconomic parameters second half of 1999, when the fieldwork was carried out,

to get more understanding on the impact of monetary crisis on coffee farming. The macroeconomic parameters used in the study are tabulated in following Table 1.1.

Table 1.1. Macro economic parameters used in the study

	mid 1997	1999
Exchange rate (Rp / US $)	2,400	8,600
Wage rate in Sumatra (Rp/person-days)	4,000	6,000
Real interest rate (net of inflation)		
Private	20% per annum	
Social	15% per annum	

It needs to note here that real interest rates (that is interest rate net of inflation) are the discount factors used to value future cash flows in current term. A private discount rate of 20% and a social rate of 15% were chosen as the initials values to facilitate comparison with PAM results of different land use activities already analyzed by the ASB program (Tomich *et al*., 1998). It is argued that a private discount rate of 20% is a lower bound for the actual cost of capital for smallholder due to imperfections in Indonesian capital markets. The explanation of the interest rates used here, for both private and social prices, heavily refers to Tomich et al (1998, pp. 63-64):

> …. As in most developing countries, capital markets in Indonesia are fraught with imperfections – some of which have been manifested in the financial crisis. Private interest rates (at least for smallholder, if not for large corporations that could secure subsidized credit) have been very high in real terms. In July 1997, *formal* sector lending rates were almost 30% pa and inflation was under 10% pa. Thus the private interest rate of 20% used in these analyses is a lower bound for the actual cost of capital for smallholder. The real social interest rate is less than the private rate and 10% is probably too low. So, somewhat arbitrarily, a rate of 15% has been used for the real social cost of capital, which are both the interest rate and the discount rate for calculating NPV at social prices.

The study also makes no different interest rates between 1997 and 1999 farm budget calculations.

In determining the prices, the study uses annual average prices (eight to ten years' annual average) of all tradable farm inputs and farm commodities that are cast in the respective constant prices (constant price 1997). The study uses local market prices as the basis of calculation of farm budget valued at private prices. Whereas for the comparable farm budget at social prices, the study applies export or import parity prices at farm gate as the basis of calculation. In this regard, the period under study for 1997 farm budget calculation is 1989 to June 1997, whereas the period under study for 1999 farm budget calculation is 1991 to 1999. See the detail in Appendix B.

Another component that also needs to be thought over in farm budget calculation is the value coffee farm at year 25. The assessment will not include this value in the farm budget calculation. It considers that whatever the value of coffee farm at year 25 is, will be topping up the returns.

1.2.3. Data collection

The approach and technique require set of essential data on agricultural activities, the market prices of any agricultural inputs as well as its output and its comparable social prices, and also the related agricultural system. Data collection was done using rapid rural appraisal (RRA) technique[2] in which the 'triangulation principles' in collecting particular data from various sources to assure the reliability of the data collected was also applied. Hence, resource persons and/or key informants interviewed for the purpose of the study were farmers, traders, AEKI officer (coffee exporter association), coffee researcher (Dr. Sutanto Abdoelah from Coffee and

[2] RRA consist of short, intensive and informal field surveys that focuses on people own views of their problem (Khon Kaen University 1985; Chambers *et al*, 1989). Generally, the method involves open-ended exploration of important issues and more focused understanding on important themes from key informants' perspectives. Two data collection techniques were applied i.e., field observation and in-depth interview with key informants using semi structured interview guide.

Cacao Research Centre, Ministry of Agriculture) and the related local government apparatus.

Unit of analysis of this assessment is *robusta* coffee land use system in Sumberjaya, and the unit of observation is agricultural activities in coffee farming; hence all agricultural undertakings during the 25 years of coffee farming system. What were observed and collected was focused on the information that is needed for the assessment, i.e., a continuous 25 years farm budget. For that purpose the assessment firstly developed the typology of robusta coffee system in Sumberjaya. As it will be elaborated in more detail in the next section, three categories are considered to develop coffee-farming typology: vegetation structure complexity, management intensity and tenurial status of land on which farmers cultivate coffee (See Section 2.3)

1.3. Structure of the Report

Following this section, the report first describes the study site on which the assessment is carried out. It consists of coffee farming practices in Sumberjaya that includes land right issues, profitability assessment and the issue of local government regulation on state forestland in Lampung province. The report then discuses the findings of the assessment to draw the conclusion in the last section.

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II. Coffee farming practices in Sumberjaya

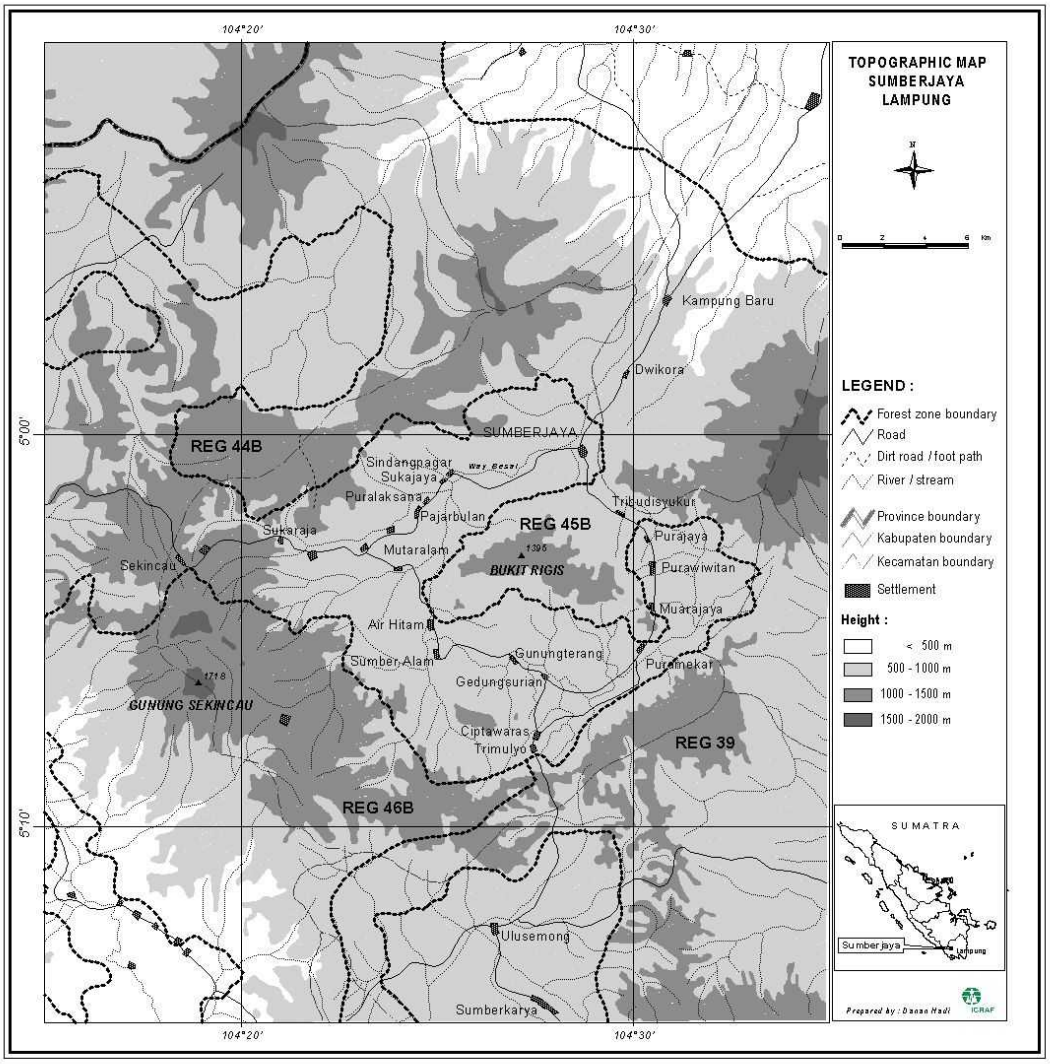
2.1. Sumberjaya in brief

Sumberjaya is a sub-district administration unit (*kecamatan*) within *Kabupaten* Lampung Barat (District/Regency) of Lampung Province in the southeastern edge of Sumatra. It is one of coffee producer area in Lampung province; contributes 18%-26% of total coffee production in the province during 1992-1997 (BPS Lampung Province, 1998 and BPS Lampung Barat, 1998). Geographically the area situated between 4^0 56' 6" and $5^0$11' 25" South Latitude and between 104^0 17' 52" and 103^0 33' 51" Longitude. The elevation ranges from 700m to 1,718m above se level. See Figure 2.1.

Administratively Sumberjaya sub-district covers an area of 541.9 km^2. Officially in 1998, there were 79,651 inhabitants (40,567 male and 39,084 female) of 18,856 households living in the area (147 people per km^2). Native Lampungese are rare and most of the populations in the area are migrants: Semendonese (South Sumatra), Sundanese (West Java, most of them from Karawang and Tasikmalaya), Javanese (Central and East Java), Balinese, Batak (North Sumatra). The first generation of Java originated people migrated to this area under National Reconstruction Bureau's Transmigration Program in early 1950's[3]. Although spontaneous in-migration is still going on until now, but it is not as high as the decade before. Looking at the statistics, the highest in-migration took place during 1978-1988 where the annual population growth reached 7.46%.

[3] A special resettlement programme of veteran, organized by army force.

Figure 2.1. Sumberjaya area of Lampung province



Referring to Agus and Kusworo (1999), soil characteristics in Sumberjaya area present a modern constraint in design and management. The soil on which coffee plantation dominates are moderately developed soil (Inceptisol) with fine texture and somewhat stable to weak aggregate. Soil color is pale to reddish and this indicates low organic matter content, low soil fertility and somewhat low pH. Chemical characteristics of Sumberjaya soil is considered to have the typical level of acidity and

nutrient availability that characterize the latosol of this agro-ecological zone. The soil is prone to erosion due to undulating to hilly phisiography, high intensity and high annual rainfall ($\pm$ 2000 mm) and weak consistency.

Dutch maps show that at the beginning of the 20th century, most of Sumberjaya area was blanketed with natural forests (Benoit et al., 1989). In 1970, primary forest covered 57.38% of the area and 11.88% of secondary forest. In 1990, the primary forest last only 12.27% and 18.05% are secondary forests and 60.37% of the area use as *kebun*, mostly smallholder plantation of coffee, *sawah* (paddy field) 5.35%, settlement 2.2%, grassland 1.12%, ponds 0.07% and cultivated lands (crops and vegetables) 0.21%. (Lumbanraja et al. 1998). The evidence of the declining forest cover in the area seems to be in line with the population growth in the area.

2.2. From shifting cultivation to permanent coffee farming systems

Historically, coffee farming in the area has been practiced since the first half of 19 century. As early as 1833 the immigrant from South Sumatra (*Semendo* sub ethnic group) set up coffee farming under the Dutch *kultuurstelsel* (Mougeot, 1990: 14-15). The pioneer semendonese was the first coffee growers in Sumberjaya area. They cultivated rice field in the river/stream banks where they also established settlement compounds *(kampung)*, while coffee farming were practiced in the up lands. They practiced coffee farming under shifting cultivation technique (forest clearing, swidden, *kebun*, and fallow) and applying very low management intensity. Hence, they would decide to establish other coffee plantation when the previous coffee farm had dropped its yield to uneconomic level to harvest. This is very much linked to the management intensity they applied, which is characterized by very little crop care

activities implemented and without any external input application. There is nearly no efforts been done to maintain the productivity after the peak production period. Rather opening another forested land to establish new coffee farm.

In its development, with the increase of Sumberjaya inhabitants by in-migrant from Java and other places within the province and Sumatra, there were gradual change taking place over time. As recorded, in 1950s Sundanese (from West Java) transmigrants migrated trough resettlement programme to the eastern part of Bukit Rigis that is now Sumberjaya sub-district administrative center. It was then follow by spontaneous migrants from Java and other parts of Lampung province. Those Javanese migrants introduced the techniques of permanent/fixed cultivation system of coffee farming: soil management (weed controls, and chemical/organic fertilizer applications, ridge, pit) and crop management (rejuvenation/topping, grafting, etc.)

There were numbers of Javanese (central Java and east Java origin), Sundanese (west Java origin) and Balinese, either directly migrated from Java and Bali or moved from other places within Lampung province, became coffee growers. They established coffee farm scattered in Sumberjaya by land transfer from semendonese who had old-abandon coffee, or actively opened secondary forest, bush or fallow land that previously used by Semendonese for shifting cultivation. Many of them established coffee farm on an unsecured land titled. Recently this pattern, opening state forestland for coffee farming, is still easily found in the area.

This population increased also brings about to change in coffee farming practices in Sumberjaya. It's been become lesser farmers were found practicing shifting cultivation technique – nowadays it's even hardly found – and more permanent coffee growers are occupying the land in Sumberjaya. There are also farm management improvements.

In practicing coffee farming, farmers plant food crop (up land paddy) in the first year, or when ever possible can be extended till the second year. In some cases farmers also plant vegetables (chili and tomato). This is to meet the subsistence need before coffee produce any yields. There are soil management measures implemented by farmers in Sidomakmur, Sri Menanti, Simpangsari using various types of ridge (*gulud, galangan*), pit (*rorak, lobang angin*), and terrace (in the sloping lands) in their coffee farm. The objectives are mostly for coffee production improvement purposes, such as: to collect water, to provide place for litter, rejuvenating the root, and – in the slopping area – preventing the fertilizer from being washed away. Farmers in Sri Menanti and Sidomakmur (villages where many farmers cultivate coffee within state forestland) adopt such techniques after they were sent to Coffee and Cocoa Research Center in Jember (East Java) by local Plantation Services. Kusworo (2000) speculates that farmers adopt and modify these techniques from the extension programs such regreening program, conservation farming, etc.

Regarding crop care activities, topping (cut the upper part of coffee crop, to keep the trees less than 1,5 to 2 meter high), grafting, and twig cutting are the main activities implemented by farmers. In traditional systems these activities were rarely done. For those who implement coffee cultivation with shading trees, *Gliricidae* and *Erythryna* are the most favorite species they plant. Some of them use these trees as living pole for pepper vine. Some farmers have tried to use the other 'productive' tree crops (timber, fruit, and palm).

Although not all coffee growers in Sumberjaya practicing all necessary activities to improve coffee productivity (such as weeding, coffee pruning, topping, twig cutting and fertilizer or other external input application), the awareness to practice those activities to improved productivity has increased among farmers, even

among the *Semendo*nese. Capital availability is among the constraint most farmers are facing. Three gradual changes has been taking place in the Sumberjaya are:

(1) permanent coffee farming system has replaced shifting cultivation practices,

(2) the tendency to improve coffee productivity per unit of land by management intensity improvement getting more common among coffee growers, and

(3) the demand for better coffee species to improve coffee productivity by grafting has also increased among those who has capital.

Regarding coffee species, *Coffea robusta* species predominates coffee cultivation in Sumberjaya. There were also *Coffea Arabica* cultivated in a few plots in combination with *Coffea Robusta,* and not widely cultivated. Coffea Arabica is not farmers' preference species to plant. Statistics of West Lampung District (1997) shows that in 1997 only 4.2% out total coffee area were arabica coffee. Almost all farmers interviewed recognize that arabica coffee species has better price in world market and has higher yield. But it is not their preference to plant. The price at farm level of arabica coffee in Sumberjaya is not attractive to them; same price as robusta coffee. There are more troublesome to cultivate than robusta coffee and also more pests sensitive.

2.3. Coffee Farming Typology

In-depth interviews with various farmers in Sumberjaya and key informants, and also observation carried out on various plots in Sumberjaya area[4], as mentioned above, the study revealed that coffee farming here have been improving from simple coffee farming system – under traditional shifting cultivation technique – to more

[4] Observation was carried out in various plots along the roadsides in Talang Bodong and the relatively remote site in the forest margin area and within the state forestland of Bukit Barisan Selatan Nasional Park and protection forest of Bukit Rigis and Way Tenong Kenali.

permanent and efficient; mostly managed by smallholder of various ethnic groups[5]. There are many different coffee-farming systems were recorded. The assessment has been able to develop coffee-farming typology based on three categories: (a) vegetation structure complexity; (b) management intensity, and (c) tenurial security of land on which farmers grow coffee.

Looking at the vegetation structure complexity or the appearance of coffee gardens in the study area, the performance varies between two extremes: simple-monocrop coffee system and complex agroforestry coffee farming or multistrtata coffee system. Here the complexity of vegetation structure is the only aspect to be considered; regardless what kind farming technique applied by the owner. In Bodong site (Sukajaya village), for example, simple-monocrop coffee plot, can be easily observed. But, fertilization rate and crop-care intensity (pruning, weeding and grafting) is among the highest in the area. On the contrary, in three forest margin villages (Sri Menanti, Pura Mekar, and Tri Mulya), more complex vegetation structure within coffee plot is widely spread over these villages , but the rate of fertilization and crop care intensity are lower than in Bodong.

According to various coffee farmers from many different sites and plots, there are three farm management systems for coffee cultivation prevailing in the area : traditional-pioneer system, semi intensive system and intensive system. This relates to the technology applied in coffee farming .

Traditional -pioneer system is a coffee farming technique applied mostly by the pioneers Semendonese in coffee cultivation. The main characteristics are:

- Without fertilizer application nor other external farm input

[5] They are pioneer Semendonese, Sundanese, Javanese, Batak, Balinese very few Lampung natives.

- Weeding and cleaning the new buds are the main crop care measures, and intensively done during year three to year five of cultivation.
- Generally, coffee plot performs as simple monocrop coffee farming without shading trees.
- Short productive lifetime cycle. Hence, farmers will leave the coffee plot abandon (or handed over to those who want to undertake the plot with a compensation payment) after the yield is decreasing to unacceptable level, normally two or three years after the highest production. (Farmers then move to other site to open new coffee plot; it is a kind shifting cultivation technique).
- Extensive

Semi intensive system constitutes the development of the system described above. In many cases it is done by new migrant who bought old coffee garden from other coffee farmers or converting secondary forest or bush. The main characteristics are :

- Low to medium external input technology : fertilizer application (Urea and TSP) in total 150 – 400 kg/ha per year.
- Weeding, cleaning the buds, and pruning (to keep the coffee trees not higher than 1.5 m) are the main crop care activities.
- Productive lifetime is kept as long as possible with great efforts: replanting, the use retardation pit or *rorak*[6] in local term is common among farmers.
- The use of shading tree is not a must

Intensive coffee farming system is characterized by the occurrences of measures to increase productivity per unit of land are done very intensively. Considerably high rate of fertilization (800-1000 kg/year per ha) is among the measures usually farmer does. Crop-care activities include grafting and coffee tree

[6] The pit size varies; the depth and width vary from 30 to 60 cm while the length varies from 40 to 200 cm. The pit is used for collecting tree litters. Most farmers mentioned the importance of plant litters in addition to fertilization on coffee production.

rejuvenation is among the requirements to increase productivity. The need of capital some time is fulfilled from credit.

Lastly, with regard to the issue of tenurial security of land where coffee farming is undertaken by farmers, the observation recorded two patterns: coffee farming on privately own land and coffee farming on state forestland. The tenurial security issue of coffee farming in Sumberjaya area, and might be also found elsewhere, is particularly important in the study. Almost all farmers with insecure land right for coffee farming are subject to pay a kind of 'unofficial fee' that decided by 'person in charge' arbitrarily. This constitute a serious issue in controlling state forestland, because by paying this 'unofficial fee', farmers would always have a feeling that what they are doing is permissible since they are willing to pay. In this regard, controlling state forestland that supposed to keep forest remain forested, would be blunted by the miss performed of its apparatus. Since the system, under prevailing discount rate, still provide positive 'return to land', the forest conversion will be continuously to happen. Without serious measures to protect the natural forest left in Lampung province, forest conversion in the remaining forest hardly can be stopped[7].

Based on those three categories, seven systems were selected, on which this assessment is carried out. The selected coffee systems (presented in Table 2.1) represent wide ranges of coffee farming systems in Sumberjaya.

[7] Just recently in June 2000, the provincial government of Lampung issued the Provincial Decree No 7 (Peraturan Daerah No 7, 2000) that regulates the levies collection for all non timber commodities taken out from the state forestland, including coffee that is cultivated on state forestland. This will also taken into account in the assessment.

Table 2.1. Selected coffee farming systems under study according to management intensity, tenurial security and vegetation complexity

Low intensity	Medium Intensity	High intensity
1. Pioneer – insecure title	2. Simple – insecure title	3. Simple-insecure title (rejuvenated from an old-abandon coffee farm)
6. Complex – insecure title	7. Complex – secure title	4. Simple – secure title without grafting
		5. Simple – secure title with grafting

It needs to note here that the type no 3, which is so called 'rejuvenation type of coffee system', can not be fairly compared to other types. The starting point is different from the other systems. Hence, farmers just rejuvenate an old coffee plantation by cutting the old coffee trees and left the trunk sprouting. Instead of converting forest or other land use type for coffee cultivation by slash-and-burn activities. This type of coffee farming system is practiced by plenty of farmers in the area.

2.4. Cost of establishment and labor requirements

What about the establishment costs or how much money do farmers need to spend for coffee cultivation in Sumberjaya? How many person-days are needed to practice coffee farming in this area? Hence, number of labor input for coffee establishment, number of labor input for operation and total labor requirement. The answers of those questions constitute farmers' constraint of any agricultural activities. Establishment cost is to be used as cash flow constraint indicator to assess whether the investment required by the system is barrier to adoption by smallholder. Similarly to that, labor

requirement indicators that used here also reflect constraint for farmers to adopt the technology of combined with the assessment of labor market. (Tomich et al, 1998. P 69-70)

Establishment cost here is defined as all inputs used to establish the systems, whereas the term of "establishment" is defined to be number of years to positive cash flow (Vosti *etal*, 1998). Using this definition as basis of assessment, years to positive cash flow of the seven type of coffee system in Sumberjaya ranging from 3 to 5 years. As presented in Table 2.2, calculated under macro economic assumption July 1997, the discounted establishment cost of coffee cultivation in Sumberjaya, excluding the rejuvenation type of coffee systems, is ranging between Rp 3.56 million to Rp 6.62 million.

Table 2.2. Establishment cost

Coffee Systems	Year to positive cash flow	Establishment cost (thousand Rupiah)	
		In private prices	In social prices
Pioneer-Insecure Title-Low Intensity	4	3,674	3,988
Simple-Insecure Title-Medium Intensity	4	3,787	4,116
Simple-Insecure Title-High Intensity (rejuvenation old coffee scenario)	**3**	**7,116**	**7,460**
Simple-Secure Title-High Intensity	5	6,621	7,575
Simple-Secure Title-High Intensity with grafting	5	6,625	7,579
Complex-Insecure Title-Low Intensity	4	3,788	4,109
Complex-Secure Title-Medium Intensity	4	3,656	3,943

Sources: Authors' calculation.

Although the rejuvenation type of coffee system has the highest establishment cost (Rp 7.116 million), this system gives the earliest positive cash flow to farmers. Only 18 month after cutting the old coffee trees, with reasonably high fertilization rate (400-800 kg/ha), farmers may harvest the first yield of coffee bean. This is why the positive cash flow occurred earlier than the other. However this type of coffee system needs more initial capital to spend, such as a kind 'compensation payment' to the former owner[8] and expenditure for external farm input application in the beginning of its cultivation that is reasonably higher than the other. That is why the establishment cost is the highest among the seven selected systems.

Looking at the figures in social (shadow) prices column, the establishment cost are higher than its comparable private prices figures. This difference mainly because of discount factor used; 15% for social prices calculation and 20% for private prices calculation (See Table 1.1). Besides, there is another factor of divergence for coffee systems on state forestland, i.e. an unofficial fee. Those who cultivate coffee on state forestland subject to pay an "unofficial fee" of Rp 50,000 per ha per year.

Regarding labor requirements there are three different indicators used in the assessment: total person-days required for establishment (refers to the period before positive cash flow occurred), person-days required for operational (defined as the period after positive cash flow) and total person-days employed over time (Tomich *et al*, 1998; Vosti *et al*, 1998). The last two indicators are in average per hectare per year. Form farmers perspective, labor requirement indicators reflect labor constraint that farmers are facing. Means that agricultural labor availability (labor market) in the

[8] It was recorded during fieldwork in 1999, the compensation payment was as much as Rp 800,000 per hectare

area needs to be considered. From policy makers' point of view, those figures reflects employment opportunity can be created in rural area

Table 2.3 presents those three indicators of coffee farming in Sumberjaya. It is interesting that all systems that apply high management intensity (exclude the rejuvenation type of coffee system), have very high labor requirements. While the rejuvenation type of coffee system requires the least in the establishment phase. It can be understood that this system has no land-clearing activities as the other has. In average, labor requirements for establishment phase are ranging between 211 and 223 person days per hectare per year.

Table 2.3. Labor requirements matrix

No	Coffee farming system	Year to positive cash flow	Labor for Establishment	Labor For Operation	Total Labor
			ps-day/ha	ps-day/ ha/year	ps-day/ ha/year
1	Pioneer-Insecure Title-Low Intensity	4	867	29	59
2	Simple-Insecure Title-Medium Intensity	4	868	191	196
3	Simple-Insecure Title-High Intensity (rejuvenate old Coffee Scenario)	3	634	199	201
4	Simple-Secure Title-High Intensity	5	1,116	218	211
5	Simple-Secure Title-High Intensity with grafting	5	1,116	204	208
6	Complex-Insecure Title-Low Intensity	4	877	52	79
7	Complex-Secure Title-Medium Intensity	4	878	207	209

Source: Authors' calculation

Looking at person-days required for operational and total person-days employed over time, the pioneer type of coffee system has the lowest labor requirements both for operation and total person days employed. The results in Table 2.3 can be

interpreted that the higher the management intensity, the higher labor requirements would be.

There is a tendency among farmers in Sumberjaya to improve coffee productivity per unit of land by management intensity improvement. It implies to the demand for agricultural labor in the area both for crop care activities and harvesting. During harvesting time the cost of hired labor for coffee harvesting is increasing higher than average agricultural laborer in the region. In many cases, the cost for harvester is based on the current local price of coffee bean.

Linking the figures above to labor market in Sumatra in general, coffee system in Sumberjaya will attract more people to move in, if return to labor provided by coffee farming system is higher than the wage rate of agricultural labor in Sumatra, that is Rp 4,000 per person day (macro-economic parameter July 1997).

2.5. Profitability assessment

The NPV of coffee farming systems in Sumberjaya per hectare of land over a 25 year span, valued at private and social prices, all have positive sign (Table 2.4.) It means that the systems are financially and economically profitable.

Financially, NPV of coffee farming system in Sumberjaya valued at private prices, is ranging between Rp 0.925 million (the pioneer type of coffee system) and Rp 4.88 million (the complex coffee system on secure land tenure with medium management intensity). As it is known that the complex systems has more commodities to harvest than the simple system. Economically, NPV of coffee farming system in Sumberjaya that is valued at social prices, is ranging between Rp 1.05 million and Rp 7.83 million. The results of profitability assessment above exclude its return from selling

the timber harvested during the conversion of land to coffee cultivation. The return from illegally selling marketable timber certainly could cover a large portion the establishment costs.

Table 2.4. Profitability matrix: NPV coffee-farming system in Sumberjaya

Coffee farming systems	Profitability/Returns to Land *(thousand Rupiah)*			Returns to Labor *(Rupiah)*	
	Private Prices	Social Prices	Divergences	Private Prices	Social Prices
Pioneer-Insecure Title-Low Intensity	925	1,050	(125)	5,004	5,027
Simple-Insecure Title-Medium Intensity	2,076	2,806	(731)	5,686	5,831
Simple-Insecure Title-High Intensity (rejuvenation coffee system)	3,291	4,594	(1,304)	6,639	6,938
Simple-Secure Title-High Intensity	2,856	3,762	(906)	6,137	6,252
Simple-Secure Title-High Intensity with grafting	1,975	2,509	(535)	5,496	5,524
Complex-Insecure Title-Low Intensity	2,947	4,912	(1,965)	6,987	8,408
Complex-Secure Title-Medium Intensity	4,883	7,827	(2,944)	7,815	8,983

Sources : Author's calculation

Looking at return to labor, all coffee systems under study provide higher return to labor than the average agricultural wage rate in Sumatra. Return to labor valued at private prices as an indicator of smallholders' production incentives, give a sign that the systems is attractive for farmers to engage, even for the pioneer type of coffee cultivation.

Making comparison among the coffee systems under study, exclude the rejuvenation type of coffee system, the complex-multistrata coffee system with

medium management intensity on a privately owned land (secure title) has the highest return. This system provides yields not only coffee been, but also other commodities harvested from the same plot such as banana *(Musa paradisa)*, manggo *(Mangievera indica)*, guava *(Psidium guajava*, jack fruit *(Arthocarpus heterophyllus)* etc. On the contrary, the pioneer type of coffee system has the least both in return to land and return to labor.

Regarding the divergences that all have negative sign, mean that what farmers get is less than it supposed to be. But this divergence is mostly due to differences in private and social discount rates. This, therefore, cannot be attributed mainly on a particular government policy. The systems that require external input application, depend on how much the rate is, the divergence is also partly contributed from a result of government subsidies of fertilizer and other chemicals[9].

Paying attention to the condition under monetary crisis, Table 2.5 presents the result of sensitivity analysis of coffee farming profitability according to the macro-economic parameters changes.

The results reflects the change of real exchange rate from Rp 2,400,- per US$ to Rp 8,600 per US$, the wage rate in Sumatra increased from Rp 4000 per person-day to Rp 6000 per person day. The monetary crisis has boost the domestic price of coffee bean reaching Rp 7,066 per kg in 1998 from Rp 3,276 in mid 1997 (both are in real term).

The results given in the Table 2.5 shows that not all systems gain from the increase of coffee price during the crisis. Means that the higher price of coffee bean

[9] As it is known, Government of Indonesia had implemented subsidy policy for fertilizer to support food production. Government spending for this policy during 1970s was Rp 100 million annually and increased six-fold to about Rp 600 million in 1988 (Hasan et al, 1996). Since 1998 this subsidies has been removed.

does not necessarily will increase the profitability. Because cost of labor for harvesting is also increased as well as fertilizers' prices. Regarding the return to labor. It is interesting that the figures increase for all coffee systems. Means that production incentive remain higher. This implies that coffee cultivation is remain attractive for farmers to cultivate. However, return to labor relative to the wage rate in Sumatra seems to be less than it was.

Table 2.5. Sensitivity analysis of Coffee farming system to macro-economic parameter mid 1997 and 1999.

Coffee farming systems	**Profitability / Returns to Land** *(at social prices)*		Returns to Labor ***(at social prices)***		**Returns to Labor relative to wage rate in Sumatra**	
	Mid 1997	*1999*	*Mid 1997*	*1999*	*Mid 1997*	*1999*
Pioneer-Insecure Title-Low Intensity	1,050	578	5,027	6,569	126%	109%
Simple-Insecure Title-Medium Intensity	2,806	4,159	5,831	8,779	146%	146%
Simple-Insecure Title-High Intensity (rejuvenation coffee system)	4,594	5,977	6,938	9,879	173%	165%
Simple-Secure Title-High Intensity	3,762	3,740	6,252	8,258	156%	138%
Simple-Secure Title-High Intensity with grafting	2,509	2,408	5,524	7,478	138%	125%
Complex-Insecure Title-Low Intensity	4,912	3,275	8,408	9,005	210%	150%
Complex-Secure Title-Medium Intensity	7,827	4,554	8,983	8,946	225%	149%

Source: Authors' calculation

The results presented above indicate that coffee-farming system offers reasonable high return to land and returns to labor. This constitutes pull factor to other farmers and transmigrant living in the neighboring area, particularly within peneplain zone in North Lampung that relies on dry-land food crop farming and other

similar area. This implies that without any consistent policy implementation to protect state forestland, especially the intact primary forest, forest encroachment for coffee cultivation could not be restrained. As what just happened in Sumberjaya area in 1997-1998, when coffee farm-gate price increased reaching Rp 13,000 per kg, and under unstable political condition, massive 'forest' opening occurs in many parts of Sumberjaya area. The reforestation stands and natural forest being cleared by white collar, smallholder, and non-landowner farmers from nearby villages and from outside Sumberjaya area to make way for coffee farming.

2.6. Recent policy of state forestland utilization and its impact to coffee cultivation

The problems caused by state forestland utilization for agriculture purposes (coffee farming) in Lampung as mentioned in the first section had encouraged the Government of Lampung to regulate the use of state forestland for agricultural purposes. In 13 July 2000 Government of Lampung enacted a Provincial Decree No 7 / 2000 to regulate retribution of commodities harvested and collected from the state forestland. It covers 32 commodities including coffee (See Appendix D). Although not clearly stated, the decree seems to have two objectives: to generate forest rehabilitation fund and to discourage forest encroachment.

The decree eventually affects the return of those who cultivate state forestland and the NTFP gatherer. Table 2.6 presents the results of sensitivity analysis of coffee systems in Sumberjaya to the implementation of provincial decree No 7/2000. The results can be interpreted as follows. Under coffee prices of Rp 3,167/kg at farm gate (ten years annual average price, in real term), except the multistrata coffee systems, all coffee systems cultivated in the state forestland would not be profitable.

Table 2.6. Sensitivity analysis of coffee system in Sumberjaya to the implementation of provincial levies on the commodities harvested from state forestland (under Provincial Decree No. 7/2000 of Lampung Province)

Coffee Farming Systems	**Discounted Establishment Cost** *(thousand Rp)*			**Return to Land (Profitability)** *(thousand Rp)*			Return to Labor *(Rupiah / person-day)*		
	No commodity retribution	With commodity retribution	Changes	No commodity retribution	With commodity retribution	Changes	No commodity retribution	With commodity retribution	Changes
Pioneer-Insecure Title-Low Intensity	***3,673***	***5,378***	***46.4%***	***925***	***(263)***	***-128%***	***5,004***	***3,715***	***-25.76%***
Simple-Insecure Title-Medium Intensity	***3,784***	***5,727***	***51.3%***	***2,076***	***(111)***	***-105%***	***5,686***	***3,910***	***-31.23%***
Simple-Insecure Title-High Intensity (rejuvenation coffee system)	***7,113***	***9,372***	***31.8%***	***3,291***	***(849)***	***-126%***	***6,639***	***3,319***	***-50.01%***
Simple-Secure Title-High Intensity	6,621	6,621	0.0%	2,856	2,856	0%	6,137	6,137	0.00%
Simple-Secure Title-High Intensity with grafting	6,625	6,625	0.0%	1,975	1,975	0%	5,496	5,496	0.00%
Complex-Insecure Title-Low Intensity	***3,786***	***5,505***	***45.4%***	***2,947***	***1,741***	***-41%***	***6,987***	***5,764***	***-17.50%***
Complex-Secure Title-Medium Intensity	3,656	3,656	0.0%	4,883	4,883	0%	7,815	7,815	0.00%

Sources : Authors' calculation

In addition, its return to labor is decreased to the level below Sumatra agriculture wage rate. For multistrata type of coffee system on state forestland, although still profitable to cultivate, its return to land will decrease by 41% and return to labor will decrease by 17.5%.

If the coffee prices at farm gate remain unchanged or lower than the coffee price used in the calculation above, coffee cultivation within the state forestland will not be attractive, and the multistrata type of coffee system will be an alternative to choose. However, as a matter of fact, the current farm gate price of coffee bean in Sumberjaya between August to October 2000, has been fluctuated between Rp 3,500 and Rp 4,200 per kg. By altering the coffee price to Rp 3,500 and Rp 4,000/kg in profitability calculation, as shown in Table 2.7, the results shows that coffee system even more profitable.

Table 2.7. Sensitivity analysis: NPV of coffee systems in Sumberjaya to the change of coffee prices (under Provincial Decree No 7/2000 of Lampung Province)

Coffee systems	Coffee bean prices at farm gate		
	Rp 3,167	*Rp 3,500*	*Rp 4.000*
Pioneer-Insecure Title-Low Intensity	***(263)***	***270***	***1,070***
Simple-Insecure Title-Medium Intensity	***(111)***	***833***	***2,250***
Simple-Insecure Title-High Intensity (rejuvenation coffee system)	***(849)***	***950***	***3,652***
Simple-Secure Title-High Intensity	2,856	4,142	6,074
Simple-Secure Title-High Intensity with grafting	1,975	3,261	5,193
Complex-Insecure Title-Low Intensity	***1,741***	***2,274***	***3,074***
Complex-Secure Title-Medium Intensity	4,883	5,872	7,358

Source : Authors' calculation
Note : all coffee systems within state-forestland written in bold letters.

The figures in Table 2.7 mentions that under current coffee price, the objective of the Provincial Decree to discourage coffee cultivation within state forestland seems hard to achieve. If coffee price at farm gate never fall under Rp 3,500 per kg, coffee cultivation within state forestland remain attractive and rather an opportunity to farmer to have a semi-secure tenure for coffee cultivation in the state forestland.

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III. Concluding remarks

1. Coffee cultivation in Sumberjaya, Lampung Province, which was initiated by pioneers Semendonese in the first half of 19 century during the Dutch *kulturstelsel*, has been improving gradually along with the increase of Sumberjaya inhabitants by in-migrant from Java and other places within the province and Sumatra. Three gradual changes has been taking place in the Sumberjaya are:

   (1) Permanent coffee farming system has replaced coffee farming under shifting cultivation practices,

   (2) The tendency to improve coffee productivity per unit of land by management intensity improvement getting more common among coffee growers, and

   (3) The demand for better coffee species to improve coffee productivity by grafting has also increased among those who has capital.

2. Coffee farming practices in Sumberjaya has encroached to the state forestland causing serious problems in the province. Conflict of interest regarding land status and land uses has been created multi-dimensional problems in controlling the utilization of state forestland. Efforts to rehabilitate state forestland that have been used for agriculture purposes (coffee) and settlements, not only hard to meet its objectives, but also create another problem. Conflicts between government apparatus (forestry officer) and the dwellers living within state forestlands in Sumberjaya area are among the problems caused by coffee cultivation. Yet, the existence of administratively recognized villages within protection forest, have brought the problems beyond the domain of Forest and Estate Ministry. Hence, it includes Ministry of Home Affair to deal with. There are also other ecological

issues such as biodiversity losses, soil erosion etc., which is filling the list of debatable environmental issues. The increasing rate of forest conversion for coffee farming in Sumberjaya area since early 1980's, however, indicates that coffee farming in this area is attractive for farmers to cultivate.

3. Using three categories, such as vegetation structure complexity, management intensity applied and tenurial security of land on which farmers grow coffee, the assessment selected seven coffee systems to be assessed representing various types of coffee system in Sumberjaya. They are : (1) pioneer – insecure title – with low management intensity, (2) simple – insecure title – with medium management intensity, (3) Simple-insecure title (rejuvenated from an old-abandon coffee farm) – with high management intensity, (4) Simple – secure title without grafting – with high management intensity, (5) Simple – secure title with grafting – with high management intensity, (6) Complex – insecure title – with low management intensity, and (7) Complex – secure title –with medium management intensity

4. The assessment reveals that coffee-farming system in the area offers reasonable high return to land and relatively higher returns to labor. Financially, NPV of coffee farming system in Sumberjaya valued at private prices, is ranging between Rp 0.925 million (the pioneer type of coffee system) and Rp 4.88 million (the complex coffee system on secure land tenure with medium management intensity). Economically, NPV of coffee farming system in Sumberjaya that is valued at social prices is ranging between Rp 1.05 million and Rp 7.83 million. It needs to note that the results of profitability assessment above exclude its return from selling the timber harvested during the conversion of land to coffee

cultivation. The return from illegally selling marketable timber certainly could cover a large portion the establishment costs.

5. All coffee systems under study provide higher return to labor than the average agricultural wage rate in Sumatra. Return to labor valued at private prices as an indicator of smallholders' production incentives, give a sign that the systems is attractive for farmers to engage, even for the pioneer type of coffee cultivation. Return to labor valued at private prices, are ranging from Rp 5,000 to Rp 7,815 per person day, that is 25% to 95% higher than average agricultural wage rate in Sumatra. While economically, return to labor valued at economic-shadow prices are ranging from Rp 5,027 to Rp 8,983 per person day, that is also 25% to 125% higher than average agricultural labor wage rate of Sumatra.

6. The divergences figures show that all systems have negative sign, mean that what farmers get is less than it supposed to be. But this divergence is mostly due to differences in private and social discount rates. This, therefore, cannot be attributed mainly on a particular government policy. The systems that require external input application, depend on how much the rate is, the divergence is also partly contributed from a result of government policy on fertilizer and other chemicals input. Besides, there is another factor of divergence for coffee systems on state forestland, i.e. an unofficial fee, approximately Rp 50,000 per ha. per year. Those who cultivate coffee within state forestland subject to pay this.

7. Making comparison among the coffee systems under study regarding the profitability, it is interesting to note that multistrata type of coffee system on secure land title (a privately owned land) with medium management intensity has the highest both in return to land and return to labor. This system provides yields not only from coffee bean, but also from fruits harvested from the same plot. On

the contrary, the pioneer type of coffee system has the least both in return to land and return to labor.

8. Looking at cash flow indicator (cost of establishment) and labor requirements figures, the assessment points up that multistrata coffee system on a secure land title with medium management intensity is the most appropriate for farmers to adopt. It has the lowest cost of establishment (Rp 3.655 million per hectare) and requires acceptable amount of labor to be employed during establishment phase (878 person days per hectare during 4 years). Compare to other type of coffee systems in Sumberjaya area, this system is still superior from profitability and soil conservation points of view.

9. During the monetary crisis, coffee growers received higher return due to the increase of coffee prices. Sensitivity analysis of coffee farming profitability according to the macro-economic parameter changes shows that not all systems gain from the increase of coffee price during the crisis. Means that the higher prices of coffee bean, does not necessarily will increase the profitability. Because cost of labor for harvesting is also increase as well as fertilizers' prices. Regarding the return to labor, it is interesting that the figures increase for all coffee systems. Means that production incentive remain higher. This implies that coffee cultivation remains attractive for farmers to cultivate. However, return to labor relative to the wage rate in Sumatra seems to be less than it was.

10. The return of coffee system enjoyed by coffee growers in Sumberjaya constitutes pull factor to other farmers and transmigrants living in the neighboring area, particularly within peneplain zone in North Lampung and other similar area that relies on dry-land food crop farming. Without any consistent policy implementation to protect state forestland, especially the intact primary forest,

forest encroachment for coffee cultivation could not be restrained. As what just happened in Sumberjaya area in 1997-1998, when coffee price at farm-gate reach Rp 13,000 per kg, and under unstable political condition, massive 'forest' opening occurs in many parts of Sumberjaya area. The reforestation stands and natural forest being cleared by white collar, smallholder, and non-landowner farmers from nearby villages and from outside Sumberjaya area to make way for coffee farming.

11. The results of labor requirement calculations show that the higher the management intensity, the higher labor requirements would be. There is a tendency among farmers in Sumberjaya to improve coffee productivity per unit of land by management intensity improvement. It implies to the demand for agricultural labor in the area both for crop care activities and harvesting would increase. During harvesting time, the cost of hired labor for coffee harvesting would be higher than average agricultural laborer in the region. Linking those facts with labor market in Sumatra in general, coffee system in Sumberjaya will attract more people to move in. It is obvious that coffee cultivation creates rural employment ranging from 59 to 211 person-days per hectare per year with better agricultural wage rate. Nevertheless, in the other hand, coffee systems will also threat the remaining forested land in Sumberjaya.

12. Regarding land tenure issue of coffee farming in Sumberjaya, it is interesting to note that almost all farmers who cultivate state forestland, including coffee farming with insecure land right, are subject to pay a kind of 'unofficial fee' that decided by 'person in charge' arbitrarily. At present, this fee is approximately Rp 50,000 per hectare per year. This constitute a serious issue in controlling state forestland, because by paying this 'unofficial fee', farmers would always have a

feeling that what they are doing is permissible since they are willing to pay. In this regard, in controlling state forestland that supposed to keep the state forest area remain in its designated function, would be blunted by the miss performed of its apparatus. Since the system, under prevailing discount rate, still provide positive 'return to land', the forest conversion will be continuously to happen. Without serious measures to protect the natural forest left in Lampung province, forest conversion in the remaining forest hardly can be stopped

13. The problems caused by state forestland utilization for agriculture purposes (coffee farming) in Lampung had encouraged the Government of Lampung to regulate the use of state forestland for agricultural purposes, by enacting Provincial Decree No 7 / 2000 in 13 July 2000. This decree is intended to regulate a kind of retribution for any commodities harvested and collected from the state forestland. Although not clearly stated, the decree seems to have two objectives: to generate forest rehabilitation fund and to discourage forest encroachment. The decree eventually affects the return of those who cultivate state forestland and the NTFP gatherer. Under coffee prices of Rp 3,167/kg at farm gate (ten years annual average price, in real term), except the multistrata coffee systems, all coffee systems cultivated within state forestland would not be profitable. Return to labor is also declined to the level below Sumatra agriculture wage rate. For multistrata type of coffee system on state forestland, although still profitable to cultivate, its return to land will decrease by 41% and return to labor will decrease by 17.5%. If the coffee prices remain unchanged or lower than the price above, coffee cultivation within the state forestland will not be attractive, and the multistrata type of coffee system will be an alternative to choose. However, current farm gate price of coffee bean in Sumberjaya between August to

October 2000 has been fluctuated between Rp 3,500 and Rp 4,200 per kg. By altering coffee price according to the prevailing coffee price at farm gate in the farm budget calculation, the assessment gives a hint that under current coffee price, the objective of the Provincial Decree to discourage coffee cultivation within state forestland seems hard to achieve. If coffee price at farm gate never fall under Rp 3,500 per kg, coffee cultivation within state forestland remain attractive and rather an opportunity to farmer to have a semi-secure tenure for coffee cultivation in the state forestland.

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REFERENCES

1. Agus, Fahmuddin and Ahmad Kusworo. 1999. Sumberjaya Subdistrict, West Lampung. Unpublished Trip Report

2. Benoit, D., Pain, M., Levang, P., Sevin, O. (1989) *Transmigration et Spontanees en Indonesie* / Transmigration and Spontaneous Migrations in Indonesia : Propinsi Lampung. ORSTOM - Departemen Transmigrasi, Jakarta

3. Budidarsono, S., Tomich TP, Lusiana B, van Noordwijk M. 1998. *Profitability Assessment of Transmigration Land Use System in Dryland Peneplain Zone of Lampung: Continuous Annual Food Crop Farming System, Degraded to Imperata cylindrica grassland*. International Center for Research in Agroforestry (ICRAF), Bogor, Indonesia.

4. Budidarsono, S., Arifatmi, B., Hubert de Foresta, and Thomas P. Tomich, 2000. *Damar Agroforest Establishment and Sources of Livelihood: A Profitability Assessment of Damar Agroforest System in Krui, Lampung, Indonesia*. International Centre for Research in Agroforestry (ICRAF), Bogor, Indonesia.

5. Chambers, R etal (1989) *Farmer First: Farmer Innovation and Agricultural Research*. Longman, London :

6. Gintings, A.N., Martua Sirait, Sutanto A., Yohanes Mogea, Mulyono, I. Tjitrajaya, Budiriyanto and Amrulah. 1999. *Laporan Penelitian Budidaya Tanaman Kopi di dalam Kawasan Hutan dan Pengaruhnya terhadap Fungsi Hutan di Propinsi Daerah Tingkat , Lampung*. Departemen Kehutanan dan Perkebunan, Jakarta

7. Hasan, M. Fadhil, M. Rum, Delima Darmawan. 1996. Fertilizer Subsidies in Indonesia. in CPIS, *Fertilizer Policy in Indonesia*. Center for Policy and Implementation Studies (CPIS), Jakarta, Indonesia. Monograph Series No 1/96

8. Kusworo, A. 2000. *Perambah Hutan atau Kambing Hitam : Potret Sengketa Kawasan Hutan di Lampung.* Pustaka Latin. Bogor, Indonesia

9. Kusworo, A. 2000. Sumber Jaya Field Work, Unpublished Trip Report

10. Lumbanraja, J., T. Syam, H. Nishide, A.K. Mahi, M. Utomo, Sarno, and M. Kimura. 1998. *Deterioration of soil fertility by land use changes in South Sumatra, Indonesia : from 1970-1990*. Hydrological Processes 12: 2003-2013.

11. Monke EA and Pearson SR. 1995. *The policy Analysis Matrix for Agricultural Development*. Cornell University Press, Ithaca, New York.

12. Mougeot, E. and Levang, P. 1990. *Marketing of Rice, Cassava and Coffee in Lampung*. CGPRT Centre, Bogor, Indonesia.

13. Suyanto, 1999. *The Underlying Causes and Impact of Fires in Southeast Asia : Fire, Deforestation and land Tenure in The North Eastern Fringe of Bukit Barisan Sealatan National Park, Lampung* – Socio-economic Report; Site I. Mimeo, ICRAF, Bogor

14. Tendean, Maria 2000. *Preliminary results of analysis of population data of Sub-district Sumberjaya*. Report of a 2-month internship at ICRAF. Unpublished

15. Tomich TP, van Noordwijk M, Budidarsono S, Gillison A, Kusumanto T, Murdiyarso D, Stolle F, and Fagi AM (Eds) 1998. *Alternatives to Slash-and-Burn in Indonesia, Summary Report & Synthesis of Phase II*, ASB Indonesia Report No 8, International Centre for Research in Agroforestry (ICRAF), Bogor, Indonesia.

16. Vosti SA, Witcover J, Gockowski J, Tomich TP, Carpentier CL, Faminow M, Oliveira S and Diaw, C. 1998. *Socioeconomic Issues Linked to Best Bet Land Use Systems*. Forthcoming as an EMBRAPA, Technical Report.

APPENDIX A

The Policy Analysis Matrix: approach of the assessment[1]

The Approach

Policy analysis matrix (PAM) is a matrix of information about agricultural and natural resources policies and factor market imperfection, that is created by comparing multi years land use system budget calculated at financial prices (reflecting actual market) and economics prices (reflecting efficiency). It composed of two set of identities – one set defining ***profitability***, and other defining the difference between private price and social values, measuring the ***effect of divergence***; as the difference between observed parameters and parameters that would exist if the divergence were removed (Monke and Pearson, 1995, pp.: 16 –19).

Profitability as the first identity of accounting matrix, is measured horizontally, across the columns of the matrix as demonstrated in Table 1.

Table 1. Policy Analysis Matrix

	Revenues	Cost		Profits
		Tradable Input	Domestic Factor	
Private prices	A	B	C	D[1]
Social prices	E	F	G	H[2]
Effect of divergences and Efficiency policy	I[3]	J[4]	K[5]	L[6]

Source: Monke and Pearson (1995, p.19)
[1] Private profit, D, equal A minus B minus C
[2] Social profit, H, equal E minus F minus G
[3] Output transfer, I, equal A minus E
[4] Input transfer, J, equal B minus F
[5] Factor transfer, K, equal C minus G
[6] Net transfer, L, equal D minus H, they also equal I minus J minus K

Ratio Indicators for Comparison of Unlike Outputs
Private cost ratio (PCR): C/(A – B)
Domestic resource cost ratio (DRC): G/(E – F)
Nominal protection coefficient (NPC)
on tradable outputs (NPCO): A/E
on tradable inputs (NPCI): B/F
Effective protection coefficient (EPC): (A – B)/(E – F)
Profitability coefficient (PC): (A – B – C)/(E – F – G) or D/H
Subsidy ratio to producers (SRP): L/E or (D – H)/E

[1] Summerized from Monke and Pearson, 1995

Profits, shown in the right hand column, are found by subtraction of cost, given in two middle columns, from revenue, indicated in the left-hand column. This column constitutes *profitability identities.* There are two profitability calculations: private profitability and social profitability.

Private profitability calculation is provided in the first row. The term of *private* refers to observe revenues and cost reflecting market prices received or paid by farmers, merchant, or processors in the agricultural system. Private profitability calculations show the competitiveness of agricultural systems at given current technologies, output values, import cost and policy transfer. Private profits are the difference between revenues (A) and cost of input (tradable input B, and domestic factors C); all measured in actual market price: D = A-B-C.

Social profitability calculations, as indicated in the second row in Table 1, is the accounting matrix utilized social prices. These valuations measure comparative advantages or efficiency in the agricultural commodity system. Social profits H, are efficiency measures, because output E (revenue) and input (E+F) are valued in prices that reflect scarcity or social opportunity cost. Social valuation of output (E) and input (F) that internationally tradable, are given by world price: c.i.f. prices for good and services that are imported or f.o.b. export prices for exportable. Social valuation for domestic factor (G) are found by estimation of net income forgone because the factor is not employed its best alternative use or its opportunity cost (Monke and Person, 1996 p.21). In practice the valuation begins with a distinction between mobile (capital, labor and services that can move from agriculture to other sector of economy) and fixed factors (mostly land). For mobile factors, aggregate supply and demand forces determine prices. For fixed or immobile factors of production, such as land, are determined within particular sector of the economy. The value of agricultural land, for example, is usually determined only by land's worth in growing alternative crops.

The second identity of the accounting matrix is ***effect of divergences***, indicated in the third row. Although this row mainly concerns the difference between private and social valuation of revenues, costs and profits, and is measured vertically. This row

constitutes the main point of the PAM approach. Any divergence between the observed private prices and the estimated social prices must be explained by the effect of policy or by the existence of market failure. *Output transfer* (I=A-E) and *input transfer* (J=B-F), arise from two kinds of policy that cause divergence between observed market prices and world product prices. Those two kind of policies are commodity-specific policies include a wide range of taxes and subsidies and trade policies, and exchanged rate policy. *Factor transfer* (K = C-G) shows how policies on factors of production and the factor market imperfection had been taking place that create a divergence between private cost (C) and social cost (G). Finally the *net transfer* (L) caused by policy and market failure is the sum of the separate effect from product and factor market (L = I-J-K). Positive entries in two cost categories J and K represent negative transfer because they reduce private profit, whereas negative entries in J and K represent positive transfer.

Data needed for Analysis

The determination of profit that actually received by farmers/households is straightforward and important initial result of the analysis. It shows which farmers are currently competitive and how their profit might change if price policies were changed. Therefore farm budget components of the principal agriculture systems, such as farm output or revenues and input cost, are the main necessary data and information. All of these are measured in actual market price. Regarding the second row of the matrix that measures comparative advantages or efficiency in the agricultural commodity system, the valuation is given in world price. Therefore f.o.b prices data of exportable items and c.i.f. prices of importable items in farm budget are the necessary data that should be collected.

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Appendix B

1. Parity prices at farm gate of the main agricultural products in coffee farming systems in Sumberjaya
2. Domestic prices of the main agricultural products in coffee farming systems in Sumberjaya
3. Prices Tables
4. Input and Output Tables of coffee farming systems in Sumberjaya (25 years)

Appendix B1a Coffee
Export parity price calculation for coffee at farm gate in Sumberjaya area

Year	FOB at Panjang Port	X-rate annual average	FOB at Panjang port *Rp/Ton*		Export fee to AEKI	Handling and quality control fee 1)	Bank provision and other export administration cost 2)	Processing cost and packing	Allowance (5%)	Export parity price at exporter	Marketing cost and margin (9.8%)	Export parity price at farm gate	
	(US$/ton)	*(Rp/US$)*	*nominal*	*real*	*(Rp/ton)*	*(Rp/ton)*	*(Rp/ton)*	*(Rp/ton)*	*(Rp/ton)*	*(Rp/ton)*		*(Rp/ton)*	*Rp/kg*
1991	867	1,950	1,690,580	2,635,546	25,000	217,133	116,587	100,000	168,704	2,008,122	196,796	1,811,326	1,811
1992	770	2,030	1,563,170	2,277,728	25,000	217,133	105,087	100,000	141,864	1,688,644	165,487	1,523,157	1,523
1993	920	2,087	1,920,216	2,589,979	25,000	217,133	115,737	100,000	165,238	1,966,870	192,753	1,774,117	1,774
1994	2,443	2,161	5,279,895	6,630,835	25,000	217,133	250,413	100,000	467,967	5,570,321	545,891	5,024,429	5,024
1995	2,525	2,249	5,677,867	6,497,161	25,000	217,133	247,231	100,000	457,854	5,449,943	534,094	4,915,848	4,916
1996	1,567	2,342	3,670,430	3,913,149	25,000	217,133	161,462	100,000	264,240	3,145,314	308,241	2,837,073	2,837
Jul-97	1,541	2,400	3,698,574	3,698,574	25,000	217,133	154,827	100,000	248,125	2,953,489	289,442	2,664,047	2,664
1998	1,453	10,094	14,665,912	9,082,628	25,585	217,133	350,497	100,000	650,179	7,739,233	758,445	6,980,788	6,981
Apr-99	1,481	8,604	12,739,232	6,614,228	25,499	217,133	268,543	100,000	465,237	5,537,817	542,706	4,995,111	4,995
											Annual average 1991 – 1997		**2,936**
											Annual average 1991 – 1999		**3,679**

Sources

1. Authors calculation
2. Kanwil Perindustrian dan Perdagangan Propinsi Lampung
3. AEKI Lampung, 1999
4. Mougeot and Levang, 1990
5. International Financial Statistics Yearbook 1997
6. Pink Sheet, Commodity price, The World Bank, January 1998

Note

1. Handling and Quality Control Fee consists of : (1) Fumigation Cost Rp 4500/ton, (2) Certificate of Photosanitary = Rp 1000/ton, (3) Sampling fee = 55.000/30 ton, (3) Wighing Fee = Rp 550/ton, (4) *Karung Goni* (Sack) = Rp 8000/60kg (each sack is used twice), Certificate of Quality = Rp 75000/50 ton

2. Bank Provision and Other Export Administration Cost consist of : (1) Bank Provision : 0.25 % of FoB coffee price, (2) Bank Fee (document & LC) Rp 20/kg, (3) Interest Rate = 3.125% per month multiplied by coffee price, (4) Marketing Cost (Rp 5/kg), and (5) Miscellaneous (Rp 5/kg)

Appendix B1b - Paddy

Import parity price calculation for paddy at farm gate *(constant price 1997)*

Year	Annual Exchanger ate Rate [1] Rp./US$	CPI Bandar-lampung 1997=100 [2]	Price of Rice (F.o.b Bangkok) [3] US$/Mt	Price of Rice (C.I.f. Panjang Port) US$/Mt	Price of Rice (C.I.f. Panjang Port) Rp/Mt	Storage, handling and marketing 10.0%	Parity price at wholesale Rp/Mt	Processing cost and handling (10.0%)	Conversion allowance (40%)	Parity price of paddy at Collector and/or processor	Transport, handling, processing cost and marketing margin (8.5%)	Import parity price of paddy at farm gate (Rp/ton) nominal	Import parity price of paddy at farm gate (Rp/ton) real price 1997=100
1989	1,770	50.45	320.33	336.35	595,367	59,537	654,904	66,681	392,942	307,150	26,108	281,042	557,072
1990	1,843	54.36	287.17	301.53	555,657	55,566	611,222	62,234	366,733	286,663	24,366	262,297	482,482
1991	1,950	64.15	312.58	328.21	640,106	64,011	704,117	71,692	422,470	330,231	28,070	302,161	508,053
1992	2,030	68.63	287.44	301.81	612,648	61,265	673,913	68,617	404,348	316,065	26,866	289,200	451,970
1993	2,087	74.14	267.94	281.34	587,178	58,718	645,896	65,764	387,538	302,925	25,749	277,177	395,235
1994	2,161	79.63	358.03	375.93	812,313	81,231	893,544	90,979	536,126	419,072	35,621	383,451	503,814
1995	2,249	87.39	327.78	344.17	773,898	77,390	851,288	86,677	510,773	399,254	33,937	365,318	438,632
1996	2,342	93.80	338.90	355.85	833,496	83,350	916,845	93,352	550,107	430,000	36,550	393,450	437,301
1997	2,873	100.00	303.50	318.68	764,820	76,482	841,302	102,542	504,781	394,571	33,539	361,032	361,032
1998	10,094	161.47	304.20	319.41	3,224,125	322,412	3,546,537	361,102	2,127,922	1,663,326	141,383	1,521,943	942,555
Apr-99	8,626	192.60	278.70	292.64	2,359,382	235,938	2,595,320	282,718	1,557,192	1,217,205	103,462	1,113,743	578,267
											Annual average up to April 1999 (Rp/kg)		***562***
											Annual average up to July 1997 (Rp/kg)		***421***

Sources :

1) Financial Statistics Year Book 1997; and BPS 1999, Pasific Exchange Rate Service (http://www.pacific.commerce.ubc.ca/xr/)
2) BPS Lampung (1998), Indikator Tingkat Hidup Pekerja/Karyawan Propinsi Lampung 1997;BPS (1997);CPI in the province capital cities of Indonesia, 1997; CPI di Ibukota Provinsi Indonesia, 1998
3) The World Bank, Commodity Price Data / Pinksheet (http://www.,worldbank.org/prospect/pinksheet); and BPS 1999

Appendix B2:
Local Prices of coffee and paddy harvested from Coffee farming in Sumberjaya

Year	CPI Bandar lampung 1997=100 [1)]	Paddy (Rp / 100kg)			Coffee (Rp/kg)	
		Nominal		*Real prices constan price 1997*	*Nominal* [5)]	*Real prices constan price 1997*
1991	64.1	41,731	[2)]	65,057	1,397	2,178
1992	68.6	39,977	[2)]	58,251	1,333	1,942
1993	74.1	33,917	[2)]	45,747	1,522	2,053
1994	79.6	39,223	[2)]	49,259	4,225	5,306
1995	87.4	43,720	[2)]	50,029	4,360	4,989
1996	93.8	47,465	[3)]	55,204	2,275	2,425
1997	100	60,885	[3)]	66,420	3,276	3,276
1998	161.5	93,500	[4)]	63,169	11,410	7,066
1999	192.6	93,500	[4)]	52,959	10,500	5,452
Annual Average up to April 1999				**56,233**		**3,854**
Annual Average up to July 1997				**55,710**		**3,167**

Sources

1. Derived from many sources : BPS Lampung, Indikator Tingkat Hidup Pekerja/Karyawan Propinsi Lampung 1997, BPS (1997);CPI di Ibukota Provinsi Indonesia, 1997; CPI di Ibukota Provinsi Indonesia, 1998
2. BPS, 1986, Statistik harga produsen sektor Pertanian di Jawa 1983-1995 dan di Luar Jawa 1987-1995
3. Estimated form price of rice in Lampung (60% conversion factor)
4. Esteimated from floor price of rice Rp 1,700,-/kg

Appendix B3a

PRICES TABLE: Coffee farming systems in Sumberjaya, before financial crisis, July 1997 (constant price 1997)

Input Output items	*unit*	*Private Prices*	*Social Prices*
TRADABLE INPUTS			
Fertilizers			
Urea	kg/ha	338	502
TSP	kg/ha	507	493
KCl	kg/ha	422	326
Kopi Unggul(TM)	Rp/btl	4,222	4,222
Herbicides			
Spark(TM)	Rp/ltr	13,193	13,193
Pest controls			
Fastac(TM)	Rp/cane	3,166	3,166
Furadan	Rp/kg	5,277	5,277
Tools			
Cangkul (hoe)	Rp/unit	20,000	20,000
Kapak (axe)	Rp/unit	30,000	30,000
Golok (machete)	Rp/unit	10,000	10,000
Sabit (sickle)	Rp/unit	10,000	10,000
Karung Goni (sack)	Rp/unit	1,500	1,500
Sprayer (Solo , Germany)	Rp/unit	200,000	200,000
Planting materials			
Dry land paddy (Oriza sativa)	Rp/kg	3,000	3,000
Chili seed	Rp/kg	60,000	60,000
coffee	Rp/kg	3,167	3,176
Dadap (Erythrina fusca Lour)	Rp/stumps	0	0
Gamal (Gliricidae sp.)	Rp/stumps	0	0
Mangga (Mangifera indica)	Rp/stumps	0	0
Nangka (Arthocarpus heterophyllus)	Rp/stumps	0	0
Alpukat (Persea americana)	Rp/stumps	0	0
Pisang (Musa paradisia)	Rp/stumps	0	0
Jambu Klutuk (Psidium guajava)	Rp/stumps	0	0
Jeruk (Citrus sp.)	Rp/stumps	0	0
LABOR			
Land clearings			
Slashing and tree cutting	Rp/ps-d	8,333	8,333
first burning	Rp/ps-d	4,000	4,000
second burning (perun) and cleaning	Rp/ps-d	4,000	4,000
hoeing 1	Rp/ps-d	4,000	4,000
hoeing 2	Rp/ps-d	4,000	4,000
Nursery			
Paddy gogo (Oriza sativa)	Rp/ps-d	4,000	4,000
coffee	Rp/ps-d	4,000	4,000
chili	Rp/ps-d	4,000	4,000
Dadap (Erythrina fusca Lour)	Rp/ps-d	4,000	4,000
Gamal (Gliricidae sp.)	Rp/ps-d	4,000	4,000
Mangga (Mangifera indica)	Rp/ps-d	4,000	4,000
Nangka (Arthocarpus heterophyllus)	Rp/ps-d	4,000	4,000
Alpukat (Persea americana)	Rp/ps-d	4,000	4,000
Pisang (Musa paradisia)	Rp/ps-d	4,000	4,000
Jambu Klutuk (Psidium guajava)	Rp/ps-d	4,000	4,000
Jeruk (Citrus sp.)	Rp/ps-d	4,000	4,000

To be continued →

Appendix B3a (Conti'd)

Input Output items	*unit*	*Private Prices*	*Social Prices*
Planting			
Paddy gogo (Oriza sativa)	Rp/ps-d	4,000	4,000
coffee	Rp/ps-d	4,000	4,000
chili	Rp/ps-d	4,000	4,000
Dadap (Erythrina fusca Lour)	Rp/ps-d	4,000	4,000
Gamal (Gliricidae sp.)	Rp/ps-d	4,000	4,000
Mangga (Mangifera indica)	Rp/ps-d	4,000	4,000
Nangka (Arthocarpus heterophyllus)	Rp/ps-d	4,000	4,000
Alpukat (Persea americana)	Rp/ps-d	4,000	4,000
Pisang (Musa paradisia)	Rp/ps-d	4,000	4,000
Jambu Klutuk (Psidium guajava)	Rp/ps-d	4,000	4,000
Jeruk (Citrus sp.)	ps-d/ha	4,000	4,000
Crop care			
Paddy (weeding)	Rp/ps-d	4,000	4,000
Chili			
replanting	Rp/ps-d	4,000	4,000
weeding	Rp/ps-d	4,000	4,000
Coffee			
replanting	Rp/ps-d	4,000	4,000
fertilizing	Rp/ps-d	4,000	4,000
weeding (koret)	Rp/ps-d	4,000	4,000
spraying	Rp/ps-d	4,000	4,000
cleaning the buds	Rp/ps-d	4,000	4,000
coffee tree pruning[1)] :			
branches cutting (Ngeranting)	Rp/ps-d	4,000	4,000
top stem cutting (Pungkak)	Rp/ps-d	4,000	4,000
soil conservation measures (rorak, guludan etc.)	Rp/ps-d	4,000	4,000
old coffee coppicing (rejuvenation)	Rp/ps-d	4,000	4,000
Pruning other trees			
Dadap (Erythrina fusca Lour)	Rp/ps-d	4,000	4,000
Gamal (Gliricidae sp.)	Rp/ps-d	4,000	4,000
Mangga (Mangifera indica)	Rp/ps-d	4,000	4,000
Nangka (Arthocarpus heterophyllus)	Rp/ps-d	4,000	4,000
Alpukat (Persea americana)	Rp/ps-d	4,000	4,000
Pisang (Musa paradisia)	Rp/ps-d	4,000	4,000
Jambu Klutuk (Psidium guajava)	Rp/ps-d	4,000	4,000
Jeruk (Citrus sp.)	Rp/ps-d	4,000	4,000
Harvesting			
paddy	Rp/ps-d	4,000	4,000
chili	Rp/ps-d	4,000	4,000
coffee	Rp/ps-d	7,576	7,596
Dadap (Erythrina fusca Lour)	Rp/ps-d	4,000	4,000
Gamal (Gliricidae sp.)	Rp/ps-d	4,000	4,000
Mangga (Mangifera indica)	Rp/ps-d	4,000	4,000
Nangka (Arthocarpus heterophyllus)	Rp/ps-d	4,000	4,000
Alpukat (Persea americana)	Rp/ps-d	4,000	4,000
Pisang (Musa paradisia)	Rp/ps-d	4,000	4,000
Jambu Klutuk (Psidium guajava)	Rp/ps-d	4,000	4,000
Jeruk (Citrus sp.)	Rp/ps-d	4,000	4,000

To be continued →

Appendix B3a (Conti'd)

Input Output items	*unit*	*Private Prices*	*Social Prices*
Post harvest activities			
Coffee (drying)	Rp/ps-d	4,000	4,000
Collecting Fuel Wood	Rp/ps-d	4,000	4,000
LAND			
CAPITAL			
Coffee hulling services [3)]	Rp/kg	127	127
Transport services from field [2)]	Rp/zak	5,000	5,000
Marketing Transport [4)]	Rp/kg	200	200
Unofficial fee [5)]	Rp	50,000	0
Grafting Services [6)]	Rp/bud	800	800
Compensation payment [7)]	Rp/ha	800000	800000
YIELD			
Food crop and vegetable			
Paddy rice	kg/ha	557	421
chili	kg/ha	1,996	1,996
coffee	kg/ha	3,167	2,936
Fruits			
Mangga (Mangifera indica)	Rp/kg	1,000	1,000
Nangka (Arthocarpus heterophyllus)	Rp/kg	1,500	1,500
Alpukat (Persea americana)	Rp/kg	1,000	1,000
Pisang (Musa paradisia)	Rp/buch	1,000	1,000
Jambu Klutuk (Psidium guajava)	Rp/kg	500	500
Jeruk (Citrus sp.)	Rp/kg	2,500	2,500
Fuel wood	unit/ha	3,000	3,000
Timber [8)]			

Note

1) *There are two kinds of pruning; (1) branches cutting (ngeranting) and (2) top stem cutting (pungkak)*
2) *Transport services constitute carrying out the produces from the field to the farmer's house Rp 3333 per sack of fresh coffee, approximately 50 kg/sack*
3) *paid in kind of 4% out of total*
4) *Rp 133/kg market quality of coffee bean*
5) *Amount of money that has to be paid by those who cultivate coffee within state forestland*
6) *Grafting services only paid according to the buds which was successfully grafted (grown well)*
7) *Amount of money as compensation payment need to paid by farmers to the previous land owner for the land and the old coffee trees*
8) *During 25 years there is no timber would be harvested.*

Appendix B3b

PRICES TABLE: Coffee farming systems in Sumberjaya, during financial crisis, April 1999 (constant price 1997)

Input Output items	*unit*	*Private Prices*	*Social Prices*
TRADABLE INPUTS			
Fertilizers			
Urea	kg/ha	407	535
TSP	kg/ha	647	608
KCl	kg/ha	541	632
Kopi Unggul(TM)	Rp/btl	8,000	8,000
Herbicides			
Spark(TM)	Rp/ltr	25,000	25,000
Pest controls			
Fastac(TM)	Rp/cane	6,000	6,000
Furadan	Rp/kg	10,000	10,000
Tools			
Cangkul (hoe)	Rp/unit	20,000	20,000
Kapak (axe)	Rp/unit	30,000	30,000
Golok (machete)	Rp/unit	10,000	10,000
Sabit (sickle)	Rp/unit	10,000	10,000
Karung Goni (sack)	Rp/unit	1,500	1,500
Sprayer (Solo , Germany)	Rp/unit	200,000	200,000
Planting materials			
Paddy gogo (Oriza sativa)	Rp/kg	3,000	3,000
Cabai seed	Rp/kg	60,000	60,000
coffee	Rp/kg	3,854	3,976
Dadap (Erythrina fusca Lour)	Rp/stumps	0	0
Gamal (Gliricidae sp.)	Rp/stumps	0	0
Mangga (Mangifera indica)	Rp/stumps	0	0
Nangka (Arthocarpus heterophyllus)	Rp/stumps	0	0
Alpukat (Persea americana)	Rp/stumps	0	0
Pisang (Musa paradisia)	Rp/stumps	0	0
Jambu Klutuk (Psidium guajava)	Rp/stumps	0	0
Jeruk (Citrus sp.)	Rp/stumps	0	0
LABOR			
Land clearings			
Slashing and tree cutting	Rp/ps-d	8,333	8,333
first burning	Rp/ps-d	6,000	6,000
second burning (perun) and cleaning	Rp/ps-d	6,000	6,000
hoeing 1	Rp/ps-d	6,000	6,000
hoeing 2	Rp/ps-d	6,000	6,000
Nursery			
Paddy gogo (Oriza sativa)	Rp/ps-d	6,000	6,000
coffee	Rp/ps-d	6,000	6,000
cabai	Rp/ps-d	6,000	6,000
Dadap (Erythrina fusca Lour)	Rp/ps-d	6,000	6,000
Gamal (Gliricidae sp.)	Rp/ps-d	6,000	6,000
Mangga (Mangifera indica)	Rp/ps-d	6,000	6,000
Nangka (Arthocarpus heterophyllus)	Rp/ps-d	6,000	6,000
Alpukat (Persea americana)	Rp/ps-d	6,000	6,000
Pisang (Musa paradisia)	Rp/ps-d	6,000	6,000
Jambu Klutuk (Psidium guajava)	Rp/ps-d	6,000	6,000
Jeruk (Citrus sp.)	Rp/ps-d	6,000	6,000

To be continued →

Appendix B3b (Conti'd)

Input Output items	*unit*	*Private Prices*	*Social Prices*
Planting			
Paddy gogo (Oriza sativa)	Rp/ps-d	6,000	6,000
coffee	Rp/ps-d	6,000	6,000
cabai	Rp/ps-d	6,000	6,000
Dadap (Erythrina fusca Lour)	Rp/ps-d	6,000	6,000
Gamal (Gliricidae sp.)	Rp/ps-d	6,000	6,000
Mangga (Mangifera indica)	Rp/ps-d	6,000	6,000
Nangka (Arthocarpus heterophyllus)	Rp/ps-d	6,000	6,000
Alpukat (Persea americana)	Rp/ps-d	6,000	6,000
Pisang (Musa paradisia)	Rp/ps-d	6,000	6,000
Jambu Klutuk (Psidium guajava)	Rp/ps-d	6,000	6,000
Jeruk (Citrus sp.)	ps-d/ha	6,000	6,000
Crop care			
Paddy (weeding)	Rp/ps-d	6,000	6,000
Chili			
Replanting	Rp/ps-d	6,000	6,000
Weeding	Rp/ps-d	6,000	6,000
Coffee			
Replanting	Rp/ps-d	6,000	6,000
Fertilizing	Rp/ps-d	6,000	6,000
weeding (koret)	Rp/ps-d	6,000	6,000
Spraying	Rp/ps-d	6,000	6,000
cleaning the buds	Rp/ps-d	6,000	6,000
coffee tree pruning[1)] :			
branches cutting (Ngeranting)	Rp/ps-d	6,000	6,000
top stem cutting (Pungkak)	Rp/ps-d	6,000	6,000
soil conservation measures (rorak, guludan etc.)	Rp/ps-d	6,000	6,000
old coffee coppicing (rejuvenation)	Rp/ps-d	6,000	6,000
Pruning other trees			
Dadap (Erythrina fusca Lour)	Rp/ps-d	6,000	6,000
Gamal (Gliricidae sp.)	Rp/ps-d	6,000	6,000
Mangga (Mangifera indica)	Rp/ps-d	6,000	6,000
Nangka (Arthocarpus heterophyllus)	Rp/ps-d	6,000	6,000
Alpukat (Persea americana)	Rp/ps-d	6,000	6,000
Pisang (Musa paradisia)	Rp/ps-d	6,000	6,000
Jambu Klutuk (Psidium guajava)	Rp/ps-d	6,000	6,000
Jeruk (Citrus sp.)	Rp/ps-d	6,000	6,000
Harvesting			
Paddy	Rp/ps-d	6,000	6,000
Cabai	Rp/ps-d	6,000	6,000
Coffee	Rp/ps-d	9,219	9,510
Dadap (Erythrina fusca Lour)	Rp/ps-d	6,000	6,000
Gamal (Gliricidae sp.)	Rp/ps-d	6,000	6,000
Mangga (Mangifera indica)	Rp/ps-d	6,000	6,000
Nangka (Arthocarpus heterophyllus)	Rp/ps-d	6,000	6,000
Alpukat (Persea americana)	Rp/ps-d	6,000	6,000
Pisang (Musa paradisia)	Rp/ps-d	6,000	6,000
Jambu Klutuk (Psidium guajava)	Rp/ps-d	6,000	6,000
Jeruk (Citrus sp.)	Rp/ps-d	6,000	6,000

To be continued →

Appendix B3b (Conti'd)

Input Output items	*unit*	*Private Prices*	*Social Prices*
Post harvest activities			
Coffee (drying)	Rp/ps-d	6,000	6,000
Collecting Fuel Wood	Rp/ps-d	6,000	6,000
LAND			
CAPITAL			
Coffee hulling services [3)]	Rp/kg	154	159
Transport services from field [2)]	Rp/zak	5,000	5,000
Marketing Transport	Rp/kg	200	200
Unofficial fee [5)]	Rp	50,000	0
Grafting Services [6)]	Rp/bud	800	800
Compensation payment [7)]	Rp/ha		
YIELD			
Food crop and vegetable			
Paddy rice	kg/ha	562	509
cabai	kg/ha	1,933	1,933
coffee	kg/ha	3,854	3,679
Fruits			
Mangga (Mangifera indica)	Rp/kg	1,000	1,000
Nangka (Arthocarpus heterophyllus)	Rp/kg	1,500	1,500
Alpukat (Persea americana)	Rp/kg	1,000	1,000
Pisang (Musa paradisia)	Rp/buch	1,066	1,066
Jambu Klutuk (Psidium guajava)	Rp/kg	276	276
Jeruk (Citrus sp.)	Rp/kg	1,000	1,000
Fuel wood	unit/ha	5,000	5,000
Timber [8)]			

Note

1) *There are two kinds of pruning; (1) branches cutting (ngeranting) and (2) top stem cutting (pungkak)*
2) *Transport services constitute carrying out the produces from the field to the farmer's house Rp 3333 per sack of fresh coffee, approximately 50 kg/sack*
3) *paid in kind of 4% out of total*
4) *Rp 133/kg market quality of coffee bean*
5) *Amount of money that has to be paid by those who cultivate coffee within state forestland*
6) *Grafting services only paid according to the buds which was successfully grafted (grown well)*
7) *Amount of money as compensation payment need to paid by farmers to the previous land owner for the land and the old coffee trees*
8) *During 25 years there is no timber would be harvested.*

APPENDIX C:

NPV PAM Tables of Robusta Coffee system in Sumberjaya, Lampung

1. PIONEER COFFEE SYSTEM

LOW management intensity on state forest land (INSECURE land title)

	Revenues *(Rp)*	Costs *(Rp)*			Profits *(Rp)*
		Tradable Inputs	Domestic Factors		
			Capitals	Labors	
Private Prices	6,438,352	355,040	1,907,546	3,250,915	924,851
Social Prices	7,363,325	423,164	2,194,746	3,695,552	1,049,862
Effect of divergences	(924,973)	(68,124)	(287,200)	(444,637)	(125,012)

2. SIMPLE COFFEE SYSTEM on state forestland (INSECURE land title)

2.1. MEDIUM management intensity

	Revenues *(Rp)*	Costs *(Rp)*			Profits *(Rp)*
		Tradable Inputs	Domestic Factors		
			Capitals	Labors	
Private Prices	10,886,850	834,546	3,662,042	4,314,705	2,075,558
Social Prices	14,565,941	1,314,013	4,942,746	5,503,080	2,806,102
Effect of divergences	(3,679,091)	(479,468)	(1,280,704)	(1,188,375)	(730,544)

2.1. HIGH management intensity

	Revenues *(Rp)*	Costs*(Rp)*			Profits *(Rp)*
		Tradable Inputs	Domestic Factors		
			Capitals	Labors	
Private Prices	19,583,092	3,056,422	8,921,076	4,314,963	3,290,631
Social Prices	25,140,537	4,405,427	10,571,864	5,569,056	4,594,189
Effect of divergences	(5,557,445)	(1,349,005)	(1,650,788)	(1,254,093)	(1,303,559)

3. SIMPLE COFFEE SYSTEM on privately owned land (SECURE land title)

3.1. HIGH management intensity WITHOUT grafting

	Revenues *(Rp)*	Costs *(Rp)*			Profits *(Rp)*
		Tradable Inputs	Domestic Factors		
			Capitals	Labors	
Private Prices	14,630,627	2,453,686	4,635,706	4,685,016	2,856,219
Social Prices	19,581,501	3,579,848	6,235,636	6,003,980	3,762,037
Effect of divergences	(4,950,874)	(1,126,161)	(1,599,931)	(1,318,964)	(905,819)

3.2. HIGH management intensity WITH grafting

	Revenues *(Rp)*	Costs *(Rp)*			Profits *(Rp)*
		Tradable Inputs	Domestic Factors		
			Capitals	Labors	
Private Prices	14,393,627	2,656,830	5,141,244	4,620,862	1,974,690
Social Prices	19,247,285	3,958,899	6,871,141	5,907,818	2,509,427
Effect of divergences	(4,853,658)	(1,302,069)	(1,729,897)	(1,286,956)	(534,737)

4. COMPLEX COFFEE SYSTEM

4.1. LOW management intensity on state forestland (INSECURE land title)

	Revenues *(Rp)*	Costs *(Rp)*			Profits *(Rp)*
		Tradable Inputs	Domestic Factors		
			Capitals	Labors	
Private Prices	8,720,295	355,040	1,940,787	3,477,902	2,946,566
Social Prices	11,592,326	423,164	2,233,504	4,024,077	4,911,581
Effect of divergences	(2,872,031)	(68,124)	(292,717)	(546,175)	(1,965,015)

4.2. MEDIUM management intensity on privately owned land (SECURE land title)

	Revenues *(Rp)*	Costs *(Rp)*			Profits *(Rp)*
		Tradable Inputs	Domestic Factors		
			Capitals	Labors	
Private Prices	13,168,794	834,546	2,961,035	4,489,786	4,883,427
Social Prices	18,794,942	1,314,013	4,007,952	5,645,513	7,827,464
Effect of divergences and efficiency policy	(5,626,148)	(479,468)	(1,046,917)	(1,155,728)	(2,944,037)

APPENDIX D:

ATTACHMENT of Provincial Decree No. 7 / 2000, Lampung Province

List of commodities and the retributions

No	Commodities	Retributions		
1	Coffee	Rp.	610,-	/kg
2	Candle nut (*Aleurites Moluccana*)	Rp.	55,-	/kg
3	Cocoa	Rp.	300,-	/kg
4	*Tangkil (Gnetum gnemon L)*	Rp.	40,-	/kg
5	Durian *(Durio zibenthinus)*	Rp.	50,-	/unit
6	Cempedak *(Artocarpus integer)*	Rp.	10,-	/unit
7	Rape Jackfruit *(Artocarpus heterophylus)*	Rp.	50,-	/unit
8	Raw Jackfruit *(Artocarpus heterophylus)*	Rp.	5,-	/unit
9	Avocado pear *(Persea americana)*	Rp.	20,-	/kg
10	*Petai (Parkia speciosa)*	Rp.	20,-	/100strips
11	*Jengkol (Archindendron pauciflorum)*	Rp.	15,-	/kg
12	Rambutan *(Nephellium ramboutan-ake)*	Rp.	10,-	/bunches
13	Clove *(Eugenia aromatica)*	Rp.	610,-	/kg
14	*Cempaka (Michelia sp)*	Rp.	610,-	/kg
15	*Empon-empon* (medicinal and spices)	Rp.	15,-	/kg
16	*Bambu petung (Dendrocalamus asper)*	Rp.	100,-	/pole
17	*Bambu apus (Gigantochloa apus)*	Rp.	60,-	/pole
18	*Bambu milah (Bambusodieae. spp)*	Rp.	60,-	/liter
19	Honey	Rp.	150,-	/kg
20	Kulit kayu manis (Cinnamomum burmani)	Rp.	10,-	/ton
21	Cassava *(Manihot esculenta)*	Rp.	2000,-	/ton
22	Maize *(Zea mays)*	Rp.	2000,-	/ton
23	Paddy *(Oryza sativa)*	Rp.	5,-	/kg
24	*Semangka (citrullus lanatus)*	Rp.	3000,-	/ton
25	Pineapple *(Ananas comosus)*	Rp.	2,-	/unit
26	Soybean *(Glycine max)*	Rp.	15,-	/kg
27	Chili *(Capiscum sp)*	Rp.	25,-	/kg
28	Banana *(Musa spp)*	Rp.	50,-	/bunches
29	*Duku (Lansium domesticum)*	Rp.	100,-	/kg
30	*Pinang (Areca cateachu or A. pinnata)*	Rp.	60,-	/kg
31	*Pala (Myristica fragans)*	Rp.	60,-	Kg
32	*Kelengkeng (Dimocarpus longan)*	Rp.	60,-	Kg

Signed by

Drs OEMARSONO
Governor of Lampung

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