JURNAL FUSION
Vol 4 No 03, Maret 2024
E-ISSN: 2775-6440 | P-ISSN: 2808-7208
Jurnal Homepage https://fusion.rifainstitute.com

ANALYZING THE SUSTAINABILITY OF HIGH QUALITY ARABICA COFFEE FARMING BUSNESSES IN THE MUNICIPALITIES AINARO, EMERERA AND LIQUICA DISTRICT OF TIMOR LESTE

Lucio Marcal Gomes, Julio de Jesus Gomes
Agriculture National University of Timor Lorosa'e and East Timor Coffee Institute (ETCI) Ermera, Timor Leste
Email: lmg_etci@yahoo.com

Abstrak

Arabica coffee is the most critical plantation product for Timor-Leste. It is sold on regional, national and international markets to provide income and foreign exchange to rural areas. This study aims to analyze the sustainability of coffee cultivation from an economic perspective. Specifically, we compared the income levels of certified and non-certified coffee farmers and the level of participation in farmer group activities between certified and non-certified coffee farmers. We achieved this through Arabica coffee growers (Coffea Arabica L.). Analyze the indirect benefits. The research site was selected by purposive Sampling, considering that most of the livelihoods of residents in the region are coffee farmers. The study was conducted from July to December 2022. This type of research is descriptive with a quantitative approach. The number of samples used was 180 respondent farmers calculated using the Slovin formula so that the number of pieces for certified and non-certified farmers in each region was 30 people, with the sampling technique used purposive Sampling. The analytical method used in this study is qualitative and quantitative descriptive analysis. The data processing method is performed by tabulation and classification on Microsoft Excel software. The results show that the income of certified coffee growers is higher than that of uncertified households. The income obtained by certified coffee farmers amounted to $748.03 per hectare, and B/C amounted to 1.57 for the participation rate. Certified coffee farmers are more active in group activities than non-certified ones, with the highest participation rate in the Ermera district area. Indirect revenue obtained by coffee farmers comes from the value of carbon storage, with an average contribution value ranging from $85.28-98.90 or equivalent to 54.35-82.92% of the total revenue per hectare.

Keywords: *farm sustainability, farm income, arabica coffee, social characteristics.*

Diserahkan: 20-02-2024; Diterima: 05-03-2024; Diterbitkan: 22-03-2024

INTRODUCTION

Arabica coffee is a very high-quality (superior) agricultural commodity in the cultivation sub-sector in Timor Leste. Arabica coffee was introduced into C3 trees growing under a protective canopy (Saragih, 2018). Arabica coffee requires sunlight between 50-60% and grows well at an altitude of 800-1750 meters above sea level

DOI : https://doi.org/10.54543/fusion.v4i03.409
Published by : Rifa Institute

(masl), with average temperatures at night 15^0C-18^0C and in the morning 20^0C-25^0C with rainfall between 1200mm-2000mm per year. Arabica coffee came from the kingdom of Eutopia and entered this Portuguese colony in the XVIII century. Arabica coffee can botanically be classified: as kingdom Plantae, division spermatophyte, subdivision angiosperms class dicotyledon ae, and family Rubiaceae (Rahardjo, 2012).

Arabica coffee production in Ainaro, Ermera, and Liquica municipiu is mostly a plantation commodity sold to regional, national, and international markets that can generate income for the farming community and foreign exchange of Timor Leste, which has a vital role in the economy as a source of income for farmers, job creation, drivers of agribusiness and agro-industry, as well as regional development so that increasing coffee production has an excellent opportunity to exporting coffee to the world's foremost coffee consuming countries (Fellicia, 2014).

According to the coffee export activity from Timor-Leste in the international market, the leading destinations for coffee exports are five countries, the United States with a total export value of $8,509,032, and Germany with a total export value of $4,288,957, ranking third after Belgium. Ing. With a total export value of $2,724,561, Japan ranks fourth with a total export value of $2,590,886, and Australia ranks fifth with a total export value of $2,288,957. The export value was $2,279,550. The average growth rate of export volume from 2017 - 2021 reached 4.3% per year (ICO, 2022).

The types of coffee cultivated are Arabica coffee and Robusta coffee. Of the two types of coffee, Arabica coffee occupies the most significant production level of 95% among community plantation commodities, with a much greater production level than Robusta coffee which is only 5% (Director General of Timor-Leste Plantations, 2022). *Arabica coffee* is a traditional plant that the ancestors of farming communities have long cultivated in 6 Municipalities: Aileu, Ainaro, Bobonaro, Ermera, Liquica, and Manufahi. Of the six municipalities that are the center of Arabica coffee plantations are Ainaro, Ermera, and Liquica regencies. The high production of coffee produced by the three districts paved the way for other districts to develop the coffee market to the world level. Several challenges still need to be faced, especially the need for more awareness of coffee farmers towards environmentally friendly technology, excessive use of chemicals in the long term, and the low quality of coffee. Coffee sold by farmers is generally of good quality because the region's Arabica coffee is grown naturally, without chemical fertilizers (organic fertilizers). This makes the quantity of high-quality arabica coffee with a high selling value in the world market. Due to these problems, coffee farmers in Ainaro, Ermera and Liquica counties must be certified.

Certification can encourage farmers to improve the quality of their coffee because there are many benefits obtained by farmers if their coffee has been certified. Coffee certification is a third-party determination that coffee meets the standards. It provides written assurance from an independent third party and is a sign that the coffee and the processes that support it meet health, security, safety and environmental requirements. Consumers are confident that the coffee consumed has

been produced by the terms and standards applicable as one of the quality coffees with this certification. Implementing the certification process is related to economic, social and environmental aspects. These three aspects are closely related to the sustainability of farming. Sustainable agriculture is management and conservation based on natural resources and oriented towards technological and institutional changes to ensure the achievement and satisfaction of the needs of current and future generations.

The sustainability of farming in the economic aspect is seen from the income level of coffee farmers because the certification can increase farmers' income. The agricultural pattern developed can guarantee investment in energy and costs incurred by farmers; besides that, the results obtained by farmers can meet the needs of their families decently and sustainably. The social aspect is seen from the level of participation of coffee farmers in farmer group activities; farmers can have a high level of involvement in each farmer group activity because the coffee certification can encourage farmers to be more active in participating in the activities of the farmer group. Environmental aspects are seen from the assumption that coffee farmers can receive indirect benefits while managing farms. Agricultural sustainability can be achieved if economic, social and ecological elements are correctly carried out.

Based on the above background, the objective of this study was to analyze the sustainability of coffee farming from an economic perspective, namely to compare the income levels of certified and non-certified coffee growers. , from a social perspective, in particular, a comparison between certified and non-certified coffee producers' participation rates in producer group activities and the environmental aspect, namely assuming receive indirect benefits that Arabica coffee producers (Coffea Arabica L.) obtain.

RESEARCH METHODS

This research was conducted in July-December 2022. The research location was chosen purposively: Ainaro, Ermera, and Liquica municipalities. The determination of the site of this research is considering that these three municipalities have the most significant coffee land area and the highest coffee production and have implemented coffee certification. Coffee farmers have primarily implemented a Common Code for the Coffee Community (4C) certified organic system and have also implemented Rainforest Alliance (RA) coffee certification. The number of respondents was determined using the theoretical formula of Sugiarto (2005), which is mathematically written as follows:

$$n = \frac{NZ^2S^2}{Nd^2 + z^2\,s^2} \quad \text{.....(1)}$$

Information:

n = Number of samples

N = Number of population
S^2 = Sample variations (10% = 0,10)
Z = Trust level (95% = 0,95)
d = Storage degrees (5% = 0,05

Using the above formula as a guide, we can calculate the sample size of certified and non-certified farmers in each region as follows:

$$n = \frac{180\ x\ (0{,}95)^2\ x\ 0{,}10}{180\ (0{,}05)^2 + (0{,}95)^2 x\ 0{,}10}$$

$$n = \frac{16{,}245}{0{,}531}$$

n = 30,57 = 30

This study analyzes the comparison of farm income and the participation rate of certified and non-certified farmers in farmer group activities. Farmer respondents at the location were selected by simple random sampling. This study used primary data and secondary data. Preliminary data were obtained from direct interviews with farmers in the field. Secondary data were obtained from the Central Bureau of Statistics, Ministry of Agriculture, Directorate General of Plantations and International Coffee Organization. The analysis used in this study is qualitative and quantitative, and the data processing method is carried out by tabulation and categorization methods with Microsoft Excel. Mathematical farm income, according to Soekartawi (2002), can be written as follows:

Pd = TR – TC……(2)

Information:

Pd = Income (US$)
TR = Total revenue (total receipts of coffee, shade plants and interstitial plants (US$))
TC = Total cost (total production cost of coffee farming, shade crops and interstitial crops (US$))

Farming is seen as economically profitable or not and can be analyzed using a ratio or comparison between revenue and cost. It can be mathematically formulated:

$$R/C = \frac{PT}{BT} \text{ ……..(3)}$$

Information:

R/C = Acceptance ratio and fees
PT = Total receipts (receipts of coffee plants, shade plants and interstitial plants (US$))
BT = Total costs (seed, fertilizer, pesticide, tax, labor, land rent, and postharvest costs (US$))

The decision-making criteria are as follows:

1. If R/C >1, So farming experiences profits because farm revenue is greater than the cost.

2. If the R/C < 1, then the farmer suffers a loss because the farmer's revenue is less than the cost.
3. If R/C = 1, then the farm breaks even because revenue equals cost

This comparison of farm income is tested using a t-test (independent samples t-test) which helps compare two groups of two different samples and see the average difference between the two populations. The t-test was conducted to test the level of the income difference between certified and non-certified coffee farmers using SPSS 24 software. Farmer participation in farmer group activities is measured using the Likert scale. Answers from the Likert scale have scores ranging from 1 to 3, with a score of 1 for low solutions, 2 for sufficient answers and 3 for high answers. The variables to be measured are translated into indicators. The indicators used are:

a.The frequency of farmers' attendance in farmer group activity meetings.
b. Farmers' activeness in farmer group discussions.
c. Farmer involvement in farmer group activities.
d. Farmers gave monetary donations to farmer groups and participated in monitoring farmer group activities.

These indicators are determined based on the stages of participation, according to Nazir (2009).

This measurement of farmer participation uses maximum and minimum scores. The top score obtained is 57, and the minimum score is 19. The interval used to determine the level of farmer participation category in farmer group activities is obtained from the following formula according to Suparman (1990):

$$\text{Interval} = \frac{R\ (range)}{K\ (kategori)} \quad \text{.....(4)}$$

$$= \frac{57-19}{3}$$

□□□□□ 12,67 = 13

Information:
Range (R) = Highest score-lowest score
Category (K) = Number of classes

Based on the results of these calculations, three categories of farmer participation in farmer group activities are obtained as follows:

1. Interval 19-32, then the farmer is inactive
2. Interval 33-46, then farmers are less active
3. The interval is 47-60, and the farmer is active.

This comparison of participation rates was tested using the Mann-Whitney test. The Mann-Whitney test is a non-parametric test for abnormal and ordinal distribution data. This test was conducted using SPSS 24 software. Tests of validity and reliability of questions to help answer this second goal have been carried out, with the results that 19 valid and reliable questions are used in this study.

The value of indirect benefits is obtained by calculating the assumption of receiving indirect benefits from the coffee farming process, including carbon

storage, biodiversity, and water and soil conservation values by referring to the research of Prasmatiwi et al. (2010), which mathematically can be written as follows:

Be = BCs + BHc + BBd .....(5)

Information:

Be = indirect benefits (externalities)
BCs= benefits of carbon storage
BHc = benefits of soil and water conservation
BBd = benefits of Biodiversity Resources

Shade coffee carbon storage is obtained from the multiplication of shade coffee carbon (ton) with coffee farmers' land area (ha). Shade coffee carbon stocks range from 10 tons obtained based on previous research on coffee-based agroforestry environmental services by calculating carbon stocks in tree biomass and soil organic matter according to Hairiah et al. (2006). The assumption of carbon receipts received by certified and non-certified coffee farmers is obtained from the multiplication of the carbon price and the storage of shade coffee carbon per hectare. The cost of carbon credits applicable on the world market ranges from $4 to $18 per ton, so the carbon price applied for Reducing Emissions from Deforestation and Degradation (REDD) is assumed to be $5 per ton. The assumption of carbon prices is referred to from research on carbon stocks, emissions and conservation of peatlands by Agus (2007).

Water and soil conservation is obtained from farmers' costs for chemical fertilizers and pesticides. These costs are assumed to be production costs that farmers can save and revenues that farmers can use for other activities if farmers do not use chemical fertilizers and pesticides. Water and soil conservation is also assessed from farmers' labour costs to prevent erosion, such as making gold, terraces, weeds, rock and shade plants. The labour costs these farmers incur are assumed to be capital that farmers can use to carry out other activities if they do not prevent erosion.

Biodiversity in this study focused on wildlife because wildlife is the biodiversity that farmers most often see or find on their land. Biodiversity is derived from the assumption of coffee farmers' acceptance if they multiply the amount of wildlife they have encountered or seen on their ground by the wildlife price determined by BKSDA.

RESULTS AND DISCUSSION

1. Respondent Conditions

The average age of respondents, certified and non-certified coffee farmers, is still in the age of the labour force. 46% of accredited coffee farmers are high school graduates, while 49% are non-certified coffee farmers who are only able to receive education until they finish junior high school (SMP); in addition, 39% of certified

coffee farmers are labourers, and large non-certified coffee farmers (51%) do not have a side job.

Overall, 71% and 66% of certified and non-certified coffee growers had families of 3 to 4 people. The results of this study also show that certified coffee growers have more coffee-growing experience than non-certified coffee growers. Indeed, 43% of accredited coffee growers have been growing for 20-30 years, while most non-certified coffee growers (46%) have grown coffee for 10-19 years. The age of certified and non-certified coffee farmers' coffee plants is each 51% in the age range of 5 to 19 years. Certified and non-certified coffee farmers amounted to 83%, and 97% have a land area of 0.5 to 2 hectares with ownership status 97%, both certified and non-certified coffee farmers. The average number of shade plants of certified coffee farmers is 48 stems per hectare, and interstitial plants are 739 stems per hectare. In comparison, non-certified coffee farmers have 36 stems per hectare, and interstitial plants have 307 stems per hectare.

2. **Comparison of Certified and Non-Certified Farmer Farm Income**

The size of coffee production and selling prices greatly influences coffee income. Coffee farmers' revenue comes from the sale of coffee production, the sale of shade plants and the sale of intercropping plants. The average gain of certified coffee farmers from coffee farming is $1,011.25 per hectare because the amount of coffee production produced by certified farmers is 625 kg per hectare per year in the form of dry coffee beans with an average selling price of $1.38 kg, besides that certified farmers get a premium fee or additional profit of $0.022 per kg for 4C certified farmers and $0.014 per kg for RA certified farmers.

Non-certified coffee farmers produce coffee production of 450 kg per hectare per year, which is also in the form of dry coffee beans with an average selling price of dry coffee beans of $1.38 per kg, which they sell directly to the market through intermediaries or also sell to exporters (PT. Nestle or PT. Ned-Caffee) so that the average coffee income obtained is $775.36 per hectare. This is because certified coffee farmers have participated in coaching first, so the quality of accredited coffee farmers is better than non-certified ones. The quality of the coffee affects the selling price, so certified coffee farmers have a higher selling price than non-certified coffee farmers. Certified coffee farmers are entitled to a premium fee as an additional benefit that non-certified coffee farmers still need to obtain.

The coffee plant needs shade in every phase of its life. The benefits of colouring on the formation of coffee fruits are explained by Fathurohmah (2014), namely the higher level of fruit competition in coffee without shadow in terms of assimilation, causing coffee beans not to grow optimally, resulting in the size of coffee beans without shadow smaller than coffee beans that get shade. The shade plants planted by coffee farmers are petai, durian, lamtoro, dada, mahogany and warm wood, but dada, mahogany, and warm wood have yet to be produced production. The most significant income comes from petai and durian. The average income of certified coffee farmers for shade crops is $54.02 per hectare. Non-

certified farmers earn an average shade crop income of US$ 74 per hectare. The payment of shade plants of non-certified coffee farmers is higher than certified coffee farmers because non-certified coffee farmers have an average number of shade plants than certified coffee farmers.

Farmers also plant interstitial crops planted between the main crops to increase the income of coffee farmers. The interstitial crops that are generally produced by farmers, both certified coffee farmers and non-certified farmers, are pepper and banana plants because cocoa is often affected by the disease. The intercropping income of certified coffee growers is $97.01/ha higher than that of non-certified coffee growers, while non-certified coffee growers are $82/ha. Indeed, accredited coffee producers earn more than non-certified coffee producers. After all the average production and selling price of pepper produced by certified coffee farmers is higher, thus affecting the total interstitial crop income of certified coffee farmers.

Table 1. Average Coffee Farmer Income Certified and Non-Certified

Description	**Coffee Farmer Certification**	**Non certified coffee farmers**
Acceptance	Per hectare (1 ha) US$	Per hectare (1 ha) US$
Coffee reception	860,22	619,36
Reception of shade	54,02	74,00
Intercropping reception	97,01	82,00
Total receipts	1,011,25	775,36
I. Cash charges		
Seed	36,44	27,33
Chemical fertilizers	5,33	32,87
Organic fertilizers	29,18	13,45
Medicines	4,28	5,59
Tax	1,36	1,43
Village levies	1,12	0,45
Kindergarten outside the family	121,52	104,71
Post-harvest	63,98	61,58
Sub Total	263,22	247,42
II. Calculated costs		
Kindergarten in the family	104,41	68,88
Land lease	108,27	95,06
Sub Total	212,68	163,94
Total cost (I + II)	**475,90**	**411,36**
Farm income	**748,03**	**527,93**
B/C	**1,57**	**1,28**

Source: Primary data processed (2023)

Based on Table 1, it is known that there is a difference in average income and B/C between certified and non-certified coffee farmers. Certified coffee farmers earn

higher farm income than non-certified coffee farmers. The income obtained by certified coffee farmers is $748.03 per hectare, and B/C is 1.57, which means that for every cost incurred by farmers is $100, then the farmer will get an income of $157. Non-certified coffee farmers have an average payment of $527.93 per hectare with a B/C value of 1.28, meaning that for every cost incurred by farmers is $100, then the farmer earns an income of $128. The B/C ratio of certified and non-certified coffee growers' farm income is greater than 1, which means that the grower is profitable and the farm is viable. This shows that, in economic terms, agriculture is developing sustainably.

3. **Independent Sample t-test**

The comparison of income of certified and non-certified coffee farmers tested using the t-test (simple independent t-test) obtained a value of 53.66 with a value of P-value = 0.000 sig (2-tailed)<0.05 (very significant), then H_0 was rejected. This shows a significant difference between certified and non-certified coffee producers' incomes at an honest level of 95%. This difference indicates that certified coffee growers' income level is higher than non-certified farmers. This study's results align with Oktami's research (2014), which states that the income of certified farmers is higher than non-certified. The economic aspect studied in Oktani's research looks at farmers' income based on the implementation of Rainforest Alliance (RA) certification. In contrast, this study examines the income level of coffee farmers based on Rainforest Alliance certification and the Common Code for the Coffee Community (4C).

4. **Comparison of the level of participation of farmers in the activities of farmer groups.**

The participation rate of coffee farmers in farmer group activities in aggregate shows that 67.22% of farmers play an active role in farmer group activities, and the remaining 23.33% have less active participation rates and only 9.44%. The distribution of accurate data from research on the participation rate of certified and non-certified coffee farmers can be seen in Table 2.

Table 2. The level of participation of coffee farmers in farmer group activities

Regency	Number of farmers	Indicators	General farmer participation rate (%)	Farmer participation in the group (%)	
				Certification	Non certified
Ainaro	60	Active	66,67	41,67	25,00
		Less active	25,00	5,00	20,00
		Inactive	8,33	3,33	5,00
Ermera	60	Active	83,33	50,00	33,33
		Less active	11,67	5,00	6,67
		Inactive	5,00	1,67	3,33
Liquiza	60	Active	51,67	36,67	15,00
		Less active	33,33	8,33	25,00

	Inactive	15,00	5,00	10,00

Source: Primary data processed (2023)

Table 2 describes the breakdown of the percentage participation rate of arabica coffee farmers in Ainaro, Ermera, and Liquiza districts in farmer group activities per indicator for certified and non-certified farmers shows that the highest participation rate (active) in the accredited farmer category, especially in farmer groups in the Ermera regency area with a functional participation value of 50.00% followed by farmers in the Ainaro district area with an active value of 41.67% and finally in farmer groups in Liquiza district with the active participation of 36.67%. Meanwhile, in non-certified coffee farmers, the highest participation rate was in farmer groups with a functional participation value of 33.33%, followed by farmers with an active value of 25.00%, and finally, in farmer groups with an operational participation value of only 15.00%.

The percentage participation rate of certified coffee growers explained that most were actively involved in the activities of production groups. This shows the social aspects of certified coffee growers as sustainable. Certification can encourage farmers to be more active in farmer group activities. The results of the Mann-Whitney test show that the comparison of the participation of certified and non-certified coffee farmers in farmer group activities obtained a sig (2-tailed) value< 0.05, then H_0 is rejected, meaning that there is a significant difference between the participation of certified and non-certified coffee farmers in farmer group activities. The participation of certified coffee farmers is higher at 42.78% compared to non-certified, which has a participation rate of 24.44%.

5. **Indirect Benefits**

The research results on carbon storage for certified and non-certified coffee farmers in aggregate amounted to 57.42 tons/hectare, which is assumed that if the stored carbon is sold, it can produce carbon receipts of $277.10. If the breakdown is more detailed for each district, it shows that the carbon storage value ranges from 18.59-19.78 tons C/ha, with the revenue value ranging from $92.93-98.90. This indicates that coffee farmers indirectly contribute to carbon storage in agricultural production.

The biodiversity studied in this study focused on wildlife. The average assumed acceptance of coffee farmers' nature is $62.36 per hectare. One indirect benefit of coffee farmers is to protect the wildlife around them by not catching, killing or selling these animals. Farmers prefer to let the wilderness go from their land.

One form of soil and water conservation tahat farmers can do is avoid using chemical fertilizers and pesticides and prevent erosion. Farmers can save on average production costs up to 36.31 USD/h without using chemical fertilizers and pesticides. This shows that coffee growers can reduce production costs without using chemical fertilizers and pesticides. Erosion prevention carried out by farmers is terrace making, road making, gold making and shading tree planting, with an

average total overall labour cost of $25.15 per hectare. Labour costs incurred by farmers are assumed to be capital that can be used to carry out other activities if they do not prevent erosion. The average assumption of indirect benefits that certified and non-certified coffee growers can gain from their cultivation is presented in Table 3.

Table 3. Average indirect income of coffee farmers.

Regency	Description	Storage Value (ha)	Average Revenue (US$)/hc	Percentage (%)
Ainaro	Carbon storage	19,06 C/ha	85,28	54,35
	Biodiversity		47,83	30,48
	Water and soil conservation		10,06	6,41
	Erosion prevention		13,76	8,77
	Assumptions of acceptance		156,91	100,00
Ermera	Carbon storage	19,78 C/ha	98,90	72,34
	Biodiversity		6,79	4,97
	Water and soil conservation		14,86	10,87
	Erosion prevention		16,17	11,83
	Assumptions of acceptance		136,72	100,00
Liquiza	Carbon storage	18,59 C/ha	92,93	82,92
			7,74	6,91
	Biodiversity		11,40	10,17
	Water and soil conservation		0,00	0,00
	Erosion prevention			
	Assumptions of acceptance		112,07	100,00

Source: Primary data processed (2023)

Table 3 shows that the assumption of indirect benefits received by Arabica coffee growers to certified and non-certified coffee growers is dominated by revenue from carbon storage value, with the average contribution value from 85.28 to 98.90 USD or equivalent 54.35 - 82.92% of total income/ha. This indicates that coffee farming in the Atsabe district, Ermera Regency is sustainable because the agriculture practised by farmers has a high indirect economic value, and the farmers are indirectly involved in carbon storage, diversity biology and conservation of water and soil.

CONCLUSION

From the above description of the research results, the income of certified coffee farmers is higher than that of non-certified coffee farmers. The payment of certified coffee farmers was $748.03 per hectare, with a B/C ratio of 1.57. Regarding participation rate, certified coffee farmers were more active in group activities than non-certified farmers, with the highest participation rate in the Ermera district. Indirect income for coffee farmers comes from the value of carbon stocks, with average contributions ranging from $85.28 to $98.90, representing 54.35 to 82.92% of total income per hectare.

BIBLIOGRAFI

Agus F. 2007. Reserves, Emissions and Conservation on Peatlands. Paper on Buna Rampai Soil and Water Conservation. Board of the Indonesian Center for Soil and Water Conservation 2004-2007. http://balittanah. R&D.agriculture. go.id/ind/dokumentasi/lainnya/buku%20bunga%20rampai%20kta% 2012-07%20 (Fahmudd in_agus).pdf.

Bungin B. 2005. Quantative Research Methodology. Prenada Media. Jakarta.

Cohen U. 1977. Rural Development: Concept and Measures for Project Design, Implementation,and Evaluation. Cornel University. NewYork.

Fathurrohmah A. 2014. Influence of the Leda Shade Tree (Eucalyptus Deglupta Bl.) and Suren (Toona Sureni Merr.) To the growth and production of coffee (Coffea Arabica L.). Bogor : IPB. Press

Hairiah K, Subekti R, Berlian. 2006. Coffee-Based Agroforestry Environmental Services: Carbon Stocks in Tree Biomass and Soil Organic Matter (Case Study from Sumberjaya, West Lampung). *Jurnal Agrivita, 28 (3) : 298-309.* ICO. 2020.

National Director of Statistics Timor Leste (DNS-TL) Tanggamus Regency. 2014. Tanggamus in 2014 figures. BPS Tanggamus Regency. Great City.

Oktami N. 2014. Benefits of Rainforest Alliance (RA) Certification in Developing Sustainable Coffee Farming in Pulau Panggung District, Tanggamus Regency. Thesis. University of Lampung. Bandar Lampung.

Prasmatiwi FE, Irham, Suryatini A, Jamhari. 2010. Analysis of Coffee Sustainability in the Forest Area of West Lampung Regency with an Environmental Economic Value Approach. Journal of Pelita Perkebunan, *26(1):57-69*

Rahmadityah, 2017. The Impact of Community Empowerment Programs on Productivity, Market Access and Income of Coffee Farmers in Bantaeng, South Sulawesi.

Soekartawi. 2002. Basic Principles of Agricultural Economics: Theory and Application. Raja Grafindo. Jakarta.

Sugiarto. 2003. Sampling technique. Gramedia Main Library. Jakarta.

Suparman IA. 1990. Social Statistics. Rajawali. Jakarta.

Umar H. 2002. Marketing Research and Consumer Behavior. Gramedia Public Library. Jakarta.