Sustainability Science and Resources, Vol. 3:3, 2022, pp. 32-54

Can Coffee Certification Reduce Poverty?

Results from a Household Study of Smallholder Farmers in Indonesia

Esther Sri Astuti S.A.[1*] and Astrid Offermans[2]

[1] Program Director of Institute for Development of Economic and Finance (INDEF), Lecturer at the Faculty of Economics and Business, Diponegoro University.
[2] Coordinator of the rural development program that evolves around the European Common Agricultural Policies and the Dutch NSP (Nationaal Strategisch Plan).
[*]Corresponding author.
Email: esthersriastuti@lecturer.undip.ac.id, and esa@indef.or.id

Received: 6 December 2022 Accepted: 30 December 2022 Published: 31 December 2022

ABSTRACT

Sustainability certification are increasingly demanded in the global coffee trade, but its economic and poverty alleviation effects for smallholder farmers are still poorly understood. We study these effects using cross-sectional household data obtained from a survey of 320 farm households from four districts in the coffee-producing provinces of Lampung and Aceh in Indonesia. We combine a monetary expenditure approach with a non-monetary approach. Both approaches reveal information on the number of respondents that can be considered poor, as well as on the intensity of poverty experienced by them. In terms of non-monetary approach, we refer to multidimensional poverty index (MPI) that identifies deprivations in education, health and standards of living. In terms of monetary approach, we examine poverty gap index that measure coffee farmers' expenditure lies below the poverty line. We compare between certified and conventional (non-certified) coffee farmers. The results show that economic benefits contributing to poverty alleviation can be gained from coffee certification. The differences in the value of poverty measurements between certified and conventional farmers are small but statistically significant. Certified farmers are found to be less frequently poor compared to conventional farmers. There is no significant difference on the intensity of poverty for both groups of smallholder farmers. Given these results, certification is not a highly recommended strategy for poverty alleviation among smallholder coffee farmers in Indonesia.

Keywords:
Sustainability standards, coffee certification, farmers poverty, monetary and non-monetary approaches of poverty.

INTRODUCTION

Global consumers, especially in the developed world, increasingly demand that the products they purchase and or consume are produced and distributed in accordance to internationally accepted standards satisfying the three aspects of sustainability, i.e., environment, social (including human

rights) and economic. Failure to do so has been shown to lead to a global boycott against produces exported by a country and or a producer, as experienced by the Indonesian pulp and papers industry in the 2000s and early 2010s. To reverse such a boycott requires significant government policy changes and a painstaking transformation towards sustainability involving multistakeholder partnership, which is then confirmed by a globally accepted sustainability certification (Wibowo et al, 2021).

Global coffee trade is no difference. Consumers in the developed world increasingly ask not only about coffee origin or quality, but also about its sustainability. Coffees to be traded need to address consumers' concerns on the economic, environment and social aspects of sustainability (Giovanucci and Ponte, 2005), hence the emergence of coffee certification.

At present there are quite many certification schemes in the world, ranging from global schemes such as Organic Certification, Rainforest Alliance and Starbucks C.A.F.E to national schemes such as Indonesia's SNI 01-2907-2008. Because they meet stringent standards, certified coffees are expected to be in higher demand with probably a price premium. Consequently, coffee certification is expected to bring higher economic benefits to farmers.

Given the relatively high level of poverty in Indonesia's main coffee-producing provinces (which will be shown in the next section), while coffee as the main income source for coffee farmers is increasingly subjected to sustainability certification, the authors study how coffee certification affects farmers' poverty measurements. Because certification is expected to bring higher economic benefits, we hypothesize that coffee certification contributes to poverty alleviation. We expect that certified smallholders score better on both monetary and non-monetary measurements of poverty than conventional, non-certified, smallholders. The scope of this study is micro empirical research where the authors employ household survey data involving 320

coffee farm households from four districts in two coffee-producing provinces of Lampung and Aceh in Indonesia.

Poverty in Indonesia. There is a various definition on defining poverty. Gordon et al. (2006), Makoka and Kaplan, (2005) define that it is a condition when an income condition is below poverty line. World Bank Institute (2005) explains that poverty line indicates the minimum or annual income that people in a specific country or region need to live sufficiently and adequately. People have insufficient income when they live below poverty line. They don't have enough income to access basic needs such as food, safe drinking water, housing, sanitation facilities, health, education, as well as information (Melio 2015; Gordon et al., 2006; Coudouel et al., 2002). The World Bank sets the global poverty line at an income of USD 1.90 (or less) a day. National poverty lines are corrected for the Purchasing Power Parity and it varies between a country and another with possibility of indicator deviation. Richer countries have higher national poverty lines, where poorer countries have lower. In Indonesia, the poverty line equaled USD 0.85 per day based on the release by Statistics Indonesia (BPS- Statistics Indonesia, 2017).

Table 1 indicates the Indonesian poverty lines as from 2006. Generally, the poverty line increases every year, despite a decrease on the relative number on Indonesian living below the poverty line (from 17.75% in 2006 to 10.70% in 2016). Meanwhile, the poverty incidence is higher in rural areas (13.96% as in 2016) than in urban areas (7.73% as in 2016).

Table 1

An expenditure-based poverty lines base on the number of Indonesian poor people living in urban and rural areas

Year	Number of Poor People (Million)			Percentage of Poor People			The Poverty line (Rp/ Capita/ month)	
	Urban	Rural	Urban+ Rural	Urban	Rural	Urban+ Rural	Urban	Rural
2006	14.49	24.81	39.30	13.47	21.81	17.75	174290	130584
2007	13.55	23.61	37.17	12.52	20.37	16.58	187942	145837
2008	12.77	22.19	34.95	11.65	18.93	15.42	204896	161831
2009	11.91	20.62	32.53	10.72	17.35	14.15	222123	179835
2010	11.10	19.93	31.02	9.87	16.55	13.33	232989	192354
2011	10.95	18.94	29.89	9.09	15.59	12.36	263594	223181
2012	10.51	18.09	28.59	8.6	14.7	11.66	277382	240441
2013	10.53	17.92	28.55	8.52	14.42	11.47	308825	275779
2014	10.35	17.37	27.73	8.16	13.76	10.96	326853	295681
2015	10.62	17.89	28.51	8.22	14.09	11.13	355378	333034
2016	10.49	17.28	27.76	7.73	13.96	10.70	372114*	350420**

Source: BPS-Statistics Indonesia, 2017

* USD 27.56 ** USD 25.96

If we assess the characteristics of poor households in Indonesia based on Table 5.2, we will see the main differences between poor and non-poor households exist with regards to education and their main source of income. No household member with higher education than elementary school in 74.9% of the poor households, compared to the rest of 47.6% of the non-poor households. If we look at households in which at least one member has attended junior high school or more, these numbers 25.1% for poor households and 52.4% for non-poor households (Statistics Indonesia, 2017c). People who received higher education are less prone to poverty than the ones who have less or no education at all. The majority of the poor people earn their

income through farming, which applies to one-third of the non-poor people based on the Statistics Indonesia – BPS data obtained in 2017. Farming is still the main source of income for the majority of poor people. However, other activities may still be the source as well.

Table 2
The comparison of poor and non-poor Indonesian households based on the total average income that falls below poverty line

Household Characteristics	**Poor**	**Non-poor**
Average of household size	4,57	3.68
Percentage of woman as householder	15.98	15.13
Average age of householders (in years)	49.70	47.45
Length of education (average in years)	5.49	8.27
Education degree of the householders (%)		
a. Not finished from elementary school	37.81	19.83
b. Elementary school	37.12	27.73
c. Junior high school	13.13	16.10
d. General high school	10.88	26.71
e. University	1.06	9.63
Main sources of household income (%)		
a. Notworking	13.13	12.11
b. Farming	50.42	28.93
c. Industry	6.53	9.88
d. Others	29.92	49.08

Source: BPS-Statistics Indonesia, 2017 (numbers based on 2016)

We can see that 9 out of the 10 most important coffee producing region is considered poor based on Table 3, where more than 10% of the people below poverty line that is determined by 10% indicator. The only coffee producing region, West Sumatra, has less than 10% of people who live below poverty line.

Table 3

The most important coffee producing regions in Indonesia and the percentage of poor people in the regions ranking. Grey-shaded cells indicate the percentage that exceeds 10%

No	Province	Production		Number of Poor People	
		Kg	%	Thousands	%
1	South Sumatera	135251	21,32	1096,5	13,77
2	Lampung	108983	17,18	1139,78	13,53
3	North Sumatera	60310	9,51	1452,55	10,79
4	Bengkulu	56227	8,86	325,6	17,16
5	Aceh	49498	7,80	841,31	17,11
6	West Sumatera	33428	5,27	376,51	6,71
7	East Java	32278	5,09	4638,53	12,28
8	South Sulawesi	30202	4,76	795,81	10,12
9	Central Java	23622	3,72	4493,75	13,32
10	East Nusa Tenggara	21468	3,38	1150,08	22,58
11	West Java	17289	2,72	4168,11	9,57
12	Bali	15288	2,41	174,94	5,25
13	Jambi	13636	2,15	290,81	9,12
14	West Sulawesi	6965	1,10	146,9	11,90
15	West Nusa Tenggara	4835	0,76	786,58	16,54
16	West Kalimantan	3970	0,63	390,32	8,44
17	Central Sulawesi	3710	0,58	413,15	14,07
18	North Sulawesi	3001	0,47	200,35	8,98
19	Southeast Sulawesi	2989	0,47	327,29	13,74
20	Riau	2342	0,37	501,59	8,82
21	Banten	2169	0,34	657,74	5,75
22	South Kalimantan	2037	0,32	184,16	4,72
23	Papua	1823	0,29	914,87	28,40
24	Gorontalo	968	0,15	203,69	18,16
25	Maluku	446	0,07	331,79	19,36
26	DI Yogyakarta	421	0,07	488,83	13,16
27	North Maluku	376	0,06	76,4	6,22
28	Central Kalimantan	362	0,06	137,46	5,91
29	East Kalimantan	326	0,05	211,24	6,10
30	West Papua	134	0,02	223,6	8,44
31	North Kalimantan	119	0,02	47,03	6,32
32	Kep. Bangka Belitung	3	0,00	71,07	4,83
33	Kep. Riau	1	0,00	119,14	5,78
34	DKI Jakarta	0	0,00	385,84	3,61
	Total Indonesia	634477	100,00	27763,32	11,13

Source: BPS-Statistics Indonesia (2017) and Directorate General of Estate Crops (2017)

People living below the poverty line can be revealed through information based on poverty lines in both relative or absolute manner. However, it doesn't specifically say anything about the intensity of poverty experienced by people living below the poverty line (Sen, 1981). The use of poverty line information does not emphasis on the extent to with people fall below the poverty line. Neither the result of earning less than 1 cent per day nor earning half of the amount can express the line. A concept that aims to provide more explanation of the poverty intensity is the poverty gap index (P1) (Sen, 1981), which expresses the gap between the income expressed by the poverty line and the actual income. It is explained in a number between 0.01 and 1. The number 0.01 explains that people earn a little bit below poverty-line level, whereas number 1 explains that people have no income at all and therefore, fall below the poverty line. The percentage is also used in explaining poverty gap index, which ranges 0 to 100%. The Indonesian poverty gap index (P1) declined from 0.0343 in 2006 to 0.0183 in 2017 (Statistics Indonesia, 2017d). It indicates the smaller ratio between the average income of the poor and the poverty line.

The poverty gap index is often criticized for its focus on explaining that income is as a determinant for poverty (Bader et al., 2016; Melio, 2015) in addition to adding insights into the intensity of poverty in a country or region. The high income is not guaranteed to be as the power to purchase goods or services if it is used to repay debts. An expenditure approach may give better insights in the farmers' ability to make an adequate living, a consumption-based expenditure for the example. Then, the transactions that take place in the informal sector led farmers difficult to recall the income. Then, the access to credits and savings that supposed to help farmers make adequate living and escape poverty. We suggest adopting expenditure – rather

than an income approach as the consequences of the aforementioned premises (see Maitra and Rao, 2015; Rao, 2006; Deaton, 2003; Milanovic, 2002).

The next aspect that is criticizes is related on monetary indicators (Bader et al., 2016; Fitoussi et al., 2010). Poverty relates to both insufficient income and outcome with respect to health (nutrition), literacy and standards of living (UNDP, 2016; Bader et al., 2016; Ravallion, 2011; Fitoussi et al., 2010; Alkire and Foster, 2011; Alkire, 2007). This is relevant because farmers may not be able to transform their income into goods and services such as access to drinking water, education, shelter, and electricity. Each household has a different capacity to use their resources to be converted into income to fulfill their needs. (UNDP, 2015; Alkire and Foster, 2011; Alkire and Santos, 2010; Sen, 2001). Non-monetary poverty indicators are less sensitive to market fluctuations (Wang, 2016; Alkire and Santos, 2010, Alkire and Foster, 2011). It is more explicit to consider income to achieve a certain goal rather than being an essentially a goal. Poor people describe multidimensional aspects of them being poor. Those relate on lack of education, empowerment, and employment. Furthermore, poor health and housing add the aspect on their position of being poor.

METHODS

This section provides an explanation of how the poverty concept is elaborated into a poverty level comparison between certified and conventional (non-certified) coffee farmers and how household survey and data collection are undertaken in accordance to the elaboration. We combine a monetary expenditure approach with a non-monetary approach that will reveal the information on the respondents that are considered poor with the intensity of poverty experienced. The following Table 4 will provide an overview of both approaches.

Table 4
Two approaches on measuring poverty

	Monetary Expenditure Approach	**Non-Monetary Approach**
Poor people quantity	Relative number of Poor People For the example: people living below the poverty line	Relative number of deprived People
Intensity of poverty	Poverty gap index	Multidimensional Poverty Index

Monetary expenditure approach

Expenditure-based poverty line, as earlier elaborated in this study is pivotal in our methodological approach (also see Jena et al., 2012; Milanovic, 2002) and it is as an indicator of the minimum daily expenditures an individual should be able to make for an adequate living.

This study focuses on poverty among Indonesian coffee farmers. Robusta, the main variant of coffee in Indonesia, is grown and produced in Lampung, while Arabica is produced in Aceh. Both regions are targeted for our study. We employ a multi-stage stratified random sampling strategy, that implies the main data of the research. Then, we asked the local agricultural extension officers affiliated to exporters to find where the farmers live. For the conventional farmers, we interviewed farmers who live close to the certified farmers but are not affiliated to the same certified exporters. This study selects 4 districts in Lampung and Aceh, which are inhabited by both certified and conventional farmers. A total of 320 respondents took part in the research of this article, that represents 1,206 household members. The districts are Nosar Baru, Penosan Jaya, Tapak Moge, and Paya Peluin in Aceh Region as well as Fajar Bulan, Cipta Waras, Sipatuhu, and Suka Majuin in Lampung Region (see table 5 for the sampling size).

Table 5
Sample size

	Robusta (Lampung)		Arabica (Aceh)		Total
Status of Certification	**Certified**	**Conventional**	**Certified**	**Conventional**	
Number of farmers involved	80	80	80	80	Total number of farmer respondents: 320
Total number of people in the farmers' Households	282	295	297	332	Total number of household members: 1206

The first step in data collection was to measure how much coffee do farmers spend. The expenditure obtained from the data is compared to the respective poverty line. The Indonesian Bureau of Statistics (2017) indicates a monthly poverty line of IDR 415,826 (USD 30.80) for Aceh and IDR 357,792 (USD 26.50) for Lampung. In order to measure the farmers' expenditure, we used the National Socio-Economics Survey (Sesenas) questionnaire from the Indonesian Bureau of Statistics and made it accessible to coffee farmers. We measured the expenditure on food without specifying on the intake into carbohydrates, fat, protein, and calories. The respondents were asked about the monthly consumption-based expenses of their household in Rupiah on food and beverages, non-food items, as well as other expenses. The total sum of monthly expenses was subsequently multiplied by 12, and compared to the respective poverty lines multiplied by 12. In order to calculate the number of people, either it's a relative or absolute number, living below the poverty line, we examined the household sizes of each respondent. If a respondent is categorized as poor, and had other three members in the household, this would account for 4 (one member with 3 others) people living below the poverty line. The relative number is presented relative to the total number of respondents and household members living

under one roof. As the conditions of the areas where both Robusta and Arabica are grown and a distinctive market each coffee variant has, we separately elaborate the results for Arabica and Robusta farmers.

The intensity of poverty was measured by calculating the poverty gap index (P1). It measures the size of the gap between the poverty line and expenditure (Milanovic, 2002; Morduch and Graduate, 2002). Our calculation is based on a report from the World Bank (2005) and Haughton and Khandker (2009) that can be expressed as:

$$P_1 = \frac{1}{N}\sum_{i=1}^{N}\frac{G_i}{z}.$$

Where $G_i = (z - y_i)I(y_i < z)$. P_1 = Poverty gap index, N = Population, G_i = the poverty gap, z = the poverty line, and y = actual income of poor individuals

The formula calculates the gap between the actual expenditure and poverty line. This is a poverty gap. If the gap is positive, where the expenditure is higher than the poverty line, the poverty gap is insubstantial which is therefore noted as zero. Negative gaps, where the expenditure lies below the poverty line are divided by the poverty line, resulting in a number between zero and one. The number that is calculated closer to 1 will indicate an extreme poverty circumstance on an individual level based on Blackwood and Lynch, 1994 and Haughton and Khandker, 2009. The following to define the average intensity of poverty in an area, the individual poverty gaps are aggregated and divided by the total number of involved respondents, including the respective household living under one roof (see table 6). This will result in a presumed poverty gap index, which means a severe poverty when the indices are higher.

Table 6
The poverty gap index with an example of the hypothesis

The poverty gap index, with a poverty line of 150 as an assumption					
	Expenditure of each individual				**Poverty Gap index**
Expenditure	125	135	175	175	
Poverty gap	25	15	0	0	
$Gi/_Z$	0,17	0,10			0,067 [=0.27/4]

Non-monetary approach

In order to calculate poverty along the non-monetary approach, we follow the operationalization and calculation of poverty based on UNDP (2016) report, which elaborates multidimensional poverty index (MPI) that explains lack of education, health, and living standards. The deprivation in these premises is further decomposed in 10 indicators: two for health, two for education, and six for living standards (see Table 7).

Table 7
Indicators explaining multidimensional poverty*

Indicator	**Household**				**Weights**
	1	**2**	**3**	**4**	
Household Size	4	7	5	4	
Education					
No household member has completed five years of schooling	0	1	0	1	1/3 : 2 = 16.7%
At least one school-age child (years 1to 8) is not attending school	0	1	0	0	1/3 : 2 = 16.7%
Health					

At least one household member is malnourished**	0	0	1	0	1/3 : 2 = 16.7%
One or more children have died within the five years prior to the survey	1	1	0	1	1/3 : 2 = 16.7%
Living conditions					
No electricity	0	1	1	1	1/3 : 6 = 5.6%
No access to clean drinking water	0	0	1	0	1/3 : 6 = 5.6%
No access to adequate sanitation	0	1	1	0	1/3 : 6 = 5.6%
House has dirt floor	0	0	0	0	1/3 : 6 = 5.6%
Household uses "dirty" cooking fuel (dung, firewood or charcoal)	1	1	1	1	1/3 : 6 = 5.6%
Household has no car and owns at most one of bicycle, motorcycle, radio, refrigerator, telephone or television	0	1	0	1	1/3 : 6 = 5.6%
Results					
Household deprivation score, c (sum of each deprivation multiplied by its weight)	22,20 %	72,20 %	38,90 %	50,00 %	
Is the household poor (c > 33.3%) ?	No	Yes	Yes	Yes	

Source: UNDP, 2016. Human Development Report 2016, Technical Notes p.1-14

Notes:
*1 indicates deprivation in the indicator; 0 indicates non-deprivation. If the indicator applies to the respondent, a score of 1 is given. If the indicator does not apply, a zero is provided

**Malnourishment means that a BMI score is less than 18.5. We use the basis of kilograms for weight and centimeters for height. We used manual calculation of the BMI. In order to measure malnutrition in children under 5 years, the measurements of weight and height is assessed to determine nutritional status. We then looked at the thresholds that referred to WHO's anthropomorphic table that indicates children's ideal weight at a given age. If their weight is lower than the ideal weight relatively to their age, it is classified as malnourishment (use UNICEF, 2010; WHO, 2008 as a reference).

Table 7 was used as the second part of our questionnaire, which follows the questions about expenditure measurements. An indicator was scored as zero when the situation did not apply to the households of the respondents, and 1 if the indicator for deprivation applies. This elaborates that each household member is deprived in the school attendance indicator, which also similar to the states of undernourished family, where all household members are considered deprived in nutrition.

After scoring whether a respondents' household is deprived in each indicator, we weighted the deprivations. We summed and weighted scores as in the last column of table 7) for each

respondent, resulting in a percentage between 0 to 100, where 0 means not deprived at all whilst 100 is deprived in all dimension. Following the UNDP, we define poverty as the situation in which people are deprived in the least one third of the indicators in table 7 as from a total score of 33.33%. We then know how many of the interviewed respondents can be considered poor. However, as house sizes may differ, we calculated the number of poor people based on the actual household sizes. In the aforementioned above, the poor household exist of 7+5+4 that equals 16 people. In order to calculate the headcount poverty index, the summed total of deprived people is then divided by the total amount of household members represented in our study. The result indicates the relative number of people living in poor households. The intensity of deprivation is the average proportion of weighted deprivation experienced that is calculated from the summed and weighted deprivation, multiplied with the number of household members, and divided by the total number of people experiencing deprivation. The result of the calculation yields the score of 0 to 1, where 1 indicates the total deprivation in which every respondent is poor and deprived in every indicator. These calculations were applied for both Aceh and Lampung regions and separately researched to both certified and conventional farmers.

Statistical methods

In order to evaluate the effect of certification on poverty alleviation, several T-tests were executed (see De Coster, 2006; Park, 2003). At first, we tested the likelihood of certified and conventional farmers' likelihood to end up in poverty. We used a dummy variable that ranges from 0 to 1. 0 indicates that the respondent has an expenditure below poverty line while 1 indicates expenditure above poverty line. We then assess the significance for P-value, for it to equal to or below 0.05. We used an independent sample t-test to compare whether certified and

conventional farmers differ significantly in their annual expenditure. The same comparison will also be done to compare monetary poverty levels between Robusta and Arabica farmers.

In the non-monetary approach, we additionally used the independent sample t-test to assess scores based on MPI indicators to see if they are statistically different. If the P-value is equal to, or less than 0.05, there is a significance of the difference.

RESULTS AND DISCUSSION: THE IMPACT OF COFFEE CERTIFICATION ON POVERTY ALLEVIATION

Poverty rate and gaps: monetary expenditure approach

Of 320 of our total respondents, 87 can be considered poor as their expenditure lies below the monetary poverty line. From these, around 42.5% of respondents are certified farmers where 57.5% others are conventional. The certified farmers have already been certified for 4 years. If we look at the respective household sizes of the farmer respondents, 331 household members are considered poor; 40.5% of these members are part of a certified household, 59.5% of them are conventional. The average intensity of poverty experienced by the coffee farmers in Aceh and Lampung is 0.01, which is considered as very modest. Although quite some farmers seem to live in poverty, the intensity of their poverty is very shallow.

We could conclude some results on Table 8, that certified farmers are less prone to live below poverty line than conventional ones. The P-value is 0.000. The difference, however, is rather small (0.094 on a 1-point dummy-scale). Differences in average expenditure are small as well, and not significantly different. Expenditure is not significantly affected by certification owned by the farmers. However, certified farmers are less often poor compared to conventional farmers.

Table 8

The independent t-test results on the influence of certification on non-monetarypoverty

Variable	Conventional	Certified	Sig.
Poverty status (0=not poor; 1= poor)	0.294	0.200	0.000**
Expenditure in Rupiah per year	30867613	31055381	0.943

** significant $\rho<0.05$

If we now look at the variety of the coffee grown by the farmers, we will see that Robusta coffee farmers in Lampung are less frequently poor than Arabica farmers in Aceh. Of the 87 poor respondents, 41.4% live in Lampung, where the other 58.6% live in Aceh. In terms of household members, we see that 39.3% of the poor household members live in Lampung, where Robusta is grown, compared to 60.70% in Aceh, where Arabica is grown. These general data are supported by the information in Table 9 that indicates that Robusta farmers from Lampung less often live below the poverty line than Arabica farmers in Aceh. The insignificant differences were only 0.056 on a 1-point scale. No expenditure is significant between Arabica and Robusta farmers.

Table 9

The independent t-test analysis that relates Robusta and Arabica coffee production in topoverty

Variable	Robusta	Arabica	Sig.
Poverty status (0=not poor; 1= poor)	0.219	0.275	0.020**
Expenditure in Rupiah per year	29866338	32056656	0.136

Source: Primary Data, 2016

** significant $\rho<0.05$

Non-monetary approach

If the non-monetary approach to poverty is employed, 33.3% of the coffee farmers are considered poor. Of 17 respondents, 29.4% farmers are certified while 70.6% other are conventional. Around 66 household members are considered poor; 28.8% of these members are part of a certified household, 71.2% of them are conventional. The overall average deprivation score of certified farmers equals 7% and for conventional farmers 9%. This difference is small and insignificant, where P-value is 0.06 as in Table 10. This implies that coffee farmers seem to be less deprived as the literature often seems to suggest. This conclusion is further reinforced by the low scores of the intensity of poverty, which is indicated by 0.015 for the poor certified farmers and 0.03 for the poor conventional farmers (see Table 10). Similar to the results from the monetary approach, we will see that certified farmers are less likely to end up in deprivation compared to conventional farmers (P value 0.01). The difference however, is again very small which is 0.03 on a 1-point scale.

Table 10
The independent t-test results on the effects of certification on deprivation

	Conventional	**Certified**	**Sig.**
Average deprivation score (%)	9	7	0.06
Average intensity of poverty	0.03	0.015	
Average deprivation dummy score (0=not deprived / 1=deprived)	0.07	0.04	0.01**

** significant $\rho<0.05$

If we take a closer look on the individual indicator, we will find significant differences between certified and conventional farmers for four indicators such as years of schooling, school

attendance, nutrition, and electricity. In all cases, certified farmers score better than conventional farmers. This means they are less deprived. In most cases, the differences are very small again (see Table 11), except for nutrition for which the effect seems to be moderate (0.09 versus 0.17 on a 1-point scale). We could not observe differences in the quality or nutritional value of food being consumed by the certified and conventional farmers. A hypothetical explanation however, may be that certified farmers sometimes receive food supplies from the certified exporters, whereas conventional farmers do not.

Table 11
Differences in deprivation (0= not deprived/ 1=deprived) between certified and conventional farmers

MPI Indicators	Conventional	Certified	Sig.
Years of Schooling	0.04	0.02	0.042**
School Attendance	0.05	0.02	0.002**
Nutrition	0.17	0.09	0.000**
Child Mortality	0.03	0.04	0.200
Electricity	0.01	0.00	0.045**
Drinking Water	0.16	0.16	1.000
Sanitation	0.17	0.18	0.768
Floor	0.30	0.26	0.082
Cooking Fuel	0.11	0.11	1.000
Assets	0.03	0.04	0.240

Source: Primary Data, 2016

** significant $\rho<0.05$

From the deprived respondents, 47.1% are Robusta coffee farmers from Lampung, where 52.9% are from Aceh, where Arabica is grown. If we compare different levels of deprivation between both varieties, Robusta farmers generally to be less often deprived than Arabica farmers, as we conclude in Table 12 with small differences on 0.1 point on a 1-point scale. For nutrition and

drinking water however, the differences are more substantial and the pattern for these indicators is reversed. The Arabica farmers seem to be less often deprived than the Robusta farmers. We can elaborate this through the types of plantations managed by the Arabica farmers which deployed the multi-cropping-system and the closeness to mountains that assures the availability of other food sources and clean water.

Table 12
The differences in deprivation where 0= not deprived and 1 = deprived between Arabica and Robusta farmers

MPI Indicators	Robusta	Arabica	Sig.
Year Schooling	0.03	0.03	0.50
School Attendance	0.02	0.05	0.002**
Nutrition	0.25	0.01	0.000**
Child Mortality	0.04	0.02	0.010**
Electricity	0.00	0.01	0.045**
Drinking Water	0.23	0.09	0.000**
Sanitation	0.14	0.20	0.008**
Floor	0.23	0.33	0.000**
Cooking Fuel	0.13	0.10	0.158
Assets	0.02	0.06	0.000**

Source: Primary data, 2016

** significant $\rho<0.05$

Based on the results, we conclude the statement that coffee certification plays a big role in alleviating poverty on the basis of welfare, income, and productivity enhancements among Indonesian coffee smallholders, despite an insignificant difference mathematically. This raises questions on whether the same, minor benefits cannot be achieved differently in a way that poses fewer pressures on the farmers, that may be manifested by constructing facilities for sanitation in villages.

If we compare results from the non-monetary approach with the results from the monetary approach based on Table 5.13, we will see that the monetary approach results in a much higher poverty numbers than the non-monetary approach.

This can be elaborated in two ways. The first one is that farmers are categorized as poor in the monetary approach do not spend more money, but on important things. The second, we observed that Indonesian coffee farmers often do not have to spend money on indicators mentioned in the non-monetary approach. It is common for a common help in Indonesia, for gaining a better access to sanitation. Sanitation facilities developed and granted by a village member to help other village members. A non-monetary based approach therefore seems to be more informative and applicable to the rural Indonesian culture than the monetary approach.

Table 13
The poverty rate comparisons among farmers' groups

Poverty in the monetary approach	**Total number poor farmers/ household members**	**Certified**		**Conventional**	
	87 farmers	37	42.5%	50	57.5%
	331 household members	134	40.5%	197	59.5%
		Lampung		**Aceh**	
		36	41.4%	51	58.6%
		130	39.3%	201	60.7%
Poverty in the Non-Monetary approach	**Total number poor farmers/ household members**	**Certified**		**Conventional**	
	17 farmers	5	29.4%	12	71.2%
	66 household members	19	28.8%	47	71.2%
		Lampung		**Aceh**	
		8	47.1%	9	52.9%
		31	47.0%	35	53.0%

CONCLUSION

This study shows that economic benefits contributing to poverty alleviation among coffee farmers can be gained from coffee certification. Despite the relatively small differences in the value of poverty measurements between certified and conventional (non-certified) farmers, the differences are shown to be statistically significant. Certified farmers are found to enjoy a better living standard as they tend to be less frequently poor compared to conventional farmers. There is, however, no significant difference on the intensity of poverty for both groups of smallholder farmers. Because of its small impacts, certification is not a highly recommended strategy for poverty alleviation among smallholder coffee farmers in Indonesia. Investments on improvements in non-monetary components of poverty alleviation such as public facilities are considered more beneficial. Provision of drinking water well, sanitation facility, medical clinic, and or electricity for example, is more meaningful towards poverty alleviation than certifying all farmers in the region.

REFERENCES

Bader, C., Bieri, S., Wiesmann, U. and Heinimann, A. (2016). A Different Perspective on Poverty in Lao PDR: Multidimensional Poverty in Lao PDR for the Years 2002/2003 and 2007/2008. *Social Indicators Research*, Springer, 126(2): 483-502. DOI: 10.1002/pop4.140

Blackwood, D. and R. Lynch. (1994). The Measurement of Inequality and Poverty: A Policy Maker's Guide to the Literature. *World Development*, 22(4): 567-578.

BPS-statistics Indonesia (2017). Rata-rata Banyaknya Anggota Rumah Tangga menurut Provinsi:2000-2016. Available at: https://www.bps.go.id/website/pdf_publikasi/Statistik-Indonesia-2017.pdf [accessed 11 November 2017]

BPS-Statistics Indonesia (2017d). Indeks Kedalaman Kemiskinan (P1) Menurut Propinsi 2007-2017.
Available at: https://www.bps.go.id/linkTableDinamis/view/id/1121 [accessed 8 August 2017]

Coudouel, A., J. S. Hentschel, and Q. D. Wodon. (2002). "Poverty Measurement and Analysis." In: *A Source book for Poverty Reduction Strategies*, ed. J. Klugman, 29–69. Washington, DC: World Bank.

De Coster, J. (2010). *Testing Group Differences Using T-tests, ANOVA and Non-parametric Measures*. Department of Psychology, University of Alabama.
Available at: http://www.stat-help.com/ANOVA%202006-01-11.pdf [accessed 17 August 2017]

Deaton, A. (2003). Household Surveys, Consumption, and the Measurement of Poverty. *Economic Systems Research*, 15(2): 135-159. DOI: 10.1080/0953531032000091144 [accessed 17 August 2017]

Directorate General of Estate Crops. (2017). Tree Crops Estate of Statistics 2015-2017. Available at: http://ditjenbun.pertanian.go.id/tinymcpuk/gambar/file/statistik/2017/Kopi-2015-2017.pdf [accessed 4 December 2017]

Fitoussi, J.P., A. K. Sen, and Stiglitz, J.E. (2010). *Mismeasuring Our Lives: Why GDP Doesn't Add Up*, New York, The New Press.

Giovannucci, D., and S. Ponte. (2005). Standards as a new form of social contract? Sustainability initiatives in the coffee industry. *Food Policy* 30: 284–301.

Gordon, D. (2006). The Concept and Measurement of Poverty. In C. Pantazis, D. Gordon and R. Levitas. *Poverty and Social Exclusion in Britain, The Millenium Survey*, Bristol: Policy Press, pp. 29-69.

Haughton, J., and Khandker, S. R. (2009). *Handbook on poverty and inequality*. Washington, DC: World Bank. http://go.worldbank.org/4WJH9JQ350 [accessed 8 August 2017]

Jena, P. R., Chichaibelu, B. B., Stellmacher, T. and Grote, U. (2012). The impact of coffee certification on small-scale producers' livelihoods: a case study from the Jimma Zone, Ethiopia. *Agricultural Economics* 43: 429-440.

Maitra, C. & Rao, D.S. Prasada. (2015). Poverty–Food Security Nexus: Evidence from a Survey of Urban Slum Dwellers in Kolkata. *World Development*, Elsevier, 72(C) :308-325.

Makoka, D. & Kaplan, M. (2005). *Poverty and vulnerability: an interdisciplinary approach.* Munich Personal RePEc Archive, Paper No. 6964.

Melio, M.S. (2015). The Challenges of Poverty Measurement in the Arab Region. Paper presented at the IARIW-CAPMAS Special Conference *"Experiences and Challenges in Measuring Income, Wealth, Poverty and Inequality in the Middle East and North Africa"* Cairo, Egypt November 23-25. National Bank of Egypt, Cairo.

Milanovic, B. (2002). True world income distribution, 1988 and 1993: First calculations based on household surveys alone. *Economic Journal* 112 (476), January: 51-92.

Morduch, Jonathan. (2002). Analysis Of the Effects of Microfinance on Poverty Reduction. *NYU Wagner Working Paper No. 1014*

Park, H.M. (2003). Comparing Group Means: The T-test and One-way ANOVA Using Stata, SAS, and SPSS. The Trustees of Indiana University.
Available at: http://stat.smmu.edu.cn/ DOWNLOAD/ebook/statistics_course.pdf [accessed 17 August 2017]

Ravallion, M. (2011).” On Multidimensional Indices of Poverty.” *Policy Research Working Paper Series 5580*, The World Bank.

Sen A. (1981). *Poverty and Famines: An Essay on Entitlement and Deprivation*. Oxford: Clarendon Press.
Available at: http://staging.ilo.org/public/libdoc/ilo/1981/81B09_608_engl.pdf [accessed 15 September 2017]

UNDP. (2016). *Human Development Reports: Multidimensional Poverty Index*. Available at: http://hdr.undp.org/sites/default/files/hdr2016_technical_notes.pdf [accessed 5 August 2017]

Wang, X., Feng, H., Xia, Q., and Alkire, S. (2016). “On the relationship between Income Poverty and Multidimensional Poverty in China.” *OPHI Working Paper 101*, University of Oxford. Available at: http://www.ophi.org.uk/wp-content/uploads/OPHIWP101_1.pdf [accessed 1 August 2017]

Wibowo, D.H., Rakatama, A., Irhamna, A.D.P. (2021). The political economy of sustainable development in Indonesia. *Sustainability Science and Resources*, 1(3): 62-92. accessed 30 December 2022] https://doi.org/10.55168/ssr2809-6029.2021.1003

World Bank Institute. (2005). “Introduction to Poverty Analysis”. *Poverty Manual, All, JH Revision of August 8, 2005*.
Available at: http://siteresources.worldbank.org/PGLP/Resources/Poverty__Manual.pdf [accessed 6 August 2017]