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Research on the Countermeasures of China's LED Lamps Export in Response to European and American Technical Barriers

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Abstract: *At present, Covid-19 continues to be popular all over the world, the international trade friction is constant, the ecological environment is worsening, and the LED lamps market in China is struggling to survive. On the one hand, the improvement of environmental protection requirements leaves little time for the development of LED lamps market in China, on the other hand, the international trade friction is intensifying, and the technical barriers to trade adopted by Europe and the United States have an increasing impact on China's LED lamps export. Certification bodies, certification frequency, access requirements, production standards, environmental protection and safety are becoming more and more strict. The total export products of China's LED lamps market are decreasing year by year, the profits of export products are declining, and the brand influence of export products is even weaker. In order to deal with technical trade barriers in Europe and America, this paper puts forward several countermeasures from the national level, market level and enterprise level, hoping to provide help for China's LED lamps export.*

Keywords: *LED, Technical Trade Barrier, Export Measures*

1. Preface

In 2021, the manufacturing industry, especially the import and export trade enterprises, is faced with three unavoidable pressures: first, the global Covid-19 continues to be popular; second, the international trade friction continues to be fierce; third, the ecological environment is deteriorating; many countries in the world are beginning to implement the "double carbon" policy; under the triple pressures, the global manufacturing industry is struggling to survive. For China's manufacturing industry, especially for LED lamp export enterprises, the pressure is even greater. On the one hand, the conflict between environmental protection requirements and industrial development is intensifying. Although China is the largest LED lamp market, it started late and the technology is backward. Many enterprises are still in simple manufacturing and processing links. It takes more time and more resources to catch up with the technological gap between Europe and America. However, China's "3060 Double Carbon" policy leaves little time for the development of China's LED lamp industry. On the other hand, international trade friction has gradually changed from traditional trade protection to technical barriers to trade. Western developed countries hold the international high-end LED market, and their technical level, LED certification standards and popularity are ahead of other regions. In terms of LED certification standards, the high technical and safety standards of European and American countries have gradually become technical barriers to trade in developed countries. Especially under the current new round of trade friction, western developed countries began to adopt technical barriers with higher technical requirements, stricter security protection and finer standards. This round of technical barriers is characterized by low transparency, strong technology, strong concealment, difficult supervision and low universality. On the contrary, the original traditional trade protection such as tariffs, licenses, quotas and access. Some developed countries have put forward strict market access mechanism on the grounds of safeguarding national basic security, ensuring human health and safety, protecting ecological environment, preventing fraud and ensuring product quality, relying on their own advantages in science, technology and social and economic development. By formulating technical regulations and safety standards, the access requirements of LED lamp products are technically improved, which has caused great obstacles to foreign trade of other countries, especially developing countries. Based on the above background, combined with the development status of China's LED lamp export industry, this paper expects to put

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forward some optimization suggestions for China's LED lamp export enterprises to deal with the technical barriers in Europe and America.

2. The export status of LED lamps in China

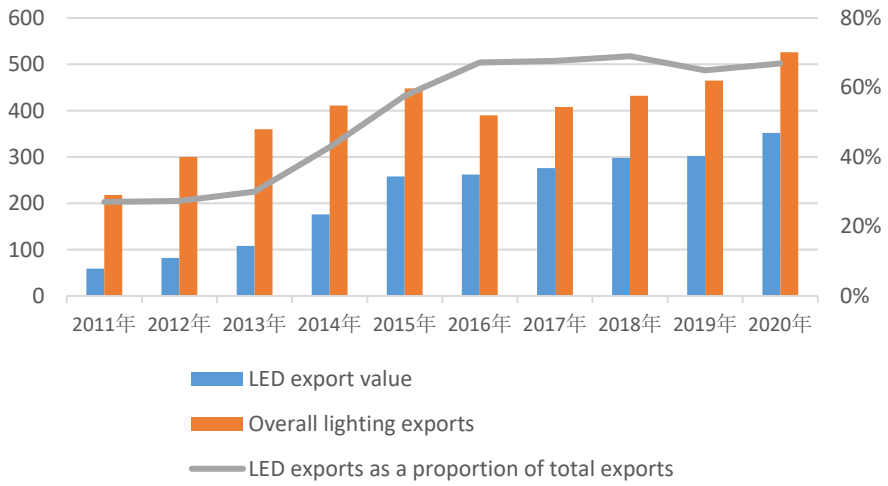

Figure 1: Export of China's lighting industry from 2011 to 2020 (billions of dollars)

2.1. Export status

In 2002, the export business of China's LED lighting industry has been developing for more than ten years. The export scale, export products, export countries and export forms are becoming more and more complex, and the overall LED lighting export industry is also developing better and better. However, in recent years, affected by factors such as international trade friction, technology blockade and market transfer, the export of the whole LED lighting industry has the following characteristics:

First, from the perspective of export scale, the total export of LED lamps is increasing, but the growth rate is slowing down. Figure 1 shows the export of LED lighting industry in China from 2011 to 2020. It can be seen from the figure that in 2020, the export of China's overall lighting industry will reach 52.6 billion US dollars, equivalent to 364 billion RMB, up 16.1% year-on-year. Among them, the export volume of LED lighting market exceeded US$ 35 billion, accounting for over 66% of the total export volume of the whole lighting industry. However, since 2016, the proportion of the export volume of LED lighting market to the total export volume of the whole lighting industry has obviously slowed down, basically maintaining a stable level.

Second, from the perspective of export products, the export proportion of LED lamps and lanterns products has expanded, and other lighting products have changed differently (see Table 1). In the past three years, LED products have accounted for more than 2/3 of the total lighting exports, and the replacement of traditional products by LED products is still showing a steady trend. Traditional light sources, incandescent lamps, halogen tungsten lamps and other heat radiation light sources, as well as high-intensity gas discharge lamps such as high-pressure mercury lamps, high-pressure sodium lamps and metal halide lamps, have little change in overall proportion. Under the direct impact of LED products with increasing cost performance, the compact and straight tube/ring products of fluorescent lamps have shown a downward trend in recent years; The lighting products related to epidemic prevention, such as scientific research, medical lamps, ultraviolet lamps, etc., have exploded in the context of massive demand caused by the global epidemic, with a year-on-year increase of 54.3%. In 2020, the export of related products will reach 585 million US dollars.

Table 1: Proportion of export quantity of electric light sources in China

Year	filament lamp	halogen tungsten lamp	Compact fluorescent lamp	Tube/ring fluorescent lamp	HID lamp	LED bulb	LED lamp tube
2020	19.10%	4.60%	5%	2.20%	0.60%	59.70%	8.80%
2019	21.50%	4.50%	9.10%	3%	0.60%	53.30%	8%
2018	20.90%	8.90%	11.70%	3.60%	0.70%	46.20%	7.90%

Third, from the perspective of export regions and countries, although the share of European and

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American markets is declining, it is still the largest LED lighting export market in China. In 2020, the top three regions of China's LED lighting exports are Europe (27.6%), North America (30.6%) and Southeast Asia (12.5%), which account for 70% of China's LED lighting exports. Among the European and American markets, although the North American market is better than the Latin American market, both of them are on a downward trend as a whole. Emerging economies' Asia-Pacific markets performed well, among which East Asia, West Asia, Southeast Asia, Oceania and other markets performed well, while South Asia market performed poorly. From the national point of view, Germany, Britain, the Netherlands and Russia account for over 52% of the European market. Only the United States accounts for 88% of the North American market; Vietnam, Singapore, Malaysia and Thailand accounted for 80.9% of the Southeast Asian market.

2.2. Technical barriers to the export of LED lamps and lanterns

Technical barriers are defined as all kinds of barriers set by international or regional governments in product technology. Usually, international technical barriers are adopted to control import and export commodities, and the technical requirements for imported products are improved by promulgating laws, decrees, regulations, rules, establishing technical standards, certification system, health inspection and quarantine system, inspection procedures, packaging, specifications and labeling standards, etc.

China's LED lamps and lanterns products are mainly exported to European and American markets. In recent years, European and American markets have adopted more stringent technical restrictions on the import of LED lamps and lanterns products, mainly reflected in the following aspects:

First, the number of technical certification bodies has increased, and the number of sub-product certification has increased. At present, there are many recognized LED product certification institutions in European and American markets, such as ANSI (American National Standards Institute), UL (American Underwriters Laboratory), ETL (American Electronic Testing Laboratory), FCC (American Federal Communications Commission), Energy Star (Energy Star), IEC (International Electrotechnical Commission), ENEC (European Standard Electrical Appliances Certification), etc. Each institution has different requirements for imported LED products and imports them.

Second, multi-agency certification coordination requires export enterprises to meet more requirements at the same time. In the EU market, the exported LED products need to pass LVD (Safety Certification Test) and EMC (Electromagnetic Compatibility Certification Test), and the corresponding certification marks are mainly CE and ENEC. Although the standards cited by the two certifications are basically the same, the threshold of ENEC is much higher, and ENEC must be tested and certified by the certification bodies of ENEC member countries, and the entry threshold of ENEC member countries has different requirements. Some countries need product management to meet ISO9002 or its equivalent standards. In some cases, the initial and minimum annual output will be inspected by the license issuing agency according to the reconciliation inspection procedure; Some countries require that if the power supply of LED products is purchased, the power supply should pass the ENEC certification, and then the power supply should be used as a lamp for certification test, etc. All kinds of restrictions have increased the export difficulty of LED products in China.

Table 2: Certification and identification of LED lamps in various international regions

Region	Europe	North America	China
Certification Mark	IEC, ENEC, CE	ANSI, UL, ETL, FCC, ENERGYSTAR	CQC, CCC, GB

Third, the international product certification standards vary from region to region, making certification more difficult. The main certifications in the North American market include ANSI, UL, ETL, FCC and ENERGYSTAR, while the European market mainly includes IEC, ENEC, CE, etc. The standards of the two regions are quite different, for example, between the FCC certification test of LED lamps in North America and the EMC certification test in EU CE: ①FCC certification only tests EMI, excluding EMS test items; Then both CE items need certification test; ②FCC certification has completely different test limits in ClassA (industrial and commercial LED lamps) and ClassB (residential LED lamps), and CE limit standard is only quite limited with ClassB; ③In the scanning test of radiation disturbance in certification space, FCC frequency range is 30MHz-1GHz, CE range is 30KHz-300MH; ④FCC-certified EMI certification test limit standard usually requires a margin of 6dB or more, and CE-certified EMI test margin is 3dB or more. In addition, timeliness is a single market in North America, and its requirements are also different. For example, at the same time, the certification standards in North America are quite different in terms of UL1310 or UL60950. In short, the global standards for LED lamps are not uniform, and the threshold is high and the changes are fast, which makes it even more

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difficult for the export enterprises of LED lamps in China. Table 2 shows the certification and identification of LED lamps and lanterns among different regions in the world.

3. The impact of technical barriers on the export of LED lamps in China

As the world's largest LED lamp production and sales market, China has an absolute market share in the field of LED product sales. However, it is precisely because of China's large export of LED products in the world that in recent years, China has been subject to technical restrictions on the import of LED products in Europe and America. With the excuses of environmental protection, safety and fair trade, many countries in Europe and America, LED by the United States, have continuously raised the import threshold of LED products, which has a great impact on the export of LED lamps in China, mainly reflected in the following aspects:

First, the total amount of export products showed a downward trend. It can also be seen from Figure 1 that after China's LED lighting products export reached a stable level in 2016, the Sino-US trade dispute began in 2018, and China's LED lighting products export declined significantly. Only in 2020, due to the epidemic situation, the foreign demand for LED lighting products increased slightly, and the overall export showed a significant slowdown trend. In addition, due to the technical barriers to trade in Europe and the United States and the transfer of international markets, the overall export volume of LED lamps in Guangdong Province, a major manufacturing province of LED lamps in China, also dropped by nearly 15% in 2021, among which the export volume of high-end LED lamps has a more serious impact.

Second, the profits of export products are declining. The core product of LED lighting technology in China is chip, while Europe and America, which have mastered the core chip technology, continue to block and suppress the technology, and the optimization of chip technology, lamp production process and capacity growth are limited. On the one hand, the cost of raw materials is constantly rising, on the other hand, the technology of high-end products is limited, and the profit margin of domestic low-end LED lamp products is constantly compressed. Not only that, the vast majority of small and medium-sized enterprises in China lack technical strength. In order to seize the market, all enterprises constantly compete viciously in price, and the phenomenon of product homogenization is serious. The profits of domestic LED lighting enterprises are further reduced, which seriously affects the development of the industry.

Third, the brand influence of export products is even weaker. At present, the global LED lamp market is dominated by the three major countries or regions of the United States, Europe and Asia. Although the Asian market is the largest, the top three leading enterprises in the real industry are Germany, the United States and Japan, followed by Taiwan Province Province and South Korea of China, followed by Chinese mainland. International giants such as Sinopharm and OSRAM have their own characteristics in products and markets, and they have formed a complete industrial chain of LED lamps market, occupying a large share of the global high-end market. However, LED lamps lighting enterprises in mainland China have weak technical strength, weak brand building, insufficient brand influence in the world and few brand enterprises with international competitiveness. At present, Europe and the United States adopt stricter technical barriers to trade, which undoubtedly further weakens China's influence in the market of high-end LED lamps and lanterns and restricts China's technological development.

4. Countermeasures and suggestions to promote the export of LED lamps in China

The above briefly analyzes the current export of LED lamps and lanterns in China and the international technical barriers to trade, and analyzes the impact of technical barriers to trade on the export of LED lamps and lanterns in China. In order to cope with the current situation, this paper gives some suggestions from the previous aspects:

First, at the national level: ①actively transfer the market and reduce the dependence on the European and American trade markets. In recent years, China's position in the international arena has been continuously improved, and the "the belt and road initiative" initiative has been put forward, leading the construction of the "Asian Investment Bank", advocating the community of destiny, building a "China-Africa partnership", etc. The government can rely on these initiatives or organizations to plan more and larger markets for China's LED lamps export. ②Establish an early warning system of technical barriers to trade to prevent trade restrictions in the international market. The government can set up professional institutions to track the changing trend of technical trade barriers and the changes of environmental protection policies, laws, technical regulations and technical standards in Europe and America, so as to

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provide an efficient professional consulting and early warning service platform for enterprises; ③Seek WTO support. China should make full use of the relevant rules in the WTO agreement, cancel the trade restrictions that do not conform to the principles of international trade, and use the WTO-related dispute settlement mechanism to resolve the technical barriers and safeguard China's own interests. ④Increase technical input and overcome core technical limitations. The government should sort out the technologies of all links in the whole LED lamp industry chain, set up technical teams and companies, increase technical investment, overcome technical problems in all links and solve the problem of insufficient market competition of high-end LED lamp products in China.

Second, the market level: ①Strengthen the construction of technical standard system and improve the quality of our products. At present, we should strictly manage the LED lighting industry association, improve the leading and supervising role of the association, cooperate with relevant government departments, improve our own certification system and technical system standards, and improve the quality of our industry products; ②Standardize the industrial production system and strengthen social exchanges. The association strives to standardize the inter-industry production system and build a comprehensive professional talent structure involving law, research and development, consulting, etc. Formulate industry competition rules to avoid vicious competition; Strengthen industry exchanges, guide communication between enterprises, school-enterprise cooperation, integration of defense and civilian technologies, etc., to comprehensively enhance the vitality of the industry and improve the overall technical strength.

Third, the enterprise level: ①Improve the production technology level and independent innovation ability. The core of technical barriers to trade that Europe and America can adopt is the lack of technical strength of Chinese enterprises. Therefore, the key to deal with technical barriers is to improve enterprises' own technical level and independent innovation ability. Those with insufficient strength should actively learn advanced technology, and powerful enterprises should increase investment in R&D and strive to improve their technical strength. ②Change the development direction and optimize the product export structure. For enterprises, it will take some time to deal with the technical barriers in Europe and America. Different strategies can be adopted for different enterprises, capable enterprises can rely on upgrading technology to deal with them, and weak enterprises can change their development direction, actively specialize in one part of the industrial chain and optimize product export. Comprehensive enterprises can selectively export products with high market demand according to market demand.

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