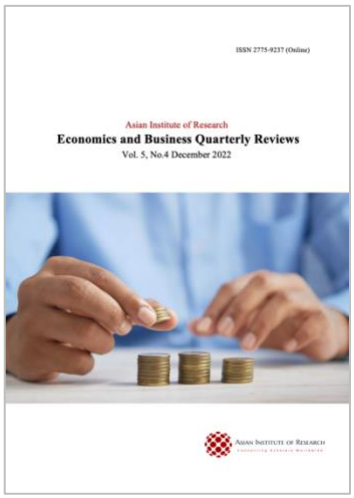

Economics and Business Quarterly Reviews

Haykal, M., Bensaadi, I., Yunus, S., Rahmi, U., & Samyra, D. (2022). The Influence of Farmer Groups, the Role of Cooperatives, and Derivative Products on the Income of Farmers (A Survey on Smallholder Oil Palm Farmers). ***Economics and Business Quarterly Reviews*****, 5(4), 276-284.**

ISSN 2775-9237

DOI: 10.31014/aior.1992.05.04.477

The online version of this article can be found at:
https://www.asianinstituteofresearch.org/

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The Asian Institute of Research
Economics and Business Quarterly Reviews
Vol.5, No.4, 2022: 276-284
ISSN 2775-9237

DOI: 10.31014/aior.1992.05.04.477

The Influence of Farmer Groups, the Role of Cooperatives, and Derivative Products on the Income of Farmers (A Survey on Smallholder Oil Palm Farmers)

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Abstract
This research examined the influence of farmer groups, the role of cooperatives, and derivative products on the income of farmers of palm oil in East Aceh Regency. There were 100 oil palm smallholders appointed to represent all oil palm smallholders in East Aceh Regency using convenience sampling. The data were collected using questionnaires distributed by research assistants. The question items were based on the indicators of each variable and analyzed using multiple linear regression. The results indicated that farmer groups significantly and positively affected the income of farmers. The role of cooperatives and derivative products had no significant effect on the income of farmers. The results provide theoretical implications about the substantial roles of farmer groups formed based on adjacent plots of land in increasing the income of oil palm farmers. Oil palm smallholders need to build local community cohesion, values, and principles of togetherness among farmer members, between cooperatives and cooperative members to realize higher welfare for oil palm smallholders.

Keywords: Farmer Groups, The Role of Cooperatives, Derivative Products, Income of Farmer, Smallholder Oil Palm Farmers

1. Introduction

Oil palm plantations play a substantial role in a country's economy, which appears from the contribution of the palm oil sector to the increase in Gross Regional Domestic Product (GRDP). In addition, oil palm plantations create many jobs for the community and contribute to the country's foreign exchange. Because of its strategic roles, oil palm plantations continue to grow and develop in various regions in Indonesia. New planting and replanting of oil palm plantations continue to occur but always ignore biodiversity sustainability aspects. Despite

having a negative impact, oil palm has contributed to the national economy and local community economic development (Rist et al., 2010; and Budidarsono et al., 2013).

In Aceh, the growth of oil palm plantations has also continued to increase. The wider the oil palm plantation, the higher its contribution to Aceh's economic growth and employment. The palm oil sector supports 30% of Aceh's economic growth and the number of workers absorbed in this sector in Aceh in 2017 reached 75,030 people (Basyah, 2019). Table 1 presents the development and production areas of three primary smallholder plantation commodities in Aceh during 2018-2020.

Table 1: The area of development and production of the three largest community plantation commodities in Aceh

Commodity	2018		2019		2020	
	Planted area (ha)	Production (ton)	Planted area (ha)	Production (ton)	Planted area (ha)	Production (ton)
Oil palm	237,769	440,087	240,368	441,603	242,819	444,436
Coconut	102,203	63,500	102,951	63,772	103,568	63,769
Rubber	129,028	64,926	123,124	45,420	121,551	63,854

Source: Statistics of Aceh Province, 2019, 2020 & 2021

East Aceh Regency is the third largest smallholder oil palm plantation in Aceh, after Nagan Raya and Aceh Singkil Regency. This research was carried out in East Aceh Regency because this area is an area with a large number of smallholder oil palm farmers, reaching 16,525 farmers (Statistics of Aceh Province, 2020). Table 2 presents the development and production areas of smallholder oil palm plantations in East Aceh Regency.

Table 2: The area of development and production of the three largest community plantation commodities in East Aceh Regency

Commodity	2018		2019		2020	
	Planted area (ha)	Production (ton)	Planted area (ha)	Production (ton)	Planted area (ha)	Production (ton)
Oil palm	26,177	31,300	26,307	31,534	26,353	31,415
Coconut	6,972	6,100	6,980	6,110	7,190	6,110
Rubber	22,400	14,789	22,521	2,355	22,520	14,901

Source: Statistics of Aceh Province, 2019, 2020 & 2021

There have been many previous studies on the factors that affect the income of oil palm farmers, such as those by Kurniawan (2014), Andriyani (2021), Aswan & Tanjung (2021). These studies are more focused on production, land area, experience, age, and participation of family members. This research is different from previous studies on the aspects of the role of farmer groups, cooperatives, and palm oil derivative products. These variables are thought to contribute to increasing the income of oil palm farmers. Farmer groups are significant for realizing individual and group welfare. Jelsma et al. (2017) document that to maintain high income, the group structure monitors activities on the plantation through rules determined together. Farmer groups are institutions that play a role in increasing the income of farmer families (Arsyad et al., 2018). Cooperatives play a role in improving the welfare of their members (Wanyama, 2016). Cooperatives contribute to increasing production volume, reducing the risk of production failure, and increasing farmers' income (Djuwendah et al., 2019). Oil palm derivative products are another substantial variable that contributes to improving the incomes of oil palm farmers. The more derivative products produced, the more sources of income for oil palm farmers. The diversity of palm oil derivative products positively influences the income of farmers (Hore & Anitha, 2015).

This research provides additional empirical evidence about the effect of farmer groups, the role of cooperatives, and derivative products on increasing the income of oil palm farmers. This research has implications for the need

to build cooperation between smallholders based on shared values and principles, both within farmer groups on adjacent plots of land and within farmer cooperatives as a larger group. Cooperatives must build the trust of members to contribute to oil palm farmers.

2. Literature Review

2.1. Farmer Groups and Income of Farmers

Several individual farmers can form specific farmer groups and work together to achieve certain goals. Baldasari (2015) argues that cooperation built on a pattern of repeated reciprocal relationships positively influences individuals and groups. Farmer groups are groups formed jointly by oil palm smallholders located on adjacent plots of land. This group builds shared value standards that aim to achieve shared prosperity. Group cooperation allows oil palm smallholders to gain mutual benefits. Individual farmer income increases if group members work well (Jelsma et al., 2017). The findings of Yunus et al. (2019) in Aceh show that cooperation between oil palm smallholders and other farmers can improve the welfare of farmers and the majority of oil palm farmers in Aceh cooperate with each other. Other findings prove that group work increases family productivity and livelihoods, reduces transaction costs, and increases access to financing sources (Glenday & Paoli, 2015). The shared values and principles of smallholder groups in adjacent plots of land force individual smallholders to carry out their duties properly in oil palm plantations management, which leads to shared standards (Jelsma et al., 2017). Thus, farmer groups affect increasing the income of oil palm farmers.

H1: farmers group affects increasing the income of farmers

2.2. The Role of Cooperatives and the Income of Farmers

Cooperatives are very important for sustainable development goals and can reduce poverty. Cooperatives can identify economic opportunities for their members, provide security to the poor by converting individual risks to shared risks, and mediate members to access assets that can help their lives (Wanyama, 2016). Cooperatives prevent poverty by increasing the productivity and income of small-scale farmers (Karthikeyan & Karunakaran, 2018). Cooperatives empower cooperative members by providing training, counseling, and accommodating or assisting market access to sell fresh fruit bunches to their consumers. Cooperatives bear most of the responsibilities for providing services to smallholder farmers and their groups (Jelsma et al., 2017). In addition, cooperatives can increase the professionalism of small oil palm farmers (Suharno et al., 2013). The presence of cooperatives in oil palm plantations can improve the welfare of oil palm farmer families and the sustainability of the oil palm planting business (Sukiyono et al., 2022). Mina (2019) proves that cooperatives play an important role in improving the standard of living of coffee farmers. Suharno et al. (2013) researched oil palm smallholders and proved that farmers who take shelter in cooperatives obtain higher yields per hectare of palm than oil palm-independent smallholder farmers. Thus, the role of cooperatives can increase the income of oil palm farmers.

H2: The role of cooperatives affects increasing the income of farmers

2.3. Derivative Products and the Income of Farmers

Palm oil is a multi-purpose raw material in the world and is used as a food ingredient and medicine. Therefore, many derivative products are from palm oil. Diversification of palm oil derivative products opens up wider employment opportunities, increases farmers' income, and promotes economic growth (Hore & Anitha, 2015).

Smallholder oil palm farmers have low human resource expertise and limited capital, which makes them low innovation in producing derivative products from palm oil. Minimal expertise and organizational skills are the main challenges for smallholder farmers (Haykal & Yunus, 2021). Previous research has documented that the diversification of derivative products is limited by a marketing network system and limited capital (Sihombing et

al., 2018). In addition, the need for immediate cash to finance family needs also limits farmers from developing palm oil derivative products.

H3; derivative products do not affect increasing the income of farmers

3. Research Methods

3.1. Sampling and Data Collection

Smallholder oil palm farmers were selected by convenience sampling method. The minimum sample size was determined based on the approach used in previous studies where the number of variables was multiplied by ten (10) (Aziz et al., 2013). This study had four variables. So, the required minimum sample size was 40. There were 100 questionnaires distributed to smallholder oil palm farmers in East Aceh Regency to ensure the minimum number of responses. East Aceh Regency was selected because this area has a large number of smallholders. The research sample includes smallholder oil palm farmers who own private land. The research samples are all males ranging in age from less than or equal to 35 years to more than 50 years, with the highest percentage being between 36 to 50 years (72 percent), and all respondents are married.

This research collected the data by distributing questionnaires by research assistants to smallholder oil palm farmers from September to October 2022. Data from all samples met the requirements for analysis

3.2. Operational Variables

Researchers used a 5-point Likert scale to measure respondents' answers to each question item from strongly disagree =1 to strongly agree =5. The dependent variable was the income of farmers as assessed by family needs, children's education, and savings (Setyawan et al., 2020). The independent variables were farmer groups, the role of cooperatives, and derivative products. Farmer groups were measured by cooperation (Jelsma et al., 2017) and access to funding sources (Glenday & Paoli, 2015). The role of cooperatives was measured by training, counseling, and marketing (Candemir et al., 2021). and derivative products were measured by motivation, technology, and derivative product variety.

3.3. Data Analysis Methods

Before analyzing, the researchers tested the main linearity assumptions; normality, multicollinearity, and heteroscedasticity tests. To empirically test the effects of farmer groups, the role of cooperatives, and derivative products on oil palm smallholders' income, researchers used SPSS with multiple linear regression models and the following model equations:

$$INC = \beta_0 + \beta_1 FG_{11} + \beta_2 RC_{12} + \beta_3 DP_{13} + \varepsilon.$$

Where INC is income of farmers, FG is farmers group, RC is role of cooperatives, DP is derivative products, β_0 *is* constant, β_1 to β_3 the parameter coefficient of the derivative product diversification, the role of farmer groups, and the role of cooperatives, and ε is the error term.

3.4. Validity and Realibility Tests

Research questionnaires used validity and reliability tests. Construct validity was proven through the significance of the Pearson Correlation, and there were 15 valid questionnaires to be analyzed. The reliability scale used Cronbach's alpha. The scale is internally consistent and reliable if Cronbach's alpha value > 0.6 (Nunally, 1975).

4. Results and Discussions

4.1. Validity and Reliability tests

The questionnaire was tested for validity and reliability to obtain valid and reliable estimation results, as shown in Table 3. All question items were valid with a high significance of Pearson Correlation (p=0.000). Cronbach's alpha value for all research variables starting from 0.658 to 0.830, indicated that the scale used was consistent and reliable internally (Nunally, 1975).

Table 3: Validity and Reliability tests

Variables	Question Items	Validity		Reliability
		Pearson Correlation	**Sig. (2-tailed)**	**Cronbach's Alpha**
Income of farmers	(Q1) Palm oil yields are sufficient to meet household needs	.538**	.000	.738
	(Q2) Palm oil yields can meet other than basic household needs (vehicles and other supporting facilities)	.676**	.000	
	(Q3) Palm oil yields can pay for children's basic education	.756**	.000	
	(Q4) Palm oil yields can send children to college	.645**	.000	
	(Q5) Some of the palm oil yields are deposited in the bank	.647**	.000	
	(Q6) Some of the palm oil yields are used to purchase for precious metals (gold, silver, etc)	.707**	.000	
Farmers Group	(Q7) Collaboration between farmers increases the production of fresh fruit bunches (FFB)	.823**	.000	.708
	(Q8) Collaboration between farmers increases the ability to manage oil palm	.811**	.000	
	(Q9) Access to funding sources is easier if done together	.796**	.000	
The Role of Cooperatives	(Q10) The cooperative provides regular counseling on efforts, strategies and development of oil palm	.839**	.000	.830
	(Q11) The cooperative provides training on how to use palm oil derivative products	.889**	.000	
	(Q12) The cooperative helps market the production of palm oil	.863**	.000	
Derivative products	(Q13) Due to the need for immediate cash and limited capital, farmers have low motivation to produce derivative products	.839**	.000	.658
	(Q14) Farmers have simple technology to produce derivative products	.784**	.000	
	(Q15) Farmers is utilizing fresh fruit bunches to produce simple derivative products (palm oil bread, confectionary fat, etc.)	.688**	.000	

4.2. Descriptive statistics

The explanation of descriptive statistics of the research variables in table 4 revealed that several question items of all variables had an average value higher than 4 (Q1, Q2, Q7, Q8, and Q9), which indicated that the respondents answered agree (somewhat agree) for questions asked with a standard deviation higher than 0.5. Other question items had an average value higher than 3 and less than 4, with a standard deviation between 0.631 to 0.914. It indicated that the majority of respondents answered neutrally to the questions asked.

Table 4: Descriptive Statistics of all Variables

Variables	**Indicators and Question Items**	**Mean**	**Min**	**Max**	**Std**	**N**
Income of Farmers	Family needs					
	(Q1)	4.09	2	5	0.534	100
	(Q2)	4.39	2	5	0.665	100
	Child education					
	(Q3)	3.95	2	5	0.914	100
	(Q4)	3.21	2	5	0.856	100
	Savings					
	(Q5)	3.38	2	5	0.648	100
	(Q6)	3.32	1	5	0.634	100
Farmer Groups	Cooperation					
	(Q7)	4.36	3	5	0.503	100
	(Q8)	4.53	4	5	0.502	100
	Access to funding sources					
	(Q9)	4.46	2	5	0.731	100
The Role of Cooperatives	Counseling					
	(Q10)	3.57	2	5	0.879	100
	Training					
	(Q11)	3.61	2	5	0.898	100
	Marketing					
	(Q12)	3.58	1	5	0.912	100
Derivative Products	Motivation					
	(Q13)	3.48	1	5	0.870	100
	Technology					
	(Q14)	3.68	1	5	0.695	100
	Product Diversity					
	(Q15)	3.81	2	5	0.631	100

Notes: Min is minimum, Max is maximum, Std is standard deviation, N is number of respondents.

4.3. Estimation Results

The estimation results from the multiple linear regression model on the effect of farmer groups, the role of cooperatives, and derivative products on oil palm smallholders' income appear in table 5. Farmer groups significantly and positively affected the incomes of oil palm farmers at a significance level of 1%. Thus, the H1 hypothesis was accepted (farmer groups influenced increasing the income of oil palm farmers). Collaboration between farmers on adjacent plots of oil palm land can increase the production of fresh fruit bunches (FFB) and encourage an increase in farmers' income. In addition, farmer groups made it easier for farmers to access funding sources for plantation management needs. This finding is in line with Jelsma et al. (2017) that the incomes of individual farmers increase with group cooperation because groups force individual farmers to carry out their duties properly based on shared standards. Also, farmer groups' work increased productivity, reduced transaction costs, and increased access to funding sources (Glenday & Paoli, 2015). Farmers will gain additional communal benefits by forming groups with fellow farmers in adjacent plots.

The role of cooperatives insignificantly ad positively affected the income of oil palm smallholders at a significance level of 10% (sig. value 0.693). Thus, the H2 hypothesis was rejected. These findings indicated that cooperatives played less of a role in educating and helping to market oil palm production, so they did not significantly influence increasing the income of oil palm farmers. These findings proved that cooperatives are still a big challenge for oil palm smallholders. Suharno et al. (2014) argued that building cooperatives requires local community cohesion, values, principles, and the dishonesty issue of cooperative management has reduced oil palm farmers' trust in cooperatives. The findings of this study indicated that cooperatives lacked efforts to improve the welfare of their members, such as providing training, counseling, and helping farmers to sell oil palm at prices that benefit farmers. On the other hand, cooperatives were more dominant in acting in the interests of a small number of cooperative administrators.

Oil palm derivative products had an insignificant positive effect on the income of oil palm farmers at a significance level higher than 0.1 (sig. value 0.362). These results concluded that the H3 hypothesis "derivative products did not affect increasing the income of oil palm farmers" has been supported. There were several reasons for palm oil derivative products not to increase farmers' income. First, farmers had low motivation to use fresh fruit bunches (FFB) to produce derivative products. Farmers chose to sell FFB to collectors or final buyers (CPO mills) to get cash immediately to meet household needs, children's education costs, and maybe also for savings. Second, smallholder oil palm farmers did not have simple technology to produce simple palm oil derivative products such as palm oil bread and confectionary fat. As a result, smallholder oil palm farmers did not take advantage of palm oil production to produce derivative products that could provide additional income for farmers. Third, farmers had low skills and experience that made them unable to utilize fresh fruit bunches to create derivative products. It is in line with the findings of Haykal & Yunus (2021), which prove that minimal expertise and organizational skills are the main challenges for smallholder plantation farmers.

Table 5: Coefficient Estimation

Variables	**Unstandardized Coefficients**		**Sig**
	Beta	**Std. Error**	
Constant	1.833	.497	.000
Farmer Groups	.346	.099	.001
The Role of Cooperatives	.023	.059	.693
Derivative Products	.073	.080	.362

5. Conclusions and Suggestion

This study focused on the effect of farmer groups, the role of cooperatives, and palm oil derivative products on the income of oil palm farmers. The results proved that farmer groups significantly and positively affected the income of oil palm farmers. The role of cooperatives and palm oil derivative products did not influence increasing the income of oil palm farmers. Based on the findings of this study, cooperation between farmers in adjacent plots of land plays a significant role in increasing farmers' income. Another implication of this finding is the need to build local community cohesion, shared values, and principles between cooperative members, cooperatives, and members so that cooperatives can run well and benefit oil palm smallholders. In addition, cooperative management needs to build member trust through honest behavior.

This study is limited in the sampling technique used, where Convenience sampling is a non-probability sampling technique whose results cannot be generalized. Subsequent studies need to consider probability sampling so that the results can be generalized. Subsequent research also needs to consider groups of smallholder plantation farmers who are independent and managed by cooperatives so that they can test the determinant drivers of oil palm smallholder income in two groups of smallholder oil palm farmers.

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