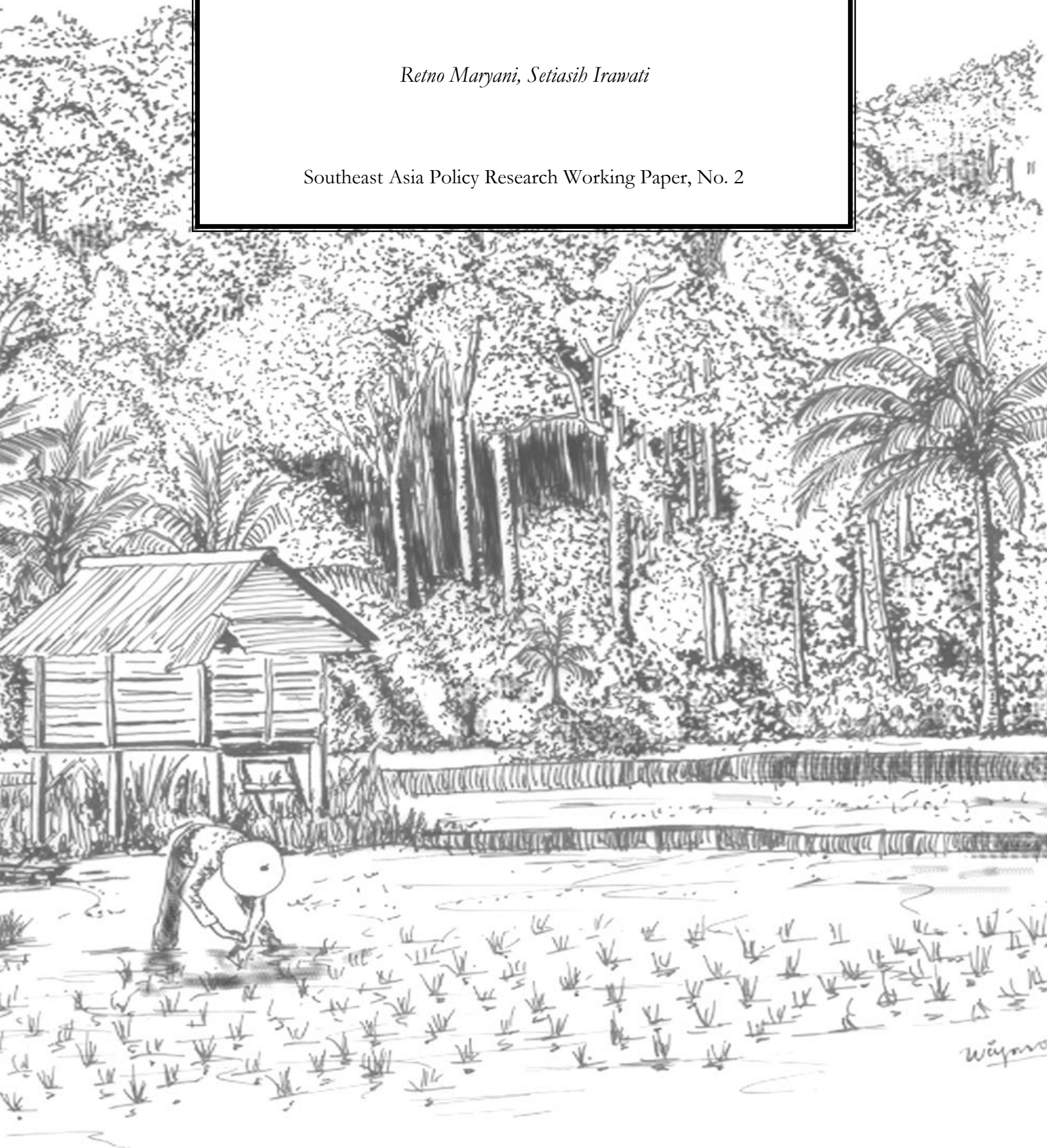


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Oil Palm and Industrial Timber Estate**

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**ECONOMICS ANALYSIS OF LAND USE SYSTEM FOR
LARGE SCALE PLANTATIONS OF OIL PALM
AND INDUSTRIAL TIMBER ESTATE**

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1. INTRODUCTION

The peneplain of Sumatra is characterized by six major landuse systems, those are shifting cultivation, non-timber forest products collection, rubber plantation, transmigration and shifting cultivation, large scale logging, and large scale plantations of palm oil and timber. Those activities involves various stakeholders, both individual and communities for subsistence level also large scale commercial enterprises.

The palm oil and timber plantation are among prominent landuse system able to provide economical return significantly to the region. This has resulted to constant (and continuous) conversion of traditional landuse system into large scale plantation of these two commodities. Furthermore, the palm oil and timber plantation also have similar characteristics in term of technology to cultivate, labor absorption, and its contribution to regional development. This has resulted to competition on land utilization between two commodities. Therefore, there is a need to justify further in term of benefit distribution between these two large scale plantation.

This study is a part of other six major landuse system study to support the program study of Alternative to Slash and Burnt (ASB) conducted by ICRAF (International Centre for Agroforestry Research). This study tries to compare profitability of large scale plantation between palm oil and timber plantation. The data are collected from two companies in Riau province, during periode of September to November 1997. The result shows competitiveness between palm oil and timber plantation beside its economical efficiency of each commodity as a result of policy applied to each commodities.

H. METHODOLOGY

The agricultural policy is a critical element in determining the rate and pattern of economic growth of the country. Two sets of policies may give significant impact on this sector, firstly, investment policy on the provision on public goods (health, sanitary facility and transportation) has abroad impact on agricultural sector productivity. Secondly, commodity-specific policies include taxes, subsidies, and quantitative controls on particular outputs and inputs, and policies that affect macroprices (interest rates, wage rates, and exchange rates). One reason that governments impose policies on their agricultural sector is the belief that intervention can accelerate the rate of income growth. (Monke and Pearson, 1989). The Policy Analysis Matrix (PAM) method allows to analyse policies in term of their impact on commodity systems - representative chains of farming, marketing and processing activities that together produce marketable products.

A. Data Collection

1. Palm Oil Plantation

The data on palm oil plantation is obtained from PT. Inti Indosawit Subur. The company is a PIR-Trans (Perkebunan Inti Rakyat - Transmigrasi) with nucleus area of 3000 hectares and 11,000 hectares of plasma areas with member some 400 farmers. The palm oil plantation are located on sub districts Pangkalan Kuras, Bunut and Langgam, both are in the district Kampar. The oldest plants are of planting year 1988, while the youngest one is of 1992, respectively.

The processing industry into CPO (Crude Palm Oil), which is PMKS Buatan- 1, is located in sub district Kijang Mati~ district Langgam. Initial operation of this industry started in 1992 with capacity of 60 tons FFB/hour. The raw material for CPO processing at present is originated from nucleus (200/6), plasma (401/6), and others 40%.

2. Timber Plantation

The data on timber plantation is obtained from PT. Arara Abadi, the HTI concession holders, located in district Bengkalis sub districts Perawang covering an area of 299,975 hectares. The major species planted is *Acacia mangium* (mangium) with the oldest plantation conducted in year 1982/1983, which almost reaches second rotation. Actual planted areas until recently is 130,000 hectares. This plantation is expected to be as a main source raw material for pulp and paper industry of PT. Indah Kiat which has production capacity of 900,000 tons of pulp/year. To fulfill its production capacity the industry required 4.5 million m³ of wood, which at present is supplied by mix tropical hardwoods from natural forests.

The data collected basically consists of annual production costs and revenue, which can be categorized as follows:

- Production components of tradable inputs consists of fertilizers, chemicalia, seeds or seedling and fuels
- The labor components of non-tradables inputs consist among others are the labor requirements (quantity and costs) for feasibility study, site preparation, plantation establishment and maintenance, until harvesting.
- The capital components of non-tradable inputs consist among others are working capital, machinery, services, and others.
- The land component of non-tradable inputs is considered 0 in order to be able to compare with other landuse system.
- The revenue is obtained from actual production quantity

B. Data Analysis

The data obtained is organized into an Input - Output form further analysed by the Policy Analysis Matrix (PAM) method.

C. Location

Riau province administratively is divided into 7 districts, those are districts Pekanbaru, Kampar, Bengkalis, Inderagiri Hulu, Kepulauan Riau, and Batam. Among of those districts, Kampar and Bengkalis are considered as the biggest districts, which comprise flat area with maximal slope of 2% each 1,930,831 hectares and 2,815,785 hectares, respectively.

Geographical description of Riau province is characterized by its Latitude of 4 45' LU - 1 15' LS and Longitude of 100 13' - 109 19' BY It consists of 3,214 small and big island, laying from the eastern part of Bukit Barisan hills until Natuna sea which is bordering with West Kalimantan province.

The total area is 329,887 km² which consists of 94,561 km² (28.67%) inland areas and 235,326 km² (71.33%) as a marine areas. In general this province is under penneplain of which 74.13% in a form of flat areas with slope 0 - 2%, and only some 5.83% is area with slope higher than 40%. The climate is influenced by sea and seasonal wind condition with average annual rainfall of 2727 mm, or 116 - 132 days of raining per year.

The soil type is characterized by 52.5% as an organosol and its associates which are found commonly in the eastern part along riverine of this province. Another 47.4% are fall under classification of Red Yellow Podsol, Latosol, Alluvial, and others. The soil types data and its distribution are presented in annex. 1.

The statistical population in year 1994 shows there 3,568,823 inhabitants in this province, with average density of 37.74 persons/km². Following table shows the population distribution in this province.

Table 1. Population Distribution of Each Districts in Riau Province

District	Area	Population	Population Density	
	(km ²)	(persons)	(person/km ²)	
Inderagiri Hulu	12,538.72	417,318	33.28	
Inderagiri Mir	12,325.82	510,256	41.40	
Kepulauan Riau	7,487.16	466,183	62.26	
Kampar	30,377.59	633,313	20.85	
Bengkalis		30,587.58	964,942	31.56
Pekanbaru	632.20	412,918	653.14	
Batam	612.53	1 163,902	267.58	
Total	96,561.60	3,568,832	37.74	

source: Statistic of Riau Province, 1994

The area within and outside this province is connected by either or both inland transportation, marine and air transportation. The connection between Pekanbaru to the southern most of the area (Tembilahan) may reaches 437 km, while to the border of North Sumatra (the northern most of this province) may reaches 348 km.

River and marine transportation is facilitated by at least 10 river ports, connected by transportation means of motor boats, cargo ships, tankers, ferries and speed boats. While the air transportation is connected by 7 small airports and an international airport located in Batam. (Riau province is one of the biggest oil producers in Indonesia).

III. POLITICAL CONTEXT OF LARGE SCALE PLANTATION

A. Palm Oil Plantation

Palm oil is one of high priority commodity to be developed in Indonesia. It produces high yield with low costs production beside demanded both in international and domestic markets. Indonesia ranks next to Malaysia in palm oil production, the other main exporters countries are Ivory Coast and Nigeria. Malaysia holds 5 1% of world production and 63% of the world export, though it shares are constantly declining. Indonesia is estimated to surpass Malaysia to be the world largest producer in the period from 2005 to 2010, as it indicated by its high annual growth rate of 12% in production and 17% in export during the last 15 years (Sato, 1996). Therefore, the palm oil industry has great potential as one of, the most promising industries for Indonesia.

The main products of Fresh Fruit Bunches (FFB) processing are Crude Palm Oil (CPO), Palm OR Kernel (PKO), and Palm Kernel (PK). These products are used by other industries to be processed further into more than 50 different products type, in a form of foods, cosmetics, fuel, and even explosive C'bahan peledale').

The development of palm oil industry is chategorized into three periodes, the first is characterized as an export periode (1969 to 1978), of which more than 80% of production are exported. In this periode plantations are developed by state-owned enterprises (Perseroan Terbatas Perkebunan/PTP), while domestic oil consumptions are fulfilled by coconut oil. The second phase is a domestic-oriented periode (1979 to 1986), of which the state-owned plantations were the dominant player supported by private plantations and the small holders fostering program so called the Nucleus Estate System C'Perkebunan Inti Rakyat" - PIR) which are intialized in this periode. At this periode the domestic consumption increase by 14% annually, also the export capacity has increased by 18% annually, due to expansion of total supply. The third periode (1987 to present time) is called as domestic market and export, of which a new entry surge of private capital into the plantation industry enabled the dramatic increase of palm oil production from the expansive plantations in Riau, Jambi, South Sumatera and Kalimantan, allowing the constant increase of exports.

The major government controlled-system of palm oil plantation and industry are on the following aspects:

(i) Plantation with Nucleus Estate System

This program is based on Presidential Decree No. I year 1986 which meant to harmonize between large capital holders (private company) and the small-holders (farmers). The small holders, each provided with 2 hectares of crop area (p *I a sma*) and I hectare of dwelling and food crop area, which are placed around a nucleus (*Inti*) plantation. The nucleus plantation gives technical support to small-holders from the implanting stage and transfers ownership of the crop land to small-holders after 3 - 5 years when harvesting start. Farmers pay the land fee in approximately 10 years out of their revenues from selling oil palm FFB to factories in the nucleus plantation. The ratio of planting area between an nucleus and plasma was eased from 40 : 60 to 20 : 80 in 10 years periode. In the year of 1995, some 33.6 percent of plantation area (656, 100 hectares) are owned by small holders, while privately owned are 46.4 percent (905,200 hectares, and state owned plantation is 20 percent (390,400 hectares) respectively. (Direktorat Jenderal Perkebunan, *Statistik Perkebunan Indonesia 1994 – 1996*)

(ii) Joint Marketting Office (*Kantor Pentasaran Bersama*)

The Joint Marketting Office is innagurrated in 1978 through Ministerial Joint Decree between the Ministries of Agriculture, Industry and Trade. It is an extended body of a Permanent Working Committee on Palm Oil established on 1973.

The Joint Marketting Office control both CPO domestic supply in terms of quantity and its Price. The state owned plantations and other 6 largest private plantations collectively sold CPO to Joint Marketting Office which will finther allocate it to domestic processors according to their refining capacity and the rest is exported. The official buying price is set by the Joint Marketting Office, of which the FFB price from small-holders is calculated from the official CPO price with a specific numerical formula. Meanwhile, of each stage of processing and distribution is guided by margin ranges, whereas 10% is allocated for refiners, 5% for wholesalers and retailers, respectively.

(iii) Trade Restrictions

The export tax was introduced in 1979 base on international CPO price to stabilized domestic price and supply. For the international price raise the export tariff will also be increased by government, conversely, when the international price dropped below domestic price the import restriction will be set to prevent processor importing low priced CPO. The most recent policies applied to palm oil bussiness are the stopping of any foreign investment in this bussiness in order to protect domestic investors (who have relatively smaller capital), and forbid export CPO until March 1998 to stabilize

domestic supply and price (because of increasing international price due to low exchange rate in domestic currency).

B. Timber Plantation

The establishment of tree plantation has become a necessary step for securing a sustainable supply of wood for the increasing population and expanding industry of Indonesia. Three main categories of forestry plantations can be categorized according to their purpose:

- *Regreening*, is a rehabilitation outside forest areas, which is basically a social forestry program in which fruit trees, fuelwood trees and other perennial crops are planted to rehabilitate critical agricultural land and watersheds.
- *Rehabilitation within forest lands*, is a rehabilitation of degraded watersheds for conservation purposes.
- *Plantation for Industrial Timber Production*, it is meant to supplement exhausting natural forest resources, beside its provide bussiness opportunities, employment for rural people, and conservation purposes.

The last category is launched by the Ministry of Forestry in 1984 being implemented through the Industrial Timber Estate Development Program (*Program Pembangunan Hutan Tanaman Industri- HTIJ*) The system of concession rights for HTI based on Presidential Regulation No. 8/1990, which contains following provisions:

- Concession rights are issued by the Nfinistry of Forestry on the recommendation of Provincial Governor,
- A concession can be granted on application to public, private or cooperative agencies,
- The concession apply to production forest areas currently in a state of low productivity (less than 20 m³/ha),
- The periode granted to a concession is up to 35 years plus one rotation cycle, subject to evaluation by the government during the rights granted,
- The total area of concession must be planted within 25 years

The HTI program aims at 4.4 million hectares area of industrial plantation by the year 2000 focussing on the outer islands of the country, Surnatera and Kalimantan and Sulawesi. The plantation is targetted to produce 1.3 million hectares of pulwood plantation and 3. 1 million hectares of plylog and sawlogs production. **GOI and FAO**, 1990, pointed out that the profitability of plantation forestry depends on a number of factors such as site characteristics, tree species, annual increment, management intensity, scale of operation, existing infrastructure, availability of skilled labor, demand for and price of timber, proximity to markets, etcetera. The duration of rotation cycle is of great importance from the profitability point of view, therefore, species selection is one of prime factors. Following are tree species recommended for different sites:

Acacia auliculiformis, Acacia mangium
Paraserianthes falcataria
Eucalyptus camaldulensis, Eucalyptus delgupta, Eucalyptus grandis, Eucalyptus
terticornis, Eucalyptus urophylla
Gmelina arborea
Pinus caribea, Pinus merkusii
Shorea spp
Swietenia macrophylla

Indonesia is said to be the only country in the world where several large export-oriented pulp and paper mills are under construction at this moment. The potential to produce high-quality pulpwoods in short term rotation plantation is huge, both in terms of the land base and growth of the trees. At the end of 1992, there were 13 pulp mills with a total annual capacity of 1.2 million tonnes, and 53 paper mills with total capacity of 3.3 million tonnes. In 1995, there were 52 paper mills industries operated with total operating capacity of 3,311,750 tonnes/annum. Current construction plans suggest that by the year 2000 pulp capacity will have risen to 3.8 million tonnes, while paper and paper board capacity will approach 5 million tonnes a year (Table 2.)

Table 2. Projected Production Capacity of Major Pulp and Paper Products in Indonesia by year 2000

Type of Products/ Processings	Year 1995 (million tonnes a year)	Year 2000 (million. tonnes a year)
Semi-chemical pulp	1.7	3.0
Mechanical pulp	0.5	0.5
Pulp total	2.3	3.8
Newsprint	0.3	0.5
Printing and writing paper	1.5	2.0
Other papers	2.0	2.6
Paper total	3.8	5.1

Source: Pulp and Paper International 35(7): 69, 1993

IV. RESULTS AND DISCUSSION

The Policy Analysis Matrix (PAM), is a method to measure the existence of policy distortion -in a form of subsidies, tariffs restrictions, taxes, etc- and market failure monopoly, oligopoly-. In the absence of policy distortions and market failure the true value (price) of certain goods reflects its scarcity in the market. The government interference is meant to maintain growth, stability, and equity of the country, whereas, may result into distortion (either in a positive way or negative one) . This distortion is reflected in the divergences.

The data analysis for oil palm plantation shows that divergences exist on the output and tradable inputs, resulted to divergences in profits (Table 3)

Table 3 . The Policy Analysis Matrix for Oil Palm Plantation
PAM- OIL PALM PLANTATION (11,700 hectares)

Profitability (NPV) of the total area: 10,700 ha

	Revenues	Cost			Profits
		Tradable Inputs	Domestic factors		
			Labors	Capitals	
Private prices	20,916,439,929	5,958,464,100	9,429,866,665	2,581,870,774	2,946,238,390
Social prices	44,046,175,137	9,082,521,531	15,979,811,976	3,152,167,064	15,831,674,566
Effect of Divergences	(23,129,735,208)	(3,124,057,431)	(6,549,945,311)	(570,296,290)	(12,885,436,176)

Profitability (NPV) per hectare in Rupiah

	Revenues	Cost			Profits
		Tradable Inputs	Domestic factors		
			Labors	Capitals	
Private prices	1,954,807	556,866	881,296	241,296	275,349
Social prices	4,116,465	848,834	1,493,440	294,595	1,479,596
Effect of Divergences	(2,161,658)	(291,968)	(612,144)	(53,299)	(1,204,247)

Profitability (NPV) per hectare in US\$

	Revenues	Cost			Profits
		Tradable Inputs	Domestic factors		
			Labors	Capitals	
Private prices	814.50	232.03	367.21	100.54	114.73
Social prices	1,715.19	353.68	622.27	122.75	616.50
Effect of Divergences	(900.69)	(121.65)	(255.06)	(22.21)	(501.77)

The positive divergence in the tradable inputs shows distortion exist in this component, whereas international price for inputs (fertilizers, chemicalia) is lower than that of domestic price, means that domestic consumers pay more than those of international market as a result of government imposed import tax for fertilizers. While, the negative divergence in output shows the domestic price for FFB is lower than that of international price (Malaysia). It means that there is an opportunity for farmers/producers to earn more from their fruits. However, the obligation for pIasma to sell their products to inti (company), combine with FFB price which is set by the government -considering profit margin for wholesaler (5%), retailers (5%) and refiners (10%)- may maintain low level of FFB price. An indication for this is shown by relatively small increase in FFB price during last five years, in comparison to continuous increase of CPO both domestically and internationally for same periode.

Regarding the labor cost, the actual situation is that palm oil production is labor intensive, some of activities such as site preparation, planting and harvesting are contracted which means low capital used and low technological inputs. Assuming that average wage rate of Sumatera was Rp.4000 per person per day, the divergence mainly partly due to the different interest rate used between private and social prices.

The positive sign of both Private and Social Profits shows that this oil palm plantation activity is profitable for producers (farmers). While the benefit for farmers mainly from security point of view, whereas they can engage in reproduction activity whole year around, means also continuous income, and expectation to own the land in the future. This is one of several reasons to explain vast development of oil palm plantation in the whole country.

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