

The Impact of Environmental Regulations on the Export of Hangzhou Enterprises

-- Taking Hikvision as an example

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Abstract: This paper studies the impact of Hangzhou environmental regulation on the export of enterprises, and takes Hikvision as a case to analyze the input of the enterprise in green transformation and its impact on the export of overseas markets. Through the analysis of Hikvision's financial and ESG reports from 2019 to 2023, the following conclusions were drawn: Hikvision gained a competitive edge in the international market through green transformation measures; By promoting green production and product certification, Hikvision has enhanced its international reputation, and this responsible corporate image has contributed to the growth of its exports; Energy conservation and resource management measures have significantly reduced resource waste and energy consumption, thereby improving the company's profitability and competitiveness in the international market; Hangzhou's environmental regulations significantly promoted Hikvision's green innovation and had a positive impact on the company's export. The research shows that Hangzhou's environmental regulation policy has a positive impact on Hikvision's export.

Keywords: Environmental regulation, Hangzhou, Export volume, Green economy development, Green transformation.

1. Introduction

The Central Economic Work Conference in 2023 emphasized that "in-depth promotion of ecological civilization construction and green and low-carbon development" is one of the nine major tasks of economic work, and the National Ecological and Environmental Protection Work Conference in 2024 pointed out that "adhere to the synergies of pollution reduction and carbon reduction, and promote green and low-carbon social and economic development". Under the effective guidance of national policies, Hangzhou Government has also taken a lot of relevant measures in terms of environmental regulation, such as pollution emission control, testing and evaluation. In this context, does the formulation of environmental regulations have a positive impact on the export of enterprises in Hangzhou? Existing scholars' research topics are mainly about the impact of environmental regulations implemented by the government such as relevant environmental policies and treatment standards on enterprises' foreign trade. For example, in terms of product quality, environmental regulations have a "U-shaped" dynamic nonlinear relationship of first inhibition and then enhancement (Qu Yan, 2022; Mu Shouzheng, 2022); In terms of product scale, the export quantity scale of enterprises has been significantly improved (Yang Mian et al., 2022); In terms of different regional factors, environmental regulation plays a promoting role in the eastern coastal areas (Mu Shouzheng, 2022).

They found that the relationship between environmental regulation and the development level of China's foreign trade showed an inverted "U" -shaped relationship satisfying the "Porter" effect. And its impact has strong regional and industrial differences (Qu Yan, 2022; Mu Shouzheng, 2022). Some scholars have studied the impact of voluntary environmental regulation on the export of enterprises, which

is less studied by scholars, and found that it can not only help enterprises reduce the amount of pollution generated, but also upgrade the production process, which can greatly improve the quantity and quality of export (Yang Mian et al., 2022). There is also research on a single environmental policy, such as carbon emission reduction policy, which can improve the export quality of enterprises through the innovation effect of low-carbon city pilot policy and the quality improvement effect of imported intermediate products, and the synergistic effect of multiple environmental policies, such as the lag effect of the synergistic effect of emission right and carbon emission policy on urban export. However, it can promote the optimization of energy efficiency and industrial structure (Zhao Haiyang, 2024). A systematic study of this problem can help Hangzhou enterprises better understand the impact of environmental regulations on exports and make more reasonable investment and development plans. Most of the existing papers focus on the general direction analysis of the overall data of the whole country, but lack the research on the environmental regulations of local governments on the foreign trade situation of enterprises, especially the case study of individual enterprises. Therefore, this study takes Hangzhou City as an example and chooses Hikvision as the case object to study the impact of local environmental regulations on its export.

2. Theoretical Basis

2.1. Environmental Externality Theory

Externalities are the effects of the actions of one economic agent on the profits or costs of another economic agent that are not directly affected by prices. The introduction of environmental regulation is mainly due to the negative externalities caused by environmental damage or pollution, which can be understood as the negative effects of an economic entity's behavior on other entities or the

environment. These marginal effects cannot be reflected only through prices. The negative externalities of the environment have caused the worsening of the natural environment around the world, such as air pollution, water pollution, noise pollution and other phenomena, resulting in the shortage of resources and the destruction of the living environment.

2.2. Porter's Hypothesis

In order to meet the increasingly perfect environmental regulations, enterprises need to increase investment in green transformation, such as research and development of new and greener products, purchase of equipment that can deal with pollution and low energy consumption, so that production conditions comply with the corresponding environmental regulations. And these measures of environmental investment cost will undoubtedly increase the operating cost of enterprises, so that the investment in innovation and research and development, expansion of enterprise scale investment is relatively reduced. Porter's hypothesis challenges the traditional concept and holds that properly designed environmental regulations will not weaken the competitiveness of enterprises, but can stimulate the innovation of enterprises, improve the efficiency of resource utilization, and ultimately enhance the competitiveness of enterprises.

Environmental regulations exert pressure on enterprises to innovate, and at the same time provide incentives for innovation through market mechanism. For example, high pollution costs encourage firms to develop low-emission technologies, while market demand for green products encourages firms to innovate. In the long run, the two complement each other, and enterprises will not only improve the environment, but also enhance their market competitiveness through continuous technological innovation and improvement in the process of green transformation.

3. Research Case

Study on the impact of environmental regulation on the export of Hangzhou enterprises -- taking Hikvision as an example

3.1. Environmental Regulation Policy of Hangzhou in Recent Years

The following are mainly selected from the production and emission policies of enterprises, including pollution emission standards, green manufacturing requirements, environmental protection taxes, etc. These policies were mainly introduced and implemented in 21-23.

(1) Hangzhou Environmental Impact Assessment and Emission Permit Supervision Action Plan (2021-2023), Its main tasks are to carry out spot checks on the implementation of environmental assessment planning in industrial parks and characteristic towns, review of environmental impact statements (forms) of construction projects, spot checks on the management of environmental assessment technical units, spot checks on the implementation of environmental assessment and approval requirements of construction projects, spot checks on the legal compliance of EIA registration and filing, and spot checks on the issuance and implementation of emission permits from fixed sources. Through the plan to strengthen the EIA supervision, strict production and emission of enterprises in disguised form.

(2) "Hangzhou Fixed pollution sources of major pollutants

total control and emission permit linkage management Measures (Trial)", the management method was launched in November 22, 23 years since the formal implementation, the main contents: 1. The construction and application of digital system; 2. Management of total emission indicators, including initial source, verification, registration and regional total emission control; 3. Regional alternative total emission index management, including shut-down project management, governance project management, emission reduction accounting; 4. Emission rights management, including emission rights trading, long trading, buyback, and linkage with permits; 5. Emission permit management, etc

3.2. Hikvision based on the Basic Situation and Export Situation

Hikvision is a leading provider of security products and industry solutions in China. Founded in 2001, Hikvision focuses on the development and production of video surveillance products. Hikvision has branches in many countries and regions around the world, and its main export markets include the United States, the Netherlands, South Africa, Canada, Colombia, Turkey and other countries. Hikvision's international market share continues to expand, especially in the US market, since 2015, its subsidiaries have become the exclusive strategic partner of the Electronic Security Association (ESA). The main export products are video surveillance, smart home and so on.

As for the proportion of Hikvision's operating revenue from 19 to 23 years,

Table 1. The proportion of Hikvision's operating revenue

	2019	2020	2021	2022	2023
Main Business - Domestic - PBG	15314	15987	19161	16135	15354
Main Business - Domestic - EBG	12449	14724	16629	16505	17845
Main Business - Domestic - SMBG	9346	9209	13490	12497	12679
Main Business - Domestic - Other	826	971	943	927	932
Main business - Overseas	15286	16444	18926	22032	23977
Innovate in business	4437	6168	12271	15070	18553

The overseas revenue of main business increased steadily, accounting for 26.51%, 25.89%, 23.24%, 26.49% and 26.84% of the total revenue respectively.

3.3. Hikvision's Actions Under the Environmental Regulation Policy

(1) Green operation: keep up with domestic and foreign environmental policies and trends, strictly abide by national, local and industrial laws and regulations standards, and prepare a number of internal management systems based on the company's situation, such as Waste Management Procedures and Hazardous Waste Management Norms. Obtained the ISO 14001 environmental management system certification, ISO 50001 energy management system certification and green supply chain five-star evaluation, for the realization of sustainable business to lay a solid internal management foundation.

(2) Energy Saving and consumption reduction: The "Energy Saving and Consumption Reduction Control Procedure" has been formulated to control the whole process of energy utilization of electricity, natural gas and other energy sources in the main production process, auxiliary production process and auxiliary production process, and the specific proportion will be mentioned in the section of 20 years.

(3) Resource Management: Hikvision pays close attention

to the rational use of all natural resources, focusing on water resources, packaging materials and chemicals. Water resources has established a strict management system, through the selection of water-saving equipment, devices, installation of water-saving, anti-spill devices, efforts to reduce water consumption, improve the utilization of water resources. In terms of packaging materials, according to the principle of recyclability and reduction, a special improvement team has been set up to take effective measures to improve the effectiveness of packaging materials. In terms

of chemicals, we have passed a number of certifications and formulated company-specific norms to regulate the management of chemicals in procurement, transportation, loading and unloading, storage, use and treatment. During the reporting period, we optimized the control process of chemical storage and use.

(4) Rational discharge: Strengthen the control and emission reduction of pollutants, minimize the damage to the environment, mainly referring to solid waste management.

Table 2. Rate of change in energy consumption

Energy type	unit	2018 consumption	2019 consumption	2020 consumption	18-19 rate	19-20 rate
unleaded gasoline	ton	617.3	469	513.8	-24.02%	9.55%
diesel	ton	52.8	45.7	27.3	-13.45%	-40.26%
nature gas	million cubic meters	143.5	225.8	135.6	57.35%	-39.95%
electric power	megawatt hour	105643.3	173318.8	203339.3	64.06%	17.32%
energy consumption						
	unit	2018 consumption	2019 consumption	2020 consumption	18-19 rate	19-20 rate
direct energy consumption	metric ton standard coal	2728.7	3500.6	2443	28.29%	-30.21%
indirect energy consumption	metric ton standard coal	12983.6	21300.9	24990.4	64.06%	17.32%
comprehensive energy consumption	metric ton standard coal	15712.3	24801.5	27433.4	57.85%	10.61%
energy consumption density	tons of standard coal/million income	0.32	0.43	0.43	34.38%	0.00%
greenhouse gas emission						
	unit	2018 discharge	2019 discharge	2020 discharge	18-19 rate	19-20 rate
Category 1	ton carbon dioxide	5045.4	6347.3	4471.8	25.80%	-29.55%
Category 2	ton carbon dioxide	72602.6	117891.6	142078.7	62.38%	20.52%
total amount of discharge	ton carbon dioxide	77648	124238.9	146550.5	60.00%	17.96%
emission density	tons of CO2 / million income	1.56	2.15	2.31	37.82%	7.44%

Table 3. Rate of change of resource consumption and rate of change of waste volume

types of water resources	unit	2018	2019	2020	18-19 rate	19-20 rate
municipal water	ton	895000.9	1181680.4	1272248	32.03%	7.66%
groundwater (overseas only)	ton	1014.7	5196.1	3816.1	412.08%	-26.56%
surface water (overseas only)	ton	/	5.7	2	/	-64.91%
total	ton	896015.58	1186882.18	1131865.01	32.46%	-4.64%
density	tons/million revenue	17.98	20.55	17.82	14.29%	-13.28%
packing material						
	unit	2018	2019	2020	18-19 rate	19-20 rate
plastic	ton	5281.9	5869.7	6000.7	11.13%	2.23%
carton	ton	27327.4	34601.6	31571.4	26.62%	-8.76%
wood	ton	1200.9	1628.8	1982.7	35.63%	21.73%
metal box	ton	64	64.8	112.8	1.25%	74.07%
total	ton	33874.2	42164.9	39667.5	24.47%	-5.92%
density	tons/million revenue	0.68	0.73	0.62	7.35%	-15.07%
recyclable waste						
	unit	2018	2019	2020	18-19 rate	19-20 rate
plastic	ton	1126.8	2884.7	3764.2	156.01%	30.49%
wood	ton	546.3	986.7	1506.61	80.62%	52.69%
paper	ton	4767.6	7600.8	10053	59.43%	32.26%
metal	ton	1034.6	1302.1	2629.7	25.86%	101.96%
Others (wiring harness, oil paper, etc.)	ton	653.7	128.9	32.7	-80.28%	-74.63%
total	ton	8129	12903.2	17986.2	58.73%	39.39%
density	tons/million revenue	0.16	0.22	0.28	37.50%	27.27%
non-recyclable waste						
	unit	2018	2019	2020	18-19 rate	19-20 rate
kitchen waste	ton	2281.1	1759.3	1686.3	-22.87%	-4.15%
Office waste	ton	5929.3	1722.3	3215.5	-70.95%	86.70%
general industrial waste	ton	1387.7	1922.7	2117.3	38.55%	10.12%
total	ton	9598.1	5404.3	7019.1	-43.69%	29.88%
density	tons/million revenue	0.19	0.09	0.11	-52.63%	22.22%
hazardous waste						
	unit	2018	2019	2020	18-19 rate	19-20 rate
total hazardous waste disposal	ton	121.6	502.1	513.1	312.91%	2.19%
hazardous waste disposal density	tons/million revenue	0.002	0.009	0.008	350.00%	-11.11%

(5) Number of innovative environment protection products: Hikvision has launched a number of innovative environmental protection products, and more than 24,000 models of products have obtained the China Environmental Label, an increase of about 20% over 2019, and about 18,000 products have obtained the China energy-saving product certification, an increase of about 125% over 2019, showing rapid development. In 2022, more than 41,800 models (including product sub-models) of the Company obtained the China Environmental Label, an increase of approximately 41.7% compared with 2021; About 30,300 products (including product sub-models) received China Energy Saving product certification, an increase of about 6% over

2021. In 2023, the company will carry out product carbon footprint certification for network cameras, intelligent identification terminals, LCD, LED and other products, analyze the carbon footprint energy consumption of products throughout the life cycle, provide targeted reference for reducing carbon emissions, and provide basis for coordinating supply chain to reduce greenhouse gas emissions. 47,050 products received the China Environmental Label (up 12.6% in 2022) and 24,800 products received the China Energy-saving Product certification (up 14.9% in 2022). In terms of green packaging, a total of 46.2 tons of plastic removal in 2023, an increase of 65.59% over last year, a total reduction of more than 200 tons of carbon

emissions, and the promotion of the application of recyclable cartons, which can reduce the use of nearly 5,000 cartons per day, reduce the waste of disposable materials, and reduce carbon emissions by 15 tons. At the same time, increase the investment in green transformation, efficient refrigeration room project fully landing, while continuing to carry out technological innovation, carry out environmental protection process research and development, physical polishing instead of traditional pickling, the annual consumption of acid cleaning agent in the production process from 4 tons to 0.6 tons, the process for other production lines to reduce the use of hazardous chemicals to provide solutions.

(6) Establishing sustainable parks: Integrating the concept of sustainable development into the whole process of park construction, focusing on low-carbon energy saving and recycling. To actively respond to climate change while taking social responsibilities and contributing to the development of enterprises and local economy.

4. Conclusion

The main research of this paper is about the impact of Hangzhou's environmental regulations on the export of local enterprises, and Hikvision is selected as a case study, and the impact of Hikvision's investment in green transformation according to Hangzhou's local environmental policy and its export situation (overseas market) is analyzed by combining its financial reports and ESG reports from 19 to 23 years. Through the analysis of the above data, the total impact is as follows:

Increasing competitiveness in the global market

Improvement of brand image and international reputation

Sustainable cost savings

Green transformation and innovation have grown substantially

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