

Improving Oil Palm Smallholders Participation in Global Market to Strengthening Indonesian Agribusiness Rural Development

Diana Chalil¹ and Riantri Barus²

¹ Universitas Sumatera Utara

² Universitas Nusa Bangsa

e-mail: ¹ana.ch@lycos.com

ABSTRACT

Since 2006 Indonesia is recorded as the highest palm oil producer in the world, in which more than 70% of the production is distributed to global markets, including the European markets that are likely concerned on environmental issues. Therefore, CPO producers require certification to be able to export to European countries. European consumers have relatively high purchasing power, for that reason increasing market sales to European markets would be beneficial for all parties in the system. It is predicted that improving palm oil smallholders' participation in European markets could improve rural development. To analyze such conditions, data from 131 respondents in Sei Lilin Subdistrict, Banyuasin District, South Sumatra Province are collected and analyzed with independent compare means test and frontier estimation models. The results show that smallholders' participation in global markets improves the agribusiness rural development. The improvement can be seen in all of the agribusiness subsystems; in the input subsystem the improvement can be seen in the amount and type of fertilizer and herbicide usage and job creation, while in the production subsystem it is seen in technical and cost efficiency. In the processing subsystem, positive changes are seen in the supply certainty, and the same can be felt in quantity and price sales in the marketing subsystem. Similarly, supporting subsystem support is also positively affected, which can be seen in the change of waste container handling and the improvement of facilities and infrastructure.

Keywords: palm oil, global market, certification, smallholders, rural development

INTRODUCTION

Oil is an important commodity for Indonesia. Since 2014, Indonesia is recorded as the world's largest CPO producer, with a share 44,46% of the total world production. Indonesia has a global export share of 78,07%, and is also recorded as the largest consumer with a share of 15,88% of total world consumption. With such a condition, Indonesia still needs global markets such as India, China and European countries. India and China uses CPO for producing their large cooking oil demand, and consumers in both countries are generally highly price sensitive.

In contrast to India and China, price is not the most influencing factor for European countries. Many of these countries have committed to only import Certified

Sustainable Palm Oil, which could be sold with premium price. To meet these requirements, many Indonesian palm oil producers obtained palm oil sustainability certificates that are accepted by importers, such as RSPO and ISCC certificates. However, not many come from smallholders, since a number of the principles and criteria certificates are still difficult for smallholders to fulfill with limited capital and managerial capability (Chalil, 2013). This raised concern about non tariff barriers that would lead to the smallholders' exclusion from international markets (Lemeilleur, S, 2013; Jaffee et al., 2011). The impact could be significant since smallholders' total land area is about 40% of the total Indonesian oil palm land area. However, strict requirements can encourage the improvement of smallholders farming system, which in turn increase the

income of farmers and agribusiness and also rural development. In particular, certification can (1) give farmers access to key markets, (2) inform consumers effectively about food quality, origin, environmental care and animal welfare, (3) increase efficiency of the farm operation, (4) have positive impacts on rural development (infrastructure, etc.), (5) reduce costs within the supply chain through vertical integration, (6) add value for producers, although this effect varies from scheme to scheme, (7) lead to price increases in all parts of the chain, but not in all cases enough to cover additional costs, (8) be most successful when adequate marketing management capabilities are present. However, certification could also lead to (1) heavy and duplicative administrative costs and burdens, (2) competition issues and potential barriers to the functioning of the single market, (3) difficulties for exporters from developing countries (especially small-scale producers in the Least Developed Countries), and (4) stakeholder concerns about transparency of schemes (Services of DG Agriculture and Rural Development, 2008).

With similar considerations in 1973 the Indonesian government started PIR Trans program, which is expected to improve farmers' welfare and rural development. Since 1970s, the percentage of poor people in rural areas is always higher than those in urban areas (CBS, 2016). In general, rural economies that are still dominated by the agricultural sector are still lacking in infrastructures and market access. This includes export-oriented commodities from plantation sector. In fact, the plantation sector appears to be a significant foreign earned income. In 2010-2014, 19,008,70 thousand tons of palm oil are exports, contributing US\$16,327.24 million to the Indonesian foreign earned income (BPS, 2015). Therefore, improving smallholders' participation in global markets is expected to improve agribusiness rural development. To analyze the possibilities, this study was conducted in Sei Lilin Subdistrict, which is the center of oil

palm smallholder plantations and has obtained RSPO and ISCC certificates. A proportional number of non certified smallholders are included as a control group. The analyses are based on the concept of vertical integration and rural development, and use compare means test and frontier technical and price efficiency model. Based on the estimation results and discussion, this paper is closed with conclusions and a number of policy implications.

REVIEW

According to Hodge and Midmore (2008) rural development is defined as the economic growth of rural areas. Rural development is generally associated with agriculture, including plantation, as it is always located in rural areas. This could be analysis by sectoral, multi-sectoral, territorial or local approaches. Each has different indicators: sectoral approach emphasis on farm income, mainly on production costs or efficiency, while multisectoral emphasis more on impact to other sectors, particularly in employment and value added. A multisectoral approach often discusses possible improvements in agribusiness subsystems that encourage rural development. Territorial approach is often associated with the development of infrastructures, while the local approach focus more on social aspects, including the impact on health and education.

Plantation development is often related with rural development, which can be seen in PIR Trans cases. Initially transmigrants were directed to develop food crops, in accordance with transmigrants farming experience in Java. However, many of the food crops programs fail because lack of land suitability, therefore it is replaced with plantations. Evidently, after the conversion, transmigrants not only enjoy improvement in productivity but also in selling price as cash crops. Moreover local communities also receive positive externalities with the development of infrastructure, especially roads and

markets (Rasiah and Syahrin, 2006). Plantation development not only improves the production subsystem but also other related subsystems, from input, processing, marketing up to supporting subsystems. Plantation products are mostly not final products, thus need to be further processed. In addition, to be competitive, plantations need to be developed in large scales and require global markets to absorb all of the products. Therefore, the development of the plantation industry is strongly influenced by vertical integration between marketing and production subsystems (Chalil, 2008).

The linkages can guarantee supply, reduce transaction costs, improve the compliance with consumers' need, and improve producers' marketing share (Buzzell, R.D., 1983). Markets offer opportunities for producers to tap into fast-growing international markets for high value agricultural products. In fact, participation in global markets could improve sales and prices up to farm levels (Valkila, J. and A. Nygren, 2008; Loveless, K.L., 2012). Participation can also improve vertical coordination with processors or exporters along the global supply chain (Csaky, E.S, 2014). Vertical coordination with farmers to meet the requirements of export markets, including certification requirements. Certification represents the requirements and specifications imposed by buyers. Sustainability certification, for example, is designed to guarantee the industry sustainability economically, socially and environmentally. For buyers, certifications reduce transaction costs of regulatory compliance and risk management. However, for smallholders, although in principle beneficial, certifications can represent a significant barrier to the global value chain participation, especially given the up-front cost. Generally, certification also requires the ability to comply with product traceability and quality in fulfilling the certification principles and criteria. In fact, many farmers' financial and managerial capability is not sufficient to meet these requirements. As a

result, many smallholders have been excluded from the opportunities of the global markets (Csaky, 2014; Stanton and Burkink, 2008).

Sahu and Narayanan (2014) show that certification can improve efficiency. On average, the certified companies improve their technical efficiency from time to time. Valkila (2009) suggests that certification could improve farmers' income but requires minimum economies of scale. Since many farmers still have small land areas, they need to collectively manage their business (Mannon, S.E., 2005). Farmers can make collective action if it has a good organization. Among various types of farmer organizations, cooperatives that are widely established in Asian rural areas are unlikely effective in facilitating collective management (Csaky, 2014). Farmers need help from government in establishing public infrastructures (World Bank, 2008).

METHODS

This study was conducted in Sei Lilin Subdistrict, Musi Banyuasin District, South Sumatra Province, which is the centers of oil palm plantations and has smallholders (organization) who have obtained RSPO and ISCC certification. Primary data were collected from four groups of respondents, namely (1) plasma (schemed smallholders), (2) non-plasma (independent smallholders), (3) company's staff and (4) government officers at village level. Plasma smallholders consist of 107 farmers and chairman of the group (2) 4 KUD board and 12 regional coordinators. The company's staff consists of one plasma chief manager, 1 administration coordinator for farmer division, and 2 field assistants for farmer development. The government officers consist of 4 village head or secretary. Plasma are determined by cluster sampling in 6 regions. All of plasma crops are above 20 years with planting year in between 1991-1995 and with 2 ha/smallholder. Non plasma are determined by purposive sampling, which are

independent smallholders who live in the same village with plasma. Other respondent groups are also determined by purposive sampling. Secondary data was collected from KUD Mukti Jaya, FKMK/LFPR in each

region of KUD Mukti Jaya and PT Hindoli. Participation in the global market linkages with rural development were analyzed descriptively with the following process.

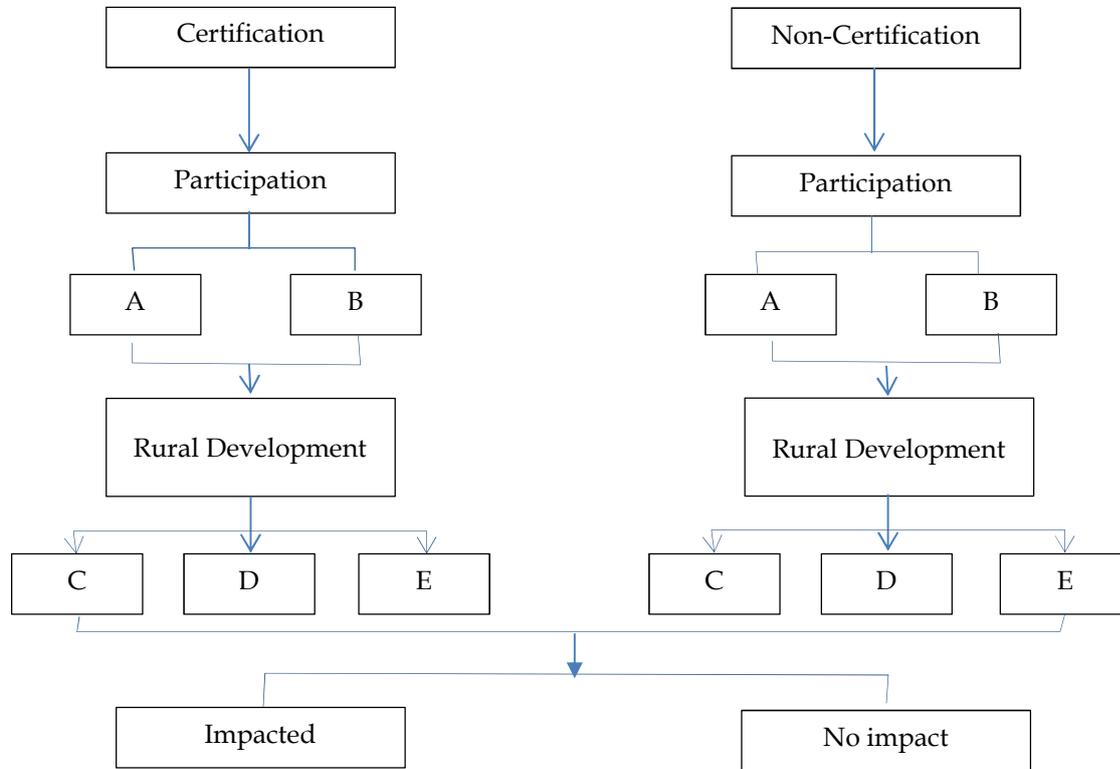


Figure 1. Research Frame

Plasma participation in the international market can not be quantitatively measured with export sales data due to limited data access. As a proxy, participation is indicated by the premium price reception. The assumption is that export sales can provide a premium price for sellers/producers. The hypothesis is that certifications improve smallholders' participation in the international market, which in turn improves the rural development. The difference in smallholders' participation will follow with the difference in rural development. Rural development is measured by changes in (a) smallholders' income, due to the change in production, sales quantity and price, and efficiency, (b) credit access (c) health service access, (d) education access, (e) employment, (f) facilities and infrastructure and (g)

environmental conditions. The difference in point (a) is analysed with independent compare means test, while the rest is descriptively analysed.

$$t = \frac{(\bar{x}_1 - \bar{x}_2)}{\sqrt{(\sigma_1^2 / n_1) + (\sigma_2^2 / n_2)}}$$

\bar{x}_1 and \bar{x}_2 are the average price, productivity, and income for plasma and independent smallholders, σ_1^2 and σ_2^2 are the varians of price, productivity, and income for plasma and independent smallholders, and n_1 and n_2 are sample sizes for plasma and independent smallholders.

Efficiency is differentiated with technical and cost efficiencies, and estimated with stochastic frontier models. Both are estimated with Maximum Likelihood Estimation

approach, using parameters from the estimation of production function and cost functions as follows:

$$Y = f(\text{urea}, \text{kcl}, \text{sp36}, \text{phonska}, \text{rp}, \text{roundup}, \text{age}, \text{harvesting labor})$$

where Y is productivity (kg/ha/semester), urea, kcl, sp36, phonska, rp are amount of each fertilizer used, that measure in kg/ha/semester, roundup is herbicide used that measure in kg/ha/semester, age is crop age and harvesting labor is amount of labor used in harvesting process.

$$C = f(Y, P_{\text{urea}}, P_{\text{kcl}}, P_{\text{sp}_36}, P_{\text{phonska}}, P_{\text{rp}}, P_{\text{harvesting labor}}, P_{\text{fertilizing labor}}, P_{\text{spraying labor}})$$

where C is cost per kg and P is price of each input

Technical and cost efficiencies are estimated with stochastic frontier models as follows:

$$TE_i = \frac{q_i}{\exp(x_i'\beta + v_i)} = \frac{\exp(x_i'\beta + v_i - u_i)}{\exp(x_i'\beta + v_i)} = \exp(-u_i)$$

$$CE_i = \frac{\exp(x_i'\beta + v_i)}{c_i} = \frac{\exp(x_i'\beta + v_i - u_i)}{\exp(x_i'\beta + v_i)} = \exp(-u_i)$$

where TE is Technical efficiency, CE is Cost efficiency, q_i is output, v_i is non-negative noise effect, u_i is inefficiency effect. TE values

will be in between 0 and 1, while CE will be 1 and ∞ . The closer TE or CE value to 1, the more efficient the production or cost will be.

RESULT

CERTIFICATION AND PARTICIPATION IN GLOBAL MARKETS

Hindoli plasma smallholders originated from PIR Trans participants in 1991. In 2010 they are the first schemed smallholder group in the world that obtained RSPO certification. The group consists of 19 cooperatives with 8.797 schemed smallholders and 1.594 ha oil palm plantation. In addition to the RSPO certificate, this group has also received ISCC certificate. Both certifications' preparation are relatively smooth because PT Hindoli has trained them as plasma since 1995. PT Hindoli has special plasma unit with field assistants that train the group members in knowledge, cultivation and managerial skills. The group is lead by KUD chair board and assisted by chairmen from plantation unit, administration and finance unit, savings and loans unit, and coordinating unit that arrange 6 regions. Below these chairmen, 2 field assistants with 8 assistants accompany smallholders in daily base. Each region leader foster 7-23 smallholder groups, which have approximately 10-28 smallholders in each group.

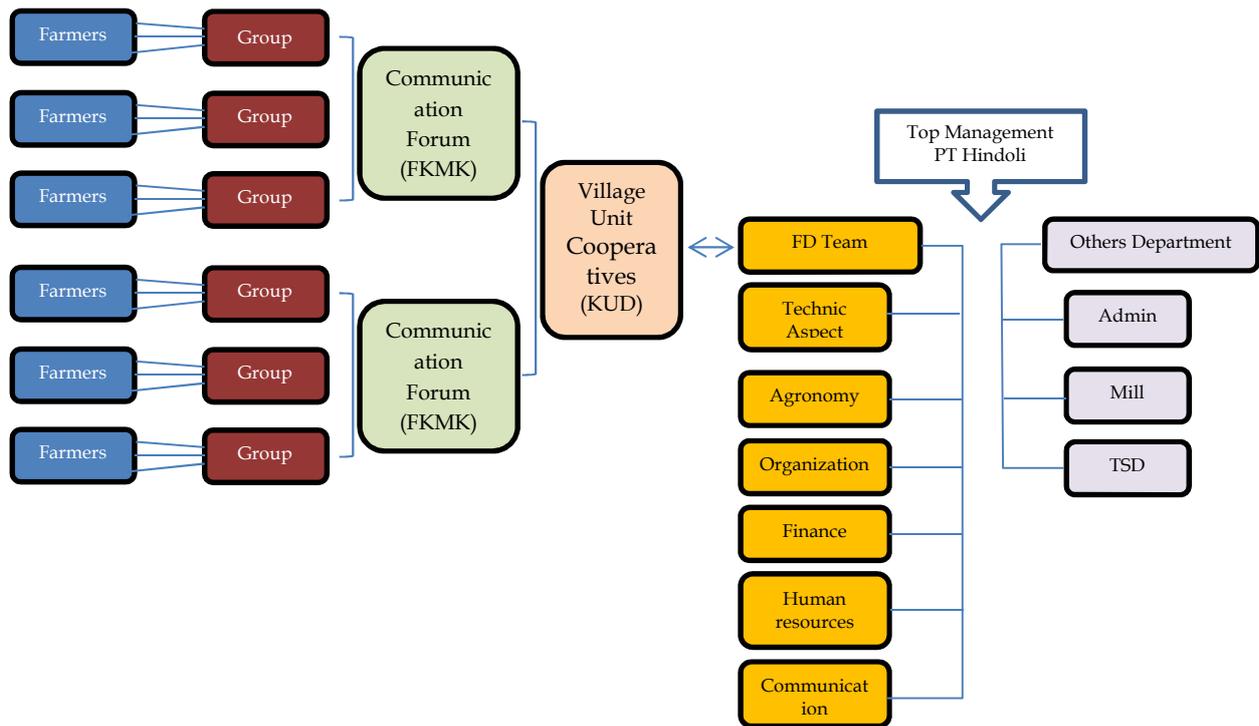


Figure 2. Organization Structure

Field assistants need to monitor that smallholders always apply best management practice. The use of fertilizers and pesticides must ensure sustainable productivity and does not damage the environment quality. Under the agreement with PT Hindoli, plasma should maintain the FFB quality and sell them to PT, and PT is obliged to buy the entire FFB yield at Disbun price. Disbun price is grouped by age of the plant, FFB from old crops receives low price because it generally produces low CPO rendemen. However, if the FFB harvest is from the same age, Disbun price is always higher than market price. In fact, currently 97% plasma crops are already over 20 years of age, while those of independent smallholders make up only 2,5%. Therefore currently Disbun price is lower than market prices, which are IDR 1.466 and IDR 1.474,38 per kg, respectively. However, the difference is relatively small and not significant, thus with 0,35 t-stat independent compare means test cannot reject null hypothesis (no mean difference).

With the agreement, plasma farmers receive relatively small sales fluctuation both in quantity and price than those of the non

plasma group. After being certified in 2010, since 2011 plasma also receive premium prices every four months. From RSPO, smallholders receive 60%, while from ISCC they receive 50%. In contrast, independent smallholders never receive premium price. Therefore it can be said that certification improves plasma access to global markets.

At KUD Mukti Jaya additional revenue from premium price is allocated for developing infrastructures that relate to certification, such as warehouse and scales. Since obtaining RSPO certification in 2010 and ISCC in 2012, KUD Mukti Jaya have earned IDR7 billion from premium price. The premium varies from US\$6/MT to US\$40/MT, which depends on the length of marketing chain. The shorter the chain is, the higher the premium price will be. In Hindoli, the largest premium price is obtained if the purchase is done directly by the trading unit of Cargill in Singapore. Hindoli is a subsidiary of Cargill engaged in the oil industry. Trading unit of Cargill is one of the 4 largest traders in the world agribusiness. Carrying 25% of the total palm oil trading is handled by Cargill, which is known to be

very efficient for highly vertically integrated (Cargill, 2011). Some large companies CPO users of Hindoli include Unilever, General Mills, Kraft, Mars, and Nestle (Cargill, 2011). RSPO certification can be differentiated in 3 types of certification, namely segregated, mass balance and book and claim. Among them segregation appears to give the highest premium price. Segregated and mass balance trade physical certified palm oil, while book and claim do not. In 2008-2014, on average only 16,98% of the total CSPO production is physically absorbed, with only US \$1,97/MT average premium price in 2014 (GreenPalm, 2015). Hindoli produce 100% certified palm oil, thus can get segregation premium price.

INPUT SUBSYSTEM

Significant changes can be seen in the provision and usage of fertilizers, pesticides and labor. Plasma smallholders have savings for purchasing fertilizers, herbicides, and labors' wages. Savings are made through deductions from FFB sales, which are IDR500.000-IDR750.000 and IDR50.000-

IDR100.000 per month per 2 ha for fertilizers and herbicides, respectively. The amount is determined in each region based on yearly leaves test in each region. The type of fertilizer is determined by the availability. Single fertilizer such as Urea, SP36, RP and KCl will give better composition than a compound one, such as Phonska. However, single subsidized fertilizer such as Urea and SP36 are not always available in sufficient amounts. If single fertilizers are not available, then compound fertilizer, such as Phonska is used with equivalent amount. In contrast, independent smallholders' fertilizer and herbicides usage depends more on their funds availability. On average, plasma is applied 2 times for each single fertilizer in each year, while independent smallholders only apply once. Table 1 shows that in general independent smallholders use less amount of fertilizer and herbicides than those of plasma smallholders.

Table 1. Fertilizer and Herbicides Application

Input	Unit	Plasma		Independent Smallholders	
		Mean	Range	Mean	Range
KCl	kg/ha/sem	130.41	62.50 - 200	23.59	0 - 200
Phonska	kg/ha/sem	55.97	0 - 300	83.72	0 - 300
SP36	kg/ha/sem	32.46	0 - 125	28.51	0 - 225
Urea	kg/ha/sem	157.46	75.00 - 200	43.53	0 - 243.75
RP	kg/ha/sem	50.37	0 - 125		
Roundup	Liter/ha/sem	1.23	0 - 2.96	0.73	0 - 5
Ally	gr/ha/sem	49.78	0 - 115		

Prior to certification, most smallholders use total herbicides spray system, which destroy all gulma. After certification, all plasma plantations are sprayed with selective system, without any paraquat and applied by spraying team that has been trained PT. The aim is to ascertain the type, amount and timing of the fertilizers and herbicides application. The team could be smallholders, their family or paid labors. The total number of fertilizer and spraying team in 6 regions

with 3680 ha is more than 60 persons, with an average of 20 working day/person/month.

PRODUCTION SUBSYSTEM

Efficiency Level

After certification, plasma smallholders use fertilizers and herbicides in more proper amount and time as recommended, which in turn increase their crop productivity. Table 2 shows that fertilizers significantly influence oil palm crop productivity.

Table 2. Production Function

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	808.9160	681.4976	1.186968	0.2381
KCl	8.623479	4.078614	2.114316	0.0370
Phonska	0.220366	2.110452	0.104416	0.9171
Roundup	-184.2725	207.3722	-0.888607	0.3764
SP36	-13.74696	4.186589	-3.283571	0.0014
Harvesting labor	443.7063	60.87858	7.288382	0.0000
Crop age	96.21990	44.07853	2.182920	0.0314
UREA	-4.899664	3.483581	-1.406502	0.1627
R-squared	0.655240	Mean dependent var		5605.100
Adjusted R-squared	0.630863	S.D. dependent var		2822.222
F-statistic	26.87941	Durbin-Watson stat		1.353797
Prob(F-statistic)	0.000000			

Productivity as the dependent variable is measured in kg/ha/sem. Initially type of seed (certified or not), variable groups (plasma or self) and RP fertilizer are included in the equation. However, almost all plasma smallholders use certified seed, while almost all independent ones use non-certified seeds. Including this variable raises multicollinearity problems, thus is removed from the equation. RP is not included because none of the independent smallholders use it. Therefore, the final equation only includes 7 independent variables namely KCl, Phonska, Roundup, SP36, harvest labor, crop age, and Urea. Multicollinearity test shows that the maximum correlation value is 0.691, equivalent to 1.914 VIF, thus can be concluded that there are no serious

multicollinearity problems. Heteroscedasticity test shows that in $\alpha_{1\%}$, the model is homoscedastic, but in $\alpha_{5\%}$ only one variable namely urea that cause heteroscedasticity. The Ramsey Linearity Test shows that linear specification can not be rejected. The partial t test shows that Phonska, Roundup and Urea do not significantly influence the productivity. Most smallholders use Phonska when single fertilizers are not enough, and Urea is mainly needed for vegetative growth. For old crops, Urea is needed for growing the crop bunches. In this study all plasma smallholders' crops are more than 20 years of age. Moreover, the track period is quite severe. Therefore, the estimation result shows that Urea does not significantly influence crops' productivity.

Table 3. Plasma and Independent Crop Age

Crop age	Plasma		Independent Smallholders	
	unit	%	Unit	%
3 - 6	0	-	3.00	7.50
6 - 20	2	2.99	36.00	90.00
> 20	65	97.01	1.00	2.50
Total	67	100	40.00	100.00

Table 2 shows that SP36 significantly influence the productivity, but the sign is negative. This might be partly explained by the wide range of SP36 usage, from 0 to 225 kg/ha/sem. Even among plasma the difference among 6 regions could reach up to 125 kg/ha/sem. However, plasma

determined it from the leaves test that is done once a year. Therefore, the independent smallholders' usage that is above 125 kg/ha/sem might be excessive use, leading to a reduce in the oil palm crop productivity.

Given these production function parameters, technical efficiency is estimated

with MLE. Samples are not grouped by crop age because the variation is insufficient. The result shows that on average smallholders reach 0,92 of technical efficiency. If the efficiency range 0-1 is distinguished in 5 groups namely very low, low, medium and high, very high, it can be concluded that samples technical efficiency has reach high category. From all smallholder samples only 1 has high efficiency, the remaining has achieved very high efficiency. Although 97% of plasma crop age is more than 20 years, while those of the independent smallholders' make up only 2.5%, the average productivity of plasma is higher than the independent smallholders', which are 6.775,97 kg/ha/sem and 3.277,14 kg/ha/sem, respectively. Moreover, with various plant managements the range of independent smallholders' productivity is also wider than those of the plasma, which are 120 to 9.000 kg/ha/sem and 1.200 to 12.537,99 kg/ha/sem, respectively. The compare means test gives -8,54 of t-stat, showing the significant difference between these plasma and independent smallholders' productivities.

To estimate the cost function, dependent variable is measured in cost per kg FFB to accommodate the different land productivity.

Initially, unit price of all input used in the production are included as independent variables. However, some appear to be highly correlated, thus were eliminated to address multicollinearity problem. The final equation includes 6 independent variables namely productivity, KCl price, Roundup price, SP36 price, harvest labor wage, fertilizer application labor wage and urea price. In this final equation, the multicollinearity test shows the maximum correlation value of all independent variables is 0,654 or equivalent to 1,747 in VIF value, thus no serious multicollinearity problem is concluded. Heteroscedasticity test shows that in $\alpha_1\%$, only one variable namely p_kcl that cause heteroscedasticity. The Ramsey Linearity Test shows that linear specification can not be rejected. Among the 6 independent variables, only productivity and Roundup price significantly influence the average cost. Productivity sign is negative as expected, showing that the higher the productivity is, the lower the FFB cost per kg will be. Roundup price is positive as also expected, showing that the lower the price per liter Roundup, the less the cost per kg FFB will be.

Table 4. Estimation of Cost Function

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	268.9084	1087.408	0.247293	0.8052
Productivity	-0.091156	0.020095	-4.536156	0.0000
P_KCL	-0.095742	0.084033	-1.139343	0.2573
P_Roundup	0.016445	0.009523	1.726810	0.0873
P_harvesting labor	-5.781766	4.214820	-1.371771	0.1732
P_fertilizing labor	0.003049	0.003562	0.856079	0.3940
P_Urea	0.335955	0.299526	1.121622	0.2647
R-squared	0.341578	Mean dependent var		502.1228
Adjusted R-squared	0.302073	S.D. dependent var		514.0689
F-statistic	8.646395	Durbin-Watson stat		0.996744
Prob(F-statistic)	0.000000			

Parameters of the cost function are then used to estimate the cost efficiency. The estimation result shows that on average

smallholders have 1,98 of cost efficiency, with 1.00 and 10,63 of minimum and maximum values, respectively.

Table 5. Cost Efficiency (%)

Cost Efficiency	Plasma (n = 67)	Independent Smallholders (n = 40)
1	0,00	17,50
2	69,64	50,00
3	29,50	17,50
4	74,60	2,50
>4	0,00	12,50

In general, independent smallholders reduce costs by using family labors, which on average is 28,20% of the total labor usage. Plasma smallholders reduce average cost from the higher productivity and from lower input price. Fertilizers and herbicides are collectively bought, thus could be purchased with lower price. As a result, the independent smallholders' average cost per kg FFB is higher than the plasma, which is IDR 676,01/kg and IDR 398,26/kg, respectively. The compare means test result gives 2,79 of t-stat, showing the average cost of these plasma and independent smallholders are significantly different. Therefore, it can be concluded that certification could significantly improve both the technical and cost efficiency.

PROCESSING SUBSYSTEM

PT Cargill is a company with various business branches that operate in 70 countries. PT Hindoli is one of them that was developed in 1996 in South Sumatra Province. In Sei Lilin Subdistrict, PT Hindoli has a mill with a capacity of 120 ton FFB/hour, with 40% supply from nucleus (company) plantation, and the rest from smallholders, both plasma and non plasma. Plasma harvest is scheduled by PT Hindoli to meet the mill capacity and ensure the purchase for all plasma FFB. Each plasma plantation, except that in Bukit Jaya Village (C3 region), is harvested 2 times a month. That in Bukit Jaya Village (C3 region) is harvested once a week. With such an arrangement Hindoli received assurance of mill supply, and smallholders gain assurance

in FFB sales, not only in normal times but also during the harvest.

MARKETING SUBSYSTEM

Market Access

Smallholders' participation in the global market can increase their income through market expansion and price increase. Certified palm oil can be sold to European countries and America. Hindoli, which is a subsidiary company of Cargill, produces biofuel and ethanol and marketed to European countries, Latin America and North America. Cargill is also recorded as the largest biofuel supplier to European market. Hindoli sells CPO to buyers based on single transactions with grace shipping and payment for 2 weeks until 1 month. With such a mechanism, demand from importers is fluctuative from time to time. Therefore, CPO exporters need to provide various certified CPO to take advantage of such opportunity. Revenues also increase with a decrease in production costs by group management and the application of best practice. The plasma and independent smallholders' income are IDR 7.584.865 and IDR 3.599.232 per ha per semester, respectively. The compare means test result gives -6.72 of t-statistics, showing that plasma and independent smallholders' income are significantly different.

SUPPORTING SUBSYSTEM

Environment Improvement

With certification, smallholders need to properly handle chemical waste. Used fertilizer sacks are washed by the fertilizer

team before being reused as loosefruit (brondolan) container. In contrast, almost all independent smallholders simply reuse fertilizer sacks, even those that also have plasma plantations. In other words, independent smallholders do not apply similar treatment due to lack of knowledge but more on the unwillingness to do extra work. One washed it in the river, which could pollute the water. The used water is flowed into a processor that can change the waste into neutral water again. Each year plasma smallholders have 6 single fertilizer applications, N, P and K. On average, each semester plasma smallholders use 26.700 sacks of fertilizers, thus properly washing and neutralizing the waste water is likely to make a significant difference. Similarly, with certification plasma smallholders no longer wash their herbicide containers in the river, just through them at their plantations, or even burned them together with other wastes. Instead the used container are cut into 3 parts and send back to PT Hindoli, which then returned to PT Nirmala that has license to handle wastes. Among independent smallholders, only 1 that is also recorded as plasma smallholder follows the same treatment.

Infrastructures

Benefits from certification are not only enjoyed by plasma smallholders. After being certified, smallholders used their premium fund to complete their infrastructures such as office buildings, warehouses for fertilizer, bathrooms for fertilizing and spraying, waste ponds, or personal protective equipment. The bathroom is useful for fertilizing and spraying teams, so that they can immediately clean up. Personal protective equipment is useful to maintain their health and work safety. In addition, smallholders contribute to the development of public infrastructure through the deduction of their monthly FFB sales income, at IDR 3/kg. With a total production of 3.926.359,94 kg, this means the average smallholders' contribution will be

IDR 11.799.079/month. The funding allocation is decided by village officials, which are usually used for the procurement of the village office equipment, the celebration of Independence Day, or the maintenance of schools and mosques.

CONCLUSION AND POLICY IMPLICATION

CONCLUSION

Certification is a requirement for the agricultural commodities export to some countries. With the certification, smallholders' FFB could expand their market access to these countries. If the increase to the global market leads to an improvement in the continuity of sales or increasing the sales price then it can improve the agribusiness rural development. It can be seen from the improvement of the entire subsystem agribusiness and integration between subsystems, from input, production, processing, marketing, and supporting subsystems. The impact can be seen from the increase in smallholders' income, employment growth, or the infrastructure improvement. Therefore, it can be concluded that certification can be used to increase farmer participation in the global market and in turn improve the agribusiness rural development. The key is that the certificate needs to be accepted by the consumers, who need to have the willingness to pay with higher prices.

POLICY IMPLICATIONS

The experience of PT Hindoli plasma smallholders shows that certification could be beneficial for smallholders, the partner company or surrounding community. This could be utilized to develop the ISPO certificate, issued by the Indonesian Government. This means that even though ISPO is mandatory for all Indonesian palm oil companies, it still needs to be accepted by consumers, both in local and global markets.

Vertical integration between oil palm smallholders and companies, which have direct relation to traders and buyers need to be established. Generally smallholders, especially independent smallholders, need facilitators to foster the relationship. Associated with it, the Estate Agency that was formally involved in the development of oil palm smallholders can be utilized as facilitators in the development of such a vertical integration. The development is not only limited to technical aspects but also managerial and group dynamics, and needs to be gradually and continuously established. As such, it is expected that certification benefits such as the increase in demand and price will be transmitted from palm oil buyers to smallholders.

In order to establish vertical integration between oil palm agribusiness subsystems, each subsystem needs to be internally coordinated as one entity. For small scale oil palm plantation, such as those of smallholders, the coordination can be built in a good smallholders group. Various stakeholders can intervene in the process, but smallholders must remain involved in planning, organizing, actuating and controlling of various activities until they become independent groups and can be integrated in a mutually beneficial relationship with other both parties.

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