

Assessing the Impact of Non-Tariff Measures on Vietnam's Agricultural Exports to ASEAN+6 Countries

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Abstract

This article aims to analyze the impacts of non-tariff measures on Vietnam's agricultural exports to the 15 remaining partners of ASEAN+6 countries during 2015-2019. In this study, non-tariff measures include sanitary and phytosanitary measures and technical barriers to trade, and agricultural exports are represented specifically by the export value of fruits and vegetables. Different tests and estimation methods are employed to ensure the consistency of the research model. Estimation results from the augmented gravity model show that most of the variables are statistically significant and are consistent with the hypotheses of the research model. This study has confirmed that the mentioned non-tariff measures have a negative impact on Vietnam's fruit and vegetable exports, but the negative impact of non-tariff measures is much smaller than that of non-tariff measures.

Keywords: Agricultural exports, Augmented gravity model, Non-tariff measures, ASEAN+6, Vietnam.

Introduction

The ASEAN Economic Community (AEC) was formed with the establishment of ASEAN, with the participation of ten Southeast Asian countries when removing and reducing tariff and non-tariff barriers (NTB), which has contributed to promoting trade facilitation, market expansion in commodity exchange, investment attraction and deeper participation in production and global supply chains of member countries. In addition, ASEAN has also negotiated additional agreements with six other Asia-Pacific countries, namely China, India, Japan, South Korea, Australia and New Zealand. These six countries plus ten of ASEAN are called ASEAN+6. After signing these free trade agreements, ASEAN countries, including Vietnam, can enjoy tax incentives, helping reduce tariff barriers that Vietnam faces when trading with these countries.

In fact, as tariff barriers decrease, NTB will increase, especially for high demanding markets such as Japan, Australia and New Zealand. For export agricultural products, especially vegetables and fruits, sanitary and phytosanitary measures (SPS) are to protect the health of humans, animals and plants; and technical barriers to trade (TBT) to ensure product quality and safety are increasingly concerned. That is one of the main reasons why it took many years and many negotiations before Vietnam was able to export vegetables and fruits to these demanding markets.

The agricultural sector, especially vegetables and fruits, is Vietnam's strength, with great potential, but the export turnover of this item in recent years has not been commensurate with its importance. The export turnover of vegetables and fruits grew quite quickly but still accounted for a small proportion of the total export turnover of the country, specifically in 2018, the export value of vegetables and fruits (HS code 08) was USD 5,978,740 thousand, accounting for only about 2.5% of Vietnam's total export value (Trade Map).

In Vietnam, exports play an important role in economic development, however, the export of fruit and vegetables has not yet achieved its worthy position, especially in the context that Vietnam is an agricultural country and has advantages in agricultural production. Therefore, understanding the factors affecting the export of fruits and vegetables will help policy makers to develop appropriate policies to encourage the export of this commodity. For international trade in agricultural products, including vegetables and fruits, the application of non-tariff measures (NTM), especially SPS and TBT, tends to increase. Since this is an inevitable trend, understanding the impacts of SPS and TBT on fruit and vegetable exports will help policymakers take appropriate actions to boost the export of this commodity. Although there are many studies on the impact of SPS and TBT measures on international trade around the world, the impact of these non-tariff measures is not clear. In many cases SPS and TBT have been shown to be trade-restrictive, but in other cases, a number of researchers have shown that these non-tariff measures can sometimes stimulate trade for developed countries (Anders and Caswell, 2009; Disdier and Marette, 2010; Grant, Peterson, and Ramniceanu, 2015; Kang and Ramizo, 2017). In addition, to date, almost no

empirical studies have been conducted to assess the impact on Vietnamese fruit and vegetable exports of non-tariff measures. Therefore, this study intends to fill that gap by assessing the quantitative impact of non-tariff measures, namely SPS and TBT, on Vietnam's fruit and vegetable exports to the 15 remaining partners in ASEAN+6.

This article consists of five sections. The first part introduces the research background and the rationale of choosing the research topic. The following section provides a literature review. The third section presents the model, data, and estimation methods. The subsequent section discusses the research results. The final section concludes the study and provides policy implications.

1. Literature Review

1.1. Non-tariff measures

Non-tariff measures include measures that alter the conditions of international trade, including trade-restricting policies and regulations as well as trade-facilitation policies. Non-tariff barriers are a subgroup of NTMs (NTMs include measures more broadly than NTBs) and are more concerned with protecting the domestic economy and hindering trade between countries. NTMs are legal provisions or mandatory requirements or laws, enacted by the government, that are discriminatory in order to give preference to domestic suppliers over foreign ones because they are non-monetary barriers applied on imported products to protect domestic production. In the past, NTMs have largely been in the form of quotas or export restrictions, so the term “barrier” is often used, these non-tariff barriers increase the costs of trade, and they are more difficult to remove compared to normal tariffs. However, policy interventions nowadays take more forms, and accordingly the term “measure” is used instead of “barrier” to emphasize that the measure may not necessarily reduce trade. SPS and TBT are the two most widely applied of NTMs for international trade in fruits and vegetables.

1.1.1. Sanitary and phytosanitary measures

Sanitary and phytosanitary measures in international trade, are measures concerned with the protection of human, animal and plant life or health by the application of control measures for the risks associated with imported goods. Sanitary and phytosanitary measures include regulations, rules, standards, and procedures that countries use to protect people, livestock, and plants from diseases, pests, toxins, and other pollutants. SPS measures are usually quarantine measures or food safety requirements. Measures taken by WTO member countries can be divided into: Food safety (related to human life or health) and Phytosanitary (related to the health or life of the people, animals and plants). The SPS Agreement addresses the rights and responsibilities of WTO member states to humans, animals and plants with regard to health protection measures, but also seeks to minimize any negative effects of SPS measures on trade (WTO).

1.1.2. Technical barriers to trade measures

Technical barriers to trade are reasonable measures to protect important targets such as human health, environment, security, *etc.* Currently, WTO member countries have established and maintains a separate system of technical measures applicable to both food and non-food imports. TBT in international trade is one of measures of the WTO Agreement, which stipulates the obligations of members to ensure technical regulations, standards, and conformity assessment procedures without creating unnecessary impediment to trade. The TBT Agreement covers specifications, quality requirements, environmental regulations, and voluntary processes for human health and animal protection. The TBT Agreement does not cover SPS measures as mentioned in Annex A of the SPS Agreement. In practice, however, technical measures can be potential barriers to international trade if they go beyond what is necessary to achieve policy objectives or when they are implemented. competition to protect domestic goods. Currently, TBT is considered as one of the popular non-tariff measures applied in international trade in goods; hence, they are also known as “technical barriers to trade” (WTO).

1.2. Previous studies on trade impacts of SPS and TBT measures on agricultural products

According to the WTO, agriculture related NTMs can increase costs for agricultural and food exporters by requiring exporters to make improvements or change production processes to meet the standards and requirements of the importing country and this is costly. The application of NTMs can disrupt imports of goods, creating business difficulties as manufacturers and exporters need time and other resources to change their production and export processes in order to meet the requirements required by the importing country. Furthermore, although the negotiation of free trade agreements is geared towards reducing tariffs in general, average tariffs on agricultural products are still significantly higher than on non-agricultural products on. However, it is undeniable that participating in multilateral and bilateral free trade agreements has contributed to promoting market globalization, removing tariff barriers for agricultural products, thus increasing international trade of agricultural commodities globally as studied by Effland, Robert, Normile and Wainio (2008). However, when tariff barriers are reduced, non-tariff barriers tend to increase, and such NTBs have been shown to have a negative impact on international trade of agricultural products because the NTMs have made it more difficult to export by requiring exported products to meet the requirements and certifications of non-tariff duties in order to be able to export goods to foreign markets (Cadot, Munadi and Yan Ing, 2015).

Otsuki, Wilson and Sewadeh (2001) used gravity models to assess the impact of the EU's promulgation of an aflatoxin standard for food exports from Africa. The panel data analysis method was applied to 15 European countries and nine African countries between 1989 and 1998. The results of the study show that the new harmonized aflatoxin standard set by the EU is for export foods from Africa could reduce health risks by only about 1.4 deaths per billion Europeans per year, but would reduce the value of Africa's nut exports by 64% or USD 670 million compared

with other international standards issued by the Codex Alimentarius Commission. Murina and Nicita (2017) also studied the application of NTMs to food exports to EU countries, using Possion estimates, which concluded that low-income countries face a reduction export of agricultural products when applying NTBs. This is because it is more difficult for low-income countries to meet the standards of NTMs because they do not have enough resources to make improvements compared to middle-income and high-income countries. Furthermore, developing countries are also incompetent to deal with the procedures and unable to demonstrate that national measures are equivalent to the requirements of developed countries. The arguments are also confirmed in the research results of Henson, Loader, Swinbank, Bredahl and Lux (2000), as well as of Disdier and Marette (2010). Research by Fontagne, Mimouni and Pasteels (2005) concludes that NTBs has a negative impact on agricultural products, while having a negligible or even positive impact on processed goods. That result has also been proved through the studies of Sithamparam, Devadason and Chenayah (2017); as well as of Disdier, Fontagné, and Mimouni (2008). These authors demonstrate that SPS and TBT have a negative impact on international trade of agricultural commodities, especially the export of these commodities from developing and least developed countries. Developing countries often consider non-tariff measures from developed countries to be harsh and hinder their agricultural and food exports to developed countries, and developed countries are beneficial when applying NTMs to protect domestically produced goods.

The negative effects of non-tariff measures on agricultural products, especially fruits and vegetables, are also shown through many studies. Gichuru (2006) surveyed Kenyan exporters of fruit and vegetables to the EU, this author concluded that both tariff and non-tariff barriers bring a negative impact on international trade of this commodity due to increased trade costs. Increased costs have made it difficult for Kenya's fruit and vegetable exports to compete with similar products in the EU markets, thereby reducing the export volume of this commodity. The results of this study support the argument that non-monetary barriers also increase export costs and negatively affect the exports of developing countries. Karov, Roberts, Grant and Peterson (2009) studied the effect of SPS on fresh fruits and vegetables imported into the United States using an expanded gravity model, the traditional variables of the original gravity model were replaced by production capacity of exporter and transportation costs, as well as introduced many other explanatory variables. With research data for the period 1996-2007 from 23 different fruits and 23 different vegetables, these authors conclude that SPS regulations tend to have a negative impact on fresh fruit and vegetable imports. Melo, Engler, Nahuehual, Cofre and Barrena (2014) use gravity modeling to estimate the impact of sanitary, phytosanitary and quality control related requirements on fruit exports from Chile, this study concludes that the SPS regulations serve as a deterrent rather than a stimulus to trade in these exports. Furthermore, the increasing level of requirements and the increasing application of different requirements have had more negative

impacts on Chilean fruit exports. Therefore, with the desire to quantify the non-monetary impact of NTMs, Fugazza and Maur (2006) use the Computable General Equilibrium (CGE) model to assess the impact of non-tariff measures on the export of food and agricultural products into developed countries. These authors conclude that with the reduction of tariffs, non-tariff measures are increasing, in which TBT and SPS are not only the two most widely applied NTBs but also tend to apply more and more to ensure food safety. Therefore, there is a need for reasonable technical and financial support to help developing countries meet the requirements of non-tariff measures so that developing countries do not face much difficult to improve and change products to adapt to SPS and TBT measures enacted by importing countries. At the same time, it is necessary to strengthen the promotion of these developing countries to join the global standards organization as a prerequisite for the development of the international food system (Roberts, Orden and Josling, 2004).

Recent studies give a more positive view when concluding that the negative impact of NTMs will decrease over time. That is because exporters will no longer be surprised with the regulations on NTMs as at first, however have found a suitable way to adapt to these regulations. Grant *et al.* (2015) study the impact of non-tariff measures on agricultural exports of the United States, namely fresh fruits and vegetables. This study demonstrates that SPS measures often only have a negative impact on fresh fruit and vegetable exports in the initial period. Adverse effects of SPS measures usually fade as exporters gain more experience in the global market and are usually eliminated after two to three years of exporting. However, it should also be considered that the United States is a rich country, so exporters have many conditions and resources to change the production process or improve products to adapt to the conditions of the non-tariff measures. Therefore, when considering the impact of non-tariff measures on agricultural exports, it is necessary to consider the level of development of the exporting country, since the more developed the exporting country is, the easier it is to comply with regulations of NTMs. Furthermore, different NTMs have different effects as concluded of Santeramo and Lamonaca (2019) when assessing the impact of non-tariff measures on trade in agricultural and food products. This study concludes that SPS and TBT do not always have a negative impact on trade, but even some other non-tariff measures have a positive effect on trade of agricultural and food products. This result is also confirmed in the study of Wood, Wu, Li and Kim (2019) where these authors conclude that as people become more and more aware of food safety and health standards, Therefore, they believe that the quality of agricultural products will be improved if these products meet the strict requirements of food hygiene and inspection of animals and plants so that consumers will be more assured of the quality and lead to increased demand, contributing to the promotion of international trade in agricultural products.

2. Models, data and estimation methods

2.1. Research models

Using the approach of Disdier *et al.* (2008) for trade in agricultural products, the gravity model used includes fixed effects for importers, control variables and factors that can affect trade, and address potential endogenous problems. In order to assess the impact on international trade (in particular, export value in this study) of non-tariff measures, many factors other than the main variable – SPS and TBT measures – need to be considered. Specifically, this study will use an extended gravity model, including variables of economic size and average income of importing countries, geographical distance between capitals of two countries, common border effect between two countries, tariff barriers and non-tariff barriers for vegetables and fruits imported into ASEAN+6 countries. The variables of economy size and per capita income of the partner country are used because these two variables represent the economic size and purchasing power of a country. The distance variable between two countries and the common border effect variable were used because these two variables represent trade cost, specifically the transport cost between two countries. Although the main objective of this study is to measure the impact of non-tariff measures specifically SPS and TBT, the tariff variable is also used in the gravity model. Previous study of Otsuki, Wilson and Sewadeh (2001) did not estimate the import tariffs paid by exporters, and as a result, they were unable to distinguish which effects were from non-tariff barriers and which were from tariff barriers. To avoid this, tariff data is also included in the model estimates.

Based on the above assumptions and explanatory variables, the gravity model for Vietnam's fruit and vegetable exports has the following form:

$$\ln EX_{ijt} = \beta_0 + \beta_1 \ln GDP_{jt} + \beta_2 \ln Y_{jt} + \beta_3 \ln D_{ij} + \beta_4 BD_{ij} + \beta_5 T_{ij} + \beta_6 NTM_{jt} + \varepsilon_{ijt} \quad (1)$$

In which:

i : Vietnam, j : Vietnam's trading partners; $t = 1, 2, \dots, T$: numbers of year;

EX_{ijt} : Vietnam's fruit and vegetable exports to country j in year t ;

GDP_{jt} : the size of the importing country's economy, with the importing country's GDP as a proxy.

Y_{jt} : the average income of the importing country, with the GDP per capita of the importing country as representative.

D_{ij} : distance between capitals of 2 countries (Vietnam and country j)

BR_{ij} : is a dummy variable measuring the borderline effect between two countries. The dummy variables are equal to 1 if country j shares a border with i (Vietnam), and 0 if the two countries do not share a border.

T_{ij} : tariff barriers for fruits and vegetables exported from Vietnam to country j .

NTM_{jt} : are dummy variables measuring the impact of SPS and TBT on vegetable exports from Vietnam. The dummy variables take the value of 0 if the partner country does not apply SPS

and TBT to fruit and vegetable products and take the value of 1 when the partner country applies SPS and TBT to fruit and vegetable goods at year t .

ε_{ijt} is the random error of the export equation.

2.2. Data

The data used in this study is in the form of a panel data, including 75 observations from Vietnam and 15 remaining ASEAN+6 countries for the period 2015 – 2019. Monetary figures are in USD and are converted to a fixed price in 2015. The data on exports, GDP, GDP per capita, are taken from the database of the United Nations Commission on Trade and Development (UNCTAD). SPS and TBT data were obtained from UN Trains. Tariff data is taken from the Trade Map (MacMap). Finally, bilateral distance data were obtained from the Time and Date AS website (<http://www.timeanddate.com>).

Table 1 provides an overview of the data and predicts the direction of the impact of the independent variables on the dependent variable.

Table 1: Information on variables

Variables	Predicted Impact direction	Obs.	Max value	Min value	Mean	Standard deviation
$\ln EX$		75	15.03	4.73	10.07	2.41
$\ln GDP$	+	75	16.46	9.44	12.79	2.00
$\ln Y$	+	75	10.98	7.05	9.10	1.36
$\ln D$	-	75	9.175	6.17	7.69	0.74
BR	+	75	1	0	0.2	0.40
TAR	-	75	0.35	0	0.04	0.09
NTM	+/-	75	1	0	0.86	0.34

Notes: All variables are converted to logarithmic form (except dummy variable and TAR variable calculated as a percentage).

Source: Authors' calculations.

Table 2 provides the correlation index between the variables used in the model. From the correlation coefficients in Table 2, it can be seen that there is a pair of explanatory variables with a correlation coefficient greater than 0.6, so there is a possibility of multicollinearity (Wooldridge, 2009). Therefore, to ensure that the estimated model will not be affected by multicollinearity, we continue to use the method of Variance Inflation Factor (VIF) to test. As suggested by Wooldridge (2009), if the VIF is less than 10, the model will not be affected by multicollinearity. The results of applying VIF will be presented in the next section of estimation results.

Table 2: Correlation matrix between variables

Variables	lnEX	lnGDP	lnY	lnD	BR	TAR	NTM
<i>lnEX</i>	1						
<i>lnGDP</i>	0.812	1					
<i>lnY</i>	0.3316	0.276	1				
<i>lnD</i>	0.3211	0.5147	0.6509	1			
<i>BR</i>	0.134	-0.2023	-0.4051	-0.496	1		
<i>TAR</i>	0.1744	0.2699	-0.0067	0.083	-0.1067	1	
<i>NTM</i>	-0.0888	0.1619	0.0173	0.3446	-0.2942	-0.5531	1

Source: Authors' calculations.

2.3. Estimation methods

Equation (1) is usually estimated using the least squares regression method for panel data (Pooled OLS) because the method often gives efficient estimation results, however, this estimation method is also often biased due to the nature of the model. Therefore, in order to avoid the biases of the above model, this study uses two different estimation methods, namely fixed effect (FE) and random effect (RE), because these two estimation methods will give consistent estimates than Pooled OLS (Wooldridge, 2002). However, because the model includes many dummy variables, the use of FE is no longer appropriate. Besides, when we use Hausman test to check whether we can use RE to estimate the model or not, the test results show that the estimation by RE is appropriate (p -value of Hausman test = 0.5886). With this Hausman test result, the estimation of panel data by RE method will give more efficient estimation results than FE estimation (Wooldridge, 2002).

Finally, due to panel data, there is a possibility of cross-correlation, autocorrelation, and heteroskedasticity. When these phenomena are present, the standard error calculated in the usual way will be biased and produce inaccurate t-statistics. In this study, we will apply the robust standard error calculation method in Stata software to solve these problems.

3. Estimated results and discussions

Table 3 presents the results of estimating equation (1) using the FE robust method and RE robust shown in columns (I) and (II), respectively.

The estimated results of most of the variables are statistically significant and are consistent with the hypotheses of the gravity model. The R2 index of RE estimation method shows that the

model can help explain about 83% of fluctuations in the export value of fruits and vegetables of Vietnam to the 15 remaining ASEAN+6 trading partners during the period of 2015-2019.

NTMs show a negative impact on Vietnam's fruit and vegetable exports. The estimated results are statistically significant with a 95% confidence level. Specifically, the application of these non-tariff measures will reduce our country's fruit and vegetable exports to partner countries 1.9% in value. This result is also consistent with many previous studies, which suggested that the application of SPS and TBT would hinder to fruits and vegetables export as well as increase the export cost of these products when it had to meet the requirements of such non-tariff barriers, in particular, where the SPS and TBT regulations are not exactly the same in different countries. This may be because Vietnamese producers and exporters of agricultural products face difficulties to fulfill the requirements of NTBs resulting in high production costs as they have to change production facilities to accommodate many technologies and specifications of SPS and TBT, leading an increase in unit costs. In addition to the costs due to production changes, Vietnamese manufacturers and exporters may also incur compliance assessment costs such as laboratory testing or certification costs. Moreover, the exporters may have to pay information costs such as the cost of technology efficiency assessment, international law, translation, expert advice, and even the cost of disseminating product information for the manufacturer.

Table 3: Estimated results of agricultural exports function of Vietnam, 2015 – 2019

Variables	FE robust (I)	RE robust (II)
	lnEX	lnEX
<i>lnGDP</i>	-0.476	1.2013***
	(-0.07)	(0.189)
<i>lnY</i>	3.252	0.530**
	(0.40)	(0.197)
<i>lnD</i>	0	-0.428
	(.)	(0.632)
<i>RD</i>	0	1.713**
	(.)	(0.830)
<i>TAR</i>	-9.089	-6.368**
	(-1.59)	(2.651)
<i>NTM</i>	0	-1.879**
	(.)	(0.779)
<i>Constant</i>	-13.03	-5.267

	(-0.76)	(3.537)
Observations	75	75
R^2	0.194	0.832

Notes: Standard error in parentheses; *, **, *** represent significance at 10%, 5%, and 1%, respectively.

Source: Author's calculations.

As predicted by the gravity model mentioned above, the tariffs imposed by partner countries on fruits and vegetables exported from Vietnam have had a negative impact on the export value of this item. As with non-tariff measures, the estimated results of tariff measures are also statistically significant with 95 percent confidence. This can be explained that when the tariff increases, the export cost of vegetables and fruits will increase, so the selling price of these agriculture products from Vietnam in partner countries will increase, and thus, consumers will tend to buy less fruits and vegetables from Vietnam because then these goods will become more relatively expensive compared to these products from non-taxable or lower taxable countries.

The estimation results of both methods conclude that both GDP and GDP per capita of the partner country have a positive impact on the export of fruits and vegetables from Vietnam. This is completely consistent with the gravity model, as well as other economic theories related to the size of the potential market and the income of the people there. When the market size increases or people's income increases, they tend to consume more; as a result, they will increase their spending on many products including fruits and vegetables exported from Vietnam. Specifically, when the GDP of a partner country increases by 1 percentage points, the export value of the country's fruits and vegetables will increase by 1.2 percentage points. Similarly, a 1 percentage points increase in per capita income of the partner country's people will increase the export value of these products of Vietnam by 0.53 percentage points.

As previously predicted, sharing a border with partner countries will increase Vietnam's fruit and vegetable exports by about 1.7 percent points. These estimates are statistically significant at 95% confidence. This is in line with previous studies that have shown that sharing a border is more conducive to trade and lower transportation costs. The distance between Vietnam and partner countries has a negative impact on our country's export value, but this negative impact is insignificant.

Table 4: Multicollinearity Test by Variance Inflation Factor

Variables	VIF	1/VIF
$\ln GDP$	3.06	0.326497
$\ln Y$	2.74	0.364852
$\ln D$	2.35	0.426276
BR	2.33	0.428426

TAR	1.59	0.629883
NTM	1.56	0.64013
Mean VIF	2.27	

Source: Author's calculations.

The test results by the method of VIF are presented in Table 4. From the results, we can conclude that the estimated results of the model are not affected by the problem of multicollinearity.

4. Conclusions and policy implications

The results of quantitative analysis have shown that there is a relationship between non-tariff barriers and export turnover of fruits and vegetables of Vietnam and its ASEAN+6 partners in the period 2015 - 2019. Non-tariff barriers, specifically SPS and TBT for fruits and vegetables exported from Vietnam, have reduced the export value of this commodity by 1.9%. Although the estimation results confirm that both non-tariff barriers and tariff barriers have a negative impact on our country's fruit and vegetable exports to the mentioned partner countries, the negative impact of tariffs are much larger than non-tariff barriers. This may be because although joining the free trade agreements has resulted in a significant reduction in the imposition of tariffs on exports from member countries, agricultural products including fruits and vegetables have still remained subject to high taxes (Effland *et al.*, 2008).

The application of non-tariff measures to agricultural products, especially fruits and vegetables, tends to increase, so it is crucial to enhance the awareness and understanding of farmers and businesses in this field in the phases of growing, processing and exporting fruits and vegetables to other trade partners. To do this effectively, the government of Vietnam should create favorable conditions to promote farmers, businesses and stakeholders to access to clear, accurate and timely information on non-tariff measures. In addition, the government and local authorities need to encourage organize practical training sessions, raise awareness and practice so that relevant stakeholders can learn and be able to update the change of non-tariff measures.

In addition, when negotiating free trade agreements, the government should pay more attention for negotiating the reduction of tariff barriers for agricultural products because these goods are still subject to high tariffs and the negative impacts of tariffs on Vietnam's export turnover is very large, especially in the current conditions when Vietnam is a country with strengths in the production of agricultural products.

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