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Development of Indonesian Organic Agrifood: Certification Process and Issues

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Abstract. The global growth of organic agrifood has also reached Indonesia, creating opportunities and challenges for smallholder farmers. This study aims to explore the certification process and identify key barriers to obtaining organic certification for Indonesian agricultural products. Using a qualitative case study approach, data were collected through in-depth interviews with three certified organic farming groups in Central Java—each producing rice, vegetables, or coffee. Data analysis was conducted using descriptive methods and graphical tools such as spider charts. The findings reveal that both pre-certification and certification stages typically require three months, not including land conversion, which may be shortened if prior organic practices are recognized. Major challenges during these stages include business planning, seed availability, group coordination, investment capital, pest management, and contamination prevention. These issues are rooted in limited knowledge and technical skills regarding organic standards and practices. Technological interventions—such as the use of ozone plasma, Internet of Things (IoT), and mobile cold storage—were found to support compliance and productivity, particularly in vegetable farming. However, constraints such as land fatigue, lack of rotation, limited access to organic inputs, and high certification costs persist. The study suggests that improved training, mentoring, institutional support, and access to organic inputs are essential to overcoming certification barriers and strengthening farmers' participation in organic value chains. These insights offer practical implications for policymakers and stakeholders to promote sustainable organic farming in Indonesia.

Keywords: organic certification; organic food; certification barriers; value chain

INTRODUCTION

The global organic food industry has demonstrated a consistent pattern of annual growth, including in Indonesia. The expansion of Indonesia's organic agriculture sector has reached 15-20% (IFOAM, 2023), driven by increasing consumer purchasing power. Currently, 15% of the world's agricultural land is organic, with a growth rate of 1.6%. This represents an increase of 1.1 million hectares and 3.1 million organic producers. Of these, 51% are located in Asia, 27% in Africa, 14% in Europe, and 7% in Latin America (IFOAM, 2023). In 2019, global organic food sales exceeded 106 billion euros, with the largest organic markets being the United States (44.7 billion euros), Germany (12.0 billion euros), and France (9.1 billion euros) (IFOAM, 2023).

The expansion of Indonesia's organic agriculture sector has reached 13,5% (David and Alkausar, 2023), driven by increasing consumer purchasing power. The data on the organic agricultural land area is presented in Table 1.

Table 1. Organic agricultural land area in Indonesia

Year	Land Area (Ha)
2019	494,727
2020	463,735
2021	419,922
2022	476,611

Currently, the organic agricultural products produced in Indonesia are diverse and include rice, vegetables, bananas, oranges, coffee, coconut, cocoa, and honey (Tridjaja Nyoman Oka, 2016; David and Ardiansyah, 2017). Among these organic agricultural products, organic rice and vegetables are primarily produced by small farmers and are predominantly marketed for the local market(Lindawati *et al.*, 2024). This trend arises because organic rice and vegetables are staple products purchased by Indonesian consumers (Methamontri *et al.*, 2022). Nevertheless, Indonesian organic rice

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and coffee have been exported to countries such as the United States, France, and Germany(David and Ardiansyah, 2017; Oktarina, Sebagustionnes and Mukhlis, 2024). Furthermore, Indonesian organic agricultural production has increased significantly; for example, as Asia's largest organic coffee producer, there has been a 33% expansion in the area of certified organic coffee plantations in Indonesia, rising from approximately 40,000 hectares in 2016 to 60,000 hectares in 2019 (AOI, 2020).

The global demand for organic products continues to increase, driven by heightened public awareness of healthy lifestyles and environmental concerns (Flynn *et al.*, 2019). These changes necessitate assurances that agricultural products possess food safety, sustainable attributes, and high nutritional content (Sulistyana, Mulyo and Jamhari, 2016). Moreover, the growing awareness of the potential hazards and risks associated with chemical use in agriculture (Szocs *et al.*, 2017)has rendered organic farming an increasingly appealing option for both producers and consumers. Organic food products are cultivated using organic farming practices that rely on natural materials and minimize or eliminate chemical inputs (Dlamini and Kongolo, 2014). In general, organic farming adheres to three fundamental principles: environmental (biodiversity), social (employment and health), and economic (competitiveness and income) principles (Sulistyana, Mulyo and Jamhari, 2016). Thus, organic farming represents a viable alternative for sustainable agricultural development, including in Indonesia.

However, one of the main challenges faced in developing the Indonesian organic agrifood value chain pertains to organic certification (David and Ardiansyah, 2017). As a prerequisite for participation in the organic food market, organic certification is a crucial element for farmers, as it guarantees the quality of their products and facilitates expansion into international markets. The research of (Leitner and Vogl, 2020; Kamau *et al.*, 2022) compares the sustainability between certified organic farming and conventional farming that show conventional farming faces limitations in market access, typically confined to local or informal markets where products are sold at lower prices. Additionally, organic certification can enhance the value of Indonesian farmers' products and potentially increase their market competitiveness (Ibnu, Offermans and Glasbergen, 2018). To obtain a legal certificate, producers must undergo a certification process with an accredited certification body. Currently, there are eight accredited certification bodies in Indonesia, known as *Lembaga Sertifikasi Organik (LSO)*, each of which provides certification for a wide range of products (BSN, 2024). Furthermore, empirical research regarding the organic certification process remains limited. The majority of empirical studies in Indonesian organic farming focus on socio-economic contexts, consumer behavior, soil and water management, regulatory transformations, and plant protection (David and Ardiansyah, 2017). Given these considerations, understanding the organic product certification process and the challenges faced by farmers in applying for organic certification is crucial(Novita, 2015; Hadi *et al.*, 2016). Therefore, this research aims to examine the processes and issues associated with organic certification for Indonesian agricultural products.

METHODS

This research employed a case study approach. The study was conducted in three different farmer groups in Central Java that produce organic products: rice (Ketapang Village, Semarang), vegetables (Kopeng Village, Semarang), and coffee (Kalimanggis Village, Temanggung). The research location was selected purposively, based on the deliberate consideration that the area includes organic farmers with high production potential and established organic farming groups. These organic farmer groups are certified by Indonesian organic certification bodies and sell their organic products in the

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market. Data were collected through in-depth interviews with three key informants who possess a comprehensive understanding of the organic food certification process and the implementation of organic food business strategies. The key informants included the head of Paguyuban Petani Al-Barokah (organic rice), the head of Kelompok Tani Citra Muda (organic vegetables), and the Internal Inspector of Gapoktan Nunggal Roso (organic coffee). The selected farmer groups were chosen using purposive sampling, as they had already developed an organic agribusiness and obtained official certification. Additionally, extension officers (BPP) were interviewed as government representatives to triangulate the data. Data triangulation was applied in this study to ensure the validity of the data. The data collection took place from February 6 to February 19, 2024.

Table 2. Organic farms' profiles

Case Study 1	
Name of business	Paguyuban Petani Al-Barokah
Name of entrepreneur	Drs. Mustofa
Crops	Organic rice
Certification body	INOFICE (062-INOFICE/LSO-003-IDN/01/22)
Start of organic business	1998
Channels	Online (web), offline (koperasi Tani KSU Gardu Tani Al-Barokah)
Customer segments	Individuals particularly conscious of healthy living principles
Case Study 2	
Name of business	Kelompok Tani Citra Muda
Name of entrepreneur	Shofyan Adi Cahyono, SP
Crops	Organic vegetables
Certification body	INOFICE (472-INOFICE/LSO-003-IDN/12/22)
Start of organic business	2010
Channels	Online (web, Instagram, WhatsApp, Facebook), offline
Customer segments	Individuals particularly conscious of healthy living principles
Case Study 3	
Name of business	Gapoktan Nunggal Roso
Name of entrepreneur	Pariyanto
Crops	Organic coffee
Certification body	PT Icert Agritama Internasional (ICERT-5029/E.1/LSO-009- IDN/III/19)
Start of organic business	2010
Channels	Offline
Customer segments	Export companies, collectors, and coffee entrepreneurs

The data were analyzed using descriptive and graphical analysis, including spider charts. The data analysis process, derived from the three case studies of organic rice, vegetables, and coffee, began with data reduction, followed by data presentation, conclusion drawing, and verification of results. The certification process was subjected to quantitative analysis to assess producers' perceptions regarding the issues and obstacles encountered at each stage of the pre-certification and certification process, including the time required to complete each phase.

The analysis utilized a Likert scale, with scores ranging from 1 to 5. A Likert scale value of 1 indicates that the issues or challenges faced are complicated to overcome, while a score approaching five suggests that the issues or challenges are easily manageable. A Likert scale value of 1 also signifies that the pre-certification and certification processes require a considerable amount of time. In contrast, a value of 5 indicates that the process is completed quickly. Subsequently, the results of all Likert scale scores were presented in a spider chart using MS Excel.

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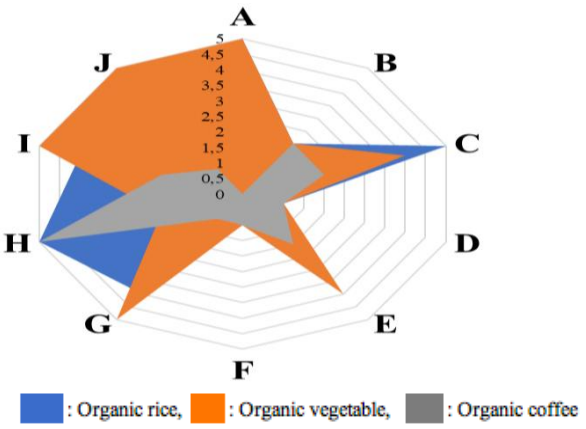
RESULTS AND DISCUSSION

The three cases of organic farming—Paguyuban Petani Al-Barokah (organic rice), Kelompok Tani Citra Muda (organic vegetables), and Gapoktan Nunggal Roso (organic coffee)—exhibit both similarities and differences in their experiences during the pre-certification and certification processes. **Table 3** presents a detailed overview of their organic certification processes, including time requirements, challenges, and obstacles encountered in both the pre-certification and certification phases for their respective organic products. The three organic farming groups require a similar amount of time for their pre-certification processes, largely due to the assistance provided by the government through the *1,000 Village Program*. Common issues and obstacles are encountered regarding the standards of organic certification and the limitations in knowledge, skills, and awareness among farmers (Gaspar *et al.*, 2022; Shah *et al.*, 2023). The certification process necessitates revision to address these emerging issues. The transition from conventional to organic agriculture is a lengthy and costly undertaking, resulting in a decline in productivity (Lien *et al.*, 2022). Furthermore, the preservation of local varieties, management of land fertility, and pest control in the context of Optimal Pest Management (OPT) require significant attention (Rohe *et al.*, 2022).

The organic rice production of Paguyuban Petani Al-Barokah typically employs the Internet of Things (IoT) for the maintenance and management of the organic processes and land on a four-month cycle. The organic vegetable production characteristics of Kelompok Tani Citra Muda include the use of ozone plasma for sterilizing organic products, greenhouses for maximizing vegetable yield, and mobile cold storage units for maintaining appropriate temperatures for organic products. A distinctive feature of the organic coffee business is the rejuvenation of coffee trees, typically performed every seven to nine years, in cases where the trees are identified as not bearing fruit to their fullest potential. These characteristics reflect the efforts made to address existing issues and constraints.



Note:
A. Training
B. Mentoring
C. Land conversion
D. Maintenance of organic management
E. Types of production on land
F. Contamination prevention
G. Land management, soil fertility and water
H. Selection of plants and varieties
I. Ecosystem and diversity management
J. Pest and disease management

Figure 1. Time required for pre-certification and certification processes

Figure 1 illustrates the rapid implementation of training activities in the pre-certification process, which is completed in a single day. In contrast, the mentoring process is a more extended undertaking, spanning two months. Generally, the certification process for implementing activities related to the selection of plants for business purposes—particularly those pertaining to the cultivation of organic rice and coffee—progresses relatively rapidly. Conversely, the cultivation of organic vegetables progresses more slowly and gradually due to the diversity of cultivated varieties.

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Table 3. Pre-certification and certification processes for organic rice of paguyuban petani al-barokah, organic vegetables of kelompok tani citra muda, and organic coffee of gapoktan nunggal roso

Process	Time	Issue	Constraint
Pre-certification			
Training	• One day (rice and vegetables)	• The production of pesticides • The processing of organic fertilizers • Seeding cultivation techniques • Post-harvest management • Group dynamics • The formulation of business plans	• Lack of knowledge and skills
Mentoring	• Two months	• The following document serves as a compilation of relevant information • The formation of the Internal Control System (ICS)	• Lack capacity to create documents • Inconsistency in the implementation of organic agriculture
Certification			
Land conversion	• No land conversion when first applying for certification (rice, coffee) • Land conversion may be carried out for three months.	• A prolonged period is required • Notable decline in productivity • Essential to secure financial resources, encompassing initial investment and financing required during the transition period	• Low yields and income during the transition period • Lack of knowledge
Organic maintenance management	• Continuous observation and assessment of the growth and development of organic plants • Use of IoT • Utilization of ozone plasma, greenhouses, and mobile cold storage	• Consistent use of land for organic agricultural production • Production input, imports • Investment term length (to improve soil health)	• Lack of knowledge • Need to consistently apply standards • High cost of organic inputs and certification
Type of production on land	• No crop rotation (rice, coffee) • Monthly changes, a variety of general changes based on consumer requests	• Continuous planting of the same crop in the same location can lead to land fatigue, as observed in the cultivation of rice and coffee • Using low-efficiency tools (machines) such as tractors, harvesters, and land processors can also impact the ecosystem	• Insufficient stock of nutrition-specific items (rice and coffee) • Delayed land restoration (rice and coffee) • Limited variety of rotational plants (rice and coffee) • Inadequate variety of supporting plants (rice and coffee) • Lack of comprehensive knowledge • Cost, logistics, and marketing challenges

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Process	Time	Issue	Constraint
Prevention of contamination	• During organic cultivation	• Utilization of border and companion plants along highways • Implementation of tools and machines designed for organic products • Implementation of drying and milling procedures that prevent contamination from non-organic products • Designation of a special warehouse for organic products • Implementation of appropriate packaging	• Seeds treated with pesticides or genetically modified organisms (GMOs) • Adherence to organic standards
Land management, fertility, and water	• Land processing every six months • Monthly irrigation frequency varies by specific varieties planted	• Essential to optimize plant rotation and use of natural cover materials (e.g., mulch) to maintain soil fertility • Organic soil fertility management requires a comprehensive understanding of intrinsic plant characteristics and nutrient needs	• Limited knowledge • Intensive land preparation is needed, requiring more time for crops to grow (rice and vegetables) • Changes in precipitation patterns, including rainfall and temperature, can impact planting schedules and water requirements.
Selection of plants and varieties	• Fixed (rice and coffee) • Monthly variations based on consumer requests	• Preservation of local varieties • Resistance to disease • Several organic varieties have been observed to exhibit greater productivity than their conventional counterparts	• Availability of seeds or varieties that meet organic standards • Limited training and counselling services related to variety selection
Management of ecosystems and diversity in production	• Organic planting every six months • Monthly changes based on the varieties planted • Replacement of trees aged seven to nine years is recommended	• Enhancement of biological diversity among plant species, soil microbes, and natural pest populations • Mitigation of pollution risks to land, water, and air	• Ownership of narrow land • Lack of knowledge • Consistency of implementation
OPT Management	• Biopesticides	• Management of crop predators • Utilization of biopesticides (Rice and Vegetables)	• Ongoing need for awareness regarding the significance of effective pest management practices

Note: :organic rice : Organic vegetables : Organic coffee : All organic product

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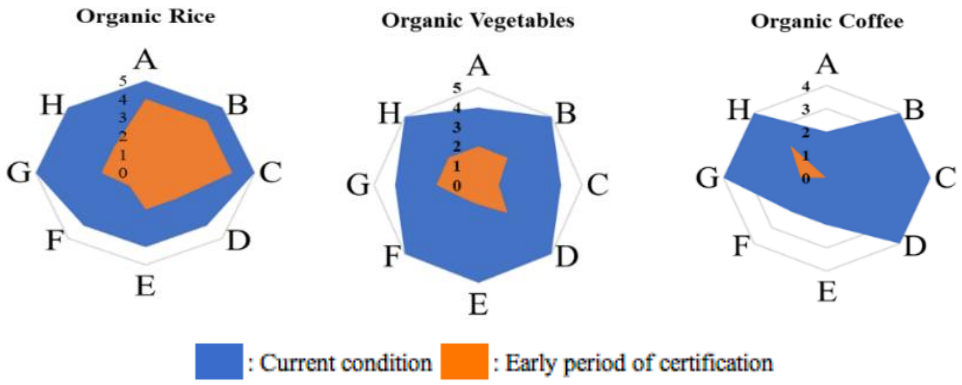

Note: A represents the making of natural pesticides, B indicates organic fertilizer management, C denotes seeding cultivation techniques, D refers topost-harvest management, E signifies group dynamics, F is the preparation of a business plan, G denotes document preparation, and H indicates Internal Control System (ICS) creation.

Figure 2. Issues in the pre-certification process

Unfortunately, there is no rotation of organic rice and coffee. The ongoing activities associated with the certification process are lengthy, particularly concerning the maintenance management of organic products (Jolink and Niesten, 2015; Borrello *et al.*, 2022). This is primarily because the business involved must undertake maintenance procedures throughout the product lifecycle, from preparation and production to consumer distribution (Donner *et al.*, 2021; Baird, 2024).

Figure 2 illustrates the various issues encountered by the business during the initial stages of certification, which are generally challenging. However, the problems that arise during this period can often be addressed effectively, as evidenced by the management of organic fertilizers. The business provides training in the production of organic fertilizers and implementation support to enhance farmers' knowledge, skills, and abilities sustainably (Truong, Lang and Conroy, 2022).Furthermore, the business has established training programs in organic agriculture and has received awards for its contributions to the advancement of the field.

The pre-certification process for organic rice produced by Paguyuban Petani Al-Barokah has now commenced, and the most challenging aspect of this process is compiling the relevant business plan. The business has not yet formulated a previous business plan, as the focus is primarily on production and sales outcomes. Current circumstances facilitate the resolution of this issue, as farmers' understanding and expertise in organic cultivation have already been enhanced through beneficial training (Dudin *et al.*, 2015; Joyce and Paquin, 2016). The pre-certification process for organic vegetables presents significant challenges, particularly concerning seeding and group dynamics. Farmers cannot produce their own seeds for local vegetables and must instead purchase them from agricultural stores. For instance, certain varieties of broccoli and cabbage are not currently available as certified organic products.

Consequently, these seeds must be imported or purchased as inorganic seeds, which need to be washed prior to use. This presents a relatively straightforward issue, particularly concerning group dynamics. At the outset of the pre-certification period, the internal control system (ICS) and the organizational structure of the farmer group had yet to be established. The group comprised a chairman, vice chairman, secretary, and treasurer. Following the provision of training and mentoring, the ICS was established, and three divisions were constituted: the production division, the marketing division, and the training division

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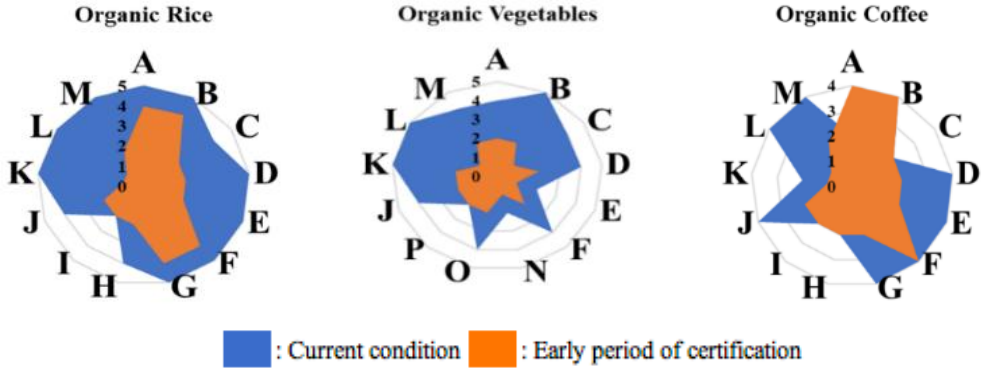
(*Pusat Pelatihan Pertanian dan Pedesaan Swadaya*, P4S). The establishment of these divisions allows for a more comprehensive range of activities, thereby increasing income potential (Ibnu, Offermans and Glasbergen, 2018; Yang, Liu and Luo, 2023). The individual responsible for the organic coffee business has yet to receive training at the outset of the certification process. The organic coffee business obtained an organic certificate through the "1,000 Desa Organik" program. However, it also received external assistance. In the initial stages of the pre-certification process, document compilation proved particularly challenging due to the limitations in the perpetrator's ability to compile documents. Nevertheless, with external support, this task became considerably more straightforward.



Note: A indicates land conversion takes a long time, B denotes decreased productivity, C refers to capital requirements, D signifies consistency of organic land use, E represents local production inputs, F indicates long-term investment, G denotes soil degradation, H refers to the development of pests, I signifies lack of biodiversity, J indicates the application of buffer zones and border plants, K denotes the use of specialized organic tools and machines, L signifies the establishment of organic specialty warehouses, M refers to packaging, N indicates low tool efficiency, O denotes complications with crop rotation, and P signifies the requirement for more intensive labor.

Figure 3. Issues in the certification process

Figure 3 illustrates the difficulties encountered during the certification process for organic products in the agricultural sector. At the outset of the certification process, a significant challenge arises concerning the availability of specialized tools, machinery, and storage facilities for organic products. This issue arises from a lack of capital to procure the requisite tools, machinery, and storage facilities necessary to meet the standards outlined in organic regulations. However, some measures have been implemented to address this issue, such as the consistent use of organic land. Farmers primarily cultivate both organic and non-organic products, with some also engaging in the cultivation of inorganic products. Additionally, the current circumstances influence the initial investment decisions made at the beginning of the transition period, resulting in a lack of productivity gains within the agricultural sector (Luna, Chalit Hernandez and Sawadogo, 2021; Solfanelli *et al.*, 2021).

The certification process for organic rice produced by Paguyuban Petani Al-Barokah was initially challenging due to difficulties in managing pests and diseases, as farmers had previously relied on chemical pesticides. Consistent compliance with organic agricultural practices remains a challenge for farmers. However, the entity responsible for producing organic rice has now acquired the necessary knowledge and skills to manufacture natural pesticides and has established a pesticide bank. The initial implementation of the organic vegetable

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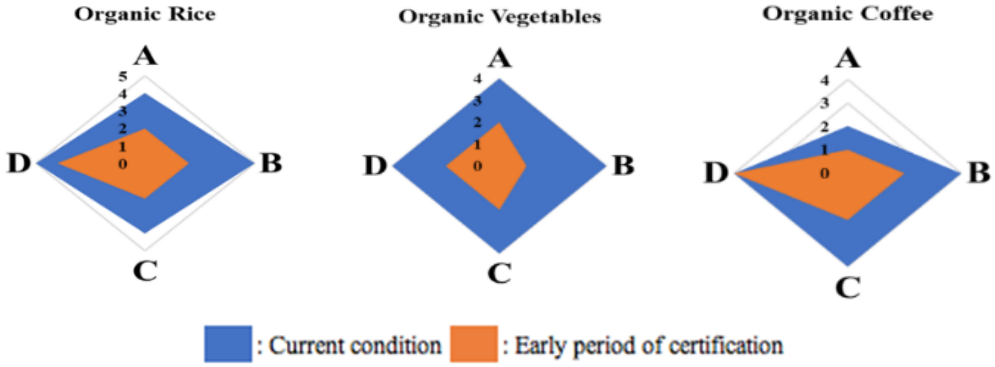
certification process encountered several challenges, primarily related to financial constraints and the vulnerability of vegetable crops to climatic fluctuations. When the Kelompok Tani Citra Muda's vegetable business was in its infancy, it lacked the infrastructure and machinery to support its activities. This infrastructure included a greenhouse, a warehouse, an ozone plasma machine, and a mobile cold storage unit. Such resources represent an innovative approach to enhancing the quality and quantity of organic vegetables (Clark and Martínez, 2016; Ramadhan, Najib and Sarma, 2020). One of the critical challenges in the organic coffee industry is preventing contamination during the initial stages of the certification process. However, once the contamination prevention measures have been established, a buffer zone is constituted by two lines of coffee plants (a minimum of four meters apart) managed organically. Furthermore, farmers recognize the necessity of storing coffee in a dedicated organic coffee warehouse.



Note: A denotes limitations in knowledge, B signifies skill limitations, C indicates limitations in document preparation, and D refers to the consistency of implementation.

Figure 4. Constraints in the pre-certification process

Figure 4 illustrates the challenges encountered during the pre-certification phase. Generally, the obstacles faced can be attributed to limitations in knowledge and skills related to organic farming system standards, strategies for building an organic business, and manufacturing pesticide-free and organic fertilizers, as well as cultivation techniques, seeding, management of the post-harvest process, group dynamics, and the compilation of a business plan. Nevertheless, these challenges can be surmounted through training provided by government programs and the empowerment of entrepreneurs (Oya, Schaefer and Skalidou, 2018). The organic rice of Paguyuban Petani Al-Barokah, organic vegetables of Kelompok Tani Citra Muda, and organic coffee of Gapoktan Nunggal Roso currently consistently implement organic standards. This consistency is influenced by the strict supervision conducted by the Lembaga Sertifikasi Organik (LSO). Following the issuance of organic certification, the LSO conducts annual inspections of the business premises, both scheduled and unscheduled.

As illustrated in Figure 5, the primary challenges encountered at the outset of the certification process pertain to a lack of credit, which impedes the acquisition of the capital necessary to cover certification fees and invest in tools, machinery, and infrastructure for organic farming. However, the initial certification expenses were borne by the government through the Go Organic and *1,000 Desa Organik* programs. At the time of this study, the organic rice of Paguyuban Petani Al-Barokah and the organic vegetables of Kelompok Tani Citra Muda had already completed the certification process at no cost to the producers. In contrast, the buyer incurred the expenses associated with the organic coffee business. The organic rice business faced constraints at

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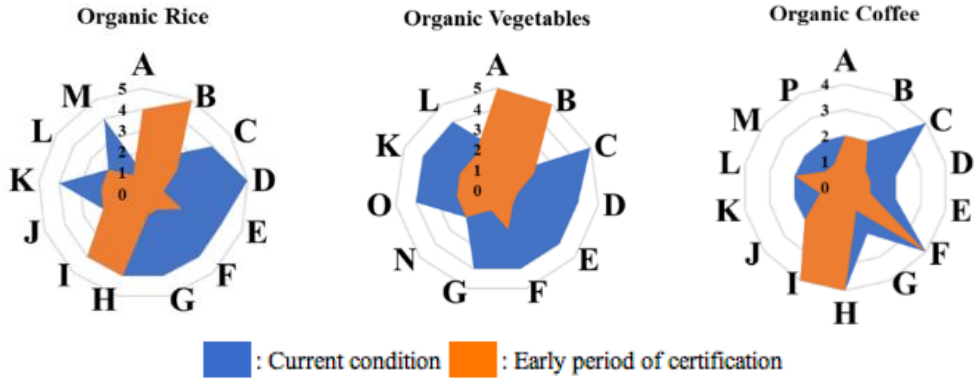
the outset of the certification process due to a lack of training and counseling resources, which limited the variety of products that could be produced (Kuehne *et al.*, 2017).



Note: A refers to a decrease in income (transition period), B indicates uncertainty in harvest results (transition period), C denotes a limitation of knowledge, D represents a lack of access to credit, E signifies consistency in standard application, F pertains to the high cost of organic farming, G denotes expensive certification fees, H indicates depletion of specific nutrients, I refers to slow soil recovery, J highlights limitations in crop rotation, K concerns land directly bordered by inorganic land, L involves changes in rainfall and temperature, M addresses limited training and extension of superior varieties, N represents high marketing logistics costs, O pertains to pesticide/GMO contaminated seeds, and P signifies a lack of awareness in handling Organisms that Disturb Plants (OPT).

Figure 5. Constraints in the certification process

The capacity to produce seed-quality local rice in seed banks is already established. The business engaged in organic vegetable production has encountered several challenges during the initial stages of the certification process, including high logistics costs. At the outset of the certification process, this business also initiated efforts to secure market share by offering products through door-to-door sales. Nevertheless, costs can be mitigated once a marketing division is established, which is responsible for both promotional activities and the recording of sales over a one-week period (Delmas and Gergaud, 2021). Furthermore, costs associated with delivery to locations outside urban areas and islands will be discussed with consumers and charged accordingly. The organic coffee business faced obstacles during the certification process due to a lack of awareness regarding the handling of Organisms that Disturb Plants (OPT). At that time, the management of OPT was minimal, consisting primarily of natural preservation methods and the pruning of infected coffee trees (Ibanez and Blackman, 2016).

Based on the results, several policy recommendations and practical solutions are proposed to strengthen the development of organic agriculture in Indonesia. These include improving access to training and education, providing financial support and infrastructure to enhance certification readiness, strengthening ICS within farmer groups, and facilitating access to organic seeds (Taufiq *et al.*, 2023; Wirda *et al.*, 2023; Wirasta *et al.*, 2024). Additionally, enhancing digital tools, building stronger partnerships with certification bodies, and supporting market access (Indriyani and Suri, 2020; Ni Putu Manik Julythiawati and Putu Agus Ardiana, 2023; Ningsih, 2024). These integrated efforts are essential to accelerating certification procedures and promoting a sustainable organic farming system.

CONCLUSION

The findings of this study indicate that the pre-certification and certification

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processes typically require three months, excluding the time needed for land conversion. If the land has already undergone organic preparation, this can be acknowledged at the time of registration, thereby reducing the conversion period. This has been observed in cases of organic rice and coffee cultivation. Furthermore, the research revealed that farmers face similar issues in both the pre-certification and certification stages. These include the development of a business plan, seed procurement, group dynamics, investment capital, pest and disease management, and the prevention of organic product contamination. These challenges stem from a lack of knowledge and skills among farmers regarding organic farming practices. The practical recommendations for stakeholders include providing training, guidance, supervision, and funding schemes to support the sustainability and compliance with organic standards. Future research may explore different regional contexts or case studies.

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