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38.04.01 Economics
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GRADUATION THESIS

on

The impact of green barriers on China's foreign trade

Master's degree student

Cao
Leshia

signature, date

Academic adviser

Salnikova O. V.

signature, date

Compliance supervisor

Vlazneva S. A.

signature, date

Reviewer

Barbashova S. A.

signature, date

Head of the Department
of Economics and Finance of Penza Branch of
Federal State Educational Budgetary
Institution of Higher Education
Financial University under the Government of
the Russian Federation

The thesis was approved for defence (record of the department meeting dated _____ no.____)

Head of the Department

Rozhkova L.V.

signature, date

The thesis was defended and marked _____ (record of the State Examination Board dated
_____ no.____)

Secretary of the SEB

Rasskazova N. V.

signature, date

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FSBEI HE Penza State University
Institute of Economics and Administration
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Field of study 38.04.01 Economics,
Master's degree programme International Economics and Business

APPROVED BY:
Head of the Department
Doctor of Social Sciences,
Professor
Rozhkova L.V.

«_____» _____ 20__

ASSIGNMENT
FOR THE GRADUATION THESIS OF

Master's degree student Cao Lesha, group 23ЭЭВАМ1, full-time mode of study

1 The topic of the graduation thesis: "The Impact of Green Barriers on China's Foreign Trade"

was approved by the university order
dated «___» _____ 20__ no. _____

2 The deadline for the Master's degree student to complete the graduation thesis is 11.06.2025.

3 The input data for the graduation thesis is the regulatory and legal framework, scientific literature and reference books, and Internet data.

4 The list of issues to be studied includes theoretical foundations; foreign trade; connotation and performance of green trade barriers; characteristics of green trade barriers; impact of green barriers on China's foreign trade; current situation of China's foreign trade; impact of green barriers on China's export trade; impact of green barriers on China's import trade; China's countermeasures to green trade barriers; government's countermeasures; countermeasures of enterprises; consumer response.

5 The list of visuals contains tables and figures.

6 The date of setting the assignment is 7.09.2023.

Academic adviser _____ / Salnikova O. V. /
(signature) (full name)

The assignment was accepted by Master's degree student _____ / Cao Lesha /
(signature) (full name)

Schedule for completing the graduation thesis

№ п/п	Content of the thesis	Deadline for completion	Due date, signature of the academic adviser
First year of study			
1	Substantiating of the research topic and methodology, subject and object of research	1.09.2023 – 31.10.2023	
2	Framing the scientific concept of research	1.11.2023 – 18.12.2023	
3	Collection of scientific literature for the thesis	19.12.2023 – 15.01.2024	
4	Substantiating the relevance, concept, and novelty of the research	16.01.2024 – 19.02.2024	
5	Framing of a detailed plan and layout of the research	20.02.2024 – 12.03.2024	
6	Studying new literature sources within the topic of the thesis	13.03.2024 – 26.03.2024	
7	Conducting theoretical research within the first chapter of the thesis	27.03.2024 – 30.04.2024	
8	Preparing the first chapter of the thesis	1.05.2024 – 30.06.2024	
Second year of study			
9	Conducting analytical research within the second chapter of the thesis	1.09.2024 – 22.10.2024	
10	Preparing the second chapter of the thesis	23.10.2024 – 24.12.2024	
11	Conducting analytical research within the third chapter of the thesis	25.12.2024 – 25.02.2025	
12	Preparing the third chapter of the thesis	26.02.2025 – 21.04.2025	
13	Preparing the introduction and conclusion	22.04.2025 – 12.05.2025	
14	Completing the graduation thesis	13.05.2025 – 26.05.2025	
15	Handing in the thesis for compliance control and antiplagiat	27.05.2025 – 9.06.2025	
16	Getting acquainted with the feedback and review	10.06.2025	
17	Presenting the written thesis	11.06.2025	

Academic adviser _____ / Salnikova O. V. /
(signature) (full name)

The assignment was accepted by Master's degree student _____ / Cao Leshu /
(signature) (full name)

Summary

The graduation thesis comprises 70 pages, 3 chapters, 15 figures, 5 tables, 61 sources.

GREEN BARRIERS, FOREIGN TRADE, IMPACT, CHINA ECONOMY, EXPORT, IMPORT, COUNTERMEASURES, GOVERNMENT, ENTERPRISES, CONSUMERS.

The target of research is through a systematic analysis of green barriers, this study reveals their dual effects on China's export and import trade, and explores corresponding strategies to enhance China's international competitiveness in the green trade environment and promote high-quality development of China's foreign trade.

The goal of work is to study the impact of green barriers on China's foreign trade, enhancing China's competitiveness in foreign trade, and achieving sustainable development goals

The methodological framework of the paper is formed by the complex of theoretical and practical methods such as literature analysis, comparative analysis, case study, statistical analysis, and qualitative evaluation.

The results of research include: green barriers have had a wide-ranging and far-reaching impact on China's foreign trade development. In the context of the new era, China should continue to conduct in-depth research on green barriers and achieve coordinated progress between economic development and ecological civilization.

The recommendations on disseminating and applying the results are as follows: Strengthen policy promotion and knowledge dissemination, and incorporate the results into the policy-making process; guide enterprises to transform and upgrade, integrate into higher education and professional training; encourage public participation and sustainable consumption, establish a continuous monitoring and dialogue platform.

The theoretical relevance of the thesis is established by bridge the gap between trade liberalization and environmental regulation through the perspective of green trade barriers, and contribute to academic theory and practical policy formulation.

The target of research can be further explored through comprehensively analyzing the interaction between green trade barriers and the structure, dynamics, and sustainability of China's foreign trade, including studying how specific environmental regulations of major importing countries affect China's export competitiveness.

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Introduction

As the process of global economic integration and international trade liberalization continues to advance, traditional tariff barriers and non-tariff barriers are gradually weakening, while new forms of trade barriers are emerging. Among these, green trade barriers have become a significant factor influencing the structure of international trade. Green barriers are measures that restrict imports and exports by establishing technical standards, environmental regulations, inspection and quarantine procedures, and certification systems, all centred on environmental protection. Their main characteristics include strong legal validity, high technical complexity, strong concealment, and broad coverage. They have not only become an important tool for developed countries to restrict foreign goods and maintain their domestic industrial competitiveness but have also evolved into a new form of international trade protectionism in the current era.

As the world's largest trading nation and the largest developing country, China faces increasingly stringent green trade barriers from developed countries while actively participating in international trade. These barriers not only raise the entry barriers for Chinese export products into international markets and increase compliance costs for enterprises but also force industrial restructuring and green transformation, with far-reaching implications. Therefore, the impact of green barriers on China's foreign trade has become an important research topic with both theoretical value and practical significance.

To achieve the above research objectives, this paper primarily accomplishes the following tasks:

1 Theoretical level: Review the basic theories of foreign trade and green trade barriers, define relevant concepts, and analyse the basic characteristics and technical support mechanisms of green barriers.

2 Current situation analysis: Systematically review the current status and policy environment of China's foreign trade, and identify the main challenges facing China's foreign trade under the backdrop of green barriers.

3 Impact analysis: Specifically analyse the impact of green barriers on China's exports and imports, including both the negative effects on trade costs and market access, as well as

the positive guiding role in industrial structure upgrading and environmental technology innovation.

4 Policy recommendations: Propose feasible response strategies from the perspectives of government, enterprises, and consumers to effectively address green barriers in China.

The novelty of this paper is mainly reflected in the following aspects:

1 Comprehensive Perspective: The analysis of green barriers is placed within the dual context of the new global trade landscape and China's green transition and development, taking into account both macro-level policy changes and micro-level corporate practices;

2 Dual Impact Assessment: Breaking away from the traditional single 'negative impact' perspective, the study delves into the positive effects of green barriers on China's trade, particularly their role in promoting industrial upgrading and green technological development;

3 Systematic policy recommendations: A multi-dimensional response mechanism is proposed, guided by the government, led by enterprises, and involving consumers, emphasising the synergistic interaction between policy tools, corporate strategies, and public behavior. This framework provides new analytical frameworks and theoretical support for future research, offering policy recommendations and practical pathways to address the adverse impacts of green barriers and seize strategic opportunities for green development.

This paper begins by establishing the theoretical foundation, laying the groundwork for the entire study. This section provides a detailed explanation of the concept, theory, and importance of foreign trade, offering the necessary background knowledge for the subsequent analysis of green trade barriers. It also delves into the essence, manifestations, and characteristics of green trade barriers, while analysing the role of green technology support in green trade barriers, thereby constructing a comprehensive understanding of green trade barriers. Secondly, the focus shifts to the impact of green barriers on China's foreign trade. This section first provides an overview of the current state of China's foreign trade, including the policy environment, development highlights, and challenges faced. It then conducts a detailed analysis of the specific impacts of green barriers on China's export and import trade, encompassing both negative effects, such as market access restrictions and

increased costs, and positive effects, such as promoting industrial upgrading and enhancing environmental awareness. Thirdly, specific strategies will be proposed for how China can address green trade barriers, divided into three levels: government, enterprises, and consumers. At the government level, it is recommended to impose environmental protection taxes, implement early warning mechanisms, improve environmental standards systems and payment mechanisms, and establish research and advisory institutions to provide information support. At the business level, companies are encouraged to increase investment in green technology development, expand direct investment abroad, implement green integration strategies, and establish a comprehensive and integrated response strategy system. At the consumer level, it is advocated to foster ecological values and promote green consumption attitudes, and to drive green development through green consumption. Finally, in the conclusion section, the study reviews the entire research process, summarises the impact of green trade barriers on China's foreign trade, and outlines China's strategies for addressing green trade barriers. Through the collaborative efforts of the government, businesses, and consumers, this study aims to provide valuable references and recommendations for China to better navigate green trade barriers in international trade.

In summary, this study aims to provide a systematic, comprehensive, and practically meaningful analysis and policy recommendations based on the relationship between green trade barriers and China's foreign trade, with the goal of offering theoretical foundations and practical references for China to achieve sustainable development in the increasingly complex international green trade environment.

Chapter 1 Concept and theoretical foundations of green trade barriers

1.1 Foreign trade theory and types

Foreign trade, also known as import and export trade or trade abroad, refers to the exchange of goods, labour and technology between one country (or region) and another.

Such exchanges cover a wide range of activities and take various forms, as shown in figure 1, and can be divided into three types: exchange of commodities, exchange of labour and exchange of technology. Among them, commodity exchange is the most intuitive and universal form, which involves the purchase, sale and circulation of various raw materials, semi-finished products and finished products among countries. This kind of exchange not only meets the production and consumption needs of countries, but also promotes the improvement and optimisation of the global industrial chain.

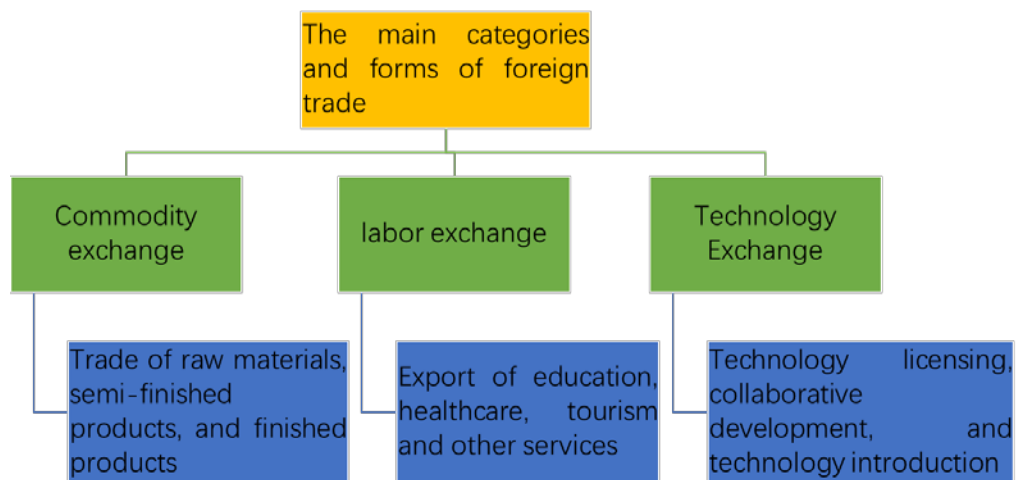


Figure 1 – The main categories and forms of foreign trade [40]

At the same time, the exchange of labour services is also an important part of foreign trade, which covers a variety of fields such as education, medical care and tourism. It provides countries with abundant service resources and employment opportunities. In addition to the exchange of goods and labour, the exchange of technology is playing an

increasingly important role in foreign trade. With the continuous progress and innovation of science and technology, technological exchanges and co-operation among countries have become increasingly frequent. Such exchanges not only help to enhance the scientific and technological level and innovation capacity of countries, but also promote the rapid development of the global science and technology industry [13].

It is worth noting that foreign trade activities are usually accompanied by the receipt and payment of money. This not only reflects the essence of economic activity - the exchange of value - but also promotes the formation and development of the international monetary system. In international trade, money acts as a medium of exchange and a measure of value, enabling the smooth exchange of goods, labour and technology between different countries.

From a national perspective, foreign trade can be divided into two parts: export trade and import trade, as shown in figure 2. Export trade refers to the activities of selling goods, labour and technology produced in the country to foreign markets. It not only generates foreign exchange earnings for domestic enterprises, but also enhances the international competitiveness of domestic industries.



Figure 2 – Two main types of foreign trade (from a national perspective) [19]

Import trade, on the other hand, refers to the activities in which the country purchases goods, labour and technology from foreign markets. It meets the needs of domestic consumers and promotes the diversification and comprehensive development of the domestic economy.

There are a total of four theories of foreign trade as follows.

1 The theory of comparative advantage. Proposed by David Ricardo, the theory holds that countries should focus on producing and exporting goods in which they have a comparative advantage, while importing goods in which they do not have an advantage [8], and that through such a division of labour and exchanges each country can achieve a better allocation of resources and an increase in welfare.

2 Heckscher-Ohlin theory. Also known as the factor endowment theory, this theory explains the causes of trade from the perspective of differences in resource endowments between countries. It argues that countries should export goods that are produced using their own relatively abundant factors and import goods that are produced using their own relatively scarce factors.

3 New trade theory. Gradually emerged in the second half of the 20th century, emphasising the role of imperfect competition, economies of scale, product differences and other factors in international trade. These theories argue that trade benefits can be achieved through economies of scale and product differentiation even in the absence of differences in resource endowments between countries.

4 Competitive advantage theory. Proposed by Michael Porter, the theory stresses that the formation of a country's competitive advantage depends on the innovative capacity of enterprises and the industrial environment. For a country to gain an advantage in international trade, it needs to cultivate internationally competitive enterprises and industries and create an environment conducive to innovation and industrial upgrading.

The development of foreign trade plays a very important role for the country as a whole.

1 Promoting economic growth. With the deepening development of globalisation and the increasingly close economic ties between countries, foreign trade has become an important driving force for economic growth. By expanding the market scale, enterprises can obtain broader sales channels and increase the market share and popularity of their products [28]. This can not only drive the rapid development of enterprises, but also inject new vitality into the entire national economy. At the same time, foreign trade can also accelerate domestic industrial upgrading and technological innovation. Through the

introduction of foreign capital and advanced technology, the country can absorb international advanced experience and technological achievements, and promote the development of domestic industry to a higher level and a broader field. Such technology transfer and industrial upgrading are of great significance in enhancing the country's economic strength and international competitiveness.

2 Optimising resource allocation. International trade can achieve cross-border flow and optimal allocation of resources, enabling countries to make full use of their own resource endowments and comparative advantages. By importing goods and services in which they do not have a production advantage, countries can make up for the shortcomings of the domestic market and meet the diversified needs of consumers [22]. At the same time, exporting products with competitive advantages can bring the country lucrative foreign exchange earnings and provide financial support for economic development. This optimal allocation of resources not only improves overall economic efficiency, but also promotes the sustainable development of the national economy [5].

3 Increase employment opportunities. With the expansion of foreign trade, related industries will also develop rapidly. The development of these industries will lead to more employment opportunities, providing workers with more employment options and opportunities. At the same time, foreign trade can also promote the mobility and transfer of labour, so that labour resources can be more reasonably allocated. This will not only help to ease the pressure on domestic employment, but also raise the income level and quality of life of workers [52].

4 Enhancing national industrial competitiveness. By participating in international market competition, the country can exercise and enhance its industrial competitiveness. In the international market, enterprises need to face the fierce competitive environment and continuously improve product quality, reduce costs, improve innovation ability and other aspects in order to gain a foothold. This competitive pressure can push enterprises to accelerate technological innovation, improve management level, optimise product structure and so on, thus enhancing the competitiveness of the whole industry. At the same time, participation in international competition can also enable enterprises to understand the needs and trends of the international market, providing a direction for future development.

5 Promote global economic integration and regional economic cooperation. Through foreign trade activities, the country can strengthen economic ties and cooperation with other countries and regions, and promote the common development of the global economy. At the same time, regional economic cooperation can also promote intraregional trade liberalisation and facilitation, reduce trade barriers and costs, and improve intraregional economic efficiency and competitiveness [56]. Such cooperation is important for promoting regional economic prosperity and stability.

1.2 Connotation and performance of green trade barriers

The history of international trade development is the history of free trade and protection of trade theory and policy intertwined application. The World Trade Organisation is committed to establishing an open, fair and non-distorting competition ‘free trade and environmental rules’ framework, adhering to the principle of reciprocity and the goal of expanding trade, and seeks to promote global economic growth by minimising tariff barriers. Traditional tariff barriers have been progressively weakened by the WTO and other international organisations [8]. At the same time, however, the WTO stipulates that member States have the right to take such measures as may be necessary to protect the lives and health of human beings, animals and plants and to preserve the environment. International trade barriers are mainly divided into two categories: tariff barriers and non-tariff barriers, as shown in figure 3. Among them, non-tariff barriers to trade refer to a variety of import restrictions other than tariffs, of which green trade barriers centred on technical barriers have become a typical new type of non-tariff barriers that impede the free flow of international commodities, marking the gradual transition of trade protectionism from traditional tariff barriers to the more implicit and complex green trade barriers.

Green trade barriers, also known as environmental trade barriers, are a type of technical trade barriers whose origins can be traced back to the 1980s and which began to spread widely in the 1990s. Its initial purpose is to avoid environmental pollution or resource depletion caused by certain international trade activities through a series of laws, regulations, policies and corresponding administrative measures aimed at maintaining the stability of the

ecosystem and safeguarding human life, health and safety, in line with the principle of sustainable development.

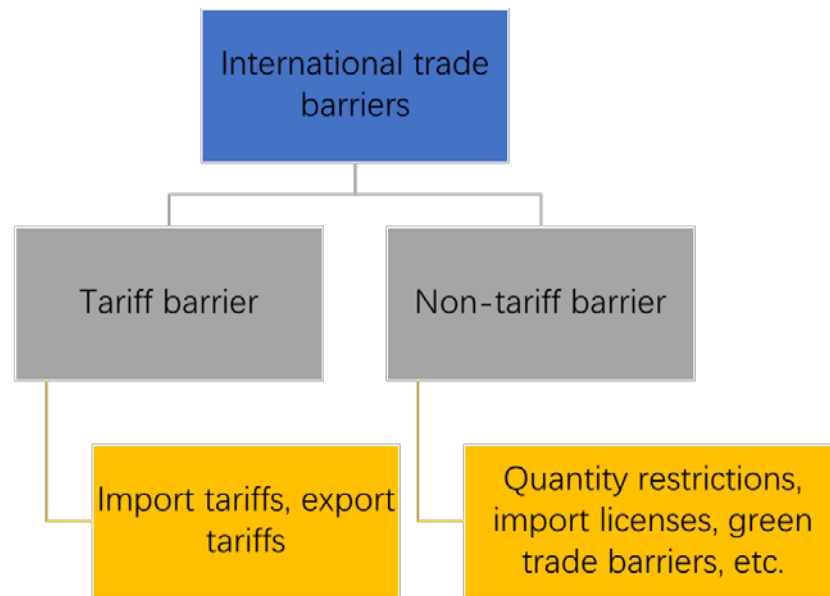


Figure 3 – Classification of barriers to international trade [38]

From a practical point of view, green trade barriers are mainly led by developed countries such as Europe, the United States and Japan, which have set up a series of strict environmental regulations and technical standards on the grounds of protecting the integrity of ecosystems, biodiversity, the abundance of resources, and the health and safety of human life [53]. These standards cover all aspects of product production, including research and development, production, packaging, transport, use, recycling and so on, and are usually set in a harsh manner, making it difficult for most developing countries to accept them, thus creating new barriers to trade.

Causes of green trade barriers:

- 1 The growing prominence of the world's environmental problems so that countries around the world began to focus on the development of green and healthy products. With the environmental problems of today's world becoming more and more prominent, as well as the improvement of people's living standards and quality of life, governments are beginning to pay attention to the issue of environmental protection. People's value concept has also changed, focusing more and more on green and healthy food, more yearning for a healthy life.

The concept of green environmental protection prevails among countries, in order to protect the development of domestic industry and ensure the health and safety of nationals, governments have set up green trade barriers to strengthen the inspection of green health and safety of foreign products.

2 The level of economic development of countries and the definition of green standards are different. Due to the level of economic development between countries, national habits and cultural differences, trade barriers often differ from country to country, in a country in line with the green standards of the product, does not apply to the standards of other countries. Generally speaking, the developed countries in the West have higher economic level, and their products have higher technical level and technological content, so the setting of green standards is higher, while the products of developing countries, due to their technological shortcomings and economic gaps, will encounter the problem of green trade barriers when exporting to developed countries, and it is very difficult to export their products to developed countries. Therefore, green trade barriers have a great impact on international trade.

3 The existence of international green organisations has indirectly contributed to the formation of green trade barriers. With the deepening of environmental problems, green organisations, such as Greenpeace, have been established internationally to deal with environmental issues. The emergence of green organisations and green political parties has gradually developed into a political force that cannot be ignored. This force also puts pressure on governments in power to pay more attention to green ecological issues and green trade issues, and these pressures also contribute to the formation of green trade barriers.

Green trade barriers in various forms, mainly in the form of green technical standards, green packaging system, green health inspection and quarantine system and green tariff system, green environmental labelling.

1 Green technical standards. Green technical standards refer to a series of technical specifications formulated by national or regional organisations to protect the ecological environment and reduce pollution. For example, ISO14000 environmental management system is a set of quality and environmental certification system formulated by the European Union for all products entering its market, covering all aspects from production, sales to use and recycling, to ensure that the products comply with the requirements of environmental

protection and reduce pollution. the ISO14000 system provides effective management measures for reducing or eliminating environmental pollution through a prevention-oriented approach. In addition, the HACCP system originated from the U.S. has become an internationally recognised food safety assurance system, and is implemented as a mandatory standard in North America, Oceania and some European countries; Japan's positive list system and the Agricultural Standardisation Management System strictly regulates the sales of agricultural products, production licenses and technical standards, and with the improvement of the system, the JAS standards become more and more stringent, and cover a wide range of products and technical requirements are increasing. With the improvement of the system, JAS standards have become more and more stringent, covering more and more product types and technical requirements, and these strict technical standards have become a major obstacle to the entry of foreign commodities, especially Chinese agricultural products, into the Japanese market [46]. In general, the green technology standards formulated by developed countries not only require products to meet technical requirements, but also require compliance with environmental protection standards, gradually subordinating technical standards to the core objective of environmental protection.

2 Green packaging system. The green packaging system refers to the provisions that, under the guidance of the principle of 'protecting the environment and conserving resources', stipulate that commodity packaging and its raw materials must have the relevant provisions of conserving resources, promoting the recycling and reutilisation of resources, natural degradation, protecting the environment, and safeguarding the life, health and safety of consumers. The system requires that packaging materials must, firstly, comply with safe use standards and, secondly, not cause harm to human life, health and the natural environment.

At present, the green packaging system has been widely promoted and implemented globally, especially in developed countries, and the relevant legal system is becoming more and more perfect. For example, Austria enacted the Packaging Code in the last century, which was further supplemented by the Packaging Targets Code, and then introduced the Draft Packaging Law, which requires 80 per cent of packaging materials to be recovered, recycled and reused, and establishes a recovery and recycling system at the legal level. The environmental regulations of developed countries generally emphasise the recyclability,

recycling rate and ease of disposal of commodity packaging, and stipulate that producers and sellers are obliged to recover discarded packaging materials. These green packaging regulations provide a legal basis for the creation of green trade barriers in developed countries.

3 Green health inspection and quarantine system and green tariff system. The green health inspection and quarantine system refers to the comprehensive inspection of imported products by the importing country, mainly to check whether they are harmful, whether they will have adverse effects on the natural environment, and the amount of additives. According to the Sanitary and Phytosanitary Agreement, countries have the right to adopt certain sanitary and epidemiological means to safeguard the life and health of human beings, animals and plants [20]. The international legal regime of sanitary inspection and quarantine has existed since its inception, particularly in the 1990s, when the World Trade Organisation reached the Agreement on Sanitary and Phytosanitary Measures through the Uruguay Round of negotiations, which lasted eight years. The Agreement explicitly recognises the sovereignty of member governments in the protection of human life and health, allowing countries to enact the necessary laws and regulations to ensure that food and animal products are free from contaminants, toxins or additives. With the changes in environmental pollutants, the inspection targets and testing standards of various countries have been continuously adjusted, especially in the field of food safety, where the standards for controlling hazardous substances (such as pesticide residues and heavy metal content) in food products have become increasingly stringent. For imported goods containing these risk factors, importing countries have the right to prohibit their entry into the market. Due to the limitations of the level of production technology, developing countries often face strict green health inspection and quarantine systems when exporting food products to developed countries, which creates great constraints on their exports.

4 Green environmental labelling. The green environmental labelling system is a system whereby government departments mark their products or packaging in accordance with the relevant environmental regulations and standards, in order to prove that the entire process from production to recycling of the product is carried out in accordance with environmental standards. Government departments and private certification bodies will certify the products upon application by the enterprises, and if the requirements are met, special graphic labels

will be printed on the packaging of the products. This is to indicate to consumers that products bearing the logo are in compliance with the requirements of renewable resources and environmental protection, and at the same time, it can guide consumers in choosing environmentally friendly commodities, so as to promote environmental protection and human health in consumption. Many countries have adopted methods of identifying green environmental labelling and only allow products bearing the logo to be imported [45].

According to table 1, it can be seen that the development and evolution of the green environmental labeling system.

Table 1 – Development and evolution of the green environmental labelling system [6]

Year	Subject	Content
1971	Germany introduces the concept of eco-labelling	The German government first introduced the concept of eco-labelling as part of its national environmental programme, with the aim of informing consumers about the environmental characteristics of products through product labelling
1978	Blue Angel	Germany introduces the world's first national eco-label, the 'Blue Angel', under the responsibility of the Federal Ministry for the Environment, for environmentally friendly non-food products
1992	European Union Ecolabel	The EU established an official eco-labelling system covering more than 30 non-food product categories, emphasising environmental impact assessment throughout the life cycle of the product
1994	Global Ecolabelling Network	The Global Ecolabelling Network (GEN) was established to bring together 29 ecolabelling organisations around the world to promote international coordination and information exchange on ISO 14024 Type I labelling
1999	ISO 14024 standard published	The International Organisation for Standardisation publishes the ISO 14024 standard, which regulates the principles and procedures for third-party certified eco-labelling (Type I)
2010	EU eco-labelling regulation updated	The European Union has adopted Regulation 66/2010, which simplifies the eco-labelling application process, expands the scope of products covered and strengthens the linkage with green public procurement
2019	China's Green Product Labelling System	China has issued the Administrative Measures for the Use of Green Product Labels to establish a unified system of green product certification, labelling and statistics covering a number of product categories
2024	EU Green Claims Directive	The EU has adopted the Green Claims Directive, which requires companies to provide scientific evidence for their environmental claims by 2026, and prohibits vague statements such as 'climate neutral' based solely on carbon offsets

1971, the German government for the first time in the national environmental programme put forward the concept of Eco-label, aimed at informing consumers of the

environmental characteristics of products through product labels, laying a theoretical foundation for the subsequent development of the eco-labelling system, marking the initial application of environmental protection concepts in the field of consumerism. In 1978, Germany launched the world's first national eco-label 'Blue Angel', which is under the responsibility of the Federal Ministry of the Environment and applies to non-food eco-products, becoming the pioneer of the global eco-labelling system, which promotes the market acceptance of eco-products and motivates enterprises to adopt environmentally friendly production methods.

1992, the European Union set up an official eco-labelling system covering more than 30 non-food product categories. more than 30 non-food product categories, with emphasis on the environmental impact assessment of the whole life cycle of the product, which greatly enhanced the standardisation requirements for environmentally friendly products in the EU market, and promoted the promotion of sustainable consumption and production modes. 1994 saw the establishment of the Global Ecolabelling Network, which brings together 29 eco-labelling organisations around the world, and promotes the international co-ordination and exchange of information on ISO14024 Type I labels, and strengthens the countries' In 1994, the Global Ecolabelling Network was established, bringing together 29 ecolabelling organisations around the world to promote international coordination and information exchange on ISO14024 Type I labels, strengthening the co-operation and mutual recognition of various countries' ecolabelling systems, and promoting the consistency of global environmental protection standards. In 1999, the International Organisation for Standardisation issued the ISO14024 standard, which regulates the principles and procedures for third-party certified eco-labels (Type I), provides a unified technical framework for the global eco-labelling system, and enhances the credibility and transparency of the labels. In 2010, the EU adopted Regulation 66/2010, which simplified the application procedures for eco-labelling, expanded the scope of applicable products, strengthened the linkage with green public procurement, increased the market coverage of eco-labelling, and promoted the application of environmentally friendly products in public procurement. In 2019, China issued the Measures for the Administration of the Use of Green Product Labelling to establish a unified green product certification, labelling and In 2019, China issued the Administrative

Measures on the Use of Green Product Labelling, establishing a unified green product certification, labelling and statistical system covering a wide range of product categories, promoting the development of China's green trade and enhancing the environmental competitiveness of domestic products in the international market. 2024 The European Union adopted the Green Claims Directive, which requires companies to provide scientific evidence for their environmental claims by 2026, prohibits vague expressions such as 'climate neutral' based on carbon offsets alone, and combats 'greenwashing' and 'greening'. In 2024, the EU adopted the Green Claims Directive, which requires companies to provide scientific evidence for their environmental claims by 2026, and prohibits vague expressions such as 'climate neutral' based on carbon offsets.

1.3 Characteristics of green trade barriers

Rationality in name and legitimacy in form Green trade barriers impose trade restrictions and sanctions in the name of protecting the ecological environment and human life and health. With the high degree of economic development and people's demand for quality of life, environmental awareness has gradually increased, and public concern for the ecological environment and human health has deepened. As a result, developed countries often have reasonable excuses for implementing green trade barriers, claiming that their aim is to avoid the entry into the market of goods that pollute the environment and endanger health.

Although green trade barriers belong to the category of non-tariff barriers, their implementation is fundamentally different from that of traditional quantitative restriction barriers, mainly in that their basis and rationale are derived from international and domestic publicly available legal provisions. Since the 1970s, international organisations have successively formulated environmental protection-related conventions, and the impact of these conventions on international trade has become increasingly significant. In particular, the General Agreement on Tariffs and Trade and the World Trade Organisation have successively formulated the world's most authoritative multilateral trade treaties, of which GATT gives countries the 'right of exception for environmental protection', while the WTO

explicitly stipulates that ‘any Member State may, in accordance with such measures as it deems necessary Any Member State may take such measures as it deems necessary to protect the life and health of mankind, animals and plants, and the environment’. These international conventions and agreements provide a legal basis for green trade barriers, enabling developed countries to enact a wide range of domestic green laws in accordance with these legal provisions, thereby legally erecting green trade barriers.

Wideness of protection content and covertness of protection mode. Green trade barriers to protect an extremely wide range of objects, not only related to environmental protection, resource conservation and human life and health and safety of products related to research and development, production, sales and after-sales service, but also on the production process of the product surrounding the conditions (such as staff hygiene, production of environmental sanitation, etc.) of the strict requirements. This has exerted tremendous pressure on developing countries with limited technology and backward testing standards, and the breadth of its protection has made it more difficult for developing countries to export and become a major means of clamping down on their economic development [18]. According to table 2, green trade barriers differ from traditional tariff barriers in a number of ways.

Table 2 – Green trade barriers versus traditional tariff barriers[30]

Comparative Dimension	Traditional Tariff Barriers	Green Trade Barriers
Expression	Tariffs, quotas, licences	Environmental standards, technical regulations, green label certification
Mode of protection	Directly imposing import taxes and restricting the number of imports	Implicit entry conditions in the name of environmental protection, conventions and standards
Equity	May result in inequitable distribution and discrimination	Often regulated by uniform environmental standards, ostensibly reducing discrimination and distributional problems
Impact on developing countries	Increasing commodity costs and affecting market access	Raising technical thresholds and increasing compliance burdens on exporting countries, especially developing countries

Compared with traditional tariff barriers, green trade barriers are more covert in their mode of protection. Firstly, it is usually integrated into international environmental protection conventions and multilateral trade treaties, thus significantly reducing

international trade disputes and frictions; secondly, unlike traditional trade licensing and quota systems, green trade barriers avoid the problems of irrational trade distribution and trade discrimination; furthermore, green trade barriers are often presented in the name of protecting the ecological environment and human health, thus hiding the essence of trade protectionism behind them. The green trade barriers are not the same as the quota system.

Complexity of technical requirements. Green trade barriers set strict green technical standards for product research, development, production, sales and after-sales service, which are usually harsh, complex and cumbersome, based on advanced science and technology. Developed countries are relatively close to each other in terms of scientific and technological level, so their environmental standards and management measures are more consistent, which makes trade friction between these countries less frequent. However, the developing countries and developed countries in environmental standards and technology level of the difference is larger, developed countries higher environmental standards and management system for developing countries, often constitutes an insurmountable gap. In addition, the continuous progress of science and technology and the constant changes in technical rules and standards make green trade barriers highly uncertain. For developing countries, the lag in technological responsiveness makes it difficult for them to adapt quickly to these changing and complex technological requirements, resulting in an unfavourable and passive situation in the global trade market.

The rapid deterioration of the global ecological environment has become a major crisis for the survival and development of mankind, and has become the focus of extensive attention of the international community today. The level of development of science and technology determines the ability of human beings to transform and utilise nature, and it is the most powerful tool to promote natural change, as well as the key means to adjust the relationship between human beings and nature. Technological innovation is widely regarded as the fundamental driving force of economic development, and green technological innovation, in particular, is the core means of achieving green economic development [47].

Although the rapid development of human economy and science and technology has, to some extent, led to ecological disasters, the solution of ecological problems also depends on the progress of science and technology. Therefore, green technology constructed on the

basis of ecological and environmental values, as an alternative to traditional technology, is not only a key way to resolve the contradiction between economic development and environmental pollution, but also represents an inevitable trend of historical development. Traditional technology lays the foundation for green technology, because any technology and its products must have the function, quality and economy to satisfy human needs; otherwise, even if green technology is highly developed, it lacks the significance of practical application. Green technology shoulders the dual responsibility of promoting economic development and environmental protection, so it is not only a product of technological innovation, but also an inevitable way to achieve sustainable development.

The so-called ‘green technology’, also known as ‘environmentally friendly technology’, is a general term for a group of technologies, processes or products designed to reduce environmental pollution or the use of raw materials and natural resources. Unlike traditional technology, the core theoretical basis of green technology originates from the closed-loop law, feedback regulation law and system harmony law in modern ecological philosophy, which regards the industrial production process as a system similar to the natural ecosystem, and carries out a comprehensive balance between the input (such as energy and raw materials) and output (such as products and waste) of the system through feedback regulation to realise a harmonious symbiosis between human beings and nature and a co-evolution. It embodies ecological justice and harmony. Green technology follows the ‘3R’ principle - Reduce, Reuse and Recycle. According to figure 4, the principle of Reduce not only emphasises reducing the amount of waste and cutting down the source of rubbish, but also includes saving raw materials and energy, thus effectively controlling the consumption of resources and reducing the burden on the environment; the principle of Reuse further realises the reuse of products by mimicking the decreasing tendency of the natural system and designing products with detachability; and the principle of Recycle realises the recycling of wastes and fully develops and makes use of resources, so as to promote the secondary development of resources. The ‘3R’ principle of green technology not only implies the concept of ecological value, but is also in line with the concept of economic value, emphasising the importance of harmonious coexistence between human beings and nature while promoting economic development, and adhering to the principles

of environmental protection and resource conservation, so as to promote the balance of the natural ecosystem. As a key pillar in promoting the construction of an ecological civilisation, green technology also provides technical support for addressing green trade barriers and serves as the basis for sustainable development of the global economy.

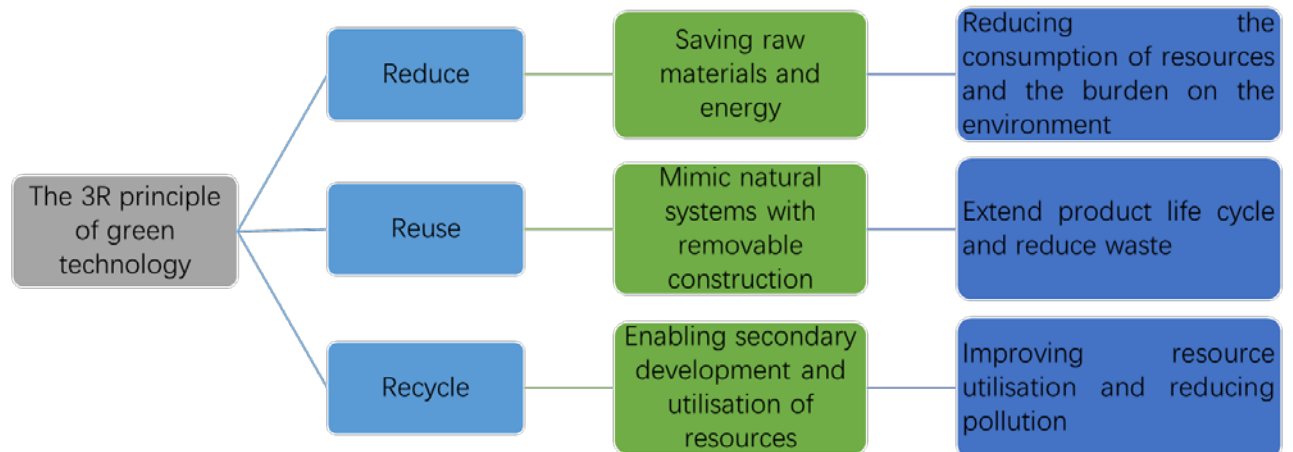


Figure 4 – Green technology ‘3R’ principles [34]

The concept of green technology has a distinctive feature, which is rooted in ecological philosophical thinking and builds a unique technical knowledge system. Green technology takes wholeness, systemicity and dynamism as its guiding ideology and applies these perspectives to thinking and problem-solving. It not only promotes economic development and creates economic benefits, but also commits itself to maintaining ecological balance and protecting ecological benefits, so as to realise the harmonious coexistence of economic development and ecological environment through the intermediary of technology. In the 1960s, the theory of ‘spaceship economy’ put forward by the American economist Baoding pointed out that the earth is just like a spaceship in space, relying on itself and its own economy. The theory of ‘spaceship economy’ put forward by the American economist Paulding in the 1960s pointed out that the earth is like a spaceship in space, relying on its own resources to maintain its life, and it will eventually be destroyed due to the exhaustion of resources. The only way to extend the life of the Earth's spaceship is to achieve resource recycling and minimise waste emissions [55].

This theory advocates that mankind should build a self-sufficient and non-polluting economy or production system in accordance with the closed-loop principle of ecology, forming a closed material cycle and renewing the economic system. Green technology follows this concept, treating the earth as an isolated and limited system and realising the effective recycling of resources and energy through technical means. Ecosystems are dynamic, not static, and there is a constant exchange of matter, energy and information between the elements within the system; therefore, green technology requires non-linear thinking and comprehensive consideration of a variety of changing factors in order to effectively protect the complex and changing ecological environment and promote sustainable development.

Chapter 2 Impact of green barriers on China's foreign trade

2.1 Current situation of China's foreign trade

China had always adhered to the strategy of independent and self-reliant development of foreign trade, with the aim of promoting the sustained growth of foreign trade and safeguarding the country's trade interests. In this process, China has implemented a series of diversified trade policies, including import-substitution policies, export-orientation policies, market diversification strategies and trade remedy measures, in order to promote the overall development of foreign trade.

At the same time, China has also strengthened the supervision and management of foreign trade, including strengthening intellectual property rights protection, enhancing customs supervision, implementing stricter anti-dumping and countervailing measures, and actively responding to all kinds of trade barriers, so as to effectively safeguard the stable and healthy development of the country's foreign trade. These policies will not only help enhance China's competitiveness in global trade, but also further optimise the trade structure in the international economic environment. Countries around the world should create a multi-level and wide-ranging co-operation system, and consolidate economic and trade co-operation relations by actively strengthening co-operative exchanges at all levels, including governments, enterprises and personnel [54].

Since the reform and opening up, China's foreign trade has continued to develop and become a key engine for promoting the wealth of society. According to the statistics of total foreign trade in figure 5, since 2020, China has surpassed the United States for the first time to become the world's largest trading country and has been ranked first in the world. The successful convening of the 20th Party Congress marks the remarkable achievements of China's foreign trade. However, with the changes in the global economic situation, especially the sudden outbreak of the new crown epidemic in 2020, international economic development suffered a serious impact, and international import and export trade once came to a drastic standstill, with the trend of trade protectionism gradually rising [29]. Although global import and export trade experienced varying degrees of recovery in 2021 following

adjustments to the anti-epidemic policies of a number of countries, it still faces a series of challenges such as rising commodity prices, shortages in global energy supply and intensifying pressure on the industrial supply chain, which have had far-reaching impacts on the global economy and China's foreign trade.

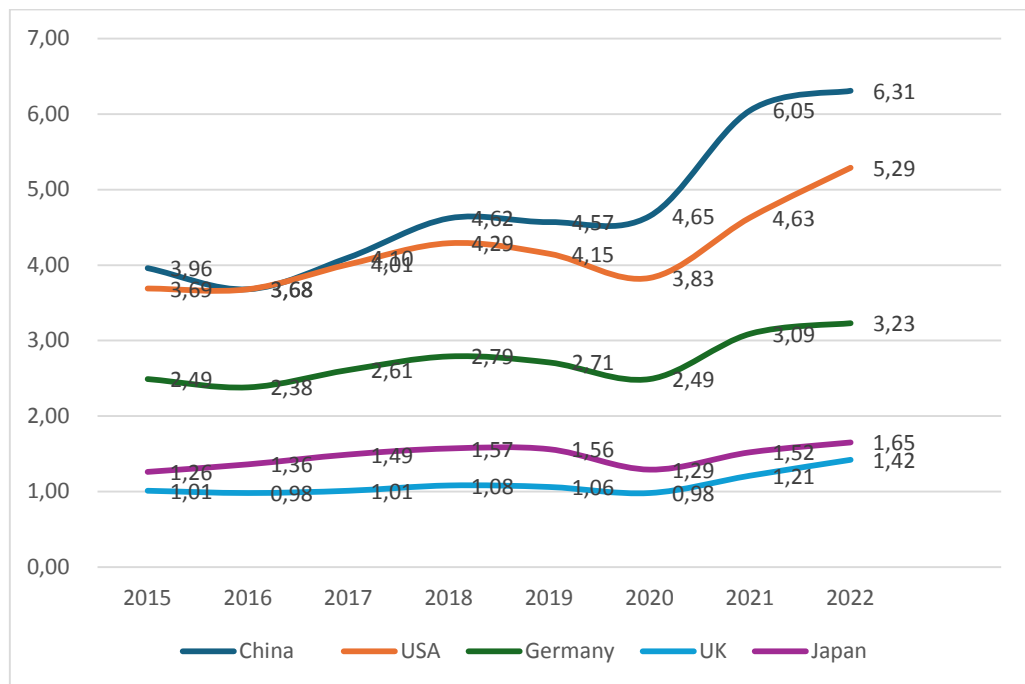


Figure 5 – Total foreign trade by country from 2015 to 2022, trillions dollars [41]

Since the beginning of 2022 to the present, the global political situation has been turbulent, Europe, the United States and other developed countries have accelerated the tightening of macro-policies, the Russia-Ukraine conflict has continued to ferment, and the problem of the energy crisis in Europe has become more prominent, which have affected the global economic situation to a certain extent, and have made the trend of the world's import and export trade even more intricate and complex. China's production and life in some areas were greatly affected in the early stage of the Xin Guan epidemic outbreak, but with the government's implementation of rapid and vigorous anti-epidemic policies, China took the lead to become the first country among the world's major economies to achieve positive economic growth, which provided a strong impetus for the orderly recovery of global import and export trade.

Since the 20th Party Congress, China's economy has continued to recover steadily, production has risen steadily and market expectations are favourable , which has provided a favourable economic environment for import and export trade. In addition, China has been actively promoting reform and innovation in trade facilitation, accelerating the construction of a tertiary service export base with special characteristics, expanding the scope and autonomy of pilot zones such as FTZs and FTZ ports, and constructing a high-level network of FTZs facing the world, so as to support the development of the import and export trade with a high level of openness.

Highlights of China's foreign trade.

1 Total import and export trade continues to grow. As shown in figure 6, from 2019 to 2024, China's total import and export trade shows an overall growth trend, although the growth rate has slowed down in some years. On the export side, China has maintained growth for many consecutive years, and the growth rate has been higher than that of imports and overall imports and exports in most years, indicating the competitiveness of China's export products and their acceptance in the international market. On the import side, despite a slight decline in some years, the overall trend is still growing, reflecting China's domestic market demand for external resources, technologies and products. As can be seen from the data, China has maintained a trade surplus for many consecutive years, and the size of the surplus has been expanding year by year, which has helped to strengthen China's foreign exchange reserves and international payment capacity.

2 The structure of import and export products is optimized . As shown in figure 7, from 2019 to 2023, the total value of China's exports of electromechanical products as a proportion of China's total exports is generally on a steady upward trend. However, the total value of exports of labour - intensive products has always been below 5 trillion yuan, accounting for only less than 20 per cent of the total value of export trade, which indicates that China has gradually moved away from the production and export of labour - intensive products, reflecting the optimization and upgrading of China's export commodity structure.

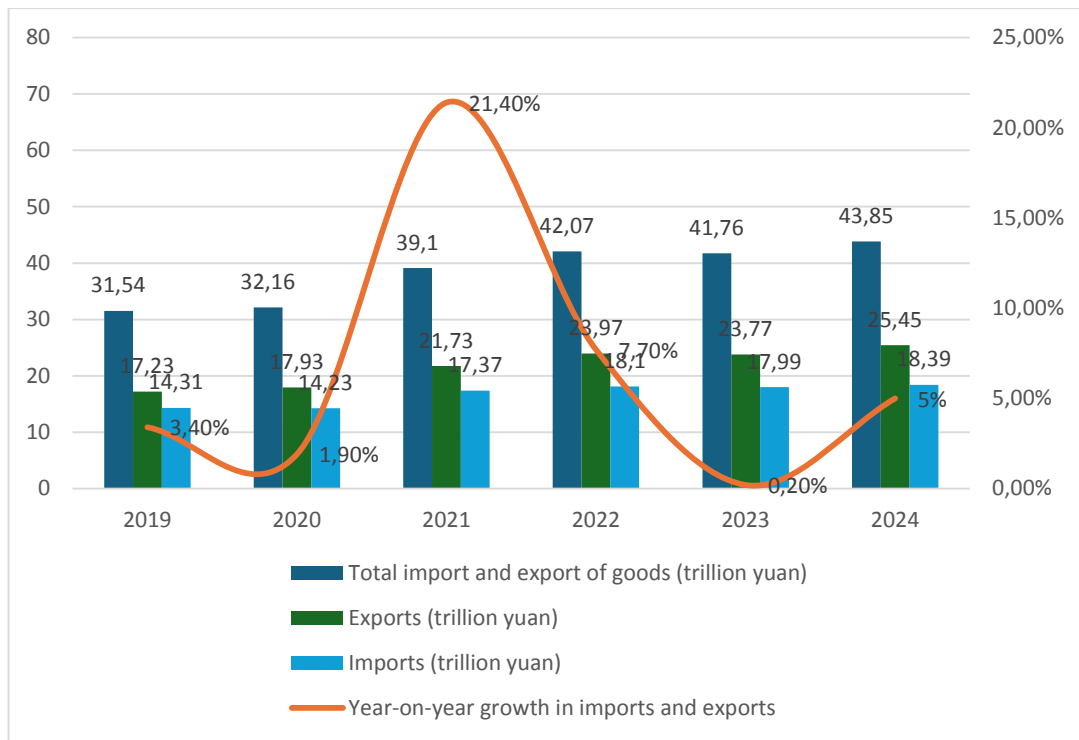


Figure 6 – China's total import and export and year-on-year growth trend from 2019 to 2024 [2]

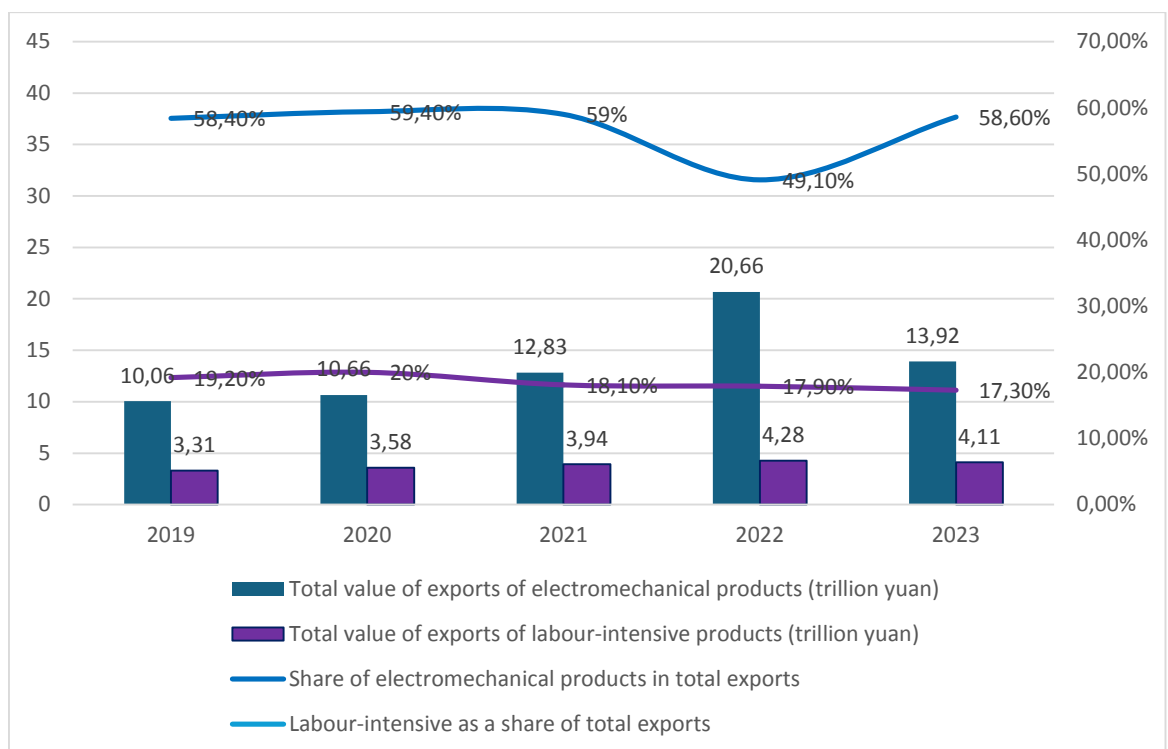


Figure 7 – Trends in the total value and share of China's exports of electromechanical products and labour-intensive products from 2019 to 2023 [1]

3 Vigorously explore emerging markets. ASEAN, as an emerging force in world economic growth in recent years, has been China's largest trading partner for four consecutive years. 2022, China and ASEAN became comprehensive strategic partners, and the economic and trade exchanges between the two sides have become closer. As shown in figure 8, ASEAN will account for 15.9 per cent of China's foreign trade in 2024, up 9 per cent year-on-year. General Administration of Customs spokesman Lv Daliang said: 'China's economic and trade relations with ASEAN have a solid foundation and great potential for development.' Looking into the future, China will carry out more in-depth strategic integration with it, expanding the scope of co-operation and making trade between the two sides more fluid. With the continuous promotion of trade and the gradual liberalisation of investment cooperation, it is believed that win-win cooperation between China and ASEAN will make greater progress in the near future.



Figure 8 – Trend of total import and export trade between China and ASEAN and its share from 2020 to 2024 [4]

In addition, according to figure 9, in 2022, China's total imports and exports with the 14 member countries of the Regional Comprehensive Economic Partnership reached nearly 13 trillion yuan, accounting for about 30.8 per cent of China's total foreign trade. 2023 marks

the 10th anniversary of the Belt and Road Initiative, and looking back over the past decade, China's imports and exports with countries along the route grew at an average annual rate of 8.6 per cent, not only achieving faster trade growth but also improving trade quality, showing remarkable results in exploring emerging markets. Looking back on the past decade, the average annual growth rate of China's imports and exports with countries along the Belt and Road has been as high as 8.6 per cent, which not only achieves faster trade growth, but also improves the quality of trade, showing that the development of emerging markets has achieved remarkable results. By continuously deepening its cooperation with RCEP member countries and countries along the Belt and Road Initiative, China has further consolidated its strategic position in global trade and promoted regional economic integration.

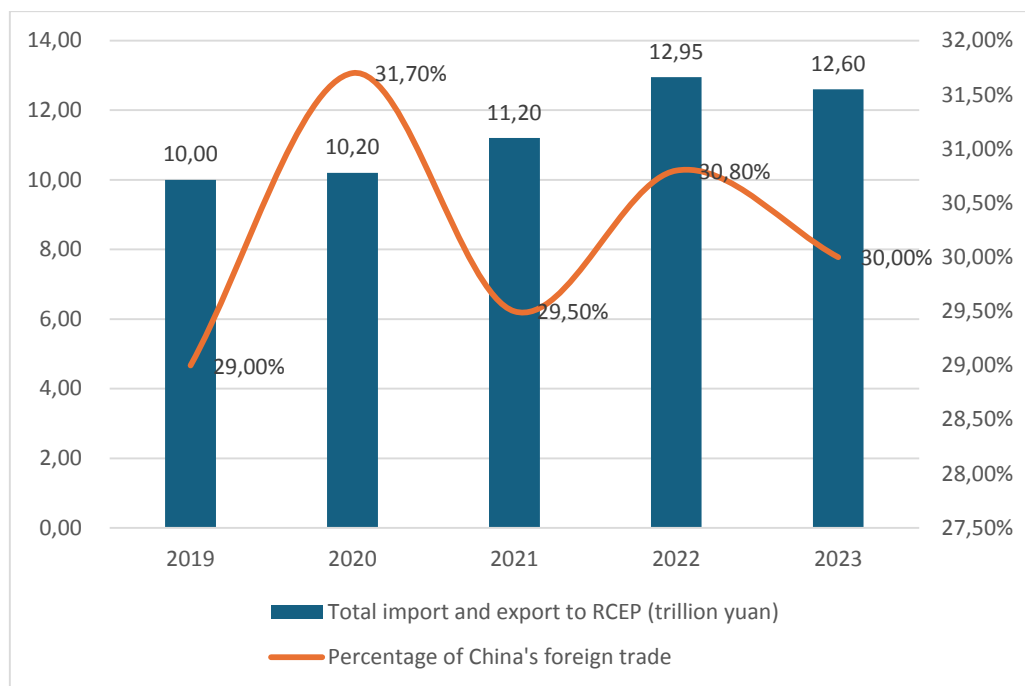


Figure 9 – Total trade between China and RCEP member countries and its share from 2019 to 2023 [37]

4 The booming development of cross-border e-commerce and other emerging businesses has injected new impetus into the growth of China's foreign trade. With the popularisation of the Internet and the continuous improvement of network payment and logistics infrastructure, China's cross-border e-commerce has risen rapidly and has become

an important engine for promoting foreign trade growth, and has gradually become a new choice for consumers to shop. As shown in figure 10, China's cross-border e-commerce market reached RMB 16.85 trillion in 2023, up 7.32% year-on-year. The emergence of cross-border e-commerce platforms has attracted more and more sellers to join, and these platforms help sellers reduce costs and expand their markets by providing a variety of services, such as marketing, logistics, and payment. At the same time, consumers are also increasingly inclined to shop online, seeking more quality and personalised products and services, a trend that further drives the development and innovation of cross-border e-commerce.

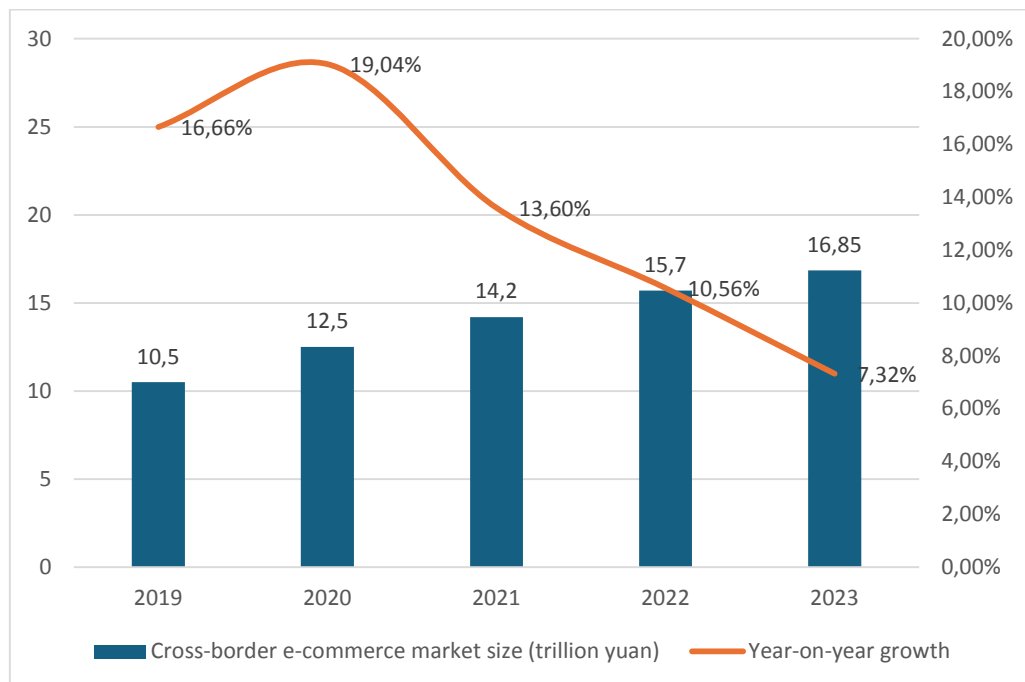


Figure 10 – Changes in Cross-Border Ecommerce Market Size from 2019 to 2023 [39]

Cross-border e-commerce, as an emerging international trade industry, has innovated the traditional international trade model with the help of networking and electronic means, using e-technology and logistics to break the tangible and intangible barriers between countries and regions. It is rapidly developing globally by reducing intermediate links, reducing costs and other advantages. In the past few years, the continuous improvement of international logistics networks and the gradual optimisation of cross-border e-commerce

trade mechanisms have further accelerated the broadening of cross-border e-commerce channels. With the continuous improvement of China's economic strength, China has become an important development power of global cross-border e-commerce, and many Chinese enterprises have gone to the international market and occupied the corresponding market share. Especially in the context of active trade co-operation between emerging markets and countries along the 'Belt and Road', China's cross-border e-commerce and other new business models have shown good prospects for development, bringing far-reaching impacts on the global trade pattern.

At the same time, China's foreign trade also has some problems and challenges.

1 China is not only the world's largest trading country, but also an important global manufacturing centre, and the construction of a strong manufacturing country can not be separated from the support of foreign trade enterprises. 2024, China has nearly 700,000 foreign trade enterprises with import and export records, the number of which has reached a new high. From the point of view of industry distribution, China's foreign trade enterprises are mainly concentrated in the field of general trade. According to figure 11, 2024, private enterprises as the 'main force' of foreign trade, its total import and export amounted to 24.33 trillion yuan, an increase of 8.8 per cent year-on-year [27], accounting for China's foreign trade value of the proportion of China's foreign trade value further increased to 55.5 per cent. However, from the point of view of enterprise size, most foreign trade enterprises are still predominantly small enterprises, with a relatively weak risk-resistant capacity. In addition, China's foreign export product structure needs to be optimized, and at present, exports are mainly concentrated in labour-intensive products, which usually have low added value and are more dependent on the domestic market, and lack high value-addedness and technological content. At the same time, in the process of international market development, many foreign trade enterprises lack of initiative and innovation, failed to effectively build their own international brand and market influence. Therefore, enhancing the scale, innovation capacity and value-added products of foreign trade enterprises has become the key to promoting the development of China's foreign trade.

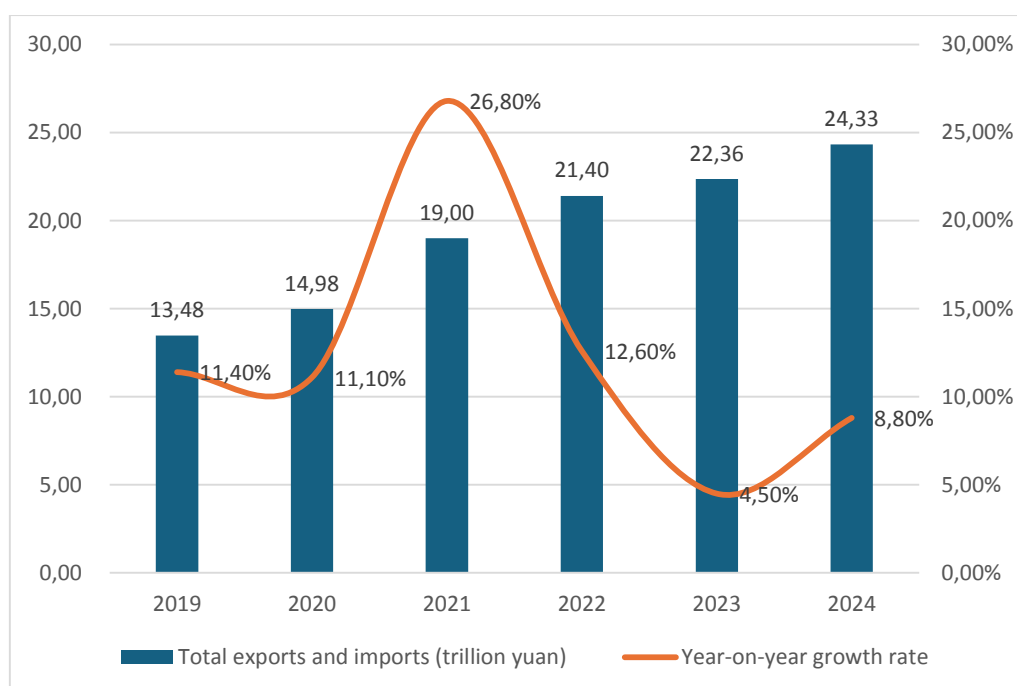


Figure 11 – Total Import and Export of Private Enterprises in China and Year-on-Year Growth Rate from 2019 to 2024 [32]

2 Trade frictions are increasing. The main reason for this is that the reform of China's foreign trade system has not yet been thoroughly promoted, failing to establish a fair and competitive market environment, and there is a certain degree of confusion in management, with a lack of sound laws and regulations to constrain and regulate trade behaviour. Accelerating the pace of foreign trade system reform and gradually establishing a reasonable, fair and orderly market environment is the key to promoting the healthy and sustainable development of China's foreign trade in the future. However, multiple factors such as slow recovery of the global economy and insufficient domestic consumption are still restricting the growth of foreign trade. At the same time, external pressures, such as increasingly fierce competition in the international market and continued changes in the global economic landscape, have also made China's foreign trade face severe challenges. To cope with this series of problems, China needs to strengthen its institutional reforms, optimize its policy measures and, while enhancing its market competitiveness, address the challenges posed by global economic uncertainty.

3 Resource and environmental constraints are increasing. In particular, China's exports are dominated by labour – intensive and traditionally processed products, which

have relatively low technological content and consume large amounts of natural resources. As the scale of China's exports continues to expand, the problem of resource scarcity is becoming more acute. For example, in terms of mineral resources, although China has rich coal resources, but the per capita reserves of less than half of the global average, natural gas and oil and other resources per capita reserves is far less than the world average of 1/10. In addition, the price fluctuations in basic energy products, while the developed countries on most of the resource commodities of the elasticity of demand is small, in the long term, this will be China's traditional primary products exports constitute greater pressure. Exports constitute greater pressure. The limited price competitiveness of primary products in the international market due to their low value-addedness further exacerbates the problem of rising production costs brought about by the deterioration of the resource environment, which in turn reduces the profitability and investment capacity of enterprises and undermines their research and development potential, and ultimately affects the enhancement of the quality of exported products and the increase in value-added. This series of problems highlights China's challenges in the global competition for resources and the need to further strengthen technological innovation and optimal allocation of resources in order to cope with the constraints posed by resource bottlenecks.

4 Higher labour costs. With the transformation of China's demographic structure and labour market demand, the number of young labour force is gradually decreasing, which means that the era of demographic dividend is coming to an end, and the original advantage of labour cost as the key driving force of China's foreign trade growth is gradually weakening, and the sustained development of China's foreign trade will no longer be able to rely on the low labour cost, and there is an urgent need to accelerate the transformation to technological innovation and productivity upgrading. There is an urgent need to accelerate the transition to technological innovation and productivity upgrading to meet the challenges posed by rising labour costs [59].

5 There were still many problems in the development of China's foreign trade, notably the irrationality of the commodity structure of its exports, which was manifested mainly in the over-representation of primary commodities and the relative scarcity of high-end products, the shortage of high-value-added products, and the lack of exports of high-

technology products. If a country is overly dependent on one or a few types of export commodities, once it is affected and impacted by unfavourable factors at home and abroad, it will lack the ability to counterbalance its foreign trade exports and will not be competitive internationally [26]. Maintaining this export structure for a long time will not only increase the cost of foreign trade, but will also be detrimental to the sustainable and healthy development of China's foreign trade, and hinder the optimisation and upgrading of the economic structure.

2.2 Impact of green barriers on China's export trade

From the present point of view, the impact of green trade barriers on the development of China's foreign trade is significant. Since China's green trade measures are at a relatively low level compared with those of developed countries and play a minor role in foreign imports, the impact of green trade barriers on China's foreign trade is mainly manifested in export trade [44].

Some countries make use of the provisions of the Agreement on Technical Barriers to Trade and the Agreement on Sanitary and Phytosanitary Measures that 'no country shall be prevented from taking measures necessary to protect human life, animals, plants or the environment' to implement protectionist policies, which have had a significant impact on China's export trade. This has had a significant impact on China's export trade. Since China's accession to the World Trade Organisation, the impact of green trade barriers on China's exports has been increasing [3], especially in the United States, the European Union, Japan, South Korea and other economies that have set stricter technical standards for Chinese exports. According to 2005 statistics, China loses about 10 per cent of its foreign exchange earnings each year due to packaging problems, a significant portion of which is due to packaging that does not meet green requirements. Green trade barriers have gradually become an obstacle to the export of Chinese products. However, green trade barriers are not entirely negative, and they have a double impact. We should not only pay attention to their negative impact on China's exports, but also see the positive effects they bring. The

following will analyse the specific impact of green trade barriers on China's export trade from both negative and positive aspects.

Negative impacts:

1 China's export market scope is increasingly restricted and involves a wider range of products. Currently, China's major trading partners include the United States, Japan, the European Union, South Korea, South-East Asia, and Hong Kong and Taiwan, which, according to figure 12, will account for more than 60 per cent of China's total imports and exports in 2024. It is worth noting that most of these countries and regions are members of the World Trade Organisation's Committee on Trade and Environment, which is also the most prevalent area of green trade protectionism. As China has long neglected the development of environmental protection industry in the past, coupled with the fact that it is often difficult for export products to meet the environmental standards set by developed countries in a short period of time, which makes China's export products face more stringent environmental requirements and technical barriers, further restricting its market competitiveness.

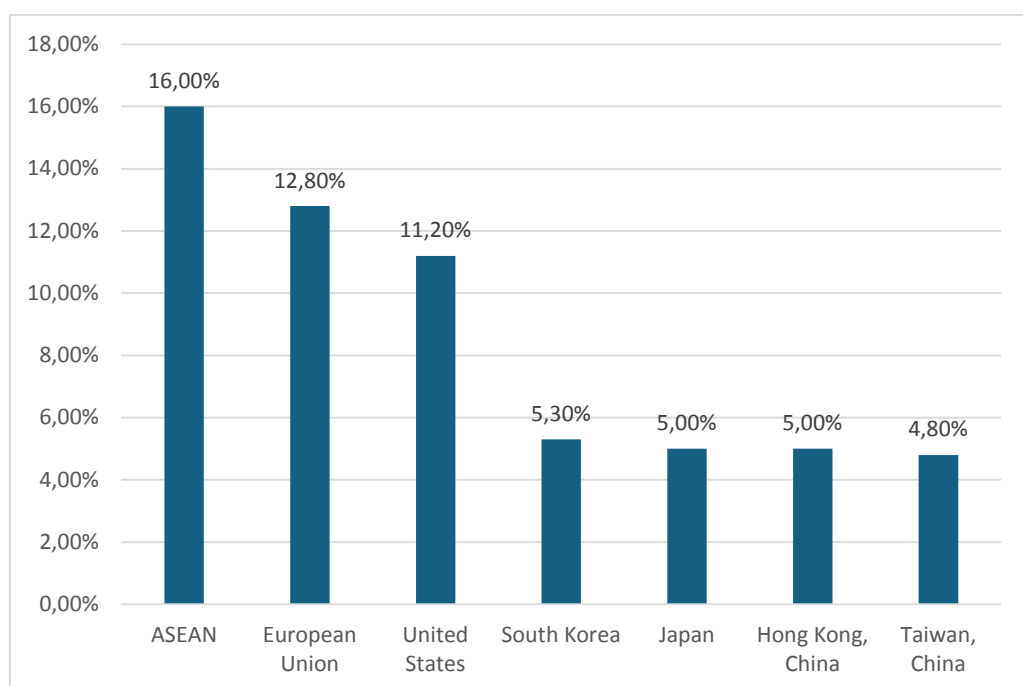


Figure 12 – Share of China's total import and export with major trading partners in 2024 [24]

2 Weakening the market competitiveness of products. Green trade barriers require that the principles of environmental and ecological sciences be applied to the entire process of production, processing, storage, transport and marketing of products, and that a complete pollution-free and non-polluting environmental management system be constructed. In order to meet the environmental standards of importing countries, manufacturers must increase investment in this process, and fulfil a series of complex procedures, including environmental protection inspection, certification, technical review, accreditation and so on. In addition, products in packaging and decoration, health and quarantine, labelling and marking and advertising must also make more adaptive adjustments, which not only leads to an increase in product intermediate costs and additional costs, but also makes the export cost of products rose significantly, weakening its competitiveness in the international market, which in turn led to a significant decline in the economic efficiency of export products. According to incomplete statistics, due to non-compliance with environmental protection requirements, China's annual exports of about 7.4 billion U.S. dollars of goods are affected.

Green trade barriers require higher levels of environmental technology and research and development capabilities, which has hindered the development of international trade by Chinese exporters [15]. Not only that, green trade barriers brought about by the derived costs on the export cost of enterprise products can be reflected in the following aspects. As shown in figure 13, first of all, the certification costs (C1), that is, due to the green trade barriers caused by the inspection link and the certification system of the costs associated with these costs directly increase the cost of enterprise exports; secondly, the cost of adaptability (C2), because of the foreign green trade technical standards and regulations Often change, in order to deal with new trade barriers, enterprises have to continue to collect information, re-certification, and even adjust the process or hire new employees, thus increasing the cost of adaptation; third is the cost of goods sold (C3), packaging and labelling barriers force enterprises to change the form of packaging, which not only increases the cost of packaging, and in order to enhance the brand image and to maintain the goodwill of the enterprise also need to pay additional This not only increases packaging costs, but in order to enhance brand image and maintain goodwill, firms also need to pay additional advertising and promotion

costs, which further increases their sales expenditure; and finally, there are other derived fees or costs (C4), such as waste recycling costs borne by exporters as a result of responding to the green barriers. These derived costs undoubtedly increase the cost of exporting in the international market and affect the competitiveness of enterprises.

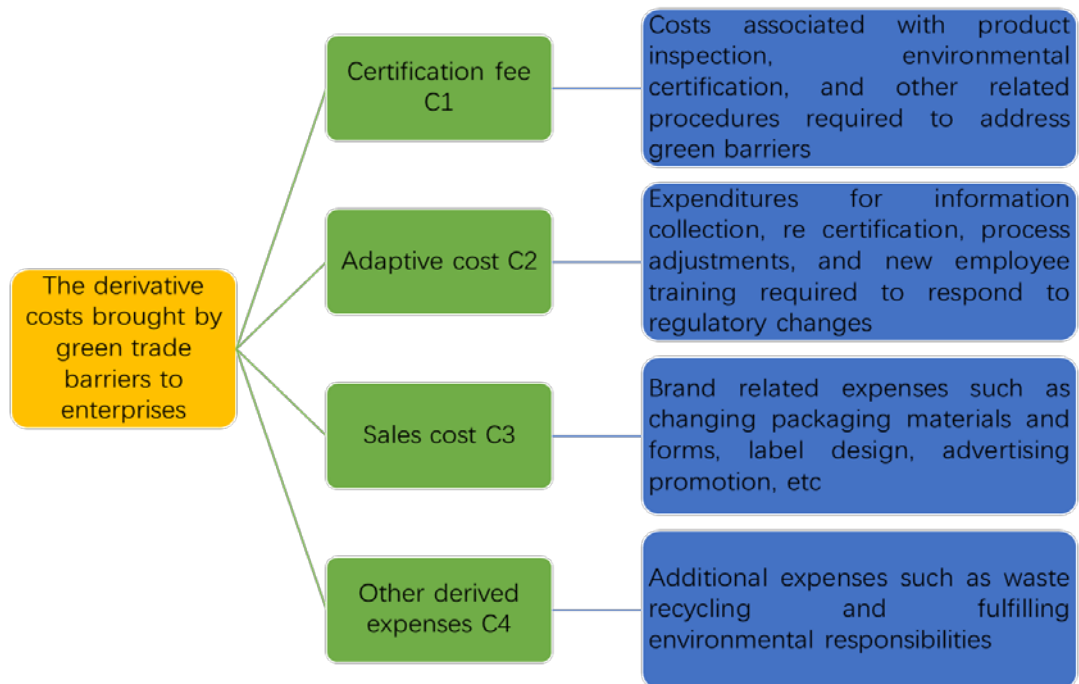


Figure 13 – Classification of derived costs incurred by enterprises as a result of green trade barriers [51]

3 The structure of export commodities has been affected. China's export commodity structure has always been irrational, with labour - intensive and capital-intensive products accounting for a disproportionately high proportion of total exports, and most of the products being of low technological content and grade. Although the proportion of electromechanical products and high-tech products in total exports has gradually increased in recent years, which has partly optimised the commodity structure of exports, but in terms of specific categories, most of the exported electromechanical products are still low value-added products, and the export of high-tech products is mainly led by foreign-invested enterprises. The exports of developed countries are mainly concentrated in capital- and technology-intensive products, while the exports of developing countries are mostly environmentally sensitive commodities. As the world's largest developing country, China

has a comparative advantage in environmentally sensitive commodities, which determines the structure of China's exports in the global market, as well as the impact and influence of green trade barriers. Specifically, green trade barriers mainly affect China's agricultural and food products, textiles, pharmaceutical products, electromechanical products and other categories, especially in the regulations of developed countries and regions, such as pesticide residues in food products, lead in ceramic products, PCP residues in leather, safety of electromechanical products and toys, the organochlorine content of tobacco, the recyclability of packaging, automobile exhaust emission standards and requirements such as indicators of harmful substances in textiles and garments, all of which have had a major impact on China's exports.

Positive impacts :

1 The rapid development of green economy provides new business opportunities for Chinese enterprises. The enhancement of environmental protection awareness has prompted fundamental changes in the consumption concepts of global consumers, and green consumption has gradually become a mainstream trend. Green food, green buildings, green clothing, green computers and other products are sweeping the world with an unstoppable momentum, and environmental protection industry has become a new economic growth point in developed countries, a focus of international economic competition, and a core area for countries to promote the development of green economy.

At present, the environmental protection industry has become a strategic area to which developed countries attach great importance. As a developing country, China, by virtue of its 'latecomer's advantage', is able to draw on and make use of the mature experience of developed countries in the environmental protection industry to accelerate the development of its own environmental protection industry and stand at a higher starting point in the competition in the global environmental protection market. The green economy, as a key to promoting sustainable development, encompasses the active development of biological resources, the development of low-pollution and non-pollution industries, and the sustainable use of resources, etc. These measures not only promote the innovation of green technology, but also provide great opportunities for Chinese enterprises to compete in the international arena, thus accelerating the overall development of the green economy.

Taking organic food as an example, the development course of China's organic food industry is gradually on the right track, and the international market has shown strong interest in China's organic agricultural products, with several foreign buyers seeking to import China's organic soybeans, peanuts, teas, rice, wheat, cotton, organic dried fruits, wines, organic honey, and organic traditional Chinese medicine, which has also provided the future development of China's organic food industry with great market potential and promising prospects for the future development of China's organic food industry. With the rising health awareness of global consumers and the growing trend of green consumption, China's organic food industry is not only ushering in more opportunities for international co-operation, but will also become an important growth point in international trade in the future.

2 Enhanced international competitiveness of products. With the rapid development of the green economy, China, in order to break through the green trade barriers in the international market, the Government has continued to promote the alignment of national standards with international standards, and has adopted and adjusted international standards reasonably according to the actual situation of the country. In order to achieve a resource-efficient export structure, China has implemented a series of mandatory methods to explore and set up a green trade system [33]. In addition, Chinese enterprises continue to improve their technology in all aspects of production, processing, process, distribution, sales and recycling of products, actively participate in international certification, optimise their product structure and effectively break through the constraints posed by green trade barriers by upgrading the quality of their products [60]. Through these efforts, enterprises have successfully enhanced the international competitiveness of their products while coping with global environmental requirements. With the continuous innovation of green technologies and increasingly stringent environmental protection certifications, Chinese enterprises will not only be able to successfully enter the markets of developed countries, but will also be able to occupy a favourable position in the competition of the global green economy, thus promoting the further enhancement of the international competitiveness of their products [16].

3 It is conducive to the promotion of China's exports and the improvement of the quality of domestic goods. The choice of these two directions of development can be specifically analysed and understood in table 3, thus helping enterprises to deal with trade barriers more effectively and achieve sustainable development in the context of the global green economy.

Table 3 – On the main export development options chosen by exporters under the threshold of green trade barriers [49]

Way	Difficulty	Cost incurred	Realize the effect
Transfer market	Low	Small	Unsustainable short-term benefits
Improve technology	Tall	Big	Sustainable long-term benefits

Green barriers are essentially international trade products of science and technology and advanced product barriers, the development of green barriers for China is actually a development opportunity. In the face of increasingly severe green trade barriers, export enterprises usually adopt two main strategies to ensure the smooth export of their products: on the one hand, they sell their products to countries and regions with a lower threshold of green barriers in order to circumvent the high standard of environmental protection requirements [43]; on the other hand, they improve their own production processes through technological transformation and innovation in order to make their products comply with the standards of the green barriers of the advanced developed countries.

2.3 Impact of green barriers on China's import trade

For the existence of green trade barriers, mainly refers to the international trade, which is mainly based on a series of settings established on the basis of environmental protection, many importing countries will set some non-tariff trade barriers for the protection of ecosystems and other requirements, so that the import and export of goods to improve its inspection standards, and make the goods safer, its main purpose is to limit the

import of some goods. Based on the previous trade barriers, more technologies are combined so that they can be better protected.

In the process of implementation, green trade barriers have often evolved, which can be divided into five types, respectively, green tariffs, green health and quarantine system, green technical standards, green environmental labeling system and green packaging system. There are many industries involved, and almost every industry receives the restrictions of green trade barriers, and industrial products become more slow in their development under such restrictions [3]. Green tariffs: its mainly refers to the process of trade exports, developed countries in order to can more accurately practice environmental protection policies, in the process of trade import and export, developed countries will develop relevant policies for products from developing countries. When the appearance of goods that do not meet the requirements of environmental protection, government departments need to increase their appropriate taxes, or to limit their imports of goods.

Green technology standards: the developed countries' science and technology level is higher than that of developing countries, and there will be a certain monopoly phenomenon in the technology level, therefore, it will often restrict the technical standards of developing countries in the name of its environmental protection, but such technical standards are very unfavorable to developing countries.

Green environmental labeling system. This is issued to manufacturers by government departments and civil society in accordance with strict environmental standards and procedures, a graphic on the packaging, as a way to prove to importing countries and consumers that the product from raw materials to production and processing, to packaging and distribution, as well as recycling and the entire production and distribution process is in line with ecological and environmental protection standards

The transfer of seriously polluting industries and products to China not only seriously jeopardises the health and safety of the Chinese people as well as animals and plants, but also profoundly affects the stability and sustainability of the ecological environment of the country as a whole. In view of China's late start in technological innovation and environmental protection, the corresponding technical level and environmental protection standards are still at a low level, therefore, the effective green trade barriers system has not

yet matured in China to build, on foreign imports of undesirable products of interception and restriction of the role of a very small.

While some developed countries are actively setting up strict green trade barriers to protect their own environments, they are adopting unethical means to quietly transfer to China pollution-intensive industries and products that cannot gain a foothold in their own countries. In recent years, this phenomenon has become more and more serious, and the number of hazardous wastes entering China from abroad has risen sharply and at a staggering rate. These hazardous wastes mainly originate from the United States, Japan and Hong Kong, China, covering a variety of industrial waste such as abandoned ships, used cars, electronic and electrical equipment, waste cables and so on. Their illegal entry and improper disposal have brought immeasurable pollution and damage to China's natural environment.

What is particularly worrying is that, due to China's imperfect laws and regulations in the field of environmental protection, relatively low environmental standards, coupled with the fact that the law enforcement and regulatory effectiveness of customs and other regulatory authorities need to be improved, the phenomenon of imported 'foreign rubbish' has not been effectively curbed, but rather, it is showing a trend of intensification. According to incomplete statistics show that only in 2003, China's imports of plastic waste, scrap iron and the amount of waste paper reached 125 times the 1990, 50 times and 21 times the huge, this alarming data undoubtedly for us sounded the alarm, reminding us that we must take immediate action, with a more resolute attitude and more forceful measures, to safeguard the country's ecological security and people's health. health of the people.

GM products enter China in a big way. The possible positive or negative effects of genetically modified foods on human health are still hotly debated between academics and the community, as shown in table 4. Although GM crops have brought many benefits to society, such as increased crop yields and enhanced resilience, they are also associated with a series of risks that cannot be ignored, covering environmental, food safety, socio-economic, and ethical dimensions. As far as food safety is concerned, despite the significant advantages of GM crops in terms of yield enhancement, there are growing public concerns about GMOs in food products.

Table 4 – Controversial views of genetically modified foods on human health [11]

Opinion Categories	Supporting viewpoints	Opposing viewpoints
Scientific Consensus	Most scientific bodies (e.g. WHO, US National Academy of Sciences, European Union Food Safety Authority) consider that approved GM foods pose no significant risk to human health	Some scientists and organisations have pointed out that there is no globally unified scientific consensus and there is uncertainty, particularly regarding long-term health effects
Nutrition and health benefits	Genetically modified (GM) technology can enhance the nutritional value of foods (e.g. 'golden rice' is rich in vitamin A) and help alleviate malnutrition	Critics have questioned the nutritional benefits of GM foods and are concerned that they may cause new health problems
Allergy and Toxicity Risks	There is no evidence of new allergic reactions or toxicity problems associated with GM foods	There are concerns that GM foods may introduce new allergenic proteins and increase the risk of allergy
Pesticide Use and Residues	GM crops reduce reliance on chemical pesticides and lower pesticide residues	Concerns about increased pesticide use due to herbicide tolerance of GM crops and increased risk of human exposure
Regulation and Transparency	Most countries have stringent approval and regulatory mechanisms for GM food	Existing regulatory systems were criticised for not being sufficiently transparent, and calls were made to strengthen labelling systems and the public's right to know

Specifically, there are widespread concerns that GMOs may trigger allergic reactions in humans and that long-term consumption of such foods may increase the risk of fatal diseases such as cancer. These concerns are not empty, but are based on in-depth analyses and prudent assessments of existing scientific research. According to statistics, as of 2004, 16 types of genetically modified foods have been commercially produced worldwide. These foodstuffs are of a wide variety, covering crops such as oilseed rape, cotton, soya beans, corn, tomatoes, potatoes, melons, papayas, sweet peppers, sugar beets, courgettes and other crops, as well as microbiological products such as genetically engineered bacteria for transferring bovine rennet and genetically modified baker's yeast. The widespread use of these genetically modified foods has undoubtedly brought about revolutionary changes in

agricultural production, but at the same time, it has also posed more serious challenges to food safety regulation and public health protection.

Therefore, in the face of the complex impacts of genetically modified foods, we need to adopt a more scientific, comprehensive and prudent attitude, study in depth their potential risks and opportunities, and formulate reasonable policies and regulations, so as to ensure that genetically modified foods can realise their due social and economic values under the premise of safeguarding human health and ecological and environmental safety.

Chapter 3 China's countermeasures to green trade barriers

3.1 Government's countermeasures to green trade barriers

The formation of green trade barriers stems from today's increasingly severe ecological crisis, and its core purpose is to protect ecological and environmental safety and safeguard public health and safety, so to a certain extent it has its own rationality, because developed countries occupy a dominant position in the formulation of global green standards. With the acceleration of economic globalisation and the further aggravation of the ecological crisis, the impact of green trade barriers has become more and more significant and is expected to be further strengthened. Against this background, this paper provides an in-depth discussion on effective measures to deal with green trade barriers at the government, enterprise and consumer levels, with a view to providing strategic guidance and policy recommendations for Chinese enterprises in the global competition for a green economy.

Levy environmental protection tax and gradually internalise environmental costs. Taxation, as an important macro-control tool, plays a crucial role in the market economy, especially in ecological environmental protection and the promotion of sustainable development with significant advantages. Through the implementation of environmental protection tax, it can not only effectively promote the rational use of resources, but also gradually realise the internalisation of environmental costs and ensure that enterprises undertake corresponding environmental responsibilities in their economic activities. Many developed countries have taken the lead in implementing environmental protection tax, and their successful experience shows that environmental protection tax is an effective policy tool to help balance the relationship between economic development and ecological protection, and can promote economic growth while reducing environmental pollution and excessive consumption of resources. For China, environmental protection tax not only helps to improve the level of domestic ecological environmental protection, but also helps to break through green barriers in international trade and enhance the market competitiveness of

Chinese enterprises [9], thus promoting the further development of the green economy and the internationalisation process.

Implementation of an early warning mechanism for green barriers to trade. Changes in green barriers have dynamic and professional characteristics, so it is particularly important to establish an early warning mechanism for green barriers. If the information asymmetry, will lead to the enterprise can't update the products in time according to the changes of regulations or standards, then the product export will encounter obstacles. As countries trading with China are always setting up new green barriers and developing in various directions, national government departments should comprehensively study the green standards of other countries, collect data on the environmental barrier initiatives of other countries and set up an early warning mechanism on green trade barriers, so as to help domestic enterprises export their products effectively in response to the green barrier situation. The government can set up an information database to provide domestic export enterprises with data to help them better cope with green barriers from other countries, which will lead to the rapid development of China's export trade. In addition, the Government should actively participate in the negotiation of international multilateral agreements and international environmental conventions, and build a dispute settlement mechanism to better safeguard China's interests [35].

Improve environmental protection standard system. If China wants to seek development in competition, it must speed up its pace in environmental legislation, improve the programme of environmental protection legislation and raise people's awareness of environmental protection [25]. Based on the background of green trade barriers, in the development process of China's export trade, the government and relevant functional departments should actively promote the environmental protection standard system and strengthen the convergence of China's product standards with those of the world. At present, there is still a gap between China's relevant system and international standards, which needs to be improved urgently. For this reason, the Chinese government should actively understand the situation and changes in the international market, and according to the actual situation in China, to formulate appropriate environmental standards and certification work. To set certain technical barriers for the products, so that they are suitable for environmental

protection and export needs, and ultimately meet international standards. In addition, the relevant departments also need to carry out more comprehensive management of the production process of export trade, so that the products involved in all aspects of the corresponding record, and strictly control the quality of export products, to ensure that the quality of China's foreign trade products in line with international market standards. Finally, through financial, tax and other tilted support means to promote green technology innovation in the foreign trade industry. Firstly, accelerate the financing channels of green industry, provide green loans and other financial support for environmental protection science and technology enterprises through providing green credit, issuing green bonds, setting up green funds and other diversified financial services to ensure that science and technology and environmental protection enterprises of all types and sizes can enjoy financial services equally and fully; secondly, increase the financial inclination of science and technology-based green enterprises, and actively promote the development of the green trade industry through tax concessions, financial subsidies and other inclined policies to actively promote the development of the green trade industry [48].

Establish research and advisory bodies to provide information support on green barriers.

1 The establishment of a 'green trade barriers' information centre and consulting agency to comprehensively collect, collate and analyse green trade barriers on a global scale, especially those in China's major export markets, is of great significance to improving the competitiveness of China's export products. The Centre should conduct in-depth research on relevant provisions in international environmental conventions and international trade agreements, especially special safeguard provisions for developing countries' national conditions, such as the transitional period given to developing countries in meeting standards, the principle of non-discrimination and the principle of compensation, so as to reduce the impact of trade discrimination on China. In addition, through the establishment of a green trade barriers database, further detailing the impact of green trade barriers in major export markets on China's specific export commodities [14], it is possible to provide enterprises with customised coping strategies and solutions, thus effectively assisting

Chinese enterprises to break through the green barriers in the international market and enhance their trade competitiveness.

2 In order to effectively deal with international green trade barriers, it is recommended that a special research institution be set up to focus on research and analysis of green technical barriers. The institution should conduct in-depth comparative analyses of domestic and international standards for Chinese import and export products, assess the current status of international green trade barriers and their development trends [42], and predict future changes through scientific research and data support. Based on the results of this research, the institution should provide policy recommendations and technical support for standard setting to governmental functional departments, and provide specific countermeasures and measures for relevant enterprises to formulate coping strategies and improve their technological processes. In addition, through the work of this research institute, it can effectively help Chinese enterprises to enhance their competitiveness in the global green trade environment, promote enterprises to adapt to the requirements of green technology standards, and promote the sustainable development of China's international trade [50].

3 Actively carry out ISO14000 international certification and green mark certification, and establish a sound system of environmental standards and technical regulations in China. China should learn from the successful experience of foreign enterprises and vigorously implement ISO14000 environmental management certification and green mark certification. At the same time to establish and improve China's environmental standards and technical regulations system. At present, there is no international unified standard for environmental labelling products. Through the bilateral and multilateral international mutual recognition of environmental labelling, the international validity of China's environmental labelling can be strengthened, so that the products of China's certified enterprises can enter the international market smoothly.

4 Actively carrying out 'environmental diplomacy' activities and strengthening international exchanges and cooperation. Actively participate in the activities and negotiations of international environmental protection organisations and international trade organisations, expand China's influence in some international environmental protection and trade legislation, stop the abuse of environmental protection regulations and the

phenomenon of trade protectionism, and China can put up a defence or take reasonable retaliatory action against developed countries' violation of the principle of non-discrimination and the abuse of green trade barriers to trade discrimination against Chinese export products. At the same time, we should strengthen international exchanges and cooperation with other developing countries, look for emerging potential markets, reduce the impact of trade friction aggravated by trade protectionism [23], and in the formulation, revision and negotiation of international treaties, we should jointly adhere to the lawful and reasonable demands of the developing countries, and stop the attempts by developed countries to abuse the provisions of the environmental trade agreements, set up green trade barriers and carry out trade protectionism indiscriminately, so as to jointly safeguard the interests of developing countries. Jointly safeguard the interests of developing countries. In addition, we should effectively use the arbitration mechanism of the WTO to appeal to the Dispute Settlement Body (DSB) of the WTO against discriminatory green trade barriers unilaterally set up by importing countries with the nature of trade protection, and actively strive for favourable verdicts to safeguard China's legitimate economic rights and interests.

5 Strengthen cost management and establish a 'green accounting system'. The Chinese government should strengthen cost management, incorporate environmental costs into the social cost accounting system, and establish a 'green accounting system', so as to internalise environmental costs. According to figure 14, environmental costs include the costs of environmental pollution control and the costs of ecological damage restoration incurred during the production, transport, use, recycling and disposal of commodities.

However, the current prices of many export products do not reflect their environmental burden, and this 'market failure' phenomenon makes export commodities fail to cover the full environmental costs, which leads to the worsening of the global environmental pollution problem. According to the theory of internalisation of environmental costs, the government should internalise these environmental costs into the true cost of exported goods by clarifying property rights, so as to eliminate the cost advantage of environmentally unfavourable products in the market.

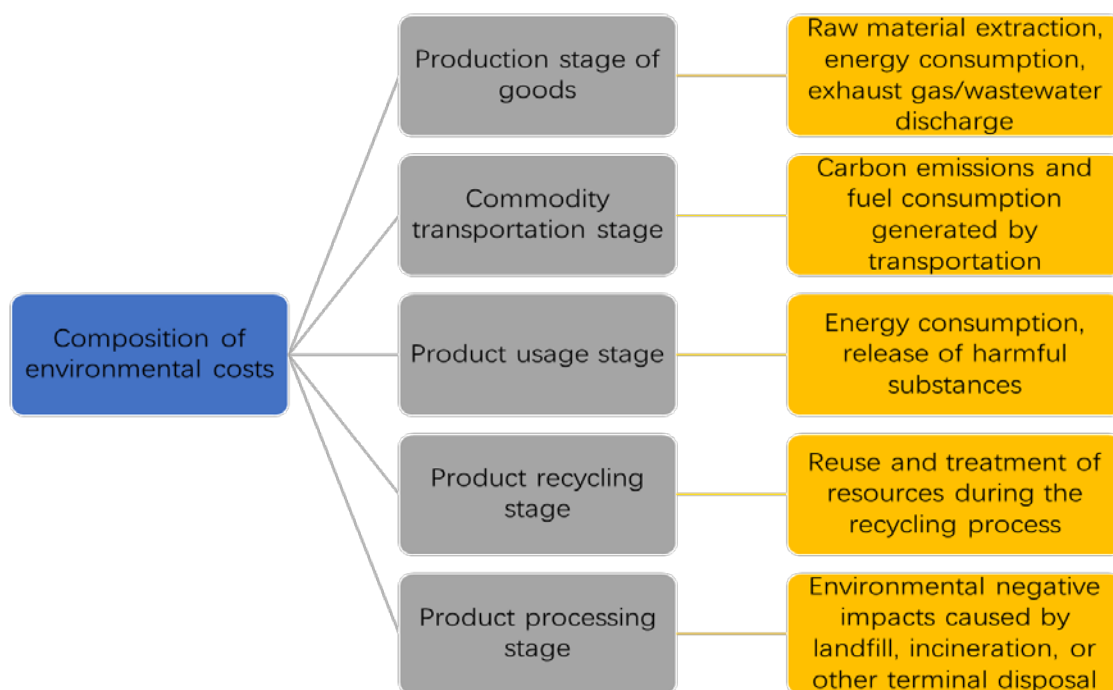


Figure 14 – Environmental cost components [7]

In addition, the government can promote the production and export of green products through environmental asset assessment, enterprise scale operation and other measures, as a breakthrough to reduce the impact of ‘green trade barriers’, and thus promote the sustainable development of international trade [57]. The establishment of a green accounting system not only enhances the environmental awareness of enterprises, but also helps China to occupy a favourable position in the global competition for a green economy.

3.2 Countermeasures of enterprises to green trade barriers

With the continuous development of China's economy, people's consumption level is increasing, so they are more and more concerned about the environmental issues that are closely related to them, and their consumption preference is also developing in the direction of green and organic products. As the main body of technological innovation, Chinese enterprises should apply green products to break through the green barriers of other countries, and consider the resource, energy and environmental protection issues in the design, procurement, production, marketing, logistics and recycling of products in an all-round way, so as to embody the concept of product transformation from low-end to high-

end from the root [17]. At the same time, enterprises can take advantage of the state for green products to give support, preferential policies, through the digital technology-enabled production technology transformation, management model innovation, innovation of existing production models, build a clean low-carbon energy system, so that green low-carbon production through the product design and development, manufacturing, recycling and other processes, for their own technological progress inserted into the take-off ‘! For this reason, Chinese enterprises should increase the development of green technology [50].

Increasing direct investment abroad. As one of the important trends in the current international economy and society, green development will not be blocked by any country. Developed countries regard environmental barriers as a tool to protect their own trade interests, which seriously affects the development of trade in developing countries. For this reason, enterprises should actively implement the national ‘going out’ development strategy and make direct investments abroad, especially in countries and regions where green barriers often appear. Through transnational direct investment, enterprises could set up product technology research and development centres in developed countries and closely integrate them with advanced foreign technology and experience, as one of the most effective ways of dealing with the new international trade protectionism.

Implementation of green integration from product design, production to product marketing.

1 Enterprises should actively participate in various forms of international economic and technological exchanges, commodity fairs or exhibitions, overseas visits and industry visits, etc., to collect ‘green information’ dynamics related to their own development, so as to establish a good international environmental image. Traditionally, design is designed for manufacturing, but green design is designed for the environment. According to table 5, in the purpose of design, traditional design takes ‘how to make the product’ as the starting point and gives priority to production efficiency and cost, while green design takes ‘reducing environmental impact’ as the core, which is a kind of progress and expansion of traditional thinking. In terms of material selection, traditional design tends to use low-cost, high-performance materials, while green design pays more attention to the sustainability of materials, such as recyclable, biodegradable or low-carbon materials. In the life cycle

perspective, traditional design is mostly confined to the closed loop of ‘design-make-sell’, while green design introduces a ‘cradle-to-grave’ or ‘cradle-to-cradle’ approach. ‘Cradle to Cradle’ concept, which emphasises the optimisation of the whole process from raw material acquisition to final recycling. In terms of waste disposal, green design's concept of ‘disassembly and reuse’ not only reduces disposal costs, but also responds to the development trend of the circular economy, whereas traditional design gives less consideration to this, often leading to a waste of resources. Especially in terms of regulations and awareness of responsibility, green design actively responds to and even leads environmental regulations and social expectations, expanding the role of designers from ‘product creators’ to ‘environmental guardians’ and ‘responsibility bearers’. The role of designers is expanded from ‘product creators’ to ‘environmental guardians’ and ‘bearers of responsibility’. Products are conceived, developed and manufactured with the future in mind, so that at the end of their life, some parts can be refurbished and reused, while others can be safely disposed of. Green design is so important that it can determine the fate of a product. ‘It's just as important that a product is easy to destroy as it is to make’ and “we don't make rubbish” is the jargon of the green design community.

Table 5 – Traditional design vs green design [36]

Comparative Dimensions	Traditional Design	Green Design
Design Objectives	Centred on manufacturing efficiency and cost control	Focus on environmental friendliness and sustainability
Material Selection	Prioritise performance and price	Prioritise renewable, biodegradable, low-polluting materials
Life Cycle	Focus on performance in the use phase	Emphasis on environmental impact throughout the product life cycle (from raw materials to recycling)
Disposal	Recycling and disassembly are not usually considered	Emphasis on ease of recycling, degradability or reusability
Regulatory Standards	Comply with minimum product safety and quality standards	Compliance and promotion of environmental regulations, green certifications

2 Promote clean production, develop green products and expand green packaging. Today's international attention to such a reality: on the one hand, human beings are spending huge sums of money to protect the environment and control pollution; on the other hand, the environment on which human beings rely for survival has not given human beings the corresponding gift, but instead issued warnings again and again. Although industrial pollution in some developed countries to get some control, but the economic cost is huge, and new environmental problems continue to appear. People in the past to reflect on the environmental protection strategy and environmental protection technology, found that in the past more emphasis on environmental protection on the end of the pollutant control and treatment, but ignored the pollutants of the 'whole' control and prevention. More and more facts show that environmental problems are not only problems at the end of the production process, but also in the whole production process and all the links before and after the production process, and sometimes the impact of other links on the environment is even greater than that of the production process itself. If we start from the preparatory process of production on the whole process of raw materials used, production processes, as well as the use of products after the completion of the production of a comprehensive analysis and evaluation of the possible environmental pollution problems in advance to prevent the environment will greatly reduce the hazards faced by the environment. Cleaner production includes cleaner production process and cleaner products in two aspects, that is, not only to achieve the production process of non-polluting or non-polluting, but also produced products in the use of the final end-of-life treatment process does not cause damage to the environment. This requires enterprises to adhere to the green development of green factories, green enterprises, cleaner production enterprises and energy-saving and environmentally advanced enterprises to build a platform for exchanges and co-operation and display, and promote enterprises to establish the concept of green brand, and consistently take the road of green development, the construction of green brands, enhance the competitiveness and influence of enterprises [21].

3 Changing business concepts and carrying out green marketing has become one of the key strategies for modern enterprises to achieve sustainable development. Green marketing, as an emerging marketing concept, is a major leap forward in marketing activities

across the century, which emphasises that enterprises should not only meet consumer needs in the promotion of their products and services, but also pay attention to the protection of the Earth's resources, the reduction of pollution and the promotion of the sustainability of the ecological environment [31]. The core concept of green marketing lies in the fact that, in the process of achieving marketing objectives, enterprises need to take into account factors such as the social environment and ecological sustainability, so as to ensure that their products or services can effectively meet market demand while also contributing to the maintenance of the ecological balance and the enhancement of the quality of the environment. Green marketing pays attention to tapping the inherent ecological needs of human beings, and better meets the needs of the spirit and quality of life while satisfying the material needs of human beings. Green marketing is characterised by its emphasis on the unity of the economic benefits of enterprises and the interests of society and the environment.

Differentiating between environmental protection and green trade barriers. Although the green trend in international trade promotes the coordinated development of trade and environment, it also breeds green barriers, but we can't simply regard all international conventions, international standards and various certification systems related to environmental protection as green trade barriers. In fact, these international conventions and standards related to environmental protection have gradually become the basic conditions and norms for global green trade, and the Chinese government has taken a clear attitude towards this. We should recognise that the implementation of trade standards and related systems in most countries still reflects the good intentions of protecting the ecological environment and promoting human health. Although these international environmental conventions and standards in many cases reflect the will of developed countries, but through these international norms derived from the unreasonable national environmental standards and trade barriers set up in accordance with the true nature of the green protection of trade barriers. Therefore, we should fully understand the positive significance of international norms on green trade, but also accurately distinguish the green trade barriers that may be implied therein, so as to comply with the international trend of green environmental

protection, and to meet the challenges posed by green protection with a more open and pragmatic attitude.

Construct a three-dimensional and comprehensive strategy system to deal with green barriers.

1 Cooperate with the government's environmental diplomacy strategy, make use of the WTO mechanism, improve the construction of the external environment for the survival and development of enterprises, dock with the existing international standards, improve the quality of green products as soon as possible, actively participate in the formulation and negotiation of the international environment and trade rules, and strengthen cooperation with the international community through the summit forums, high-level dialogues and other international exchange activities [61]. Now that China is a member of the WTO, it can resolve the issue within the WTO framework through negotiation or by making representations to the arbitration body of the WTO, in accordance with the WTO principle of differential and more favourable treatment for developing countries.

2 Seek government technical and financial support and special environmental subsidies. Enterprises need to pay attention to keeping abreast of the times while participating in international competition, actively introducing advanced technology, constantly improving their own technical strength, and reducing the impact of green trade barriers on the export trade of enterprises . With regard to the formulation of specific measures, it is recommended that enterprises that produce and export green products on a national basis, as well as those that internalise environmental costs, should actively seek financial and technological support from the Government when faced with financial difficulties in major technological innovations and export operations. To this end, Governments should take effective measures to encourage the production and business activities of these enterprises, establish special green credit support mechanisms and technology development support mechanisms, and at the same time strive for relevant tax incentives and environmental subsidy policies, so as to reduce the production costs of enterprises and enhance the price competitiveness of their products. This will not only help to promote the sustainable development of a green economy, but also promote enterprises to better meet the challenges of green trade barriers in the global market and improve their

international competitiveness. In recent years, a number of countries and regions have supported the development of green industries through similar measures and achieved significant economic and environmental benefits, demonstrating that these policies have broad implementation space and good prospects for development.

3 Strengthen enterprise management efforts to enhance the green competitiveness of products. Facing more and more green barriers abroad, enterprises can only move forward, there is no way back. Enterprises are the main body of the market, the survival and development of enterprises rely on their own efforts. Enterprises only seriously and pragmatically looking for breakthroughs from themselves is the only way to meet the challenge and overcome the barriers.

3.3 Consumer response to green trade barriers

With the deterioration of the ecological crisis, the traditional way of economic development has been in trouble, and mankind is counting on the green way of economic development and adopting a green way of life and consumption. In this context, the implementation of green trade barriers is also increasingly difficult to avoid. To deal with green trade barriers, develop a green economy and protect the ecological environment, it is not enough to rely on the government and enterprises alone, but consumers should also be involved. Consumers, as the main body of consumption, express different consumption wishes for different products, which will have a direct impact on the production and operation of enterprises.

Establish ecological values and form green consumption attitudes. The traditional consumption pattern, guided by anthropocentric thinking, puts people in the position of conquerors of nature, pursues an uncontrolled increase in the quantity of consumption, and ‘mass production - mass consumption - mass disposal’, which essentially belongs to the resource-consuming consumption pattern, destroys the ecological balance, and is non-sustainable consumption. As shown in figure 15, green consumption refers to a new type of consumption behaviour characterised by moderate moderation of consumption, avoidance or reduction of damage to the environment, protection of consumer health and reverence for

nature, and its core is sustainable consumption. The formation of green consumption is based on the establishment of the ecological and ethical values of ‘living in harmony’ between man and nature, emphasising the guidance of green consumption awareness, relying on the development of ecological and green technologies, and receiving strong protection from national green laws and regulations. Green consumption opposes the human-centred stance of the traditional consumption model and its utilitarian attitude, and advocates the harmonious integration and coordinated development of human beings and nature, a concept that not only reflects the need to protect the ecological environment, but also promotes the realisation of sustainable development [58].

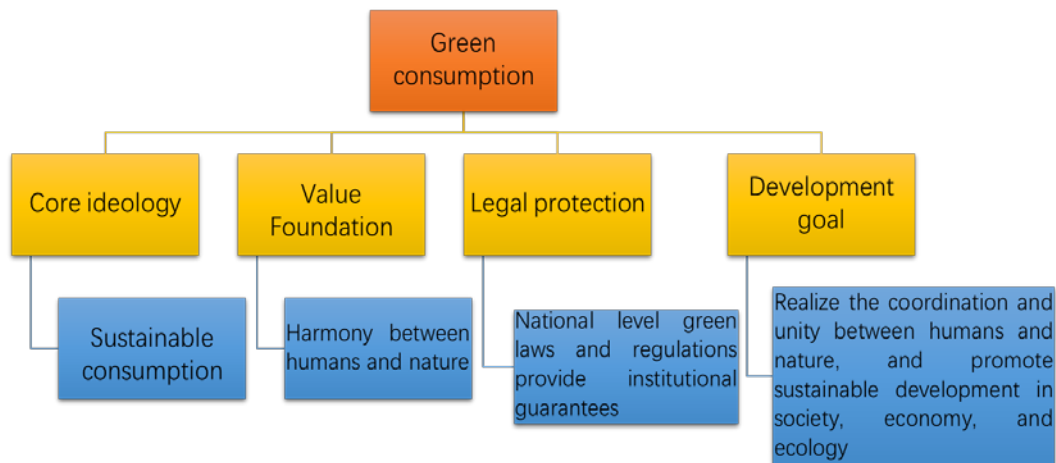


Figure 15 – Green consumption [12]

With the continuous innovation of green science and technology and the improvement of global environmental awareness, green consumption is gradually becoming the new normal of the global economy, influencing the policies, corporate strategies and consumer behaviour of various countries. A person's thoughts and actions are determined by his level of knowledge and values about things. First of all, it is necessary to popularise the environmental education of consumers, improve the level of knowledge of environmental science, let consumers enhance their understanding of the green economy, know the natural conditions under which human beings can survive and the real situation of natural destruction, know the reasons for the destruction of nature and how to prevent the

destruction, cultivate the consciousness of consciously protecting the environment, and set up the eco-values: cultivate the consciousness of energy-saving and environmentally friendly consumption, and form the scientific and reasonable green consumption attitude. Secondly, we should increase the knowledge of life, health and safety education for consumers, so that consumers understand that their life, health and safety are closely related to the ecological environment, green consumption is beneficial to the consumer's personal life, health and safety; so that in the process of consumption and take the initiative to choose the environmentally friendly green products that do not harm the environment or harm the degree of the green products, pay attention to the reuse of the product in the process of using, multiple use, and pay attention to the consumption of the product classification recovery, recycling. In the process of product use, attention is paid to repeated use, multiple use, and attention is paid to the post-consumption of product classification recovery, recycling.

Researches have reflected that several things effect consumers' decision-making, but perhaps the strongest influences are the expenses associated with green buying [26]. The economic influences that effect individuals consist of more than just price, i.e. the effort and time needed to search and assess goods and services are part of the cost incurred in consuming that product [7]. For individuals to hold desirable behaviors, the apparent ratio of costs to benefits (i.e., value) given to green products must be better than that of substitutes [27]. Thus, theory proposes that if individuals feel that environmental products are priced too high, environmental buying is impeded. As environmental products are seen to be significantly more expensive than conventional products [28], it is probable that price discourages many non-green consumers. Furthermore, most individuals see higher prices related with energy star rated appliances but do not assume forthcoming cost savings. Thus, consumers choose alternatives that have a lower initial financial expenditure not realising another choice is inexpensive in the long run though also being advantageous for the environment [7]. Since price has been studied as a barrier in most of the researches on green consumption, however there is need to explore whether it moderates consumers green purchase of eco-friendly home appliances or not.

Since environmental products often comprise higher costs (e.g., higher prices, information search, or performance risk), the acquisition of such items makes a social

dilemma for consumers. Thus, consideration of social effects on the buying of green goods and services is likewise an important aspect. It is anticipated that reference group will effect green purchase behavior. If a group to which an individual belongs to or aspires to belong to, displays behaviors consistent with their pro-environmental attitude, the person is under more pressure to imitate. In disparity when a reference group does not display consistent behaviors, the person is less expected to interpret their own behavior into action [20]. Thus, it is of importance to investigate, whether social influence acts as a barrier to green purchasing. Trust Besides, consumers' loyalty to a conventional (i.e., non-green) product may be unwilling to experience the cognitive costs of searching out, and assessing the information required to evaluate, available substitute to a currently used product.

Research further submits that consumers do not want to be perceived as a “sucker” [29], which could be the situation if a eco-friendly product fails to meet their standards. The effort and time needed to seek and assess green alternates, as well as the cognitive and economic risks related with eco-friendly product failures, possible further discourages eco-friendly consumption. Several studies reported that lack of consumer trust and characteristics of green products and confidence in green claims was a noteworthy barrier of green purchasing [32], however these researches focused on low involvement products. Subsequently, it is of great concern, whether lack of consumer trust effects low involvement green purchasing.

Consumers practice green consumption and promote green development. Not only does production provide for and induce consumption, production itself is also dependent on consumer demand in some form, in Marx's words, consumption ‘creates the producer's conception’; the reaction of consumption on production, guiding the formation of the production mode and production structure. The promotion of green consumption concept, the proportion of green products and services in the consumption of consumers gradually, expanding, green consumption will become increasingly popular, green product consumption will occupy a dominant position in the consumption structure, the formation of a strong green demand; according to the theory of demand, when the consumer preference for a certain product, the equilibrium price of the product rises, increasing the willingness of enterprises to produce and supply, expanding the amount of production of products,

increasing the product supply. The expansion of green demand will directly promote the expansion of green production, which in turn promotes the procurement of environmentally friendly raw materials, the development of green production technology and green product innovation, thus forming a complete green production system. Therefore, the implementation of green consumption by consumers can not only greatly promote the transformation and upgrading of the production structure of enterprises, but also accelerate the process of research and development of green technology, innovation of green product production and expansion of the scale of green production. This change will help enterprises shift from the traditional resource- and energy-consuming production model to a more energy-efficient, material-saving and sustainable green production model, thereby meeting the increasingly stringent global environmental requirements and market demand.

The implementation of green consumption by consumers will not only promote the transformation of the economic production model, but will also lead to the transformation of human ideology, replacing the traditional concept of consumption with the concept of green consumption and promoting the construction of an ecological civilisation in society as a whole. Green consumption is a kind of planned consumption mode, advocating rational consumption, moderate consumption, restrained consumption, overcoming the tendency of 'materialisation' of human beings, and is a kind of consumption that maintains the balance between material and spiritual; it gives up the consumption concept with profligate and ostentatious material consumption as the core content, and opposes uncontrolled development and use of natural resources, and establishes a consumption concept based on the affordability of natural resources and energy. It is a kind of consumption that maintains the balance between material and spiritual; it abandons the core content of profligate and ostentatious material consumption, opposes the uncontrolled exploitation and use of natural resources by human beings, and establishes the consumption based on the affordability of natural resources and energy. Consumers' choice of green consumption means that they cherish the ecological environment and natural resources, as well as the expectation of creating a good relationship between human beings and nature in a harmonious coexistence, which will promote China's green development and accelerate the construction of an ecological civilization.

Conclusion

As global environmental issues become increasingly severe and the concept of sustainable development gains widespread acceptance, environmental protection has emerged as a critical issue of concern to the international community. In this context, green barriers—a new form of non-tariff trade barriers that utilise environmental standards and technical specifications as tools – are gradually replacing traditional tariff barriers and emerging as a significant factor influencing international trade. Especially in the current trend where global trade liberalisation and environmental protection are given equal importance, green trade barriers have exerted profound impacts on the structure of international trade, the efficiency of resource allocation, and the global industrial chain structure. This paper takes ‘The Impact of Green Barriers on China's Foreign Trade’ as its research theme, combining international trade theory with an environmental economics perspective to systematically analyse the background, operational mechanisms, and multi-dimensional impacts of green barriers on China's foreign trade. It also proposes targeted and actionable response strategies, aiming to provide theoretical support and practical pathways for China to achieve sustainable development within the global green trade system.

At the theoretical level, this paper first systematically defines the basic connotation, forms of manifestation, and main characteristics of green trade barriers. Green barriers essentially refer to measures taken under the guise of environmental protection, such as setting environmental standards, technical specifications, environmental certification systems, product labels, and inspection and quarantine procedures, to restrict and intervene in the market access of imported goods. Such barriers are characterised by strong legal legitimacy, high technical content, covert implementation methods, and broad coverage. Especially within the framework of WTO multilateral trade rules, they are increasingly being applied as ‘legitimate non-tariff barriers’ in international trade practices. Especially in developed countries, leveraging their strong capabilities in setting technical standards and environmental enforcement resources, green barriers are used as an effective tool for coordinating trade policies with environmental policies. This not only safeguards their own

environmental security but also, to some extent, establishes technical and institutional trade barriers against developing countries.

In the analysis of the current situation, this paper reviews the development process and current policy environment of China's foreign trade, pointing out that in the new phase of China's ongoing efforts to advance high-level opening-up and green development, green trade barriers have become an important challenge facing China's foreign trade development. On the one hand, developed countries such as Europe and the United States are continuously upgrading their environmental regulations and market access conditions, causing China's traditional export products—particularly those from the mid-to-low-end manufacturing sector—to frequently encounter technical trade barriers, thereby increasing corporate compliance costs and export risks. On the other hand, green barriers have also driven Chinese enterprises to continuously improve their environmental standards, product quality, and production processes, thereby promoting industrial structure optimisation and green technological innovation, becoming an important external force driving China's economic transformation and upgrading.

In a detailed analysis of their impact, this paper systematically examines the dual effects of green barriers on China's export and import trade. From an export perspective, green barriers manifest as trade restrictions in the short term, leading to restricted market access for export companies, reduced orders, compressed profits, and the need to allocate more resources to certification, inspection, and production process improvements. However, in the long term, these barriers help enhance corporate environmental awareness, drive technological upgrades, increase product value-added, and improve brand international image. Especially under the 'dual carbon' strategy, green barriers align to some extent with China's green development strategy, exerting a positive guiding effect on promoting green transformation.

In terms of response strategies, this paper constructs a multi-dimensional collaborative green barrier response mechanism from three dimensions: government, enterprises, and consumers. At the government level, efforts should be made to improve environmental protection regulations, strengthen the construction of green standard systems, establish a technical trade barrier early warning mechanism, promote the implementation of

environmental tax systems, and establish green trade information and research support institutions to enhance the country's comprehensive response capabilities to green barriers. At the corporate level, companies should prioritise green technology R&D and upgrades to clean production processes, enhance international cooperation, improve green certification capabilities and brand competitiveness, and establish a fully integrated green supply chain. Additionally, they should actively expand overseas investment channels, optimise global industrial, and reduce reliance risks associated with specific markets. At the consumer level, efforts should be made to cultivate green consumption awareness, promote the popularisation of green consumption concepts, and achieve positive incentives for green products and environmentally friendly behaviour from the consumer end, thereby forming a collaborative effort for green development guided by the government, driven by enterprises, and participated in by consumers.

This study has certain innovative and practical significance. First, in terms of research perspective, it comprehensively considers the dual context of the evolution of the global green governance system and China's green transition, constructing a macro-micro integrated framework for green barrier analysis, emphasising a systematic analysis of the policy-industry-market-public quadrilateral. Second, in terms of impact assessment, the study not only analyses the negative impacts of green barriers but also focuses on their positive roles in promoting sustainable trade and driving high-quality industrial development, breaking away from the traditional research paradigm that overly emphasises the 'restrictive effects' of green barriers. Finally, in terms of policy recommendations, we propose the establishment of a multi-dimensional collaborative mechanism involving governments, enterprises, and consumers, with a focus on addressing green barrier challenges from multiple angles, including institutional design, technological innovation, and social awareness, providing theoretical references and analytical pathways for future related research.

In summary, green barriers, as an emerging and increasingly normalised form of non-tariff barriers in international trade, have a broad and far-reaching impact on the development of China's foreign trade. They are not only a real challenge for China's foreign trade enterprises but also an external driving force for China's advancement of its green

development strategy. In the new era, in-depth research into the essential characteristics, operational mechanisms, and response strategies of green barriers is of significant importance for enhancing China's foreign trade competitiveness, accelerating green and low-carbon transformation, and achieving sustainable development goals. In the future, as global green governance mechanisms are further strengthened and trade rules continue to evolve, green barriers will inevitably become deeply embedded in the global trade system. Therefore, China should continue to advance the dual-track approach of green trade policy and internationalisation of environmental protection systems, actively participate in the formulation of international green rules, enhance its voice and initiative, and integrate into global economic and trade cooperation with a more open, transparent, and green posture, achieving the synergistic advancement of economic development and ecological civilisation.

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