

ANALYZING THE ECONOMIC EFFICIENCY OF SERICULTURE FARMING HOUSEHOLDS IN YEN BAI PROVINCE

● DO TRUONG LAM - NGUYEN THO QUANG ANH
- TRAN THE CUONG - HYUN JONG NAE

ABSTRACT:

This study analyzes the economic efficiency of sericulture farmers in Van Chan and Tran Yen districts, Yen Bai province. The study's data is collected through surveys with 40 sericulture farming households in these two districts. The study finds out that households using VH2020 silkworm breeds and new mulberry varieties such as VH9, VH13, and GQ2 have a higher economic efficiency. The growth rate of these households' income is also higher than that of other households. Based on the study's findings, to improve the economic efficiency of sericulture farmers, it is necessary to further support farmers gain knowledge, have good silkworm varieties and mulberry varieties, and also better connect to the market.

Keywords: economic efficiency, sericulture, households, Yen Bai province.

1. Introduction

Sericulture is an agricultural production sector with a long tradition in Vietnam. Nowadays, although the chemical industry develops and many kinds of synthetic fibers appear with good features, they still cannot replace silk. Sericulture provides a livelihood for nearly 40,000 farming households with over 103,000 workers cultivating mulberry and raising silkworms in 32/63 provinces of Vietnam as reported by Hoang Giang (2022). Sericulture has contributed to income generation for rural people, especially the Northern mountainous people. Moreover, the demand for silk is increasing strongly in recent years both at

home and abroad. Therefore, the mulberry area in 2018 increased by 26% compared to 2017 according to statistics from Livestock Department reported by Minh Hau (2020). The rapid growth of silk and silk products is an opportunity to develop mulberry farming to raise silkworms and bring higher incomes to farmers, especially farmers in rural and mountainous areas. However, the cocoon productivity and quality of Vietnamese farmers are still low. Moreover, with the low productivity of mulberry leaves, the value chain of silk in our country has not yet developed strongly. Recognizing these problems, KOPIA Vietnam Center has implemented the project: "Innovative

Rural Development through Establishing Model Villages of High Added Value Silk in Yen Bai Province" project with the coordination of the Vietnam Academy Agriculture of Science (VAAS), Vietnam Sericultural Research Centre (VietSERI), and Center for Agrarian Systems Research and Development (CASRAD). The project is implemented in 3 years (2020, 2021, and 2022) and Van Chan and Tran Yen districts of Yen Bai province.

Van Chan is a mountainous district located in the southwest of Yen Bai province. Van Chan has a total natural area of 1,129.90 km², with 155,473 people, according to data from the 2019 Population and Housing Census. Van Chan has great economic potential in terms of land, forestry, medicinal plants, and a variety of minerals. The town of the district is an area of tea, fruit trees, and forest gardens, Tran Yen is a lowland district located in the south of Yen Bai province. The average temperature is from 23.1 to 23.9 degrees. Tran Yen has an area of Feralit soil and alluvial soil along the river. Tran Yen's agricultural land area is 57152.11ha in 2020. With the advantage of being located along the banks of the Red River, Tran Yen has many favorable conditions to develop the agricultural industry in the direction of producing goods such as tea, citrus fruits, cinnamon, Bat Do bamboo shoots, and sericulture. Tran Yen is the district with the largest mulberry area in Yen Bai province.

Because of the projects, the production activities of farmers will change. Specifically, farmers participating in the sericulture project can grow new mulberry varieties with higher yields, and at the same time, the cost of growing mulberries will also change. Due to the new mulberry variety, the mulberry growing area increased. Therefore, silkworm farmers will increase silkworm production. In addition, the silkworm farmers participating in the project have improved their knowledge of silkworm rearing and used silkworm varieties for better yield and quality of silkworm cocoons. As a result, the price of the output product will be higher. However, the costs of silkworm rearing by farmers may be to increase. So, will the income of silkworm farmers and

mulberry growers increase when they join the project?

Against this background, this paper aims to address the following research questions: (i) What are the current incomes of both households participating in and households non-participating in the project? (ii) How have the current incomes of these farmers changed compared to before the project was implemented (in 2019)? (iii) How does the project impact the income of farmers from growing mulberry and raising silkworms? Answering these questions provides useful information for the project managers to decide to replicate the model of growing mulberry and raising silkworms in other localities of Vietnam.

2. Research Methodology

2.1. Household survey

Semi-structured interviews using household questionnaires are conducted to collect data from 40 households in Van Chan and Tran Yen districts of Yen Bai province. The sample includes 30 farmers who participated (participating households) and 10 farmers who did not participate in the project (non-participating households). The participating households can participate in training courses, receive new silkworm breeds such as VH2020, new mulberry varieties such as VH9, VH13, and GQ2, and receive other supports such as market connection, fertilizers, and disinfectants in silkworm rearing.

The household questionnaires are used to collect data containing sections on the farming data or cultivation data, production cost (seed or silkworm, fertilizers, pesticides, utilities, production scale, materials, farming equipment, and labor), total income (production volume or cocoons produced, unit price, total revenue), and participant satisfaction with KOPIA projects. The contents of the questionnaire are surveyed before and after the households participated in the projects.

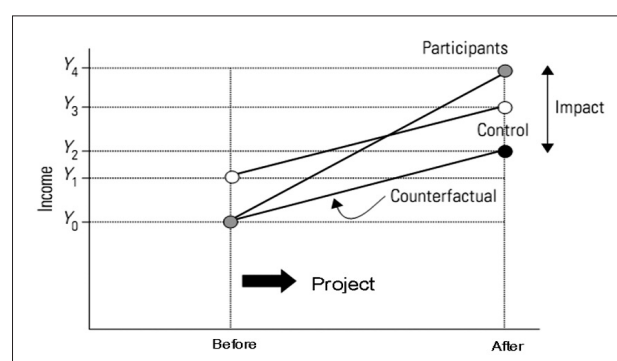
2.2. Data analysis

We use two methods namely the cost-benefit analysis method and the difference-in-difference (DID) method as discussed by Fredriksson and Oliveira (2019) for this research. Firstly, we use the cost-benefit analysis method to analyze the economic efficiency of both participating and

non-participating household groups. Benefits indicators include total revenue, total income, income/cost, and income/labor.

To analyze the impact of the project on the income of farmers, we use the difference-in-difference (DID) method (Figure 1). First, we calculate the incomes of the participating farmers (Y_0) and the non-participating farmers (Y_1) before the project is implemented. Second, we calculate the incomes of farmers participating in the project (Y_4) and farmers not participating in the project (Y_3) after the project is implemented. Third, we calculate the first differences in income between the participating farmers (Treatment group) and the non-participating farmers (Control group) (Bilach et al, 2022; Schochet, 2022).

Figure 1: The impact of the project on household income



Finally, we calculate the project's impact on household income as the difference in the difference between the participating and

non-participating households and between before and after the project implementation (Olden & Men, 2022). The project's impact (DID) = The first differences in income of the Treatment group - The first differences in income of the Control group, or the project's impact (DID) = $(Y_4 - Y_0) - (Y_3 - Y_1) = Y_4 - Y_2$.

3. Results and findings

3.1. Economic efficiency analysis for participating farmers

We estimate the economic accounting for households growing mulberry and raising silkworms both before (the year 2019) and after the project (the year 2022). These households are mainly in Viet Thanh commune, Tran Yen district.

The economic accounting results for one silkworm egg card showed that the costs and the total production value of households participating in the project both increased, of which the total cost increased by more than 31.7% and the total production value increased by more than 42.4% compared to before the project. This increase in the total production value is due to an increase in the unit prices and an increase in the cocoons produced, of which the cocoons produced increased by 15.4% and the unit prices by 23.4% compared to before the project. Since the growth rate of the total production value was greater than that of the total cost, total profit increased by more than 46.8% compared to the period before the project.

Besides, thanks to the higher profit growth than the production value increase, the profit/production value ratio increased by about 3.1% or 2.21

Table 1. Economic efficiency in mulberry cultivation and silkworm rearing of participating households (estimated for one egg card of silkworms)

Indicator		Unit	Year 2019 (1)	Year 2022 (2)	Difference 1 (2) - (1)
1.	Cocoons produced (A)	Kg	19.09	22.02	2.94
2.	Unit price (B)	1,000 VND/kg	94.64	116.79	22.14
3.	Total production value (A*B)	1,000 VND	1,806.45	2,572.11	765.66
4.	Total cost	1,000 VND	529.59	697.27	167.68
5.	Total profit	1,000 VND	1,276.86	1,874.84	597.98
6.	Total profit/family labor	1,000 VND/labor	96.87	160.37	63.50
7.	The profit/production value ratio	%	70.68	72.89	2.21

percentage points compared to the period before the project. This shows that the economic efficiency for an average of one silkworm egg card has improved. In addition, thanks to the reduction in family labor time involved in mulberry growing and silkworm rearing and the profit increase, the average profit per worker also increased significantly, by nearly 65.5%, compared to the period before the project. This is an important factor to help farmers maintain production activities in the long term future.

3.2. Economic efficiency analysis for non-participating farmers

The non-participating farming households were mainly surveyed in Viet Thanh commune (Tran Yen district), the local mulberry growing - silkworm rearing activities have developed for many years ago and households in the area received support from several state projects as well as good market connections with several enterprises purchasing and processing silkworm cocoons. The total production cost of farmers outside the project tends to increase markedly.

The calculation of economic results and efficiency indicators show that the average total cost per silkworm egg card rose by more than 49.4% while the average total production value increased by only 33.7%. This leads to a slight increase in the average profit per silkworm egg card of the household. Besides the increase in silkworm farming results, economic efficiency also increased with an increase in the profit/labor ratio of 18.4%. However, the profit/production

value ratio decreased by 24.3% or 7.92 percentage points.

3.3. Assessment of project impact on the income of sericulture households

The results (Table 3) show that the project's impact has reduced the cost by about 443 thousand VND/egg card of a silkworm. This can be explained that the participating households have used good mulberry varieties, mulberry growing methods, appropriate tree density/ha along with a reasonable fertilizer regime leading to lower total costs compared to the other households. Along with that, the silkworm breeding techniques trained by the project are applied thoroughly, since then the cost of silkworm treatment and loss in the silkworm rearing process has been significantly reduced, so the cost is also reduced accordingly. In contrast, for non-participating households, in mulberry cultivation, there is a tendency to grow mulberry with a thicker density, and apply more fertilizer, leading to a higher rate of pests and diseases. The impact of the project on the household's profit is about 590.8 thousand VND per egg card of a silkworm. The reasons are the increases in the price of cocoons and the cocoons produced of the participating households larger than that of the non-participating households.

For the whole household, the results show that the project has the impact of increasing profit by 52.5 thousand VND per family labor, increasing the profit/production value ratio by 10.1%, and increasing the total income by 11.5 million VND/household/year. The reason is that the

Table 2. Economic efficiency in mulberry cultivation and silkworm rearing of non-participating households (estimated for one egg card of silkworm)

Indicator		Unit	Year 2019 (1)	Year 2022 (2)	Difference 1 (2) - (1)
1.	Cocoons produced (A)	Kg	19.12	21.00	1.88
2.	Unit price (B)	1,000 VND/kg	95.83	116.67	20.83
3.	Total production value (A*B)	1,000 VND	1,832.76	2,450.43	617.67
4.	Total cost	1,000 VND	1,235.75	1,846.24	610.49
5.	Total profit	1,000 VND	597.01	604.19	7.19
6.	Total profit/family labor	1,000 VND/labor	59.80	70.82	11.02
7.	The profit/production value ratio	%	32.57	24.66	-7.92

Table 3. Impact of project's activities on economic efficiency (DID)

Indicator	Unit	Difference 0 (0)	Difference 1 (1)	DID (1) - (0)
I. Estimate for one egg card of silkworm				
1. Cocoons produced (A)	Kg	1.88	2.94	1.1
2. Unit price (B)	1,000 VND/kg	20.83	22.14	1.3
3. Total production value (A* B)	1,000 VND	617.67	765.66	148.0
4. Total cost	1,000 VND	610.49	167.68	-442.8
5. Total profit	1,000 VND	7.19	597.98	590.8
II. Estimate for one household				
1. Total silkworm income	1,000 VND	4032.6	1,5497.6	1,1465.0
2. The profit/production value ratio	%	-7.92	2.21	10.1
3. Total profit/family labor	1,000 VND/labor	11.02	63.50	52.5

Table 4. Comparison of economic efficiency of mulberry-silkworm production and maize production (estimated for 1000 m² of arable land)

Indicator	Unit	Mulberry-silkworm (A)	Maize (B)	Compare (A-B)
1. Total cost	1,000 VND	3670.1	5,880.6	-2,210.4
2. Total production value	1,000 VND	1,0369.5	9,333.3	1,036.1
3. Total profit	1,000 VND	6,699.3	3,452.8	3,246.6
4. Total profit/family labor	1,000 VND	143.99	76.2	67.8
5. The profit/production value ratio	%	64.6	37.0	27.6

participating households have optimized the number of silkworms raised per litter and the number of litters per year with the number of employees, the area household mulberry cultivation by using the knowledge learned in the project through training and visiting the model. They used effectively the fertilizers in mulberry garden and disinfectants in silkworm rearing to improve their income. This is consistent with Srinivasa et al. (2008) who report that the fertilizers in mulberry gardens and disinfectants in silkworm rearing for more efficient use of resources and for earning better income in Kamataka of India.

To better understand the impact of the project on the farmers' income, we compare the economic efficiency of mulberry cultivation for silkworm rearing of new entrants in Chan Yen district with the economic efficiency of maize and

rice. Maize and rice are the two most competitive crops with mulberry in terms of land. In other words, if farmers don't grow mulberries, growing corn or rice will bring the highest income to them. During the survey, we found that local farmers cultivate several types of cash crops, most commonly maize, in addition to mulberry trees. Therefore, we selected maize production for the economic accounting with 2 maize crops per year in the area. The economic results and efficiency indicators are converted to 1000 m² of arable land for comparison.

Calculation results show that the cost of planting 1000 m² of corn is nearly twice higher as that of growing mulberry, while the total production value generated from growing mulberry and raising silkworms is about 11.1% higher than that of growing corn. Therefore, the profit of growing mulberry-silkworm farming, for 1000 m² of arable

land, is nearly 2 times higher than that of growing corn. Economic efficiency according to the profit/family labor ratio and the profit/production value ratio of mulberry-silk raising is also about 89% and 75% higher than that of maize, respectively. The large difference in the economic results and efficiency of mulberry-silk farming is a big driver for the restructuring of local crops and a significant decrease in the maize area of farmers was also recorded during the survey.

4. Conclusion

The sericultural households have positive profits. The sericultural profit of households participating in the project is much higher than before the project was implemented (in 2019) due to lower production costs and a strong increase in revenue. The profit growth rate of participating households is higher than that of non-participating households. In other words, the project contributes to increasing income for farmers through the KOPIA center's mulberry growing model,

especially for new farmers involved in sericulture. Therefore, the project also contributes to achieving income targets in the construction of the New Rural model.

The economic efficiency of mulberry cultivation and raising silkworms is higher than that of competitive crops such as maize. Therefore, farmers have been shifting their resources from other crops and occupations to growing mulberry and raising silkworms. Thus, the proportion of income from growing mulberry and raising silkworms in the total income of households is increasing. The farmers are very satisfied with project activities including the training activities, and supporting mulberry and silkworm varieties/breeds. Therefore, the farmer households will maintain and introduce the project's techniques to other farmers. Gradually replicate the model of growing mulberry to raise silkworms in other localities, especially where there is an inefficient farming land area ■

Acknowledgments:

We thank the surveyed farmers in Yen Bai province for their support and cooperation. We acknowledge the financial support of the KOPIA Vietnam Center and appreciate the efforts of the staff at the Vietnam Sericultural Research Centre for data collection.

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Received date: November 15, 2022

Reviewed date: December 1, 2022

Accepted date: December 17, 2022

Author information:

1. Dr. DO TRUONG LAM¹

2. MS.c NGUYEN THO QUANG ANH¹

3. MS.c TRAN THE CUONG¹

4. Dr. HYUN JONG NAE²

¹Faculty of Economics and Rural Development, Vietnam National University of Agriculture

²Director, Korea Program on International Agriculture (KOPIA) in Vietnam

HIỆU QUẢ KINH TẾ HOẠT ĐỘNG TRỒNG DÂU, NUÔI TẦM CỦA CÁC HỘ NÔNG DÂN TẠI TỈNH YÊN BÁI

● TS. ĐỖ TRƯỜNG LÂM¹

● ThS. NGUYỄN THỌ QUANG ANH¹

● ThS. TRẦN THẾ CƯỜNG¹

● TS. HYUN JONG NAE²

¹Khoa Kinh tế và Phát triển Nông thôn

Học viện Nông nghiệp Việt Nam

²Giám đốc, Chương trình Nông nghiệp Quốc tế Hàn Quốc (KOPIA)

tại Việt Nam

TÓM TẮT:

Nghiên cứu này nhằm phân tích hiệu quả kinh tế hoạt động trồng dâu, nuôi tầm của các hộ nông dân tại 2 huyện Văn Chấn và Trấn Yên, tỉnh Yên Bái. Dữ liệu nghiên cứu được thu thập thông qua khảo sát 40 hộ nông dân tại 2 huyện này. Kết quả cho thấy, các hộ nông dân sử dụng giống tầm VH2020 và các giống dâu mới VH9, VH13 và GQ2 cho hiệu quả kinh tế cao hơn so với trước đây. Tăng trưởng thu nhập của các hộ này cũng cao hơn các hộ nông dân khác. Nghiên cứu cũng chỉ ra rằng để nâng cao hiệu quả kinh tế của các hộ nông dân, cần tiếp tục hỗ trợ nông dân về kiến thức, giống tầm, giống dâu, cũng như hỗ trợ họ kết nối với thị trường tốt hơn.

Từ khóa: hiệu quả kinh tế, nghề trồng dâu, nuôi tầm, hộ gia đình, tỉnh Yên Bái.