Insects Alcohol Traps, Sustainable Agricultural Value Chain in Coffee and Tea Crops in the Northern Regions of Vietnam - and Solutions for Marketing Mix

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ABSTRACT

To ensure sustainability in tea and coffee crops as two main crops in the northern region of Vietnam, for instance in Son La and Thai Nguyen Provinces, we need to explore changing traditional production methods (manufacturing according to own experience) by a new way of production according to the

production process cleaner, safer (VietGAP, GlobalGap, ..). This production process helps households, Farmers use the right inputs at the right time, reducing costs as well as product quality improvement.

The next solution is to replace gradually chemical pesticides (at least reduce proportion) in agricultural using, with insect traps such as insect alcohol traps or bottle traps in order to eliminate female insects (Coffee berry borer- CBB) that are harmful and their next generation as well.

Research results show us that CPI and R (lending rate) have negative correlation with tea export price, whereas G (GDP growth) and Rf (Risk free rate) have positive correlation with tea price. Besides, this study also give out recommendations for reduction in CPI and R and increase in G to push tea export price.

Our research limitation is that we can expand for other crops, industries and markets as well.

Key words: agricultural value chain, sustainability, tea crops, coffee crops, insect alcohol traps, Vietnam

JEL: M21, G30, G32, G38

***Tob Regul Sci.™ 2021;7(6-1):* 6797-6813**
DOI: doi.org/10.18001/TRS.7.6.1.10

1.Introduction

First, we recognize the importance of developing sustainable agricultural value chain for coffee, tea and lychee crops in the North of Vietnam in recent years, under effects from covid 19.

Pham Van Hong, Nguyen Thao Nguyen, Dinh Tran Ngoc Huy, Nguyen Thu Thuy, Le Thi Thanh Huong (2021) stated that In Vietnam, we will evaluate the effectiveness of VIETGAP and GLOBAL GAP models, principles and standards applying in Vietnam agriculture value chain in a specific case study. The research results show a strict condition for applying VIETGAP and GLOBAL GAP for better quality in agriculture, including: Conditions for soil, irrigation water, fertilizers, pest control, etc.

Next, Nguyen Dinh Trung, Dinh Tran Ngoc Huy, Nguyen Thi Hang, Le Thu Ha (2021) mentioned Vietnam agriculture has been growing in 2012-2020, however according to World bank, overall agricultural productivity (TFP) has been in a declining trend since the year 2000. Vietnam's tea exports are mainly and for a long time focused on markets Easy-going market, does not set strict standards on food safety and hygiene.

Then, Duyen Nhat Lam Tran et al (2021) presented study findings further suggest that mitigating water shortages in coffee farms require subregional and national policy support such as better access to credit and extension services, training, land management, and household-level efforts to improve farming practices through the application of appropriate technologies and traditional knowledge

And Perez and Viana (2012) showed a cross-country study comparing Colombia and Vietnam, two of the major coffee exporting countries in the world, in terms of their infrastructures, the roles of external shocks, technology adoption at different stages of production, added value, positioning in both domestic and global markets, internationalization patterns, marketing and branding innovations, regulatory frameworks, and policy environments.

Research questions

Question 1: What are principles of sustainable value chain applying in coffee, tea and lychee crops in the North of Vietnam?

Question 2: What are benefits of insect alcohol traps used for Coffee berry borer?

2. Literature review

Activities to improve global agricultural value chains

For developing countries (production enterprises/organizations or households)

family) when participating in the global value chain is a successful step. Participating in this network, the actors participate in the stages in the chain will have the opportunity to access knowledge, management skills and production technology higher. Since then, the capacity and working skills of enterprises, farming households as well as workers in general gradually approach the common standards of developed countries.

According to Humphrey and Schmitz (2002), there are three main groups of methods to improve value growth in global value chains. Specifically:

Upgrade/Improve production process:

Improve added value through changing production methods more efficiently.

For example, in farming, changing traditional production methods

(manufacturing according to own experience) by a new way of production according to the production process cleaner, safer (VietGAP, GlobalGap, ..). This production process helps households, Farmers use the right inputs at the right time, reducing costs as well as product quality improvement.

In the stages of post-harvest preservation and product processing, changes in technology

or modern and appropriate processing and preservation process will help improve product quality agricultural products, long-term product sales, thereby avoiding the quantity supplied to the market massively in a short time. The extension of time will help to increase the selling price of the product higher.

In fact, changing and improving the production process depends quite a lot on the requirements of the customer market. Even in the domestic market or the export market, if consumers and retailers have a need to consume clean products, clearly stating the origin and clear production process, the production stage will be forced. must meet if you want to participate in the value chain. In developed countries, the regulations and supervision on food safety, counterfeit goods as well as strict management and enforcement policies force the products supplied to consumers to ensure quality and quantity. The state's legal corridor helps protect consumers and promote Brand investors.

We summarize previous studies as follows:

Table 1 – Summary of previous studies

Authors	Year	Contents, results
Perez & Viana	2012	Using value chain analysis, it was found that Colombia and Vietnam produce different types of coffee, and that both have implemented diverse strategies in order to be more competitive in domestic and foreign markets via product differentiation. These differences make explicit room for cooperation between these two countries in an international environment where fierce competition persists. Originality/value – Cooperation between producing countries is an under-researched subject. These findings will be useful both for policy makers in coffee-producing countries and agribusiness researchers.
Doan Ba Toai et al	2019	investigate the Vietnam tea export from 2010 to the world. The Vietnam tea overview research Vietnam tea production, domestic consumption and Vietnam tea export volume to more important recommendations for the future of the Vietnam's tea. The Result, we found that volume of Vietnam's tea and average volume per person in Vietnam is going up.
Nguyen Hung Anh et al	2019	highlight the fact that farmers' decisions to participate in

		sustainable coffee farming are mainly driven by economic benefits. Sustainable farming is more cost-effective and profitable than conventional farming, despite the insignificant difference in production efficiency. Improvement of education, farming knowledge, and collective actions could mitigate negative effects of small-scale production for sustainable coffee farmers. Pesticide management, shade coffee encouragement, and reduction of excessive fertilization, over-irrigation, and unproductive coffee varieties are recommended for sustainable development of the sector.
Azrag et al	2019	Although the coffee berry borer, *Hypothenemus hampei* (Ferrari) (Coleoptera: Curculionidae: Scolytinae) is the most destructive insect pest of coffee worldwide, there is much to learn about its thermal biology.
Johnson et al	2019	estimated that 49.5% of the total coffee berry borer load was present in dripline raisins, 47.3% in tree raisins, and 3.2% in center aisle raisins. Our findings confirm the importance of whole-farm sanitation in coffee berry borer management by demonstrating the negative impact that poor postharvest control can have on the following season's crop.
Tran, D.N.L et al	2021	The production function analysis using Cobb–Douglas shows that the volume of irrigation water, amount of working capital, labor, and farm size significantly influence coffee productivity. Indigenous farmers are more efficient in utilizing irrigation water than migrant farmers. The Tobit result indicates that farmers' experience, education level, the distance of farm to water sources, security of access to water sources, extension contact, and credit access significantly affect IWUE.
Pham Van Hong, Nguyen Thao Nguyen, Dinh Tran Ngoc Huy, Nguyen Thu Thuy, Le Thi Thanh Huong	2021	Sustainability of Vietnam agriculture value chain will be dependent on various factors such as skills and experience of farmers, advanced technology, agricultural engineering, standards and models such as VIETGAP or GLOBAL GAP, etc
Nguyen Dinh Trung, Dinh Tran Ngoc Huy, Nguyen Thi Hang, Le Thu Ha	2021	emphasizes positive and healthy aspects of lychee products and lychee fruit juice in our country, Vietnam. And also roles of banks in project financing is also a good way to support microfinancing for star-ups and our business model.

Last but not least, Johnson, M.A et al (2020) stated that Coffee berry borer (*Hypothenemus hampei* (Ferrari), CBB) has invaded nearly every coffee-producing country in the world, and it is commonly recognized as the most damaging insect pest of coffee.

3. Methodology

Method and Data

This study mainly use combination of quantitative methods and qualitative methods including synthesis, inductive and explanatory methods. And it emphasizes again important roles of internet data in sustainable modern bank management

For quantitative analysis, the study is supported with OLS regression.

Data is collected from reliable internet sources and websites of Bureau Statistics, State Bank and Ministry of Finance and Vietnam banks. See below figure 1, we recognize that standard deviation of variable - tea export price has highest value while that of GDP growth is lowest:

Figure 1 - Descriptive data statistics

	TEA_EXPO...	CPI	G	R	RF
Mean	1627.650	0.053530	0.061090	0.115260	0.046905
Median	1645.100	0.038150	0.064800	0.100000	0.053350
Maximum	1724.500	0.181300	0.070800	0.190000	0.065350
Minimum	1466.000	0.006300	0.029100	0.080000	0.012200
Std. Dev.	89.43470	0.048052	0.012441	0.039225	0.018595
Skewness	-0.572756	2.051303	-1.843628	1.138882	-0.570545
Kurtosis	2.050915	6.308044	5.524584	2.705184	2.017240
Jarque-Bera	0.922067	11.57272	8.320575	2.197970	0.944960
Probability	0.630632	0.003069	0.015603	0.333209	0.623454
Sum	16276.50	0.535300	0.610900	1.152600	0.469050
Sum Sq. Dev.	71987.08	0.020781	0.001393	0.013847	0.003112

(source: Ministry of Industry and Trade, Ministry of Agriculture and Rural Development)

4.Main results

4.1 Coffee crops planting in Vietnam

Monitoring coffee berry borer with alcohol trap

Son La province, located approximately 300 km westward from Hanoi and borders Laos to the south, is the largest province in northwestern region with a total area of 14,055 km2, and the provincial population of 1,024 million.

Thai ethnic minority people account for approximately 55% which is more than half of provincial population. The main crops are cassava, sugarcane, and coffee beans.

There are a lot of nations who used Traps in order to monitor CBB, and in some cases, to manage these populations by “Mass-trapping” to reduce females lead to reduce next generations.

Scientists and researchers have formed Traps , using 2.0 litter bottles which are transparent and plastic (initially a container - soft drink) and used a small window (13 x 18 cm) of 9.0 cm above the bottom. Then they form a killing agent by Water (200 ml) with liquid detergent (2 ml) added to bottom of the bottle trap , this is for preserving dead adult CBB. A 15 ml amber glass vial with a rubber cover (originally used as a medicine antibiotic powder container) was used as a alcohol dispenser. Absolute Ethanol and Methanol (1:1) were used in average about 868mg day. Inside bottle - The vial was hung, 20cm above the trap bottom. 12 m was distance b.t traps within a block, and 30 m b.t blocks. Plots were laid out in a completely randomized design with three replicates. Scientists set /arranged 20 traps for every coffee farm. Scientists have to replace Water with liquid detergent and alcohol weekly. In order to

perform research assessments, researchers has removed water with dead insects for counting and the weighted vial to determinate mean volatile release rates. Nuber CBB adults captured per trap and proportion berry infestation were record once a week.

(source: Suu Thi Bui, Dinh Tran Ngoc Huy, Lan Duc Doan, 2021)

Insects Alcohol traps in agricultural crops

In planting coffee, tea, etc. there are many harmful insects which previously can be killed by chemical pesticides.

But nowadays scientists develop more tools and traps to eliminate harmful insects, for example, alcohol traps to hold female insects and kill next generation.

Bottle trap using alcohol attractants will help farmers track CBB populations and monitor CBB adult flight to determine the best timing for insecticide (chemical, entomopathogenic fungi) spray.

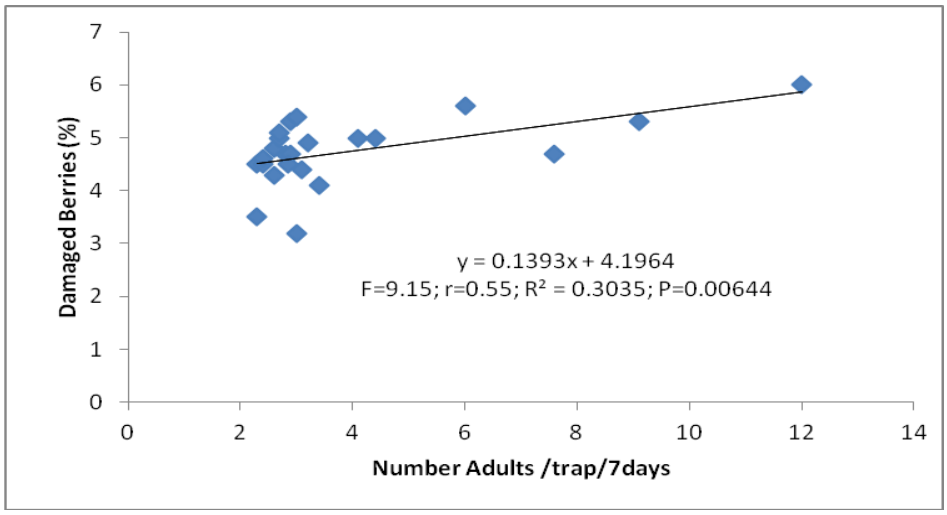


Figure 2- The regression of the mean of infested coffee berries proportion and the no. of CBBs captured

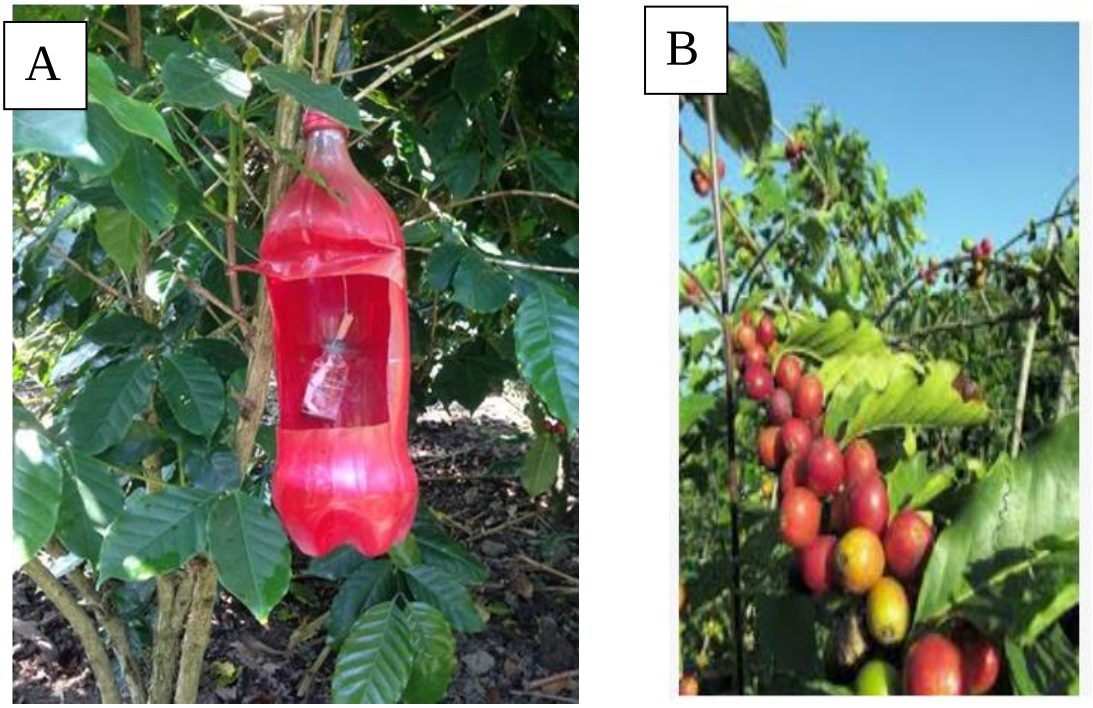


Figure 3-Monitoring CBB in Son La province, Vietnams using red bottle traps. (A) The bottle trap using monitoring CBB; (B) Coffee tree with matured berries.

(Source: Bui Thi Suu, Lan Duc Doan, Dinh Tran Ngoc Huy, 2021)

Beside, Bui Thi Suu, Dinh Tran Ngoc Huy, Nguyen Thi Hoa (2021) stated that scientists has thought of using traps, alcohol traps to reduce generations of insects, reduce female insects that are harmful. There are some factors that influence traps for example: wind direction, climate, etc. The reason for scientists to limit chemical pesticides and move to other methods to eliminate coffee berry borer is that chemicals will be harmful for coffee products, for farmers and for consumers.

Then, Johnson et al (2019) said that Coffee berry borer, Hypothenemus hampei Ferrari (Coleoptera: Curculionidae: Scolytinae), is the most damaging insect pest of coffee worldwide. Old coffee berries (raisins) are widely acknowledged as coffee berry borer reservoirs, yet few studies have attempted to quantify coffee berry borer populations in raisins remaining on farms postharvest.

4.2 Tea crops planning in Vietnam

The change in the structure of Vietnam's tea export market to developing countries
development has a negative trend even though the import tax rate is increasingly reduced.
From 2007 onwards, the output exported to countries with high requirements for
standards such as EU, Japan, Australia, Canada,... tend to decrease significantly (see also table 2). The cause of this decrease can be attributed to an increase in the number of
regulations on food safety and hygiene as well as lowering the MRL for some types of Plant protection products. In particular, in 2009, exports from Vietnam to the EU countries (as well as the UK, France) and Japan have significantly decreased due to the inability to passed the food safety and hygiene tests.

Table 2- The largest tea export markets of Vietnam (% by volume)

	2013	2014	2015	2016	2017
Total Markets	100	100	100	100	100
Pakistan	16.2	26.5	29.2	29.7	23
Taiwan	15.9	17.4	14.1	9.6	12.6
Russia	8.3	8.6	12	12.5	12.5
China	9.9	9.7	6.2	6.3	7.7
Indonesia	8.3	4.3	7.8	11.9	6.9
USA	7	7.5	6.3	4.8	5.0
UAE	2.7	2.7	4.9	2.3	4.8
Malaysia	2.6	2.6	2.3	3.4	2.6
India	0.8	0.8	0.1	1.9	1.2
Arab xeut	1.6	1.7	1.6	1.1	1.2

(source: Vietnam General custom)

Key actors in the tea value chain

Input provider

Because tea producing households all have long-term experience in growing tea (many households have 30-40 years of experience) so many households are able to self-seed their growing areas new or renovate tea garden. However, most households buy new varieties to replace Traditional tea varieties (Middleland tea) are often easily purchased from households other businesses, or seed agents in the locality or neighboring communes and districts.
Fertilizers, pesticides and simple production and processing tools can be easily purchased

at local shops (in the commune or in the district). Agricultural materials (fertilizers, pesticides) provided by private companies and other small merchants. Tea growers can buy and pay later (buy on credit) for the owners of agents of agricultural materials

Tea growers

Tea growers in Thai Nguyen province are still mainly households and businesses

The industry is also involved in tea growing, but the area is very small compared to the total area conscious. On average, the total tea growing area per household is only about 0.2-0.3 ha and is dispersed into about 2-3 small pieces. It is the fragmentation and small size of the area that Households also face difficulties in the cultivation process as well as in the application of public science technology into production.

Education level is an important factor for all economic activities and for production

Tea products are no exception. According to the survey results of the research team for

The average number of years of schooling of the head of a tea growing household is 7.6 years, which is only good junior high school career. The qualifications are quite low but most of them have 30 to 40 years of experience in tea growing.

The cultivation and care of tea has a fairly clear division of labor. Most activities

This movement is mainly performed by women. Female participants (in terms of time, number of days workers) compared with men is because tea picking is mainly done by hand, these jobs more suitable for women. In contrast, pesticide spraying for tea is mainly done by men (69% of pesticide spraying is done by men in the household).

Table 3- Division of labor in tea planting and processing

	By stage (%)	**By gender**		
DIY	*100*	*Male*	*Female*	*Total*
Tea planting and caring	*92.38*	*34.17*	*65.83*	*100*
Tea processing-Homemade	*7.62*	*34.42*	*65.58*	*100*
Hire labors	*100*			
Tea planting and caring	*88.25*	*6.76*	*93.24*	*100*
Tea processing	*11.75*	*0.71*	*99.29*	*100*

(source: Le Van Hung, Pham Van Hong, Project, 2019)

Trader (Trader)

Tea collectors can either buy fresh tea or dry tea from households. Because the majority of Tea growing households have processed to dry tea, so the main collectors are:

for dry tea. They can directly come to buy at tea growing households, buy at the market

wholesalers (weekly markets like Dai Tu district), or tea growing households bring them to sell for them. Traders can resell to processing and packaging establishments/enterprises tea or resell it to tea shops and retailers in Thai Nguyen province as well as in other provinces.

For tea enterprises and processing establishments in Thai Nguyen province, they mainly buy directly from tea growing households (both fresh and processed tea).

Processors

For Thai Nguyen province, tea production at the household level is the main type of tea production.

The total output of processed tea in the province is over 42,000 tons. Of these, 80%

tea production is processed by 45 cooperatives, 95 groups of cooperatives and 216 craft villages (with more than 60,000 participating households). Enterprises engaged in industrial processing Industry accounts for only about 20% of total production (8,400 tons). Processing is on a large scale small, scattered leading to difficulties in quality control, reputation and security brand protection. In the domestic market, there are many jars labeled Thai Nguyen but do not specify the unit, production and packing facility. Even many tea products There is no information about the person who processes and produces the tea product packing and tea packing. Tea products processed at households by traditional methods, The system is mostly loose tea products packed in large bags, without packaging and labels.

Processing establishments/cooperatives usually have business registration and product labels pack. They mainly process traditional tea (dried green tea) and create brand in the local or domestic market. Processing scale of each establishment/cooperative is not too large, so the raw materials used are usually purchased from relatives, people acquaintances in the commune or members of the cooperative.

Wholesaler/retailer

The people who play the role of distributing tea products of Thai Nguyen province are including: wholesalers, retailers in the domestic market and companies that play the role of intermediary to export to the international market. Distribution is difficult
about equipment for maintaining and preserving tea quality. The people
Wholesalers/retailers can pack and label themselves to improve added value. Also
Like households/processors and businesses, distributors can also pack
dry tea by foil bags and vacuum.Currently packing tea in various types
bags of organic origin are still modest, only used by a few businesses.

Consumers

There is a relative difference in the type of tea consumed in the domestic market with tea exported
For domestic consumption, due to the taste of Vietnamese people, most tea is consumed
The domestic tea is dried green tea. Meanwhile, the export tea of Thai Nguyen province has two main product categories are raw tea for export (bag tea), dip tea and tea group
packaged dried greens. Thai Nguyen tea has become a famous brand for
tea drinkers in the country. Demand for Thai Nguyen tea in the country
This is one of the reasons for reducing tea export motivation of the province.

Because the quality of tea depends quite a lot on the land, weather and care techniques of the farmers. Even within the province, the distance between the two districts is only 25km, but the quality and yield of tea in the two districts are different. While, the average selling price of fresh tea in Thai Nguyen city is 42.5 thousand VND/kg of fresh tea, while the selling price of fresh tea in Dai Tu district is only 29.2 thousand VND/kg. Thanks to the high selling price but low maintenance cost, the profit of tea growers in Thai Nguyen city is much higher than in Dai Tu district. Another important reason leading to the difference in selling prices between the two areas is that Thai Nguyen city has a famous Tan Cuong tea brand in the country.

Table 4- Comparison of profits of tea growing households by different groups

1,000 VND/kg (fresh tea)

	Cost	**Revenue**	**Profit**
General	18.556	37.190	18.634
By location			
Thai Nguyen city	15.863	42.454	26.591
Dai Tu district	22.515	29.455	6.940
By ethnicity			
Kinh	17.707	37.610	19.903
Minority	25.851	33.588	7.738

Education level of household			
Secondary school or lower	18.804	36.409	17.604
High school or upper	17.249	41.308	24.059
Join the link			
Linked	16.083	41.816	25.733
Not linked	19.308	35.784	16.476

(source: Le Van Hung, Pham Van Hong, Project, 2019)

According to population groups, Kinh people have a higher profit from tea cultivation than ethnic minority groups. Ethnic minority groups often live in disadvantaged areas
(Ethnic people often live in mountainous areas of Dai Tu district, far from the center, markets,...) compared to Kinh people in Xinjiang, Thai Nguyen city, so the land is less fertile fat and tea quality are also worse.
Under the same natural conditions, the profits from tea cultivation for ethnic minorities are still low than the Kinh people living there. The reason is that the ethnic minority group has more limited techniques for planting and taking care of tea trees than the Kinh people. Low level of education and capacity is also the reason leading to lower profits from tea cultivation of households headed by a householder with a secondary education or less than that of a household head with a high school education level or higher.

Constraints restricting participation in international markets

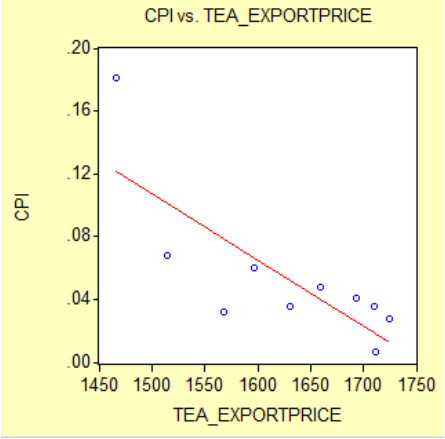
Small scale production but weak production links

With a large number of farmers engaged in tea production, it is understandable why
The scale of tea production of households is still very limited, although the area of tea cultivation in the province is very limited
Thai Nguyen has continuously increased over the years. According to the survey results of the Year 2018, on average, a production household has only 0.36 hectares, scattered into two or three different plots (maybe near or far from where they live). Even, the average area of each tea growing household in Thai Nguyen province is only 0.11 ha (Thai Nguyen Provincial People's Committee, 2017).
Moreover, the small size of the area and the lack of centralized production lead to higher production costs and reduced efficiency. Due to the limited and unsynchronized common irrigation system, households often hire people to drill wells and buy pumps to get water for irrigation without sharing water sources. It is also difficult because the scale is not large enough. Currently, more than 77% of surveyed households report a lack of water for irrigation, especially during the dry season months (November to April).
Moreover,in areas lacking electricity connection infrastructure, farmers have to invest in generators to generate electricity to run water pumps. Recently, the manifestations of climate change such as prolonged heat and cold, harmful cold, extreme weather phenomena and the frequency of natural disasters (floods, droughts) are increasing in Vietnam. some places in Thai Nguyen province in recent years. According to the Hydrometeorological Station of Thai Nguyen province; the average annual temperature in 9 districts, cities and towns in the province increased gradually, from 1959 to 2016 it increased by about 20 C; In the last 9 months of 2018 and the first 3 months of 2019, the rainfall is only 66% compared to the average rainfall of previous years.
Meanwhile, the abuse of pesticides is still happening and at a very low level
worthy of attention. On average, each tea growing household was sprayed 19.2 times/year (for 7 tea batches), 1.38 times higher than the recommended level of 14 times/year. The pre-harvest quarantine period is shorter, with an average of only 12.4 days compared to the recommended level of 15 days. If based on the results of this survey, it can be concluded that the production stage in the tea value chain of Thai Nguyen province has not yet ensured the recommended safe thresholds in the use of pesticides for tea plants and harvested tea products.

4.3 Econometric model for tea - export price:

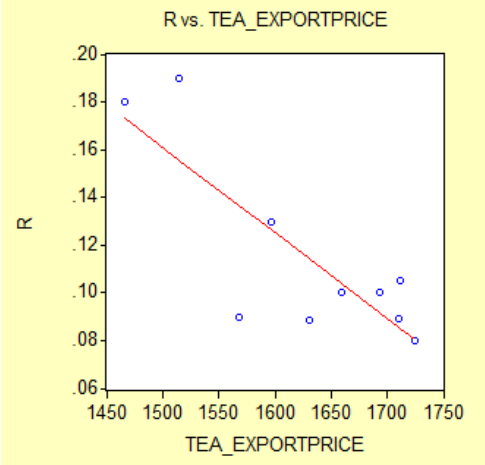
First of all, we see below scatter charts and see that:

Chart 1 - CPI vs tea export price



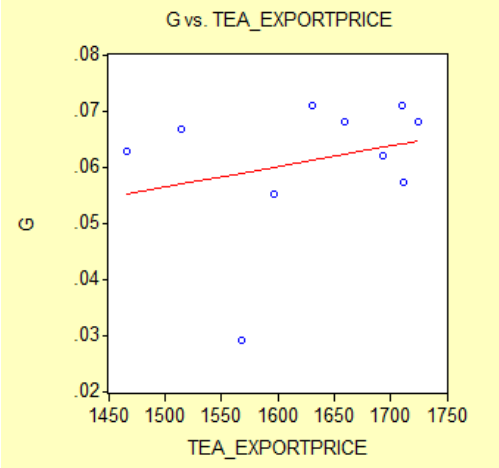
(source: Ministry of Industry and Trade, Ministry of Agriculture and Rural Development)

Chart 2 - Lending rate vs tea export price



(source: Ministry of Industry and Trade, Ministry of Agriculture)

Chart 3 - GDP growth vs tea export price



(source: Ministry of Industry and Trade, Ministry of Agriculture and Rural Development)

Second we analyze from below correlation matrix:

- Correlation between tea export price and R is lower than that between tea export price and CPI and Rf (figure 2).

Figure 2 - correlation matrix

Correlation Matrix					
	TEA_EXPO...	CPI	G	R	RF
TEA_EXPO...	1.000000	-0.783433	0.262450	-0.819496	-0.299648
CPI	-0.783433	1.000000	0.099628	0.744833	0.509105
G	0.262450	0.099628	1.000000	0.095911	0.426732
R	-0.819496	0.744833	0.095911	1.000000	0.678900
RF	-0.299648	0.509105	0.426732	0.678900	1.000000

(source: Ministry of Industry and Trade, Ministry of Agriculture and Rural Development)

We analyze from below regression results that:

- CPI and R have negative correlation with tea export price, whereas G and Rf have positive correlation with tea price.

Figure 3 - Regression results for tea price

Dependent Variable: TEA_EXPORTPRICE
Method: Least Squares
Date: 10/05/21 Time: 11:15
Sample: 1 10
Included observations: 10

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CPI	-756.2119	384.3429	-1.967545	0.1063
G	1723.285	1145.063	1.504970	0.1927
R	-1723.106	570.4374	-3.020675	0.0294
RF	1529.279	1037.685	1.473742	0.2006
C	1689.729	75.74046	22.30946	0.0000

R-squared	0.905267	Mean dependent var	1627.650
Adjusted R-squared	0.829480	S.D. dependent var	89.43470
S.E. of regression	36.93123	Akaike info criterion	10.36284
Sum squared resid	6819.578	Schwarz criterion	10.51414
Log likelihood	-46.81422	F-statistic	11.94493
Durbin-Watson stat	2.145434	Prob(F-statistic)	0.009014

(source: Ministry of Industry and Trade, Ministry of Agriculture and Rural Development)

4.4 Drinking Products from green tea

From green tea and lychee, we can make delicious lychee tea product, a favorite drink for many people.

Steps to Make rose tea:

Put 1 packet of rose tea in a glass jar, pour hot water to cook dried rose buds, steep the tea for about 3 minutes, then remove the filter bag.

Put 150ml of rose syrup, 50ml of sugar syrup, 50ml of fresh lychee juice, 50ml of yellow lemon juice into the tea pot. Stir until the mixture comes together. The tea has a beautiful bright pink color and a faint rose scent.

The last step, put the lychee into the glass depending on your preference more or less. Add ice cubes and then pour in rose tea, add mint leaves or basil to increase the taste and beauty.

Figure - Make Rose tea drink with ice

(source: internet)

5. Discussion and Conclusion

Dinh Tran Ngoc Huy, Nguyen Thi Hang,Le Thi Thanh Huong, Pham Van Hong (2021) stated that lychee and tea planting policies and capital financing policies in the country, esp. In the north of Vietnam. For instance, the nation needs to continue to negotiate with countries that have not yet allowed Vietnam's fresh lychee to be imported into developed countries (such as Korea, ...); The state/province cooperates with donors and businesses in trade promotion activities in potential export markets for Vietnamese lychee and fruit products (Japan, Korea, US, EU, ASEAN)

In the context of product distribution and consumption activities of production networks and The value chain is led and dominated by most large corporations in developed countries, If Vietnam wants to really take advantage of the opportunities from integration, it needs to be able to participate in global value chains. Therefore, agriculture needs comprehensive changes from production to processing to meet strict standards and technical requirements of markets, especially developed countries.

The common group of solutions to the agricultural industry:

Linking and forming concentrated commodity production areas

The problem of land consolidation and change of plots: to ensure that rural people still have land

"self-defense" agriculture has just transformed agricultural production according to the collective model. Vietnam should encourage and create favorable conditions for investors, businesses, and capable farmers to stand out to rent land from farmers, mobilize farmers to participate in concentrated production according to regulations. business processes to create product homogeneity.

Production linkage between farmer households, between farmers and enterprises

Invest in the synchronous construction of infrastructure for agricultural production (irrigation, transport and connection in production and with the market).

Alcohol traps

Johnson, M.A et al (2019) mentioned Coffee berry borer (CBB) is the most serious insect pest of coffee worldwide, causing more than US$500M in damages annually. Reduction in the yield and quality of coffee results from the adult female CBB boring into the coffee fruit and building galleries for reproduction, followed by larval feeding on the bean itself.

Authors conclude, based on findings, that alcohol traps (bottle) and Beauveria bassiana could be used to eliminate new generation of insects (killing female Coffee berry borer-CBB) and replace for chemical pesiticides solutions, then serving for agricultural sustainability.

Bui Thi Suu, Vu Quang Giang, Vu Phuong Lien, Dinh Tran Ngoc Huy, Ha Thi Lan (2021) stated that Among main cultivated crop in northwest area of Vietnam is coffee crop, then we have to deal with the negative factor, or insect, coffee berry borer (CBB), which cause losses and damages for farmers with negatively significant impact.

Marketing mix solutions

The process of having an agricultural product goes through many steps such as planting, planning, harvesting, packing, transporting, storing and distributing. So what are the marketing mix strategy of the agricultural industry?

Products (coffee, tea, lychee,…) - Develop product chain or categories - Improve quality control - Product positioning - Branding	**Price** - Apply penetration policy - Payment time flexible - Customer type based - Price for loyal clients - Discount policy and price based on psychology
Place - Online marketing for agricultural products - Change distribution channel - Indirect and direct channels	**Promotion** - change approach way - change social media, communication

Research limitation

We need to expand further analysis for other crops as well.

ACKNOWLEDGEMENTS

I would like to take this opportunity to express my warm thanks to Board of Editors and Colleagues in assisting convenient conditions for my research paper.

References

[1]. Buu Thi Suu, Vu Quang Giang, Vu Phương Lien, Dinh Tran Ngoc Huy, Ha Thi Lan. (2021). The Auto-infection Trap with the Native Entomopathogenic Fungus, Beauveria Bassiana for Management of Coffee Berry Borer (Stephanoderes Hampei Ferrari) in the Northwest Region of Vietnam, Alinteri Journal of Agriculture science, 36(1): 191-198.

[2]. Bui Thi Suu, Dinh Tran Ngoc Huy, Nguyen Thi Hoa. (2021). SUSTAINABLE VALUE CHAIN ISSUES, INSECT TRAPS AND SOLUTIONS FOR COFFEE BERRY BORER IN THE NORTH OF VIETNAM, Plant Cell Biotechnology and Molecular Biology 22(55&56), 74-83

[3]. Dinh Tran Ngoc Huy, Nguyen Thi Hang, Le Thi Thanh Huong, Pham Van Hong. (2021). FOOD AND DRINK PROCESSING FROM LYCHEE PRODUCTS IN THE NORTHERN PROVINCES OF VIETNAM - AND ROLES OF AGRICULTURE PROJECT FINANCING, Revista de Investigaciones Universidad del Quindío, 33(1), 187-195. https://doi.org/10.33975/riuq.vol33n1.555

[4]. Hac, L.D.; Huy, D.T.N.; Thach, N.N.; Nhung, P.T.H.; Thang, T.D. & Anh, T.T. (2021). Enhancing risk management culture for sustainable growth of Asia commercial bank -ACB in Vietnam under mixed effects of macro factors. Entrepreneurship and Sustainability Issues, 8(3). https://econpapers.repec.org/article/ssijouesi/v_3a8_3ay_3a2021_3ai_3a3_3ap_3a291-307.htm

[5]. Hansen, H. and Tarp, H. (2001), Aid and growth regressions, *Journal of Development Economics*, 2001, 64, 547-570.

[6]. Hang, T.T.B.; Nhung, D.T.H.; Nhung, D.H.; Huy, D.T.N.; Hung, N.M. & Dat, P.M. (2020). Where beta is going - case of Vietnam hotel, airlines and tourism company groups after the low inflation period. Entrepreneurship and Sustainability Issues, 7(3). 2282-2298. https://ideas.repec.org/a/ssi/jouesi/v7y2020i3p2282-2298.html

[7]. Huy, D.T.N.; Loan, B.T.; Anh, P.T. (2020). Impact of selected factors on stock price: a case study of Vietcombank in Vietnam. Entrepreneurship and Sustainability Issues, 7(4): 2715-2730. https://ideas.repec.org/a/ssi/jouesi/v7y2020i4p2715-2730.html

[8]. Huy, D.T.N. (2015). The critical analysis of limited south asian corporate governance standards after financial crisis. International Journal for Quality Research, 15(1), 741-746. http://www.ijqr.net/paper.php?id=378. Access: Jan. 11, 2021.

[9]. Hong, P.V., Nguyen, N.T., Huy, D.T.N., Thuy, N.T. and Huong, L.T.T. (2021). Evaluating Several Models of Quality Management and Impacts on Lychee Price Applying for Vietnam Agriculture Products Value Chain Sustainable Development. Alinteri Journal of Agriculture Sciences, 36(1): 122-130. doi: 10.47059/alinteri/V36I1/AJAS21018

[10]. Huy, D.T.N.; Dat, P.M.; & Anh, P.T. (2020). Building and econometric model of selected factors' impact on stock price: a case study. Journal of Security and Sustainability Issues, 9 (M), 77-93. https://cibg.org.au/index.php/cibg/article/viewFile/9/journal/article_8416.html

[11]. Huy, D.T.N.; Hien, D.T.N. (2010). The backbone of European corporate governance standards after financial crisis, corporate scandals and manipulation. Economic and Business Review, 12(4), 2015-2040. http://ojs.ebrjournal.net/ojs/index.php/ebr/article/download/101/30

[12]. Humphrey, J., and H. Schmitz. 2002. "How Does Insertion in Global Value Chains Affect Upgrading in Industrial Clusters." *Regional Studies* 36 (9): 1017–27

[13]. Humphrey và Memedovic (2006),*Global value chains in the agrifood sector*. Working papers 2006, UNIDO.

[14]. Huy, Dinh T.N., (2012), Estimating Beta of Viet Nam listed construction companies groups during the crisis, *Journal of Integration and Development, 15(1).*

[15]. Huy D.T.N., Nhan V.K., Bich N.T.N., Hong N.T.P., Chung N.T., Huy P.Q. (2021). 'Impacts of Internal and External Macroeconomic Factors on Firm Stock Price in an Expansion Econometric model—A Case in Vietnam Real Estate Industry', *Data Science for Financial Econometrics-Studies in Computational Intelligence*, vol.898, Springer. http://doi-org-443.webvpn.fjmu.edu.cn/10.1007/978-3-030-48853-6_14

[16]. Mendesil, E.; Jembere, B.; Seyoum, E. Population dynamics and distribution of the coffee berry borer, Hypothenemus hampei (Ferrari) (Coleoptera: Scolytidae) on Coffea arabica L. in southwestern Ethiopia. Sinet 2004, 27, 127–134.

[17]. Posada-Flórez FJ. 2008. Production of *Beauveria bassiana* fungal spores on rice to control the coffee berry borer, *Hypothenemus hampei*, in Colombia. 13pp. *Journal of Insect Science* 8:41, available online: insectscience.org/8.41

[18]. Yobana A. Mariñoa , Maria-Eglée Pérezb, Fernando Gallardoc, Marella Trifilioa, Michelle Cruza, Paul Bayman (2015). Sun vs. shade affects infestation, total population and sex ratio of the coffee berry borer *(Hypothenemus hampei*) in Puerto Rico. Agriculture, Ecosystems and Environment 222 (2016) 258–266

[19]. Perez, M.A.G., & Viana, S.G. (2012). Cooperation in coffee markets: The case of Vietnam and Colombia, Journal of Agribusiness in Developing and Emerging Economies 2(1):57-73. DOI:10.1108/20440831211219237

[20]. Robert G. Hollingsworth, Luis F. Aristizábal, Suzanne Shriner, Gabriel M. Mascarin, Rafael de Andrade Moral and Steven P. Arthurs (2020). Incoporating *Beauveria basssiana* into an intergreated pest

managerment plant for coffee berry borer in Hawaii. Frontiers in sustainable foof systerms, volume 4, Article 22

[21]. Johnson, M.A., Ruiz-Diaz, C.P., Manoukis, N.C., and Verle Rodrigues, J.C. (2020). Coffee Berry Borer (*Hypothenemus hampei*), a Global Pest of Coffee: Perspectives from Historical and Recent Invasions, and Future Priorities. *Insects*, 11(12), 882. https://doi.org/10.3390/insects11120882

[22]. Kulandaivelu Velmourougane, Rajeev Bhat and Thirukonda Nannier Gopinandhan (2010). Coffee Berry Borer (Hypothenemus hampei)—A Vector for Toxigenic Molds and Ochratoxin A Contamination in Coffee Beans. FOODBORNE PATHOGENS AND DISEASE Volume 7, Number 10, 2010

[23]. Nguyen Hung Anh, Bolkemann, W., Nga, D.T., & Minh, N.V. (2021). Toward Sustainability or Efficiency: The Case of Smallholder Coffee Farmers in Vietnam, *Economies* 2019, *7*(3), 66; https://doi.org/10.3390/economies7030066

[24]. Tran, D.N.L.; Nguyen, T.D.; Pham, T.T., Rañola, R.F., Jr.; Nguyen, T.A. (2021). Improving Irrigation Water Use Efficiency of Robusta Coffee (Coffea canephora) Production in Lam Dong Province, Vietnam. Sustainability, 13, 6603. https://doi.org/10.3390/ su13126603

[25]. Trung, N.D., Huy, D.T.N., Hang, N.T. and Ha, L.T. (2021). Effective Management via a Business Model of Food and Drink Processing from Lychee Products in the Northern Areas of Vietnam. Alinteri Journal of Agriculture Sciences, 36(1): 406-411. doi: 10.47059/alinteri/V36I1/AJAS21061

[26]. Vu, H.T. (2013). The Research on Arabica coffee cultivation technical toward sustainable development for Northwest ecological region. In national conference on Crop Science I, 897-906.

[27]. Vega, F.E.; Benavides, P.; Stuart, J.A.; O'Neill, S.L. Wolbachia infection in the coffee berry borer (Coleoptera:Scolytidae). Ann. Entomol. Soc. Am. 2002, 95, 374–378.

[28]. Vega, F.E.; Infante, F.; Johnson, A.J. The genus Hypothenemus, with emphasis on H. hampei, the coffee berry borer. In Bark Beetles: Biology and Ecology of Native and Invasive Species; Vega, F.E., Hofstetter, R.W., Eds.; Academic Press: San Diego, CA, USA, 2015; pp. 427–494.

Exhibit

Exhibit 1 – Inflation, CPI over past 10 years (2007-2017) in Vietnam

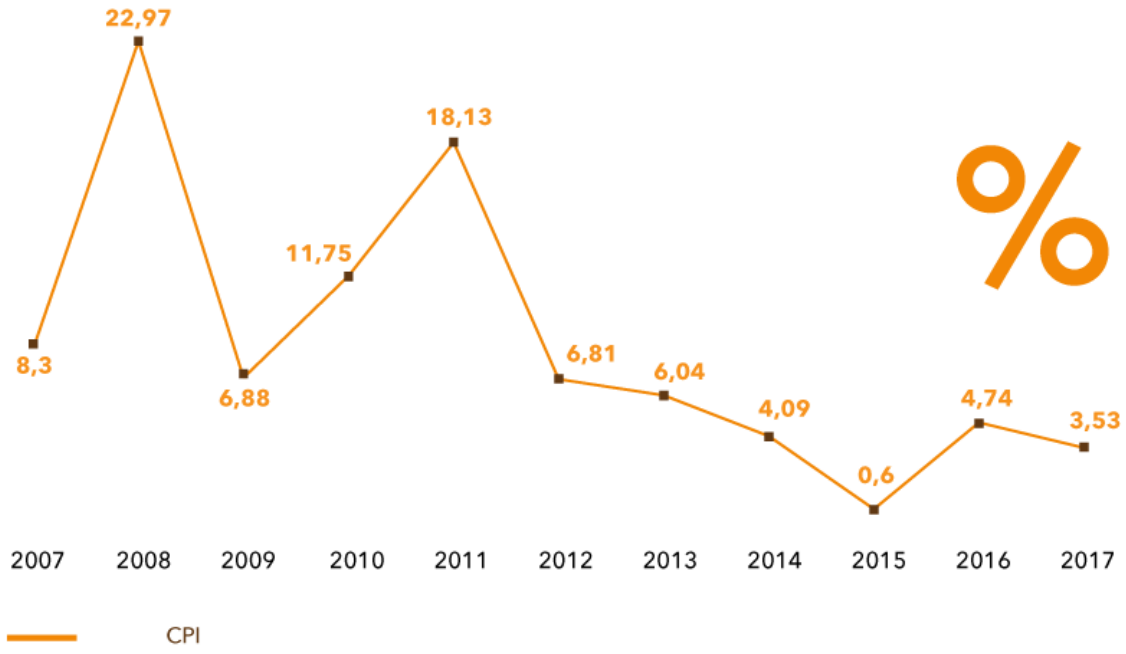


Exhibit 2 – GDP growth rate past 10 years (2007-2018) in Vietnam