Impact of Eco-Labelling on Indonesia's Smallholder Coffee Farmers

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ACKNOWLEDGEMENTS

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

IMPACT OF ECO-LABELLING ON INDONESIA'S SMALLHOLDER COFFEE FARMERS

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EXECUTIVE SUMMARY

In terms of value, coffee which is mostly grown on smallholder farms, ranked fourth in the exports of food and agricultural commodities of Indonesia in 2008. Together with state-owned and private plantations, they add up to 969,082 ha of area harvested – the second largest in the world. Nevertheless, Indonesia ranked only seventh in the world in terms of yield per hectare. In addition, the coffee sector is facing many problems related to environment and its sustainability. Eco-labelling can be a solution to indirectly increase productivity and solve environmental problems brought about by coffee cultivation through better farming techniques imposed by eco-labelling organizations. This research studies the impact of eco-labelling implementation by Indonesia's smallholder coffee farmers using financial analysis.

Financial analysis was used to compare the profitability of eco-labelling and non-eco-labelling smallholder coffee farms. Descriptive statistical analysis was also used to present the stakeholders' and farmers' perceptions of eco-labels in the coffee sector. To get the primary data, survey and personal in-depth interviews were conducted. Findings show that eco-labelling in the coffee sector is profitable as evidenced by the results of cash flow analysis for both eco-labelled and non-eco-labelled Arabica and Robusta coffee farms. Nevertheless, problems still exist in the implementation of coffee certification i.e., limited support from government, quite difficult to implement due to low educational level of farmers and lack of awareness of advantages of eco-labels, the differences of certification scheme required by different coffee-importing countries, and financing problem for the certification fee.

1.0 RESEARCH PROBLEM

1.1   Description of the Problem

Coffee plays a vital role in Indonesia's agricultural sector. In terms of value, it ranked fourth in the exports of food and agricultural commodities of Indonesia in 2008. Unlike palm oil which is mostly produced by large plantations, coffee is mostly produced by smallholder farms. In 2009, coffee accounts for 95.52% and 95.96% of total area harvested and total production, respectively (Directorate General of Plantation Indonesia 2011). Area harvested from both state-owned and private plantations add up to 969,082 ha, making coffee the second largest export commodity in the world. Nevertheless, Indonesia ranked only seventh in the world in terms of yield per hectare. The low productivity was due to the smallholders' lack of farming knowledge, such as cultivation techniques.

Indonesia's Ministry of Agriculture has set long-term targets to increase the output of the coffee sector. The production of Arabica (*Coffea arabica*) and Robusta (*Coffea canephora* var. *robusta*) are set at 193,000 ton and 865,000 ton, by 2025, respectively. This means that there should be an increase from 148,487 ton and 535,589 ton in 2010. The efforts to increase production are by intensification and/or extensification of farming system. However, increasing current harvested area (yield) and opening a new area negatively affect the environment, especially if these efforts are not done in a sustainable manner. The three negative environmental impacts of coffee plantations are deforestation, soil degradation, and water pollution. Smallholder farmers often open a new plantation area by clearing natural forest areas. Such practice destroys the surrounding ecosystems. Soil degradation is due to excessive use of herbicides and chemical fertilizers while pollutants discharged from post-harvest activities pollute surface waters.

Eco-labelling of coffee can be an indirect solution to increase productivity and solve environmental problems brought about by coffee production. This is because better farming techniques are imposed by eco-labelling bodies. Moreover, eco-labelling can increase farmers' income through the higher price set for higher quality coffee. Jena et al. (2010) stated that certification or eco-labelling adds value to a commodity

because it addresses consumer demand for a healthier and more socially and environment-friendly products.

Eco-labelling as a certification is important to enhance competitiveness of Indonesian coffee, especially since coffee consumers have become increasingly aware of the impact of their consumption habits on the people and the environment in coffee producing countries. Thus, there is a need for implementing certification programs in the coffee sector to ensure the good practices in production and marketing of coffee (Pierrot et al. 2010).

According to Pierrot et al. (2010), the trend in certified coffee trading has increased year after year. Coffee certified as Fairtrade is the only coffee guaranteed to provide a minimum price to producers when sold and produced exclusively by organized smallholder farmers. The Fairtrade makes a movement to offer greater voice and power to marginalized producers in the global economy by ensuring that producers earn a greater portion of the final product value (Raynolds et al. 2004).

However, it is not easy to implement eco-labelling in the coffee sector. Smallholders and any related stakeholders must understand the long-term benefits of eco-labelling on coffee production to ensure its sustainability. Thus, it is important to know whether implementation of eco-labelling by Indonesia's smallholder coffee farmers satisfies the goal of economic, social, and environmental improvement. This research specifically, focused on organic-Fairtrade and organic-Rainforest Alliance types of eco-labels or certification.

1.2   Policy Context

The Indonesian government has set targets to increase productivity of both Arabica and Robusta coffees to 1,200 kg/ha per year and, consequently, 1,000 kg/ha per year by 2025. In order to achieve the targets and to improve the coffee sector in general, the government has created policies for its development.

The main goals of the country's existing policies in its coffee sector are: a) to increase productivity and quality of coffee; b) to increase export and value added of coffee products; and c) to provide funding assistance for coffee farmers. The first policy incorporates the development of sustainable coffee, which includes organic coffee. In this regard, the government has launched pilot projects for specialty and organic coffees in some regions.

The government has also conducted trainings for coffee farmers in coffee producing areas. Such trainings are intended to improve smallholders' knowledge in using agricultural technologies and techniques to help increase productivity. Nevertheless, increased productivity will not necessarily mean increase in income because price, which could better explain income, is determined in the world markets. In this regard, eco-labelling can be a solution.

Eco-labelling complements government programs to achieve sustainable production of coffee. Although government programs may not be continuously implemented by smallholders due to lack of monitoring, eco-labels will put pressure on smallholders to continuously apply the standards set by eco-labelling bodies.

1.3   Literature Review

Blue Angel is the first environment-related label for products and services in the world. Since Germany introduced Blue Angel in 1978, there has been a number of researches trying to address the implication of such label to various economic actors. Imhof and Lee (2007) found that Fairtrade by itself does not seem to explain the differences in productivity. Furthermore, they found that non-organic production of one non-Fairtrade cooperative produces lower yield than the organic production of two Fairtrade cooperatives.

Kilian et al. (2006) explored the two most widely recognized certification schemes (e.g., organic and Fairtrade) to determine whether certification to these systems is actually benefiting coffee producers in

Central America. They found that in the short-term, these schemes seem to be viable strategies in combating the current coffee crisis among Central American farmers. However, in the long term, these certification processes, without other changes in quality, productivity, export, and production, will not solve the problems. Wilson (2010) stated that although minimum price and price premium can improve farm-gate prices, the gains must be understood in the context of long-term indebtedness as well as rising production costs and household consumption costs.

Bacon (2005) links changing global coffee markets to opportunities and vulnerabilities for sustaining small-scale farmers' livelihood in northern Nicaragua. This research surveyed 228 smallholders to measure the impact of sales on organic and Fairtrade markets. Results suggest that participation in organic and Fairtrade networks reduces farmers' livelihood vulnerability.

In 2010, Méndez et al. studied the impact of Fairtrade and organic certifications on 469 small scale coffee farmers and 18 cooperatives in Central America and Mexico. It was found that price and farmers' income of certified coffee were higher than those of the non-certified. This implies that in order to improve the economy, social and environmental aspects related to coffee farming must be considered. Also, cooperation between farmers/smallholders, cooperatives, coffee certification organizations, environmental organizations, researchers, and academicians must be strengthened.

Certifying bodies require farmers and/or farmers' cooperatives to comply with the standards of eco-labelling. Farmers and/or farmers' cooperatives need to apply sustainable farming system that protects the environment, preserves valuable ecosystems for future generations, and uphold their welfare. Hence, harmful agrochemicals are strictly prohibited. This means that coffee must be grown on land without synthetic herbicides or other prohibited substances. In this research, the impact of applying organic, Fairtrade, and Rainforest Alliance certification on Arabica and Robusta smallholder coffee farmers was analyzed. A brief discussion of the types of certification is provided as follows.

1.3.1 Fairtrade

The first Fairtrade coffee originated from a farm in Mexico. In Indonesia, Persatuan Petani Kopi Gayo Organik (PPKGO) in Aceh Province was the first coffee farmers' cooperative which was Fairtrade certified in 2000. Currently, there are 13 coffee farmers' cooperatives/organizations which are Fairtrade certified in Aceh.

There are four general parts of Fairtrade standards which farmers and/or cooperatives should comply with (FLO 2009). The first part is *social development*, which involves the following principles: a) Fairtrade adds to development; b) members are small producers; and c) there is democracy, participation, transparency, and non-discrimination. To comply with these, farmers' cooperatives should ensure that member participation in the organization's administration and internal control are promoted through training and education.

The second part is *socio-economic development*. It involves the organization's transparent administration and management of the Fairtrade Premium. This also involves the economic strengthening of the organization. The organization should continue to develop its business-related operations and maximize the return to the members.

The third part is *environmental development*. This involves impact assessment; planning and monitoring; agrochemical use; waste management; soil and water use; fire safety standards; and the use of genetically modified organisms (GMO). Some important conditions of this principle include the following: a) the organization ensures that for certified products, no plant material is gathered from protected areas or is propagated in contravention of national and international regulations; b) new planting in virgin forest areas is prohibited; c) materials on the FLO Prohibited Materials List may not be used or otherwise sold, handled, or distributed by the organization; and d) the organization must ensure that its members have undertaken procedures and practices designed to reduce and/or prevent soil erosion caused by wind, water, and/or human or animal impact.

The fourth part is *labor conditions*, which looks into employment policy, freedom from discrimination, freedom of labor, freedom of association and collective bargaining, conditions of employment, and occupational health and safety. Conditions of this part include the proper treatment of

employees, such as: a) the employer does not engage in, support or tolerate the use of corporal punishment, mental or physical coercion or verbal abuse; b) work does not jeopardize school attendance, the educational attainment, or the social, moral or physical development of the person under 18 years of age; and c) persons who must not undertake any potentially hazardous work includes persons younger than 18 years; pregnant or nursing women; persons with incapacitating mental conditions; persons with chronic, hepatic or renal diseases; and persons with respiratory diseases.

1.3.2 Rainforest alliance

Along with Ethiopia and Tanzania, Indonesia was the first country outside of Latin America to get the Rainforest Alliance certification. Coffee farms from these countries were initially certified in 2007. Currently, there are 15 farmers' cooperatives and organizations with this certification in Aceh, Indonesia.

The Sustainable Agriculture Standard (SAN) sets the standard certification standards of the Rainforest Alliance. SAN indicates several issues that require the attention and compliance of farmer and/or farmers' cooperative (SAN 2010). These include: social and environmental management system; ecosystem conservation; wildlife protection; water conservation; fair treatment and good working conditions for workers; occupational health and safety; community relations; integrated crop management; soil management and conservation; and integrated waste management.

Some important criteria for this certification are the following:

a) All existing natural ecosystems, both aquatic and terrestrial must be identified, protected, and restored through a conservation program;

b) Hunting, capturing, extracting, and trafficking wild animals must be prohibited on the farm;

c) The farm must not discharge or deposit industrial or domestic wastewater into natural water bodies without compliance with the respective legal requirements, and the wastewater's physical and biochemical characteristics do not degrade the receiving water body;

d) Farm management must implement policies and procedures for identifying and considering the interests of local populations and community interest groups regarding farm activities or changes that could have an impact on their health, employment or local natural resources; and

e) New production areas must only be located on land with the climatic, soil and topographic conditions suitable for intensity level of the agricultural production planned.

1.3.3 Organic Coffee

Organic certification is one of the leading eco-certification schemes worldwide. Organic agriculture is based on the principle of health, i.e., organic agriculture should sustain and enhance the health of soil, plant, animal, human and planet as one and indivisible; the principle of ecology, i.e., organic agriculture should be based on living ecological systems and cycles, work with them, emulate them and help sustain them; the principle of fairness, i.e., organic agriculture should build on relationships that ensure fairness with regard to the common environment and life opportunities; and the principle of care, i.e., organic agriculture should be managed in a precautionary and responsible manner to protect the health and well-being of current and future generations and the environment (IFOAM, 2012).

In practical terms on a coffee farm, certified organic agriculture means (Giovanucci, 2003):

a) recycling and reusing available nutrients through methods such as composting;

b) the rotation or intercropping of diverse plants to balance the soil's requirements, improve its tilt, and check the proliferation of pests and diseases;

c) using plant cover and terracing to minimize runoff and erosion; and

d) neither monocropping nor clear-cutting large tracts of land in order to significantly maintain biodiversity.

Finca Irlanda in Chiapas Mexico pioneered certified organic coffee through Demeter Bund, the German association for biodynamic agriculture in 1967. Today there are more than forty nations supplying the global organic coffee market – more than any other certifications (SCAA, 2010). First organic coffee in Indonesia was certified by SKAL in Gayo, Aceh Province in 1992.

1.4   Potential Contribution

This study can be of importance to a number of coffee stakeholders. The government can provide assistance to smallholder coffee farmers in applying for eco-labels if its implementation is found to be economically, socially, and environmentally beneficial. The government can further encourage coffee exporters to diversify their target markets--eco-labelled coffee should be sent to importing countries where demand is significantly high. For example, 8% of all green coffee exported in 2009 had some form of certification of credible claim for sustainability. The Netherlands is the leader in market share with 40% certified coffee brands. The United States as the world's largest single market has 16% of all raw coffee imports certified, while Denmark, Sweden and Norway have 10%.

The trend of consumers' demand for coffee certification type is different for each country. Organic dominates in Germany and Italy, while Fairtrade is the market leader in the United Kingdom and France. Rainforest Alliance is a market leader in Japan, and Utz Certified is dominant in the Netherlands (ITC 2011).

The Indonesian government can push for export of certified coffee to the countries (ITC 2011). This will help maintain traditional markets and establish new import markets for Indonesian eco-labelled coffees. The Ministry of Trade can use the result of this study in providing regulations which will ease the export of eco-labelled coffee and promote Indonesian sustainable coffee in importing countries. Local governments can play their role in assisting smallholders in implementing eco-labelling through establishment of farmers' cooperatives or similar institutions and provision of eco-label compliant farming techniques.

The Association of Indonesian Coffee Exporters and Industries (AICE) can link farmers' cooperatives with eco-label organizations and eco-labelled coffee importing agencies. Smallholder coffee farmers and cooperatives can use the research results to decide whether to apply for eco-labelling or not. In addition, implementation of eco-labelling can be further improved based on the research findings.

2.0 RESEARCH OBJECTIVES

The study was conducted to investigate the prospects for smallholder coffee farmers and farmers' cooperatives in Indonesia in adopting eco-labelling schemes. It answered the following research questions:

1. How profitable are eco-labelled coffee farms relative to non-eco-labelled ones?

2. What are the determinants of farmers' decision to apply for eco-labels?

3. How is the stakeholders' perception of eco-labels in the coffee sector related to their application in Indonesia?

Specifically, the study aimed to:

1. Analyze costs and benefits (financial assessment) of eco-labelled coffee farms;

2. Determine the factors influencing smallholders' decision to participate in eco-labelling; and

3. Analyze the stakeholders' perception regarding eco-labels in the coffee sector and its application in Indonesia.

3.0 RESEARCH METHODS

3.1 Study Sites

The study was conducted in two provinces, Aceh and Lampung (Figure 1). These provinces represent coffee producing areas in Indonesia. Specifically, the study sites were Aceh Tengah and Bener Meriah districts in Aceh and Lampung Barat district in Lampung. The study sites were purposively chosen since they have implemented eco-labels in the coffee production.

Aceh Tengah and Bener Meriah Districts,
Aceh Province

West Lampung District, Lampung Province
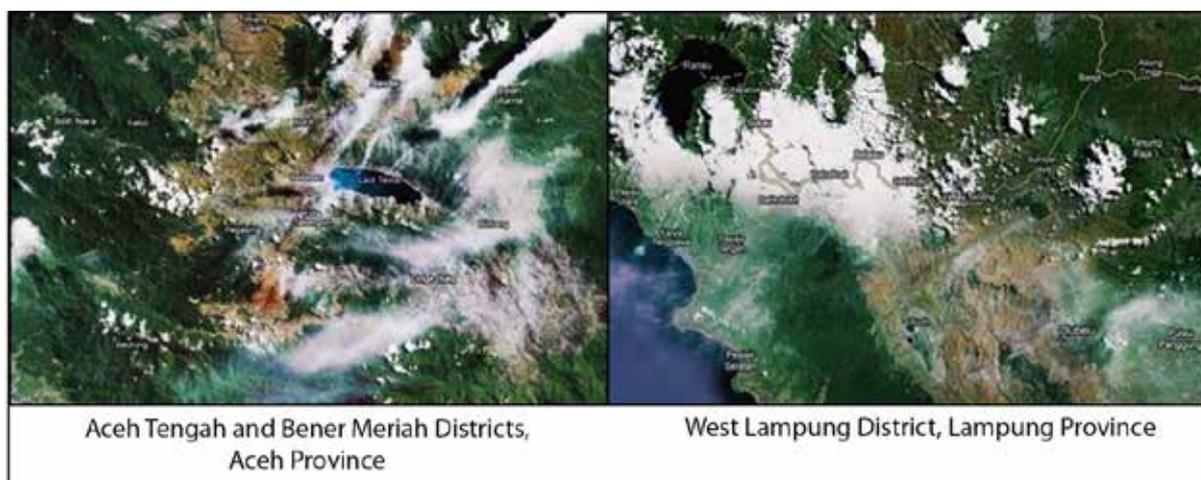
Figure 1. Study sites

Lampung and Aceh provinces are among the largest coffee-planted areas in Indonesia, which ranked second and third, respectively in 2009. The largest coffee-planted area is South Sumatera province (Ministry of Agriculture, Indonesia 2011). However, there are no eco-labelled coffee producers in South Sumatera.

Lampung and Aceh Provinces are the biggest Arabica and Robusta producers in Indonesia, respectively. However, these provinces suffer from rapid deforestation. Aceh and Lampung provinces are among the most deforested areas in Sumatra Island. Data show that Lampung has the lowest forest cover in Indonesia with only 8% in 2005, down from 14% in 1990 (Dinata et al. 2008). Almost 70% of Lampung's coffee production occurs inside and adjacent to the Bukit Barisan Selatan National Park. Since 1985, the park has lost more than 28% of its forest, mostly to agricultural conversion for Robusta coffee (O'Brien and Kinnaird 2003). Around 3.7 million hectares out of 6.5 million hectares (both including forest and non-forest area) of Aceh's area were categorized as highly critical (Ministry of Forestry, Indonesia 2011). In mid 1990s, the total deforested area and degraded forest in Aceh amounted to 1.4 million hectares (FWI and GFW 2002).

The population of smallholder coffee farmers in the study sites was further categorized into two groups, i.e., with and without eco-labels. The two groups, eco-labelled and non-eco-labelled, were analyzed to gather the impact of certification on coffee.

3.2 Analytical Methods

This research covered impact evaluation (profitability/feasibility), determinant of smallholders' decision to implement eco-labels (certification), and descriptive statistical analysis. Data on benefits and costs, and socioeconomic characteristics of farms and farmers were gathered by conducting in-depth interviews and using survey questionnaires among smallholder coffee farmers. Focus group discussions among stakeholders and key persons of smallholder coffee farms were also conducted.

Cash flow analysis was used to analyze the profitability of both eco-labelled and non- eco-labelled smallholder coffee farmers. This is important to recognize the information on how eco-labelling affects smallholders' income. Accordingly, the financial profitability must describe in detail whether eco-labelling

will profit smallholders by comparing the financial analysis results between eco-labelled and non-eco-labelled farms.

Generally, smallholders could not apply certification by themselves. They apply for certification through an organization (cooperative) or company which facilitates the certification process. The profitability of cooperative as an eco-labelling facilitator was evaluated. The benefit and cost of cooperative/company as an eco-labelling facilitator are important to consider because smallholder coffee farmers can access eco-labels through such institution. Thus, besides the need of profitability of smallholders, the sustainability of eco-labelling in the coffee sector also depends on profitability gathered by those organizations/companies. Figure 2 shows the eco-labelling certification process in Indonesia's coffee sector.

To recognize the impact, the profitability analyses of eco-labelled and non-eco-labelled coffee farmers were compared. In order to evaluate the profitability of smallholder coffee farmers, all benefits and costs related to the farm activities and eco-labelling application were identified and calculated separately for Arabica and Robusta farmers. The benefits and costs are shown in the Table 1.

The environmental and social variables, such as benefit of reducing chemical fertilizer, pesticides, herbicides, and social aid from premium fee were analyzed using descriptive analysis. This analysis was based on the information gathered from primary data and literature study. Furthermore, cash flow analysis was also used to recognize the profitability of organization and eco-labelling facilitator which in this case, are the farmers' cooperative. The benefits and costs are provided in Table 2.

The criteria to verify the profitability are as follows:

Net Present Value (NPV). NPV is the total value of cash flows at the current time after deducting the investment capital. Investment capital is considered as investment costs for a certain time. The farm is profitable if all benefits are larger than costs. The difference between benefits and costs is called 'net present value'. A project is feasible if the NPV > 0.

Benefit Cost Ratio (BCR). BCR is the ratio between net benefit and net cost. A project is feasible if the BCR > 1.

Internal Rate of Return (IRR). IRR is a discount rate (DR) that makes NPV = 0. This is presented in percentage (%). Coffee farms' system is more feasible or profitable if the results obtained from analysis is IRR >i or opportunity cost of capital.

In order to support the results of this study, factors affecting farmers' decision to implement eco-labels were also determined using a binary logit analysis. Variables which were expected to influence smallholder coffee farmers' decision to participate in eco-labelling include social and economic aspects, farms' characteristic and farmers' knowledge of eco-labelling.
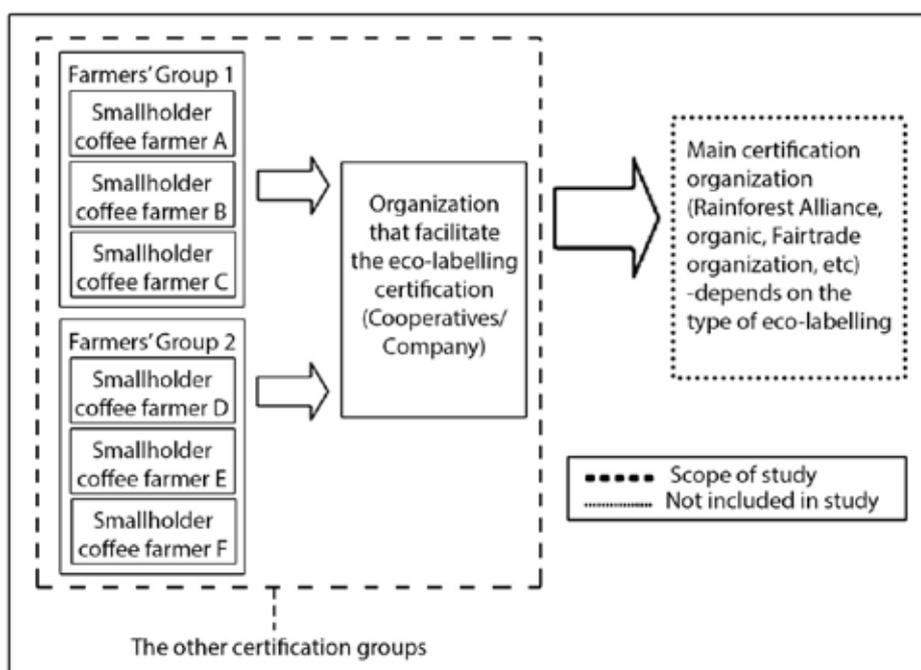
Figure 2. The eco-labelling (certification) system of coffee sector in Indonesia

Table 1. Benefits and costs needed in farm level

Benefit	Cost
Economic variable	**Economic variable**
a. *Revenue from coffee* - Quantity of production - Price - Premium fee	**a. *Farm cost*** - Investment costs of farm (seed, etc) - Operational costs of farm (labor cost, input cost, maintenance cost) **b. *Post-harvest cost*** - harvesting cost - processing cost **c. *Certification cost*** - Administration fee (if any) - Self-controlling and learning related to certification (such as farmer's budget to buy certified book and training, if any)

Table 2. Benefits and costs needed in cooperative level

Benefit	Cost
Net Revenue of Organization from certified coffee - Quantity of production - Differential of coffee price (margin) obtained by those organization (Δ P with eco-labelling - Δ P without eco-labelling)	**Certification Cost** - Certification fee - Administrative cost - Self-controlling - Self-monitoring - Cost of training (farmer and staff) - Marketing cost

3.3   Variables of the Study

Table 3 shows the main variables measured in this study.

Table 3. Variables measured in the study

Aim	Variables measured	Type of data	Data collection method
1	**A. Profitability-Farm Level (Benefits and Cost):** ***Economic and social aspect*** · Quantity of production · Selling price of output/coffee (eco-labelled and non-eco-labelled) · Lands' holding and area under coffee · Price of inputs (coffee seed, fertilizers, pesticides), eco-labelled and non-eco-labelled. · Labor cost · Planting and other investment cost · Cost of field maintenance on farm · Certification fees for eco-labelled farmers (administrative and learning cost) · Post-harvest costs (harvesting, processing, and marketing cost) · Premium fee ***Environmental Aspect:*** · Soil conservation/water source maintaining **B. Profitability – Cooperative (Benefits and Cost):** · All benefits and cost for all of eco-labelled farmers · Total cost of farmers and staff training · Monitoring costs · Total costs of administering implementation	Primary	Personal (in-depth) interview and questionnaire
2	**Determinant of farmers compliance with sustainable coffee standard (certified coffee):** · Smallholders' socio economic characteristic (age, education level, farming experience on coffee, coffee sector as main income) · Farm's factors (area under coffee, and production)	Primary	Personal interview, questionnaire
3	**Perception regarding eco-labelling in coffee sector and its application in Indonesia:** · Awareness · The existing impact of eco-labelling in economic, social and environment · The existing problems faced to apply eco-labelling. · Requirement of eco-labelling application · Appropriate application of the eco-labelling in coffee sector in Indonesia.	Primary	In-depth interview with stakeholders (key person) through FGD and in-depth interview using structured questionnaire

3.4 Data Collection Methods

In this research, both primary and secondary data were used. Primary data were collected through the field study in the study sites. Surveys and in-depth interviews were conducted among respondents from both eco-labelled and non-eco-labelled groups. Survey questionnaires and in-depth interviews among the stakeholders, farmers, and cooperatives provided important data on output level, income level, production costs, and costs incurred due to implementation of eco-labels, among others. The data on farm-gate prices provided a better picture of the benefit of eco-label to smallholder coffee farmers. Interviews with local governments and national coffee organization provided information on various policies implemented in the coffee sector.

Secondary data were obtained from available public sources. These data included aggregate coffee production, world coffee prices, and export quantity of coffee. Some important secondary data sources were local coffee cooperatives; national and international coffee organizations, such as the Association of Indonesian Coffee Exporters and Industries (AICE) and International Coffee Organization (ICO); and government organizations i.e., the Central Statistics Bureau (BPS), Ministry of Agriculture, and Plantation Office of Gayo and West Lampung.

Sampling techniques were used to gather information from the respondents. These sampling techniques were used to ensure that all eco-labelling types were well-represented. Cluster sampling was used for selecting the study area and convenience sampling method for selecting smallholder coffee farmers. As for the stakeholders, purposive sampling was used to select key persons knowledgeable in eco-labelling of coffee.

4.0 RESEARCH FINDINGS

This section presents the results of the analyses and discussions of the implications.

4.1 Coffee Farming in Study Areas

Most farmers in all study areas acquired knowledge on farming techniques from their parents. Also, they normally do not have access to recent developments in farming techniques. These are the reasons why productivity in a majority of coffee farms is low. In order to understand the condition of coffee farms in Indonesia, it is important to determine the characteristic of smallholder coffee farmers.

4.1.1 Characteristics of smallholder coffee farmers

Generally, traditional farming methods passed down from previous generations influence the type of fertilizer used. Table 4 indicates that most of smallholder coffee farmers use organic fertilizer (41%) and only 25% of farmers use chemical fertilizer. The others use both organic and chemical fertilizer in the coffee farming. The organic fertilizer derived from coffee husk for Robusta plantation, wet Arabica pulp for Arabica plantation, and manure.

Table 4. Types of fertilizer used by smallholder coffee farmers

Fertilizer Used	Percentage (%)
Chemical	25
Organic	41
Organic and chemical	34

The use of fertilizer also depends on financial condition of farmers' household. When a household's financial condition is worsened, some farmers usually reduce the use of chemical fertilizers and herbicides. Majority of farmers in both areas have also used organic fertilizers. As shown in Figure 3, organic fertilizers used in coffee farms are coffee pulp (from wet coffee process) or coffee husk (from dry coffee process), and compost, among others. Although, there have been problems with the disposal of large amounts of coffee pulp or husk, it is still used as fertilizer because it is organic, which makes it ideal as fertilizer.

For post-harvesting processing, tarpaulin is commonly used in Gayo highlands to dry the coffee bean. In West Lampung, some farmers, especially non-certified coffee farmers, usually dry coffee cherries on the ground or asphalt road. This practice is not allowed in all eco-labels being studied. Coffee should be dried on tarpaulin or concrete patio in order to avoid change in its aroma.

Figure 3. Dried Robusta coffee husk (left) and wet process Arabica pulp (right)

In both Aceh and Lampung, 49% are certified and 51% are non-certified coffee farmers. The characteristics of smallholder coffee farmers described in this section are those that may influence their willingness to adopt new technology and their understanding of coffee cultivation. These are: a) harvested area; b) land ownership; c) farming experience; d) age; e) main livelihood; and f) educational level.

a) *Harvested area.* The average size of harvested area in both provinces is1.6 ha/farmer(Figure 4). Generally, most of the coffee farmers (69%) have 1-2 ha of land area and some (14%) have more than 2 ha of coffee plantation. Specifically, majority of coffee farmers, both eco-labelled (66%) and non-eco-labelled (73%), have 1-2 ha of land area. The number of land holdings by farmer is relatively small[1] thus, conducting a group coffee farming system, especially for the processing of crops, is expected to increase productivity per hectare of land owned. The criteria for certification, where farmers can apply as a group through cooperatives, could intensify the cultivation of coffee and optimize production and value.

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[1] http://aped-project.org/forumkopi/pengolahan.php
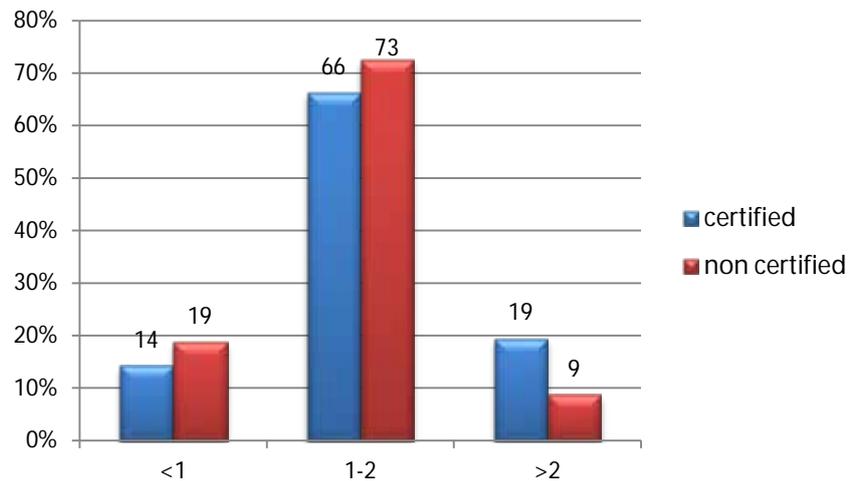
Figure 4. Harvested area owned by coffee farmers in Aceh and Lampung

b) *Land ownership.* Land ownership is also expected to be an important aspect in relation to the production and adoption of new decision-making technologies. In general, 90% of farmers are land owners, 7% are profit sharing farmers, and another 3% are tenant farmers. As shown in Figure 5, majority of both eco-labelled and non-eco-labelled coffee farmers are owners of coffee plantation. This means that in terms of land ownership, there are no barriers for farmers in deciding if they will apply for certification or not.
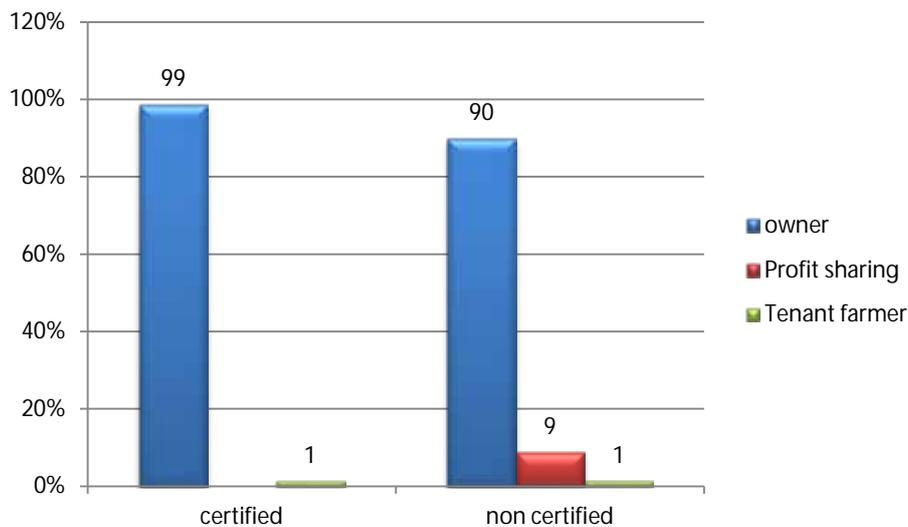
Figure 5. Land ownership of smallholder coffee farmers

c) *Age.* Farmers' age is also expected to be factors that influence their willingness to adopt new technology or participate in certification. Figure 6 shows that most certified smallholder coffee farmers' (79%) are 25-50 years old. The same is true of non-certified coffee farmers, where 78% are 25-50 years old. Thus, it can be concluded that, in this case, age does not influence farmers' decision to participate in certification. This is despite the fact that farmers older than 50 years old tend to apply the traditional coffee farming system.
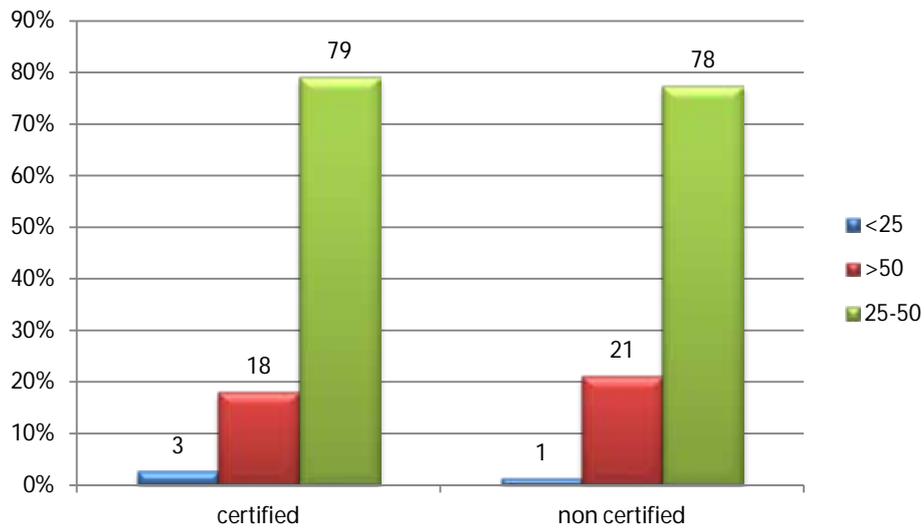
Figure 6. Distribution of smallholder coffee farmers' age

d) *Farming experience.* Similarly, Figure 7 shows that majority of certified coffee farmers have less than 30 years of farming experience. This is also true of non-certified smallholder coffee farmers. Based on this, it can be concluded that regardless of farming experience, farmers tend to not participate in certification program.

According to the in-depth interviews, most farmers with less farming experience expect high yield in order to get more profit. This leads to their use of extra chemical inputs such as chemical fertilizers. On the other hand, farmers who have longer farming experience tend to feel comfortable with their farming methods and do not realize that participation in certification can provide significant benefits.
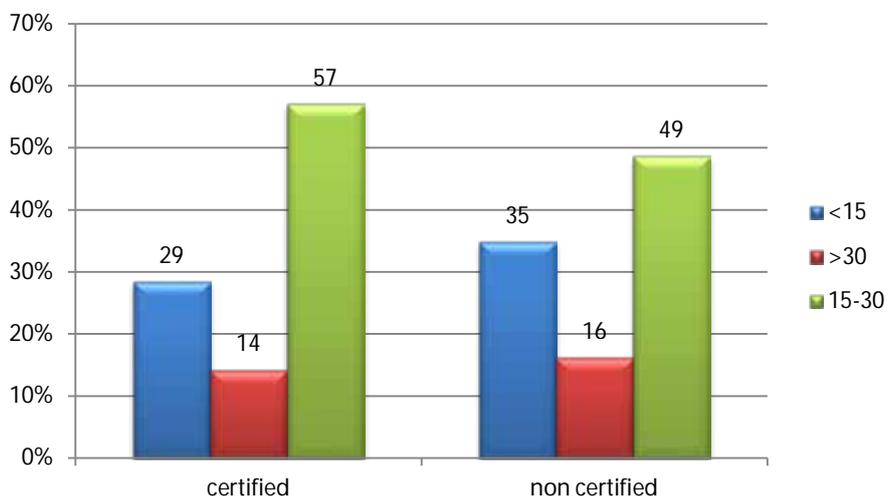
Figure 7. Distribution of smallholder coffee farmers' experience

e) *Main occupation.* Most smallholder coffee farmers in both areas (>80%) regard coffee farming as their main job (Figure 8) thus, they manage their farm intensively. Intensive coffee farming with good management and cultivation treatment increases the production to the optimum level.
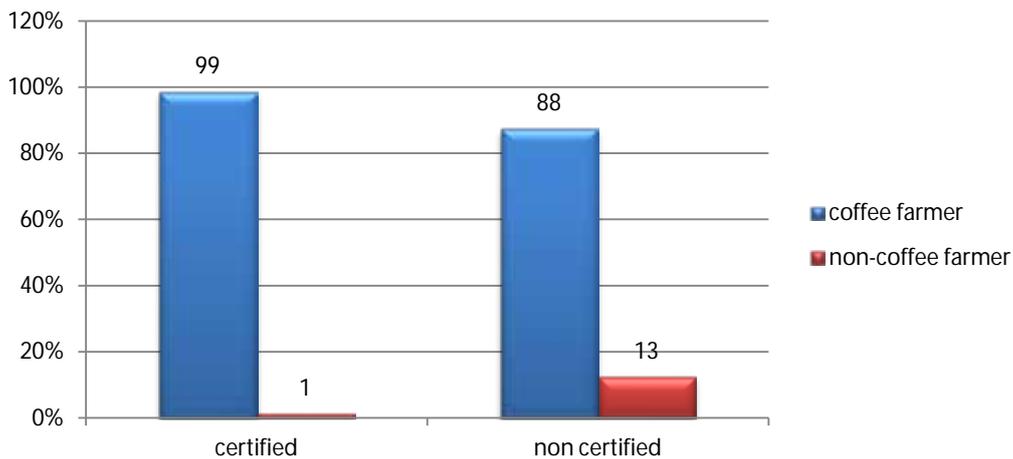
Figure 8. Smallholder coffee farmers' main occupation

f)   *Educational level.* Based on educational level, most smallholder coffee farmers have medium to high level of education (junior and senior high school) for both certified (60%) and non-certified (69%), respectively (Figure 9).
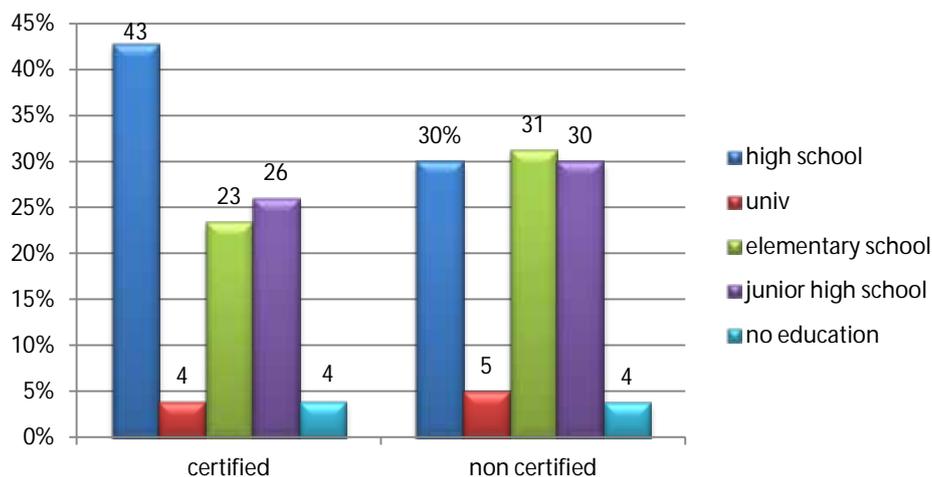
Figure 9. Educational level of eco-labelled and non-eco-labelled smallholder coffee farmers

4.2   Profitability Analysis of Eco-labelled and Non-eco-labelled Smallholder Coffee Farmers and Cooperatives

Profitability analysis was used to assess the impact of eco-labelling certification to smallholder coffee farmers, as well as cooperatives which have a role in facilitating eco-labelling certification among farmers. Three investment criteria were calculated, namely, net present value (NPV), benefit cost ration (BCR), and internal rate of return (IRR) at smallholders' coffee farmer and cooperative level. In this study, there were two specific research areas: Gayo highlands (Aceh) as a center of Arabica coffee and West Lampung as a center of Robusta coffee in Indonesia.

4.2.1   Eco-labelling impact on Gayo Highlands (Arabica) coffee farmers

The impact of certification on smallholder coffee farmers was analyzed separately between eco-labelled and non-eco-labelled coffee farms. In this case, eco-labelled coffee farmers represent the farmers who have organic and/or Fairtrade certification. The structure of investment costs, operational costs, coffee

production, and the income of eco-labelled and non-eco-labelled coffee farms were described and analyzed using cash flow analysis. Structures of costs and benefits of both were compared to assess the impact of certification on smallholder coffee farmers. To analyze the impact of certification on Arabica coffee using cash flow analysis, 20-year period was chosen based on the life cycle of coffee plant.

Based on the accomplished cash flow analysis, the investment cost needed for eco-labelled Arabica coffee farm is lower than non-eco-labelled. The total investment cost of eco-labelled and non-eco-labelled Arabica coffee farm were IDR29.81million and IDR 30.57 million, respectively. An eco-labelled smallholder coffee farmer saved an investment cost of as much as IDR 755,000, which was the savings from some equipment obtained through premium fee, such as grass trimmer, hoes, machete, and sickle. Furthermore, eco-labelled coffee farmers also do not have to spend money for hand sprayer in applying chemical pesticides and herbicides because they control pests and weeds manually with sickle, machete, and trimmer.

Early in the year (before planting), it is necessary for any coffee farmer to prepare their cultivated area. This preparation requires expenses for land clearing, putting stakes, coffee planting, early weed plant control, and fertilizing. Overall, the expenses for eco-labelled coffee farm seem similar with non-eco-labelled. However, the costs for eco-labelled coffee farm are higher to about IDR 1.6 million per hectare than non-eco-labelled. This extra cost used for conserving water and soil around the plantation area was due to the making of a wind breaking hole, which is intended to reduce surface water run-off, prevent soil erosion, and decompose litters to ensure sustainable agricultural system.

Besides investment cost, there were operational costs for coffee cultivation which were spent annually. These include labor cost, cost of inputs, and cooperative membership fee. Table 5 describes the operational costs required in the coffee farm.

Table 5. Operational cost (average per year) of eco-labelled and non-eco-labelled Arabica coffee farms

Type of Operational Cost	Cost by Certification Status	
	Eco-labelled (IDR)	Non-eco-labelled (IDR)
Labor force		
Weeds plant control	790,000	200,000
Coffee pest control	600,000	176,316
Stem trimming	960,000	960,000
Shading-trees control	187,500	187,500
Coffee branch trimming	570,588	570,588
Coffee harvesting	3,806,135	3,874,130
Post harvesting	1,308,983	1,332,368
Inputs		
Fertilizer	2,240,000	5,222,526
Herbicides	-	133,421
Insecticides	-	388,000
Fungicides	-	50,000
Cooperative' membership fees (certification facilitator)		
Principal saving	50,000	-
Compulsory saving	120,000	-
Total of Operational Cost	**10,633,206**	**11,688,173**

Note: 1 USD = 9,100IDR

The costs of stem preservation, control of shade trees, and coffee branch trimming for both eco-labelled and non-eco-labelled Arabica coffee farms were IDR 960,000; IDR 187,500; and IDR 570,888 respectively. The costs for coffee weed and pest control in eco-labelled farms are higher than that of non-eco-labelled. This is based on the manual control of weed and pests using organic product which require more labor force.

Further, the difference of IDR 91,380 between harvesting and post-harvesting costs of non-eco-labelled and eco-labelled is not too significant. This can be accounted for by the production of organic or eco-labelled coffee which is lower than non-eco-labelled. On the other hand, the average total cost of fertilizer herbicides, insecticide, and fungicide of non-eco-labelled is higher because the eco-labelled Arabica coffee farmer (organic) could minimize the expenses for chemical substances.

4.2.2 The structure of production

The profitability of coffee farming depends on coffee production of each farm, where higher coffee production means higher income received by the farmer. For Arabica coffee, it will be produced in the fourth year, although, still not optimum. Table 6 shows the detailed coffee production data from the 4th until 20th year for eco-labelled and non-eco-labelled.

Apparently, organic coffee production is lower compared to non-organic coffee production. However, with the continuity of organic fertilizers used and intensive care, productivity of organic coffee could be equal. Productivity of organic coffee in the first year harvest is 0.6 times more than the non-organic productivity and in the second year harvest, 0.8 times more. Although at first and second year of harvest (fourth and fifth years of planting), organic coffee productivity is lower than non-organic coffee. The role of certification to train the member group of farmers to improve their technical knowledge related to sustainable and economically profitable organic coffee cultivation could help farmers improve their production.

Table 6. Production of eco-labelled and non-eco-labelled Arabica coffee

Year	Production of Non-eco-labelled (kg)	Production of Eco-labelled (kg)
4th	650	390
5th	850	680
6th	1050	1050
7th	1250	1250
8th	1500	1500
9th and above	1600	1600

4.2.3 Revenue of Arabica coffee farming

In this section, the income refers to sales revenues which were calculated from production estimates multiplied by its price. Thus, besides the amount of production that can be produced by farmers, the selling price of coffee is important to determine farmer revenue. Most of Arabica coffee farmers in Indonesia sell their coffee in grain because it has a higher selling price than cherry.

Moreover, a certified Arabica coffee price is higher than non-certified Arabica coffee. In this research, the price is based on cooperative calculations using international price of coffee in New York City terminal. Certified coffee price received by farmers is the international price of coffee plus the certification incentives less the costs of processing and transportation services. Based on these calculations, the price of grain certified organic coffee is IDR 27,266/kg, while conventional non-certified coffee price is IDR 24,042/kg. The details of farmers' revenue of Arabica coffee are shown in Table 7.

Table 7. Arabica coffee farmers' revenue by year

Year	Non-eco-labelled (IDR)	Eco-labelled (IDR)
4th	15,627,629	10,633,972
5th	20,436,130	18,541,285
6th	25,244,631	28,629,925
7th	30,053,132	34,083,244
8th	36,063,759	40,899,893
9th and above	38,468,009	43,626,552

Note: 9,100 IDR = 1 USD

4.2.4   Profitability analysis

To see the impact of certification on Arabica coffee farmer, cash flow analysis of both eco-labelled and non-eco-labelled Arabica coffee farm was applied by simulating the estimated cash flow. In analyzing the costs and benefits of coffee farming, several assumptions were used for the analysis: a) 20-year time periods were chosen based on the economic life of coffee plant; b) price of inputs and output are current price (2011); c) area of coffee plantation is 1 ha (salvage value of land is equal with the purchasing price of land with the assumption that there is no depreciation); d) reinvestment of equipment is based on its economic life; and e) the discount rate is 12% based on personal loan interest rate.

Profitability analysis performed by calculating investment criteria in the project were NPV, IRR, Gross B/C, and Discounted Payback Period. A project is feasible or profitable if: NPV is greater than 0; the IRR is greater than the prevailing interest rates; Gross B/C greater than 1; and payback period is much smaller than the project's duration. In summary, the results of cash flow analysis of the project are shown in Table 8.

Table 8. Cash flow analysis of eco-labelled and non-eco-labelled Arabica coffee farm

Investment criteria	Eco-labelled coffee Farm	Non-eco-labelled coffee farm
NPV	IDR 84,665,695	IDR 61,348,221
IRR	28%	26%
Gross B/C	1.93	1.62
Discounted PP	7.81	8.02

Note: USD 1 = IDR 9,100

Using 12% interest rate, NPV of eco-labelled Arabica coffee farm is IDR 84.67 million while NPV of non-eco-labelled is IDR 61.35 million. Since the NPV of both Arabica coffee farm is > 0, then it can be concluded that both eco-labelled Arabica coffee farm and non-eco-labelled are feasible. Meanwhile, when comparing the two using NPV criterion, the eco-labelled Arabica coffee farm is more profitable than the non-eco-labelled one. The difference of NPV between eco-labelled Arabica coffee farm with non-eco-labelled is IDR 23.32 million. This difference is the incremental benefit as a result of certification.

Benefit-Cost Ratio (Gross B/C) indicates a net benefit gained for additional one rupiah (IDR) expenditure. Gross B/C was calculated by comparing discounted benefit with discounted cost. The value of certified Arabica coffee farm Gross B/C of eco-labelled coffee farm is 1.93, which means it is profitable (Gross B/C> 1). This value indicates that every single rupiah (IDR) of production costs incurred will increase farmers' profit of about IDR 1.93. Meanwhile, Gross B/C of non-eco-labelled Arabica coffee farm is 1.62. By comparing both Gross B/C, eco-labelled Arabica coffee farming is more profitable than non-eco-labelled.

Internal rate of return (IRR) is the discount rate that makes the project NPV equals zero. At the prevailing interest rate of 12%, cash flow calculation indicates that IRR of eco-labelled Arabica coffee farm is 28%. Since the value is greater than the prevailing interest rate, it means that eco-labelled coffee farming is feasible.

Internal rate of return (IRR) of non-certified coffee farms showed similar result. IRR of non-certified coffee farm is 26%, which means that the non-certified coffee farms are also feasible. In line with the results of other investment criteria - NPV and Gross B/C, eco-labelled Arabica coffee farming is more profitable because all the values are higher. Payback period was also used in this analysis. The results show that payback period for eco-labelled Arabica coffee farming is 7.81 years, while for non-eco-labelled Arabica coffee farming is 8.02 years.

4.2.5 Eco-labelling impact to West Lampung coffee farmer

Cash flow analysis for smallholders' Robusta coffee farmers in West Lampung was conducted. Eco-labelled Robusta coffee farm refers to the farmers who have organic-rainforest certification. Some scenarios were developed to facilitate this study: a) the 20-year time periods were chosen based on the life cycle of coffee plant; b) price of inputs and output are current price (2011) when the study conducted; c) area of coffee plantation is 1 ha; and d) discount rate used is 12% based on personal loan interest rate.

For this analysis, various components of costs needed for Robusta coffee farming should be clearly identified. These were generally distinguished between investment costs and operational costs. Unlike Arabica coffee farm, investment costs of eco-labelled Robusta coffee farm are higher than non-eco-labelled. Total investment cost of eco-labelled Robusta coffee farm was IDR 29.38 million and non-eco-labelled was IDR 25.21 million. This difference was especially because eco-labelled farms need to invest in tarpaulin for postharvest process, shading trees, and for making wind breaking hole on the land plantation. This indirectly represents an effort to improve the productivity of coffee and conservation of water and soil.

Furthermore, annual operational costs to run the coffee farming consist of labor cost and cost of chemical/organic inputs. The types of operational costs for eco-labelled and non-eco-labelled are almost similar i.e., fertilizing, weed plant control, pest control, stem treatment, harvesting, and post harvesting. The average total operational cost for eco-labelled coffee farm was IDR 8.98 million while for non-eco-labelled coffee farm was IDR 7.21 million (Table 9).

Table 9. Operational costs (average per year) of eco-labelled and non-eco-labelled Robusta coffee farm

Type of Operational Cost	Cost by Certification Status	
	Eco-labelled (IDR)	Non-eco-labelled (IDR)
Weeds plant control	1,225,000	60,000
Coffee pest and ants control	895,000	605,000
Stem trimming	900,000	900,000
Fertilizing	3,500,000	2,868,000
Chemical herbicide	-	280,000
Coffee harvesting	2,136,667	2,136,667
Post harvesting	801,250	801,250
Total of Operational Cost	**8,984,625**	**7,206,665**

Note: 9,100 IDR = 1 USD

Total cost of eco-labelled coffee farm was IDR 10.77 million while total cost of non-eco-labelled was IDR 8.65 million. Thus, the overall cost (investment and operational costs) of eco-labelled coffee farming is higher because there are soil conservation activities to be undertaken to ensure sustainable agricultural systems. The farm activities for fertilizing and manual weed and pest control also need more expenses. To control pests and insects without hazardous chemicals, smallholder coffee farmers could use a simple insect trap called "brocap" (Figure 10).

Figure 10. Brocap trap, non-chemical (manual) pest treatment

The income of smallholder coffee farmer refers to sales revenues, which were calculated from production estimates multiplied by its price. The local price of Robusta coffee in Lampung was used as basis. Eco-labelled coffee price received by farmers was IDR 25,000 while the conventional non-eco-labelled coffee price was IDR 17,000. Apparently, revenue gained by eco-labelled coffee farmers is higher than non-eco-labelled farmers (Table 10).

Table 10. Robusta coffee farmers' revenue by year

Year	Non-eco-labelled (IDR)	Eco-labelled (IDR)
3rd	425,000	625,000
4th	8,500,000	12,500,000
5th	8,500,000	12,500,000
6th and above	17,000,000	25,000,000

Note: 9,100IDR = 1 USD

Cash flow analysis of both eco-labelled and non-eco-labelled Robusta coffee farm was applied to determine the impact of certification. Profitability analysis was performed by calculating investment criteria in the project i.e., NPV, IRR, and Gross B/C. A project is feasible or profitable if NPV > 0, IRR is greater than the prevailing interest rates, and Gross B/C > 1. The summary of results of cash flow analysis is shown in Table 11.

Table 11. Profitability analysis of eco-labelled and non-eco-labelled Robusta coffee farm

Investment Criteria	Eco-labelled	Non-eco-labelled
NPV	IDR 24,741,934	IDR 9,792,542
IRR	19%	16%
Gross B/C	1.28	1.15

Note: IDR 9,100= USD 1

Using 12% interest rate, NPV of eco-labelled Robusta coffee farm is IDR 36.16 million while NPV of non-eco-labelled is IDR 39.27 million. Since the NPV of certified and non-certified Robusta coffee farm is > 0, both are feasible. Meanwhile, comparing NPV values between the two, the eco-labelled Robusta coffee farm is more profitable than non-eco-labelled. The difference of NPV between eco-labelled Robusta coffee farm with non-eco-labelled is IDR 14.95 million. This difference is accounted for by the high price of eco-labelled coffee because of better cultivation technique and post harvesting treatment.

Gross B/C was calculated by comparing discounted benefit with discounted cost. The value of certified Robusta coffee farm Gross B/C of eco-labelled coffee farm was 1.28 which means eco-labelled coffee farm is profitable (Gross B/C > 1). This value indicates that every single rupiah (IDR) of production cost incurred will increase profit to about IDR 1.28.

Meanwhile, Gross B/C of non-eco-labelled Robusta coffee farm was 1.15. By comparing the Gross B/C of both coffee farm, eco-labelled Robusta coffee farming is more profitable than non-eco-labelled with IDR 0.13 for every IDR 1 of cost spent.

With the prevailing interest rate of 12%, cash flow calculation indicates that IRR of eco-labelled Robusta coffee farm is 19%. Since the value is greater than the prevailing interest rate, it means that eco-labelled coffee farming is feasible to be applied. Internal rate of return (IRR) of non-eco-labelled coffee farms also showed similar result. IRR of non-eco-labelled coffee farm is 16%, indicating that non-eco-labelled coffee farms are also feasible. In line with the results of other investment criteria, such as NPV and Gross B/, eco-labelled Robusta coffee farming is more profitable because all the values are higher.

4.2.6   Eco-labelling impact to the cooperative

In implementing eco-labelling certification of coffee in Indonesia, smallholder coffee farmers are required to apply through a cooperative or company as a facilitator. This is required by certification organizations such as Fairtrade and Rainforest Alliance. This requirement will benefit smallholder farmers because they do not need to pay the certification and training fee.

The components used in analyzing the cooperative profitability of conducting certification are presented in the Table 12. Some assumptions are:

a)   Production refers to coffee purchased from certified farmers (members) of the cooperative and sold to international markets after implementing some stages of processing. The average coffee production of a cooperative is 256.185 kg.

b)   The sale price calculated on cash flow is the difference between International price of eco-labelled coffee and International conventional/non-eco-labelled coffee price.

c)   The number of cooperative members is 771 farmers.

d)   The scale of operation is based on cooperative certification fee for 500 to 1000 smallholder coffee farmer-members.

e)   The interest rate used is 12% based on loan interest rate of National Bank of Indonesia.

f)   Age of project used is 5 years.

Cooperatives are legal entities based on the values of cooperation and participation. Hence, they are the main and the most suitable organizers to facilitate certification of coffee farming in Indonesia. As such, the profitability of the cooperative as a facilitator of coffee farming certification needs to be analyzed by comparing the benefits received relative to the costs needed. This can be analyzed using the cash flow analysis. The costs and benefits are taken into account merely through the implications of the implementation of coffee farming certification. The results are shown in Table 13.

Results show that facilitating and organizing the certification of smallholder coffee farmers are beneficial and economically feasible for cooperatives with NPV > 0 (IDR 1.66 billion). It can be interpreted that the certification provides a net benefit for the cooperative of as much as IDR 1.66 billion. Gross B/C value indicates that a benefit of IDR 1.51 will gain for every IDR 1.00 production cost incurred by the cooperative for coffee certification.

Table 12. Components of benefits and costs of a cooperative

Benefit	Cost
1. Quantity of production 2. Differential of coffee price (margin) obtained (Δ P with - Δ P without eco-labelling)	**Investment cost** 　1. Fee for certification registration 　2. Investment on motorcycle (for operational activities) **Operational cost** Self-controlling & self-monitoring 　1. Staff salary 　2. Telephone and internet 　3. Cost of staff training (ICS, etc.) 　4. Cost of farmers training 　5. ICS operational cost 　6. Cost of staff trip related to certification 　7. Cost of consultant/expert **Administrative cost** 　1. Cost for forming the village representative 　2. Shipping cost of coffee sample 　3. Reporting cost **Certification cost** 　1. Cost of fulfilling external audit checklist 　2. Inspection cost 　3. Cost for certification audit

Table 13. Cash flow analysis of cooperatives

Investment Criteria	Value
NPV	IDR 1,659,496,522
Gross B/C	1.51

Note: 9,100 IDR = 1 USD

4.2.7　Switching value (sensitivity) analysis

Application for certification is aimed at increasing smallholder coffee farmers' revenue based on quality of coffee, selling price, and productivity. Since smallholder coffee farmers can only apply for certification through an organization, the level of price received by farmers will affect the profitability of the cooperative. To determine the sensitivity of cooperatives to any changes in coffee price level, switching value analysis was carried out. This calculation refers to IRR equals the interest rate applicable or NPV value equals 0 or net value of B/C equals1.

Based on the results of switching values, cooperatives are still financially feasible as long as the differences of coffee prices received by eco-labelled smallholder coffee farmers and non-eco-labelled are not more than 74%. In other words, if the coffee price received by eco-labelled farmers increases more than 74%, assuming that the price of eco-labelled and non-eco-labelled coffee sold by cooperatives in the international market is fixed, then it is not feasible to operate the cooperatives. In this scenario, the Gross B/C of cooperative is equal to 1.

4.2.8　Socio and environmental impact of certification

This section explores the social and environmental impacts of certification. The method used was study literature analysis, of which results were compared with the information gathered from the field.

Generally, smallholder coffee farmers have to fulfil various requirements of any certification scheme in order to obtain eco-labelled certificate. These requirements actually contain aspects of social and environmental improvements which are not too difficult to accomplish by some coffee farmers in Indonesia. This is because they have already done environment-friendly agricultural activities through *gotong royong* (mutual cooperation-volunteerism).

In relation to the environmental impact of certification, Boot et al. (2003) studied the beneficial impact of eco-labelled Mexican coffee, specifically the environmental impact of certification in the coffee farm. It was found that shade trees in coffee farms are providing valuable environmental benefits and maintaining an important balance in conserving natural resources and promoting biodiversity. The incentives provided by certification to farmers could be crucial in their decision to continue producing with their important role to be environment-friendly and promote sustainable agriculture and conversation efforts.

In Costa Rica, Blackman and Naranjo (2010) have done a study on the environmental benefits of eco-certification of coffee farms. Using propensity score matching techniques, they found that certification significantly reduces the use of all three chemical inputs, such as pesticides, chemical fertilizers, and herbicides. These increased adoption of at least one of the four environment-friendly management practices, i.e., use of organic fertilizer. There are relatively few farms able to obtain certification without significantly changing their management practices.

Based on field observations and interviews with multi-stakeholders, most of Gayo Aceh Arabica and Robusta Lampung coffee farmers treat their farms organically and perform water and land conservation efforts, such as terracing, making wind breaking holes, and planting shading trees. These aspects also indirectly indicate the overall condition of Indonesian coffee farming. Apparently, eco-labelling certification will help the farmers maintain and improve their cultivation technique organically.

In relation to the social impact of certification, Rhonci (2002) in his case study of the impact of Fairtrade on producers and their organizations found that the Coocafe cooperative in Costa Rica invests 70% of the Fairtrade premium in a *producers' fund*, which is available to farmers in the form of small loans. The remaining 30% is invested in the Social Capital Fund for capital acquisition and community investments, such as secondary school scholarships, university scholarships, and an educational extension fund aimed at narrowing the gap in educational quality between rural and urban students. The educational extension fund supports rural school infrastructure and materials as well as providing for scholarships.

In Oaxaca, Mexico, part of the premium fee has contributed to an education centre for young people. The education centre provides training in community development, focusing on composting technologies, intercropping of coffee and legumes, animal husbandry, and alternative food and cash cropping. It has also contributed to capitalizing the cooperative by investing in machinery that improves efficiency and quality of production like an electronic selector machine (for choosing high-quality beans) and the construction of an organic coffee warehouse (Murray, Raynolds and Taylor, 2003).

The case is similar in Nicaragua, where cooperatives use the higher Fairtrade price to invest in productive infrastructure, pay debts, provide credit access, provide technical assistance, cover administrative and certification costs, and fund housing and education projects in rural communities (Bacon, 2005).

Based on the literature, eco-label certification, especially Fairtrade have a positive impact on the social aspects. The existence of a premium price provides additional benefits beyond coffee production because it helps improve rural infrastructure development and access to better education. In Gayo Aceh, some of premium fee was used for improving infrastructure, such as the *masjid* (i.e., mosque) and source of clean water.

4.3   Analysis of Factors Influencing Smallholders' Decision to Participate in Eco-Labelling

Random samples from several *gampongs* (villages) in Aceh Tengah, Bener Meriah, and West Lampung districts were taken i.e., Takengon, Rembele, Simpang Teritit, Lelabu, and Liwa. The samples consist of eco-labelled and non-eco-labelled farms. The model used to identify factors influencing farmers' decision to participate in certification program is as follows:

$$\hat{Y} = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \dots + \beta_n X_n + \varepsilon \hspace{2cm} \text{(Equation 1)}$$

$\hat{Y}$ = -7.290 + .111LAND+ 1.924LANDSTS + .065YEARFRM-.053AGE-.160EDU + .608MAIN + 6.696INFO - 16.948ACCES_D1 + 6.736ACCES_D2

where:

$\hat{Y}$	=	Participating on certification (0=not participate ; 1=participate)
β_0	=	Intercept
$\beta_1, \beta_2, \dots \beta_n$	=	Coefficient parameter
LAND	=	Land area under coffee (ha)
LANDSTS (D)	=	Land owner (0=not land owner ; 1=land owner)
YEARFRM	=	Farming experiences (years)
AGE	=	Farmers' age (years)
EDU	=	Farmers education (years)
MAIN (D)	=	Main job (0=not coffee farmer ; 1=coffee farmer)
INFO (D)	=	Information about certification (0=don't know ; 1=know)
ACCES (D1)	=	Access to certification (0=others; 1=easy)
ACCES (D2)	=	Access to certification (0=others ; 1=difficult)

The result of binary logit regression shows that the overall percentages correct of prediction is 96.8%. Based on the logit regression results, most of independent variables used are not significant. It indicates the homogeneity of farmers' characteristics (Table 14). However, the certification information and the access to the certification are independent variables which are significant.

Table 14. The results of logit regression

Predictor	Coef	P	Odds Ratio
Constant	-7.290	0.146	0.001
LAND	0.111	0.803	1.117
LANDSTS	1.924	0.269	6.847
YEARFRM	0.065	0.254	1.067
AGE	-0.053	0.307	0.948
EDU	-0.160	0.258	0.852
MAIN	0.608	0.852	1.836
INFO	6.696	0.144****	5.451
ACCES (D1)	-16.948	0.999	0.000
ACCES (D2)	6.736	0.000*	842.392

Note: * significant at 1 %, **** significant at 15%

The ease of information of certification gathered by farmers illustrates a positive value (6.69). It is significant at 15% confidence level. The odd ratio of this variable is 5.45. Thus, as expected, the easier information of certification gathered by farmers, the higher farmer' profitability willing to participate in certification program than those who difficult to get information.

In addition, coffee farmers who have access to the certification party, such as cooperative, have a higher opportunity to participate in the certification. This is because these farmers are well-informed about the coffee certification scheme, how to participate, and the requirements.

As shown in Figure 11, the higher the land ownership, the higher the percentage of farmers of farmers with knowledge and understanding of certification benefits thus, participation in certification is also higher. This is further supported by Figure 12 which shows that the higher distribution of land area, the higher farmers' participation in certification.
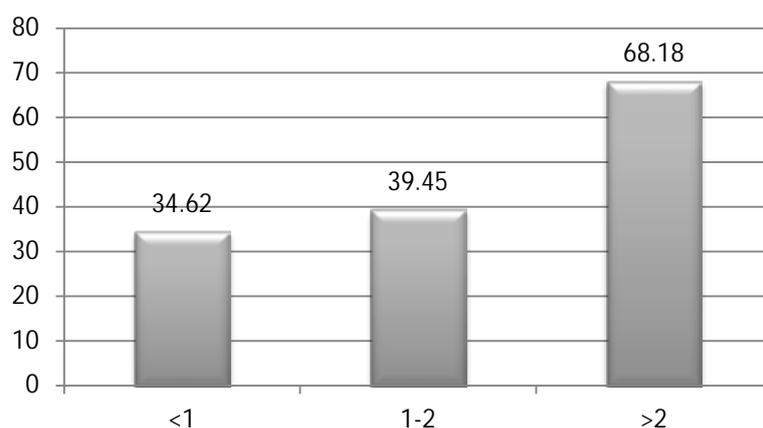
Figure 11. Land area and information of certification gathered by smallholders coffee farmers
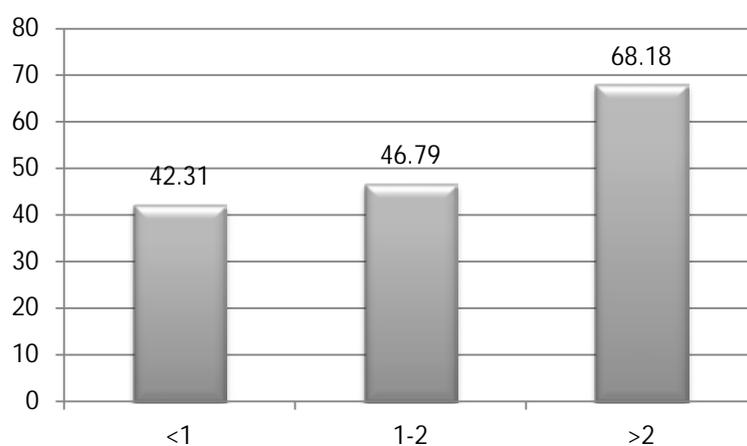
Figure 12. Land area and smallholder coffee farmers participating in certification

4.4 Stakeholders' Perception on Eco-Labelling in Coffee Sector and Its Application in Indonesia

To meet the global coffee demand, certification becomes a necessity for coffee farmers. Application of certification has at least three aspects to consider--economic, environmental, and social. This way, the sustainability of coffee farming can be assured. This section evaluated various perspectives of stakeholders, i.e., farmers, cooperative, and government on the implementation of certification.

4.4.1 Farmers' perception regarding certification

Perceptions of smallholders coffee farmers on certification, specifically on the benefits, the ease of access or participation and the ease to meet certification standards are discussed in this section.

As shown in Table 15, 74% of certified smallholder coffee farmers perceived that implementing certification was useful and profitable. The advantages of acquiring certification as perceived by farmers were the coffee premium fee and the increasing post-harvest processing and cultivation knowledge. The allocation of premium fees is in accordance with the agreement made at the Annual Meeting of Cooperative Members (RAT), which was attended by farmer representatives. Premium fee can be used to improve farmers' productivity and knowledge through the conduct of farmers' training or provision of agricultural production equipment such as trimmers and hoes. Premium fees may also be used for infrastructure improvements and construction of educational facilities. In addition, the certified cooperatives are able to offer more stable prices with direct payments to the farmers.

Table 15. Smallholders coffee farmers' perception on the benefit of certification

Perception	Eco-labelled (%)	Non-eco-labelled (%)
Beneficial and valuable	74	0
Beneficial but still invaluable	18	14
No information	8	86

Eighteen percent (18%) of certified smallholder coffee farmers perceived that certification was beneficial but did not realize its profitability. One reason for this is that farmers are aware of the premium fee, but they are still tied to the middleman to sell their coffee at their own price. Also, farmers do not sell their coffee to certified cooperative because the price set by conventional middlemen/local buyer is higher.

Farmers encounter some difficulties in joining the cooperative and participating in the certification program. Moreover, some certified coffee farmers do not fully understand the benefits of certification. This is due to the lack of socialization regarding certification from the collector or cooperatives' delegation.

Among the non-certified smallholders coffee farmers, 14% stated that they heard about certification program and its benefits, but they have not felt the benefits because they did not have access to the certification. Apparently, most non-certified coffee farmers do not know about the program or the benefits of certification. This is because there is no socialization about certification and/or there is no cooperative in their area.

In addition to the perception of smallholders coffee farmers on the application of certification, there is also a need to evaluate the coffee farmers' access to certification. Smallholder coffee farmers' awareness of the benefits of certification will be more meaningful to the development of the application of certification in Indonesia if it is followed by the ease of access to certification program. Table 18 illustrates the perception of farmers about the ease of access to certification program.

From the certified coffee farmers' point of view, 99% noted that the access to certification was fairly easy (Table 16). This is because of the farmers' relationship with cooperative representatives and collectors. The cooperatives visit their farms and the farmers register as members then join in the application for certification. Clearly, the farmers' participation in certification is by top-down invitation. This is not a problem as long as socialization, mentoring, and monitoring among farmers and cooperative representatives are carried out regularly.

Table 16. Smallholder coffee farmers' perception on the access to certification program

Access to the Certification	Eco-labelled (%)	Non-eco-labelled (%)
Difficult	0	14
No information	1	80
Simple	99	6

Meanwhile, only 14% of non-certified coffee farmer noted the difficulty in participating in certification. Moreover, 80% of non-certified coffee farmers were not familiar with certification program. Majority of the coffee farmers did not have a connection to the cooperatives or other certification organizers.

The opinion of smallholder coffee farmers on the ease to accomplish certification standards was also evaluated. This aspect is important to support the sustainability of the implementation of coffee certification in Indonesia.

As shown in Table 17, 70% of certified coffee farmers stated that the certification standard was easy to accomplish. This was because of the trainings on cultivation technique, organic agricultural systems and its benefits; the traditional coffee farming and cultivation system; livestock as a source of organic fertilizer; and the existence of collective work system among farmer groups known as *gotong royong* in Indonesia.

However, due to the top-down invitation to participate in certification, some certified coffee farmers (21%) still felt the difficulty to accomplish the standards (Table 17). Their reasons include: the difficulty of obtaining large quantities of organic fertilizers; the dependence on land owners; the difficulty in eradicating weeds manually; and the belief that production will decrease without the use of chemical fertilizers.

Table 17. Smallholder coffee farmers' opinion on accomplishing certification standards continuously

Farmers' Perception	Eco-labelled (%)	Non-eco-labelled (%)
Difficult	21	11
No information	9	84
Simple	70	5

Furthermore, about 11% of non-certified coffee farmer stated that certification standards were difficult to accomplish and they need intensive work on their farm if they apply the organic coffee farming system. Also, there were 84% of non-certified farmers who had no information about certification. This implies that coffee certification in Indonesia still has the potential to be implemented with better promotion and information dissemination system to all smallholder coffee farmers.

The use of organic fertilizers is one of the requirements for certification. Hence, excessive use of chemical fertilizers and systemic pesticides must be prohibited. Coffee farmers' knowledge about certification and its benefits also affect their attitude towards the use of certain types of fertilizers. For instance, results show that majority of farmers with good knowledge about certification benefits (61%) have been using organic fertilizer on their farm. Only 2% with good knowledge of certification still used chemical fertilizers (Table 20). Farmers use chemical fertilizers to stimulate the growth of their coffee at the early years.

Thirty-one percent (31%) of coffee farmers who had fair knowledge about certification had already treated their coffee organically, though still punctuated with chemical fertilizer use (Table 18). Their reasons in using chemical fertilizers were: a) they just started to learn organic coffee system and are still hesitant to fully implement it; b) it is difficult to distribute large amounts of coffee husk in farms with hilly topography; and c) adding chemical fertilizers will increase the productivity of coffee especially in unproductive plants and during the early years of coffee planting.

Most of farmers who did not know about certification benefits (55%) still used chemical fertilizers because they were not familiar with alternative fertilizers (Table 20). Their lack of knowledge may be due to: lack of socialization; insufficient labor to manage coffee farms intensively; distant farm location; and difficulty in obtaining organic fertilizer and productive land.

Meanwhile, about 22.5% of farmers with low knowledge of certification had already used organic fertilizers or a combination of organic and chemical fertilizers (Table 18). Their use of organic fertilizers and various organic treatments are due to: their sufficient understanding of the benefits of organic farming; their decision to follow an inherited agricultural system; and economic factors, such as low capital to buy chemical fertilizers, herbicides, and pesticides.

Table 18. Farmers' knowledge on certification and type of fertilizer used

Level of knowledge	Use of fertilizer		
	Use chemical fertilizers	Use organic fertilizers	Use a combination of organic and chemical fertilizers
Good	2	61	37
Fair	22	31	47
Low	55	22.5	22.5

These conditions also correspond with the trend in herbicide and pesticide use (Table 19). A large majority (87%) of farmers who understood the benefits of certification did not use herbicides and pesticides. On the other hand, majority of farmers who had fair and low knowledge on certification (62.5% and 78%, respectively) still used herbicides and pesticides.

Table 19. Farmers' knowledge on certification and type of pesticide/herbicide used

Level of knowledge	Use of herbicides and pesticides	
	No	Yes
Good	87	13
Fair	37.5	62.5
Low	22	78

Clearly, while information dissemination about certification and its benefits can motivate farmers to adopt organic farming systems, it is not enough. Promotion of good organic farming systems; organic material processing system to increase local organic fertilizer; techniques in organic herbicides or pesticides use; and techniques and benefits of soil and water conservation are also needed to enhance farmers' understanding. Such socialization will allow smallholder coffee farmers to better apply the organic farming system with higher and sustained productivity from the economic, social and environmental perspectives.

In an interview with one of the representatives of a certified farmers' cooperative, it was found that farmers were motivated to participate in certification because of its impact on the environment and health. In addition, there is a premium fee shared with cooperative members and other farmers. Hence, to encourage better participation in certification, its benefits must be promoted. It was noted, however, that disseminating information on certification is especially difficult when dealing with older farmers and their acceptance takes time to achieve. Promotion of certification may also be hindered by farmers' bad experience with local agricultural institutions.

In terms of economic conditions, there are many farmers who still depend on local middlemen. As such, one of the main certification constraints perceived was the lack of access to organic fertilizers and organic farming techniques. Farmers also found it difficult to meet certification standards and maintain high productivity. However, most farmers did not take a long time to adopt the organic coffee cultivation system because it is a traditional practice. Also, such farmers have not used chemical fertilizers and herbicides mainly because there was no budget for chemical fertilizers and herbicides.

4.4.2 Government and cooperative perception regarding certification

In-depth interviews with a number of coffee stakeholders in NAD and Lampung provinces were conducted. In addition, discussions were conducted with the following key people: the chairman of Aceh Coffee Forum (ACF); representative from District Estate Crops Service (*Dinas Perkebunan Kabupaten*); special staff from Directorate General of Estate Crops of the Ministry of Agriculture; and chairmen of several cooperatives.

In Lampung, interviews with the chairmen of several farmer groups and representative from District Estate Crops Service were conducted. There were no cooperatives of coffee farming activities in the area, and interviews with companies that organize the application for eco-labels were not conducted. Unlike NAD wherein the companies and cooperatives were located in the same districts, companies in Lampung were located in different districts from the farm areas and most of them were international companies.

Results of the interviews are presented in Table 20. Although eco-labelling is good in theory, there were still problems in the implementation; one is the need to provide a better understanding of certification in terms of benefits and requirements. It was also found that eco-labels reduce the use of prohibited fertilizers and herbicides which in turn will reduce the hazards that coffee farms put to the environment.

Table 20. Cooperative's perception regarding certification

	Perception on Coffee Eco-labels	Implementation	Additional remarks
Staff of 1st cooperative	· Concept of coffee eco-label is basically good · Develop cooperative · Improve farmers' welfare · Strict requirements · Ensure information of world price to farmer · Reduce use of herbicide · Increase access to capital · Increase access to market	· Limited support from government · Limited participation of farmers	· Widespread herbicide in the market may hinder development of certification · No more premium price for organic · Basically approximately 80% of coffee farms in Gayo can be classified as organic
Manager of 2nd cooperative	· Initial step taken to apply for eco-labels was quite cumbersome. It was difficult to gather groups of farmers in order to achieve the same goals. · Increase access to capital · Insignificant price difference between Fairtrade and conventional coffee due to high demand for Gayo coffee	· Limited support from government · Quite difficult to implement due to low educational level of farmers and lack of awareness of advantages of eco-labels	

In Gayo highlands, more than 80% of farmers had already managed their coffee farm organically. Since most of Gayonese farmers have run their farms organically, it becomes easier to persuade them to join the cooperatives and get the certification. One of the biggest cooperatives in Gayo highlands that also function as organized coffee certification for Gayo Arabica coffee farmers got organic certification in 2005 and FLO certification in 2008. This cooperative manages their farmers in groups, where each group has a representative who disseminates information to the farmers. As for the standards in applying for the certification, the cooperative engaged and educated the farmers more to meet the needs of buyers. After fulfilling some procedures, those who agree to join will be welcomed but there is no limitation that the farmers should sell their coffee to the cooperative in which they are members of. This is one of the reasons why many farmers agree to join cooperatives. Another reason is that they hope to get better quality and higher price by trying the new method even though some find this idea complicated. The premium fee that Fairtrade certification offers gives farmers an advantage even if it will be shared (not as cash) at the end of the year.

Another difficulty that every cooperative faces in terms of fulfilling the standard is the sense of ownership of the certification. The characteristic and education of Gayo farmers could be the reason for the mindset that certification is not for them but for cooperatives. For the cooperative itself, sometimes it is difficult to choose a leader democratically, hence, they tend to choose based on trust. This is not allowed according to the basic standard of certification.

For the price mechanism, it is stated in the contract that a cooperative made with international buyer and/or local market trend. This system puts the cooperatives in a difficult position since there could be losses when their contract price is lower than the local market price. This problem becomes a significant aspect in the implementation of certification when the price tendency is attributed to the lack of smallholder coffee farmers' participation in cooperative societies (as the certification facilitator). In addition, the ties between farmers and middlemen (informal buyer or institution) could be closer. Hence, the farmers would rather sell according to their own price level. The cooperative institution which is trying to get in between

them cannot simply enforce their regulations because of the coffee farmers' loyalty. This is in line with the result of the surveys conducted among smallholder coffee farmers (Table 21).

Table 21. Local buyer for coffee selling by certified coffee farmers

Local Buyer	Percentage (%)
Collector (cooperative)	17
Collector or middleman	7
Another certified coffee factory	14
Middleman	62

Based on the survey results, when the price of coffee at the cooperative was lower than conventional prices, 62% of certified coffee farmers sold their coffee grain to the middlemen (local buyers); 14% to the certified coffee factory; and 7% to those who came first to buy their coffee (to cooperatives' collector or to the middleman). Only 17% sold to the collector (cooperatives). Only 17% sold to the collector (cooperative). Some of their reasons for selling coffee grain to certified cooperatives were: premium fee availability; cash payment; and their belief that coffee prices in cooperatives were stable, and/or some farmers also have closer ties with the individual collector but not with the cooperatives.

Based on the description, it is clear that to develop a cooperative and coffee certification, there is a need for considerable effort to implement it to farmers gradually and obtain their active participation. Offering credit and capital loan system especially at low production season and giving direct payments at harvest season are alternatives to develop certification among farmers. In addition, promotion and training should be done continuously to build a strong understanding on how to accomplish certification standards and what the benefits are in acquiring certification.

Furthermore, for West Lampung as the biggest area producing Robusta coffee in Lampung province, there are major companies which acquired Rainforest Alliance or Utz Certified certification. Besides, almost 50% of smallholders' coffee farmers in West Lampung had started to farm organically and some were having Rainforest certification under those major companies which gave assistance to and education to the farmers about cultivation, marketing, and organic farming.

To acquire certification by its rules or standards, the company should conduct a survey on each farmers' group and their farms, give them guidelines on how to run and manage their farm with minimal use of off-farm input, and eliminate the use of chemical pesticides and fertilizers. Also, there should be guidance in harvesting their coffee beans at the right time and processing it properly to meet the needs of foreign customers. Each farmer under certification in West Lampung is free to sell his/her products to any collector if the price offered by the company is lower than other buyers. However, most of the members in Lampung Barat are aware of their contract with the company and they know that if they fulfil the requirements, they will get a higher price from the company. To reach this goal, companies provide assistance to farmers especially before harvest time. The assistance allows farmers to buy the necessary equipment and pay it after harvest time. This has been a common practice among the members who run their farms by *gotong royong*.

5.0 CONCLUSIONS AND POLICY IMPLICATIONS

5.1   Conclusions

Eco-labelling is supposed to improve smallholders' livelihood. It is important to ensure that acquiring eco-labels is more profitable than conventional farming methods. As expected, eco-labelled farms are more profitable than their non-eco-labelled counterparts. However, some farmers regard financial profitability as the only reason for applying eco-labels.

Based on the logit regression results, only the certification information and the access to certification are independent variables, which are significant. It indicates the homogeneity of farmers' characteristics.

Another interesting point is that there is no binding contract between farmers and groups or cooperatives which oblige them to sell coffee to groups or cooperatives. This creates difficulties to groups or cooperatives when they already signed a contract with the buyer because they need to buy green coffee beans with a higher price. Otherwise, farmers will opt to sell their beans to other buyers.

5.2   Policy Implications and Recommendations

Some farmers regard financial profitability as the only reason for acquiring eco-labels. In this regard, cooperatives may actively educate farmers on other economic advantages in addition to social and environmental ones. With this in mind, smallholders will continuously apply eco-labelling compliant farming methods despite unattractive selling price at times. This creates a stronger relationship between farmers and cooperatives having the farmers to sell their coffee to cooperatives even if the price is lower than that of the local buyers. It is also useful to create binding contract between farmers and cooperatives so that both parties will be benefited. With these efforts, difficulties among cooperatives will be avoided in the long run.

Most smallholders have actually been practicing eco-label compliant farming methods. However, due to the limitation of workforce, there is still an increasing tendency of farmers to resort to chemical herbicides instead of the conventional activities as weeding. Conventional weeding, which is done manually requires more laborers hence higher labor cost. The problem of high labor cost can be solved through *"gotong royong"* or volunteerism, through which farmers will conduct conventional weeding without the use of chemical substances. With the existence of *gotong royong,* however, labor cost may be lower since farmers do not have to pay wages. *Gotong royong* can be done twice a week in different farms each week.

For specialty coffees, it is important to focus more on the quality rather than quantity. Eco-label compliant farming methods are thus, necessary to ensure the quality of coffee and attract more demand. Although, there are still some weaknesses in the implementation of eco-labels in the coffee sector, most stakeholders believe that eco-labels compliant farming methods will benefit smallholder coffee farmers in particular and Indonesia's coffee sector in general.

REFERENCES

Bacon, C. 2005. Confronting the Coffee Crisis: Can Fair Trade, Organic and Specialty Coffees Reduce Small-Scale Farmer Vulnerability in Northern Nicaragua. World Development, 33 (3), 497-511.

Blackman and Naranjo. 2010. Does Eco-Certification Have Environmental Benefits? Organic Coffee in Costa Rica. http://www.rff.org/RFF/Documents/RFF-DP-10-58.pdf

Boot W., Wunderlich, Christopher, and Bartra, A. 2003. Beneficial Impacts of Eco-labeled Mexican Coffee;"Consumers' Choice Council.

Dinata, A.E., S. Dewi, and D. K., Adi. 2008. Land Cover Changes in Different Forest Transition Stages in Indonesia: East Kalimantan, Jambi and Lampung. Bogor: ICRAF.

Directorate General of Plantation Indonesia. 2011. Luas Areal dan Produksi Perkebunan Seluruh Indonesia Menurut Pengusahaan: Komoditi Kopi. Jakarta: Direktorat Jenderal Perkebunan.

FLO (Fairtrade Labelling Organization). 2009. Generic Fairtrade Standards for Small Producers' Organizations. Bonn: Fairtrade Labelling Organizations International.

FWI & GFW (Forest Watch Indonesia & Global Forest Watch). 2002. The State of the Forest: Indonesia. Bogor: Forest Watch Indonesia.

Giovannucci, D. 2003. The State of Sustainable Coffee: A Study of Twelve Major Markets. Cali: Feriva S.A.

IFOAM (International Federation of Organic Agriculture Movements). 2012. The IFOAM Norms for Organic Production and Processing Version 2012. Bonn: IFOAM.

Imhof, S., and A., Lee. 2007. Assessing the Potential of Fair Trade for Poverty Reduction and Conflict Prevention: A Case Study of Bolivian Coffee Producers. Bern: Swisspeace.

ITC (International Trade Centre). 2011. Trends in the Trade of Certified Coffees. Technical Paper. Switzerland.

Jena, P. R., T., Stellmache and U. Grote. 2010. Forest Coffee Certification and Sustainable Livelihoods of Coffee Farmers in Nicaragua: Should We Be Optimistic. Kiel: PEGNet.

Kilian, B, C. Jones, L. Pratt and A. Villalobos. 2006. Is Sustainable Agriculture A Viable Strategy to Improve Farm Income in Central America? A Case Study on Coffee. Journal of Business Research (59), 322-330.

Méndez, V. E., C. M. Bacon, M. Olson, S. Petchers, D. Herrador, C. Carranza, L. Trujillo, C. Guadarrama-Zugasti, A. Conrdon and A. Mendoza. 2010. Effects of Fair Trade and Organic Certifications on Small-scale Coffee Farmer Households in Central America and Mexico. Renewable Agriculture and Food Systems, 25 (3), 236-251.

Ministry of Agriculture, Indonesia. 2011. Luas Areal Kopi Menurut Propinsi di Seluruh Indonesia. Jakarta: Departemen Pertanian.

Ministry of Forestry, Indonesia. 2011. Luasdan Penyebaran Lahan Kritisselama Tiga Tahun Terakhir. Jakarta: Departemen Kehutanan.

Murray, D., L. T. Raynolds and P. L. Taylor. 2003. One cup at a time: Poverty alleviation and fair trade coffee in Latin America. Fair Trade Research Group, Colorado State University.

O'Brien, T. G. and M. F. Kinnaird. 2003. Caffeine and Conservation. Science, 300 (5619), 587.

Pierrot, J., D.Giovannucci and A. Kasterine. 2010. Trends in the Trade of Certified Coffees. Geneva: International Trade Centre.

Raynolds, L. T., D. Murray and P. L Taylor. 2004. Fair Trade Coffee: Building Producer Capacity via Global Networks. Journal of International Development, 16, 1109-1121.

Ronchi, L. 2002. The impact of fair trade on producers and their organizations: A case study with Coocafe in Costa Rica. Prus Working Paper No. 11, University of Sussex.

SAN (Sustainable Agriculture Network). 2010. Sustainable Agriculture Standard. San José.

SCAA (Specialty Coffee Association of America). 2010. Sustainable Coffee Certifications: A Comparison Matrix. California: Specialty Coffee Association of America.

UTZ Certified Good Inside. 2010. UTZ Certified Good Inside Code of Conduct for Coffee. Amsterdam: UTZ CERTIFIED Foundation.

Wilson, B. R. 2010. Indebted to Fair Trade? Coffee and Crisis in Nicaragua. Geoforum (41), 84-92.

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