Agro Bali : Agricultural Journal
Vol. 7 No. 2: 488-499, July 2024
e-ISSN 2655-853X
https://doi.org/10.37637/ab.v7i2.1788

Coffee Farmers' Obligations Response to 4C Certification in South OKU Regency South Sumatra Province, Indonesia

Yetty Oktarina[1♥], Angga Sebagustionnes[1], Mukhlis[2]

[1] Agricultural Economy Study Program, Baturaja University, Baturaja, Indonesia
[2]Agribusinenss Study Program, Department of Agriculture Business, Politeknik Pertanian Negeri Payakumbuh, Payakumbuh, Indonesia

♥Corresponding author email: y3tty07@yahoo.com

Article history: submitted: February 28, 2024; accepted: July 29, 2024; available online: July 31, 2024

Abstract. The increasing demand for certified coffee has encouraged coffee exporters in Indonesia to try to help and certify coffee in their areas. Sustainable standards and certification can encourage coffee farmers to implement GAP rather than economically, socially and environmentally sustainable coffee production, the standard code coffee community (4C) certification used globally reaches 1,768,272 tons. The study aimed to determine whether farmers agreed to the implementation of 4C coffee certification in South OKU Regency. The sample was made of coffee farmers in South Ogan Komering Ulu Regency located in Pulau Beringin and Runjung Agung Districts, taken randomly and measured using a Likert scale. The study results showed that farmers agreed to implement 4C, which is in the economic, social, and environmental dimensions. Regarding environmental aspects, several important things are overlooked, especially restrictions on the use of pesticides, considering that farmers are currently accustomed to using insecticides and herbicides.

Keywords: coffee; economic; farmer; obligation; response

INTRODUCTION

Indonesia ranks third as a coffee producer globally after Brazil and Vietnam. The export of coffee has played a substantial role in Indonesia's economic expansion, mitigating the trade imbalance and partially addressing the issue of poverty reduction, particularly in rural regions. The demand for premium coffee is experiencing exponential growth. Consumers' demand for certified coffee is growing, and the prices they are willing to pay have caught the interest of dealers and farmers (Wahyudi et al., 2020).

Buyer requirements can be categorized into two groups: (1) universal legal and supplementary requirements for all coffee exporters, and (2) specialized specialty needs. For coffee exporters seeking to target certain market segments, ensuring food safety is crucial. This involves complying with statutory regulations and meeting additional standards to prevent contamination in coffee. Gaining knowledge of the various certification standards is a crucial prerequisite for entering the EU market (Reinecke et al., 2012). The primary certifications for the coffee market prioritize transitioning crucial trade routes towards sustainability (Bray & Neilson, 2017; Takahashi & Todo, 2017). At a global level, it possesses multiple sustainable coffee certifications, such as organic, Fair Trade certified, Rainforest Alliance, Smithsonian Bird Friendly, UTZ Certified, and Common Code Coffee Community (4 C) (Hidrobo et al., 2018). The 4C certification is an acronym for Common Code Coffee Community, which specifically addresses social, economic, and environmental aspects. Due to customer demand, a coffee that fulfills the required criteria is needed.

South OKU is a district in South Sumatra known for its significant coffee production, which serves as a primary source of livelihood for the local population. However, there is an imbalance in terms of productivity and prices, which prevents the achievement of farmers' welfare. This is caused by a deficiency in comprehension of cultivation techniques and limited opportunities to enter the market. Until now, people have been farming for many generations without receiving any support or guidance about coffee certification. As a result, the issues that arise throughout the cultivation and post-harvest processes remain unresolved. In addition, the practice

e-ISSN 2655-853X
https://doi.org/10.37637/ab.v7i2.1788

of utilizing the bonded bond system to facilitate buying and selling transactions remains prevalent, resulting in local traders exerting control over market access and prices at the farmer level. Research and development efforts should also focus on increasing the productivity and profitability of coffee agroforestry systems and addressing the challenges of climate change and other environmental factors (Ulya et al., 2023)

The aim of the research is to analyze farmers' responses to 4C certification. In the research, the author utilized the most recent version of the code of conduct, specifically version 4.0, which was published by 4C Services in July 2021. It is worth noting that no previous research on 4C certification has been undertaken in South OKU Regency.

METHODS

The research has been conducted at South OKU. South OKU Regency is the largest coffee-producing regency in South Sumatra, with a production area of 62,399 tons per year. Data collection at this site will be conducted in December 2021. The data used are primary data obtained using the random sampling method, where the samples taken were 84 Coffee Farmers registered in the 4C certification program in three sub-districts, namely Pulau Beringin, Runjung Agung and Muara Dua Kisam, with the consideration that these three areas are buffer areas for coffee production in Ogan Komering Ulu Selatan district. Coffee producers' ability to address environmental, social, and economic hazards is assessed using a Likert scale. The assessment of coffee farmers' responses is based on the question indicators outlined in the 4C code of conduct, namely the economic dimension, social dimension and environmental dimension. Unit 4C encompasses various facilities and manufacturing processes that can be categorized into economic, social, and environmental components.

Table 1. Indicators used to assess coffee farmers' responses to the standard code of behavior for coffee communities

No	Dimensions	Indicator
1	Economy	Farming Business Management (X1)
		Business Development Capacity (X2)
		Traceability (X3)
2	Social	Decent Treatment of Workers (X4)
		worker conditions (X5)
3	Environment	Use of pesticides and dangerous chemicals (X6)

Annotation scale component 5 categories: 1 = Strongly disagree; 2 = Disagree; 3 = Natural/Undecided; 4 = Agree; 5 Strongly agree. All indicators used are tested for validity and reliability. Measurement is used to measure attitudes, opinions, and perceptions of a person or group of people about social phenomena, including the business sector.

Table 2. Skor Farmer Response

No	Skor	Farmer Respon
1	1	Strongly Disagree
2	2	Don’t Agree
3	3	Neutral/Undecided
4	4	Agree
5	5	Strongly Agree

e-ISSN 2655-853X
https://doi.org/10.37637/ab.v7i2.1788

RESULTS AND DISCUSSION

Coffee farmers in Ogan Komering Ulu Selatan Regency have put forward and emphasized the 4C certification program which emphasizes three relevant dimensions: Social Dimension, Economic Dimension, and Environmental Dimension. This certification is expected to provide market guarantees for coffee products worldwide.

Implementation in the Economic Dimension

Economic Dimension in Common Code The assumption of Coffee Community (4C) certification is centered on ensuring farmer welfare by providing decent wages per the certification program for coffee producers. In the field of strategic management, coffee producers need to formulate strategies in running their production, which can be defined as a series of activities that enable producers to gain and maintain sustainable competitive advantages (Park, 2023). Within the economic portion of the 4C certification principle, three things are taken into account to enhance the livelihoods of coffee producers. The economic dimension in question encompasses three specific aspects: 1) Farming Business Management, 2) Business Capacity and Development, and 3) Coffee Product Traceability (Bray & Neilson, 2017).

Business Management and Farming

The administration of coffee plantations involves the oversight of cultivation and the processing of harvested crops. In this scenario, farmers engage in agriculture activities autonomously, encompassing tasks such as fertilizing plants, tending to coffee trees, and drying them. Harvesting actions are adapted according to the condition of the coffee fruit. If the fruit is heavy, it typically requires the involvement of a larger number of individuals. This measure is implemented to prevent the occurrence of fruit drop, which can lead to a decrease in overall production. **Table 3** displays the incorporation of business management indicators.

Table 3. Coffee farmers' implementation of the 4C certification program on Business Management and Farming Business indicators

	Criteria	Average
P 1	Management system implemented, demonstrating commitment to comply with 4C requirements, including appointment of person responsible for implementation (does not apply to smallholder farmers)	3
P 2	BP producers do not carry out immoral transactions, such as bribery, corruption, fraud and/or extortion	4
P 3	There are no indications of violations of regional and national laws and regulations related to 4C requirements	4
P 4	Manufacturer BP ensures that subcontractors fully comply with 4C requirements	4
P 5	Producer BP maintains records relating to costs and revenues from its coffee operations	4
P 6	Production records, including planting year, variety, input and yield are available	3.47
P 7	BP Producers know the steps that impact profitability and productivity to achieve an economically viable production scale and the strategies to achieve these goals (only applies to small farmers)	3
		3.63

e-ISSN 2655-853X
https://doi.org/10.37637/ab.v7i2.1788

Coffee farmers participating in the 4C certification program have adopted business and farming management indicators standards. Where certified producers document production expenses, agricultural revenue, and coffee cultivars. This recording calculates cost plans and allocations based on planting conditions (Ibnu, 2019).

Farmers engage in autonomous agriculture practices, encompassing tasks such as fertilizing plants, tending to coffee trees, and drying the harvested crops. Management is essential for every action involved in coffee production to ensure that it aligns with the investment value made by farmers (Ihsaniyati et al., 2020).

When carrying out fertilization, it is crucial to consider the 5Ts for each fertilization activity: Correct Method, Correct Dosage, Correct Target, Correct Time, and Correct Type. Standardized programming instructions Coffee producers participating in the 4C certification program have undergone instruction on the process, function, and application of fertilization. performing fertilization tasks (Bray & Neilson, 2017). Coffee farmers in certification activities focus on the application of the necessary fertilizer dosage. The implementation of balanced fertilization has resulted in a 20-40% improvement in coffee productivity in areas supported by 4C certification, despite consistent meteorological conditions throughout the certification period. This is a notable accomplishment of the 4C certification program, which aims to enhance farmers' livelihoods by using well-organized farming business management practices (Jena & Grote, 2022). Fertility of nutrient content needs to be maintained and improved along with plants' continuous absorption of soil nutrients.

In capacity and business development, the 4C certification program for coffee farmers in the economic dimension encompasses agricultural operations beyond coffee cultivation. The 4C certification program sets criteria to enhance farmers' income by diversifying their revenue sources. This is achieved by encouraging farmers to cultivate and register plantations inside the certification program to increase their income annually. Coffee producers engage in additional business ventures alongside coffee growing to supplement their income (Aziz et al., 2023).

Some farmers have adopted an intercropping technique by planting coffee trees alongside bananas, chiles, and peppers. They also cultivate seasonal fruit crops such as Jengkol, Avocado, Durian, and areca nut. This is done in order to generate additional revenue to fulfill the financial requirements of agricultural households, including their living expenses, educational expenses, and healthcare expenses. The **table 4** displays the incorporation of capability and business development metrics.

Table 4. Coffee farmers' implementation of the 4C certification program on capacity and business development indicators

	Criteria	Average
P 8	Training policies and documented training plans (and materials) to train BP Producer workers on issues necessary to meet 4C requirements are available (does not apply to smallholders)	3
P 9	Training must have been provided to all relevant workers from BP Producers on an equal basis on a risk-based approach regarding the 4C requirements offered free of charge during working hours (does not apply to smallholders)	3
	Total	**3**

e-ISSN 2655-853X
https://doi.org/10.37637/ab.v7i2.1788

One of the objectives of the partnership program between coffee farmers and the 4C certification program is to enhance their income. This is achieved by encouraging coffee farmers to diversify their sources of revenue by cultivating multiple crops on the same land, rather than solely relying on the selling price of coffee (Bekere & Megersa, 2021).

By engaging in intercropping, producers can generate employment possibilities for the local population to assist with garden maintenance, transportation, marketing of agricultural products, and investment in the plantation. The 4C certification program's intercropping efforts in the economic dimension will lead to food independence through establishing registered gardens (Ahmad et al., 2023).

A response score of 60 percent indicates that farmers have agreed to the training policy criteria and have access to training plans and materials for training BP Producer workers on the necessary issues to meet 4C requirements. All relevant BP Producer workers are required to receive training on 4C requirements during working hours, with a focus on equality and a risk-based approach (Assefa et al., 2022).

Traceability, or the ability to track and verify the origin and journey of coffee goods, is a mandatory criterion in the 4C certification process. Tracing coffee products is crucial as it provides qualified coffee buyers with the necessary information to ensure the quality of the coffee products they purchase. The coffee traceability system must include the following information: The required information includes the farmer's name, the land acreage, and the specific sort of coffee cultivated. Geographical coordinates of the land, as well as the highest possible yield of crops that can be grown on it. The coffee processing procedures involve drying and product separation. Segregate the storage of certified coffee from non-certified coffee. Segment marketing efforts for certified coffee and non-certified coffee.

Implementing a coffee product traceability system will facilitate the identification of issues with the coffee beans purchased by consumers through a back-tracking system. To ensure the integrity of the supply chain in both directions, it is essential to conduct thorough inspections and verifications if any non-conforming products are identified. Farmers segregate certified coffee products from non-certified ones to enable collectors and exporters to ensure that the coffee originates from plantations enrolled in the 4C certification program (Sellare et al., 2020).

The traceability system is an essential requirement in all third-party verification activities. Exporters, collectors, and farmers must comprehensively explain the coffee produced from registered plantations, using registered numbers or codes. Furthermore, they must ensure that certified coffee is not mixed with non-certified coffee during the production process. Processes including the removal of moisture, the safekeeping of items, and the transportation of goods. Each farmer is provided with traceability through collectors and farmer groups, in the form of a travel record that adheres to the norms of the 4C certification programme. Thus, the backtracking process will be executed by farmers, collectors, and exporters alike, as all three supply chains possess equal access to coffee product backtracking information. The traceability indicators are presented in **table 5**.

The traceability indicator displays a numerical value of 3.59, indicating a state of neutrality or indecision. The criteria and farmers have recognized the significance of implementing a traceability system for certified coffee. This system involves keeping separate records of the volume, stock, and sales of certified coffee, distinct from conventional coffee. Additionally, it is important to accurately record the volume of 4C-certified coffee sold by BP Producers, taking into account the specific areas of land or plots that are registered on the map. The purpose of Business Partners (BPM) Unit 4C

e-ISSN 2655-853X
https://doi.org/10.37637/ab.v7i2.1788

is to prevent the practice of making various claims about certified coffee and to establish a stronger connection between certification and prices for farmers. This is due to the presence of various additional elements that contribute, specifically food security, certification, and worldwide marketplaces (Bray & Neilson, 2017).

Table 5. Coffee farmers' implementation of the 4C certification program on traceability indicators

	Criteria	Average
P 10	Clear procedures for managing traceability are available and implemented	3.38
P 11	4C certified coffee is physically separated from non-4C certified coffee	3.73
P 12	Available records of 4C certified coffee produced on land/plots registered on the 4C Unit Business Partner Map (BPM) (not applicable to small farmers)	3
P 13	Reports on all sales/shipments of 4C certified coffee, and stock including date, volume of 4C certified coffee, and name and address of recipient are available and match the quantities stated on the invoice, and delivery notes.	3.47
P 14	The volume of 4C certified coffee sold by BP Producers is in accordance with the area of land/plots registered on the 4C Unit Business Partner Map (BPM).	4
P 15	P 15 - "Multiple claiming" of certified coffee does not occur, for example selling/sending one batch of certified coffee several times	4
	Total	**3.59**

Implementation in the Social Dimension

The social dimension pertains to the roles and participation in social activities, both within the household setting and on plantations. Interpersonal interaction has a crucial role in achieving sustained development and overall stability (Valkila & Nygren, 2010).

Decent treatment of workers

The engagement of laborers in plantation operations is inextricably linked to the activities of the workers, in order to facilitate work, employers are prohibited from performing capricious measures, including but not limited to:

a. Ensuring the safety of foreign workers or laborers and furnishing them with lodging or cottage facilities
b. Ensuring that no compelled labor or slavery is practiced on behalf of employees.
c. Adhering to the agreed-upon schedule of rest periods and working hours.

The implementation of appropriate worker treatment indicators, as determined by research, receives an average score of 3.7, indicating a neutral or undecided stance. Nevertheless, there were declarations that expressed significant concurrence with the non-existence of coerced evictions, forced labor, and labor provisional involvement in human trafficking. In addition, employers (farmers) have established areas for workers to congregate or lodge complaints in order to ensure their comfort. With regard to remuneration, employers adhere to wage regulations that are deemed valid within the local jurisdiction or as stipulated in verbal agreements. This finding indicates that producers who participate in the certification program are cognizant of the treatment of their employees (Tran & Goto, 2019; Jena & Grote, 2022).

e-ISSN 2655-853X
https://doi.org/10.37637/ab.v7i2.1788

Table 6. Implementation of the 4C certification program by sample coffee farmers on the indicator of proper treatment of workers

	Criteria	Average
P 16	There have been no indications of forced eviction of people, families and/or groups from their homes and communities without mutually agreed compensation since 2006	5
P 17	New land acquisition has been carried out with the free, prior and informed consent (FPIC) of affected people	4
P 18	BP producers do have valid land certificates and/or government permits for the land they work on	5
P 19	There are no forms of forced and bonded labor (no sanctions, punishments and coercion to force workers to work)	5
P 20	BP manufacturers are not involved in human trafficking, for example for labor recruitment	5
P 21	Disciplinary action is in line with national law and internationally recognized human rights (arbitrary punishment in cases of for example illness or pregnancy is prohibited)	5
P 22	Children under the age of 15 (or legal school age) are not part of the permanent workforce	4
P 23	Children under the age of 15 (or legal school age) attend school	4
P 24	Children under 18 years of age do not perform hazardous/hazardous work	4
P 25	Facilities for childcare during parents' working hours are available (not applicable for small farmers)	3.34
P 26	Transport available for BP Producer children and workers to go to school, if necessary (does not apply to small farmers)	3.57
P 27	All workers are free to establish and join labor organizations of their own choice and organize themselves for collective bargaining (does not apply to small farmers)	4.20
P 28	Annual discussions with permanent workers on topics related to working conditions, remuneration, dispute resolution, internal relations and matters of mutual concern take place and are documented (does not apply to small farmers)	4
P 29	The collective agreement with BP Producer workers is communicated and applied to all BP Producer workers (does not apply to small farmers)	4
P 30	An assessment has been carried out to identify whether there are any groups potentially vulnerable to discrimination among BP workers (does not apply to smallholder farmers)	4
P 31	BP Producer ensures that equal rights for its workers are guaranteed with respect to age, gender, national origin, religion, race/colour, physical condition and political views	5

e-ISSN 2655-853X
https://doi.org/10.37637/ab.v7i2.1788

P 32	There is evidence that measures to remove possible barriers that encourage discrimination are being developed (does not apply to small farmers)	3
P 33	There is a policy to respect and protect human rights	4
P 34	There is no form of physical, sexual, psychological or verbal abuse or harassment among workers and in the relationship between BP Manufacturers and their workers	4.20
P 35	There are complaint handling mechanisms such as an anonymous complaint mechanism known to BP Producer workers (does not apply to small farmers)	3
P 36	Appropriate feedback has been provided to BP Producer workers if discrimination or abusive behavior has been reported and concrete action to prevent or resolve it has been implemented (does not apply to small farmers)	3
P 37	There is a policy to promote gender equality among BP Producer workers (does not apply to small farmers)	3
P 38	Employment contracts are in place and adhered to	3
P 39	The working conditions of BP Producer workers comply with legal regulations and/or collective labor agreements	4
P 40	Wages for all workers correspond to at least the national minimum wage or sector agreement (whichever is higher) (does not apply to small farmers)	4
P 41	Remuneration for all workers according to living wages (does not apply to small farmers)	3
P 42	Wages are paid on time (does not apply to small farmers)	4
P 43	Wages paid are documented with payment records or pay slips and a copy is given to the worker (does not apply to small farmers)	3
P 44	Temporary and permanent workers receive the same benefits (excluding wages) (does not apply to small farmers)	4
P 45	Working time for all workers does not exceed 48 hours per week or less if regulated by national law (does not apply to small farmers)	3
P 46	Overtime is voluntary and fully paid for workers, not exceeding 12 hours per week (does not apply to small farmers)	3
P 47	Workers have at least one day off for every six working days and continuous working days never exceed 21 days (does not apply to small farmers)	3
P 48	Workers are entitled to maternity leave and other benefits in accordance with national law (does not apply to small farmers)	3
P 49	Workers who take maternity/natal leave have the right to return to work with the same terms and conditions as their previous job	3
P 50	Negative impacts of BP Producer operations on surrounding communities are assessed and identified (does not apply to small farmers)	3
P 51	Manufacturer BP addresses identified negative impacts	3

e-ISSN 2655-853X
https://doi.org/10.37637/ab.v7i2.1788

P 52	BP Producers support economic development by providing local employment opportunities and service provision (does not apply to small farmers)	3
P 53	Adequate housing is provided to all permanent and temporary workers where necessary (does not apply to small farmers)	3
P 54	Clean and adequate food storage areas, designated rest areas, rain shelter, toilets and handwashing facilities are available on site and accessible to all workers (not applicable to smallholder farmers)	3
P 55	Drinking water is available to Producer BP and all its workers (including subcontracted workers) in sufficient quantities	5
	Total	**3.7**

This is to prevent anything from occurring that could be detrimental to both parties. The conditions pertaining to the workers in question are as follows:

a. Irrespective of ethnic or religious affiliation, every worker is entitled to identical rights and benefits.
b. Prevent the employment of minors.
c. Ensure that individuals perform pesticide applications with adequate training and personal protective equipment.
d. Pregnant women and infants should not be involved in the application of pesticides.

Table 7. Implementation of the 4C certification program by sample coffee farmers on the indicator of proper worker conditions

	Criteria	Average
P 56	A risk assessment has been carried out to identify the main health and safety risks in the workplace.	3
P 57	Health and safety programs are implemented based on risk assessments.	3
P 58	Workers are aware of and trained appropriately in the health and safety risks and measures.	3
P 59	Clear and permanent warning signs are posted in potentially risky areas.	4
P 60	Safe procedures are in place for handling pesticides and hazardous chemicals.	3
P 61	All accidents are documented, appropriate medical care is provided and action is taken to prevent similar accidents in the future.	3
P 62	Health insurance costs and/or medical costs related to work-related injuries and illnesses are borne by business partners.	3
P 63	Breastfeeding women have access to a specific breastfeeding room or place and adequate rest during working hours.	3
P 64	Partner producers and all their workers are trained and equipped with protective clothing and equipment that meets legal requirements.	3
P 65	Protective equipment is in good condition and cleaned regularly	3
P 66	Facilities for dealing with accidents and accidental contamination caused by operators are available and adequately equipped.	2,83
P 67	Workers experiencing disorders are not involved in hazardous work	4,25
P 68	Producer partners diversify their agricultural and/or commercial activities to expand sources of income and/or increase food security.	3,35
P 69	Workers have access to healthy, quality and affordable diets	3,29
	Total	3,17

e-ISSN 2655-853X
https://doi.org/10.37637/ab.v7i2.1788

These results show that the implementation of the worker condition indicator is at point 3.17, which means that farmers are neutral. However, one criterion has a value of 3.83, namely the criterion of Facilities to handle accidents and accidental contamination caused by operators are available and adequately equipped. The low response value indicates that accidents and contamination have not been handled properly. This is due to the location of the plantation, which is far from settlements, and also the minimal availability of health facilities in the village. Health facilities are provided only operating on weekdays and working hours and limited services.

Implementation in the Environmental Dimension

Always prioritize and enforce safety protocols and provisions to protect the surrounding environment. This is done to protect the environment from various activities that endanger the survival of plants and animals and cause damage. Thus, this gave birth to a new development concept, namely SDGs or sustainable development goals. Sustainable Development Goals are development that maintains the improvement of people's economic welfare in a sustainable manner, development that maintains the sustainability of community society, development that maintains the quality of the environment and development that guarantees justice and the implementation of governance that is able to maintain the improvement of the quality of life from one generation to the next (Asaju, 2022).

Protection of Biodiversity and Carbon Stocks

A conscientious attitude towards the environment is essential to ensure environmental preservation and protection. Plant area expansion is frequently pursued to enhance production yields, often without consideration for the preexisting environmental impacts and aspects. At least one location where new gardens are being established requires the clearance of forest regions that are, in fact, protected ecosystems. As a result of inadequate oversight and punitive measures against individuals responsible for forest encroachment, this action was taken (Mardiah et al., 2019).

It is common for farmers and the broader community to disregard the food chain and ecosystem. In an environment where capturing and maintaining a substantial number of birds is routine. Each member gains knowledge through certification activities on safeguarding the ecosystem and avoiding hunting, particularly protected animals.

In order to preserve carbon reserves and safeguard indigenous vegetation, coffee plantation regions engage in protective tree planting initiatives. The purpose of shade trees is to provide protection for coffee plants during the dry season and to act as wind and water barriers during the wet season. Typical shade tree species consist of *Erythrina variegata*, *Senna siamea*, avocado, *Pithecellobium jiringa*, *Gliricidia sepium*, and *Leucaena leucocephala*. The execution of carbon stock indicators and biodiversity protection is detailed in Table 8.

According to the research table concerning the protection and biodiversity criteria, the average implementation score is 3.21. This indicates that farmers express a neutral or undecided stance regarding this indicator. The farmer expressed strong agreement in response to the criterion that no genetically modified organisms be used in coffee production. This is evident from the coffee seeds utilized by the farmers, most of which have been harvested from coffee trees planted decades ago and handed down through generations (Mojo et al., 2017). Climate change is also a global natural phenomenon that has attracted the world's attention, which also needs to be anticipated by coffee farmers so that it does not have a negative impact, namely a decrease in coffee production, including the need for replanting, land extensification, and

e-ISSN 2655-853X
https://doi.org/10.37637/ab.v7i2.1788

intensification of the production process that is more optimal by coffee farmers. In addition, it is accompanied by maintenance to maintain its quality (Prasetyo et al., 2017).

Table 8. Coffee farmers' implementation of the 4C certification program on biodiversity and carbon stock protection indicators

	Criteria	Average
P 70	There has been no logging, destruction or conversion of primary forests and protected areas into coffee plantations since 2006	3
P 71	There is an action plan to protect and restore areas with high biodiversity, natural vegetation, fauna, land and water resources, as well as sensitive areas	3.10
P 72	Actions from the action plan for the protection and restoration of areas with high biodiversity, natural vegetation, fauna, land and water resources and sensitive areas are implemented	3
P 73	There is no hunting or catching of protected species	3
P 74	There is no use of GMOs in coffee cultivation	4.15
P 75	Climate change risks to coffee production have been identified and measures to adapt and reduce these risks have been implemented	3
	Total	3,52

CONCLUSION

Farmers who participated in the 4C certification program have expressed their agreement on the economic, social, and environmental aspects. Regarding the environmental aspect, we agree; however, there are a number of essential points that are neglected, especially the limitation of pesticide use, considering that contemporary farmers are accustomed to using insecticides and herbicides. As a result of the community and farmers' concern for biodiversity conservation, farmers continue to expand their plantation areas through the opening of extensive protected forests.

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