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Analysis of producer behavior towards organic vegetables in Vientiane capital, Lao PDR

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ABSTRACT

The study investigated the behavior of producers towards organic vegetables to determine the main factors influencing households' income and analyze the challenges of producing organic vegetables. Organic agriculture can bring benefits to sustainable production and be a major source of households' income. The Lao government is promoting and supporting clean agriculture in potential areas where the conditions of production and marketing are proper. Organic agriculture can help farmers increase their incomes and help people improve their health conditions. Organic agriculture has significant potential in Laos since several conditions of a traditional farming system can easily adapt to the organic farming system. Organic vegetables can create a value chain with government certification. However, the Lao government has difficulty recommending organic agriculture to farmers. The study collected 272 individual farm households cultivating organic vegetables in six districts in Vientiane's capital, Lao People's Democratic Republic (Lao PDR). The analysis was considered for both descriptive statistics and an ordered logistic model. The results from the ordered logit model show that age, higher education level, organic vegetable area, and selling frequencies are positive and statistically significant. The study can contribute to the next five-year plan of clean agricultural programs for agriculture and forestry development.

Contribution/Originality: This study contributes useful information for potential farmers participating in organic vegetable farming. In addition, the results from the study can help policymakers develop the next plan for organic agriculture in Lao PDR. Based on survey data, the ordered logistic model is used to determine factors influencing producers' decisions about organic vegetables.

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1.INTRODUCTION

Industrial agriculture has substantially contributed to the large amount of agricultural production and to the accessibility of food (Gowdy & Baveye, 2019); however, the farming systems of industrial agriculture have faced negative impacts such as greenhouse emissions, air and water pollution, destruction of wildlife habits, and so on. For

the sustainable development of agriculture, organic agriculture has become an alternative farming method for sustainable global food supply (Abebe, Traboulsi, & Aoun, 2021). According to the Food and Agriculture Organization of the United Nations (FAO), organic agriculture is a farming system relying on ecology rather than synthetic and external agricultural inputs. In terms of such a definition, an organic farming method is close to a traditional farming method. Organic agriculture can be an opportunity for many developing countries to develop domestic agriculture and join international trade.

Agriculture in the Lao People's Democratic Republic (henceforth, Laos) has played a significant role in economic growth. In order to alleviate poverty and shift industrial agriculture, the government of Laos encouraged farmers to use external agricultural inputs such as synthetic fertilizers, pesticides, improved varieties, and so on. Nevertheless, this phenomena leads to negative consequences such as environmental deterioration and food safety. Thus, in 1996, the concept of "sustainable agriculture" was introduced in the 8th National Economic and Social Development Plan (1997–2001), but the participation of farmers in organic agriculture was low and the relevant policies were poor (Sipaseuth & Roder, 2005). In the early 2000's, the Laos government announced the supplementary concept of "Clean Agriculture" (Hirokawa, 2013). The government of Laos prioritized organic agriculture as an important strategic policy to enhance the sustainable development of the agriculture industry. Organic agriculture in Laos can provide opportunities to manage safe food, a higher income source for farm households, and the conservation of natural resources for the nation (Meemekn & Qaim, 2018; Nhuan et al., 2018).

Organic agriculture has significant potential in Laos since several conditions of a traditional farming system can easily converge to the organic farming system (Poyearleng, Kai, Shahriar, & Reakine, 2019). Farmers in Laos have long been practicing organic farming by using indigenous knowledge, which heavily depends on natural resource subsistence, called "traditional farming". From 2004 to 2011, the Department of Agriculture of the Ministry of Agriculture and Forestry (MAF) in Laos collaborated with Swiss Development Organization (Helvetas, 2011), and they implemented the promotion of organic farming and marketing projects. This project contributed to establishing a certification system for the organic standard and logo in Laos. In the middle of the 2000's, Lao Farmers Products (LFP) appeared. It is a local fair-trade cooperative company for organic rice and tea (Poyearleng et al., 2019; Vitoon, 2016). In 2011, MAF revised the strategies for national agricultural development for long-term sustainable development, considering economic, social, and ecological dimensions. Such strategies treated organic farming as a new system in agriculture. Organic vegetables could create a value chain with certified products (Boldanov, Dong, Li, Cheng, & Yang, 2019; Willer & Lernoud, 2017). MAF intends to promote organic agriculture in two main agro-ecological zones: one is placed in the Mekong lowlands, where organic vegetables are specialized, and the other is placed in the Bolovens Plateau zones, where organic coffees are specialized. Organic agricultural commodities produced from these areas are under contract for domestic markets and for export to neighboring countries (Ministry of Agriculture and Forestry, 2015). The demand for organic vegetables in domestic and foreign markets has increased due to consumers' interests in well-being and food safety. The Laos government has encouraged farmers to produce organic vegetables for sustainable agricultural development. Organic agriculture in Laos has been implemented in 26 districts of 8 provinces in 2019. The total areas cultivated for organic agriculture are 7,985 ha, and the total production is 51,170 tons in 2019.

This study particularly focuses on organic vegetables in Vientiane since 50% of cultivating areas and production are concentrated in Vientiane as the capital of Laos. Vientiane is the first city to participate in organic farming and marketing since it has the largest cultivating areas and enough consumers for organic agricultural products. According to the Ministry of Industry and Commerce (MOIC), in Vientiane, the total area certified as organic production reaches 3,231 ha, which produces about 37,210 tons of organic agricultural products per year. Furtjermore, the city possesses a favourable geographical location that facilitates the exportation of goods to neighboring nations, particulary Thailand, Vietnam, and China. Vientiane is located along the Mekong River site, sharing a border with Nongkai province of Thailand (Ministry of Industry and Commerce, 2011). It is the first Lao-Thai Friendship Bridge over the Mekong River to connect Laos and Thailand.

This study analyzes factors affecting farmers' behavior towards organic farming in Vientiane and suggests supplementary policies and government programs about organic farming. The specific objective is to determine factors that influence households to produce organic vegetables using an ordered logistic regression. The study will contribute to further developing a suitable agricultural system regarding organic vegetable production.

2. MATERIALS AND METHODS

2.1. Data Collection

Data used in the study were collected from the households producing organic vegetables in Vientiane by a face-to-face interview method. The field survey was conducted from July to August 2020 and covered all organic vegetable groups. This study selected six districts, such as Naxaithong, Xaythany, Pakngum, Sikhottabong, Xaysetha, and Hadxaifong, where organic agriculture is practically implemented. The total area in these districts is 329.14 hectares and there are 303 households and 12 farmer's groups. However, the study excluded one farmer group because farmers of the group only produce fruits. Totally, 272 individual households were surveyed among 303 certified households.

2.2. Empirical Method

This study conducted the descriptive analysis to show data summarization and the econometric model to determine factors influencing farmers' decisions to buy organic vegetables. An ordered logit model is applied to estimate factors affecting the incomes of farm households producing organic vegetables. Several studies have

suggested that when a dependent variable is an ordinal discrete variable, it is appropriate for an ordered logit model (Grilli & Rampichini, 2016; Polimeni, Iorgulescu, & Mihnea, 2018; Tu, Can, Takahashi, Kopp, & Yabe, 2018). The ordered logit model is also known as the proportional odds modelbecause the parallel regression assumption implies the proportionality of the odds of not exceeding the c^{th} category; $odds_{ci} = g_{ci}/(1 - g_{ci})$. The ratio of these odds for two units ($i$and j) is expressed as,$odds_{ci}/odd_{cj} = exp[\beta'(x_j - x_i)]$ which does not depend on the c^{th} categoryand thus is constant across response categories (Williams & Quiroz, 2020).

In the study, gender, age, education, type of training, farm area (organic vegetable area, non-organic vegetable, normal rice, organic rice, cash crop, and livestock area), organic farm experience, and selling frequency are used as the independent variables, and organic vegetable households' incomes are used as the dependent variables. The income variable is categorized into 4 levels, such as 201 to 400 US$, 401 to 800 US$, 801 to 1200 US$, and more than 1200 US$. In the case of the dependent variable, whichincludes 4 categories, we can estimate the Z-value and the assumed logistic distribution of the disturbance term. The ordered logit model can be used to estimate the probability that the unobserved variable Y^* falls within the various threshold limits.

The ordered logit estimation equation is expressed as:

$$Income_{i,k} = \beta_0 + \beta_{1,l}Gender_{i,l} + \beta_2 Age_i + \beta_{3,h}Edu_{i,h} + \beta_{4,m}Area_{i,m} + \beta_{5,n}Sell_{i,n} + \beta_{6,p}Training_{i,p} + \beta_7 Exp_i + u_{i,k,h,l,m,n,p} \quad (1)$$

Where $Income_{i,k}$ represents kth level of income at the ith farmer , $Gender_{i,l}$ represents the gender of respondent at ith farmer ,Age_i represents age of respondent at ith farmer, $Edu_{i,h}$ represents the hth education level of respondent at the ith farmer, $Area_{i,m}$ represents the mth type of area for agriculture activities at the ith farmer, $Sell_{i,n}$ represents the nth selling frequencies per week at the ith farmer, $Training_{i,p}$ represents the pth training program at the ith farmer, Exp_i represents experience of organic vegetable farming at the ith farmer, and $u_{i,k,h,l,m,n,p}$ represent an error term.

3. RESULTS AND DISCUSSION

3.1. Descriptive Analysis

Tables 1-6 report the information associated with the basic characteristics of organic vegetable farm households. Table 1 shows gender, age, and education distributions. In terms of gender distribution, females represented 51.10% of respondents and 48.90% were males. This outcome demonstates a significant level of female participation in the domain of organic vegetable cultivation. The increases in participation of women in organic vegetable farming can positively influence the role of women in agriculture. Regarding age, this study found that the youngest of the organic farmers was 20 years old and the oldest was 69 years old. The majority of respondents (37.71%) were within 41-50 years old. In terms of education, 8.09% of the respondents have never had formal education. The majority of respondents (33.46%) have had a primary level of education, 27.57% and 23.53% of respondents have had secondary levels of education, or high school, respectively. High levels of education, such as a bachelor's degree, master's degree and PhD, represented 4.04%, 2.21%, and 1.10%, respectively.

Table 1. Socioeconomic characteristics of organic farm household.

Variable	Category	Frequency	Percentage (%)
Gender	Male	133	48.90
	Female	139	51.10
Age	20-30 years	16	5.88
	31-40 years	80	29.41
	41-50 years	108	39.71
	51-60 years	58	21.32
	More than 60 years	10	3.68
Education	Not study	22	8.09
	Primary school	91	33.46
	Secondary	75	27.57
	High school	64	23.53
	Bachelor's degree	6	2.21
	Master	11	4.04
	PhD	3	1.10

The result of the study Table 2 shows that the main sources of information concerning organic vegetable farming. 59.19% of respondents obtained the information from the District Agriculture and Forestry Office (DAFO). 34.93% of respondents obtained information from other farmers, 3.68% of respondents obtained the information from social media. From this result, we can suggest the importance of the government program. Based on the result, the study found that before farmers started organic farming, the main agricultural activity was normal rice farming with 91 respondents (33.46%), and followed by rice and vegetables with 83 respondents (30.51%), vegetables and fruit with 43 and 1 respondents covering 15.81% and 0.37%, respectively. 19.85% of respondents did not harvest specific crops. Such results show that the government program influenced the transformation of rice farmers to organic vegetables.

In terms of the reason to produce organic vegetables, the major reason is related to higher income sources than other crops (59.93%). 22.06% of respondents chose organic vegetable farming because of the good environment. 18.01% of respondents chose it because of government support.

Table 2. Source of information about organic vegetable production.

Variable	Category	Frequency	Percentage
Organic information	DAFO	161	59.19
	Farmer	93	34.93
	Social media	10	3.68
	Other	8	2.94
Main agriculture before OA farming	None	54	19.85
	Rice only	91	33.46
	Rice and vegetables	83	30.51
	Vegetables only	43	15.81
	Fruits	1	0.37
Reason to produce organic vegetable	More income than non-organic	163	59.93
	Government supports	49	18.01
	Environment	60	22.06

Table 3 presents the types of training that farmers receieved. Almost all farmers obtained knowledge of organic vegetable farming from the course of organic agriculture as a whole, represented by 145 respondents (53%), techniques for planting organic vegetables represented by 100 respondents (36.76%), techniques for developing fertilizers represented by 24 respondents (8.82%), and the certificated system represented only 3 respondents (1.1%).

The study investigated the organizers of training. The results show that most organic farmers are trained by the technical staff of the District of Agricultural and Forestry Office (DAFO), with 96 respondents (54.41%). The 84 respondents (30.88%) are trained by other members of organic group. The 52 respondents (19.12%) are trained in the Japan International Cooperation Agency (JICA) project. The rest of the respondents (14.71%) joined the training programs organized by the farmers group.

Table 3. Types of training on organic farming.

Variable	Category	Frequency	Percentage
Types of training	Organic agricultural as whole	145	53.31
	Techniques how to plant	100	36.76
	Techniques how to develop fertilizer	24	8.83
	Certificated system	3	1.10
Organizer of training	JICA project	52	19.12
	DAFO	96	54.41
	Farmers group	40	14.71
	Group members in village	84	30.88

In terms of the frequency of selling, Table 4 shows that the majority of farmers sell their products twice a week: two times per week with 125 respondents covered (45.96%), followed by three times per week with 123 respondents covered (45.22%), one time per week with 22 respondents covered (8.09%), and more than three times per week with only 2 respondents covered (0.74% of respondents).

The study examined the future strategy for marketing organic vegetable cultivation. 60.01% of respondents answered when market prices would be high. 18.38% of respondents answered when a market would be expanded. 7.71% of respondents answered when there are chances to export organic vegetable products. The 16 respondents (5.88%) answered that there are possibilities to keep receiving government support.

Table 4. Selling frequency of organic vegetables.

Variable	Category	Frequency	Percentage
Frequency of selling	One time per week	22	8.09
	Two times per week	125	45.96
	Three times per week	123	45.22
	More than 3 times per week	2	0.74
Further plan to sell organic vegetables	Higher price	185	68.01
	Chance to export	21	7.71
	Possibility to receive GOV support	16	5.88
	Market expansion	50	18.38

Regarding the farm area in Table 5, this study found that the area of organic farming is quite small (less than one hectare). The majority organic farm area was from 0.01-1.00 hectares with 214 farm households presented by 78.58%, followed by 1.01-2.00 hectares, with 39 farm households presented by 14.34%, the area from 2.01-3.00 hectares with 12 farm households presented by 4.41%, the area from 3.01-4.00 hectares with 4 farm households presented by 1.47%,

and more than 4.00 hectares with 3 farm households 1.10%. The smallest farm area is 0.02 hectares and biggest farm area is 4.5 hectares.

Table 5. Farm size of organic vegetable farming.

Variable	Category	Frequency	Percentage
Farm area	From 0.01-1.00 ha	214	78.58
	From 1.01-2.00 ha	39	14.34
	From 2.01-3.00 ha	12	4.41
	From 3.01-4.00 ha	4	1.47
	More than 4.00 ha	3	1.10

In terms of the challenge of organic farming Table 6, this study found that the main challenge of organic farming was the limited market, with 207 respondents, representing 76.1%, followed by weather conditions, with 194 respondents representing 71.32%, limited area for organic farming, with 168 respondents representing 61.76%, and limited technical support from the government, with 64 respondents representing 23.53%.

Table 6. Challenge of organic farming.

Variable	Category	Frequency	Percentage
Limited market	Yes	207	76.10
	No	65	23.90
Limited technical support from GOV	Yes	64	23.53
	No	208	76.47
Weather condition	Yes	168	61.76
	No	104	38.24
Limited area for organic farming	Yes	168	61.76
	No	104	38.24

3.2. Results from Ordered Logistic Model

This study employed an order logit model to examine the characteristics that influence households' income fro organic vegetables, based on descriptice analysis. The results from the ordered logit model are presented in Table 7. The higher education level, organic vegetable area, cash crop area, livestock area, selling frequencies per week, and age are significant factors influencing households' income for organic vegetables. Selling frequencies such as twice, three times, and more than three times positively affectthe household income for organic vegetables. The increases in size of cash crop areas negatively affect income; however, the increases in size of livestock areas positively affect income.

Table 7. Results of ordered logit model.

Variables	Category	Coefficient	Std. error	P-value
Gender	Male (Base)	-	-	-
	Female	-0.079	0.315	0.801
Education	No study (Base)	-	-	-
	Primary school	0.937	0.647	0.148
	Secondary school	1.044	0.651	0.109
	Higher education level	1.296	0.671	0.056*
Area size of mixed production	Organic vegetable area	0.468	0.251	0.062**
	Non-organic agriculture area	0.008	0.197	0.968
	Normal rice area	4.435	853.590	0.996
	Organic rice area	48.777	2750.019	0.986
	Cash crop area	-5.443	3.112	0.080*
	Livestock area	0.132	0.072	0.069*
Selling frequencies	Once per week (Base)	-	-	-
	Twice per week	1.650	0.507	0.001***
	Three times per week	4.197	0.602	0.000***
	More than 3 times per week	1.461	1.545	0.344***
Training programs	OA as a whole (Base)	-	-	-
	Techniques how to plant OA vegetables	0.271	0.421	0.519
	Technique how to develop organic fertilizer	0.908	0.421	0.131
Age	-	0.037	0.018	0.042**
OA farm experience	-	0.050	0.056	0.373

Note: ***, **, * significant at 1%, 5%, and 10%, respectively.

The results from the ordered logit model show that age, higher education level, organic vegetable area, and selling frequencies are positive and statistically significant. In other words, the increases in such variables lead to the likelihood of farmers being placed at the higher level of income. Considering the results of the marginal effects of each category of income, it can be said that with the increase in these independent variables, the likelihood of farmers

being placed at a lower level of income decreases and the likelihood of them being placed at higher level of income increases. On the other hand, cash crop area had a negative coefficient and was statistically significant, this mean cash crop area had a negative impact on households' income. As the increase in this variable increased, the likelihood of farmers being placed at a high level of income decreased. Table 8 reports marginal effects at means for different income levels. The marginal effects are useful information to show the relationship between changes in a responding variable and changes in independent variables.In terms of gender, when a farmer is female,the likelihood of income level "under 200US$" will be increased by 0.2%, then the likelihood of income level "201~400US$" will be increased by 0.2%, then the likelihood of income level "401~800US$" will be increased by 0.6%, but the likelihood of income level "801~1,200US$" will be decreased by 1.1%. Regarding to education, when a farmer is highly educated with an increase in a higher education level, the likelihood of farmers with higher education level being placed at a lower category of income decreases. On the other hand, the likelihood of them being placed at a higher category of income increases as follows: with an increase of one unit of higher education level, they are about 4.8 percent less likely to be high level of income, about 4 percent less likely to be high level of income, about 9.4 percent less likely to be high level of income and about 18.2 percent more likely to be high level of income. According to types of areas, the increase in variables of organic vegetable area, non-organic vegetable area, normal rice area, organic rice areas and livestock area decreases, the likelihood of farmers being placed in the lower category of income, and the likelihood of farmers being placed in the higher category of income increases as follows: with an increase of one hectare of organic vegetable area, farmers are about 1.3 percent less likely to be lower categories of income, about 3.9 percent less likely to be middle category of income and about 6.6 percent more likely to be high category of income. Similarly, increasing the livestock area by one hectares make it about 0.3 percent less likely to be in low and middle categories of income, and about 1.1 percent less likely to be in the middle category of income and about 1.8 percent more likely to be in the high category of income. On the other hand, with increase by one hectare of cash crop area about 15.4, 15.2 and 46.2 percent more likely to be low and middle categories of income, respectively and about 76 percent less likely to high categories of income, this means the area of cash crop does not have an effect on households' income.

In terms of selling frequencies, with the increase in selling frequencies, the likelihood of farmers to be placed at lower category of income decreases, on the other hand the likelihood of farmers being placed at higher category of income increases as follows: with increase one unit of selling two times a week about 10.9 percent less likely to be low level of income, about 10 and 7.1 percent less likely to be middle level of income and about 28.1 percent more likely to be high level of income. Regarding the type of training, the result found that with the increase in one unit of training on how to develop organic fertilizer, the likelihood of farmers being placed at a lower level of income decreases. Nevertheless, the probability of farmers being put at a higher level of income increases. On the other hand, with increase by one unit of training on how to grow up the organic vegetables, the likelihood of farmers being placed at lower level of income increases, the likelihood to be placed at a higher level of income decreases, which means that this variable does not have an effect on households' income. In terms of age, when a farmer gets old by a year, the likelihood of income level "under 200US$" will be decreased by 0.1%, then the likelihood of income level "201~400US$" will be decreased by 0.1%, then the likelihood of income level "401~800US$" will be decreased by 0.3%, but the likelihood of income level "801~1,200US$" will be increased by 0.5%.

Table 8. Marginal effects at means by different income levels.

Variables	Categories	Marginal effects			
		Level 1 (Under 200 US$)	Level 2 (201~400 US$)	Level 3 (401~800 US$)	Level 4 (801~1200US $)
Gender	Male (Base)	-	-	-	-
	Female	0.002	0.002	0.006	-0.011
Education	No study (Base)	-	-	-	-
	Primary school	-0.038	-0.031	-0.063	0.133
	Secondary school	-0.041	-0.034	-0.072	0.148
	Higher education level	-0.048	-0.040	-0.094	0.182
Type of areas for agriculture activities	Organic vegetable	-0.013	-0.013	-0.039	0.066
	Non-organic agriculture	-0.000	-0.000	-0.000	0.001
	Normal rice	-0.125	-0.124	-0.377	0.626
	Organic rice	-0.381	-1.365	-4.146	6.894
	Cash crop	0.154	0.152	0.462	-0.769
	Livestock	-0.003	-0.003	-0.011	0.018
Selling frequencies	One time per week (Base)	-	-	-	-
	Two times per week	-0.109	-0.100	-0.071	0.281
	Three times per week	-0.140	-0.145	-0.413	0.699
	More than three times per week	-0.102	-0.091	-0.049	0.242
Training programs	OA as a whole (Base)	-	-	-	-
	Techniques how to plant OA vegetables	0.006	0.006	0.018	-0.031
	Techniques how to develop organic fertilizer	-0.007	-0.007	-0.023	0.038
Age	-	-0.001	-0.001	-0.003	0.005
OA farm experience	-	-0.001	-0.001	-0.004	0.007

Regarding organic farm experience, the results show that with higher experience on farming, the possibilities of gaining a higher level of income increase. As the experience in farming increases by one year, the likelihood of farmers being placed at a lower level of income decreases. On the other hand, the likelihood of having a higher level of income increases.

3.3. Discussion and Implication

The Laos government has been promoting and supporting clean agriculture in potential regions where conditions of the natural environment and markets are favorable. Organic agriculture not only can strengthen ecological system while conserving soil and water resources but also increase household's incomes and improve the health conditions of consumers (Das, Chatterjee, & Pal, 2020; Uematsu & Mishra, 2012). The study attempted to investigate the behavior of producers towards organic vegetable farming. First, the study characterizes the household socio-economic attributes of organic farm households and analyzes the challenges of producing organic vegetables. Second, the study determines the major factors influencing households' income using an ordered logit model.The results of the study show that age, higher education level, organic vegetable area, livestock's area, selling time, organic market expansion, information source were positively and statistically significant.

The study provides useful information about organic producers in Vientiane capital, Laos. It can be used for planning the next five-year plan of agriculture and forestry development, especially for clean agricultural programs. However, in the middle of field survey, we found that organic farmers have some challenges with the implementation. First of all, the market is limited. The government focuses on expanding the organic market by formulating policies in order to allocate a permanent location for the retailer market. The study suggests marketing promotion strategies. For example, it opens organic booths (selling only organically certified products) inside the most popular food markets to attract consumers. This would require important investment in terms of the organization from the farmers to enable them to sell on these other markets every day of the week. Farmers also need to improve the technique of organic farming to increase the productivitiy in both quality and quantity for stable supplies. Thus, the government should consider qualified training course on how to utilize agriculture inputs, soil improvement, and growing patterns in order to increase productivity. Especially in the rainy season, the production of organic vegetables is unstable, and it will lead to a higher prices than during the dry season. In order to maintain stable supplies, the government should provide technical support such as training on how to test their soil, how to make appropriate organic fertilizers, and most importantly, the best pest and disease control methods to apply during the monsoon period. In addition, policymakers need to consider ways to cover the additional variable coststhat farmers have to bear in the process of transitioning organic agriculture.Compared with convential agriculture, organic agriculturural farmers can pay additional costs such as labor costs, insurance expenses against risks and marketing charges for entering new markets (Uematsu & Mishra, 2012). Thus it is important to be made of policy efforts for famers who transition to organic farming. We suggest that the Laos government must provide a program that improves consumers' awareness of organic agricultural products. Such program can be an indirect way to expand a domestic market. Finally, the government needs to establish a price information system based on consumers and other market conditions. It can help to maintain sustainable market access for organic products.

This research has been conducted with only organic vegetable groups in Vientiane Capital, without considering the others in the regional area. Therefore, future research should be conducted by covering all areas and channel distribution organic groups in the country and the research studies such as papers or journals were limited, so there were some difficulties in reviewing the similar or related topics concerning the behaviors of organic vegetables.

4. CONCLUSION

This research contributes useful results for sustainable development in the agricultural sector in Laos. The findings of the study provide positive information to policymakers in order to encourage farmers to convert organic vegetables and to stakeholders in order to expand the organic market. Even though this is a highly utilized study, it has several limitations for the sample. The study has been conducted with only organic vegetable groups in Vientiane, the Capital of Laos, without considering the others in the regional area. Therefore, future research should be conducted by covering all areas and channel distribution organic groups in the country.

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