The Analyses Structure and Household Income Distribution of Palm Oil (*Elaeis guineensis* Jacq) Farmers NES-TRANS in South Sumatra, Indonesia

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Abstract

The objectives of this research are (1) to analyze household income structure of palm oil farmers and (2) to analyze household income distribution of palm oil farmers NES-TRANS. The Gini Coefficient measurement method was used in this research based on samples of 137 households. The research result shows that income from estate sector has dominant part in household income structure. As whole, income distribution for palm oil, diversification pattern for palm oil and rubber, total household income was relative flat or flow lameness. The Gini Coefficient value was less from 0.1.

Key Words: Income, Household, Gini Coefficient, Lorenz Curve, Oil Palm, NES-TRANS

Introduction

Development prospects and potential of oil palm (*Elaeis guineensis* Jacq) agribusiness with NES (Nucleus Estate System) pattern is expected to empower in the upstream and downstream of oil palm agribusiness. Application of the NES pattern in partnership combines the activities of production, processing and marketing co-operation in one integrated system [1] [2]. NES is a pattern of conduct aimed at socioeconomic improvement of small farmers where plantation companies as the core with some smallholder farmers in the plasma, so that both are intertwined mutually beneficial cooperation, mutual need and interdependence and on the basis of their respective positions.

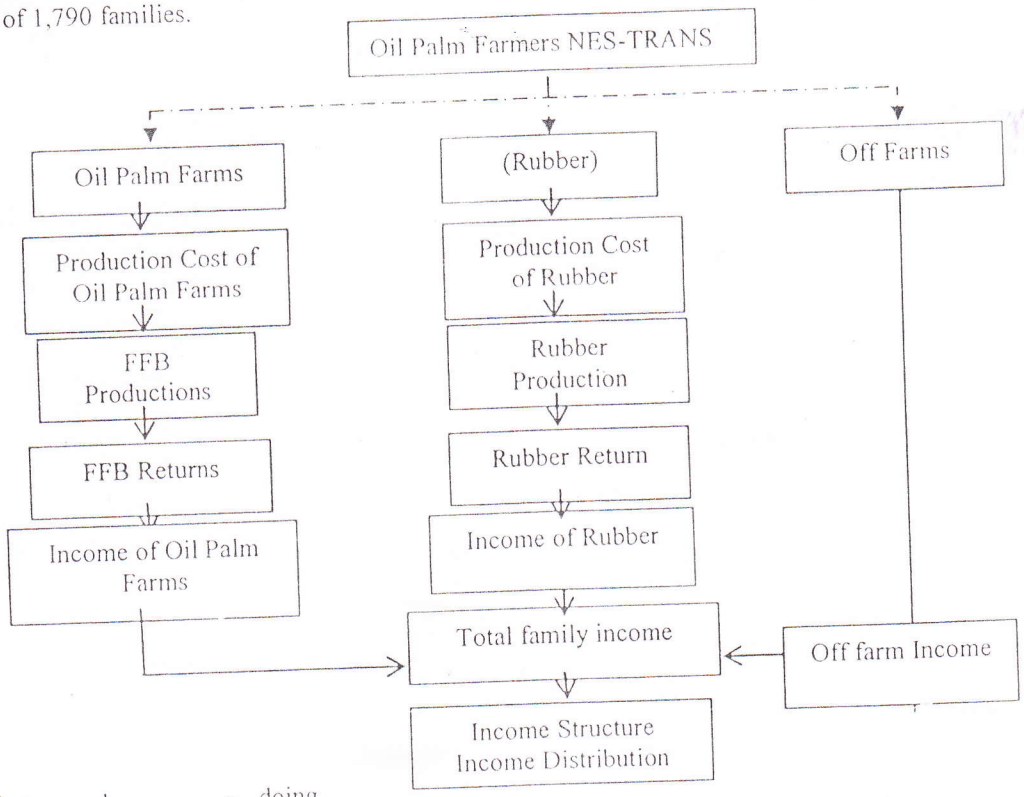
One measure of farmer's welfare of oil palm agribusiness is the household income of farmers. In a study of the structure of income, household income source selection is based on; on-farm income, off-farm income and non-agricultural income [3] [4]. Population's income data was approached by the data resident expenditure or household consumption. The size of the population overall income inequality was approached by the Gini Coefficient [5] [6]. Gini Coefficient is based on the Lorenz curve explaining a curve between two-dimensional distribution of the population (cumulative percentage of the population) and the expenditure distribution per capita (percentage of cumulative expenditure per capita), by making some classes of expenditure.

The farmers are not just relying on one source of income to support their life, but they have more than one source of income. Farmer's income is derived from various sources outside of farming by working as traders, craftsman, etc. In addition, farmers also utilize land resources to grow crops other than oil palm plantations. They are planting also other crops to make income diversification. It is expected to increase total farm household income. Farmers' income is derived from several types of farm businesses, namely palm oil, rubber farm and off-farm activities will be different in each household. Thus, it would lead to unequal distribution of income, will result in differences in the distribution of consumption and widen the gap in incomes. The research purpose is to analyze the structure of household income and to analyze the income distribution of farmers. Diagrammatic approach to the model is presented in Figure 1. It is presumed that the more works or efforts are done, thus household income distribution will be more equitable.

Materials and Methods

The research was conducted in South Sumatra, Indonesia. The field research was conducted in January to March 2012. The survey method was conducted in this research. Use of this method is intended to conduct thorough observations to obtain the facts of the existing symptoms and seeking factual descriptions by going directly to the field and interviewed the farmers. The method was determined by purposive sampling with considerations that the farmers cultivate palm oil as the main source of income with NES-TRANS and several other farming activities as additional income

resources. The number of respondents (farmers) was 137 Head of Households (HH) from a population of 1,790 families.



Description: 1. - - - - ▸ doing
2. ⟶ Influencing

Figure 1: Diagrammatic Approach Model

Collected data consisted of the primary data and secondary data. Primary data was obtained by direct observation and interviews in the field by questionnaires. It includes data on farmer identity, land, production facilities used, prices and production costs, production, consumption and other information. Secondary data was obtained from relevant agencies, the literature related to this research and other resources that can support this research.

Collected data was processed into a form of tabulation, followed by a descriptive analysis, by presenting results obtained in the form of a systematic description. To answer the first objective is to analyze the structure of earnings made through descriptive method with the method of accounting. In this case the total household income is the sum of income from oil palm farm, non-oil palm cultivation and from off-farm. The formula used is:

a. Total income of farm families (PTK)
   PTK = PUKS + PUL + PLU
b. Farm income of oil palm (PUK)
   PUKS = Pnut – Bptot
   = (Hj x Q) – Bpt
c. Farm income in addition to palm oil (PUL)
   PUL = Pnut – Bptot
   = (Hj x Q) – Bptot

Where;
PTK = total family income (Rp/year)
PUKS = oil palm farm income (Rp/year)
PUL = other farm income (Rp/year)
PLU = off-farm income (Rp/year)
Pnut = return of oil palm and rubber farm (Rp/year)
Bptot = total production cost (Rp/year)
Hj = selling price (Rp/kg)

Q = total production (kg/yr)

Furthermore, to answer the second objective, namely the distribution of household income was descriptively analyzed and to see the value of spreading used Gini Coefficient.

$$IG_Y = 1 + \frac{1}{n} - \frac{2}{n^2 Y}(1Y_1 + 2Y_2 + ... + nY_n)$$

Where;

IG_Y : the Gini Coefficient of household income distribution
N : total household sample (unit)
Yi : sample household income (Rp/year)
Y : on average income household sample (Rp/year)

The grouping of farm household based on household income was grouped into: (1) low income, (2) middle income and (3) high income, identified by:

(1) Low Income : income of ≤ - 0.5 sd p
(2) Middle Income : p - 0.5 sd <income ≤ p + 0.5 sd
(3) High Income : income ≥ p + 0.5 sd

Where;

p : average household income of farmers
sd : standard deviation

Results and Discussion

A. Income Sources

Income sources of farmers come from oil palm cultivation and palm oil farming out the rubber. Income derived from outside the farm consists of farm craftsman, entrepreneurs, labors, transport services etc.

1. Oil Palm Farming

Farmers' income is a measure of income received by farmers from farming. In the analysis of farm, income is used as an important indicator because it is a major source in their daily lives every day. Cultivation of oil palm farmers' income is the difference between returns and costs of production. Production costs are the overall cost of farmers, either fixed or variable costs. For more details of how much the average cost of production incurred palm planters can be seen in Table 1. The fixed costs include equipment depreciation costs, consisting of hoes, saws, hand sprayer, rickshaw, machetes, long crook, chisel and eggrek. The amount of fixed costs was Rp514,674 or 3.95%. Beside the fixed costs, the farmers have to pay variable costs, i.e. fertilizer, pesticide and labor costs as well as KUD cost.

Table 1. The average production cost of oil palm farms 2011

Nr	Component	Amount (Rp/year)	Percentage (%)
1.	Fixed cost (Rp/year)		
	Cost of equipment depreciation	514,674	3.95
	Variable cost (Rp/year)		
2.	- Fertilizer cost (Rp/year)	3,997,443	30.67
	- Pesticide cost (Rp/year)	364,188	2.79
	- Labor cost (Rp/year)	4,968,551	38.13
3.	KUD costs	3,187,299	24.46
Total Production Costs		13,032,155	100.00

The smallest cost was pesticide around Rp364,188 per area cultivated per year or equivalent to 2.79% of the total cost of farmers. Pesticides and weeding activity was sprayed twice a year.

The greatest variable cost was labor costs in the amount of Rp4,968,551per year or by 38.13%. High labor costs were caused by uses of labor outside the family members with a contract system. Labors were used for maintenance activities consisting of fertilizing, weeding, spraying, pruning, harvesting and transporting. Costs for fertilizer were around Rp3,997,443 or by 30.67%. This is due to the type

of fertilizer used by farmers such as Urea, KCl, NPK, phosphate, borate and Dolomite. The use of fertilizer was twice a year.

KUD costs were Rp3,187,299 or 24.46%. Component of KUD costs consist of fees for KUD, management, transportation, savings, safety, wages weigh, and infra structure. Among the seven components, the cost for roads and transport is the biggest cost. This is because road conditions at the study site have not yet been in the asphalt form. When the rainy season the roads become sticky and muddy, so it often makes transport stuck in the middle of the road. Average production, sale price of Fresh Fruit Bunches (FFB), return, total cost of production and income received by farmers of oil palm cultivation is presented in Table 2.

Table 2: The average income received by oil palm farmers, 2011

Nr	Component	Number
1.	Production (kg/area)	37,459.36
2.	Selling Price of FFB (Rp/kg)	1,592.25
3.	Return (Rp/area/year)	59,644,665
4.	Total Production Cost (Rp/area/year)	13,032,155
5.	Income(Rp/area/year)	46,612,510

Based on the above table, it is known that the production of FFB, the farmers obtained an average of 37,459.36 kg per farm size. The price of FFB in 2011 was by an average of Rp1,592.25 per kg. Because the level of production and selling prices of FFB changes every month, the returns and incomes by farmers are also changing from one month to the next month. The average income received per farmer amounted Rp59,644,665 land size per year. Returns by farmers are a multiplying of the FFB production with the FFB prices. The average income received by farmers from the farming of oil palm is Rp46,612,510 per cultivated area per year. The income obtained from the reduction of the average income received by farmers with an average production cost incurred farmers.

2. Rubber Farming

Beside oil palm plantations as the main livelihood, the farmers are executing other farming activities, namely farming rubber. Rubber land is cultivated by farmers apart from palm oil, but it's not too far from the location of oil palm plantations. Farmers who do this rubber farming activities as well as the production cost incurred in oil palm cultivation. In this study the cost of production is divided into two groups: fixed and variable costs. Fixed costs in rubber cultivation consist of equipment depreciation used. Meanwhile, variable costs include the cost of fertilizer, pesticide costs, and labor costs. To find out how much the production costs can be seen in Table 3. In Table 3 the average production costs for rubber cultivation is widely Rp4,704,746 per year.

Table 3. Average production cost of rubber farming, 2011

Nr	Component	Amount (Rp/year)	Percentage (%)
1.	Fixed cost (Rp/year)		
	- Cost of equipment depreciation	199,030	4.23
2.	Variable cost (Rp/year)		
	- Fertilizer cost (Rp/year)	469,802	9.99
	- Pesticide cost (Rp/year)	62,643	1.33
	- Labor cost (Rp/year)	3,973,271	84.45
Total Production Costs		4,704,746	100.00

Based on Table 3 it can be seen that the variable cost is dominating compared to the fixed fee in the amount of rubber farming Rp4,505,716 or by 95.77% and the fixed cost of Rp199,030 or 4.23%. The type and timing of fertilizer and herbicide use on farms just like palm oil. So is the labor used, both using hired labor and labor outside the family member with a contract system.

Farmers are selling their latex once a month. They sell their produce in the form of in a rectangular form. They usually sell their latex to middlemen who come to the villages. Latex production was changing every month. This is because the influence of environmental conditions. Rubber latex prices received by farmers each month is also changing. Sales in March to August rubber production have

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decreased, as occurs in the dry season, causing fast rubber having freezing. In September to February rubber production has increased, as occurs in the rainy season, so the high rubber latex production. Selling price of a rubber slab in January until December did not experience an increase in the amount of Rp15,000.00 per kg. Because the production rate changes every month, then the income received by farmers are also experiencing a change from one month to the next month. It also causes the rubber farmers' incomes change each month due to production changes slab. The average income of rubber farmers in 2011 are shown in Table 4.

Table 4: Average farm household income of rubber, 2011

No	Components	Amounts
1.	Production (kg)	1,593.43
2.	Selling price (Rp/kg)	15,000.00
3.	Return (Rp/area/year)	23,901,450
4.	Total Production Cost (Rp/area/year)	4,704,746
5.	Income (Rp/area/year)	19,196,704

Table 4 shows that the average production obtained by the farmers is 1,593.43 kg per cultivated area per year, with an average selling price of Rp15,000.00 per kg. Meanwhile, the income of farmers per farm size was Rp19,196,704 per year. The income obtained from the reduction of the average income received by farmers for Rp23.901.450 with an average production cost incurred by farmers Rp4,704,746 per cultivated area per year.

3. Off-farm

Non-farm activities of farmers who do this are generally just a side job to increase family income, but it is possible to achieve higher income from oil palm farm income. Non-farm activities undertaken by the farmers are labors, shops, entrepreneurs, trade unions, the greengrocer, farm laborers, carpenters transport, and oil transport. The amount of income derived from off-farm sector is strongly influenced by the level of education or skills. Average off-farm income of farmers can be seen in Table 5.

Table 5. Average off-farm income of farmers, 2011

No	Employment Type	Income (Rp/year)	Percentage (%)
1.	Craftsman	115,714	2.52
2.	Shop	128,571	2.81
3.	Entrepreneur	171,428	3,74
4.	Trade	342,857	7.48
5.	Labor	2,912,571	63.54
6.	Greengrocer	102,857	2.24
7.	Farmer labor	235,714	5.14
8.	Driver	257,143	5.61
9.	Palm oil transport	317,143	6.92
	Amount	4,583,998	100.00

B. Income Structure

The structure of household income is presented in Table 6. Table 6 shows that the income derived from oil palm cultivation dominated the structure of farm household income with contributions amounting 66.22%. While 27.70% comes from rubber farming. Meanwhile, income from off-farm was only 6.51%.

C. Groups of Farm Household Income

The farm household based on household income was grouped into: (1) low income, (2) middle income and (3) high income. On average higher household income group was around Rp46.63 million/year or 24.10%. This amount is lower than its standard deviation value; it means that the distribution income was not unequal. Middle and lower household income groups were 45.98% and 29.92% respectively (Table 7).

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Table 6: Structure of farmer's household income, 2011

No	Sources of income	Income (Rp/year)	Percentage (%)
1.	Farms:	46,612,510	66.22
	Oil Palm	19,196,704	27.27
	Rubber	4,583,998	6.51
2.	Off-farms	70,393,212	100.00
	Amount		

Table 7: Groups of Farm Household Income, 2011

No	Groups of Farm Household Income	Percentage (%)
1.	Low income	29.92
2.	Middle income	45.98
3.	High income	24.10
	Amount	100.00

C. Gini Coefficient and Lorenz Curve of Income Distribution

To measure inequality of income distribution can be used Gini Coefficient. Value of the Gini Coefficient is a measure that is used to look at the income distribution of the population in a region or area. If the value of the Gini Coefficient is equal to zero, it means that income is perfectly evenly distributed, and if the Gini Coefficient value equal to one means that there is perfect income inequality. If the Gini Coefficient value < 0.4 means lower inequality, if it is a range of 0.4 to 0.7 means moderate inequality, and if > 0.7 means the place of high inequality [7]. In detail, the Gini Coefficient for the distribution of farm household income is presented in Table 8.

Table 8: Gini coefficient values of farmer household income distribution, 2011

No	Description	Gini Coefficient
1.	Oil Palm Farming	0.15
2.	Oil Palm Farming + Rubber	0.31
3.	Total Household income	0.12

In Table 8 shows that the Gini Coefficient of total household income of farmers in the village of inspection, lower than the oil palm cultivation and palm oil farm diversification pattern + rubber. This shows that the inequality in the distribution of total household income is lower than the palm farming and farm diversification pattern + rubber palm. Inequality of income distribution of income derived from the distribution of land ownership. It is seen a tendency that the more land the higher the amount of household income level. But overall distribution of income is relatively low, where the inequality of income distribution of an area or areas of low to say if the value of the Gini Coefficient is less than 0.4.

The low value of the Gini Coefficient on total household income for farmers who farm household 0.12 due to not only rely on one source of income to live alone, but more than one. In other words it can be concluded that the more effort the more equitable distribution of income. Thus the hypothesis can be accepted. From the data in Table 8 it may be plotted on the Lorenz Curve shown in Figure 2.

Figure 2 show that the Lorenz Curve of total household income and income diversification patterns between oil palm and rubber is more evenly distributed than the income from oil palm. This is shown by the Lorenz Curve that is more in line closed evenly. While oil palm farm income is relatively evenly away from the line, which shows the distribution of oil palm farm income is more unequal or larger limp. Source of inequality is thought to arise from differences in land area with the level of household income. This means that the more widespread ownership of arable land owned by oil palm growers higher levels of household income in the study area. This fact suggests that the acquisition of land size is an important determinant of household income the amount of oil palm growers.

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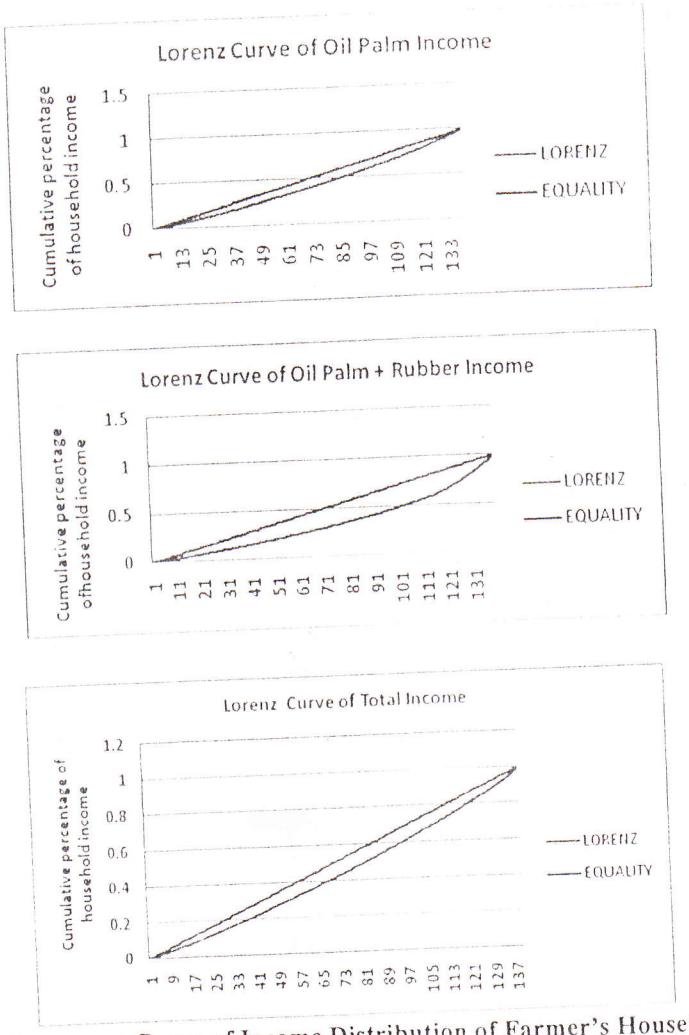

Figure 2: Lorenz Curve of Income Distribution of Farmer's Household

Conclusions

1) The structure of the income derived from the plantation sector has a dominant share in the structure of household income.
2) Overall distribution of income to farm palm oil, palm oil farm diversification pattern and rubber, and total farm household income is relatively evenly or low inequality.

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