

Determinants of VietGAP Adoption by Tea Farmers in Phu Tho Province, Vietnam

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Although the Vietnamese Ministry of Agriculture and Rural Development has issued a Good Agriculture Practice (VietGAP) procedure for tea production, the number of VietGAP-certified farmers still needs to grow. This research aimed to determine the determinants of VietGAP adoption in tea production in Thanh Ba District, one of the largest and highest tea production areas in Phu Tho Province. It applied a binary logit model to analyze data from 100 Vietnamese tea farmers. It found that age, tea revenue, access to credit, cooperative membership, and VietGAP training have a positive and statistically significant effect on encouraging the conversion decision of farmers. The study's findings presented helpful information that the Vietnam Government may use insofar as how to apply and popularize VietGAP tea production to produce safer products, increase farmers' income and protect the natural environment.

Keywords: VietGap adoption, tea production, logit model, Thanh Ba district

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INTRODUCTION

Tea (*Camelia sinensis*) is a perennial crop in tropical and subtropical areas. This plant thrives both in regions that have high drought and cold. Thus it is quite popular in many parts of the world. Tea has been regarded as one of Vietnam's most important cropped plants. With a market within and outside Vietnam, as the cut plant is also exported abroad, fresh tea leaves are produced by a million tonnes across 130,000-hectare tea plantations in the country. Tea production provides subsistence opportunities and economic stability, particularly in Vietnam's five most significant tea production areas: Phu Tho, Tuyen Quang, Ha Giang, Thai Nguyen, and Lam Dong (GSO, 2020b). Additionally, the tea production industry has employed around 1.5 million people and has contributed to Vietnam's economy as tea export has been over USD 200 million per year since 2010 (Hong & Yabe, 2015; Hoi et al., 2016; Ho Van Bac 2019; GSO, 2020a).

Despite the development of tea production in Vietnam in recent years, Vietnam's tea industry has had challenges promoting trademarks and compliance with food safety standards (Lampach & Nguyen-Van, 2017). The export price of Vietnam's tea is lower than the world's average prices, attributed to the chemical residues found on the tea leaves. This has resulted in the country's failure to comply with other country standards, like that of the EU, and resulting inability to penetrate their market (Doanh et al., 2018). In addition, excessive application of chemical compounds on plants has been found to cause harmful effects on human health and the environment (Aktar et

al., 2009). As a result, while there has been an increase in production and export volume in the last twenty years, Vietnamese tea products are primarily traded to lower-value markets, including Pakistan, Indonesia, Russia, Taiwan, and Iran (Doanh et al., 2018; Ho Van Bac, 2019). Furthermore, the poor market price is worsened by substandard post-harvesting technology and non-strategic branding development (Khoi et al., 2015). Over the past years, this has prompted the international market to urge tea producers to raise the quality standard by placing residue limits, providing importance to hygiene, and considering resolving contaminant issues. Lately, Vietnam has participated in several trade agreements and partnerships, such as the Trans-Pacific Partnership (TPP) and the Regional Comprehensive Economic Partnership (RCEP), which may help Vietnam raise the standard and quality of production. However, non-adherence to the demand for increasing tea quality and safety may pose a severe threat. As a result, Vietnamese tea producers may lose their international and home markets, such as China and India (Xiong, 2017).

To cope with these problems, improve tea safety, and build up the trust of consumers, the Ministry of Agriculture and Rural Development of Vietnam (MARD) issued Decree No. 379/QĐ-BNN-KHCN on Vietnamese Good Agricultural Practices (VietGAP) that commenced implementation on 28 January 2008. VietGAP is considered to be a fundamental principle that sets procedures that aim to guide organizations and individuals to produce, harvest, and process post-harvest to ensure safety, improve the quality of agricultural products as well as protect the natural environment and increase traceability of products (MARD, 2008). Tea farmers in Vietnam have been encouraged to apply the VietGAP standard since 2009. Although VietGAP adoption has brought many practical benefits, the number of farmers with VietGAP certification could be higher. Therefore, it is necessary to determine the factors affecting VietGAP adoption and how they affect farmers' decisions.

On a global scale, many studies have explored how new technology and farming practices can be adopted (Feder et al., 1985). However, these studies focus only on European nations. Some authors have investigated VietGAP production in Vietnam, focusing mainly on vegetables and fruits; only a few studies have focused on VietGAP tea production. This research will contribute to the extensive adoption literature in the field of VietGAP tea farming by focusing on five main essential variables, including (1) tea revenue; (2) contract farming; (3) access to credit; (4) cooperative membership; and (5) VietGAP training. Additionally, there are limited empirical studies on VietGAP adoption in Thanh Ba district, Phu Tho Province, even though Thanh Ba is regarded as one of the largest tea areas and tea production sites in Phu Tho Province. The result identified in the study may aid the policymakers in having a fuller grasp and understanding as to why farmers decide to promote, adopt, and operationalize VietGAP in tea production areas in Vietnam.

LITERATURE REVIEW

Definition of Vietnamese Good Agricultural Practices

VietGAP is the abbreviation of the Vietnamese Good Agricultural Practices. It is the application of production methods to produce clean and safe products, especially fresh fruits and vegetables. The fundamental mission of VietGAP is to steer the producers to enhance quality and guarantee food safety by setting up hazard control mechanisms for the product to be at par with the standards of ASEAN GAP, Global GAP, and Freshcare. VietGAP endeavors to foster favorable conditions that will enable the country to become competitive in the world market while achieving the goal of sustainable agriculture. The norms determined by VietGAP on its merchandise aim at instructing manufacturers to obey for better performance of food hygiene, traceability, environmental protection, and user's health by providing:

- (1) Guidance on VietGAP for Cultivation products: VietGAP for safe vegetables, fruit, tea production, rice, and coffee (Decision No.379/2008; No.11221/2008, No. 2802/2017);
- (2) Guidance on VietGAP in aquaculture such as catfish, tiger shrimp, white leg shrimp (Decision No.1503/2011,

No. 3824/2014); and

- (3) Vietnamese Good Animal Husbandry Practices (VietGAPHP) for pigs, poultry, dairy cows, bees, and beef cattle (Decision No.1504/2011, No.1506/2011, No.1579/2011, No. 1580/2011, No, 4653/2015).

VietGAP tea production is a high-commodity production industry. Therefore, VietGAP tea products must comply with specific standards to ensure the quality of tea produced meets the requirements and guarantees user safety. The GAP-oriented safe tea production process, issued by the Ministry of Agriculture and Rural Development or a competent authority of a centrally affiliated city or province (from now on referred to as a province or city), is developed in accordance with GAP Guidelines on human resources, soil, and substrate, irrigation water, tea production process according to VietGAP standards (MARD, 2008). In addition, the regulation states the main factors in new tea production, including product evaluation and selection; varieties and rootstocks; land management and substrates; additives and fertilization; watering; plant protection and chemical use; harvest, post-harvest handling, and fresh tea transport, garbage management, and remediation; labor; documents, record-keeping, the ability of trace, and product recall; internal inspection; complaints and complaint resolution.

Factors Affecting Adoption Behaviors in Previous Studies

According to Mwangi & Kariuki's synthesis of research papers (2015), the adoption behavior in agricultural adoption is affected by individual characteristics and assets, imperfect knowledge, risks, uncertainties, institutional limitations, input shortages, and facilities. Nevertheless, this study only addresses farmers' perspectives on using VietGAP in tea cultivation. From the literature review, this study's factors include tea revenue, contract farming, cooperative membership, access to credit, VietGAP training, age, gender, education level, farm labor, and input costs.

A critical factor in the adoption literature is farmers' incomes. Many studies presented that farmers' behavior could be affected by income. The findings by Dey et al. (2010), Negatu & Parikh (1999), and Udensi et al. (2011) demonstrated that farmers with higher incomes are more likely to accept new modern technology than those with lower incomes. Moreover, Van et al. (2015) highlighted that Vietnamese small-scale farmers with higher incomes can afford more significant investment expenditures and therefore tend to be more likely to adopt innovations. The study by Lampach et al. (2020) indicated a positive relationship between tea revenue and organic adoption in tea production.

H1. Farm households with larger revenue are more likely to adopt VietGAP tea production.

Contract farming is an essential factor in adopting new modern technology. A large number of contractual arrangements include the supply of main tea production inputs, including seeds, fertilizers, and other significant supports in terms of production. As many existing documents state, seeds and fertilizers are essential in a production chain. In addition, the contractors can help with land preparation, cultivation, harvesting practices, and supervising free training courses and agricultural extension. The main reason is to achieve the expected crop qualities (Eaton & Shepherd, 2001). So if farmers have contract farming, they will be assured of adopting new agricultural technologies. Concerning the variable of contract farming, To The Nguyen & Nguyen Anh Tuan (2018) found that contract farming positively impacts organic farmers' decisions.

H2. Farm households engaged in contract farming are more likely to adopt VietGAP tea production.

Credit access provides options to farmers on the methods of production to adopt, allowing them to purchase better sources of varieties, fertilizers, and other inputs (Zcgeye et al., 2001). Adopting new technologies will be difficult for farmers needing more financial capacities. It is also believed that granting access to credit decreases

farmers' risk aversion and encourages the practice of utilizing risky technologies (Simtowe & Zeller, 2006). Evidence-based studies and experiences from developing countries presented that access to credit has a strong positive and substantial impact on the utilization of agricultural technology (Akudugu et al., 2012; Udimal et al., 2017; Ullah et al., 2018; Teshome et al., 2019).

H3. Farm households with access to credit facilities are more likely to adopt VietGAP tea production.

Membership in an association or cooperative influences the adoption of new agricultural technologies. Agricultural organizations are essential in empowering farmers to work closely by initiating shared participation in markets and value chains. These organizations foster and strengthen networks and linkages by which farmers can share their best practices and learn from the challenges. Participating in these farmers' organizations may also address challenges and lessen costs for start-up farmers since they can access their organization's credit and agricultural machinery (Banson et al., 2018). The studies of Dang Xuan Phi (2018) highlighted a significant relationship between cooperative membership and VietGAP adoption.

H4. Farm households that are members of cooperatives are more likely to adopt VietGAP tea production.

VietGAP training is a critical determinant that affects farmers' adoption. The study by Lokendra Karki (2011) showed that training participation affected organic adoption. The study of Ho Van Bac et al. (2017) also presented that VietGAP training is significantly associated with the VietGAP adoption in tea production. The capacity-building initiatives empower farmers to comprehend the VietGAP tea production mechanism holistically and provide them with the know-how to minimize possible risks and other threats to tea production.

H5. Farm households that participated in VietGAP training are more likely to adopt VietGAP tea production.

Additionally, the head of the household's characteristics, such as age, gender, and education level, may also affect the probability of adopting new agricultural technology. Nonetheless, the previous findings regarding the associations of some of these factors are inconsistent (Sapbamrer & Thammachai, 2021). Furthermore, farm labor and input costs also significantly impact farmer decisions (Ho Van Bac et al., 2017; Ullah et al., 2018).

DATA AND EMPIRICAL METHOD

The data is directly collected through a structured questionnaire administered to 100 tea farmers (VietGAP farmers and non-VietGAP farmers) in Thanh Ba district, Phu Tho Province, Vietnam. We apply a stratified random sampling technique to choose the respondents in this survey. To determine sample size, we used the formula of Slovin (Consuelo & cs., 2007), with $e = 10\%$, $N = 15,000$.

$$n = \frac{N}{1 + N(e)^2}$$

During the interview, the head of the household is asked for the entire household's opinion. If the head of the household is absent, another household member with the best knowledge about the production status was selected. This research questionnaire reflects the willingness of farmers to provide detailed and accurate information for the study.

Descriptive statistical methods are applied to investigate the key characteristics of VietGAP and conventional

farmers. The Independent Sample T-Test and Chi-square test are adopted to identify the difference between VietGAP and conventional farmers. In this study, the adoption of VietGAP tea production is separated into two values: non-adopter (0) and adopter (1), meaning that the dependent variable has a binary decision. When the dependent variable has a binary choice, taking either zero or one, the Probit (Bliss, 1934) or Logit (Reed & Berkson, 2002) regression model is regularly applied. The binary choice analysis aims to estimate the conditional or response probability $P(x) = P[Y=1 | X=x] = E[Y | X=x]$ on a given set of variables X_s (Hansen, 2021). The marginal effect equals the regression derivative is stated as follows:

$$\frac{\partial P(x)}{\partial x} = \frac{\partial P[Y=1/X=x]}{\partial x} = \frac{\partial E[Y/X=x]}{\partial x}$$

The Probit and Logit model produce similar response probabilities and marginal effect estimates. Nonetheless, the advantage of the Logit model is that the distribution function is available in a closed form, accelerating the calculation. Therefore, to determine the factors affecting tea farmers to adopt the VietGAP standard, we employ the following logit model:

$$\text{Prob}(Y=1) = \frac{\exp(x'\beta)}{1 + \exp(x'\beta)}$$

Where : Y is the dependent variable (Y = 0: non-adopter, Y = 1: adopter) $x'\beta$ is presented as follows:

$$x'\beta = \beta_0 + \beta_1 \text{Age} + \beta_2 \text{Gender} + \beta_3 \text{Education} + \beta_4 \text{Labor} + \beta_5 \text{Revenue} + \beta_6 \text{Contract} + \beta_7 \text{Inputcosts} + \beta_8 \text{Credit} + \beta_9 \text{Cooperative membership} + \beta_{10} \text{training} + \varepsilon.$$

Where: β_i : the estimated coefficient and the error term. The definitions of all variables in the study are presented in Table 1.

Table 1. The variables used in the research

Code	Variables	Definitions	Evidence
Y	Adoption status	Farmer's adoption status (0 = Non-adopter, 1 = Adopter)	
X ₁	Age	Age of household head (years)	Lokendra Karki et al. (2011)
X ₂	Gender	Gender of household head (0: Male, 1: Female)	Ho Van Bac et al. (2017)
X ₃	Education	The education level of the household head (0: Low education (either primary and secondary school), 1: Higher Education (high school and above))	Kisaka-Lwayo (2008); Ho Van Bac (2017); Ullah et al. (2018)
X ₄	Farm labor	Number of members who are working for tea production (persons)	Ho Van Bac et al. (2017)
X ₅	Tea revenue	Natural log of tea revenue	Lampach et al. (2020)
X ₆	Contract farming	Contract farming (0: No, 1: Yes)	To The Nguyen & Nguyen Anh Tuan (2018)
X ₇	Input costs	Natural log of the price of pesticides and fertilizers	Ullah et al. (2018)
X ₈	Access to credit	Access to credit (0: No, 1: Yes)	Akudugu et al. (2012), Udimal et al. (2017), Teshome et al. (2019)
X ₉	Cooperative membership	Being a member of local tea cooperatives (0: No, 1: Yes)	Dang Xuan Phi (2018)
X ₁₀	VietGAP training	The number of participating in VietGAP training (times)	Lokendra Karki (2011), Ho Van Bac et al. (2017)

Source: Authors (2020)

EMPIRICAL RESULTS

Comparative Statistics of Explanatory Variables of Production Methods

The following analysis shows the difference in some households' characteristics between adopter and non-adopter groups. To compare the mean of household characteristics between the two groups, an independent sample T-test is used for statistical analyses. Table 2 below shows that farmers' attributes, including age, tea revenue, and VietGAP training, significantly differ among adopters and non-adopters. Relating to age, a significant difference between the two groups is found with $p = 0.01$. The head of adopter households is approximately six years older than that of non-adopter households. Households with higher tea revenue are more likely to belong to the VietGAP adopter group. Additionally, the level of participation in VietGAP training differs between the two groups: most adopters have a higher rate of participation in training. Training courses on tea production techniques are always expected because farmers must learn and update information from local staff. Nevertheless, there is no statistically significant difference between the two groups regarding farm labor and input costs.

Table 2. Independent T-Test on adopters and non-adopter group

Variables	Adopters		Non-adopter		SigF (From levene test)	Sig (2-tailed)
	Mean	S. D	Mean	S. D		
Age	54.84	5.056	48.62	12.167	0.000	0.01*
Farm labor	3.3	1.488	3.52	1.502	0.786	0.464
Tea revenue	14.7997	.26331	14.6228	.24429	0.709	0.001**
Input costs	8.6682	.72267	8.3812	1.28643	0.264	0.173
VietGAP training	2.02	1.436	1.24	1.519	0.386	0.01*

Source: Author's calculation (2020)

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

Table 3 shows a statistically significant difference between contract farming, access to credit, and two farmer groups. From the table, it is clear to see that the percentage of farmers without a contract is higher in both groups, adopters and non-adopters. However, the rate of contract farming in the adopter group is higher than in the non-adopter group, with 72% and 28%, respectively. Concerning having credit, there is a statistically significant difference between access to credit and two groups at 1%, and the adopters who have access to credit are found to be higher than non-adopters. The figures are 69.4% and 30.6%, respectively. Nonetheless, there is no difference between gender, education level, cooperative membership, and two farmer groups. Most tea farmers have primary or secondary school education and are placed in low education levels. It also can be observed that the adopter group would prefer to be a member of the cooperative than the non-adopter group, with 56.3% of adopters being

Table 3. Chi-Square on adopters and non-adopter group

Classification (N=100)	Gender		Education		Contract farming		Access to credit		Cooperative membership	
	Male (60)	Female (40)	Low (86)	High (14)	No	Yes	No	Yes	No	Yes
Adopter	29 (48%)	21 (52.5%)	40 (46.5%)	10 (71.4%)	32 (42.7%)	18 (72%)	16 (31.4%)	34 (69.4%)	23 (44.3%)	27 (56.3%)
Non-adopter	31 (52%)	19 (47.5%)	46 (53.5%)	4 (28.6%)	43 (57.3%)	7 (28%)	35 (68.6%)	15 (30.6%)	29 (55.7%)	21 (47.7%)
Statistic	X ² =0.17, P=0.683		X ² =2.99, P=0.084		X ² =6.45, P=0.011*		X ² =14.446, P=0.000**		X ² =1.442, P=0.230	

Source: Author's calculation (2020)

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

members of the cooperative and 47.7 % of non-adopters being members of the cooperative. So, being a cooperative member might affect farmers' adoption of VietGAP for tea production.

Factors affecting VietGAP's adoption of tea farm

To determine the factors which affect VietGAP adoption, all the independent variables, including age, gender, education level of household head, farm labor, tea revenue, contract farming, input costs, access to credit, cooperative membership, and VietGAP training were tested with a logit regression model. From the summary of the model (Table 4), it can be noted that the Nagelkerke R^2 value = 0.535, and the Hosmer and Lemeshow test is insignificant ($\chi^2 = 7.373$, p-value = 0.497), indicating that the goodness-of-fit of the logistic regression model is acceptable.

Table 4. Binary logistic regression model summary and Hosmer and Lemeshow test for model fitness

Model summary				Hosmer and lemeshow test		
Step 1	-2 Log LH	Cox & Snell R^2	Nagelkerke R^2	Chi-square	df	Sig.
	87.349a	0.401	0.535	7.373	8	0.497

Source: Author's calculation (2020)

Additionally, we verify the classification of prediction on VietGAP adoption in Table 5. The result shows that the prediction level for the adopter group is 80%, while the non-adopter group is 74%. Most overwhelmingly the overall is 77% which shows that this analytic tool has rated the prediction level very high in its dependent variable for VietGAP adoption.

The following table provides that among 10 explanatory variables, five variables have a significant influence on the adoption choice, namely age, tea revenue, access to credit, cooperative membership, and VietGAP training.

Hypothesis H1 states that farm households with larger revenues are more likely to adopt VietGAP tea production. As expected, the results point out that $\beta = 3.664$, $p = 0.033 < 0.05$, and tea revenue has a positive and statistically

Table 6. Factors influencing VietGAP adoption on tea production

Variables in the equation						
	B	S.E.	Wald	df	Sig.	Exp (B)
X ₁ _Age	0.085	0.035	5.911	1	0.015*	1.089
X ₂ _Gender (0: Male, 1: Female)	-0.184	0.579	0.101	1	0.751	0.832
X ₃ _Education (0: Low education, 1: High education)	-1.264	0.908	1.937	1	0.164	0.283
X ₄ _Farmlabor	0.206	0.193	1.141	1	0.285	1.229
X ₅ _Tea revenue	3.664	1.718	4.549	1	0.033*	39.025
X ₆ _Contract farming (0: No, 1: Yes)	1.152	0.885	1.694	1	0.193	3.166
X ₇ _Input costs	-0.166	.347	0.229	1	0.632	0.847
X ₈ _Access to credit (0: No, 1: Yes)	1.802	0.585	9.495	1	0.002**	6.061
X ₉ _Cooperative membership (0: No, 1: Yes)	1.887	0.741	6.486	1	0.011*	6.597
X ₁₀ _VietGAP training	0.529	0.209	6.437	1	0.011*	1.697
Constant	-60.216	24.343	6.119	1	0.013	0

Source: Author's calculation (2020)

Note: *, **, statistically significant at 5% and 1%, respectively

Table 5. Classification of Prediction Table on VietGAP adoption

Step 1	Observed	Predicted		
		VietGAP adoption		% Correct
		No	Yes	
VietGAP adoption	No	37	13	74
	Yes	10	40	80
	Overall			77

Source: Author's calculation (2020)

significant effect on encouraging the conversion decision of farmers. This result is similar to the finding of Lampach et al. (2020). This is because household farmers with high revenue would invest more time, money, and labor and pay more attention to tea farming. They also expect higher revenue from the new adoption of tea production.

It is interesting to note that hypothesis H2 is not statistically significant in this framework. With $\beta = 1.152$, $p = 0.193 > 0.05$, contract farming is found to be an insignificant factor for the adoption choice of VietGAP in this research. This result is contrary to the findings of To The Nguyen & Nguyen Anh Tuan (2018). The descriptive results showed that 75 farmers do not have contract farming, which means contract farming is unfamiliar in the case study. This can be explained by the research of Le Thi Kim Oanh (2018) that companies in Phu Tho province are not satisfied with farmers due to their limitations in terms of educational qualification and knowledge, which may serve as a factor why farmers are not fully aware of their rights and obligations in the contract. Farmers are not aware of their interests when negotiating conditions of the contract, leading to their dissatisfaction when entering contract farming. Moreover, they are unfamiliar with their obligations, which might result in a breach of contract. For example, on one hand, the farmers might likely breach the contract when the tea price in the spot market is higher than the pre-agreed price in the contract, or the farmer does not apply pesticides that are listed by the company. On the other hand, some companies, especially small or start-up companies, often lack the necessary capital and are not well-established enough in a stable market, which can make them find it hard to complete contract obligations (Le Thi Kim Oanh, 2018).

Hypothesis H3 reveals that farm households with access to credit facilities are more likely to adopt VietGAP tea production. The results of $\beta = 1.802$, $p = 0.002 < 0.05$ indicate that access to credit would encourage farmers to adopt new tea production under VietGAP standards. We obtain the same conclusion from the findings of Akudugu et al. (2012), Udimal et al. (2017), Ullah et al. (2018), and Teshome et al. (2019). This can be explained by the fact that most of the farmers have small land areas in this case study. Hence, access to credit would enable them to invest in inputs and infrastructure for tea production. Moreover, especially with credit, farmers could pay for applying for and extending VietGAP certificates.

Hypothesis H4 reports that farm households that are members of cooperatives are more likely to adopt VietGAP tea production. The estimation results with $\beta = 1.887$, $p = 0.011 < 0.05$ document that cooperative membership is consistent with what we expect in the case of VietGAP adoption in tea production. This result is supported by the findings of Dang Xuan Phi (2018). This can be explained by cooperatives supporting farmers with extension training, various supplies, fertilizer, pesticides, and field protection services. Equally important is that the cooperatives also help tea farmers find companies or partners to buy or process tea. Furthermore, tea farmers can share experiences and learn from each other. Hence, they may reduce barriers, costs, and risks when they adopt VietGAP.

Hypothesis H5 states that farm households who participated in VietGAP training are more likely to adopt VietGAP tea production. The results with $\beta = 0.529$, $p = 0.011 < 0.05$ indicate that the more farmers participate in VietGAP training, the more they decide to apply VietGAP in tea production. This is because the training positively impacts awareness and willingness to engage in new technologies and practices. After all, it equips farmers with knowledge of VietGAP production and minimizes relevant risks. We reached the same result as presented in the studies of Lokendra Karki et al. (2011) and Ho Van Bac et al. (2017).

In addition, age has a positive and significant impact on the probability of adoption of VietGAP. Estimation results indicate that households having older heads are more likely to adopt VietGAP. This result supports the findings of Lokendra Karki et al. (2011). This may be attributed to the fact that old farmers have more experience. Thus, they are confident in adopting newer technology and will likely use an integrated method of food safety and environmental concern. This finding also reflects the actual situation in Vietnam, with a tiny proportion of young people engaging in farming. The youths are attracted to other jobs in bigger cities.

Moreover, other explanatory variables such as gender, education of household head, farm labor, and input costs are not significant for adopting VietGAP standards.

CONCLUSION

The estimation results demonstrated that farmers' decisions were mainly affected by some factors such as age, tea revenue, access to credit, cooperative membership, and VietGAP training. Age has a positive and significant impact on the probability of VietGAP adoption. Moreover, higher tea revenue would significantly contribute to an increase in the adoption of VietGAP. If farmers have access to credit, they would be more likely to convert from conventional to VietGAP production. Tea farmers who are members of cooperatives would prefer to adopt VietGAP standards. Another important factor for adopting VietGAP is VietGAP training. Tea farmers who have attended more VietGAP training are more likely to adopt VietGAP standards. Nonetheless, contract farming was found to be an insignificant factor in deciding to adopt new practices.

The findings of the study bring four policy recommendations. Firstly, the government should provide monetary assistance to poorer households to compensate for the initial losses and expenses during the transition period. Secondly, broadening the lending system and linkages of funding institutions by utilizing community-based socio-political organizations as guarantors and grouped borrowers may enable the farmers to create more comprehensive access to formal credit mechanisms with minimal interest rates and low business costs. Thirdly, it is highly recommended that the government encourage farmers to join cooperatives to share experiences, inputs, and outputs in production and reduce the risks when adopting VietGAP. Lastly, strengthening VietGAP training would be a good policy for promoting VietGAP adoption.

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