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FOOD SCIENCE & TECHNOLOGY | RESEARCH ARTICLE

How does organic agriculture contribute to food security of small land holders?: A case study in the North of Thailand

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Abstract: There has been a trend to encourage organic agriculture in response to improve global food security. This article investigated how organic agriculture contributed to food security of small land holders experiencing organic agriculture. It involved in-depth interview, focus group, and participatory observation from a purposive sample of thirty participants at San Sai and Muang Wa Villages, Luang Neua Sub-District, Doi Sa Ket District, Chiang Mai Province, the north of Thailand. The result indicated the important aspects of organic agriculture that contributed to food security of small land holders. These aspects included integrated production leading to self-reliance on food, production management for sufficient economy, culture relating to food access and sustainability, and participation in protecting natural resource and environment to ensure sustainable food production. However, they required agriculture land ownership, a group and network of organic agriculture, consumer and fair market, and agency support. In addition, there were risk factors of food security in organic agriculture: climate change relating to drought, lack of agriculture succession, and expansion of chemical agriculture.

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Authors are experience working with rice small holders farmers in the regions with committed to work in the article. They have research interest related to food security, sustainable farming and local institutional policy. The contribution of the finding will enhance sustainable food security in rural northern Thai communities which will be somehow related to the issue of local public policy on organic agriculture and food security.

PUBLIC INTEREST STATEMENT

The authors were curious whether the performances of organic agriculture help improve global food security. Then, they conducted the study in two villages, the north of Thailand, where there were small land holders experiencing organic agriculture. In this study, the activities of organic agriculture were observed and several participants especially small land holders were interviewed individually and collectively to address what they wanted to know. The findings concluded that the performances of organic agriculture are able to contribute food security in household of small land holders which depends upon the stability of agriculture inputs, climate, succession, and institutional support. This directs national policy to strengthen food security in small-scale farms through the efficient management in agriculture inputs especially land and water. In addition, national policy should focus on empowering adaptation of farmers to climate change and educating the knowledge of organic agriculture.

Subjects: Environment & Agriculture; Social Sciences; Development Studies

Keywords: organic agriculture; food security; small land holder; self-reliance; sufficient economy; and sustainability

1. Introduction

Food security has been an important global issue since the crisis of oil and food concerned the world in the 1970s (McKeown, 2006). The report in 2014 to 2016 indicated that about 795 million people in the world were undernourished (FAO, Ifad & WFP, 2015). Rosegrant and Cline (2003) also predicts that the issue of food security will continuously disturb global population over the next fifty years because the increase of demand for food tends to inconsistency with the decrease of food production by economic growth, demand for energy crop, climate change, water shortage and environmental degradation. Therefore, the changes in the methods of food production, food processing, food distribution and food accessibility are a further challenge for sustainability of food security (Godfray et al., 2010). According to the 2020 vision determined by International Food Policy Institute (IFPRI), “enough food must be produced sustainably to meet the food needs of every person on the planet and all people must have economic and physical access to the available food” (Pinstrup-Andersen & Pandya-Lorch, 1998, p. 2).

In this sense, organic agriculture has been extensively discussed although conventional agriculture occupies a main stream of food production and markets (Connor, 2008). Badgley and Perfecto (2007) insist that the productivity of organic agriculture is able to supply food for the world. However, to improve global food security, organic agriculture would rather focus on family survival and sustainability in small-scale farms than crop export in large-scale farms (Vasilikiotis, 2000). For example, the practices of integrated cropping with the lower investment cost in organic farming help increase farm production and income of small farmers in the Indian states of Uttarakhand, Madhya Pradesh, and Tamil Nadu (Panneerselvam, Hermansen, & Halberg, 2010). Cuba recovers from food security crisis after the Cuban government proclaims the policy of sustainable agriculture based on small-scale organic farming (Nelson, Scott, Cukier, & Galán, 2009); underlines multiple cropping, efficient land and water uses, family labor, input materials within farm, and natural resource management (Warwick, 2001). United Nations (2008) also concludes that the performances of organic agriculture empower the capacity of poor farmers to produce more food variety and safety relating to increase income and food availability for rural household. It leads to alleviate poverty and improve quality of life in rural communities in a long term.

In Thailand, food insufficiency remains a national problem especially in remote areas although the government occupies a leader of crop exports to world food markets (Bio Thai Foundation, 2010). The change of agricultural practices from subsistence agriculture to commercial agriculture also causes food insecurity for agriculturalists (Santasombat, 2005). The agriculturalists are usually confronted with food accessibility; only 29.74% of them are able to rely on food in their own cropping areas (Bio Thai Foundation, 2010). In addition, their food production is uncertain due to high cost of import materials, loss of land to investors, decrease of agricultural workers from industrial expansion, and environmental and natural resource degradation caused by using chemical substances. It leads to income and economic problem of agricultural sector which is different from business sector (Aroonpong, 2013).

However, since 2001, organic agriculture has been promoted as a national strategy of economic and social development to recover and sustain ecological and human health (Kraidang, 2006). Pragmatically, a few studies imply that it benefit relates to food security in local communities. For example, organic agriculturalists in Ubon Rachathani, Yasothon, and Amnat Charoen Provinces in the lower northeast are able to access various safety foods seasonally in their cultivation area and share safety foods with an organic group in a local community since they stop using chemical substances, emphasize integrated cropping, and depend on farm materials workers in families for cultivation (Fakged, Morachart, & Aunpim, 2016). Organic food standardized by organic network in

Khon Kaen, Mahasarakham, Roi Ed, and Karasin Provinces in the middle northeast also increases the confidence of consumers to buy organic food or the ability of safety food distribution from producers to consumers (Nakapaksin, Naipinit, & Promsaka Na Sakolnakorn, 2013).

This article aimed to investigate how organic agriculture contributed to food security of small land holders including what factors explained it. Focus was made in Luang Neua Sub-District, Doi Sa Ket District, Chaing Mai Province, the north of Thailand, where small land holders experienced the performances of organic agriculture for more than ten years and accepted that their practices helped improve their health, agricultural products, household economy, and natural resources in cropping areas.

2. Definitions and framework

The concepts of food security and organic agriculture are reviewed to create the research framework for addressing the aim of this research. The organic agriculture focuses on environmental friendly in production process and transportation process from producer to consumer (Scialabba & Hattam, 2002). IFOAM indicates four major principles of organic agriculture practices (Rundgren, 2006, p. 1): (1) principle of health—enhancing and sustaining ecosystem and human health by discontinuing chemical substances, (2) principle of ecology—operating production process harmonizing ecological cycle, nature balance, local wisdoms and community culture (3) principle of fairness—providing equity, respect and justice between human and human, and human and environment, and (4) principle of care—managing organic agriculture with the manner of precaution and responsibility to environment for well-being of current and further generation.

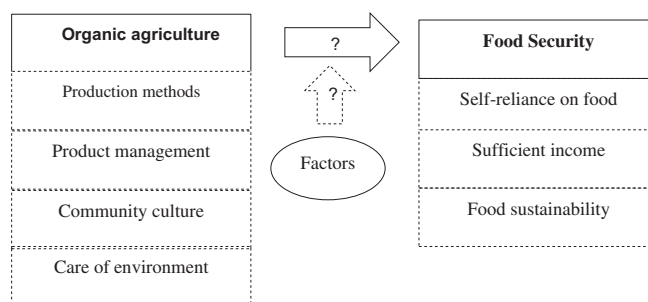
The term of food security has been explained with different perspectives (Pinstrup-Andersen, 2009). World Bank (1986) defines it as food availability that everybody has the ability to access sufficient food for serving physical needs. FAO (2006) also mentions four aspects of food security: (1) food availability—having sufficient food quality supplied through domestic production or imports, (2) food access—the ability to access nutritious diet relating to economy, society, politics, right, and law in community, (3) food utilization—adequate food, clean water, sanitation and health care in response to physiological needs, and (4) food stability—the competency to access sufficient food at all times. However, Sen (1981) argues about food entitlement relating to economy and politics; starvation was not caused by insufficiency food but it was caused by lack of right to access food. It also involves food sovereignty which *va Campesina* states that it “is the right of each nation to maintain and develop its own capacity to produce its basic foods respecting cultural and productive diversity” (Patel, 2009, p. 665). In addition, individual and household food security relies on the community that had the potential for food management and helping one another (Prachasan, 2012). However, Sustainable Agriculture Foundation, Thailand (2011) concludes that food security in the context of local communities included self-reliance on food, sufficient food and water for feeding family, dependence on natural resources, the security of occupation and income relating to buying food from markets, the production providing food safety and nutritious diet, culture, and food sustainability.

In this research, the framework focused on performing organic agriculture that related to contribute to food security and the factors that explained it as shown in Figure 1. Specifically, the performances of organic agriculture involved production methods, agricultural product management, community culture and care of environment. The term of food security was defined as self-reliance on food or the ability to access food sources sufficiently based on self-food production, sufficient income to supply additional food, and food sustainability or ensuring to have sufficient food for present and further generation.

3. Research methods

This research used three qualitative methods for data collection: in-depth interview, focus group, and participatory observation. It involved a purposive sample of thirty informants or participants. The key informants were seven small land holders and five of their family members at San Sai and

Figure 1. Research framework.



Muang Wa Villages, Luang Neua Sub-District, Doi Sa Ket District, Chiang Mai Province. The small land holders were more than fifty years old and experienced organic agriculture for more than ten years. Their family members also helped them perform organic agriculture occasionally. Other informants included four community leaders, eight villagers, and six representatives of agencies who were associated with small land holders. Therefore, all participants were able to provide information about the performance of organic agriculture relating to food security.

In-depth interview provided direct conversation with participants and allowed the research to understand important ideas, thoughts, information, experiences and details (Charmaz, 2003). The interview questions were focused on: (1) the performance of organic production, agricultural product management, community culture, and natural resource protection, (2) the benefits of performing organic agriculture to food access, sufficient economy, and food sustainability, and (3) the factors that involved such benefits. Focus groups were also organized with a group of five small land holders which allowed cumulating and elaborating data from discussion forum among similar group of participants (Fontana & Frey, 2008). The topic of focus groups included the benefits of performing organic agriculture to food access, sufficient economy, and food sustainability and the factors explaining these benefits. In addition, ethnographic methods were combined with an emphasis on participatory observation which allowed the researcher to live in study areas and interact with participants (O'Reilly, 2005). Observational data were collected to describe the agriculture areas and activities of smallholder agriculturalists.

Data collection and analysis occurred concurrently and shaped each other until a description was completed (Bryant & Charmaz, 2007). The process of data analysis consists of (1) data reduction, (2) data display, and (3) conclusion drawing and verification (Miles & Huberman, 1994). Data reduction involved selection, clarification, conceptualization and transcription of all data collected from in-depth interview, focus group and notes from participatory observation. Data display referred to organizing and presenting data in description and table. In the final step, data was interpreted and verified to draw on conclusion. However, the final conclusion appeared when data collection was completed.

4. Results

4.1. Background information of small land holders

The results demonstrated (see Table 1) that seven key informants who were small land holders, were 28.57% male and 71.43% female. Their age ranged from 53 to 68 years old or average age in 60. Almost all of them were in small size families of not over than 3 people in a family and only one informant lived alone. A family included parents (father, mother) and child (daughter or son and sibling). All informants had legal ownership in their agriculture land. They had strictly performed organic agriculture on their own land for more than ten years (after organic agriculture was introduced to their community in 2003). In addition, two of them occupied the government land in the forest nearby their houses to perform organic agriculture without any legal document.

Table 1. Background information of seven small land holders at San San and Muang Wa Villagers, Luang Neua Sub-District, Doi Sa Ket District, Chiang Mai Province in the north of Thailand

Small land holders	Sex	Age	A number of family member	Agriculture areas (Rai)		
				Rice field	Orchard at home	Orchard in a forest
1	M	58	3	-	3.5	-
2	F	63	2	3	3	5.5
3	F	53	2	1	1.5	-
4	F	68	2	-	1.5	-
5	M	60	1	-	0.5	-
6	F	60	4	3	2.5	4.5
7	F	58	3	6	1.5	-

Notes: (1) data collected in 2016, (2) M = male, F = female, 1 rai = 0.395 acre, (3) orchard at home included backyard and area of raising animal, and (4) orchard in a forest referred to the land nearby a village that belonged to the government and the government allowed villagers to earn a living.

In the performance of organic agriculture, all informants focused on the principle of sufficiency and integrated agriculture. The sufficiency prioritized the production for household consumption and economy; grew whatever they eat and eat whatever they grew. Surplus production was first shared to relatives and neighbors and later was sold to customers. Integrated agriculture was performed by rice farming and orchard. Orchard provided varieties of food sources that were enough and ready to serve both household and customer needs in different seasons. For example, there were: fruits—papaya, grapefruit, longan, rose apple, lychee, banana, avocado, tamarind, mango, coconut, pomelo, passion fruit, dragon fruit, and custard apple; vegetables—broccoli, cabbage, lemon, lettuce, kale, eggplant, lemon grass, bergamot, tomato, local vegetables, and herbs; and animals—fish, cricket, frog, and poultry.

4.2. Organic agriculture contributing to food security

Data analysis indicated the four important aspects of organic agriculture that contributed to food security of small land holders at San Sai and Muang Wa Villages, Luang Neua Sub-District, Doi Sa Ket District, Chiang Mai Province. These aspects, described in this section, included integrated production leading to self-reliance on food access, production management for sufficient income to survive and access additional food, culture relating to sufficient food access and food sustainability, and participation in protecting environment to ensure sustainable food production based on soil, water, forest, and climate.

4.2.1. Self-reliance on integrated production

All small land holders performed integrated cultivation within agriculture areas, for example, cropping rice in field, planting tropical fruit in orchard, growing vegetables and herbs in backyard garden, and raising poultry and fish in house courtyard. These practices provided the variety of products that were sufficient to feed their family members in household. The rice field, backyard and orchard functioned as a supermarket in the house. Their family members were able to have rice through year and were able to access fruit seasonally such as banana, grapefruit, longan, and papaya. They also collected food ingredients for cooking in response to their needs such as chili, lemon, tomato, lettuce, egg, chicken and duck. Therefore, integrated agriculture contributed self-reliance of small land holders and their family members on food access.

According to a male small land holder (interview on 16 December 2015), “I was never afraid of starvation. I had everything in my backyard. I could get what I wanted to eat. I grew what I ate. I ate what I grew. I thought I could survive without money. I had fish, lemon, chili and vegetables. So I could make spicy fish curry whenever I wanted. I felt happy that I did not have much expense”.

4.2.2. *Product management to sufficient income*

Various organic products in the farms of small land holders were managed to consume in household and to sell in market places since all small land holders strictly held the principle of organic agriculture, “eat what you grow and sell what you have surplus”. In daily life, all small land holders usually used their own organic products for cooking and having with family members through the process of steaming, boiling, frying, making curry, pounding, and blending. Some of them made processed food such as salted egg, pickled mango, tamarind in syrup, and baked longan. Consequently, they could save money; the average of food expense was in between 100 baht to 300 baht per day which depended upon the amount of each family member.

A female small land holder insisted that (interview on 16 December 2015) “Every day, I paid for food very less. Mostly, I bought pork and used only 200 baht per week to buy food. I did not need to go to market because food was in my garden. I could get everything to eat and cook”.

In addition, all small land holders focused on retail selling. They sold surplus organic products especially rice, vegetables, chicken and egg in order to earn income sufficiently for supporting household daily expenses including additional food.

Another female small land holder added that (focus group on 10 May 2016), “I used what I left from eating to make process food to earn money. At least, I could buy some food that I did not have and was safe to eat”.

Their organic products were distributed through four types of small market places:

- (1) at home—direct sell to customers inside and outside villages who came to buy organic products at a house of small land holders,
- (2) local market—a particular market place inside community for selling general goods, for example, Luang Neua municipal market, which a small land holder could occupy to sell organic products independently,
- (3) organic network market—a particular market place outside community for selling organic products which organic network in Chiangmai Province managed to select organic sellers according to particular criteria,
- (4) alternative markets—direct sell to other market places, for example, organic cooperative in Chiangmai Province.

4.2.3. *Culture relating to food sustainability*

The culture of sharing and exchange remained in organic community which helped sustain access to food. In daily life, all small land holders usually shared or exchanged their food, vegetables, fruits, seeds, young plants and materials with neighbors, relatives, friends, and organic network. Sometimes, they gathered to share and discuss knowledge about organic agriculture such as fermenting fertilizer, selecting seed and controlling pests.

A male small land holder explained that (focus group on 30 April 2016) “I had a market at home. I grew plants to eat, share and sell. My neighbor made a curry for me after I gave her some vegetables. I also got some rice from a friend. So I did not need to buy rice. If an organic agriculture thought about business too much, he or she would not be able to survive”.

The culture of knowledge transmission was also embedded in the performances of organic agriculture even though most people preferred to carry on other occupations than agriculture and most descendants focused on studying in schools and universities. All small land holders had passion for teaching their descendants and neighbor agriculturalists about performing organic agriculture since they realized on the advantages of organic agriculture for sustainability of food production, food access and household economy. For example, they asked their child to help plant vegetables and ferment fertilizer during weekend and semester break. Some agriculturalists in community learned techniques of organic production by discussing with a neighbor organic agriculturalist and visiting a neighbor farm.

A daughter of a small land holder added that (interview on 31 January 2016) “My mother cultivated me a way of agriculture. When I was young, she took me to look on how to do at her friend houses. She taught me what she knew and she learned for others what she did not know. Now, I had to go study in a city. So I was able to help my mother sow rice when I had semester break”.

In addition, all small land holders were able to educate about organic agriculture to people outside community who came to visit their farms. Sometimes, they were invited to explain how to perform organic agriculture and demonstrate how to ferment organic fertilizers at schools, villages, and government organizations. Sharing organic experience through mass media like radio broadcasts and television programs was also a mean to transmit knowledge for publics.

4.2.4. Participation in protecting natural resources and environment

All small land holders realized that natural resources and environment was the important input resources of organic agriculture. The depletion of natural resources and the degradation of environment would affect organic yields and quality.

For example, a male small land holder said (interview on 30 April 2016), “If everybody did not burn dry leaves, soil would be good. If everybody did not use chemical substances to get rid of grass, soil would be good. If soil was good, everybody could eat all plants he or she grew. Everything was connected”.

Therefore, they focused on the production system that helped sustain the health of soil, water, climate and ecosystem especially in their agriculture areas. Their strict action of using organic substances instead of chemical substances produced an effect to recover soil quality which was verified by staff officials. They also noticed the positive change of ecosystem, for example, bee on a tamarind tree helping pollinating various plants, earthworm loosening soil and digesting the remnants of plants, and various species of animals and plants in a pool. In addition, the rotation of agriculture rubbish instead of burning helped reduced the emission of carbon dioxide to atmosphere which was a cause of global warming. For example, rice straw was used to cultivate straw mushroom and leaves were used to ferment organic fertilizers or cover ground surface to increase soil humidity.

Furthermore, they engaged with conservation activities of natural resources and environment by offering food, donating money, and attending activities, for example, the campaign project for reducing smog from forest fire at their villages, the forest conservation at Pa Sak Ngam Village in the same districts, the network of soil, water, forest in Mae On District, Chiang Mai Province, the forest conservation at Mae Yuam Watershed in Chiang Rai Province. Some of them helped motivate environmental awareness of neighbors and customers. A male small land holder added that he gave additional vegetable as a gift for a customer who brought own cloth bag. Consequently, he could save plastic bag leading to reduce rubbish for earth. Simultaneously, a female small land holder convinced elderly people in the village to create artificial flowers and wreath from rubbish like plastic bags, lotteries, straws and twigs.

4.3. Contributing and risky factors of food security

This section explained the factors that involved the stability of food security of small land holders at San Sai and Muang Wa Villages, Luang Neua Sub-District, Doi Sa Ket District, Chiang Mai Province. All small land holders had special characteristics which was essential for the continuity of organic agriculture performances leading to food security. These characteristics included strong passions and patience for agriculture occupation, expert on organic agriculture, satisfaction with sufficient livelihood, and honesty to consumers by using only organic substances.

A male small land holder insisted that (interview on 30 April 2016) “Organic producers needed to think of consumers. They ate what they grew. So they had to sell what they grew. They should not keep organic fields for eating and hide themselves from using chemicals for selling. It should not happen like this”.

In addition, they indicated these following factors that contributed to their stability of food security.

4.3.1. Being land owner

All small land holders possessed agriculture land with legal document. No land was in mortgage and no one rented land from other people. Therefore, they were able to perform organic agriculture independently which led to ensure the stability of food production, food access, and household economy. Importantly, everybody had never thought about selling his or her land, but intended to hold his or her land for earning a living and transferring to descendants.

4.3.2. Help of organic group and network

In San Sai Village, there was a group of organic agriculture led by a male small land holder. This group connected with organic networks in Luang Neua District and Chiang Mai Province. The members of the organic group and networks could share production methods, food, products, and markets together which was beneficial for food access and economy in households of small land holders.

4.3.3. Consumer demand and fair market

All small land holders had had a good sale on organic products since most consumers realized on the effect of chemical substances on their health. Therefore, they could earn enough income for buying food and covering expenses of their families. If nobody wanted organic products, economic household would be worse. They also believed that customers bought organic products because they held the aspect of fair market. In this sense, the fair market was defined by a male small land holder as selling quality products with reasonable prices. Specifically, the customers were willing to pay, without bargain, for organic products because they trusted in product quality.

4.3.4. Encouragement of agencies

Government and non-government agencies had encouraged organic agriculture in San Sai and Muang Wa Villages continuously. For example, Institute for a Sustainable Agriculture Community (ISAC) organized training for villagers to know how to perform organic agriculture, and helped establish the organic group at Sansai Village and promote organic markets. Maejo University provided organic seeds and knowledge about standard of organic products. Luang Neua District Health Promotion Hospital introduced organic rice and vegetables to people who had diabetes and hypertension.

In contrast, all of small land holders were worried about three factors that would lead their food security to be risky. The first one was drought due to climate change. During extreme hot weather, several kinds of plants will be slow to grow and some of them will be died. If drought continues, agricultural products will be decreased and food security will be unstable. Next, a succession of performing agriculture will be discontinued even though the knowledge about organic agriculture had transmitted within households and community members. All of small land holders were over fifty

years old and attempted to teach their descendants about organic agriculture. However, they expected that their descendants would have higher education and work with government officials or private company rather than performing agriculture. Finally, the extensive areas of chemical agriculture were able to contaminate the areas of organic agriculture. Specifically, chemical substances usually spread through water, soil and climate which may cause low quality of organic food products and environmental degradation in the long term.

A male small land holder added that (interview on 30 April 2016) “It was risky but it was inevitable. My field was in the middle of chemical agriculture areas. I was not able to move it away. Chemical substances always polluted air and water. So I needed to prevent contamination from them as much as I could. For example, planting vetiver grass encircled rice field to filtrate polluted water in rice field”.

5. Discussions

In addition to conventional agriculture, there has been a prospect of extending organic agriculture in response to improve global food security. More than one hundred countries change from conventional agriculture to organic agriculture since the methods of organic agriculture help address environmental impact and improve sustainable productivity (Halberg, Alroe, & Knudsen, 2006). According to Badgley et al. (2007), organic agriculture has the potential of food production for feeding human in present and further generation. It leads to ensure the stability of food supply especially in Africa, Asia, and Latin America (Pretty, Morison, & Hine, 2003). However, knowledge about organic farming technique and farm management is important to obtain high organic food products including conserve environmental health (Azadi & Ho, 2010). This study indicates that organic agriculture provides contribution for food security at household level of small land holders in the aspect of sufficiency economy relating to self-reliance and sustainability.

Sufficiency economy focuses on the middle path based on Buddhist concept and Thai culture (Mongsawad, 2010). This aspect consists of moderation, reasonableness and risk management with consideration of knowledge use and moral principle (Wibulswasdi, Piboolsravut, & Pootrakool, 2012) which is applicable to sustain economy, society, environment and culture of individual, family, community, organization and nation (Chalapati, 2009). According to Seubsman, Kelly, and Sleigh (2013), the sufficient economy connects with sustainable agriculture in term of process to promote self-reliance on production and consumption in response to cope with external changes. For example, Thai rural communities reduce chemical agriculture and combine variety of cash crop for having sufficient productions to consume and earn money. The villagers, held sufficiency economy, in north-eastern and southern Thailand also confirm that they are able to maintain food production, livelihoods, social relationship, and environment conservation which will lead to sustainable villages (Naipinit, Na Sakolnakorn, & Kroeksakul, 2014).

Simultaneously, the small land holders in this study honestly perform organic agriculture contributing to food security by holding non-chemical use, integrated cropping, self-reliance, sufficient livelihoods, and environment accountability. They know how to produce and manage the varieties of organic products prudently and reasonably for sufficient household consumption and economy rather than commercial success which directs a solution of food security problem to focus on the survival and sustainability of families in small-scale farms (Vasilikiotis, 2000). Natural resource and environment at farm, community and national levels are also revived and protected to prevent the risk of food production leading to food insecurity from degradation and deterioration of agricultural inputs like soil, water, and forest. This implies the action of small land holders to sustain food production for present and further generation, in other words, to stabilize sufficient household economy. According to the 2020 world vision (Pinstrup-Andersen & Pandya-Lorch, 1998), sustainable natural resource use and management in agricultural systems are pivotal to attain food security that everybody especially poor people is able to access adequate food and economy to improve and maintain individual health and life.

The distribution of organic food products in this study also relates to the concept of community supported agriculture (CSA) which focuses on the relationship and benefits of producers and consumers in a community (Janssen, 2010). The CSA expects that consumers will obtain a seasonal food supply and an opportunity from producers to learn about agriculture and local ecosystems which includes establishing community connection between consumers, producers, and neighbors (Tegtmeier & Duffy, 2005). This study indicates that the small land holders share and exchange their food products with relatives, neighbors and organic networks inside and outside communities. They also allow neighbors, customers and others to visit their farms and learn the performance of organic agriculture. Their organic food products are provided mainly at local market places and organic network markets which the customers are able to access more certainly. However, their connection with customers and organic networks is necessary to be strengthened for the stability of safety food accessibility.

Importantly, culture functions as a factor to maintain performances of organic agriculture contributing to food security since it is able to guided behavior and abilities in a society from generation to generation such as knowledge, art, morals, law and custom (Tylor, 1871). In this study, the small land holders at San Sai and Muang Wa Villages in Chiang Mai Province accumulate concept and experience in organic agriculture. They also attempt to disseminate their knowledge, performances and customs to descendants while as encourage their descendants to learn new culture through conventional education. However, their descendants prefer to follow new culture rather than culture of organic agriculture which influences the change in a way of life, occupation and food security. Therefore, the stability of food security under the concept and performance of organic agriculture requires cultural succession to focus on driving small scale-scale organic farming for household survival.

In addition, the ability of adaptation to climate change is pivotal to mitigate food insecurity from the effect of climate change especially in South Asia and Africa (Lobell et al., 2008). Maxwell (1996) indicates that insufficient food due to drought concerns African people in urban area which affects African people to limit food consumption in household. In the northwest of Bangladesh, famers cope with drought by changing methods of rice cultivation, developing water sources and seeking for alternative occupation (Habiba, Shaw, & Takeuchi, 2010). Simultaneously, the small land holders in this study realizes the risk of food security since drought due to climate change causes low food products. Then, they maintain strict action the performance of organic agriculture which helps sustain ecosystem and climate. They also engage in social activities of forest and water conservation and help stimulate environmental awareness of community members about global warming. However, the sustainability of food production requires the empowerment of small land holders in adaptation to climate change.

6. Conclusions and recommendations

Organic agriculture under the concept of sufficient economy helps strengthen household food security in small scale farming. The small land holders emphasize self-reliance on food production and food accessibility for household consumption while as manage organic products to produce small business for earning income to support additional food and other expenses in household. Their actions to conserve natural resource and environment also direct to sustain agricultural production which will provide variety of food sources and sufficient income in the future. Culture of sharing and exchange embedded in organic community implies social dependence in need such as food, agricultural inputs, and organic farming knowledge. However, the stability of food security requires the small land holders who possess own land legally and are able to maintain and disseminate the concept, performance, culture of organic agriculture. At the same time, it is essential to manage or control the risks of food security especially climate change.

Therefore, to strengthen food security, the policy should focus on small scale-organic farming in addition to promote commercial agriculture. Specifically, the government should control land use for organic agriculture, improve the efficiency of water management and other supports, stimulate awareness of natural resource and environment conservation and encourage activities to maintain community culture of helping one another. Importantly, the competency of adaptation in agriculture should be empowered in response to external change especially climate change. In addition, successions of organic agriculture should be substantially developed by organizing training course and introducing agriculture curriculum into educational institution.

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Competing interest

The authors declare no competing interest.

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