TÁC ĐỘNG CỦA VỐN ĐẦU TƯ ĐẾN KẾT QUẢ SẢN XUẤT CHÈ TRÊN ĐỊA BÀN TỈNH LAI CHÂU, VIỆT NAM

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Tóm tắt

Nghiên cứu này sử dụng số liệu thu thập được thông qua các cuộc phỏng vấn với các hộ sản xuất chè trên địa bàn tỉnh Lai Châu của Việt Nam và áp dụng mô hình hồi quy đa biến (2SLS) để đánh giá tác động của đầu tư đến kết quả sản xuất chè (đại diện bằng năng suất chè bình quân trên một héc ta và thu nhập bình quân năm từ chè). Kết quả cho thấy 1% lên trong vốn đầu tư tương quan với 7% tăng lên trong năng suất chè, tại mức tin cậy là 99% và 1% lên trong vốn đầu tư tương quan với xấp xỉ 2% tăng lên trong thu nhập từ chè, tại mức tin cậy là 95%.

Từ khóa: *Chè, vốn đầu tư, sản xuất, năng suất, thu nhập, Lai Châu*

IMPACTS OF CAPTIAL INVESTMENT ON TEA PRODUCTION IN LAI CHAU PROVINCE, VIET NAM

Abstract

The study used data obtained from interviews with tea grower and producers in Lai Chau province of Vietnam and employed multi-regression approaches to examine the impact of capital investment on tea production, which is represented by average tea yield per hectare and annual tea revenue. The results showed that a one per cent increase in capital investment was associated with approximately seven per cent increase in average tea yield, significant at one per cent level. In addition, a one per cent increase in capital investment was associated with almost two per cent increase in annual tea revenue, significant at five per cent level.

Keywords: *Tea, capital investment, production, yield, revenue, Lai Chau*.

1. Introduction

Tea is the second largest beverage consumed in the world. Approximately three billion cups of tea are consumed every day globally (Hicks, 2009). Vietnam is the fifth largest tea producer and the tenth highest tea exporter in the world (Maps of World, 2008). Tea is considered as one of the crops to help eliminate poverty in Lai Chau province of Vietnam. A project to produce high quality tea for the period of 2015-2020 has been launched. Three major tea production areas including Tam Duong and Tan Uyen Districts, and Lai Chau City, were selected as the focus of the project. In 2017, there were 5,005 hectares (approximately six per cent higher than in 2016) of tea in the province with a production of 26,000 tons (approximately nine per cent higher than in 2016) (Lai Chau province, 2017). Previously, tea in the province was extensively cultivated. As a result, both quality and quantity of the tea was not sufficiently high to meet market demands. Recently, it has been observed that a number of tea growers and producers applied extensive cultivation methods with more capital investment and hence both quality and quantity of tea has been significantly improved. A study to examine the impact of capital investment on tea production (represented by average tea yield per hectare and annual tea revenue) in Lai Chau province of Vietnam, which has not been explored previously, is therefore proposed.

The study uses data obtained from interviews with tea producers in Lai Chau province of Vietnam and employs multi-regression models for impact evaluation. The results show that capital investment has a positive and significant impact on tea production. Particularly, an increase in capital investment is significantly associated with an increase in average tea yield and annual tea revenue.

The structure of this paper is organised as follows: Section 2 reviews previous studies on the impact of capital investment on agricultural production. Section 3 presents data sources and descriptive statistics. Section 4 discusses methodology, data, and variable selection. Econometric results and discussions are presented in Section 5. Section 6 concludes.

2. Literature review

Despite considerable efforts, neither previous studies on capital investment on tea production (represented by average yield per hectare and annual tea revenue) in Vietnam nor those globally are found. Instead, studies on the impact of capital investment on agricultural productivity or production are reviewed bellow. Benin, Mogues, Cudjoe, and Randriamamonjy (2009) used data obtained from various sources in Ghana and

employed simultaneous-equations approach to analyse the impact of public expenditure on agricultural productivity returns. The results show that a one per cent increase in public expenditure is associated with an 11.7 per cent increase in agricultural labour productivity. The impact is significant at one per cent level. Allen and Qaim (2012) used data obtained from FAO to examine the impact of public expenditure on agricultural productivity in Sub-Saharan Africa. The results show that a one per cent increase in labour expenditure is associated with a 56 per cent increase in agricultural productivity. The impact is significant at one per cent level. The impact of fertiliser spending is positive and significant at one per cent level. Particularly, a one per cent increase in public spending is associated with an approximately 18 per cent increase in agricultural productivity. A one per cent increase in land size is associated with almost a nine per cent increase in agricultural productivity. The impact is significant at five per cent level.

Blanco Armas, Gomez, Moreno-Dodson, and Abriningrum (2012) used data obtained from various sources and employed the Generalised Method of Moments (GMM) to examine the impact of public spending on agricultural production. The results show that a one per cent increase in public expenditure is associated with almost three-time increase in agricultural output, significant at five per cent level.

Nigeria (2015) used data obtained from the Central Bank of Nigeria and National Bureau of Statistics in 2013 and used OLS to examine the impact of government spending on agricultural production in Nigeria. The results show that the impact of government spending on agricultural production is positive and significant at five per cent level. Particularly, a one per cent increase in government spending is associated with a 0.6 per cent increase in agricultural production.

De and Dkhar (2018) used time series data during 1984 and 2014 and the Autoregressive Distributed Lag model to examine the impact of public spending on agricultural outputs in India. The results show that a one per cent increase in public expenditure is associated with approximately 120 per cent decrease in agricultural output. No sufficient explanations for the reverse impact of investment on agricultural outputs are presented. Previous studies used various data sources and applied different approaches to examine the impact of investment (represented by public spending or expenditure on agricultural productivity or production). Most of them found that the impact of investment on agricultural productivity or production is positive and significant. However, no previous studies on investment on tea production are found.

3. Data source and descriptive statistics

3.1. Data sources and sample

Data for the study are obtained through interviews with tea growers and producers in 2016 in Tan Uyen district, Tam Duong district and Lai Chau city, which represent three tea production areas in Lai Chau province. Due to the limitation of resources, only three communes from each district are randomly chosen to sample. Ten households are randomly selected from a list of tea growers or producers in each commune, making a sample of 90 households.

Table 1: *Descriptive Statistics*

Variable	Mean	S.D[1].	Min	Max
Annual tea revenue (million VND)	60.3913	54.6055	10.0000	300.0000
Average tea yield (tons/hectare)	7.9804	2.6141	2.8000	14.0000
Capital investment on tea (million VND)	4.1855	1.8440	1.3800	8.0000
Household head age (years)	42.6087	8.7329	29.0000	70.0000
Household head education (years in school)	6.2065	3.0075	0.0000	12.0000
Household head experience in growing tea (years)	8.1957	2.9622	3.0000	15.0000
Dependants (persons)	1.7174	1.0412	0.0000	5.0000
Tea cultivation area (hectares)	1.0377	0.9816	0.2000	5.0000
Loan volume (million VND)	14.5652	28.8007	0.0000	150.0000

Note. Number of observations is 90 households ;
[1] *Standard Deviation.*

Source: Calculated by author from survey data.

3.2. Descriptive statistics

Descriptive statistics of variables used for the study are presented in Table 1. Statistics in Table 1 show that the annual tea revenue is approximately 60 million VND per annum while the average investment on tea is approximately four million VND per year.

4. Methodology and variable selection

4.1. Regression models

The study uses the following regression model:

$$Y = \alpha + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \varepsilon_i \quad (4.1)$$

Where:

- Yi represents average tea yield (measured in tons per hectare) or annual tea revenue (measured in million VND per year) of household i.

- X1i represents average capital investment (on tea) of household i. The investment is an aggregate of all expenditure on fertilisers, pesticides, labour and irrigation as it is difficult to split the investment into separate items at the household level. This variable is measured in million VND per hectare per year.

- X2i is a vector of household head characteristics of household i, includes age (measured in years), gender (1= male, 0 = otherwise), education (measured in years spent in school), experience in tea growing and producing (measured in years).

- X3i is a vector of household characteristics of household i, includes the number of dependants (measured in persons), land size for growing tea (measured in hectares), borrowing status (1= borrower, 0 = otherwise), loan volume (measured in million VND), technology assistance recipient (1 = yes, 0 = otherwise).

As the study area shares similar regional characteristics, including such characteristics in the models is not necessary.

4.2. Expected outcomes of selected variables

- Y_i and X_{1i}: Tea production, including average tea yield and annual tea revenue, is expected to increase when investment increases. The correlation between investment and yield is expected to be more significant than that between capital investment and annual tea revenue as annual tea revenue may be affected by price.

- X_{2i}: A family with a mature household head is expected to have better tea production than that with immature household head. Similarly, a household with a male household head is expected to have better tea production than that led by a female household head. Also, a household head with higher education is expected to lead the family to have better tea production.

X_{3i}: The number of dependants is expected to have a negative impact on tea production of the family. In contrast, land size for growing tea is expected to have a positive impact on tea production. Similarly, a household with access to credit is expected to have better tea production than that that does not have access. Also, a household that received technology assistance is expected to have better tea production than that that does not.

4.3. Estimation procedure

Both ordinary least squares (OLS) and two-stage least squares (2SLS) can handle cross-sectional data. OLS is fundamental and straightforward, but may face problems such as endogeneity, autocorrelation (in case the data are time series), heteroscedasticity, multicollinearity, omitted variables, variable measurement and outliers. In the context of the study, the issue of endogeneity is likely to occur. In contrast, 2SLS is more sophisticated, but can mitigate the impact of endogeneity that OLS faces. In the study, the issues caused by endogeneity can be mitigated by using instruments (Wooldridge, 2010). Because of this advantage the study applies 2SLS.

In the regression model of average tea yield on capital investment, the variables that are instrumented include investment on tea production, experience in growing tea and

borrowing status, while the instruments are the gender of household head, the number of dependants in the family, land size for growing tea, age of the household head and loan volume.

In the regression model of annual tea revenue on capital investment, the variables that are instrumented include investment on tea production, experience in growing tea and borrowing status, while the instruments are the gender of household head, the number of dependants in the family, land size for growing tea, tea yield, age of the household head and loan volume.

5. Results and discussion

5.1. The impact of capital investment on average tea yield

Table 2 shows that the impact of capital investment (on tea) on average tea yield is positive and significant at one per cent. Particularly, a one per cent increase in investment is associated with approximately seven per cent increase in yield. Obviously, increasing investment on fertilisers, labour, petticides and irigation would help to increase tea yield.

The impact of experience in growing and producing tea on tea yield is also as expected. It

is positive and significant at one per cent level. Particularly, a one more year increase in experience is associated with seven per cent increase in tea yield.

Table 2: *The Impact of Capital Investment on Average Tea Yield in Lai Chau Province*

Tea Yield (natural log)	Coef.[a]	S.E.[b]
Investment (natural log)	***7.0743	0.9230
Experience (years)	***7.0200	0.6240
Household head gender (1=male, 0=otherwise)	0.4549	0.5905
Dependants (persons)	-0.2147	0.1354
Borrowing status (1=yes, 0=otherwise)	0.0079	0.4267
Technology assistance recipient (1=yes, 0=otherwise)	0.5332	0.5301
Constant	6.7569	7.0794
R^2	0.7619	
Observations (households)	90	

*Note. [a]Coefficient, [b]Standard Error; ***, ** and * represent one, five and ten per cent level of significance*

Source. Calculated by author from survey data.

The impact of the household head gender on tea yield is not significant. Women empowerment in Vietnam has been significantly improved. Therefore, it is common to observe that there is no difference between tea yield grown by a household led by a male and those led by a female. The impact of dependant on average tea yield is also not significant. A household with more dependants (less labour) could use technology advantages or hire labour to grow and produce, hence the impact of this variable on average tea yield is not obvious. As most of the loans were preferential and obtained from the Agribank or the Vietnam Bank for Social Policies with small volumes, it is not surprised that its impact is not significant to help increase tea average yield.

The R^2 shows that approximately 76 per cent of the variation of the dependent variable (represented by average tea yield) is explained by independent variables (represented by capital investment, experience in producing tea of the household head, household head gender, number of dependants in the household, credit access, and technology assistance recipient).

5.2. The impact of investment on annual tea revenue

As shown in Table 5.2, the impact of capital investment (on tea) on annual tea revenue is positive and significant at five per cent level. Particularly, a one per cent increase in investment is associated with almost two per cent increase in annual tea revenue. The impact of capital investment (on tea) on annual tea revenue is less significant than on tea yield can be explained that investment on tea directly affects yield while it indirectly affects annual tea revenue. It is common to observe that when agricultural production (including tea) increases prices often decrease (Law of supply and demand).

Table 3: *The Impact of Capital Investment on Annual Tea Revenue in Lai Chau Province*

Annual Tea Revenue (natural log)	Coef.[a]	S.E.[b]
Capital investment (natural log)	**1.8180	0.5700
Tea cultivation area (hectares)	***0.2840	0.0255
Household head gender (1=male, 0=otherwise)	0.3825	0.3442
Experience (years)	**0.0969	0.0268
Dependants (persons)	**-0.0808	0.0277
Borrowing status (1=yes, 0=otherwise)	0.3175	0.2857
Technology assistance recipient (1=yes, 0=otherwise)	0.4798	0.4319
Constant	6.3715	7.5343
R^2	0.6232	
Observations (households)	90	

*Note. [a]Coefficient, [b]Standard Error; ***, ** and * represent one, five and ten per cent level of significance*

Source. Calculated by author from survey data.

The land size used to grow and produce tea has a positive impact on annual tea revenue, significant at one per cent level. Particularly, a one-hectare increase in land size is associated

with approximately 28 per cent increase in annual tea revenue.

The impact of experience in producing tea on annual tea revenue is positive and significant at five per cent level. In particular, a one more year increase in experience is associated with almost 10 per cent increase in annual tea revenue.

As expected, dependants have a negative impact on annual tea revenue, significant at 5 per cent level. Particularly, one more dependant in the family is associated with a decrease of approximately 8 per cent in annual tea revenue. Although a household can use technology advantages to compensate the shortage of labour, there is always spending for dependants. Therefore, the more dependants in the household, the more the income will be likely affected.

The R^2 shows that approximately 62 per cent of the variation of the dependent variable (represented by annual tea revenue) is explained by independent variables (capital investment, tea cultivation area/land size, household head gender, experience of the household head in producing tea, the number of dependants in the household, credit access and technology assistance recipient).

6. Conclusion

The study uses survey data obtained from interview with tea growers and producers in Lai Chau province of Vietnam and employs multi-regression models to analyse the impact of capital investment on tea production (represented by average tea yield and annual tea revenue). The results show that capital investment has a positive and significant impact on average tea yield. Particularly, a one per cent increase in investment is associated with approximately seven per cent increase in yield. The impact is significant at one per cent level. The impact of investment on annual tea revenue is also significant. Particularly, a one per cent increase in investment is associated with almost two per cent increase in annual tea revenue, significant at five per cent level. The impact of other controlled variables in the models is as expected.

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