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The accessibility to the Consumption Market of Fruit Household: a Study in VO Nhai District, Thai Nguyen Province, Viet Nam

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ABSTRACT: Through relevant research documents and field surveys, the authors proposed a model of 10 factors affecting the market access of fruit households in Vo Nhai district, Thai Nguyen province. By using the logistic regression method and multivariate regression model, the study evaluated the influence of factors on the market access ability of fruit households. Research results have shown that the factors such as gender, age, education level, experience, area, access to information, credit, training, and communication have a positive influence on the ability to market access of these households.

Keywords: Consumption market, accessibility; growing fruit household.

I. INTRODUCTION

Sustainable rural development is an issue that many developing country governments, donors, and non - governmentorganizations continue to grapple with. Agricultural markets are promoted as a possible pathway to rural development, as they are seen as important for economic growth and addressing poverty [1]. Access to markets for smallholder rural farmers, however, is fraught with challenges. Market access issues present local to global connections that prove to be both opportunities and challenges for rural smallholder farmers. On one hand, the structural changes in markets through integration on national, regional,and internationalmarketsprovidean opportunityfor participation and profit forsmallholder farmers who can supply new product lines and meet the market's needs [1]. Market participation of farmers is both a cause and a consequence of economic development [2,3]. It is a major pathway for rural people in assuring better income and improving food security. The existence of markets and improved market access are important for smallholder farmers since they can draw agricultural and economic development. Improved access to markets has paramount importance in increasing smallholder market participation and the extent of their participation, ceteris paribus [4,5]. Smallholder agriculture, one of the principal economic occupations in the world, is the main source of income and employment for 70 percent of the world's poor in rural areas [6]. Smallholder farmers contribute to food security, equitable distribution of income, and linkage creation for economic growth [7]. However, smallholder farmers are facing constraints in terms of physical access to markets and a lack of market information [8]. Smallholder farmers can significantly increase their incomes by enlarging the market sales ratio [9]. Nonetheless, the participation rate of smallholder farmers in the rice market remains low due to various constraints [10]. Fundamentally, most of the smallholder farmers are in remote areas with poor transport and market infrastructures, causing high transaction costs. In addition, they lack reliable market information as well as information on potential exchange partners [5]. Due to their small surpluses in production, smallholders are also generally exposed to a higher degree of risk and transaction costs [9]. Most rural farmers sell their produce mainly at their farm gate and in village markets. Their decisions on the amount of output to sell are mainly influenced by marketing information, produce prices, and distance to the market [11]. Economic liberalization has provided opportunities for smallholder farmers to diversify their products and take their surplus to nearby markets [12].

However, one drawback regarding smallholder farmers is that they lack marketing knowledge and as a result, most of the crops are sold at lower prices at their farm gate or in local markets [13]. Limited access to

guaranteed markets for their products and the acquisition of inputs is another major problem the smallholders confront [14].

Vo Nhai is the only highland district of Thai Nguyen province, where many ethnic minorities live. Socio-economic conditions are still difficult. In the review of poor and near-poor households in 2020, the whole district still has 1,730 poor households and 2,270 near-poor households. By the end of 2020, Vo Nhai upland district has 9.58% poor households, and this is the locality with the highest poverty rate in Thai Nguyen province.The life of most of the people is mainly based on agricultural production. With the advantage of land and climatic conditions, farmers have focused on growing several fruit trees with high economic value. In recent years, to achieve the goal of socio-economic development, create jobs, and increase income for production households, local authorities have had many solutions. Specifically (i) plan and build concentrated production areas based on market demand and orientation of specialized farming areas; (ii) open training courses on planting and caring for fruit trees; (iii) develop and implement fruit tree production models to ensure food safety and hygiene according to VietGap process.Vo Nhai currently has nearly 1,600 hectares of fruit trees, bringing a large income and high economic value. In addition to several well-known key crops in the market, the continued exploitation of new trees will contribute to the enrichment and diversity of fruit tree development in the district. Several fruit trees have been selected by the people to grow into concentrated production areas with high economic efficiency such as La Hien custard apple (250ha), income 380-400 million VND/ha/year; Trang Xapomelos (350ha) gives income of 500-700 million dong; Lau Thuongorange; guava in PhuThuong gives an income of 400-500 million VND/ha/year... In recent years, the brand name of some fruit trees of the district such as La Hien custard apple, Trang Xa pomelo, PhuThuong guava, ... more and more known by domestic consumers. Fruit trees are considered as hunger eradication and poverty alleviation crops in many communes in Vo Nhai. However, the output market of these agricultural products is still precarious, with many potential risks. This problem stems from the limited market access of fruit growers in the district. Therefore, this study will focus on studying the factors affecting market access and proposing policy to improve market access for fruit growing households in Vo Nhai upland district, Thai Nguyen province shortly.

II. METHODOLOGY

Research model

The study of market access of agricultural produce households has been interested in many domestic and foreign researchers, such as Nyein Nyein Kyaw et al (2018), Berahanu Kuma (2012), Anteneh et al. (2011), Nadezda Amaya et al. (2011) and domestic authors such as La Nguyen Thuy Dung, Mai Van Nam (2015), Nguyen Quoc Nghi, Mai Van Nam (2014).Through relevant research documents, combined with field surveys, the author proposes a model of factors affecting market access of fruit growing households in Vo Nhai district as follows:

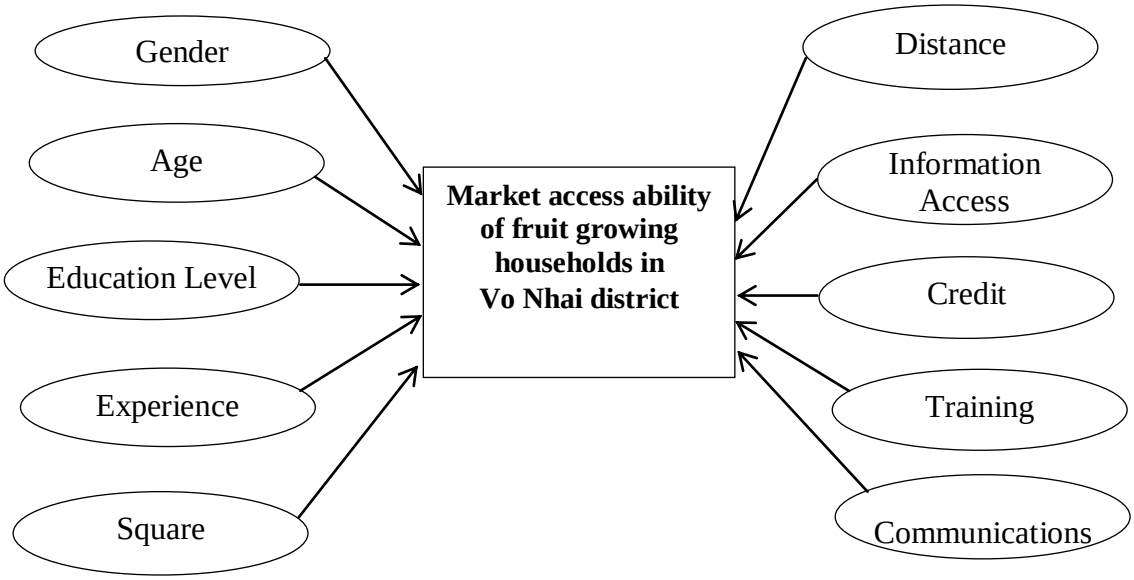

Figure 1.Research model

To test this model, the author uses logistic regression method with the equation is set up as follows:

$KNTCTT = \beta_0 + \beta_1 Gender + \beta_2 Age + \beta_3 Education + \beta_4 Experience + \beta_5 Square + \beta_6 Distance + \beta_7 Information + \beta_8 Credit + \beta_9 Training + \beta_{10} Communication$

In wich:

KNTCTT is a dependent variable that measures the market accessibility of fruit-growing households, this variable takes the value 1 if the household has good market accessibility (regularly updating prices, market information of input and output, understanding market participants, grasping market policy) and vice versa will receive the value 0. The independent variables in the model are explained in detail in Table 1.

Table1.Interpretation of the independent variables

Name	Unit	Definition	Kỳvọng	Source
Gender	0/1	Gender = 1 male, 0 female	+	La Nguyen Thuy Dung and Mai Văn Nam (2012)
Age	Year	Age, get the corresponding value as the age of the main producer, up to the time of the study.	+/-	Berahanu Kuma (2012); Anteneh, Muradian, Ruben (2011)
Education level	Year	calculated by the number of years of schooling of the main producer, up to the time of the study.	+	Berahanu Kuma (2012); Takashi Yamano, Yoko Kijima (2010); Anteneh, Muradian, Ruben (2011)
Experience	Year	receives the value corresponding to the number of years of fruit growing by the main producer, up to the time of the study.	+	Berahanu Kuma (2012); Anteneh, Muradian, Ruben (2011)
Square	Ha	receives the value corresponding to the number of hectares of the production area of the household at the time of the study.	+	Berahanu Kuma (2012); Sushil Pandey và Nguyen Tri Khiem (2001)
Distance	km	The distance from the farmer's house to the main road, taking the value of the corresponding number of kilometers.	-	Senyolo et al. (2009); Takashi Yamano et al. (2010), Berahanu Kuma (2012)
Information	0/1	Access to information via the internet. If the household knows how to use the internet to access information, it will receive the value 1 and, vice versa, it will receive the value 0.	+	Van Schalkwyk et al. (2007)
Credit	0/1	Access to credit, farmers that have access to official credit sources to grow fruit trees will receive the value 1 and vice versa will receive the value 0.	+	Anteneh et al. (2011); Van Schalkwyk et al. (2007)
Training	0/1	Farmers participating in the training on planting and consuming fruit trees will receive the value 1 and vice versa will receive the value 0.	+	A. Anteneh, Muradian, Ruben (2011)
Communication	Person	Several people can provide information related to fruit production and consumption in the farmer's phone book.	+	Nadezda Amaya, Jeffrey Alwang (2011)

Model of factors affecting the level of market access

To better evaluate and have a more comprehensive view of the factors affecting the level of market access of fruit-growing households in Vo Nhai district, the author establishes one more research model to identify the factors affecting the level of market access of fruit-growing households. This model is developed on the scientific basis of the model of factors affecting market access. However, the important difference is that in

the dependent variable. The dependent variable of this model is measured by the level of market access on the 5-level Likert scale, with 1 being very bad and ascending to 5 being a very good level. Therefore, a multivariable linear regression analysis model is used to test as follows:

$$MĐTCTT = \beta_0 + \beta_1 Gender + \beta_2 Age + \beta_3 Education + \beta_4 Experience + \beta_5 Square + \beta_6 Distance + \beta_7 Information + \beta_8 Credit + \beta_9 Training + \beta_{10} Comunication + u_i$$

2.2. Methods of data collection

Primary data was collected using the conditional convenience sampling method. The author conducts direct interviews with fruit-growing households in Vo Nhai district, Thai Nguyen province through a pre-made survey form. To determine the sample size, this study uses Slovin's formula (1960), specifically as follows:

$$n = N/(1+N*e^2).$$

In which: n: sample size; N: population and e: standard error. The allowed error is 5%. With the scale of households producing main fruit trees in Vo Nhai district by 2021, about 1,550 households, applying the above sampling formula, the number of production households to be surveyed is 317 households. Thus, the research will select a sample of 320 households. The survey sample is distributed as follows:

Table 2.Survey sample distribution

No	Subject	Total number of producing households (household)	Sample size (household)
1	Grow custard household	700	145
2	Grow pamelo household	340	70
3	Grow guava household	290	60
4	Grow orange household	220	45
	Total	**1550**	**320**

Source: Calculations and determination of the research team (2021)

III. RESEARCH RESULTS

Information of households growing fruit trees

Table 3.Information of fruit tree farmers in Vo Nhai district

Indicator	Unit	Min	Max	Average	Standard deviation
Age	Year	23	68	43,74	9,22
Education	Year	3	16	8,35	3,78
Square	1.000m2	1,25	10,6	2,13	2,72
Production experience	Year	3	26	11,7	4,53
Number of people in the household	Person	3	7	4,21	1,12
Number of employees involved in fruit tree planting	Person/ household	2	6	2,94	1,07
- Number of male employees	*Person*	1	4	2,83	1,02
- Number of female employees	*Person*	23	68	43,74	9,22

Source: Synthesis of actual survey data of the research team, 2021

The survey results show that the oldest fruit grower's age is 68 years old and the lowest is 23 years old, with an average age of 43.74 years old. Most of the farmers involved in fruit tree production were in middle age, accounting for 52.2% (from 35-50 years old). The level of education of fruit growers is quite low, the average number of years of schooling of the household is about 8.35 years with the highest education are university level (accounting for only 5.3%), the lowest is finishing grade 2 (accounting for 1.56%). The fruit growing area of the household is quite small, on average of 2,130 m2, the smallest is 1,250 m2 and the largest is 10,200 m2. Households with an area larger than 10,000 m2 account for about 1.25%. The farmer's experience in growing fruit trees is relatively high with the average number of years involved in fruit production being 11.7 years. On average, a household growing fruit trees has about 4.21 people, of which more than 50% are directly involved in growing fruit trees, the rest are mostly dependents, a few do other jobs.

Market accessibility of fruit growers

Sources of market information

According to the survey results from Table 4, most fruit-growing households in Vo Nhai district get market information from collectors and relatives, neighbors at the rates of 76.9% and 70.3%. Near the time of harvest, farmers often call or directly ask the collectors to compare prices and then decide to sell to the trader with a better price. Besides, information from agricultural extension officers is also interested by farmers with the rate of 54.7%. In recent years, the locality has paid great attention to promoting the consumption of agricultural products for the people and there have been many promotional activities to promote the image of local products at home and abroad.The district's agricultural extension officers are active and enthusiastic. Social networks, television, and, radio are also information channels that farmers are interested in with the rate of 52.5% and 49.1%. According to the majority of farmers, information from social networks, television and, radio is only for reference because of the big difference between the price of fruit bought at the garden and the price posted on social networks, television and, radio. There are 23.4% of farmers get information through newspapers and magazines.

Table 4.Sources of access to market information of fruit growers

No	Source	Frequency (person)	Percentage(%)
1	Traders, collectors	246	76,9
2	Relatives, neighbors	225	70,3
3	Agricultural extension officer	175	54,7
4	Social internet (Facebook, zalo, etc.)	168	52,5
5	Television, Radio	157	49,1
6	Journal	75	23,4

Source: Summary from the survey results of the research team (2021)

In general, the means of accessing market information of fruit growers in Vo Nhai district are quite diverse, but mainly from collectors, relatives,and neighbors. The ability of farmers to access the market through the mass media is still not high.

Factors affecting the market accessibility of fruit tree growers

To determine the factors affecting the market access ability of fruit farmers in Vo Nhai district, the research team tested the logistic regression model. The results of the analysis are as follows:

Table 5.Results of logistic regression analysis on factors affecting market accessibility of fruit growing households in Vo Nhai district

Variables	β	Sig.
Gender	0,026	0,046
Age	0,071	0,036
Education	0,301	0,029
Experience	0,058	0,048
Square	0,023	0,012
Distance	-0,119	0,049
Information	0,392	0,024
Credit	0,007	0,043
Training	0,392	0,024
Comunication	0,125	0,000
Constant	-8,156	0,000
N	320	
Sig.	0,000	
-2 **Log-likelihood**	76,428	
Overall Percentage	86,7	

Table 5 shows that the overall percentage has a significance level of sig.=.000, that is, the coefficients in the model are significant in explaining the dependent variable. The value of -2 Log-likelihood indicates the fit of the model, in this model with -2 Log-likelihood = 76,428 is not very high, so it has a good fit with the overall model. The correct prediction rate of the model is 86.7%. Thus, the model is accepted and used to determine the factors affecting the market access of fruit farmers in Vo Nhai district.

To determine the factors affecting the level of market access of fruit-growing households, the research team conducted a multivariate regression analysis. The results of multivariate regression analysis in Table 6 also show that the model has a high level of significance (sig < 0.05), the variables included in the model all have variance magnification (VIF) less than 2, showing that the variables included in the model do not have multicollinearity. The Durbin-Waston coefficient of the model is 1.998, showing that the model does not have autocorrelation. The model's adjusted R2 coefficient is 0.584, showing that the independent variables in the model explaining the change in market access are 58.4%.

Table 6.Results of multivariable regression analysis on factors affecting the level of market access of fruit growing households in Vo Nhai district

	β	**Sig.**	VIF
Gender	0,016	0,554	1,158
Age	0,054	0,565	1,354
Education	0,195	0,004	1,264
Experience	0,027	0,034	1,413
Square	0,017	0,047	1,248
Distance	-0,105	0,017	1,256
Information	0,123	0,018	1,945
Credit	0,012	0,696	1,985
Training	0,248	0,017	1,421
Comunication	0,074	0,000	1,991
Constant	0,742	0,072	
N	320		
Sig.	0,000		
Adjusted R Square	0,584		
Durbin-Watson	1,998		

Tables 5 and 6 show that gender, age, and credit variables have differences in the two models.In the logistic regression model, gender, age, and credit have the significance level of 0.046; 0.036 and 0.043 with the coefficient β of 0.026; 0.071 and 0.007. However, in the multivariable regression model, these three variables are not statistically significant. The results show that the gender, age,and credit of fruit growers in Vo Nhai district affect market access but not on the level of market access. Vo Nhai is a mountainous and remote district, so the role of women has not been promoted. In addition, the older the direct producer, the better relationships with traders, relatives, neighbors,and cooperative groups. The fact that farmers have access to formal credit will create conditions for farmers to have more financial resources to be able to buy communication equipment, so market access will be better.

The educational level variable (Education) of fruit-growing households in both models is statistically significant (sig < 0.05) with beta coefficients of 0.301 and 0.195. This shows that the level of education has a positive impact on the ability and level of market access of farmers. The higher the education level of the person who directly grows and consumes fruit trees, the better the farmer's ability and level of market access. Households with a high level of education have better access to and processing of information from extension workers, the media, and modern tools to access the market, and vice versa.

The experience variable of fruit-growing households in both models is highly significant (sig < 0.05) with coefficients β of 0.058 and 0.027, respectively. This shows that the experience of fruit growers has a positive impact on the ability and level of market access. The higher the number of years of planting fruit trees directly, the better the relationship with traders, collectors, extension workers, and the way to find market information, that is, the ability and level of market access of households will be better.

The variable area (Square) of fruit trees of the household is significant in both models (sig < 0.05) with the coefficient β of 0.023 and 0.017, respectively. This variable positively affects the ability and the level of farmers' market access. This shows that the larger the production land area of the household, the higher the ability and the level of market access of the household. The larger the production area, the larger investment costs as well as fruit output, the farmers must try and actively access market information to consume at the highest possible price.

The distance variable of the household is significant in both models (sig < 0.05) with the coefficient β of -0.119 and -0.105, respectively. Thus, this variable has a negative impact on the farmers' ability and level of market access. The farther the distance between the grower and the main road, the lower the ability and level of access to the consumer market. Vo Nhai district is a remote - area, so the farther the distance, the more difficult

and poorer the transport and telecommunications infrastructure, which will affect the information provided to the farmers.

The variable access to information (Information) of the household has high significance in both models (sig < 0.05) with coefficients β of 0.392 and 0.123, respectively. This shows that fruit growers' access to information has a positive impact on the ability and level of market access. The more fruit-growing households have access to information via the internet, the better they will grasp and approach the consumption market. Especially, farmers who participate in e-commerce platforms will have better market accessibility.

The training variable in both models has high significance (sig < 0.05) with coefficients β of 0.392 and 0.248, respectively. This shows that the training variable has a positive impact on the ability and level of market access of farmers. In recent years, to develop the household economy and especially promote fruit-intensive farming areas, Vo Nhai district has implemented many training programs on fruit growing techniques and methods to promote fruit consumption. These training programs have helped farmers improve farming techniques and facilitated farmers to access the market.

The communication variable has high significance in both models (sig < 0.05) with the coefficient β of 0.125 and 0.074, respectively. Thus, the communication of fruit growers has a positive impact on the ability and level of market access. The more information is provided related to fruit production and consumption, the higher the market access. Moreover, farmers are often far apart, so communication by phone is more effective than a face-to-face meeting. Besides, when farmers know many phone numbers of buyers, they will have more favorable access to price information, helping them to decrease market risks.

IV. CONCLUSION

Research results have identified the factors affecting the ability and level of market access of farmers. Excluding the distance factor, the factors of education level, experience, area, access to information, training, and communication have a positive influence on the ability and level to access the consumption market of households. From the results of this study, the author proposes some recommendations to improve the ability and level of market access for fruit farmers in Vo Nhai district as follows:

Firstly, strengthen the training program on production and consumption of fruit products for farmers. It is necessary to focus on disseminating market information and market approach to farmers. This program not only helps farmers improve farming techniques but also helps them be more proactive in seeking market information, improving their ability to respond to market risks.

Secondly, pay more attention to the propaganda and dissemination of market information on the mass media. Local authorities need to pay attention to the activities of disseminating market information to farmers through locally available means such as local radio and television programs. At the same time, it is necessary to strengthen the role of the grassroots agricultural extension system in updating market information for fruit farmers.

Thirdly, local authorities need to promote the completion and upgrade of transport and telecommunications infrastructure so that households in remote and isolated areas can better access the market.

Fourthly, the local government promotes the district's fruit products through many channels and forms. Encouraging farmers to participate in fairs, exhibitions... will help increase the ability and level of market access of fruit-growing households in Vo Nhai district.

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