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Does State-Financed Organic Coffee Certification Increase Smallholder Farmers' Income?

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Abstract

The Indonesian government encourages coffee farmers to take organic coffee certification as a means to show a high production quality, and hence, a higher farmers' income. This article aims to evaluate the impacts of such a certification on smallholder famers' income. The study involves 60 randomly-selected smallholder farmers consisting of 30 organic coffee farmers from the robusta-producing Nunggal Roso Farmers Group Association (*Gapoktan*) in the Temanggung district of Central Java and 30 non-organic coffee farmers from the same district. Interviews were undertaken by use of a structured questionnaire in 2020. The Mann-Whitney U test was performed to analyse the mean-difference between the two groups of farmers. The results show that the two groups have no statistically-significant differences in gross income, total expenses, net income and return per working-person day (WPD). To ensure that organic certification means increased income for smallholder farmers, higher productivity, availability of price premiums and more efffective government programs are recommended.

Keywords: coffee, smallholder farmers, farmers' income, organic certification, Indonesia.

Introduction

Customers' demand on high quality and safe agro-industrial product is constantly increasing (Will and Guenther 2007). The global markets increasingly require standardized products, whether on its production or processing. On the other hand, the marketing of agricultural products is now increasingly impersonal so that the relationship between producers and consumers is no longer intensive (Schmid 2007). These conditions cause the exchange of information between producer and consumer not running smoothly which can lead to an uncertainty and relatively higher transaction cost (Zorn, Lippert, and Dabbert 2009). Product

standarization in the form of product certification could be an alternative to resolve the problem by minimizing product fraud and protect consumer from unfair competition.

In the context of Indonesian agriculture, product certification is mostly applied on coffee commodities. Coffee is an important commodity for Indonesia because of its significant contribution to Indonesia's economic growth, reducing the trade balance deficit, and helping to solve some of the problems of poverty, especially on rural areas (Wahyudi et al. 2020). One of the certifications applied on Indonesian coffee is organic certification. Through the organic certification, the coffee produced is guaranteed to meet standards in terms of production and procesing (Zorn, Lippert, and Dabbert 2009).

Organic coffee which is classified as specialty coffee has export opportunities when there is an excess supply of conventional coffee in the international market (Drajat, Agustian, and Supriatna 2007). Although still relatively new, the specialty coffee market has grown rapidly in recent years (Lewin, Giovannucci, and Varangis 2004). This growth was due to the industry interest and as well as high consumer demand. Apart from being of better quality, specialty coffe also targets a market niche that is competitively different market than the conventional coffee so that it can have a higher selling price.

There are several regions in Indonesia that has developed organic coffee as well as its certification. One of them is Temanggung Regency in Central Java Province. Temanggung is the biggest robusta coffee producer in Central Java. Of the many coffee producers in Temanggung, there is only one producer that has an organic certificate, namely Nunggal Roso Farmer Group Association (FGA) located in Kalimanggis Village, Kaloran District

Organic certification could be an alternative to address increasing consumer demand for food quality and safety in an increasingly impersonal market. In addition, certification is also expected to increase the selling price. However, to be considered organic, a product must go through a rigorous and high-cost certification process

This study aims to anaylse the impacts of organic certification on coffee farming income. The article will first describe how data were collected and what statistical method employed to analyse the data. A descriptive analysis of coffee farming activities in the studied area and the implementation of organic certification will then be provided. Results, discussions and conclusion drawn from the study are presented in the later parts of the article.

Methods

Research location and duration

This research was conducted on Gapoktan (Farmers Group Association/FGA) Nunggal Roso in Kalimanggis Village, Temanggung District, Temanggung Regency, Central Java Province. The location selection was purposively choosen with the consideration that Gapoktan Nunggal Roso is the only producer in Temanggung Regency that had obtained organic certificate on their coffee farming. A structured questionnaire was used and field interviews were carried from March to June 2021.

Income and profitability analysis

Descriptive analysis is used to explain the farming activity and the implementation of organic certification. The analysis of income and profit measures (Soekartawi, Dillon, and Hardaker 1984) was carried out to determine the effect of organic certification on coffee farming income (Table 1). Furthermore, the application of organic certification will be tested with the Mann-Whitney U Test to determine statistical differences in the existence of the certification.

Table 1 Income measures and farm profitability [a]

Measures	Symbol and calculation
1. Gross farm income: 1) Cash income (sales of coffee), 2) Noncash income (household consumption of farmers, farm inputs, payments in kind, and savings)	= (A)
2. Total farm expenses: 1) Cash expenses (not including interest) 2) Noncash expenses (not including family labor)	= (B)
3. Net farm income	= A – B = (C)
4. Net farm earnings	= C – bunga pinjaman = (D)
5. Return to family labor	= D – bunga modal petani = (E)

[a] Modified from Soekartawi *et al.* (1984)

Data collection

This study uses primary data derived from 60 respondents. A total of 30 respondents from 46 populations of organic farmers were selected using random sampling method. The 30 respondents from non-organic farmers were selected by snowball sampling because there was no sampling frame.

Results And Discussion

General description of the research area

Kalimanggis Village is one of the villages in Kaloran District, Temanggung Regency. Topographically, the area is located on a plateau in the form of undulating hills with an altitude between 690 m to 1150 above sea level. Based on the soil type map issued by the Temanggung Regency Government (BAPPEDA 2021), the soil type at the study location is yellowish-red latosol.

The number of households in Kalimanggis Village is 891 with a population of 3050 people (BPS Kabupaten Temanggung 2016). When viewed from the histogram of population composition, the village can be categorized as an area with a stationary population (Figure 1). Most of the population are farmers who cultivate food crops, horticulture, plantations, and

animal husbandry. In terms of plantation crops, the resident of Kalimanggis Village cultivate a lot of coffee, vanilla, ginger, cubeb, and kapok plants. The form of farming style that appears from the people of Kalimanggis Village is commodity diversification or polycultural cultivation.

Respondents in this study consisted of 52 male respondents (86.7%) and 8 female respondents (13.3%). The average age is 56 years for organic farmers and 53 years for non-organic farmers. In this study, it was found that 2 respondents did not attend school, while others attended school for 3 years (did not graduate from elementary school) to 17 years (bachelor). The main occupations of the respondents are farmers (93.3%), government employees (5.0%), and factory workers (1.7%). Most of the respondents had family dependents of 5-7 people (46.7%) and less than 5 people (46.7%), followed by respondents who had more than 7 dependents (6.7%).

Family income data is approximated by monthly expenses data. In this study, most of the expenses are classified as food expenses (59.8%). The amount of spending on food in Engel's theory indicates that most of these families are still not prosperous (Widyaningsih and Muflikhati 2015).

Farming activities related to coffee carried out by respondents are weeding, pruning, tillage, fertilizing, rejuvenation; harvesting; as well as post harvest processing. Those activity was carried out by respondents while taking care of their food or horticultural crops so that in general coffee plants have not been maintained intensively.

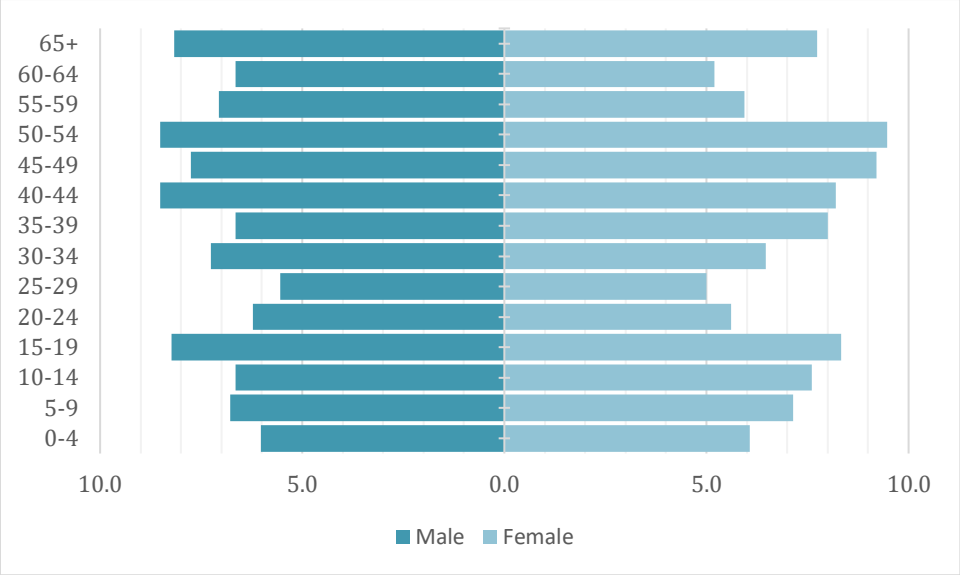

Figure 1 The histogram of Kalimanggis Village population (processed from Temanggung Statistic Bureau (BPS Kabupaten Temanggung 2016))

Organic coffee certification

The organic certification carried out at Gapoktan Nunggal Roso is included in the Ministry of Agriculture program called 1000 Organic Farming Villages. This program is in line with the Go Organic Program that was started by the Ministry of Agriculture since 2010. During the leadership period of President Joko Widodo and Vice President Jusuf Kalla, there was an *Agenda Nawacita* which consists of 9 priority agendas. In this case, the 1000 Organic Farming Village program is included in the 6th point of the 12th action program, namely Indonesia Go Organic! with a pilot project in the form of 1000 organic villages which are planned to be established until 2019 (Widodo and Kalla 2014, 37–38).

Regarding organic certification, most of the respondents did not understand the concept of organic certification. Most of the respondents' knowledge was limited to growing coffee without using chemical fertilizers and drugs. Under these conditions the implementation of certification may be carried out with the assistance of the local Agricultural Extension Officers or the PPLs. Organic certification itself was only carried out at the research location in 2019 with a registration fee of 25 million rupiah and a surveillance fee of 15 million annually. In

the research area, there exists only an organic coffee purchasing post that is under the auspices of Gapoktan and is tasked with buying coffee from organic farmers.

One of the impediments facing farmers in implementing organic certification is lack of market rewards for certified products. Initially, the existence of organic certification was expected to increase selling price. However, in reality buyers do not differentiate prices between organic and non-organic produces. Buyers pay more significance to coffee bean quality in determining their buying prices.

Total expenses

Coffee farming inputs consist of fertilizers, medicines, labor, equipment (depreciation), and other expenses such as Land and Building Tax (PBB), and farmer group dues. Related to the dues, Gapoktan members have yet to agree on the mechanism for sharing the fee burden, whether it will be charged per kilogram of coffee produced, divided equally for each Gapoktan member who is registered as an organic farmer, or a combination of both. Table 2 presents a breakdown of coffee farm production input per hectare of land for the year of 2020.

Table 2 Input requirements per hectare per year for organic and non-organic coffee farming at Gapoktan Nunggal Roso in 2020

Description	Unit	Organic	Non-organic
Manure	sack	184,05	116,21
Synthetic chemical fertilizer			
Urea	kg	16,72	66,60
NPK	kg	-	61,57
TSP	kg	4,78	30,16
ZA	kg	4,78	80,42
KCl	kg	-	1,26
KNO_3	kg	4,78	-
Pesticide	liter	0,04	-
Herbicide	liter	-	0,10
Nursery transplant	pieces	-	10,05
Plant scion	pieces	173,88	117,11
Labor			
Family labor	WPD*	70,90	39,03
Nonfamily labor	WPD*	2,10	4,83

*unit abbreviation: WPD = working person-day = 7 hours

Total farm expenses is analyzed by looking at the expenses structure formed during the coffee production process (Table 3). These expenses are then grouped into cash and non-cash expenses together with other expenses such as depreciation of tools and form the structure of farming expenses (Table 3). Expenses in the form of Family Labor, Land and Building Tax (PBB) according to Soekartawi *et al.* (1984) are excluded from this expense and are calculated later in the net income and net income sections

Table 3 shows that organic coffee farmers need to expend greater resources than their non-organic peers. The biggest components in organic coffee farming include manure (non-cash), equipment depreciation, and nursery transplant or scion (non-cash). For non-organic farmers, the biggest expenses are manure (non-cash), equipment depreciation, and chemical fertilizers.

It is interesting to note, even though they have received organic certification in 2019, in 2020 several organic farmers will still be found using agrochemical inputs in the form of synthetic chemical fertilizers and pesticides. This violation cannot be tolerated by the certification agency and can be subjected to sanctions for in the form of revocation of organic certification in the next planting season for farmers who violate it.

Most of Gapoktan Nunggal Roso's coffee farming expenses are non-cash expenses, namely 91.6 percent for organic farmers and 60.2 percent for non-organic farmers. Research by Fatmalasari *et al.* (2016) on organic certified coffee farming in West Lampung Regency also showed a ratio of non-cash expenses to total expenses that was greater than the ratio of cash expenses, namely 55.3 percent for certified farmers and 52.1 percent for non-certified farmers. The large non-cash expenses ratio shows that the coffee farmers in Gapoktan Nunggal Roso still rely a lot on internal inputs and little on external inputs.

Table 3 Expense structure of coffee farming per hectare at Gapoktan Nunggal Roso in 2020

Components	Organic			Non-Organic		
	Quantity	Value (Rp)	Percentage (%)	Quantity	Value (Rp)	Percentage (%)
Cash expense						
Fixed cost						
1. Land lease	-	-	0,0	-	-	0,0
2. Equipment lease	-	-	0,0	-	-	0,0
Variable cost						
1. Fertilizer		76.431	1,6		522.337	19,5
Urea	16,7 kg	34.394		66,6 kg	139.230	
NPK	-	-		61,6 kg	147.975	
TSP	4,8 kg	11.465		30,2 kg	71.776	
ZA	4,8 kg	11.465		80,4 kg	153.303	
KCl	-	-		1,3 kg	10.053	
KNO_3	4,8 kg	19.108		-	-	
2. Manure	9,5 kr	95.538	2,0	15,1 kr	150.790	5,6
3. Pesticide	0,04 lt	19.585	0,4	-	-	0,0
4. Herbicide	-	-	0,0	0,1 lt	8.545	0,3
5. Coffee grinding		65.557	1,4		60.019	2,2
6. Non-family labor	2,1 WPD	140.441	3,0	4,8 WPD	320.680	12,0
Total cash expense		397.553	8,4		1.100.069	39,8
Noncash expense						
Fixed cost						
1. Depreciation		1.453.440	30,6		598.187	22,4
2. Certification		1.160.991	24,4		-	
Variable cost						
1. Manure	174,5 kr	1.745.008	36,7	101,1 kr	1.011.299	37,9
Total noncash expense		4.359.439	91,6		1.706.495	60,2
Total farm expense		4.756.992	100,0		2.806.564	100,0

*unit abbreviation: pcs=pieces, kg=kilogram, sck=sack, lt=liter, working person-day=7 hours

Gross farm income

The production of coffee plants can be sold directly in the form of red coffee cherries, or further processed into coffee green beans or roasted coffee beans. In this research, productivity and selling price measure uses production results in the form of green beans only by converting red coffee cherries (0.25 rice coffee beans) and roasted coffee beans (1.25 coffee green beans). Productivity, average land area and selling price of coffee can be seen in Table 4.

Tabel 4 Productivity, average land area, and selling price in the form of coffee green bean on Gapoktan Nunggal Roso in 2020

Description	Unit	Organic	Non-organic
Productivity	kg ha^{-1}	483,90	526,50
Average land area	ha	0,35	0,65
Selling price	Rp kg^{-1}	22.787	21.691

This productivity is lower when compared to the productivity of robusta coffee in other areas in the Kaloran District and the Temanggung Regency (BPS Kabupaten Temanggung 2020b; 2020a). The productivity of coffee farm at the research location, which is lower than the surrounding area, indicating that the management of coffee plantations is not yet intensive, both for organic and non-organic farmers.

It is important to note that organic coffee cultivation at Gapoktan Nunggal Roso has not changed with the presence of organic certification. Therefore, the low productivity of organic farmers is not a decrease in productivity due to conversion from non-organic cultivation to organic. The results of this study are in accordance with the findings of Berry *et al.* (2006) which states that the production yields of organic gardens are often 20-40% lower when compared to conventional gardens. Therefore, in its use it is recommended to add legume plant compost (beans) or synthetic chemical fertilizers from nitrogen sources such as urea (Williams et al. 1993).

When viewed from the average age of coffee plants and the number of plants per hectare, organic coffee farmers have older coffee plants (21.2 years) and fewer in number (1402 plants/ha) than coffee plants owned by non-organic coffee farmers which is younger (17.0 years) and greater in number (1764 plants/ha). The combination of older and fewer plants is one of the reason why the organic coffee farmers had lower productivity. This finding is consistent with the results of Risandewi's research (2013) which found that the number and age of coffee plants affected robusta coffee production in Temanggung Regency. Up to a certain point, younger and greater in number will be translated into a higher production.

The selling price of coffee beans for organic coffee farmers is higher than for non-organic coffee farmers. The average price for organic coffee farmers is IDR 22,787 per kilogram, higher than the price for non-organic coffee farmers, which is IDR 21,691 per kilogram. In this price discovery, organic certification has not played a significant role. The Gapoktan’s

purchase post for buying organic coffee is only able to buy an average of 2300 rupiah per kilogram higher than non-organic coffee. The price difference is higher than the price difference for organic farmer certification in West Lampung Regency, which is IDR 2,000 (Fatmalasari, Prasmatiwi, and Rosanti 2016) and 4C and Rainforest Alliance farmer certification in Tanggamus Regency, which is IDR 320 and IDR 200, respectively (Incamilla, Arifin, and Nugraha 2015). However, not all organic coffee can be collected by organic coffee purchase posts due to their limited capital. Similar cases are also found in the certification of Fair Trade and organic coffee farmers in Central America and Mexico (Méndez et al. 2010).

Furthermore, regarding the price of certified coffee and its impact on farmers' income, there is research by Beuchelt and Zeller (2011) in Nicaragua and Jena *et al*. (2012) in Ethiopia. Beuchelt and Zeller suggest that although the price of certified coffee at the farm level is higher than that of non-certified coffee, the benefits and the consequent effect on poverty levels are not clear. Jena *et al.* (2012) also stated that certified coffee as a whole has a low impact on the income of small-scale coffee farmers due to their low production, insignificant price premiums, and constraints on access to credit and information.

The average total gross income of organic coffee farming is slightly lower, namely IDR 11,374,438.71, while the average non-organic coffee farmers earn IDR 11,436,615.01 (Table 5). For both of organic and non-organic farmers, the majority of sales are in the form of green bean. The income results in this study were lower when compared to the Incamilla *et al.* (2015) which shows that certified farmers earn a gross income of IDR 20,694,082.00 and in Fatmalasari *et al.* (2016) research of IDR 20,104,348.29.

Table 5 Smallholder organic and non-organic coffee farmers' income, the Nunggal Roso Gapoktan in 2020

Components	Organic		Non-organic	
	Quantity	Value (rupiah)	Quantity	Value (rupiah)
Gross income		11.374.439		11.436.615
Coffee products				
a) sold in the form		10.299.680		11.284.313
- *cherry*	203,02 kg	1.091.048	215,57 kg	1.162.625
- *green bean*	385,62 kg	9.017.555	463,85 kg	10.121.688
- *roasted bean*	1,91 kg	191.077	-	-
b) dikonsumsi pribadi	22,93 kg	547.148	6,57 kg	104.708
c) disimpan	22,21 kg	527.611	2,19 kg	47.594
Total expense		4.756.992		2.806.564
Cash expense		397.553		1.100.069
Noncash expense		4.359.439		1.706.495
Net income		6.617.447		8.630.051
Interest rate		-		-
Net earnings		6.617.447		8.630.051
Farmers' capital interest		2.265.368		2.786.638
Land		2.084.075		2.660.722
PBB*		181.293		125.916
Return to family labor		4.352.079		5.843.413
Labor use**	70,90 WPD		39,03 WPD	
Return per day		61.383		149.716

*PBB=Land and Building Tax; **WPD = working person-day (7 hours)

Net farm income

Net farm income is the difference between gross income and total expenses of the farm. Net farm income measure the return that received by farmer family from using the factors of production, management, and own capital or loan capital which are invested on their farm (Soekartawi, Dillon, and Hardaker 1984). However, net income alone is not able to accurately show the appearance of farming. Farm performance can be more precisely measured by including the measure of net farm earnings and returns to family labor.

Interest on farmer's capital is a reward for the capital owned by farmers. In this study, farmers do not have buildings and special tools used in coffee farming, so that farmers' capital interest is only in return for land as measured by the land rental value and Land and Building Tax (PBB), which according to Soekartawi (Soekartawi, Dillon, and Hardaker 1984) can be

considered a form of land rent. paid to the government. Respondent farmers in this study did not borrow capital so that the interest rate on loan capital was zero and there was no difference between net income and net earnings.

The net income of organic farmers is lower than that of non-organic farmers (Table 5). Although in the previous section it was known that the gross income of organic farmers is higher, their expenses are also high, resulting in lower net income. With net income minus the interest on the farmer's capital, there is the return for family labor, which results are also lower in organic farmers.

When the return is divided by the number of working person-day (WPD) spent by the farmer, the return for each WPD will be known. This measure can be interpreted that in organic coffee farming the farmers still benefit when the labor wage prevailing at the local location at the time of the study is less than IDR 61,383.34 and suffer losses when the labor wages are above. As for non-organic coffee farming, the farmers will benefit when local labor wages are below IDR 149,715.93 and suffer losses when labor wages are above. If we look at Table 5, the returns per WPD for non-organic farmers, apart from the result of higher net income, are also caused by the lower number of HOK. From these calculations it can also be concluded that when the labor wage is more than the value of the return for the family labor, it is better for farmers to work as farm laborers rather than working on their farm because it is more profitable.

Family-owned farm according to Suratiyah (2006) aims to increase the farmer's income so that when the farmer's income is still positive, the farming shall continue. Calculations using the farmer's income approach are considered to be more appropriate to the situation of the farmers because in fact, until now the coffee farming at Gapoktan Nunggal Roso is still running. In contrast to the profit approach which is not necessarily positive (loss), even though in reality the farming is still carried out by farmers.

Mann-Whitney U test

A mean difference test was conducted to determine statistical differences in the value of gross income, total expenses, net income, and return to family labor for each WPD between organic and non-organic coffee farmers. The authors employed the Mann-Whitney U test with a five percent significance level (0.05) to test the following hypotheses:

H0 : there is no difference between the medians of the farmer groups with regard to the variables: gross income, total expenses, net income, and return to WPD.

H1 : there is difference between the medians of the farmer groups with regard to the variables: gross income, total expenses, net income, and return to WPD.

If the difference in the significance value or asymp. Sig. (2-tailed) is less than five percent (0.05), the H0 is rejected, and vice versa. In this study the U test was carried out using the Statistical Packages for the Social Sciences (SPSS) program.

The results of the difference test in Table 6 show that the Mean Rank value of organic coffee farming in the gross income, total expenses, and net income variables is greater than that of non-organic coffee farming. Only for the return to family labor for each WPD the Mean Rank value of organic coffee farming is smaller than non-organic coffee farming. Meanwhile, the significance value of the variable gross income, total expenses, net income, and return to family labor for each WPD is 0.322; 0.117; 0.647; and 0.941. The four significance values are greater than 5 percent (0.05) so accept H0. It can be concluded that statistically gross income, total expenses, net income, and return to family labor for each WPD are not significantly different at the 95 percent confidence level. Thus the difference in the size of farm income and earnings in nominal terms in the previous discussion is not statistically different.

Table 6 Results of different tests on income and earnings variables of organic and non-organic coffee farming Gapoktan Nunggal Roso in 2020

Components	Organic mean rank	Non-organic mean rank	*Asymp. sig. (2-tailed)*	Result
Gross income	32,73	28,27	0,322	Accept H_0
Total expenses	34,03	26,97	0,117	Accept H_0
Net income	31,53	29,47	0,647	Accept H_0
Return per WPD	30,33	30,67	0,941	Accept H_0

Policy Implications

The results show that organic certification does not lead to an increased income for smallholder coffee farmers. The expenses that must be paid by organic farmers are even greater, while their productivity is lower. Because both organic and non-organic coffee share the same distribution and market channels, no price premium is given to organic produces. Without a price premium, organic farmers have no incentives to continue organic certification program.

To address the problem, the authors propose the following policy recommendations: (a) to increase productivity. Robusta coffee productivity in the study area is still lower than that of its neighboring areas. (BPS Kabupaten Temanggung 2020b; 2020a). Increasing the number of coffee plants to reach the optimal number of ±1600 plants (plant spacing of 2.5 m × 2.5 m), pruning, and more efficient weeding are recommended. Apart from reducing harvesting labor, pruning also increases the production by maintaining productive branches and pruning unproductive branches (Sianturi and Wachjar 2016). The authors observed an excessive weeding called *besrik* which can be made more efficient; (b) the Gapoktan needs to work with specialised organic coffee buyers to ensure premium prices, as is done by coffee farmers in West Lampung (Fatmalasari, Prasmatiwi, and Rosanti 2016); (c) the Ministry of Agriculture needs to show greater commitment to organic coffee development program and to intensify collaborations with relevant Ministries and coffee industries, including international and local brands, to promote organic coffee.

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