



Organic Vegetable Production for Sustainable Development of Farmers in Vientiane Capital, Lao People's Democratic Republic

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Abstract

The objectives of this research were to study 1) characteristics of basic personal, economic, and social information; 2) levels of knowledge and understanding about organic vegetable production of farmers; 3) acceptance of organic vegetable production by farmers, and 4) problems, obstacles and suggestions about organic vegetable production as perceived by farmers. The sample group used in the study consisted of 175 organic vegetable farmers in Vientiane capital, Lao People's Democratic Republic. Data were collected through interviews and analyzed using descriptive statistics. The study found that most of the farmers were male (50.9%), aged between 31-40 years old (36.6%), and had completed lower secondary education (37.7%). Additionally, most of them had other occupations besides organic vegetable farming (66.9%). About 40.6% had been growing organic vegetables for 6-10 years. Before growing organic vegetables, 56.6% of the farmers had previous experience in growing conventional vegetables. Almost all of the participants were members of organic vegetable producers (99.4%). Most of them own 89.7% of the land used for organic vegetable cultivation. The average annual income ranged from 72,867,485-97,156,000 kip/year (29.1%), with the majority earning more than 19,431,685 kip/ year from growing organic vegetables (76.0%). They primarily used their capital for organic vegetable cultivation (84.0%) and have debts of less than or equal to 24,289,000 kip/ year (65.1%) Farmers demonstrated good knowledge and understanding of organic vegetable production practices at a high level. As a result, they expressed concerns about the environment, emphasized maintaining the balance of nature and biodiversity in the production system, highlighted the use of organic matter to enhance soil fertility, and focused on utilizing renewable resources for maximum benefit within the local area rather than relying on imports from outside the area. Almost organic vegetable farmers (100%) expressed acceptance of organic vegetable production practices. The problems and obstacles identified by the farmers regarding sustainable organic vegetable production could be divided into six issues, namely

control systems in production techniques, quality and standard control systems, marketing, accounting and financial systems, credit, and organizational protection and management.

Keywords: Organic Vegetable, Acceptance, Sustainable Development, Vientiane Capital, Lao People's Democratic Republic

Introduction

Organic farming is a method of farming with natural methods that do not use chemicals or pesticide in the production process but it focuses on utilizing existing natural resources for maximum benefit. It can grow crops to produce both quantity and good quality environmentally friendly and it is not harmful to farmers and consumers. Moreover, it is a sustainable agricultural system and a stable job (SorathonThitisut and PuttisanKruekham, 2019). Organic agriculture exists in 76% of the countries worldwide and covers an area of 43.6 million hectares, which is 1% of the world's agricultural land (Willer and Lernoud, 2016). In the Lao People's Democratic Republic (Lao PDR), most of the land is subsistence farming which plays a very important role in rural life. Currently, many rural areas have always been doing organic farming because farmers do not have the knowledge to use chemicals in agriculture properly. In addition, organic farming is a production system that takes into account the environment, maintaining the balance of nature and biodiversity. The main objective of sustainable agriculture is to produce products that are safe for both producers and consumers through processes, procedures, and standards supported by safety inspection agencies. The demand for organic produce is constantly increasing (SangphajanSornthawilai, 2019) as a result of the Lao government promote organic farming. Currently, organic farming production groups have been established in one city, seven provinces, twenty-six districts, two agricultural centers, seventeen companies, twenty-two large organic farming groups covering eighty-eight small groups, 1,598 families covering an area of 3,002 hectares, and average organic production of 3,375 tons per year, and fruit in an area of 1,186 hectares yielding 1,457.64 people per year (Department of Agriculture, 2016, cited in Johnny Luangpan et al., 2022). The production of organic products that pass the standard system is in the Vientiane capital the most and distributed in major cities such as Savannakhet, Luang Prabang, Champasak, etc. Most of the produce is vegetables, fruits, and rice. These products are certified according to organic standards, about 3,375 units per year, and can generate an average income per household between 70 – 100 million kip or 300,000 baht per year, which is more than 10-12 times the income from conventional farming (Johnny Luangpan et al., 2022).

Although the Lao government has established policies and promoted organic farming, small organic vegetable farmers also face difficulties in accessing loans. In the case of access to

loan sources, the interest rate is as high as 36 percent and there is no flexibility enough to fit the production cycle. Some farmers can sell their products, but some do not have a system for keeping vegetables in their rooms to store unsold vegetables. In addition, farmers still want the government to allocate a permanent place to sell organic vegetables and develop the school system to meet international standards. They still lack knowledge of production techniques and packaging development. However, farmers still do not know which agencies are responsible for assisting them in accessing the market to expand organic vegetable production. Another important issue, farmers also see organic certification as a costly claim, and the process is complicated, especially for small entrepreneurs or poor farmers, who still lack information about which organic standards consumers trust (SangphajanSornthawilai, 2019). A study on “Organic Vegetable Production for Sustainable Development of Farmers in Vientiane Capital, Lao People’s Democratic Republic, is very important because of the characteristics of basic personal data, economic and social data, level of knowledge and understanding of organic production farmers, acceptance of organic vegetable production by farmers, and problems, obstacles, and suggestions regarding the organic vegetable production of farmers, the results of the research will be beneficial to relevant agencies. It can be used to develop policies and models to promote organic vegetable cultivation in line with the needs of farmers to develop sustainable organic farming.

Equipment and Methods/ Research Methods

This research applied a quantitative research method to study organic vegetable production for the sustainable development of farmers in the Vientiane Capital, Lao People’s Democratic Republic with the research methods as follows:

Population and sample

The population used in this study was organic vegetable farmers in Vientiane Capital, Lao People’s Democratic Republic, in which the samples were calculated by using the random method. Then, the sample size was determined according to Yamane’s formula (1973) at a confidence level of 95%, from a total of 305 people. A sample of 175 people was selected at random for data collection using a simple random sampling method by drawing lottery numbers of farmers’ names to complete the number of samples of 175 people without returning the lottery numbers of the names drawn and put back. This research was conducted from November 2012 to March 2023.

Data collection

Data sources collected for use in research can be divided into two types: 1) Secondary data which is a compilation of information from documents, research reports, the study of concepts, theories, and related research; and 2) primary data: semi-structured interviews were used. There were both closed-ended and open-ended interviews, divided into four parts: Part 1: a study of basic personal, economic, and social characteristics; Part 2: a study of knowledge and understanding about organic vegetable production of farmers; Part 3: a study of acceptance of organic vegetable production by farmers, and Part 4: problems, obstacles, and suggestions about organic vegetable production of farmers.

Data Analysis

All data collected were analyzed by a ready-made statistical program for social science research. The analysis of statistical data was divided as follows: basic personal, economic, and social data of farmers, level of knowledge, and understanding of organic vegetable production of farmers. There are criteria to measure farmers' knowledge which is to score the correct answer equal to 1 point and the wrong answer equal to 0 points. The study of farmers' acceptance of organic vegetable production provided two levels of measurement criteria: 1 point for compliance and 0 points for non-compliance by using descriptive statistics.

Research Results and Discussions

The study found that most of the farmers were male (50.9%), aged between 31-40 years old (36.6%), and had completed lower secondary education (37.7%). Additionally, most of them had other occupations besides organic vegetable farming (66.9%). About 40.6% had been growing organic vegetables for 6-10 years. Before growing organic vegetables, 56.6% of the farmers had previous experience in growing conventional vegetables. Almost all of the participants were members of organic vegetable producers (99.4%). Most of them own 89.7% of the land used for organic vegetable cultivation. The average annual income ranged from 72,867,485-97,156,000 kip/ year (29.1%), with the majority earning more than 19,431,685 kip/ year from growing organic vegetables (76.0%). They primarily used their capital for organic vegetable cultivation (84.0%) and have debts of less than or equal to 24,289,000 kip/ year (65.1%).

Level of knowledge and understanding of organic vegetable production of organic vegetable farmers in Vientiane Capital, Lao People's Democratic Republic

The study found that organic vegetable farmers have a high level of knowledge and understanding about organic vegetable production. The farmers answered all questions correctly, accounting for 100 percent. In terms of a production system that takes into account the environment, maintains the balance of nature and biodiversity, and has an ecological management system similar to nature that focuses on the use of organic matter such as manure, compost, green manure, and bio-fertilizers to increase soil fertility and to focus on the use of renewable resources for maximum benefit within the area rather than imports from outside the area. The production does not use chemicals, chemical fertilizers, synthetic hormones, non-plants, or microorganisms derived from Genetically Modified Organisms (GMOs) and growing more integrated crops to increase the diversity of living organisms to reduce pest infestation and support ecosystems. There was only one wrong answer, representing 0.6% (as shown in Table 1). When combining the individual scores to find the mean knowledge and understanding of farmers' organic vegetable production, divided into three levels: good level of knowledge (valued between 5 – 6 points, more than 75 percent) moderate level of knowledge (valued between 3-4 points, 50-75 percent) and low level of knowledge (valued between 1-2 points, less than 50 percent). It showed that farmers had a good understanding of organic vegetable production at 100% (as shown in Table 2). This is consistent with the study of Yingluck Kanchanaroek (2022) found that consumers in Lampang have basic knowledge and understanding of organic agriculture matter at a high level. More than 90 percent of consumers understand that organic farming systems are ecological and friendly to the environment, humans, and animals. In addition, consumers also understand the nature of organic systems that it is difficult to control the exact amount of production because it is based on the natural system (74%), but consumers still have the misconception of hydroponic agricultural products (74%), organic agriculture and safe agriculture (76%) as an organic product. According to Kongsom (2016), less than one percent of consumers who have a full understanding of organic agricultural products can answer all questions. In addition, SawanManeechot and Dusit Athinuwat (2019) found that 80 percent of small farmers in Nakhon Sawan Province know organic agriculture at a high level. The remaining 20 percent have moderate knowledge. The issue that the farmers answered 100% correctly was organic agriculture is a production system that considers and benefits the environment, consumers, and the balance of nature; growing legumes or other soil-nourishing crops and plowing them into green manure; crop rotation to reduce the risk of disease and pests; choose plant varieties that are disease resistant to reduce damage; use biological agents, herbal extracts, and microorganisms to control insect pests, and take into account the fairness of labor wages within the farm. Organic farming can remove plant residues on the plot

by burning. Framers use chemical fertilizers to increase plant growth when needed and use herbicides and weed control when necessary and labeled to claim that it is an organic product.

Table 1 Number and percentage of farmers classified by knowledge and understanding of organic vegetable production of organic vegetable farmers in Vientiane Capital, Lao PDR (item list)

(n=175)		
Organic vegetable production	Answer Results	
	Correct	Incorrect
	No. of Cases (Percent)	No. of Cases (Percent)
1) A production system that takes into account the environment, maintains the balance of nature and biodiversity and has an ecological management system similar to nature.	175 (100)	-
2) Production does not use chemicals, chemical fertilizers, or synthetic hormones.	174 (99.4)	1(0.6)
3) Do not use plants or microorganisms derived from Genetically Modified Organisms (GMOs).	174 (99.4)	1 (0.6)
4) Emphasize the use of organic matter such as manure, compost, green manure, and bio-fertilizers to increase soil moisture.	175 (100)	-
5) Growing more integrated crops to increase the diversity of living organisms to reduce pest infestation and support ecosystems.	174 (99.4)	1 (0.6)
6) Focus on using renewable resources for maximum benefit within the area rather than imports from outside.	175 (100)	-

Table 2 Number and percentage of farmers classified by knowledge and understanding of organic vegetable production of organic vegetable farmers in Vientiane Capital, Lao PDR (classified by level).

(n=175)		
Knowledge and understanding of organic vegetable production	Number of farmers (people)	Percent
Farmers have a good level of knowledge.	175	100
Farmers have a moderate level of knowledge.	-	-
Farmers have a little level of knowledge	-	-
Total	175	100

Acceptance of organic vegetable production by organic vegetable farmers in Vientiane Capital, Lao PDR

The study found that acceptance of organic vegetable production in compliance with various topics, 25 out of 30 items, a total of 175 cases, representing 100 percent, followed by acceptance of organic vegetable production by organic vegetable growers in compliance with various topics, 4 out of 30 items, a total of 174 cases, representing 99.4 percent, and there is only one non-compliance, representing 0.6 percent, and the last one is acceptance of organic vegetable production by organic vegetable farmers in compliance with 1 of the 30 items, a total of 144 cases, representing 82.3%, and there were 31 non-compliance cases, representing 17.7% (as shown in Table 3). This is consistent with the study of ThanapatKhaowiset (2020) found that the acceptance of organic agriculture among rice farmers in Sam Chuk District, Suphan Buri Province was at a high level overall. In the development of a self-reliant production system in terms of organic fertilizers and nutrients on the farm, followed by the improvement production system according to the integrated agricultural approach and control of diseases, insects, and pests with a combination method without using chemicals, that is, farmers want to do self-reliant agriculture and use of various resources in integrated farming. In terms of chemical fertilizers and various nutrients to reduce the use of chemicals and help to reduce the cost of farming more, it is continuous learning and improvement of agriculture from attitudes that require safety and cost reduction in the use of chemicals and pesticides.

Table 3 Number and percentage of farmers in Acceptance of organic vegetable production of organic vegetable farmers in Vientiane Capital, Lao PDR

Acceptance of organic vegetable production	n=175)	
	Acceptance	
	Compliance	Non-compliance
	No. of Cases (Percent)	No. of Cases (Percent)
1) A production system that takes into account the environment, maintains the balance of nature and biodiversity and has an ecological management system similar to nature.	175 (100)	-
2) Production does not use chemicals, chemical fertilizers, or synthetic hormones.	175 (100)	-
3) Do not use plants or microorganisms derived from Genetically Modified Organisms (GMOs).	175 (100)	-

4) Emphasize the use of organic matter such as manure, compost, green manure, and bio-fertilizers to increase soil moisture.	175 (100)	-
5) Growing more integrated crops to increase the diversity of living organisms to reduce pest infestation and support ecosystems.	175 (100)	-
6) Focus on using renewable resources for maximum benefit within the area rather than imports from outside.	175 (100)	-
7)The planting area is not at risk of chemical contamination or heavy metals, nor adjacent to factories, dumping grounds, or community areas.	175 (100)	-
8)Water sources used in organic vegetable production, clean produce, and clean equipment used or involved in production must be clean, without toxic contamination, heavy metals, or harmful microorganisms.	175 (100)	-
9)There are clear contamination prevention measures in soil, water, air, and agricultural tools in organic vegetable production.	175 (100)	-
10) A system of crop production is planned. Choose a planting system and plant type to suit the season and environment.	175 (100)	-
11) Growing co-cropping and cross-cropping in organic vegetable production.	174 (99.4)	1 (0.6)
12)Do not grow the same vegetables or the same family in the same area.	174 (99.4)	1 (0.6)
13)Plant varieties obtained from genetic editing or irradiation are not used in organic vegetable production.	175 (100)	-
14)Commercially produced seeds are not mixed or dipped in chemicals before planting.	175 (100)	-
15) Use seeds that come from organic production systems.	175 (100)	-
16)Therearepracticesandmeasurestopreventsoilerosion.	175 (100)	-
17) There are measures to prevent pesticides (diseases, insects, weeds) attached to the seeds, or breeds in organic vegetable production systems.	175 (100)	-
18) Use biological, plant-based natural substances, mechanical methods, and karmic practices in pest management.	175 (100)	-
19) Using manual labor, planting cover crops, using plant waste or plastic cover, or using a mower to control weeds	175 (100)	-
20) Having knowledge of principles of harvesting and post-harvest management in organic vegetable production	175 (100)	-

21) The place of operation of harvesting management and post-harvest management must be clean and hygienic, with no risk of chemical contamination, heavy metals, or microorganisms that cause harm.	175 (100)	-
22) Do not mix common crop products with organic vegetables.	175 (100)	-
23) Packing materials and vehicles used to transport organic produce are suitable.	175 (100)	-
24) Choose biodegradable materials or packaging that do not damage the environment or opt for reusable packaging.	144 (82.3)	31 (17.7)
25) The storage facility for organic vegetables has sufficient space, clean, good ventilation and can protect against microorganisms, insects, and pests that carry diseases	174 (99.4)	1 (0.6)
26) Yield preservation separates organic vegetable produce from conventional crop produce.	175 (100)	-
27) Prevent damage to productivity and loss of organicity.	175 (100)	-
28) Record evidence or documents showing organic crop production separate from conventional crop production.	175 (100)	-
29) Prepare production plans and record operations that contain important information about organic crop production, such as planting, maintenance, pest prevention, and harvesting in all production cycles continuously, completely, and up-to-date.	175 (100)	-
30) Prepare accurate and up-to-date history, maps, and plot/ farm plans.	174 (99.4)	1 (0.6)

Problems, obstacles, and suggestions about organic vegetable production for sustainable development of organic vegetable farmers in Vientiane Capital, Lao People's Democratic Republic

From the study of information and collecting data from a sample group of 175 organic vegetable farmers, it was possible to summarize the problems, obstacles, and suggestions about organic production for sustainable development of organic vegetable farmers in Vientiane Capital Area, Lao People's Democratic Republic divided into six topics as follows:

1. Control system issues in production techniques

In terms of problems and obstacles, it revealed that farmers could not control the exact number of fruits produced and assessment of the economy, investment, and profit of the members, lack of responsible staff and consultants in production and marketing plans, lack of

equipment and skills to use, lack of coordination between producers, government and private sectors, and skills and labor capacity in the production of organic vegetable growers are also minimal.

Suggestions: The production system should be built to meet the needs of consumers and adequately meet the needs of the market for diversity in production and output including creating a separation point, production cleaning point, packaging, processing, and storage of standardized products.

2. Quality and standard control system issues

In terms of problems and obstacles, it showed that farmers still lacked knowledge, techniques, and methods for controlling pests, and lack of basic knowledge of the production calendar in a planting period that adapts to the weather and the quality of the seeds did not meet the standards, making them less resistant to disease.

Suggestions: maintaining the produce to quality and standards is very important because the product quality must meet the market demand.

3. Marketing issues

According to the problems and obstacles, it showed that there were quite a lot of competitors in the market either in the same organic group or in other groups. Therefore, sometimes there is a problem with setting the selling price. The lack of a definite marketing strategy causes the price of produce in the market to change, rising and falling according to demand that is consumers, and supply that is sellers. In addition, the distribution facilities are limited and insufficient to meet the growing demand of manufacturers.

Suggestions: marketing systems or marketing channels should be created that are modern and easy to access so that consumers can easily access organic vegetables and meets the needs of consumers. It also has a positive effect on farmers who can expand the organic vegetable market in a large area. Distribution capacity and improvement of transportation systems should be promoted effectively, instilling awareness for consumers to see the importance of the consumption of organic vegetables and their differences from conventional chemical-treated vegetables to promote the consumption of more organic vegetables. In addition, the government should have a policy about the allocation of space or marketing channels for selling more organic vegetables to create more variety of organic vegetable distribution channels.

4. Accounting and financial system issues

In terms of problems and obstacles, it showed that the accounting system was still in its old form. It is still not an accounting system that can calculate accurately and surely. Persons

responsible for accounting and finance still lack of skills in using accounting systems (Software and Hardware). Moreover, the protection regulations are not yet strong and strict.

Suggestions: Regulations in the administration and management of the accounting and financial system should be created to be transparent and verifiable, including having responsible persons with knowledge and expertise.

5. Credit issues

In terms of problems and obstacles, it showed that there are still strong funds within the group and a lack of capital turnover in the group during periods when no organization or project is supported. Therefore, they must be self-reliant and reduce borrowing, lack professionalism in systematic credit management, and uncertainty in the group's financial management and funding sources.

Suggestions: there should be regulation, control, and transparency within the group. There is a need for ongoing budget support from the government and other sources of funding and assistance is needed to provide low-interest financing to meet the capital needs of farmers.

6. Organization protection and management issues

In terms of problems and obstacles, it showed that the coordination or mutual agreement between groups in pricing sales, area allocation, and product list quality including coordinating for joint sales is quite problematic and difficult. There is still a lack of people who have leadership and those who will be passed down from generation to generation. Moreover, the area for organic vegetable farming is limited and inadequate.

Suggestions: Skills and leadership should be promoted to more individuals who will be passed down from generation to generation. People with knowledge, ability, and organizational management skills should be created and responsibilities should be divided within the group, so that the group can be strong and self-reliant, including expanding its organization or group. The potential of the members of the group is always developed for members to have the ability and expertise in various fields. As a result, the organization or group can develop together the entire organization or group to be accepted by outsiders.

Conclusion

The results of the study on "Organic vegetable production for sustainable development of farmers in Vientiane Capital, Lao People's Democratic Republic", organic vegetable farmers have a high level of knowledge and understanding about organic vegetable production (100%). In terms of production systems that take into account the environment, maintain the balance of nature and biodiversity, and have an ecological management system similar to nature, emphasizing the use of organic matter such as manure, compost, green manure, and bio-fertilizer

to increase soil fertility. In addition, it focuses on the maximum use of renewable resources within the area rather than imported from outside the area. In terms of the acceptance of organic vegetable production by farmers, it revealed that most organic vegetable farmers accepted 25 out of 30 of the organic vegetable production practices about the safety of producers and consumers and it is friendly to the environment, such as the use of organic matter such as manure, compost, green manure, and biological fertilizers to increase soil fertility. The cultivation of crops increases the diversity of life to reduce pest infestation and to support ecosystems, using biological methods, natural substances from plants, mechanical methods, and karmic practices in pest management. The problems and obstacles of farmers in organic vegetable production for sustainable development can be divided into 6 issues: control systems in production techniques; quality and standard control systems, marketing, accounting and finance systems, credit, and organizational protection and management.

Recommendations

Recommendations from research results

The results of the study show that organic vegetable farmers in Vientiane Capital, Lao People's Democratic Republic have knowledge and understanding of organic vegetable production, but there are still some farmers want to know more from the staff or related agencies. It means that government officials or related agencies should pay attention to the following issues:

1. Knowledge and understanding of principles of organic vegetable production on “the production without using chemicals, chemical fertilizers, synthetic hormones, without using plants or microorganisms derived from Genetically Modified Organisms and growing crops to increase the variety of living to reduce pest infestation and to support ecosystems.

2. Knowledge and understanding of practices in organic vegetable production according to the standards of organic vegetable farmers: in terms of area and water sources, seeds and the part used for propagation, soil management and improvement, harvest and post-harvest management, and packaging storage and transportation.

3. Most organic vegetable farmers in Vientiane Capital, Lao People's Democratic Republic agree to comply, but there are still some farmers want to know clarification or additional explanations from staff, related agencies, or officials should focus on the issue of co-cropping and cross-cropping in organic vegetable production. Do not grow the same vegetables or the same family in the same area. The storage area for organic vegetable products is sufficient, clean, and well-ventilated, and can prevent microorganisms, insects, and pests that carry diseases and prepare accurate up-to-date history, maps, plots, and farm plans.

Recommendations for future research

1. A study on the group of organic vegetable farmers as an important model not only studying but also disseminating the achievements of such sample farmers to be a role model for new generation farmers who want to be successful according to the model farmers.

2. The study found that farmers still face marketing problems. Therefore, to achieve sustainability in the development of organic vegetable farmers, it is necessary to find a way to fix it, promote distribution potential, and improve transportation systems to be more efficient, as well as raise consumer awareness of the importance of consuming organic vegetables and how they differ from conventional chemical vegetables to promote the consumption more organic vegetables. In addition, the government should have a policy on area allocation or marketing channels for selling more organic vegetables to create more variety of organic vegetable distribution channels.

3. There should be a government policy to promote organic agricultural production. There is a study of the needs of organic vegetable farmers in different areas and regions of the country to promote and develop organic vegetable farmers to the point that meets the needs and to achieve development farmers who do conventional farming are increasingly interested in growing organic vegetables whether in the area of Vientiane Capital and other provinces that are the foundation for the production of important agricultural products.

4. To be an alternative for farmers to make future career decisions including the factors that create opportunities for farmers to pursue a career, there should be a comparative study of organic vegetable growing data each year to know the differences and to be informed of the planting plan in the coming years effectively.

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