Research article

Impact of Agricultural Certification for Silk Farmers: Case Study of Khon Kaen Province, Northeast Thailand

MOEKA NUMATA*
Graduate School of Frontier Sciences, The University of Tokyo, Chiba, Japan
Email: moeka.n.0530@gmail.com

MALLIKA SRISUTHAM
Khon Kaen University, Khon Kaen, Thailand

AYA SUZUKI
Graduate School of Frontier Sciences, The University of Tokyo, Chiba, Japan

Received 15 April 2024 Accepted 5 June 2024 (*Corresponding Author)

Abstract Despite rapid economic growth, income inequality between rural and urban areas remains an important social issue in Thailand. In 2020, the disparity between the Northeast region, which has the lowest GRP per capita, and the East region, which has the highest GRP per capita, was approximately 5.05 times. Northeast Thailand is an agricultural area and is famous for silk production. According to the Queen Sirikit Department of Sericulture, in 2017 sericulture silk yarn production in the Northeast region was 520 metric tons and engaged 82,071 households (or approximately 80% of all households in the region). Improving the silk industry in the Northeast is essential for economic development in this region. Obtaining certifications that guarantee quality is considered one effective way to increase farmers' income. Hence, this study aimed to clarify the factors that play a role in obtaining certification and the impact of obtaining certification on farmers' profits from silk weaving. We examined the case of farmers in Khon Kaen province in Northeast Thailand and focused on four certifications: Organic Thailand, Geographical Indication (GI), OTOP, and Peacock. We conducted both quantitative and qualitative analyses based on the primary data collected through in-person interviews with 103 farmers from October to November 2022. The results showed that the important factors affecting profits from silk weaving are design, the type of dyestuffs, and the ability to access markets where products fetch high prices. To identify the key factors to obtain certification, we used logistic regression, and to evaluate the impact of the certifications, we conducted a two-sample t-test. Statistical analysis results revealed that joining a farmers' community and the number of processes involved in sericulture are two important factors in obtaining certifications and that farmers who have certifications tend to earn more income compared to non-certificated farmers.

Keywords agricultural certification, sericulture, logistic regression, two-sample t-test, Thailand

INTRODUCTION

In Thailand, economic inequality between rural and urban areas is an important social problem. In 2020, the economic gap between the Northeast, the region with the lowest GRP per capita, and the East, the region with the highest GRP per capita, was approximately 5.05 times (Gross Regional and Provincial Product Chain Volume Measure 2020 Edition). The main industry in the Northeast is agriculture, which accounts for about 20% of the region's gross domestic product. Therefore, improving agriculture is necessary to reduce the economic gap.

To increase farmers' income, we can consider the following three methods. The first is to increase farmers' land, and the second is to increase the yield. The last one is increasing the price per unit of the crop. In Thailand, almost all the arable land is already used, and the expansion of agricultural areas is no longer relevant. Further, many farmlands have environmental problems

because of the overuse of chemical fertilizers (Tirado et al., 2008). Hence, of the three methods, the first two are not feasible in considering environmental conservation. Therefore, producing high-value crops is essential to improve farmers' income. Furthermore, high quality with agricultural certifications or labels is one promising method for farmers to take. The last decades have seen a rise in the public interest in the consumption and production of ethical foods, such as organic food and fair trade (Vermeir and Verbeke, 2006). Acquiring agricultural certification also often has positive impacts on farmers' net income. However, the crops that have been studied are limited, such as chocolate, fruits, and coffee (Meemken, 2020).

Thailand is known for its silk production, and in 2020 the amount of production of silk yarn was 520 metric tons, ranking fifth in the world (International Sericultural Commission, 2020). According to the report of Queen Sirikit's Department of Sericulture, the Northeast area is one of the main production areas of silk. In 2017 sericulture practices covered 57 out of the total 77 provinces in Thailand. The mulberry area was 7,553 ha and 82,071 households conducted sericulture. Around 80% of households conducting sericulture lived in Northeast Thailand. The origins of the Thai silk industry are not known in detail but according to the ASEAN GI database, 2024, in Chonnabot district, Khon Kaen, silk was used as a gift for King Rama I (1737-1809) as early as in the 18th century.

OBJECTIVE

This paper studies the silk sector and agriculture certifications, taking the case of Khon Kaen province in Thailand. In this paper, we focus on four certifications. The first label is Organic Thailand which is organic certification in Thailand. The second is Geographical Indication (GI), certified to protect the locality and traditionality of the product. The third one is OTOP which means One Tambon One Product. Tambon means village in Thai and this certification encourages rural development, and the last certification is Peacock which is an exclusive certification that indicates the quality of Thai silk.

METHODOLOGY

We have two research questions: what factors are related to obtaining certification and what kind of impact does the certification bring to silk farmers' annual income from silk weaving? To clarify those two research questions, we conducted face-to-face interviews and questionnaire surveys in Khon Kaen province, Northeast Thailand (Fig. 1). Black dots indicate the locations of the farmers who were interviewed. We conducted two rounds of fieldwork. The first survey was from August 1st to August 5th, and the second survey was from October 23rd to November 11th. The total number of farmers who answered our questionnaire was 103.

To examine determinants to obtain certificates, we chose variables as such years of education completed, gender, and whether to join farmers' communities (Table 1). We conducted a logistic regression to examine the important factors of obtaining certifications.
We used the following model Eq. (1) varying the number of control variables in the five models we conducted.

$$Y = f(X'\beta) \quad (1)$$

Where Y is equal to 1 if the farmer has certification and zero otherwise, and X is a vector of independent variables, which includes *education, age, experience, area_ha, full-time, seripeople, and steps*, depending on the models.

Comparing the mean values between certified and non-certified farmers, the three areas with particularly large differences in mean values were experience, land area, and the number of sericultural processes conducted in their households (Table 2). We will analyze using logistic regression whether those factors are statistically significant.

In addition, to determine the certification's effect on silk farmers, we conducted a two-sample t-test. We examine each research question not only by quantitative analysis but also by qualitative analysis based on information obtained through interviews and other means.

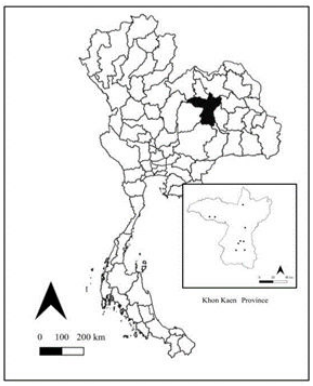

Fig. 1 The map of the study site

Table 1 List of independent variables

age	Farmer's age
edu	Years of education completed
gender	= 1 if the farmer is a woman, = 0 otherwise
experience	Years of agricultural experience
fulltime	= 1 if the farmer is a full-time silk farmer, = 0 otherwise
family number	Number of family members
Area ha	Size of land that the farmer owns (ha)
seripeople	Number of family members who are involved in sericulture
steps	Number of processes in silk production that the farmer is engaged in
community	= 1 if the farmer belongs to a community, = 0 otherwise

Table 2 List of independent variables' mean and standard deviation

	Group	Obs.	Mean	Std. dev.
Age	1	46	56.08	10.34
	0	24	58.54	10.94
Difference			-2.56	
Education	1	46	7.74	2.74
	0	24	6.54	1.98
Difference			1.2	
gender	1	43	0.9	0.29
	0	24	0.92	0.28
Difference			0	
experience	1	34	30.74	15.53
	0	20	26.1	18.44
Difference			4.64	
fulltime	1	33	0.73	0.45
	0	18	0.83	0.38
Difference			-0.11	
area_ha	1	40	3.3	3.54
	0	20	1.37	1.33
Difference			1.94	
seripeople	1	44	1.7	1.49
	0	19	1.42	0.69
Difference			0.28	
steps	1	46	3.76	1.88
	0	24	2.38	1.95
Difference			1.39	

Note: Group=1 means the farmer joins the community and Group=0 means the farmer doesn't join the community

RESULT AND DISCUSSION

From the result of the regressions, the steps were statistically significant, indicating that it is an important factor in obtaining certifications (Table 3). We estimated Average Marginal Effects (AME). If a farmer adds one more process, the probability of certification increases by 8.84% (Model 5). In sericulture, there are six main processes to make silk weaving. These are mulberry cultivation, silkworm bleeding, reeling yarn, dyeing, weaving, and selling.

From the interviews, we found that some farmers who perform a smaller number of processes are concerned by the recent increase in the cost of purchasing raw silk while the purchase price remained the same for finished silk fabrics. However, raising silkworms requires skills, and it is difficult for some farmers to increase the number of processes if they are also engaged in non-farming jobs in cities or growing other crops. In addition, opportunities to learn the skill to raise silkworms are also limited as these skills are often taught in communities or in an area where sericulture is traditionally practiced.

Table 3 Results of logistic regression

	Model 1 Obs:54 GOF: -34.24		Model 2 Obs:48 GOF: -26.78		Model 3 Obs:38 GOF: -24.91		Model 4 Obs: 49 GOF: -29.22		Model 5 Obs: 54 GOF: -31.4	
	AME	P>|z|	AME	P>|z|	AME	P>|z|	AME	P>|z|	AME	P>|z|
edu	0.02	0.37	0.00	0.52	0.04	0.30	0.02	0.45	0.00	0.45
age	0.00	0.63	0.00	0.57	0.00	0.63	0.00	0.39	0.00	0.86
experience	0.00	0.24	0.00	0.17	0.00	0.72	0.00	0.17	0.00	0.24
area_ha			0.12	0.12						
fulltime					-0.01	0.96				
seripeople							0.00	0.761		
steps									0.08	0.02**

*Note p>0.01 ***, p>0.05 **, p>0.1**

The community variable was not included in the regressions because the variable is concerned with endogeneity, but we determined it to be an important factor as a result of the interviews. The importance of being part of a community can be discussed from two aspects. The first is that one must join the community to obtain OTOP, and the second is that the Queen Sirikit Department of Sericulture (QSDS) offers technical improvement workshops for certification, but these are offered on a community basis. The main purpose of the community is to provide technical training so if the farmer doesn't join any community, the farmer finds it difficult to improve their sericulture skills. From our survey, 54 of the farmers joined some kind of community and out of 46 farmers who have certifications, 44 of them belong to the community while out of 24 non-certificated farmers, 1 of them joined the community.

We also examine the impact of agricultural certification on farmers' annual income from silk textiles[1]. Table 4 reports the results of the t-tests between the certified and non-certified farmers. We find that certified farmers tend to obtain 15,702 THB more income annually, and the difference is statistically significant at the 1% level.

Table 4 Results of two sample t-tests

Group	Obs.	Mean	Std. err.	Std. dev.
Non-certified	13	19692.31	2923.87	10542.17
Certified	36	35394.44	3305.6	19833.62
Difference		-15702.1		
				t = -2.71

[1] We do not use regressions to examine the impact of certification on income due to the issue of endogeneity of certification variable and unavailability of instrumental variables to correct for this bias.

Focusing on each certification, there were significant differences in the number of certifications obtained by farmers. The certification with the highest number of farmers obtaining it was OTOP, with 26 farmers obtaining it. Peacock was next, with 17 holders. On the other hand, GI and Organic Thailand had two each. While OTOP and Peacock are popular certifications among silk farmers in Khon Kaen, Organic Thailand and GI are not as popular. In the interview, the leader of the farmers' community that has GI and Organic Thailand said GI is not easy to obtain because the certification is one of the international labels that have many requirements.

We find that certifications positively impact farmers' income and joining farmers' communities and conducting more processes of sericulture contribute to obtaining certifications. However, many farmers still find it difficult to join the community and obtain certifications. There are mainly two reasons. Firstly, lack of connection with the community that conducts training and information exchange about silk. In our survey, one community welcomes anyone who wants to join while another community refuses new members because they are concerned about their relationships with existing members and village residents. In addition, because joining the farmer's community is a common culture in Thailand, while farmer communities are already organized, the types of communities are diverse, and farmers can be found belonging to more than one community. This leads to the next reason we will discuss for the lack of time to take training.

Secondly, the time constraints for farmers to join communities. Sometimes farmers leave the community because of a lack of time they need to give to take training. Moreover, silk has traditionally been a sideline business for farmers, and many farmers grow silk apart from engaging in non-agricultural work or growing other crops.

One type of support that may help farmers in such situations is to offer financial assistance such as microfinance. While they start engaging more with the sericulture sector to join communities and learn skills, they may rely on this assistance to supplement the loss of income that may otherwise have been realized with their non-farm work. If the government can offer such assistance until the farmers' sericulture business takes off, the farmers may be able to upgrade their products and obtain certifications to benefit from higher income. In addition, in the private sector, where silk is consumed, it is important that buyers and others properly understand certification and promote it to consumers to encourage consumption.

CONCLUSION

In this study, we conducted an interview and questionnaire survey with silk farmers in Khon Kaen, Northeastern Thailand to identify the important factors in acquiring a certification and the effects of certification. The results showed that increasing the process of sericulture and community participation are two important factors for obtaining certifications. We also found that certification has a statistically significant positive impact on farmers' income. Certified farmers earn 15,702 THB higher annual income from silk weaving than non-certified farmers. On the other hand, improving technology is important to increase the number of processes, and one way to improve technology is to belong to the community and attend training. However, farmers face challenges such as a lack of connections to join communities and a lack of time to attend training. Therefore, the government needs to provide more financial support to farmers and information on how to attend training.

ACKNOWLEDGMENTS

We would like to express our deepest gratitude to the 103 silk farmers and QSDS staff in Khon Kaen for their generous cooperation in conducting this study, Koshi Yoshida, and Jin Sato for providing valuable comments, and students of Khon Kaen University who assisted with our surveys.

REFERENCES

ASEAN GI Database. 2024. Retrieved from URL http://www.asean-gidatabase.org/gidatabase/
International Sericultural Commission. 2020. Retrieved from URL https://www.inserco.org/en/statistics

Meemken, E.M. 2020. Do smallholder farmers benefit from sustainability standards, A systematic review and meta-analysis. Global Food Security, 26, 100373.
National Statistical Office. 2013. Agricultural census, Northeastern region, 978-974-11-3094-8.
Office of the National Economic and Social Development Council, Gross Regional and Provincial Product Chain Volume Measure 2020 Edition.
The Queen Sirikit Department of Sericulture data Catalog. 2017. Retrieved from URL https://catalog.qsds.go.th /en/
Tirado, R., Englande, A.J., Promakasikorn, L. and Novotny, V. 2008. Use of agrochemicals in Thailand and its consequences for the environment. Greenpeace Research Laboratories, Technical Note 03/2008.
Vermeir, I. and Verbeke, W. 2006. Sustainable food consumption, Exploring the consumer attitude–behavioral intention gap. Journal of Agricultural and Environmental Ethics, 19, 169-194.