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Research on the Impact of Trade Facilitation on the Export of High-tech Products

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Abstract

Based on the annual panel data of 49 countries in the period 2009-2017, this paper empirically analyzes the impact of trade facilitation on high-tech products export. The results suggest that: first, the improvement of trade facilitation has a significant positive impact on high-tech exports; furthermore, the impact of the sub-indices of the trade facilitation level on the high-tech exports ranges from large to small in the order of the port efficiency, e-business, customs environment and regulatory environment; besides, the results of heterogeneity analysis show that the improvement of trade facilitation in non-OECD countries has a significant positive effect on high-tech product exports, in OECD countries the effect is positive but limited. In addition, per capita GDP, the percentage of government expenditure on education, the percentage of gross capital formation, and the proportion of merchandise trade also play a certain role in promoting the export of high-tech products. On the basis of empirical analysis, it is proposed that all countries should consider to promote trade facilitation from the methods of improving infrastructure, e-commerce and customs clearance efficiency; then further improve the quality of the system and the regulatory environment, take actions to encourage and protect the R&D innovation of high-tech enterprises; accelerate the accumulation of human capital of high-tech talents, and thus the export of high-tech products can be promoted.

Keywords

Trade Facilitation; Export of High-tech Products; Port Efficiency; Human Capital.

1. Introduction

With the gradual deepening of regional economic integration, countries and regions around the world have successively proposed more open, free and convenient international trade policies to achieve common development of regional economy and trade. With the further deepening of trade and investment cooperation between bilateral and multilateral countries, the inhibition of traditional tariff barriers on international trade is gradually decreasing, while non-tariff barriers still have potential for growth, such as technical barriers to trade as well as other "invisible" and new trade barriers. Therefore, countries generally pay attention to seeking a more transparent, stable and efficient investment environment. In order to create a coordinated, transparent and predictable environment for international trade transactions, WTO members adopted a protocol on the implementation of The Trade Facilitation Agreement in 2014. Then, the formal entry into force of The Trade Facilitation Agreement in 2015 marks the arrival of a new stage in the development of global trade. Trade facilitation aims to simplify and coordinate trade procedures and accelerate the cross-border circulation of factors. The research shows that trade and investment facilitation is an "additive" game, which can bring significant trade benefits and welfare to all players. With the promotion of trade facilitation, the export trade scale of economic entities will expand and, as a result, the overall welfare of society will increase (Cui Riming and Huang Yingwan, 2016)[1].

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While global trade cooperation continues to deepen, countries pay more attention to domestic economic development, and improve the level of economic development by continuously optimizing domestic industrial structure. With the continuous improvement of the level of economic development, countries have emphasized on developing high-tech industry. In 2019, the State Council of China issued The Guiding Opinions on Promoting the High-Quality Development of Trade, which emphasized the demand to consolidate the industrial foundation of trade development, enhance trade innovation capability, and vigorously develop high-quality, high-tech, high value-added products trade and other measures [2]. Russia has issued The Outline of National Science and Technology Development of Russia, which defines three key goals for the future development of the country, one of which is the effective mechanism and technology update of science and technology and innovation activities. The United States has also successively released policy documents such as American Innovation Strategy: Ensuring Our Economic Growth and Prosperity, which pointed out that innovation is the basis of American economic growth and national competitiveness [3]. It can be seen from the promulgation of the above national documents that technological innovation has increasingly become an important force to promote national economic development, and high-tech industry will be a key area of global economic development. Meanwhile, the export competitiveness of high-tech products has become an important reference system reflecting the economic and technological development of a country [4]. Since the 21st century, the import and export trade between the world's major high-tech products trading countries has become closer and closer, and the international flow of high-tech products has become more and more frequent.

Under the current influence of the global COVID-19, the world economy is in a downturn, and the undercurrent of anti-globalization, unilateralism and protectionism is surging. Scientific and technological innovation has become the main field of international strategic game, and there is now unprecedentedly fierce competition between countries in the most advanced science and technology. High-tech industry is a strategic industry that determines national competitiveness. Its innovation performances have an important impact on the optimization and upgrading of export structure of products and further economic development of the country. As a way to deepen trade cooperation advocated by governments in recent years, how much does trade facilitation contribute to the export of high-tech products? Based on this, this paper studies the impact of trade facilitation on the export of high-tech products, with a view to enhancing the trade innovation ability of countries, further cultivating new competitive advantages in foreign trade and promoting the economic development of countries.

2. Literature Review

In international trade, trade facilitation refers to a series of measures used to reduce administrative and logistics barriers, reduce trade costs, improve policy transparency, and improve the efficiency of goods flow, thus promoting trade development in the process of cross-border flows of goods and factors. In The Action Plan for Trade Facilitation (2002), APEC divided trade facilitation measures into four categories: customs procedures, standards and consistency, business mobility and e-commerce. At present, the research on trade facilitation is mainly carried out from two aspects, one is the measurement of the level of trade facilitation, the other is the economic effects of trade facilitation. John S. Wilson and Otsuki et al. (2003) used port efficiency, customs environment, regulatory environment and e-commerce to measure trade facilitation [5]. Zeng Zheng and Zhou Qian (2008), Zhang Xiaojing and Li Liang (2015), Li Xinwu and Li Ning (2021) [6,7,8] introduced taxation environment, market access and business environment, and marketization process into the indicators system for measuring trade facilitation. For the weight of indicators at all levels of trade facilitation, Wilson and Mann et al. (2003) [5] divided the original data of each country by the average of the original values

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of all APEC members to obtain the corresponding indices; Zeng Zheng et al. (2008) [6], Cui Riming and Huang Yingwan (2016) [1] used analytic hierarchy process to calculate the weight of indicators at all levels; Li Yuxin and Guo Yinghui (2013), Kong Qingfeng et al. (2015), Sakyi et al. (2017) [9,10,11] used principal component analysis to assign weight values to each indicator; Yang Fengmin and Cheng Kai (2019) obtained comprehensive trade facilitation indicators through arithmetic average [12]. Regarding the measurement of the economic effects of trade facilitation, Wilson et al. (2005) [13], Ben Shepherd et al. (2009) [14], Shan Junlan and Zhou Ping (2012) [15] analyzed the impact of trade facilitation on trade flows based on the gravity model. Francois et al. (2005) [16], Tong Jiadong and Li Lianqing (2014) [17] used CGE models to discuss the positive impact of trade facilitation on global trade flows and the economic impact of improving trade facilitation. In addition, some scholars studied other economic effects of trade facilitation: such as the impact of trade facilitation on market competition and product categories of producing countries [18] (Mayer et al., 2014), and the role of trade facilitation in promoting regional trade scale [19] [20] (Fontagn é et al., 2020; Riadh, 2020).

According to the definition of the World Bank and the United Nations Commodity Trade Statistics (UN Comtrade) database, high-tech products refer to products with high research and development intensity, including aerospace, computers, medicine, scientific instruments, electrical machinery, etc. According to the existing research, the factors that influence the export of high-tech products include institutional environmental factors such as the protection of intellectual property rights of importing countries, and the uncertainty of economic and trade policies; innovative investment factors such as R&D activities and human capital; as well as foreign direct investment, financial development and other factors. Liu Junting et al. (2018) found that strengthening intellectual property protection in importing countries has a positive impact on the expansion margin and price margin of China's high-tech products export, but reduces the quantity margin of China's high-tech products export [21]. However, the research of Tong Jiadong and Fan Longfei (2022) shows that bilateral political relations distort the trade effect of intellectual property protection on high-tech product exports, that is, there is a strong negative moderating effect [22]. Studies by Qu Lina, Liu Junting (2020), Liu Junting et al. (2021) show that the uncertainty of economic policy and trade policy have a restraining effect on the share of high-tech products' export trade, which is reflected in the decline of the expansion margin and quantity margin [23] [24]. Braunerhjelm and Thulin (2008) believed that R&D investment was the key factor determining high-tech exports of OECD countries [25]; R&D investment and human capital can significantly improve the competitiveness of high-tech products for a long time [26] (Qiu Shilei et al., 2017). Bao Qun and Zhang Yanan (2010) believed that, in addition to foreign investment, R&D investment and human capital, regional financial development level is also an important source of regional high-tech product export advantages [27]; Du Xinqian (2021) found that financial development can promote the export of high-tech products [28].

With regard to the impact of trade facilitation on high-tech exports and manufacturing exports, Jiao Xiaosong et al. (2019) found that the positive effects of trade facilitation on export of goods with different technology content in exporting countries range from large to small in the order of low technology products, high-tech products and medium technology products [29]; The research of Sheng Bin, Mao Qilin (2017), Xiao Yang et al. (2020) shows that trade liberalization and trade facilitation have a significant role in promoting the export technology complexity of Chinese manufacturing enterprises [30] [31].

To sum up, there are many existing literatures on trade facilitation and high-tech products export, which provide important references for this study. After reading through the literature, it is found that the existing literature on the export trade of high-tech products mainly focuses on the quality and protection of intellectual property rights of importing countries, as well as

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R&D and innovation activities, but rarely considers the influencing factors of high-tech product exports from the perspective of trade facilitation, especially the impact of trade facilitation of exporting countries on high-tech products export. In this context, this paper empirically analyzes the impact of trade facilitation on high-tech exports, in the hope of providing reference for the adjustment of high-tech industrial structure and the promotion of high-tech product trade in countries with different income levels or at different stages of economic development.

3. Research Design

3.1. Model Consturction

In order to verify the impact of trade facilitation on high-tech product exports, the following regression model is established [32]:

$$\text{Tech-export}_{it} = \alpha 0 + \beta 1 \cdot \text{Tfii}_{it} + \eta \cdot \text{Controls}_{it} + \mu i + \lambda t + \varepsilon it \quad (1)$$

Here i represents the country (or region), and t represents the year. The explained variable of the model is Tech-exportit, which represents high-technology exports as a percentage of manufactured exports of country i (or region i) in year t; the core explanatory variable is Tfiit, which represents the trade facilitation level of country i (or region i) in year t; the control variables Controlsit consist of the main national economic characteristics and financial characteristics that affect the export of high-tech products of a country, including the per capita GDP (in constant 2010 US dollars) (Gdppit), the percentage of net inflows of foreign direct investment in GDP (Fdi-inflowit), the percentage of gross capital formation in GDP (Capitalit), the percentage of gross savings in GDP (Savingsit), the percentage of merchandise trade in GDP (Merchandiseit), the proportion of research and development expenditure in GDP (R&Dit) and general government expenditure on education as a percentage of GDP (Eduit). α0 is the intercept item, μi stands for national fixed effect, λt is the time fixed effect, εit is a random error term.

3.2. Variable Description and Data Source

Explained variable: high-tech products export proportion (Tech-export). Measured by the percentage of a country's high-tech product exports in its manufactured goods exports. The data is from the World Bank.

Core explanatory variables: the level of trade facilitation (Tfi). This is the core explanatory variable of this paper, which is measured by the trade facilitation index (Tfi). First of all, based on the research of Wilson et al. (2003, 2005), the trade facilitation level is divided into four measurement angles, corresponding to four first level indicators: port efficiency, regulatory environment, customs environment and e-business [5] [13]. Secondly, referring to the construction of trade facilitation indicators by Yang Fengmin and Cheng Kai (2019) [12], a relatively complete evaluation system consisting of 4 primary indicators and 11 secondary indicators was established, as shown in Table 1. Among them, the port efficiency is expressed by four secondary indicators of roads, railroad infrastructure, port infrastructure and air transport infrastructure quality; the regulatory environment is represented by three secondary indicators of judicial independence, burden of government regulation and transparency of government policymaking; the customs environment is represented by two secondary indicators: prevalence of non-tariff barriers and burden of customs procedures; e-business is represented by two secondary indicators: availability of latest technologies and firm-level technology absorption. The data of all secondary indicators are from The Global Competitiveness Report (GCR) 2009-2017 from the World Economic Forum (WEF). Regarding the measurement of trade facilitation index, considering the absence of secondary indicators in

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some countries and the fact that the explained variable is in the form of percentage, refer to and improve the method of Yang Fengmin and Cheng Kai (2019): take the simple arithmetic mean of the corresponding secondary indicators under each primary indicator to obtain the four primary indicators of port efficiency, regulatory environment, e-business and customs environment, and then take the arithmetic average of the data of the four primary indicators [12]. Finally, the trade facilitation index is obtained through standardized processing (the arithmetic average of the primary indicator data is multiplied by 100/7). It is expected that when other conditions remain unchanged, improving the level of trade facilitation in a country will reduce the import and export costs of high-tech product enterprises. Thus, new enterprises will be encouraged to enter the market, resulting in an increase in the depth and breadth of exports. Therefore, the improvement of trade facilitation will have a positive impact on high-tech products export, that is, the coefficient of core explanatory variable is positive.

Other control variables: since the control variables that consists of the per capita GDP (in constant 2010 US dollars) (Gdppit), the percentage of net inflows of foreign direct investment in GDP (Fdi-inflowit), the percentage of gross capital formation in GDP (Capitalit), the percentage of gross savings in GDP (Savingsit), the percentage of merchandise trade in GDP (Merchandiseit), the proportion of research and development expenditure in GDP (R&Dit) and general government expenditure on education as a percentage of GDP (Eduit) will promote exports, it is expected that the coefficients of these variables are positive. The data of control variables are all from the World Bank.

Table 1. Measurement System of Indicators of Trade Facilitation Level

Primary indicators	Secondary indicators	Index score range	Data source
Port efficiency	Quality of roads	1-7 (best)	GCR
	Quality of railroad infrastructure	1-7 (best)	GCR
	Quality of port infrastructure	1-7 (best)	GCR
	Quality of air transport infrastructure	1-7 (best)	GCR
Regulatory environment	Judicial independence	1-7 (best)	GCR
	Burden of government regulation	1-7 (best)	GCR
	Transparency of government policymaking	1-7 (best)	GCR
Customs environment	Prevalence of non-tariff barriers	1-7 (best)	GCR
	Burden of customs procedures	1-7 (best)	GCR
E-business	Availability of latest technologies	1-7 (best)	GCR
	Firm-level technology absorption	1-7 (best)	GCR

3.3. Descriptive Statistics

In view of the availability of data, this paper selects transnational panel data from 49 countries, including 21 emerging market countries and 28 developed economies, with a sample period of 2009-2017. This paper adopts the concept of emerging markets proposed by the Research Department of Spanish Foreign Bank at the end of 2010, and names 21 countries as emerging market countries, including China, India, Brazil, Indonesia, Russia, Turkey, Mexico, Argentina, Bangladesh, Chile, Colombia, Egypt, Malaysia, Pakistan, Peru, the Philippines, Poland, South Africa, Thailand, Ukraine and Vietnam. The 28 developed economies are: Australia, Austria, Belgium, Canada, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Japan, South Korea, Luxembourg, the Netherlands, Switzerland, Portugal, Slovakia, Spain, Sweden, the United States, the United Kingdom, Cyprus, Estonia, Malta, Slovenia. Descriptive statistics of samples are shown in Table 2. It can be seen from the table that among the 49 countries, the percentage of high-technology exports in manufactured exports of country is 0.19% at the lowest, 60.32% at the highest, and the average is 15.81%.

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Table 2. Data Description

Variable	Implication	Observations	Mean	Std. error	Min	Max
Tech-export	High-technology exports (% of manufactured exports)	424	15.81	10.71	0.19	60.32
Tfi	Trade facilitation index (standardized)	441	66.06	10.32	42.44	86.34
Gdpp	GDP per capita (Logarithm taken)	441	9.60	1.25	6.62	11.61
Fdi-inflow	Foreign direct investment, net inflows (% of GDP)	440	8.63	27.85	-15.75	280.13
Capital	Gross capital formation (% of GDP)	432	22.74	5.81	11.89	46.66
Savings	Gross savings (% of GDP)	432	23.46	7.88	4.66	51.33
Merchandise	Merchandise trade (% of GDP)	441	68.00	40.75	17.23	180.12
R&D	R&D expenditure (% of GDP)	397	1.48	0.99	0.06	4.29
Edu	Government expenditure on education, total (% of GDP)	373	4.86	1.22	1.54	8.56

4. Empirical Analysis

4.1. Analysis of Benchmark Estimation Results

Table 3. Impact of Trade Facilitation on High-tech Products Export

	(1)	(2)
Explained variable: Tech-export		
Tfi	0.224*** (0.085)	0.268*** (0.091)
Gdpp		6.111* (3.503)
Fdi-inflow		0.009 (0.009)
Capital		0.150* (0.084)
Savings		0.064 (0.761)
Merchandise		0.060** (0.027)
R&D		0.331 (1.054)
Edu		1.067** (0.427)
Constant	1.255 (5.745)	-74.266** (34.012)
Year effects	Yes	Yes
N	424	321
R^2	0.031	0.151

Note: *, **, *** respectively represent significance at 10%, 5% and 1% levels, and the standard errors are shown in parentheses. The same as the following table.

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Table 3 reports the benchmark regression results using transnational unbalanced panel data spanning 2009-2017. In column (1) the trade facilitation index (Tfi) is the only right-hand-side variable. In column (2) the trade facilitation index (Tfi) and all covariates are added to the regression equation.

It can be seen from the results in Table 3 that before and after the introduction of control variables into the model, trade facilitation has a significant positive impact on the export of high-tech products, that is, the higher the level of trade facilitation, the higher the proportion of high-tech products in export. Specifically, without introducing control variables, the coefficient of Tfi in column (1) is 0.224, which is significant at the level of 1%. In these models, when a country's trade facilitation level increases by 1%, its high-tech products export will increase by 0.224%. It can be found from column (2) that after introducing all covariates, the coefficient of Tfi is up to 0.268, which is also significant at the level of 1%, again verifying the positive impact of trade facilitation on high-tech products export. From the perspective of control variables, per capita GDP (Gdppit), the proportion of government expenditure on education (Eduit), the proportion of gross capital formation (Capitalit), and the proportion of merchandise trade (Merchandiseit) also promote the export of high-tech products at the level of significance. However, the impact of the percentage of foreign direct investment (Fdi-inflowit) and the percentage of gross savings (Savingsit) is negligible.

4.2. Extended Regression Analysis

4.2.1. Sub-indicators Regression Analysis

Table 4. Impact of Trade Facilitation in Different Dimensions on High-tech Products Export

	(1)	(2)	(3)	(4)
Explained variable: Tech-export				
PE	0.193*** (0.060)			
RE		0.027 (0.064)		
CE			0.132** (0.063)	
EB				0.190*** (0.072)
Gdpp	4.221 (3.585)	7.003** (3.551)	6.659** (3.523)	7.315** (3.506)
Fdi-inflow	0.010 (0.009)	0.014 (0.009)	0.011 (0.009)	0.011 (0.009)
Capital	0.213** (0.850)	0.152* (0.087)	0.174** (0.085)	0.120 (0.085)
Savings	0.061 (0.076)	0.088 (0.077)	0.077 (0.077)	0.066 (0.076)
Merchandise	0.052* (0.027)	0.059** (0.028)	0.061** (0.027)	0.048* (0.027)
R&D	0.544 (1.056)	0.164 (1.069)	0.171 (1.061)	0.321 (1.057)
Edu	1.042** (0.425)	0.961** (0.432)	1.058** (0.431)	1.048** (0.428)
Constant	-51.793 (5.745)	-66.118* (34.716)	-71.123** (34.280)	-80.916** (34.536)
Year effects	Yes	Yes	Yes	Yes
N	321	321	321	321
R^2	0.156	0.123	0.137	0.145

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In order to further analyze the impact of trade facilitation measured by different dimensions on high-tech exports, four first level indicators of trade facilitation index (Tfi), namely port efficiency (PE), regulatory environment (RE), customs environment (CE) and e-business (EB), were respectively added to the regression equation instead of Tfi in model (1). The regression results in Table 4 show that port efficiency, regulatory environment, customs environment and e-business all play a positive role in promoting the export of high-tech products. Specifically, for each 1% increase in these four dimensions, the export of high-tech products will increase by 0.193%, 0.027%, 0.132% and 0.190% respectively. Among the variable coefficients of the four dimensions of trade facilitation level, the coefficient of port efficiency and e-business is significant at the level of 1%, and the coefficient of customs environment is significant at the level of 5%, but the regulatory environment has no significant and small impact on high-tech exports. The above results show that improving the quality of infrastructure, simplifying customs procedures to a certain extent, and appropriately reducing trade barriers can improve the logistics performance of a country and then promote the export of high-tech products. The development of e-business can accelerate the absorption and transformation of new technologies by enterprises in the country, thus promoting the export of high-tech products.

4.2.2. Heterogeneity Regression Analysis

Table 5. Impact of Trade Facilitation on High-tech Products Export (Differentiate OECD Countries)

	(1) OECD	(2) Non-OECD
Tfi	0.010 (0.070)	0.594*** (0.202)
Gdpp	16.048*** (4.322)	-0.1826 (6.122)
Fdi-inflow	-0.029*** (0.008)	0.028 (0.018)
Capital	-0.139 (0.088)	0.122 (0.161)
Savings	-0.0141 (0.063)	0.144 (0.190)
Merchandise	-0.002 (0.021)	0.049 (0.074)
R&D	1.086 (0.762)	6.435* (3.830)
Edu	-1.130*** (0.379)	2.819*** (0.861)
Constant	-140.251*** (43.795)	-42.051 (52.904)
Year effects	Yes	Yes
N	202	119
R^2	0.275	0.399

The existing research generally believed that OECD countries included major developed countries in the world, so OECD countries exported more kinds of high-tech products than countries in other regions. Therefore, this part divides the sample countries into OECD countries and non-OECD countries for analysis, and the estimated results are shown in Table 5. Column (1) of Table 5 reports the estimated results of model (1) using OECD country samples,

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and column (2) reports the estimated results using non-OECD country samples. The results show that trade facilitation has a positive effect on high-tech product exports in these both two types of countries, indicating that the above-stated results of empirical analysis are robust. In the sample of non-OECD countries, a 1% increase in the level of trade facilitation will lead to a 0.594% increase in high-tech products export; and the estimated coefficient is significant at the level of 1%, indicating that for these countries, promoting trade facilitation plays a greater role in stimulating high-tech exports. However, in the sample of OECD countries, trade facilitation has little positive and insignificant impact on high-tech products export. Perhaps it is because that OECD countries have similar institutional environment and economic development stages, and have generally reached a higher level of institutional quality and trade openness; therefore, compared with other countries, OECD countries have relatively low feedback on the proportion of high-tech products exports brought about by trade facilitation.

5. Conclusions and Suggestions

This paper first establishes a system of trade facilitation indicators on which the trade facilitation index is calculated. After that, a country-and-year fixed effects model is built, based on which the impact of trade facilitation on high-tech products export is empirically analyzed by making use of the annual panel data of 49 countries in the period 2009-2017. The empirical results suggest that the improvement of trade facilitation in exporting countries has a significant positive effect on their high-tech product exports. Specifically, if a country's trade facilitation level increases by 1%, its high-tech product exports will increase by 0.268%. The results of sub-indicators regression analysis show that the impact of trade facilitation on high-tech product exports ranges from large to small in the order of the port efficiency, e-business, customs environment and regulatory environment. Heterogeneity regression results indicate that in OECD and non-OECD countries, trade facilitation has a positive effect on high-tech product exports, and the results of benchmark regression are robust; compared with OECD countries, trade facilitation in non-OECD countries plays a more significant role in promoting high-tech exports.

Based on the above research conclusions, the following policy recommendations are proposed: First, countries and regions should comprehensively improve the level of trade facilitation. Countries can improve port efficiency and logistics performance by strengthening infrastructure construction and improving port structure. Neighboring countries can jointly build ports, aviation and international logistics service systems to achieve connectivity of trade exports and promote the efficient flow of high-tech products. Afterwards, countries can expand network coverage, improve communication quality, promote the interconnection of electronic payment systems among countries, deepen the information communication mechanism of high-tech industries, encourage the introduction of high-tech, so as to improve the level of e-business and form a smooth information flow and technology flow of high-tech products trade; simplify customs clearance procedures and improve customs clearance efficiency to reduce the trade cost and time cost of export enterprises. At the same time, countries should appropriately reduce non-tariff barriers, vigorously promote the development of commodity trade, deepen international cooperation, and consciously abide by and implement the Trade Facilitation Agreement.

Second, in order to further improve the quality of the regulation, the state should avoid corruption, improve the transparency of government policy-making, build a fair, just and effective legal environment, reduce political instability, and increase the confidence of high-tech enterprises in their own regulations. Then countries should also improve the domestic regulatory environment, set up innovation standards, implement innovation systems. It is important to improve the intellectual property system and protect intellectual property to

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stimulate technological innovation together with the proliferation of technological innovation that both can attract innovative investment, thus high-tech enterprises can be protected and supported. In addition, for enterprises, it is urgent to boost their absorption and conversion rate of new technologies; for the government, a sustainable business environment for high-tech industries should be created; the combination of the above two aspects can encourage more high-tech products to enter the market, here a certain competitive effect can be formed in the domestic market. Thereby the export expansion of high-tech products can be driven, and the product structure can be optimized and upgraded.

Finally, according to the current situation of domestic high-tech industries and national development needs, countries should screen high-tech industries, formulate high-tech talents training plans, focus on increasing investment in higher education and human capital investment in high-tech talents. Meanwhile, it is wise to timely adjust the scope of key disciplines in colleges and universities and appropriately expand the cultivation scale of masters and doctors under these disciplines. The development of high-end industries, the cultivation of high-tech talents and the development of national economy should be combined, and the development of high-tech industries should be integrated into the national economic development.

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