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Productivity And Income Performance Comparison of Smallholder Oil Palm Plantation at Dry Land and Wet Land of South Sumatra Indonesia

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Abstract

Oil palm plantations has become a growing business in South Sumatra and other provinces in Indonesia, since it provide higher profit for the owners (producers) compared to that can be resulted from other agricultural business operated on suboptimal lands (dry and wet lands). Many farmers has engaged in the business by operating smallholder oil palm plantations at both areas, but traditionally the business started at dry land area which were not productive for food crops like rice, corn and soybean. Around less than ten years ago, the farmers of wet land area began to involve in the buisness. This research tries to compare the productivity and income (profit) gained by the farmers at both areas using primary data collected from sample farmers. The results shows that there was no significant differences in productivity and income from the oil palm plantation between the two areas, although there were different variation in fertilizer uses and age level of oil plant trees. The wet land palm oil seems to be more economically prospective to operate in the future, but should be endorsed with the application of good agricultural practices.

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1. Introduction

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Oil palm plantation is one of important agricultural subsector which significantly contribute to the current of Indonesian economic development. This is expressed by its role as source of income for many farmer households, raw material supplier for intermediate and final product industries, source of export earnings, source of employment, and as a back up for regional development and transmigration program (Plantation Office of South Sumatra Province, 2009).

Among all provinces in the countries, South Sumatra is one of the oil palm plantation centers. The rising economic role of this commodity has been supported by this province's land endowment and suitability for planting the crops and increasing number of private firms and farmers engage in oil palm plantation business. Many farmers have considered this business as a main source of income for financing their family livelihood.

Long period of oil palm trees life cycle, which takes around 25 years, would relate to yearly production cost requirement. This mean that input prices change together with age stage of the trees and land type would influence the production cost value. Therefore for economically rational farmers, their demand for inputs would increase (or decrease) as the price decrease (or increase), *ceteris paribus*. In the output perspective, the demand of inputs would increase as the oil palm fresh fruit bunch (FFB) increase, and its would decrease as the output price decrease, *ceteris paribus*. In order to gain maximum profit, farmers have to apply the inputs combination at optimal level. This phenomenon is interesting to be studied further.

Oil palm plantation in South Sumatra is cultivated on two land typologies, dry land and wet land (swamp land). Differences in soil structure, fertility and other condition affects the requirements and use of inputs. Hence, what also interesting to be analyzed is whether or not there are significant farm production cost and profit differences of the crops planted on the two typologies of land.

2. Literature Review

Production is a process of changing inputs into an output (product). The amount of output, among other things and at given input and output prices, could be considered as a signal and a measurement of revenue or profit level gained by the producer (Nicholson, 2002; Hackman, 2008)

According to Hernanto (1996), farm activities aim to produce agriculture products at the optimal amount that would give maximum money profit or differences between total revenue and total costs. The revenue would allow farmers to allocate it among many uses such as production costs, family budget and saving.

Research by Setiawan and Mulyana (2005) revealed that the level of FFB production and profit were positively determined by plant age and current palm oil price, but negatively influenced by its marginal costs. Rahutomo *et al* (2006) in their research fertilizer used in dry and wet land for oil palm plantation at different age level discovered that the plants in age range of 9 – 13 years are the highest dosage uses among all age ranges. The dry land oil palm consumed 8.75 kg each plant a year, and the wet land oil palm plant used 9.50 kg each plant a year. In addition, Urea was the highest fertilizer type used on dry land plantations, while SP36 (superphosphate) was the highest on wet land plantations.

Fertilizer and pesticide costs, and labor wage contributed relatively high portions to the total production costs of oil palm plantation. Fertilizer and pesticide costs were around 31 - 35 % oil palm plantation up to 10 years old and around 50 – 60 % for plantation above that age. Labor wage was more stable around 28 – 30 % in total oil palm production costs along the life cycle of oil palm plantation (Oemar, 2007; Lifianthi and Hakim, 2009).

3. Research Methods

Majority of oil palm plantations in South Sumatra are managed in NES (Nucleus Estate Smallholders) model, in each NES a nucleus firm foster and work together with smallholders farmers in producing FFB from

their own plantations. All of FFB are delivered to palm oil factory belongs to the nucleus firm. This research, however, focused on the smallholder plantations both in dry and wet land, since several problems in cultivation and managements are still occurring until recently at their plantations but only minor problems at the nucleus firm plantation.

The representative research locations were Karang Jaya and Muara Rupit Sub Districts in Musi Rawas Regency for dry land oil palm plantations, and Banyuasin III and Talang kelapa Sub Districts in Banyuasin Regency for the wet land plantations. Since each farmers on average cultivates 2 hectares plantation uniformly, from each regency were selected 30 farmers using multistage sampling method.

Quantitative data collected from the survey were processed and calculated using standard mathematical formula for measuring cost, revenue, and profit as follows :

$$Profit = TR - TC = (P \times Q) - (TFC + TVC) \quad (1)$$

where :

TR = Total revenue of oil palm plantation (Rp/ha/year)

TC = Total production cost (Rp/ha/year)

P = FFB price (Rp/kg)

Q = FFB production (kg/ha/year)

TFC = Total fixed cost (Rp/ha/year)

TVC = Total variable cost (Rp/kg/year)

The total fixed cost consists of depreciation of farming tools or equipments, land tax, management fee, etc. Total variable cost include fertilizer and pesticide costs, loan repayment, and institutional fee based on production volume.

To compare and analyze farm profit (income) and other measurement differences between the dry and wet land oil palm plantations, we used two mean-value test with the standard formulas depends on whether the first group and the second group showing the same or different variances (Huntsberger *et al*, 1980). We also used benefit to cost ratio analysis in order to compare money value gain on each rupiah spent for financing the farm operations at the two areas.

4. Results And Discussion

4.1. Input Uses

Input uses in smallholder oil palm plantation at dry land (Karang Jaya and Muara Rupit) and wet land (Banyuasin III and Talang Kelapa) were different not only in types, but also in quantities, as presented at Table 1. The dry land plantation in general used less fertilizer and more labor compared to that of the wet land plantation. The higher amount of total fertilizer used at wet land oil palm plantation is proved to strengthen the research results by Rahutomo *et al* (2006) since fertilizer applied on wet land is easier to be washed out before absorbed by the plants. It is also understood why dry land oil palm plantations used higher composite fertilizer (such as NPK) than the wetland plantation did. For the single fertilizer, the data shows that it uses not uniformly spread over by all farmers which is proven by the higher standard deviation than the mean for SP36 and KCL.

Table 1. Average comparison of input uses in oil palm plantations at dry and wet lands of South Sumatra, 2010

No	Items	Measurement Unit	Dry land Plantation	Wet land Plantation
1.	Labor	Man days/year	221,06	209.06

2.	Fertilizer:			
a.	Livestock manure	Kg/ha/year	0	552.66 (242.87)
b.	Urea	Kg/ha/year	351.66 (153.96)	463.16 (212.12)
		Kg/ha/year	73.33 (135.65)	263 (80.66)
c.	SP36	Kg/ha/year	133.33 (237.92)	237.33 (76.08)
d.	KCL	Kg/ha/year	350 (152.56)	195.16 (97.93)
e.	NPK			

Numbers in parantheses are standard deviation

Other important thing to mention is that until recently almost all wet land oil palm plantation are at the age below 10 years old, while the majority of dry land oil palm plantations already at the average age of 15 years old, however the productivity performances are almost the same. However in this case, FFB yield of dry land plantation was only 11.83 tonnes/ha/year, lower than yield of wet land plantation of 15,83 tonnes/ha/year. Actually, that amount of wet land palm oil productivity did not reach before by the dry land plantation at the same young age period. .

4.2. Production Cost

Production cost spent by the farmers was divided into fixed and variabel costs. Main item for fiixed cost is depreciation cost, while items for variable cost are labor cost, fertilizer and pesticide costs, and transportation cost. From Table 2 we know that average production cost of dry land oil palm plantation was lower than that of wet land plantation as a consequence of lower used of inputs. Among all cost items, it is also revealed that labor and fertilizer costs had dominant proportion in the total production cost, which accounted for about 42.16% and 27.05% for fertilizer costs, and 48.72% and 59.26% for labor cost at dry and wet land respectively.

Table 2. Comparison of oil palm production cost at dry land and wet land plantation in South Sumatra 2010

No	Cost types	Measurement unit	Dry Land plantation	Wet Lan plantation
1.	Total fixed cost	(Rp/ha/year)	77,771.98 (31,299.62)	218,326.39 (132,302.01)
2.	Total variable cost	(Rp/ha/year)	3,358,743.82 (1,208,868.58)	4,251,231.40 (1,173,975.52)
3.	Total production cost	(Rp/ha/year)	3,436,515.80 (1,226,442.04)	4,469,557.79 (1,207,133.81)

Numbers in parantheses are standard deviation

Higher standard deviation of variable costs at dry land plantation means that cost variation at the wet land oil palm plantation was higher than that of dry land, which caused by higher variation of livestock manure, urea, and NPK fertilizer costs. This also indicates the un-uniformity of actual application dosage of fertilizer at wet land plantation, and it become one thing should be improved in order to increase productivity and profit from the oil palm plantation.

4.3. Farm Income (Profit)

Nominal profit or income from the wet land oil palm plantation was actually higher by 27.22% than that of dry land plantation, although the FFB price was lower for about 13.24%. The higher FFB productivity (15,26%) at the wet land oil palm plantations has contributed to that higher income (Table 3). However, the benefit to cost ratio analysis showed the opposite situation, that is for every one rupiah spent in oil palm farming, the farmer at dry land on average received net profit of 3.25 rupiah, slightly higher than that of received by wet land farmers. This is due to the lower cost of production by 23.11 % at the dry land oil farm farming. High proportion of labor and fertilizer costs at wet land farms contribute to the the higher total production cost of wet land palm oil plantations compared to that of the dry land's. It seems tha the labor cost should be reduced more efficiently in the future. The benefit to cost ratio figures were consistent with the research results by Husin (2011), but slightly below the better performance plantations which showing the B/C value between 3.38 – 3.98.

Table 3. Comparison of oil palm production and income at dry land and wet land plantation in South Sumatra 2010

No	Items	Measurement Unit	Dry land plantation	Wet land plantation
1.	Production	(Kg/ha/year)	11,826.51	15,832.56
2.	Selling price	(Rp/kg)	1,336.66	1,159.67
3.	Total Revenue	(Rp/ha/year)	14,611,733.33	18,687,200.00
4.	Total Production Cost	(Rp/ha/year)	3,436,515.53	4,469,557.79
5.	Farm Income (Profit)	(Rp/ha/year)	11,175,217.53	12,217,642.21
6.	B/C- ratio	(Rp)	3.25	3.18

Mean difference statistical-test using SPSS program showed that both oil palm productivity and income at the two land typologies was significantly different with the confidence level values above 99.65 %. It means that the performance of wet land oil palm plantation which still in the young tree period was better than that of dry land oil palm plantation which is older than that.

Another important thing revealed from the research was the average monthly income of farm households with 2 hectares at the value of between Rp 1,862,536,25 – Rp 2,359,03. Oil palm plantation in South Sumatra was among the highest income of smallholder agribusiness in this country. That is way this business is exciting for the farmers and rapidly increasing all over the country. However, the farmers should pay attention seriously to the current international issues raised by environmentalists about forest, land water, and wildlife degradation caused by planting the oil palm trees on wet land areas without considering the sustainability of those natural resources. Intensive extension dan guidance also could be given by government and other institutions to help farmers practicing proper oil palm cultivations which do not destroy the environment.

5. Conclusion

Base on the research results, it can be concluded that oil palm agribusiness both in dry and wet land operated in the form smallholder plantations have become profitable businesses that contribute positively to the farm household incomes in South Sumatra. Performance comparison of two typologies of land for planting oil palm in the region revealed that there are significant differences in productivity and income gained by the farmers at both areas, indicating that the wet land palm oil plantation was more prospective based on current performance of the younger age trees in the majority of oil palm plantations. This performance is predicted to be better as the plantations entering to more productive age period. However, some good agricultural

practices off course should be introduced and properly implemented at the wet land plantation as well as at the dry land, especially the ways that related to environmental friendly agricultural practices in order to support sustainable development all over the country.

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