Organic Farming as an Innovative Farming System Development Model toward Sustainable Agriculture in Bali

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ABSTRACT

Organic farming has been promoted and developed in Bali since 2006 by the government in collaboration with private businesses and certification bodies. This research aimed to synthesize the development of Balinese organic production as an effort toward sustainable agriculture. Data from the in-depth interview and critical review were analyzed. As of 2012, the following have been certified as organic farms: 22 groups of food crop and horticulture farms such as rice/red rice, vegetables, flowers, salak, grape, mangosteen, papaya, banana, ginger, red onion, and mushroom; 8 groups of cashew farms; and 7 groups of coffee farms. The Balinese organic production systems are potentially sustainable since the sustainability criteria were fulfilled. Many constraint factors affect organic production in Bali, including limited organic fertilizer sources, limited fresh irrigation water resource, certification budget availability, and buyers who are willing to pay a premium for organic products. Success in removing the constraint factors would pave the way for sustainable organic agriculture in Bali.

Keywords: organic farming system, constraint factors, sustainable agriculture
JEL Classification: Q1

INTRODUCTION

The economy of Bali Province in Indonesia depends on three sectors: agriculture (primary), industry (secondary), and tourism (tertiary). Agriculture, which contributed 18.08 percent to Bali's economy in 2011 (Regional Development Plan Agency of Bali Province 2012), plays a vital role in ensuring food security, alleviating poverty, and conserving vital natural resources.

Organic farming system is a sustainable way of farming (Ghimire 2002; Budiasa 2011); it considers important aspects like sustainable natural resources and environment. It supports the Bali Clean and Green Program. The development of organic farming in Bali enjoys support from the Integrated Farming System Program (known as SIMANTRI). From 2009 to 2012, LeSOS[1] (Lembaga Sertifikasi Organik Seloliman) certified 22 groups of food crop and horticulture farms as subscribing to organic farming requirements (Food Crop Agricultural Agency of Bali Province 2013a). Some farm groups of estate commodities were also certified nationally and some even internationally. For example, cashew and coffee farming systems were certified as organic, whereas a cocoa farming system was certified as sustainable (Estate Agency of Bali Province 2013).

The study attempts to answer the following questions: (1) How can organic farming in Bali be made sustainable? and (2) What are the main constraint factors in developing organic farming in Bali? This research aims to synthesize information on the development of organic production as an innovative model of a sustainable farming system in Bali.

METHODOLOGY

Snowball purposive sampling method was used to choose the stakeholders who served as key informants in the research. They came from the Food Crop Agricultural Agency of Bali Province, Estate Agency of Bali Province, certification body, Udayana University, organic farm groups, organic fertilizer producers, and organic product traders and/or supermarkets. In-depth interviews were conducted with some of the sources to collect primary and secondary data. Existing literature on organic production were also critically reviewed. The collected data were analyzed qualitatively.

RESULTS AND DISCCUSSION

Organic Farming System Concepts

Organic farming system is a holistic and unique production management system that promotes and enhances agroecosystem health, including biodiversity, biological cycles, and soil biological activity to optimize crop production. This is accomplished by using on-farm agronomic, biological, and mechanical methods in exclusion of all synthetic off-farm inputs (Watson et al. 2002; CGSB 2006). Ghimire (2002) emphasizes two major aspects in the organic farming: the use of manure and other organic matter as fertilizers and the use of biological instead of chemical pest control.

Organic production mainly aims to develop enterprises that are sustainable and harmonious with the environment (CGSB 2006).

1 LeSOS is one of the first Indonesian bio-certification organizations located in East Java, Indonesia. In November 2007, LeSOS was granted the authority to certify at a national level.

The four principles of organic agriculture, according to the International Federation of Organic Agriculture Movements (IMO 2007), are as follows:

1. Organic agriculture should sustain and enhance the health of soil, plant, animal, human, and planet as one and indivisible (principle of health).
2. Organic agriculture should be based on living ecological systems and cycles, work with them, emulate them, and help sustain them (principle of ecology).
3. Organic agriculture should build on relationships that ensure fairness with regard to the common environment and life opportunities (principle of fairness).
4. Organic agriculture should be managed in a precautionary and responsible manner to protect the health and well-being of current and future generations and the environment (principle of care).

A fundamental difference between management of organic and conventional systems is the way problems are addressed. Conventional agriculture often relies on targeted short-term solutions (e.g., application of a soluble fertilizer or herbicide). Organic agriculture is not based exclusively on short-term economics, but also considers ecological concepts. It uses a strategically different approach, which relies on longer-term solutions (preventive rather than reactive) at the system level. An example is the importance of rotation design for nutrient cycling and conservation as well as weed, pest, and disease control (Ghimire 2002; Watson et al. 2002). The essential components of an organic farming system (Ghimire 2002) are: crop and soil management, on-farm waste recycling, nonchemical weed management, and integrated intensive farming system.

Organic farming is the only sustainable farming system that has been legally defined (Watson et al. 2002). It is a method of agricultural production, including any subsequent preparation in agronomic activities, which emphasizes careful processing and handling methods, storage, and transportation. It conforms to organic production systems management standard in order to maintain the organic integrity and vital qualities of the products (CGSB 2006). The general standards for organic farming are provided in the *Internal Control System (ICS) Guidance Manual*, developed by the Institute for Market Ecology (IMO) in behalf of IFOAM (International Foundation of Organic Agriculture Movements), with funding from the IFOAM Growing Organic program (I-GO). I-GO, which aims to strengthen the organic agriculture movement in developing countries, is mainly supported by Hivos (The Netherlands) and the Biodiversity Fund of the Dutch Government. IMO also developed a training curriculum on setting up and harmonizing the ICS for the producer group (IMO 2007).

Developed countries (e.g., USA, Japan, and EU members) are the largest market of organic products. Within the EU, crop and livestock products sold as organic must be certified under EC Regulation 2092/91 and 1804/99. In the UK, the UK Register of Organic Food Standards implements this legislation; it licenses a number of certification bodies, such as the Soil Association, to inspect and certify organic farms to ensure that organic production practices are followed. Japan has been using Japan Agriculture Standard since 1 April 2001; the United States has been using the US National Organic Standards since October 2002. Although the different bodies' regulations differ in detail, they all aim to create an economically and environmentally sustainable form of agriculture that emphasizes self-sustaining biological systems rather than reliance on external inputs (Watson et al. 2002).

Producers or exporters who trade organic products must follow the organic certification

process. That is, an accredited certification body provides a written assurance that products or production systems conform to specified requirements. Certification of products may be based on a range of inspection activities, including verification of management practices, audit of quality assurance systems, and in/out production balances (CGSB 2006). Within Japan, all labeled organic products certified by a registered certification organization (RCO) must include the JAS logo and name of the certification organization.

Currently, organic certification in a developing country is conducted by an inspector of the certification body invited from the importing country. The advantage at the exporter's side is that the name and logo of the certification body, which are included on the label, could already be familiar to the consumers, hence, lending credence to the organic product. The certification process could be costly, however, because the inspector comes from the importing country. One of the ways producers can minimize cost is through recruitment of local staff as branch officers within the producer country by the organic certification body. A certification body within the developing country or exporting country that is accredited by the importing country could also certify the organic production. However, this may be more difficult and time consuming in terms of establishing international accreditation for the local certification body. The best way would be for a local certification body to collaborate with an international certification agency. The former's role would be to inspect and certify organic farms; the latter's role would be to evaluate the certification procedure and to issue the certificate.

Development of an Organic Farming System in Bali

For an organic farming system to be sustainable, it must be economically viable, environmentally sound, socially just and acceptable, and culturally and technically appropriate (SEARCA 1995). The profitability of organic farms depends on the higher prices that their products command in the marketplace. Organic production is environmentally sound because it applies on-farm good agricultural practices (GAP) that exclude all synthetic off-farm inputs and off-farm good handling practices (GHP). GAPs minimize soil and water degradation, whereas GHPs help maintain the organic integrity and vital qualities of products. The appropriate technology and traditional farming methods applied by farm groups, with support from the government, have made the organic farming system socially acceptable.

From 2009 to 2012, LeSOS certified 22 groups of food crop and horticulture farms as organic. The farms produce rice/red rice, vegetables, flowers, *salak* (snake fruit), grape, mangosteen, papaya, banana, ginger, red onion, and mushroom (Table 1). LeSOS required two weeks to inspect and certify each organic farm. The certification process abided by the requirements indicated in the Indonesian National Standard (SNI) for Organic Food (SNI 01-6729-2002 or SNI 6729-2010), which is managed by the National Accreditation Commission. LeSOS issues the certificate (valid for three years) when there are no serious problems affecting organic production within the farm. The farms' certification was facilitated and funded by the Food Crop Agricultural Agency of Bali Province. The process cost IDR 20 million (approximately USD 2,050): IDR 15 million (approximately USD 1,537.50) for the initial inspection activities and IDR 5 million (approximately USD 512.50) for the annual surveillance activities. Fortunately, the

Table 1. Organic farming system, certified by LeSOS and facilitated by Food Crop Agricultural Agency, Bali Province, 2009–2012

Farmers' Group (Year Established)	Village/District/Regency	Area (ha)	No. of Members	Commodity	Certificate No.	Target Market
Somya Pertiwi (2009)	Mengesta/Penebe/Tabanan	26	47	Rice	LPSO-005-IDN-010	R, T, S
Mekar Sari (2009)	Sibetan/Bebandem/ Karangasem	11	25	Salak	LPSO-005-IDN-009	R, T, S
Golden Leaf Farm (2010)	Asah Gobleg/Banjar/Buleleng	5	20	Vegetables	LPSO-005-IDN-014	S, H
Beras Merah Jatiluwih (2010)	Jatiluwih/Penebel/Tabanan	24	32	Red rice	LPSO-005-IDN-019	E, R, S
Subak Selat (2010)	Buahan Kaja/Payangan/Gianyar	46	112	Rice	LPSO-005-IDN-017	T
Lila Cita Karya (2010)	Kalisada/Seririt/Buleleng	2.6	11	Grape	LPSO-005-IDN-016	W
Subak Abian Amerta Sari (2011)	Pohsanten/Mendoyo/Jembrana	15	333	Mangosteen	LPSO-005-IDN-022	W
Manggis Sari (2011)	Padangan/Pupuan/Tabanan	10	20	Mangosteen	LPSO-005-IDN-023	China, Taiwan
Sekar Bumi (2011)	Kerta/Payangan/Gianyar	12	18	Flowers	LPSO-005-IDN-025	H
Amerta Lestari (2011)	Batur/Kintamani/Bangli	11.2	32	Red onion	LPSO-005-IDN-026	T, organic outlet
Subak Semanggong (2011)	Pohsanten/Mendoyo/Jembrana	25	51	Rice	LPSO-005-IDN-021	W
Giri Kerta Lestari (2011)	Bangli/Baturiti/Tabanan	13	48	Vegetables	LPSO-005-IDN-024	H, W
Sari Bumi (2012)	Gumrih/Pekutatan/Jembrana	43	19	Mangosteen	LSPO-005-IDN-031	L
Pala Sari (2012)	Mundeh Kangin/Selemadeg Barat/ Tabanan	30	23	Mangosteen	LSPO-005-IDN-035	China, Taiwan
Mesari (2012)	Wanasari/Tabanan/Tabanan	0.15	20	Mushroom	LSPO-005-IDN-037	T, S
Mekar Sari Nadi (2012)	Tangeb/Mengwi/Badung	0.37	16	Mushroom	LSPO-005-IDN038	T, S
Bali Organik Mushroom (2012)	Jagapati/Abiansemal/Badung	0.43	29	Mushroom	LSPO-005-IDN-040	T, S
Sarwa Ada (2012)	Taro/Tegallalang/Gianyar	15	23	Ginger	LSPO-005-IDN-036	L
Tegal Sari (2012)	Pupuan/Tegallalang/Gianyar	25	23	Papaya	LSPO-005-IDN-034	L
Gunung Sari (2012)	Pupuan/Tegallalang/Gianyar	15	154	Ginger	LSPO-005-IDN-039	L
Subak Eka Dwi Buana (2012)	Langgahan/Kintamani/Bangli	54	58	Rice	LSPO=005-IDN-033	L
Wira Bakti (2012)	Sekartaji/Nusapenida/Klungkung	15	35	Banana	LSPO-005-IDN-032	L

Source: Food Crop Agricultural Agency of Bali Province (2013a)
Note: R = regional, T = traditional, S = supermarkets, E = export, W = wholesalers, H = hotels, L = local

rice farming system undertaken by the Somya Pertiwi farmers group passed the inspection. LeSOS recertified it on 3 November 2012, with the group funding the certification by themselves. The organic white rice produced by this group received a premium of IDR 1,200 (approximately USD 0.1230) per kilogram (kg) on top of IDR 7,800 (approximately USD 0.80) per kg commanded by conventional white rice at the village level. At the retail level (e.g., some outlets in Denpasar City), Somya Pertiwi's organic white rice was sold at IDR 10,000 (approximately USD 1.03) per kg, whereas conventional white rice costs only IDR 8,600 (approximately USD 0.88) per kg. The premium serves as an incentive for farmers to continuously produce organic rice and regularly subject their organic rice farming system to certification.

Similarly, Jatiluwih red rice, which also received organic certification from LeSOS with GHPs and registered by USFDA (Reg. No. 16206307650), fetched IDR 28,000 (approximately USD 2.87) per kg at the village level and IDR 29,700 (approximately USD 3.04) per kg at an outlet (retail level) in a tourism resort (Seminyak Kuta, Bali). In comparison, the conventional red rice produced at another place (e.g., Munduk Village, northern Bali) cost only IDR 17,500 (approximately USD 1.79) per kg at the village level and IDR 19,000 (approximately USD 1.95) per kg at a supermarket in Denpasar. The organic certificate for Jatiluwih red rice was valid until 30 November 2013.

In promoting and supporting organic farming, the Bali Provincial Government implemented a policy on balanced fertilizer application to food crops. Table 2 presents the recommended fertilizer dosages. The government allocated a significant amount of funds to subsidize the recommended fertilizers such as NPK Phonska, Petroganik, and organic fertilizers. It provided additional subsidy for NPK Phonska in the amount of IDR 600 (approximately USD 0.06) per kg in 2009 and 2010 and IDR 500 (approximately USD 0.05) per kg in 2011. In the case of Petroganik, the additional subsidy was IDR 400 (approximately USD 0.04) per kg in 2009–2011. For organic fertilizers, it was IDR 300 (approximately USD 0.03) per kg in 2012; the total subsidy was IDR 700 (approximately USD 0.07 cents) per kg in 2013, from the highest retail price of IDR 900 (approximately USD 0.09) per kg. The farmers actually paid for the organic fertilizers' remaining cost of IDR 200 (approximately USD 0.02) per kg in 2013. Based on data shown in Table 3, the government's subsidy amounted to IDR 202.69 billion (approximately USD 20,775,212.50) for the total volume of fertilizers during the last five years (2009–2013). The government collaborated with PT Petrokimia Gresik (marketing representative officer) and PT Petrosida (distributor) for the supply of NPK Phonska and Petroganik from 2009 to 2011. For the supply of organic fertilizers in 2012, the government collaborated with PT Pupuk Kalimantan Timur and PT Biotek Indonesia Hijau, in addition to PT Petrokimia Gresik and PT Petrosida.

Likewise, the government worked jointly with a federation of nine farmer groups, which produced and distributed 5,714 tons of organic fertilizers in 2013 in Bali (Table 4).

The Bali Provincial Government is not only concerned with on-farm organic production, but also with marketing the resulting organic products. Related to this, it developed the Organic Trade Centre (OTC) master plan in 2012. The OTC aims to serve as: education center, information or promotion center, transaction center, consulting center, and field laboratory of organic production in Bali (Food Crop Agricultural Agency of Bali Province 2012b).

The certification procedure was undertaken not only by the food crop and horticulture farm

Table 2. Fertilizer dosage recommendation (kg/ha)

Year	N (Urea)	NPK (Phonska)	Petroganik	Organic
2009	200	200	300	-
2010	200	200	300	-
2011	150	150	300	-
2012	-	-	-	500
2013	-	-	-	500

Source: Food Crop Agricultural Agency of Bali Province (2009, 2010, 2011, 2012a, 2013b)

Table 3. Area and volume of subsidized fertilizers distributed in Bali

Year	Area (ha)	NPK (Phonska) (t)	Petroganik (t)	Organic (t)
2009	17,789	3,557.80	5,336.70	-
2010	16,665	3,333.00	4,999.50	-
2011	20,512	3,076.80	6,153.60	-
2012	26,666	-	-	13,333
2013	11,428	-	-	5,714

Source: Food Crop Agricultural Agency of Bali Province (2009, 2010, 2011, 2012a, 2013b)

Table 4. Producers and distributors of subsidized organic fertilizer (2013)

Farmer Group Federation or Company/IFS*	Address (Village/District/Regency)	Organic Fertilizer Volume (t)	Region Serviced/ Area (ha)
Bina Karya Bakti/ SIMANTRI 001	Mukti/Grokgak/Buleleng	571	Buleleng Regency/1,142
Sari Bumi Rahayu/ SIMANTRI 015	Sawan/Sawan/Buleleng	149	Buleleng Regency/298
Sari Lemek/ SIMANTRI 019	Tamblang/Kubutambahan/ Buleleng	225	Buleleng Regency/450
Ananta Winangun/ SIMANTRI 079	Penarukan/Kerambitan/ Tabanan	726	Jembrana, Tabanan, Klungkung Regencies/1,452
Trade Company (UD) Timan Agung/ SIMANTRI 027	Kelating/Kerambitan/ Tabanan	1,630	Buleleng & Tabanan Regencies/3,260
Kerambitan Agro	Kukuh/Kerambitan/ Tabanan	750	Jembrana Regency/1,500
Rareangon/SIMANTRI 108	Tiga/Susut/Bangli	755	Bangli & Klungkung Regencies/1,510
CV Dharma Kerti Sedana/ SIMANTRI 117	Banjarangkan/ Banjarangkan/Klungkung	294	Bangli, Klungkung & Karangasem Regencies/588
Satwa Winangun/ SIMANTRI 120	Tangkas/Klungkung/ Klungkung	614	Bangli & Karangasem Regencies/1,228
Total		5,714	Bali/11,428

Source: Food Crop Agricultural Agency of Bali Province, 2013c
* IFS = integrated farming system (called SIMANTRI in Bali)

groups but also by the estate crop farm groups in Bali. Cashew and coffee have been certified as organically grown; cocoa was certified as sustainably grown. Eight cashew farmer groups have been internationally certified, but only four of them are continuously certified by IMO because the certification process is costly, among other reasons. For example, the budget required to inspect and certify four cashew farm groups in 2006 was IDR 150 million (approximately USD 15,375). The cost was subsidized by the Bali Province Government (IDR 50 million ≈ USD 5,125) and PMA (Profil Mitra Abadi) in Jakarta which has been supported by IMO-Swiss (IDR 100 million ≈ USD 10,250). The organic certificate is valid for three years and the cashew farms need to be recertified on the fourth year. Annual surveillance activities require IDR 50 million (approximately USD 5,125). PMA would like to have the cashew farms recertified by other certification bodies like GOCA (Guaranteed Organic Certification Agency-USA) and IN OFFICE Bogor-Indonesia. This would depend, however, on the farmers' willingness to participate.

Organic cashew farming is economically viable due to the significant premium that farmers could receive. In the past, farmers received a premium of IDR 3,000 (approximately USD 0.31) per kg of organic cashew. Given the total production volume of 210,679 kg, the total value of the cashew product was more than IDR 632 million (approximately USD 64,780). This is actually more than 2.5 times the certification cost. The organic cashew farming system in Bali is potentially sustainable because, in addition to being economically viable, it also fulfills the technical, environmental, and social criteria (Table 5).

Some coffee farms in Bali, led by farmer groups listed in Table 6, have been certified as organic and even garnered a certification from the Rainforest Alliance. The organic certification of the coffee farms was conducted by LeSOS or the Control Union. The certification of each farm group cost IDR 20 million (approximately USD 2,050) and the annual surveillance cost IDR 6 million (approximately USD 615). All costs were borne by the Bali Provincial Government. Unfortunately, despite LeSOS' certification, the organic coffee is not yet accepted in the international market.

PT Indocom Citra Persada-Surabaya paid, on the average, IDR 45,000 (approximately USD 4.61) per kg of organic coffee certified by the Control Union. On the other hand, PT Putra Bineka Perkasa paid IDR 70,000 (approximately USD 7.18) per kg of first grade organic coffee. As such, the organic coffee farming system in Bali is also potentially sustainable since the criteria for sustainable agriculture are fulfilled.

Table 5. List of cashew farmer groups with organic farming certification

Name of Farmer Group	Location (Village/District/ Regency)	Area (ha)	Prod'n (t)	Certification Body
Buana Kusuma	Dukuh/Kubu/Karangasem	190	52.955	IMO-Swiss under PT Profil Mitra Abadi (PMA), Tanggerang-Jakarta
Giri Celagi	Dukuh/Kubu/Karangasem	159.5	68.442	
Tunas Mekar	Ban/Kubu/Karangasem	96.8	39.5	
Pule Sari	Tulamben/Kubu/Karangasem	99	49.782	
Tunjungan	Ban/Kubu/Karangasem	34	13.45	1) Control Union under US Amarta 2) GOCA under PT Tunas Mekar Abadi, Semarang-Jawa Tengah
Membe	Ban/Kubu/Karangasem	58.5	50	
Pinggan	Ban/Kubu/Karangasem	22.25	60	
Wates	Ban/Kubu/Karangasem	45	45	

Source: Estate Agency of Bali Province (2013)

Table 6. List of coffee farmer groups with organic farming certification

Name of Farmer Group	Location (Village/District/Regency)	Certification Body
Suka Maju	Landih/Bangli/Bangli	LeSOS, Mojokerto, Indonesia
Sari Boga	Kiadan/Petang/Badung	
Merta Sari	Jempanang/Petang/Badung	
Eka Manik Merta	Sepang/Busungbiu/Buleleng	
Batur Pendem	Pujungan/Pupuan/Tabanan	
Giri Merta	Wanagiri/Sukasada/Buleleng	Control Union
Amerta Sari	Pegayaman/Sukasada/Buleleng	

Source: Estate Agency of Bali Province (2013)

Constraint Factors in Developing Organic Farming System

Many factors affect the development of organic farming systems. First is the limited availability of organic fertilizers. For example, a typical application of 25 tons per hectare (t/ha) of farmyard manure from housed organic cattle contains 150 kg of nitrogen, 35 kg of phosphorous, and 140 kg of potassium (Shepherd et al. 1999 in Watson et al. 2002). The Bali Provincial Government's recommended amount of organic fertilizer for 11,428 ha of food crop production in 2013 was 5,714 tons, or 0.5 t/ha (Table 3). Nine producers of organic fertilizers are needed to service this requirement (Table 4). Moreover, it is feared that this low dosage could significantly decrease annual food crop production significantly by the year, since all synthetic fertilizers have been excluded in the farming system.

Second is the difficulty of containing uncontaminated irrigation water since organic farms are located in the middle or downstream of the watershed while conventional farms are upstream. Third is the cost of organic farming system development and the need to continuously recertify, whereas only a few buyers (market) are willing to pay a premium for the organic products, especially for those that are domestically consumed (nationally certified).

CONCLUSION AND IMPLICATIONS

Organic farming systems are sustainable when they are economically viable, socially just and acceptable, culturally and technically appropriate, and environmentally sound. The organic farming systems for food and estate crop production in Bali generally fulfill the sustainability criteria. Their major constraint factors are as follows: (1) limited organic fertilizer sources, (2) contamination of irrigation water by synthetic off-farm inputs from farms located in the middle or upstream areas of the watershed, (3) high cost of the organic certification process, and (4) limited buyers who are willing to pay a premium for organic products.

The following are recommendations to further support and enhance organic farming systems in Bali:

1. The Bali Provincial Government should continue to facilitate organic fertilizer production under SIMANTRI and encourage more production.
2. All watershed stakeholders should be concerned with integrated water resource management and start to promote the development of integrated organic farming systems under one watershed.
3. It is important to establish local certification bodies to minimize inspection and surveillance costs.

4. More stakeholders from government, university, and nongovernmental organizations, among others, should be encouraged to promote Bali's Clean and Green (Go Organic) program so that more people would become aware of, understand, and apply the principles of organic agriculture and so that more buyers would be willing to pay a premium for organic products.
5. Conducting an experts' or stakeholders' meeting would be helpful in identifying various problems and coming up with ideas on how to address them. It would also be a good venue for gaining insights useful for improving future research on organic agriculture in Bali.

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