SEEJPH Volume XXV S2, 2024, ISSN: 2197-5248; Posted:05-12-2024

FACTORS AFFECTING THE MARKET ACCESSIBILITY OF VEGETABLES AND FRUITS IN HIGH-TECH AGRICULTURAL PRODUCTION COOPERATIVES: A STUDY IN THE URBAN AREA OF HANOI CITY, VIETNAM

Pham Anh Dung, Nguyen Thi Nhu Tam, Ho Thi Hien , Vu Quynh Loan , Nguyen Thi Kim Oanh

[1]*International School, Vietnam National University, Hanoi, 144 Xuan Thuy, Cau Giay, Hanoi, Vietnam -*
[2]*International School, Vietnam National University, Hanoi, 144 Xuan Thuy, Cau Giay, Hanoi, Vietnam*
[3]*Faculty of Economics - Business Administration; Nghe An University of Economics, Vietnam*
[4]*Vietnam Institute for Economic and Policy Research, Vietnam*
[5]*Department of Marketing, Thuongmai University, Hanoi, Viet Nam*

KEYWORDS
vegetables, green fruits of Hanoi City, market accessibility, information, access

ABSTRACT:
The development of the vegetable and fruit market is a topic of current interest, especially in the context of transitional economies like Vietnam. This study was conducted to analyze the impact of factors affecting the market accessibility of green vegetable and fruit products. The author employed a mixed-methods research approach, including quantitative research with data from 179 observations obtained through questionnaire surveys and 6 in-depth interviews in Vietnam. The research findings indicate that road conditions, market information accessibility, agricultural extension services, and linkage significantly and positively affect the market accessibility of green vegetables and fruits in Hanoi City. In contrast, age has a negative impact on market accessibility. Conversely, education level and distance to the market have very weak effects, while gender and ownership of electronic devices do not affect the market accessibility of these products.

1. Introduction

Agriculture plays an extremely important role in socio-economic development, especially for developing countries. It not only helps ensure national food security but also provides an input factor for the processing industries. In addition, agricultural development is also associated with rural development and poverty reduction because the majority of the poor people's livelihoods depend on farming (Ahmed et al., 2016; Markelova et al., 2009). As an inevitable consequence in the context of industrialization and modernization in many countries, the agricultural sector is having a significantly reduced proportion in the economic structure. According to World Bank statistics, *the* proportion of agriculture in Vietnam is only approximately 14% (World Bank, 2019). Contrary to this trend, some localities in Vietnam still focus on agricultural development for local socio-economic development.

Promoting the advantages of land, climate and terrain conditions, Hanoi city district has successfully built and developed many agricultural models, creating brands that are recognized in the market such as: Hanoi hill chicken, mountain goat, wild honey, etc ... In addition, the locality is also promoting the development of the Hanoi City green fruit and vegetable brand. In recent years, green vegetables and fruits in Hanoi City have been one of the main crops of the locality, becoming the main source of livelihood for farmers, helping to improve living standards and reduce poverty. In contrast to the existing results of quality-based certification (Hanoi green vegetables and fruits were recognized as 4-star products in 2019), this product is still mainly consumed in Hanoi district and surrounding areas. From the above analysis, the main research question that the research team asks is: What factors have affected the market access of green vegetable and fruit products in Hanoi City.

This study has the following main contributions: (1) in terms of academic contribution, this study approaches the research problem based on a mixed research methodology. This allows for more in-depth results on the research issue. In addition, this study approaches the problem of a brand with low brand

recognition – as opposed to the endorsement of the technical standard that the product achieves. Finally, this study takes into account the linkage factor in market development, age in the research model; (2) In terms of practical contribution, first of all, the results of this study answer the question of policymakers and managers about the phenomenon of low market access of agricultural products under the condition of great support by local and external stakeholders. On the other hand, the policy suggestions from this study can have specific policy applications to promote the expansion and development of the market of vegetables and green fruits in Hanoi City in particular, and agricultural products in general.

This study focuses on analyzing the following 03 main contents: *first,* assessing the current situation of market access of green vegetables and fruits in Hanoi City; *secondly*, to identify the influencing factors and analyze their impact on market accessibility; *third,* to make policy implications to enhance market access of green vegetables and fruits in Hanoi City.

2. Research Overview

2.1. Theory of factors affecting market access

Some scholars such as Machete (2004), Mwangi et al. (2015), and Ahmed et al. (2016) believe that poor market access by farmers is the main cause of a product that meets quality standards but is sold at a low price and small market size. Previous research by Sendal et al. (2007) also showed that low access to markets will have a negative impact on increasing profits and improving the quality of life of farmers, thereby reducing their motivation to participate in the market (A. De Janvry et al., Indeed, market access plays an extremely important role in promoting rural development, poverty reduction, and raising incomes (Jayne et al., 2010; Cai & Associates, 2012; Ahmed et al., 2016).

Access to the output market is influenced by many factors. For example, Kyaw et al. (2018) and Kuma (2012) concluded that distance has an inverse and strong impact on market accessibility. On the other hand, there are studies that show that access to output markets is strongly influenced by gender variables, in which, men have better access to markets than women (Asfaw et al., 2012; Sigei et al., 2014; Kihiu & Amuakwa-Mensah, 2020). In contrast, research by La Nguyen Thuy Dung & Mai Van Nam (2015) found that gender is not correlated with market access. Not only that, age is also one of the factors that strongly affect market access (Asfaw et al., 2012; Kassa et al., 2017; La Nguyen Thuy Dung & Mai Van Nam, 2015; Nguyen Quoc Nghi & Mai Van Nam, 2014). In addition, factors such as education level, road conditions, access to market information, linkage, ownership and access to agricultural extension services have also been shown to have a positive and very strong impact on market access (Ahmed et al., 2016; Apind et al., 2015; Kuma, 2012; Kassa et al., 2017; Kyaw et al., 2018; La Nguyen Thuy Dung & Mai Van Nam, 2015; Mwangi et al., 2015; Nguyen Quoc Nghi & Mai Van Nam, 2014; Onoja et al., 2014; Siziba et al., 2011).

What has been common in previous studies has been to look at developing countries and often assess the market accessibility of agricultural products as a whole, rather than a specific product that is local. In addition, these studies do not consider the linkage between stakeholders including farmers, cooperatives (cooperatives) and localities. In addition, past studies have not developed a framework for measuring variables to observe market access, but mainly use pseudo-variables with two values of 0 and 1 (Ahmed et al., 2016; Asfaw et al., 2012; La Nguyen Thuy Dung & Mai Van Nam, 2015; Nguyen Quoc Nghi & Mai Van Nam, 2014). Therefore, this study used observation variables to measure the dependent variable (market access) and used a 5-level Likert measure to be able to reflect more clearly and closely the level of market access of green vegetables and fruits in Hanoi City. Specifically, the study examined the influence of 9 factors on the dependency variable, including: distance, gender, age, education level, access to market information, road conditions, linkage, ownership and access to agricultural extension services.

Market Access

According to Nutilus Consultants (cited in Nguyen Tien Hung, 2009, p.5), market access is defined as a series of commercial activities in which producers bring goods to consumers. Another concept is that market access is to understand the output market of products, to grasp the needs and tastes

of consumers in order to build a suitable production organization plan to meet the requirements and desires of customers in the best way (Luu Thanh Duc Hai, 2007). Thus, it can be generalized that: Market access is a multi-step process of suppliers from determining the output market to selling their products on the market.

Collaboration/association

In the process of production and consumption of agricultural products in general and vegetables and fruits in particular, there are two main types of linkage: vertical and horizontal linkage. Horizontal association is a form of association in the form of a cooperative group or cooperative. Vertical linkage is a method of linking between entities participating in the value chain, from input supply to product consumption. Some forms of vertical linkage such as cooperative groups (cooperative groups)/cooperatives (cooperatives) with enterprises/agents, farmers with traders/agents/enterprises/processing establishments,..... If horizontal linkage helps farmers improve production techniques, share experience and access capital, then vertical linkage will help ensure input supply for the production process and stabilize output (Nguyen Quoc Nghi and Mai Van Nam, 2014).

In this study, the authors focus on the vertical linkage, which is the linkage/cooperation of vegetable and fruit farmers with Than Truong cooperative; There is also a link with the local government. These are the subjects who are directly involved in the process of understanding the consumption market, connecting and expanding the consumption market of green vegetables and fruits in Hanoi City.

Ownership (Radio, TV, Phone)

The ownership of devices such as radios, TVs, and telephones in this study is measured by the number of electronic devices that the subjects (farmers, cooperative officials, district officials) currently have and are using.

Access to agricultural extension services

According to Decree 83/2018/ND-CP, "agricultural extension is the transfer of technical advances, information, knowledge dissemination and skill training for farmers in order to improve the capacity and efficiency of agricultural production and business, environmental protection and new rural construction". Thus, agricultural extension services are services in the field of agriculture, in order to improve knowledge, skills, and transmit information to farmers through training, retraining and training activities.

The study included both subjects provided with agricultural extension services (farmers growing vegetables and fruits) and also subjects provided with agricultural extension services (cooperative officials and district officials). Therefore, access to agricultural extension services is whether farmers can participate in training classes and be informed about the market for green vegetables and fruits. If this is a direct question for farmers, it is also an indirect question for cooperative officials and local officials to evaluate the effectiveness of agricultural extension services.

2.2. Research model

Many previous studies have used quantitative research methods with multivariate regression models to identify factors affecting output market accessibility, such as research by La Nguyen Thuy Dung & Mai Van Nam (2015), Nguyen Quoc Nghi & Mai Van Nam (2014), Ahmed et al. (2016), and Kihiu & Amnuakwa-Mensah (2020). Based on those studies, this study builds a regression model of factors affecting market access of green vegetables and fruits in Hanoi City as follows:

$$MA=\alpha + \beta1*DIS + \beta2*GEN + \beta3*AGE + \beta4*EDU + \beta5*ROAD + \beta6*INF + \beta7*ASS + \beta8*OWN + \beta9*EXT + \mu$$

In which: α, $\beta1$, $\beta2$, $\beta3$, $\beta4$, $\beta5$, $\beta6$, $\beta7$, $\beta8$, $\beta9$ are the coefficients; μ is an error

Accordingly, MA: Market accessibility, DIS: Distance to market, GENE: gender of farmer or cooperative owner, AGE: Age of farmer or cooperative owner, EDU: Education level of farmer or cooperative owner, ROAD: Road conditions, INF: Access to market information, ASS: Affiliation, OWN: Owning at least one of the three radios, TVs, smartphones, EXT: Access to agricultural extension services.

2.3. Research hypothesis

Based on the review of previous research documents, the authors have developed a research hypothesis on the market accessibility of green vegetables and fruits in Hanoi City.

2.4. Research methods

With quantitative research methods, research using primary data, collected from the survey of Hanoi district officials, cooperative officials and vegetable and fruit farmers. These are people who are directly involved in the production and consumption of green vegetables and fruits in Hanoi City of the locality (farmers and cooperative officials). District officials of Hanoi City, specifically officials of the Department of Economy and Infrastructure are not directly involved in the production process, but they are participants in the process of finding an output market for green vegetables and fruits in Hanoi City. At the same time, district officials also promote and promote products, bringing the image of green vegetables and fruits to many consumers across the country, especially in large markets such as Hanoi, Ho Chi Minh City, and Da Nang,... through the form of organizing fairs, developing tourism, introducing products in the media, etc. Therefore, in addition to farmers and cooperative officials, it is necessary to investigate district officials (Department of Economy and Infrastructure) because they are major contributors to the development and expansion of the market for green vegetables and fruits in Hanoi City.

The questionnaire is designed to consist of two parts. The first part is the personal information of the survey participants, including gender, age, education level and occupation. The rest is built on the development of metrics to understand the factors affecting market access of vegetable and fruit products. In the second part, in addition to the multiple-choice questions (distance and access to agricultural extension services), the remaining questions about road conditions, access to market information, linkage, ownership, and market access are used on the 5-level Likert scale to show the level of consent of the surveyed subjects. of which 1 is completely disagreeable and 5 is completely agreed.

After designing the survey questionnaire, the author used a combination of the Anket method by sending online questionnaires and the method of distributing questionnaires directly to collect data. Specifically, the online survey was sent to district officials and cooperative officials. As for farmers, the method of sending online survey forms is not suitable because many vegetable and fruit farmers do not have smart electronic devices and have difficulty using these devices. On the other hand, if farmers fill out the survey form by themselves, the probability of the questionnaire being filled in incorrectly will be higher due to misunderstanding the meaning of the question. Therefore, the questionnaire needs to be distributed live so that reliable and accurate answers can be obtained. The data collection process took place in 1 month and collected 115 votes. However, after processing (cleaning) the data, 5 invalid votes were disqualified because the participants only filled in 01 answer to different questions, which did not ensure reliability.

In addition to the survey survey with a quantitative approach, primary data was also collected through in-depth interviews by selecting a deliberate sample of 06 people with a certain understanding of the aspects and issues that the subject wanted to clarify. The questions aim to clarify and provide a deeper analysis of the factors affecting the market access of vegetables and fruits in Hanoi and help explain the regression results.

3. Results of research and discussion

3.1. Characteristics of the research area

3.1.1. Natural conditions

Geographical Location:

Hanoi is the capital of our country with a location located in the northwest of the center of the Red River Delta, adjacent to 8 provinces: Thai Nguyen, Vinh Phuc in the North, Ha Nam, Hoa Binh in the South, Bac Giang, Bac Ninh and Hung Yen in the East. Hoa Binh and Phu Tho in the West. Hanoi is 120 km from the port city of Hai Phong and 87 km from Nam Dinh city, forming the 3 main poles of the Red River Delta.

Relief:

Currently, the city has an area of 3,358.6 km2, accounting for about 1% of the country's natural area, ranking 41st in terms of area among 63 provinces and cities in our country. After expansion in 2008, Hanoi has the largest agricultural land area in the Red River Delta. Hanoi has a diverse land bank, formed from 7 groups of land with 21 different types of land, of which: alluvial soil accounts for 36.13%, red and yellow soil accounts for 14.44%, gray and gray soil accounts for 5.65% of the natural area. Agricultural production land is mostly distributed in suburban districts.

Climate and water sources:

Hanoi has a humid monsoon tropical climate, with hot summers, lots of rain, cold winters, and little rain. The river network is quite thick, which is a source of alluvium for the fields and water supply for agricultural production (Red River, Day River, Tich River, etc.) is also a characteristic of the climate and water resources of the capital.

3.1.2. Socio-economic conditions

Regarding the construction of new countryside:

Implementing the National Target Program on building a new countryside, the city has identified agriculture-farmers-rural areas as a very important task, although the epidemic situation on crops, livestock and especially the Covid-19 epidemic is complicated, but the rural area is still a place to supply agricultural products to the Capital. is a platform for the development of the industrial and service sector. By the end of 2020, the city has 7 district-level units meeting the new rural standards, 6 districts have submitted to the Prime Minister for recognition of meeting the new rural standards in 2020, there are 368/382 communes (accounting for 96.3% meeting the new rural standards), 29 communes meeting the advanced new rural standards. The total capital mobilized for rural areas in the period 2016-2020 is VND 80,595 billion, of which direct investment in the Program is VND 62,459 billion (State budget capital is VND 56,470 billion, non-budget capital is VND 5,989 billion).

Regarding the restructuring of the agricultural sector:

The city's agricultural production continues to win many achievements (growth of 2.53% in the period 2016-2020). The structure of the internal production value of the agricultural sector in 2020 is as follows: cultivation and forestry accounted for 38.76%, livestock and fisheries reached 58.11%, and agricultural services reached 3.13%. The city has completed the land accumulation and land exchange and granted land use right certificates to 99.21% of households. Agricultural production has been promoted to form linkage chains. Specifically, in 2020, the whole city has formed 141 food safety chains.

Regarding rural economic development

The One Commune One Product Program (OCOP) is a highlight in the city's rural economic development activities with the goal of improving the added value of products of the rural economy. The results show that by the end of 2020, the city has 1,054 OCOP products, including 17 potential 5-star products (accounting for 1.6%), 731 4-star products (accounting for 69.4%), 306 3-star products (accounting for 29%), with 691 food products (accounting for 65.6%); 30 beverage products (accounting for 2.8%); 7 herbal products (accounting for 0.7%); 27 fabrics and garments (accounting for 2.6%); 299 mattresses, furniture and decoration products (accounting for 28.4%). Developed 14 points to introduce and sell OCOP products in the city.

The city has 1,235 agricultural cooperatives, of which 1,090 are operating, 145 cooperatives are suspended pending dissolution, 1,543 cooperative groups, including 1,049 agricultural cooperative groups, 417 industrial and handicraft cooperative groups and 77 cooperative groups in other fields. Through review, the whole city has 1,581 farms, including 1,173 livestock farms, 218 general farms, 120 aquatic farms, 69 crop farms and 01 forestry farm. For craft villages, there are currently 1,350 craft villages in the whole city, including 313 craft villages and traditional craft villages that are recognized.

Socio-economic development results

The per capita income in rural areas increased from 33 million VND/person/year in 2015 to 55 million VND/person/year in 2020. The rate of poor households in rural areas decreased from 5.43% in 2016 to less than 0.37% by the end of 2020. The rate of people participating in health insurance reached

90.1%. The political system at the grassroots level has been built and strengthened, political security, social order and safety in rural areas have been maintained. Cultural institutions and educational institutions in rural areas continue to be interested in investment, the quality and efficiency of operations are improved; the implementation of weddings, funerals and festivals according to a civilized lifestyle has made significant progress.

Table 1. Comparison of Key Indicators Between Hanoi, the Northern Key Economic Region, and the Nation

Indicator	Area (%)	Population (%)	GRDP (%)	Budget Revenue (%)	Exports (%)
Hanoi vs. Northern Key Economic Region (%)	21.2	41.7	51.1	54.1	20.3
Hanoi vs. Nation (%)	1.0	8.1	16.46	19.05	5.51

Source: Vietnam Statistical Yearbook (2017), cited by Hanoi Department of Agriculture and Rural Development (2019).

The area and population of Hanoi account for only 21.2% and 41.7% of the Northern Key Economic Region, and 1.0% and 8.1% of the nation's total area and population, respectively. However, the city contributes 51.1% and 16.46% of GRDP, 54.1% and 19.05% of budget revenue, and 20.3% and 5.51% of total export value to the region and the nation, respectively. The economy of the capital city is playing an increasingly significant role in the national economy and acts as the driving force for development in the Northern Key Economic Region. Improved infrastructure and logistics: In recent years, Hanoi has made substantial investments in infrastructure development, including transportation, schools, and cultural facilities. During this period, the city allocated over 713 billion VND for rural infrastructure development, 7.5 times higher than the 2011–2015 period. Additionally, the city has essentially completed the issuance of land-use rights certificates following land consolidation and redistribution, with 617,964 out of 622,861 certificates issued (99.21% completion).

These achievements provide legal certainty and favorable conditions for farmers to confidently engage in partnerships and joint ventures, fostering concentrated, specialized agricultural production on a large scale. This approach emphasizes high economic efficiency, excellent product quality, and the promotion of advanced scientific and technological applications, including high-tech innovations.

3.1.3. Overview of vegetable production and consumption of cooperatives in Hanoi

The current situation of vegetable production and consumption in Hanoi

The current situation of vegetable production in Hanoi

The total area and output of vegetables produced in the city from 2015 to 2020 are shown in the following chart:

Source: Hanoi Statistics Department (2021)

Figure 1. Area and output of vegetables produced in Hanoi in 2015-2020

According to the chart, the area and output of vegetables produced in the city increased significantly from 2015 to 2017. From 2018 to 2020, the vegetable area tended to decrease, but surprisingly, vegetable production still increased from 2018 to 2019 and production decreased slightly from 2019 to 2020. Details of the area and output of vegetables by districts of Hanoi city are shown in Appendices No. 04 and 05 of this report. In 2019, the whole city has 101 safe vegetable production areas with a scale of 20 hectares or more in Dong Anh, Thanh Tri, Phuc Tho, Hoai Duc, Gia Lam, Chuong My districts... (Department of Agriculture and Rural Development, 2019).

The city has also built, operated and developed 35 food safety chains applying PGS**, *increasing consumer*** trust associated with product traceability to households. The products of 35 chains are trusted by consumers. The income of producers increases thanks to the chain link applying PGS. The role and responsibility of self-management, cross-checking, and control to households increased. Businesses

proactively source goods to partners, limit risks when the market fluctuates in price, and control product quality. The area for issuance of certificates of eligibility for food safety in production has reached 5,044ha; 452.8 hectares of VietGAP vegetables and about 50 hectares of organic vegetables. 40 food safety chain models have been formed in concentrated vegetable production areas applying the system to participate in quality assurance for safe vegetables in Vietnam (PGS) with an area of 1,806 hectares in Dong Anh, Thanh Tri, Phuc Tho, Chuong My, Gia Lam districts,...

The current situation of vegetable consumption in Hanoi

Vegetables are consumed mainly through the market system and shops in other suitable locations because vegetables are one of the daily essential foods for consumers. Normally, vegetables from the place of production are transported to fruit and vegetable wholesale markets and then distributed to shops and small markets in residential areas through the system of small traders (Nguyen Cong Hiep, 2016)

In addition, vegetables are also distributed through the supermarket system, but the amount of vegetables produced in Hanoi only accounts for 70% of the vegetables consumed at supermarkets today, which is equivalent to 66.5 tons/day with the total amount of vegetables consumed through points of sale at supermarkets only meeting 3% of the city's vegetable demand. The amount of vegetables produced by the city is consumed through the supermarket system is 4.04%, through the market system is 40.31% and the same amount is consumed through street selling. The most successful consumers of vegetables through supermarkets are households belonging to new-type cooperatives and enterprises thanks to the organization from production to consumption. The consumption of vegetables at convenience stores, supermarkets and shopping centers has been available since the Hanoi Safe Vegetable Production Program in 1997. In addition, the city also encourages the development of a safe vegetable consumption network through safe vegetable stores, mobile safe vegetable sales points in densely populated areas, home delivery, as well as trading floors. The value of safe vegetable production in regions is 10-20% higher (Nguyen Thi Tan Loc, 2016).

Forecast of vegetable demand and trend of high-tech application in vegetable production in Hanoi

The report of the Department of Agriculture and Rural Development (2019) also forecasts that Hanoi people are moving towards a more nutritious diet, which means that the proportion of cereals in the diet will decrease, instead people will consume more vegetables, tubers, etc more fruitful. The demand for Hanoi people to consume per day is 365 grams of vegetables per person, which means that the whole city needs at least 2,800 tons, vegetables, tubers and fruits per day. Thus, based on the city's vegetable output, the city's self-sufficiency in vegetables accounts for nearly 70% of the consumption demand of people in the area. This estimate is close to the figure given according to the report of the Department of Agriculture and Rural Development in 2020 which states that the production of vegetables in Hanoi supplies about 65% of the needs of consumers in the capital. While the report of Nguyen Thi Tan Loc (2016), the supply capacity of vegetables in the city in 2014 only reached 50-52% of consumer demand. Thus, it can be seen that currently the supply of green vegetables in the city has increased significantly. This is also completely appropriate when the city has recently made efforts to develop vegetable production, including promoting the application of high technology in the production and consumption of vegetables and fruits. Specifically, the area of high-tech vegetable cultivation in the city is 794.06 hectares, accounting for about 5.3% of the city's vegetable cultivation area. Establishments applying high technology to vegetable production are present in most districts/towns/towns of the city (Sub-Department of Crop Cultivation and Plant Protection, 2021). In vegetable growing areas, there are 127 hectares of net houses; 47 hectares of economical irrigation technology; 07 vegetable processing houses with a total area of 750 m2 (Department of Agriculture and Rural Development, 2019).

The current situation of agricultural cooperatives in Hanoi

Table 2. Current Status of Collective Economic Development in Hanoi in 2020

Indicator	Unit	Quantity
Total cooperatives	Cooperatives	2,164
Active cooperatives	Cooperatives	1,802
Agricultural cooperatives	Cooperatives	1,262
Efficiently operating cooperatives	Cooperatives	1,175
Total cooperative members	Members	598,500
Workers in the cooperative sector	Workers	45,500
Total capital of cooperatives	Million VND	14,008,423
Total assets of cooperatives	Million VND	3,201,000
Average revenue per cooperative	Million VND/year	2,750
Average profit per cooperative	Million VND/year	190
Average annual income of regular cooperative workers	Million VND/year	50
Total outstanding debt of inactive cooperatives (as of 2018)	Million VND	42,958.895
Total cooperative unions	Cooperative unions	17
Active cooperative unions	Cooperative unions	10
Total cooperative groups	Cooperative groups	1,543

Source: Hanoi Rural Development Sub-Department (2020)

The city has 2,164 cooperatives and people's credit funds – collectively referred to as cooperatives (an increase of 400 cooperatives compared to 2016), of which the number of active cooperatives is 1,802 cooperatives.

In the period of 2016-2020, the number of newly established cooperatives is 555 cooperatives, the number of dissolved cooperatives is 202 cooperatives. Up to now, most cooperatives have been converted and re-registered under the Law on Cooperatives in 2012; no cooperatives have switched to other types of economy.

The number of cooperative members is 598,500 members (down 30,378 members compared to 2016), of which the number of new members joining the cooperative in the period 2016-2020 is 12,348 members. The number of employees working in the cooperative sector is 45,500 people (an increase of 8,175 employees compared to 2016), of which the number of new employees in the whole period of 2016-2020 is 9,825 cooperatives.

The total capital of the cooperative is 14,008,423 million VND; the total value of assets of the cooperative is 3,201,000 million VND. The average revenue of 01 cooperative is 2,750 million VND/year; the average profit of 01 cooperative reached 190 million VND/year; the average income of regular employees in the cooperative is 50 million VND/year. These indicators increased steadily over the years from 2016 to 2020.

Total outstanding debts of cooperatives: according to statistics from districts, towns and towns, as of 31/12/2018, the outstanding debt of cooperatives that have ceased operation in the city is 42,958,895 million VND.

Number of cooperatives operating effectively according to the Law on Cooperatives in 2012: The number of cooperatives operating effectively in 2020 is estimated at 1,175, accounting for 65.2% of the number of cooperatives in operation (an increase compared to 2016 – there are 821 cooperatives operating effectively, accounting for 55%). In the period of 2016-2020, the city has more effective cooperative models. The new cooperative models form an average member size of 07-30 people, operating mainly in each specialty, the majority of members of the Board of Directors are people with professional qualifications, bold in investment, actively looking for partners, production and business linkages, etc many cooperative models apply high technology, produce according to the VietGAP process, organic standards, apply product traceability, labels, packaging, etc. contributing to increasing the value of the cooperative's products. The provision of services of cooperatives to cooperative member households has price support compared to market and local prices, production costs of members are reduced compared to non-member households, and the consumption of products of cooperatives always has priority for cooperative member households, etc. Therefore, the income of cooperative member households is higher than that of non-cooperative member households.

The number of cooperative managers is 7,682 cooperatives, of which the number of managers at the elementary and intermediate level is 5,378 (accounting for 70%); the number of managers with college or university degree or higher is 1,844 people. In 2020, the number of cooperative officials who are eligible to pay social insurance premiums is 3,078 people. The city has 1,262 agricultural cooperatives (an increase of 214 cooperatives compared to 2016) and 07 agricultural cooperative unions (an increase of 04 cooperative unions compared to 2016).

Due to small-scale agricultural production, unstable prices of output products, the impact of natural disasters and epidemics, some members abandon their fields to do other services more and more, so the operational efficiency of the cooperative to the economy of members is not high. the number of cooperatives is limited in expanding links with organizations and individuals to invest in the production, processing and consumption of agricultural products and goods. The above results are due to the fact that cooperatives are constantly innovating in methods of operation, investment, association, joint venture and production associated with the value chain of cooperatives with other economic sectors. Cooperatives operating under the new model have invested in production in the direction of intensive and highly specialized farming, expanding production development links associated with product consumption such as production of clean vegetables, flowers, ornamental plants and general service business, etc. bringing high income to members, contributing to the effective implementation of the new rural construction program in the locality.

Regarding the current situation of high-tech application of cooperatives, based on statistics of the Ministry of Agriculture and Rural Development (2021), the number of high-tech cooperatives counted by the end of 2020 in Hanoi, the Red River Delta and the whole country is shown in the following table:

Table 3. The number of high-tech cooperatives in Hanoi compared in the region and the whole country in 2020

No.	Indicator	Unit	Hanoi	Red River Delta	Nationwide
1	Number of cooperatives applying high technology	Cooperatives	126	459	1718
2	Number of agricultural cooperatives	Cooperatives	1262	4223	15414
3	Number of crop production cooperatives	Cooperatives	-	1374	5284

4	Percentage of high-tech cooperatives / crop production cooperatives	%	-	33.4	32.5
5	Percentage of high-tech cooperatives / total agricultural cooperatives	%	9.98	10.86	11.14
6	Percentage of high-tech cooperatives in Hanoi / total cooperatives in the Red River Delta	%	27.45		
7	Percentage of high-tech cooperatives in Hanoi / total cooperatives nationwide	%	7.33		

Source: Summary of data from the Ministry of Agriculture and Rural Development (2021)

The table shows that, by the end of 2020, the number of high-tech cooperatives in the city is 126 cooperatives. The number of high-tech cooperatives accounted for 9.98% of the total number of agricultural cooperatives in the city, accounting for 27.45% of the cooperatives in the Red River Delta and 7.33% of the country's high-tech cooperatives. Thus, the proportion of high-tech agricultural cooperatives in Hanoi is lower than that of the Red River Delta (10.86%) and the whole country (11.14%). This shows that the number of high-tech cooperatives in Hanoi is not commensurate with the potential.

3.2. Cronbach's Alpha and EFA test results

The test results show that the Cronbach's Alpha coefficient values are all greater than 0.7, so the measure used is acceptable and reliable (Nunnally & Bernstein, 1994). In particular, the linkage and market access are 0.957 and 0.968, respectively, very close to 1, reflecting this measure very well (Hoang Trong & Chu Nguyen Mong Ngoc, 2008, p.24). Thus, there is no case of removing the observed variable that can make the Cronbach's Alpha of these measures greater than its Cronbach's Alpha coefficient value. At the same time, no observational variables will be excluded from the measure because their correlation coefficients with the sum variable are all greater than 0.3. Therefore, all the observed variables are accepted and will be used in the next factor analysis. In other words, the measures all ensure the requirement of statistical reliability.

For the EFA exploratory factor analysis, the results of the KMO coefficient and the Bartlett test both reflect that the factors in the model are consistent with the study data and there is a correlation between the observed variables in the factors. In addition, the results also show that the Eigenvalue at the fourth variable is 1.142 (> 1), which implies that 04 factors are meaningful and will be retained in the model. Moreover, the accumulation of variance is 72.972% (>50%), so the EFA model is perfectly suitable. This means that 04 factors in the model are explained by 72.972% of the changes in the observed variables. In addition, the results of the analysis of the rotational factor matrix also showed that there was no change in the observed variables that measured the independent variable compared to the original. Thus, through the test of Cronbach's coefficient Alpha

3.3. The current situation of market access of green vegetables and fruits in Hanoi City

The current situation of market access of green vegetables and fruits in Hanoi City. All observed variables for the MA factor have a minimum value of 2 and a maximum value of 5. The MA1 observation variable has an average value of 3.09, at a normal level, reflecting that products from green vegetables and fruits in Hanoi City have not really met the needs of consumers. Besides, the average value of the MA5 observation variable is 3.52, which is greater than 3.5, so it can be said that the survey participants agree with the view that the difference between production output and consumption is negligible. In other words, the output of vegetables and fruits in stock after each crop is relatively low.

On the contrary, with other observed variables of MA such as MA2, MA3, MA4 and MA6, the mean value is relatively low, below 3. Therefore, the descriptive results of the observed variables MA2, MA3, MA4 and MA6, show that the green vegetable and fruit market in Hanoi City is still not well

known, the market has not been expanded, has not been consumed in many places across the country and farmers in Hanoi City are still not really satisfied with the current selling price. On the other hand, the average level of consensus of MA variable observations is 2,735, which is less than 3. Therefore, it can be concluded that the ability to access the green vegetable and fruit market in Hanoi City, Hanoi City District, Bac Giang Province is still poor.

Table 4. Descriptive Statistics on the Current Market Accessibility

Variable Name	Description	N	Min	Max	Mean	Standard Deviation
MA1	I find that Hanoi's green vegetable and fruit products are increasingly meeting consumer demand.	110	2	5	3.09	1.075
MA2	I notice that Hanoi's green vegetable and fruit products are becoming more widely recognized.	110	2	5	2.80	1.118
MA3	I observe that Hanoi's green vegetable and fruit products are entering new markets.	110	2	5	2.46	1.173
MA4	Currently, the consumption market for Hanoi's green vegetable and fruit products is widespread across the nation.	110	2	5	2.23	0.985
MA5	I find the discrepancy between total production and total consumption to be insignificant.	110	2	5	3.52	1.152
MA6	I am satisfied with the current selling price.	110	2	5	2.31	1.140
MA	**Overall mean**				2.746	

Source: Analysis from the author's survey (2024)

3.3. Analysis of factors affecting market access

Linear regression results in the analysis model of factors affecting market access of green vegetables and fruits in Hanoi City. Specifically, the results showed that the gender variable was not statistically significant in the regression model because the Sig coefficient had a value of 0.706 (>0.1). Thus, this result is completely similar to the study in Vietnam by La Nguyen Thuy Dung & Mai Van Nam (2015), but in contrast to the previous conclusions of Asfaw et al. (2012) and Sigei et al. (2014) in the output market access study in Kenya.

In addition, the ownership factor also does not affect the market access of green vegetables and fruits in Hanoi City because the Sig coefficient of the OWN variable is 0.269 (>0.1). This result is in contrast to previous studies where most authors suggested that owning a smartphone, radio or TV would help them increase their market access (Asfaw et al., 2012; Bwalya et al., 2013; Mwangi et al., 2015). The reason for this difference may be that farmers here are mainly ethnic minorities, they are not used to using electronic devices to connect with consumers, learn about product prices and market demand, etc. Most farmers here access the market through information from traders, this is also the reason why prices are still highly dependent on traders and farmers do not have price power. Therefore, the results do not support the H2 and H8 hypotheses.

Table 5. Regression results of the market accessibility model of vegetables and fruits in Hanoi City

Coefficientsa

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	-2.693	.398		1.684	.096		
DIS	-.039	.025	-.036	-1.495	.038	.736	1.359
GEN	.048	.028	.013	.378	.006	.887	1.128
AGE	-.617	.003	-.593	-2.116	.037	.513	1.851
EDU ROAD	.222 .893	.055 .079	.099 .865	1.821 3.560	.075 .000	.334 .481	1.493 1.079
INF	.929	.044	.925	1.407	.035	.797	1.255
ASS	1.229	.068	1.398	7.641	.000	.235	1.263
OWN	.017	.041	.008	1.111	.009	.833	1.200
EXT	.706	.019	.794	3.320	.000	.292	1.423

a. Dependent Variable: MA

Source: Analysis from the survey (2024)

On the other hand, with 96% reliability, all variables are statistically significant in the regression model because their Sig coefficients are all less than 0.05. However, the EDU variable is not statistically significant at 95% confidence because the Sig coefficient has a value of 0.75 (>0.05), but it is statistically significant at 90% confidence. Thus, the market access of green vegetables and fruits in Hanoi City is affected by 09 factors, including distance, age, education level, road conditions, access to market information, linkage and access to agricultural extension services.

The normalized regression coefficient values show that the association between subjects in the consumption of vegetables and fruits in Hanoi has the most positive and strongest impact on market access, similar to the research results of Anteneh et al. (2011) and Kuma (2012).

Next, the second positive and strong factor affecting market access is access to market information with a normalized regression coefficient of 0.925 (the H6 hypothesis is supported). Indeed, most previous studies have come to the same conclusion that the relationship between access to market information and access to markets is positive and very close (Ahmed et al., 2016; Apind et al., 2015; Maziku, 2015; Nguyen Tien Hung, 2009; Onoja et al., 2014).

In addition, road conditions and access to agricultural extension services are also factors that positively and greatly affect the dependency variable, similar to the results of research by Kyaw et al. (2018), Kassa et al. (2017), and Siziba et al. (2011). In other words, the H5 and H9 hypotheses are supported. Moreover, the study also shows that the 'age' variable has a significant and inverse impact on the market access of green vegetables and fruits in Hanoi City. This means that younger people will have better access to the market than older people (the H3 hypothesis is supported). This result is similar to other studies (Asfaw et al., 2012; Kassa et al., 2017; La Nguyen Thuy Dung & Mai Van Nam, 2015).

In contrast, the correlation between distance and market access is very weak. With a normalized regression coefficient of -0.036, distance is an inverse factor and at least affects market access (the H1 hypothesis is supported). Indeed, when the distance from the house of the survey subject to the market is larger, the less access to the market and vice versa. This finding was also pointed out in the study of Kyaw et al. (2018), Kuma (2012), and Nguyen Tien Hung (2009).

In addition, education level also has a small impact on market access with a normalized regression coefficient of 0.099. With such a regression coefficient, education level has a positive and relatively small impact on market access (the H4 hypothesis is also supported). In other words, the higher the level of education, the better the ability to access the green vegetable and fruit market in Hanoi City. Although previous studies have concluded that the correlation between education level and market access is favorable, most scholars have demonstrated that education level has a very strong influence on market access (Ahmed et al., 2016; Bwalya et al., 2013; La Nguyen Thuy Dung & Mai Van Nam, 2015; Nguyen Quoc Nghi & Mai Van Nam, 2014).

Thus, the impact of independent variables on access to the green vegetable and fruit market in Hanoi City in order from strongest to weakest, respectively:

ASS>INF>ROAD>EXT>AGE>EDU>DIS

From the results of the study, we have a linear regression function:

MA= -2,693 – 0,039*DIS+ 0.48 GEN – 0,617*AGE + 0,222*EDU + 0,893*ROAD + 0,929*INF + 1,229*ASS + 0,706*EXT+ 0,017 OWN

To clarify some quantitative research results, this study also uses qualitative research methods through in-depth interviews. All three farmers who participated in the in-depth interview said that the reason why owning electronic devices does not affect their ability to access the market is that most farmers learn about prices and output markets through traders and neighbors. In addition, learning market information through electronic devices helps them know prices and market information, but finding markets and connecting to new markets costs a lot, so they will choose to sell to traders instead of looking for new markets. new customers.

3.4. To propose solutions to promote agricultural cooperatives to apply high technologies in the production and consumption of vegetables and fruits in Hanoi

3.4.1. Group of solutions on management organization

In the current situation, the characteristics of 2 types of commune/village agricultural cooperatives and new agricultural cooperatives in vegetable and fruit production have been pointed out. In order to promote the development of agricultural cooperatives, it is necessary to pay attention to reorganizing the management and administration apparatus of each group of agricultural cooperatives. Specifically, for the whole commune/village agricultural cooperative group, it is necessary to pay attention to the production organization and supervision according to the production group. For the new agricultural cooperative group, it is necessary to pay attention to expanding the network of associate members.

In addition, in the content of the influencing factors pointed out above, a high percentage of agricultural cooperative members are asked to be concerned about the limited capacity of agricultural cooperative managers. This is one of the barriers that need to be noted to overcome. It is easy to see that the management staff of agricultural cooperatives needs to have a specific business development strategy for their agricultural cooperatives.

The content of training to improve the capacity of agricultural cooperatives in implementing financial statements and making loan documents is rarely implemented while agricultural cooperatives are very weak in this content. Therefore, it is necessary to support and advise the management staff of agricultural cooperatives on the preparation of loan documents.

In addition, the results of the survey of agricultural cooperatives show that the awareness of agricultural cooperative managers about the importance of technologies is still incomplete. For example, the importance of QR codes, most agricultural cooperatives only understand this technology to trace the

origin of products (beneficial consumers), but in fact, agricultural cooperatives can also easily manage the parameters of scans, from there, they can grasp customer segments and have a market development strategy for their agricultural cooperatives.

3.4.2. Planning and land solutions

Regarding development planning, the city will soon complete the planning on high-tech agricultural production and the planning for the development of high-tech vegetables and fruits, pay attention to ecological sub-regions suitable for each crop and livestock, build large-scale specialized high-tech agricultural areas, modernity in localities with specific strengths to ensure long-term stability of land. At the same time, the planning needs to clearly show the needs of the locality, build a framework of mechanisms, rental rates, land lease periods for high-tech agricultural development, introduce the strengths of each district to call for investors. On the basis of the planning, technical infrastructure will be built, a clean land fund will be created and a system of appropriate mechanisms and policies will be built, facilitating the attraction of enterprises to invest in agriculture in general and high-tech agriculture in particular.

Construction of high-tech agricultural zones

To continue to establish and invest in the construction of high-tech agricultural zones in agro-ecological zones according to the approved master plan;

Promote the implementation of projects to support research and application, demonstration, training and production of agricultural products in high-tech agricultural zones;

Implement projects to support and promote the attraction of domestic and foreign investment in high-tech agricultural zones.

Formation and development of high-tech agricultural zones

To carry out the tasks of demonstration and application of hi-tech in agriculture and production of hi-tech agricultural products in recognized hi-tech agricultural areas or in approved plannings;

To step up the formation and development of high-tech agricultural areas in localities; to focus on concentrated production areas of one or a few types of vegetable and fruit products with high productivity, quality and economic efficiency.

In the process of negotiating land lease and purchase of agricultural cooperatives and farmer households, the government should only play the role of catalyst and intermediary to support farmers with peace of mind when leasing or contributing capital to agricultural cooperatives, so that agricultural cooperatives have enough area to invest in the application of high technology in agricultural production.

3.4.3. Market solutions to promote agricultural cooperatives to apply high technologies in the production and consumption of vegetables and fruits in Hanoi

With Output Market:

The proposed solution is to encourage the building of key vegetable and fruit brands for agricultural cooperatives applying high technology. The reason for proposing this solution is that there is still a part of consumers who do not appreciate high-tech vegetable and fruit products that are safer than ordinary vegetable products. Therefore, in order to build a brand of key vegetables and fruits, it is necessary to pay attention to the supervision to be transparent of product quality inspection standards, inspection of product preliminary processing production processes, soil and water quality inspection of high-tech vegetable products plays an important role. In addition, strengthen the mutual supervision of agricultural cooperative members to ensure production in accordance with the safe process, thereby creating prestige for agricultural cooperatives.

In particular, it is necessary to have a solution to implement linkages in the consumption of high-quality vegetables and fruits. All levels and branches of the city, People's Committees of districts and communes are interested in helping agricultural cooperatives, production member households to build joint ventures, associations with businesses, shops, supermarkets, schools in the district and expand in the city, collective kitchens, etc … More importantly, it is necessary to encourage businesses to associate with farmers and agricultural cooperatives to advise on processes, techniques, and support to create high-

value product chains. When enterprises associate with farmers and agricultural cooperatives to produce high-tech agriculture, the problem of farmers' loans is also solved, and farmers will access loans more easily through the guarantee of associated enterprises. Thus, the development of high-tech agriculture requires a huge amount of capital and requires links to form production chains and agricultural value chains, in which the center of the chain must be enterprises.

For input markets:

The city has formed a high-tech trading floor in agriculture and developed various types of brokerage, consulting, evaluation, investment, legal, financial, insurance, intellectual property and other services to promote high-tech activities, consumption and use of high-tech products in agriculture.

To build a database on high technology in agriculture; create favorable conditions for organizations and individuals to access, use and exchange information on high technology in agriculture; organizing and participating in markets, fairs and exhibitions of high technology in agriculture on a national and international scale.

To intensify information, propagation, dissemination and introduction on the mass media and the internet so that member households and agricultural cooperatives can have access to high technologies, high-tech application results, high-tech development models and high-tech agricultural products.

3.4.4. Capital solutions to promote agricultural cooperatives applying high technologies in the production and consumption of fruits and vegetables in Hanoi

The results in the regression model have shown the perception of easy access to credit sources that have the same relationship with the intention to apply high technology. However, with the first group of indicators on mortgage loans, 34.8% still said that there has not been a clear change in more flexible mortgage forms. This is also a barrier to promoting the application of high technology by agricultural cooperatives. Therefore, flexible forms of mortgage need to be supported by the government for banks/credit institutions to do this. In particular, it is necessary to allow the use of the valuation of high-tech assets that have been invested by agricultural cooperatives on land as a basis for agricultural cooperatives applying high technology to mortgage.

In addition, in the theoretical model that has been suggested, agricultural cooperatives need legal advice, support for trust and mortgage documents to convince financial institutions. Accordingly, it is very important to clearly define the business plan of agricultural cooperatives to suggest a feasible loan strategy for investment in the application of high technology in the production and consumption of vegetables and fruits of agricultural cooperatives.

In addition, the government's policy on credit to promote the application of high technology is in place, but in order for the implementation of capital loans to be successful, the theoretical model has pointed out the win-win principle in the coordination mechanism between 3 parties including agricultural cooperatives, credit institutions, input providers and output offsets. Accordingly, agricultural cooperatives, in addition to borrowing capital from credit institutions, may be allowed to delay the payment of input materials with input suppliers, as well as receive a part of the funding advance from the output offsetting unit. To do so, the government needs to have an appropriate mechanism for businesses, input suppliers or output consumers such as reducing taxes, increasing loan limits and borrowing levels at commercial banks, etc. For credit institutions, the State Bank also needs to adjust credit growth for banks at a higher level, consider reducing operating interest rates such as refinancing rates, discount rates, open market rates, etc.

Finally, with activities to promote loans to agricultural cooperatives applying high technology to the production and consumption of fruits and vegetables in reasonable quantities and interest rates, it is necessary to improve the capacity to formulate production and business projects for agricultural cooperatives to help agricultural cooperatives access sources capital and credit with feasible and convincing projects with credit institutions. Currently, agricultural cooperatives are very weak in setting up production and business projects to mobilize capital and account for the economic efficiency of agricultural cooperatives.

3.4.5. Labor skills solutions to promote agricultural cooperatives applying high technology in the production and consumption of vegetables and fruits in Hanoi

This solution has a policy given from Program No. 04 of the Hanoi City Party Committee, strengthening agricultural vocational training for rural workers, continuing preferential policies in training and career change: (i) fostering, training and training to improve the qualifications of subjects in agricultural development, especially the development of high-tech agriculture. Include the contents of sustainable green and clean production in training programs for farmers; focusing on and linking theory with practice of local programs. (ii) Strengthening agricultural vocational training for rural workers; adopt preferential policies in training and career change for farmers with a roadmap suitable to the labor restructuring in rural areas in the direction of urban development. However, in the research results, it has been pointed out that there are limitations in the implementation of policies to support improving the quality of human resources of high-tech agricultural cooperatives: the focal point of the support agency is dispersed, implemented by many establishments, has not been agreed upon in the city, direct funding for the Provincial Union of Agricultural Cooperatives to implement, and the Department of Agriculture and Rural Development or the Sub-Department of Rural Development, or assign the district People's Committee to implement. This existence causes overlap in training and fostering, so the implementation of fostering is not of high quality.

Regarding the training content, the research results have shown that the training content for agricultural cooperatives is not close to practical needs, there are no classes on knowledge of the cultivation process in net houses, and the content of the classes is not new and repeated between years. Therefore, in order to improve the skills of employees to apply high technology to agricultural cooperatives, units from the Economic Departments of districts need to refer to the needs of training content from agricultural cooperatives to avoid the phenomenon of formal training. Universities need to coordinate with agricultural cooperatives in the process of training students to practice topics on high-tech agricultural cooperatives in the production and consumption of vegetables and fruits. For example, some high technologies such as traceability need to be followed methodically from planting, care, preliminary processing, preservation and consumption, students also need to have the opportunity to follow all these processes, so that when they graduate, they will be more stable when working in agricultural cooperatives.

4. Conclusions and policy implications

4.1. Conclusion

The research results show that the market access of green vegetables and fruits in Hanoi City, Hanoi City District, Bac Giang Province is relatively low. The products are not diverse and rich, mainly dried vegetables and fruits, so they have not met the needs of consumers well. In addition, the consumption market is mostly in the district and surrounding areas, so the ability to identify the brand of vegetables and green fruits in Hanoi City, especially in big cities such as Hanoi, Quang Ninh, Hai Phong, Da Nang,... is still low. The scale of the green vegetable and fruit consumption market in Hanoi City is still small, there is still a limit in expanding and connecting with new markets due to the lack of linkage in product consumption and ineffective forms of product promotion and promotion. In addition, farmers growing vegetables and fruits in Hanoi City have not yet decided on product prices, and they still depend a lot on traders.

On the other hand, this study shows that linkage is the main factor affecting the market access of green vegetables and fruits in Hanoi City. Moreover, the dependency variable is strongly affected by factors such as access to market information, road conditions, access to agricultural extension services and age, however, the impact is opposite. While age is inversely related to market accessibility, the rest of the factors are positively correlated with the dependent variable. On the contrary, the dependency variable is positively and very little affected by the educational level factor. However, the gap is a factor that has an inverse impact and at least on the ability to access the green vegetable and fruit market in Hanoi City.

4.2. Policy implications

Good access to the output market not only helps to increase income and improve people's living standards, but also contributes to promoting local socio-economic development. Therefore, the state and local authorities need to promulgate policies to support and encourage actors in finding, expanding and connecting markets. From the results of correlation regression analysis and in-depth interviews, the study offers some policy implications to enhance access to the green vegetable and fruit market in Hanoi City and Hanoi City district as follows: 1) Policy to develop/promote linkages along the value chain of agricultural products; 2) Promote access to output market information; 3) Policies to increase investment in transport infrastructure; 4) Strengthen agricultural training and extension policies.

Specifically, Hanoi City is a mountainous district, with a low starting point and poor socio-economic development conditions, facing many difficulties in mobilizing external capital sources and attracting investment. Therefore, the state needs to have policies to attract enterprises to invest in building vegetable and fruit processing factories; investment in transport infrastructure; encourage the private sector to invest in the development of transport services from vegetable and fruit growing villages to national highways and to city centers such as Hanoi, Hai Phong, Quang Ninh, Bac Ninh,... Policies to attract investment can be capital support policies; the policy of giving priority to enterprises leasing land to build processing factories right near the raw material area; master planning of vegetable and fruit growing areas and road traffic infrastructure; and create a stable legal environment. In addition, localities also need to effectively integrate resources from the central budget, provincial budget, district budget, resources from national target programs to build new countryside and poverty reduction programs for priority items such as building transport infrastructure.

To promote market access, this study indicates that it is necessary to strengthen the close cohesion between farmers, agricultural extension officers, local authorities and stakeholders, creating opportunities for farmers to accurately and fully grasp information on output markets and prices. On the other hand, regularly organize training and retraining classes for local officials and cooperative officials to improve their management capacity and foster knowledge related to the market, *marketing* and application of science and technology.

Next, the locality needs to encourage farmers to switch from traditional vegetable and fruit production to production according to Vietgap standards to improve quality, increase competitiveness and be able to penetrate high-end markets, from which the selling price of products also increases. In addition, Hanoi City should also encourage vegetable and fruit farmers to participate in associations, mass organizations, cooperative groups/cooperatives to be able to be supported and provide the most complete and fastest information about the green vegetable and fruit market, help farmers regularly update the demand and selling price of products, thereby limiting the situation of being pressured by traders.

References

Adrian A.M., Norwood S.H., Mask P.L., 2005. Producers' perceptions and attitudes toward precision agriculture technologies. Computers and Electronics in Agriculture 48 (2005) 256-271.

Aubert B.A., Schroeder A., Grimaudo J., 2012. IT as enabler of sustainable farming: An empirical analysis of farmers' adoption decision of precion agriculture technology. Decision support systems 54 (2012) 510-520.

Daberkow S.G. and McBride W.D., Farm and operator characteristics affecting the awareness and adoption of precision agriculture technologies in the US. Precison Agriculture, 4, 163-177.

Dao The Anh, 2017. A Vietnamese agricultural cooperative's involvement in the Food safety value chain: perspective and policy. FFTC Agricultural Policy Articles. Retrieved from http://ap.fftc.agnet.org/ap_db.php?id=788 in March 2019.

FAO, 2019. Blockchain for agriculture: opportunities and challenges. Achieved from http://www.fao.org/3/ca2906en/CA2906EN.pdf in June 8th 2019.

Finch and Lane, 2014. Precision farming. Lockhart and Wiseman's crop husbandry including grassland, 9th Edition.Retrieved from

https://www.sciencedirect.com/book/9781782423713/lockhart-and- wisemans-crop-husbandry-including-grassland in March 20th 2019.
Kamrau S., 2015. IoT precision farming in Malaysia: efficient water management helps farmers grow more rice. Retrieved from https://www.kontron.com/blog/embedded/iot-in-agriculture-efficient-water-management-helps-farmers-grow-more-rice in March 2019.
Kitchen N.R, Snyder C.J, Franzen A.W, Wiebold W.J., 2002. Educational needs of precision agriculture. Precision agriculture, 3, 341-351.
Nawn J. and Sato S., 2011. Japan Biotechnology Annual Report. Retrieved from http://gain.fas.usda.gov in March 2019.
Rosenthal, G. & Eiges, H. 2014. Agricultural cooperatives in Israel. J Rural Cooperation, 42, 1-29.
Shanwad UK, Patil VC, Gowda HH. 2006. Precision farming: dreams and realities for Indian agriculture. http://www.GISdevelopment.net.
Ahmed, U. I., Ying, L., Bashir, M. K., Abid, M., Elahi, E., & Iqbal, M. A. (2016). Access to output market by small farmers: The case of Punjab, Pakistan. *Journal of Animal and Plant Sciences*, *26*(3), 787-793.
Anteneh, A., Muradian, R., & Ruben, R. (2011). Factors affecting coffee farmers market outlet choice. The Case of Sidama Zone, Ethiopia. *Centre for International Development Issues Nijmegen, Radboud University, the Netherlands*.
Apind, B. O., Lagat, J. K., Bett, H. K., & Kirui, J. K. (2015). Determinants of Small-holder Farmers Extent of Market Participation; Case of Rice Marketing in Ahero Irrigation Scheme, Kenya. *Journal of Economics and sustainable development*, *6*(2), 154-160.
Asfaw, S., Lipper, L., Dalton, T. J., & Audi, P. (2012). Market participation, on-farm crop diversity and household welfare: micro-evidence from Kenya. *Environment and Development Economics*, *17*(5), 579-601.
Bwalya, R., Mugisha, J., & Hyuha, T. (2013). Transaction costs and smallholder household access to maize markets in Zambia.
Cai, G., Dai, Y., & Zhou, S. X. (2012). Exclusive channels and revenue sharing in a complementary goods market. *Marketing Science*, *31*(1), 172-187.
De Janvry, A., Fafchamps, M., & Sadoulet, E. (1991). Peasant household behaviour with missing markets: some paradoxes explained. *The Economic Journal*, *101*(409), 1400- 1417.
Jayne, T. S., Mather, D., & Mghenyi, E. (2010). Principal challenges confronting smallholder agriculture in sub-Saharan Africa. *World development*, *38*(10), 1384-1398.
J.C. Nunnally and I.H. Bernstein, *Elements of statistical description and estimation*, in *Psychometric Theory*, J.C. Nunnally and I.H. Bernstein, eds., McGraw-Hill, New York, US, 1994, .
Kassa, G., Yigezu, E., & Alemayehu, D. (2017). Determinants of smallholder market participation among banana growers in bench Maji Zone, Southwest Ethiopia. *International Journal of Agricultural Policy and Research* , *5 (11)*, 169-177.
Kihiu, E. N., & Amuakwa-Mensah, F. (2021). Agricultural market access and dietary diversity in Kenya: Gender considerations towards improved household nutritional outcomes. *Food Policy*, https://doi.org/10.1016/j.foodpol.2020.102004
Kuma, B. (2012). *Market access and value chain analysis of dairy industry in Ethiopia: The case of Wolaita Zone* (Doctoral dissertation, Haramaya University).
Kyaw, N. N., Ahn, S., & Lee, S. H. (2018). Analysis of the factors influencing market participation among smallholder rice farmers in magway region, central dry zone of Myanmar. *Sustainability*, *10*(12), 4441-4456.
La Nguyen Thuy Dung and Mai Van Nam (2015), "Market access of rice producers under the model of association with enterprises in An Giang province", Can Tho University Science Journal, No. 38, pp. 25-33.
Luu Thanh Duc Hai (2007), Application Marketing, Statistics Publishing House, Can Tho.

Machethe, C. L. (2004, October). Agriculture and poverty in South Africa: Can agriculture reduce poverty. In *overcoming underdevelopment conference held in Pretoria* (Vol. 28, No. 1, pp. 29-43).
Markelova, H., Meinzen-Dick, R., Hellin, J., & Dohrn, S. (2009). Collective action for smallholder market access. *Food policy*, *34*(1), 1-7.
Maziku, P. (2015, July). Market access for maize smallholder farmers in Tanzania. In *Proceedings of the Second European Academic Research Conference on Global Business, Economics, Finance and Banking*, 1(2), 282-296.
Mwangi, M. N., Ngigi, M., & Mulinge, W. (2015). Gender and age analysis on factors influencing output market access by smallholder farmers in Machakos County, Kenya. *African Journal of Agricultural Research*, *10*(40), 3840-3850.
Decree 83/2018/ND-CP (Decree on agricultural extension)
Nguyen Quoc Nghi and Mai Van Nam (2014), "Market access of farmers in Tan Phuoc district, Tien Giang province", Can Tho University Science Journal, No. 35, pp. 24-31
Nguyen Tien Hung (2009), "Research on solutions to improve market access of flower and ornamental plant households in Bac Ninh province", master's thesis, Hanoi University of Agriculture.
Omiti, J. M., Otieno, D. J., Nyanamba, T. O., & McCullough, E. B. (2009). Factors influencing the intensity of market participation by smallholder farmers: A case study of rural and peri-urban areas of Kenya. *African Journal of Agricultural and Resource Economics*, *3*(1), 57-82.
Sigei, G., Bett, H., & Kibet, L. (2014). Determinants of market participation among small- scale pineapple farmers in Kericho County, Kenya.
World Bank (2019), "Agriculture, forestry, and fishing, value added (% of GDP)- Vietnam", từ https://data.worldbank.org/indicator/NV.AGR.TOTL.ZS?locations=VN