

Research on China's Plastic Packaging Strategy for Sustainable Supply Chain Management

Tian-Lan Zhou

Transport and Communication College, Shanghai Maritime University, Shanghai, China

Corresponding author's e-mail:
tlzhou@shmtu.edu.cn

Abstract The environmental impact of plastic packaging in China has attracted significant attention due to the implementation of plastic restrictions and the rapid growth of e-commerce. This article examines the pertinent policies regarding plastic packaging in both China and other countries, while also addressing the challenges that China encounters in relation to plastic packaging. The challenges that have been encountered include a lack of adequate customer demand for plastic packaging that is environmentally friendly, the adoption of excessive packing practices by producers, and the need to improve the technological capabilities of recyclable plastic packaging materials. The aim of this study is to provide theoretical insights and reference value to help the sustainable development of green packaging and supply chains in China.

Keywords Plastic packaging; Green packaging; Sustainable supply chain management; New plastic restriction policy

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Introduction

The role of packaging within the supply chain is of significant importance, as it directly influences the overall sustainability of the system. Plastic has attractive attributes: "light weight, high strength, high impact resistance, easy to form, good viscosity, transparency, moisture resistance, beauty, and chemical stability"[1]. Plastic is an especially appealing choice for packaging due to the fact that it meets a

number of the requirements for optimizing supply chain efficiency [2]. In China, the proportion of plastic packaging to the total output value of the packaging industry has surpassed 30 percent, with plastic packaging playing an irreplaceable role in the food, beverage, daily necessities, and numerous industrial and agricultural production. In recent years, the expansion of e-commerce in China has accelerated the growth of the express delivery industry and utilization of plastic packing materials. There also has been a growing focus from governments, academics, and the media on the environmental consequences associated with plastic packaging [3].

China's municipal household trash production has consistently surpassed 200 million tons year from 2016 to 2021, with a steady growth rate of 6% each year. According to statistics, 10 to 25% of all household waste consists of plastic waste, primarily low-value, difficult-to-recycle disposable plastic packaging waste, which is also the primary source of "white pollution." In 2022, 777,16 million tons of plastic product were used domestically, and more than 60 million tons of plastic waste was generated. The quantity of physical recycling was approximately 18 million tons, or 26.7% of the total [4]. Moreover, due to the swift advancement of e-commerce and the shift in consumer behaviour among Chinese residents, there has been a significant surge in the volume of express delivery and food delivery services in recent years. In 2022, there was a significant increase in the express delivery industry, as evidenced by a total volume of 110.58 billion units, indicating a growth of 2.1% in comparison to the preceding year. The revenue of companies in the industry amounted to 1.06 trillion yuan, indicating a growth rate of 2.1%. The industry's daily handling capacity has exceeded 700 million items, while the annual per capita volume of express mail has reached around 80 pieces. [5]. The packaging used by express and food delivery services is characterised by a significant amount of disposable plastics, leading to an uncertain environmental impact. There has been a significant increase in the amount of plastic packaging that is being discarded, coupled with a very low rate of recycling. It has become a significant contributing cause to the growing worries about the growth of plastic pollution.

This study aims to classify the existing plastic packaging control policies in China and other countries, examine the present condition and challenges within China's plastic packaging supply chain, and put forth policy suggestions and recommendations to promote the advancement of environmentally-friendly packaging [6].

Recent Developments of Green Packaging Policies in Developed Nations and Regions

Many nations have increasingly recognized the significance of environmentally friendly plastic packaging for the purpose of protecting the environment. Developed countries and regions, including the European Union, the United Kingdom, Japan, New Zealand, Canada, and others, have implemented dedicated strategies or action plans to address the issue of plastic pollution. For instance, the New Zealand's National Plastics Action Plan in 2021 and the United Kingdom's plastic packaging tax [7,8].

The recycling rate for plastic garbage in the European Union is about 32.5%, with an estimated yearly production of approximately 29.1 million tons. A considerable quantity of plastic also enters rivers and oceans, resulting in further pollution. In 2018, the European Union (EU) implemented the EU Plastics Strategy with the aim of reducing plastic waste and enhancing recycling efficiency. The strategy sets forth the objective of ensuring that, by 2030, over 50% of plastic waste produced within Europe will be capable of being recycled. Furthermore, it aims to attain a recycling rate for plastic packaging waste that is comparable to that of alternative packaging materials. The EU has announced its plan to allocate a sum of 350 million euros towards the facilitation of research and development activities, as well as the modernization of plastics production and recycling processes [8,9].

In 2019, Japan published Plastics Resource Cycle Strategy and the Action Plan for the Management of Marine Plastic Litter. This plan proposed the formulation of a comprehensive strategy to promote

plastic resource recycling, with the ultimate goal of recycling and the development of a national policy. In 2022, Japan also implemented legislation aimed at incentivizing local governments to undertake the collection and recycling of post-consumer plastic product waste, with the exception of plastic packaging trash. Japan aims to demonstrate its efforts in plastic resource recycling and marine plastics countermeasures, while also offering its expertise, experience, technology, and know-how on plastic pollution management to both the Asia-Pacific region and the global community. Japan is committed to providing the essential support in this endeavour [8].

China's policies with regard to plastic packaging

China places significant emphasis on the development of an ecological civilization, introducing an original concept of green development and establishing the objective of achieving carbon neutrality. This commitment is accompanied by a comprehensive framework of high-level strategies, institutional frameworks, and decision-making initiatives. These measures serve as fundamental principles for advancing towards a new era of ecological civilization and the realization of a visually appealing China. The Outline of the Fourteenth Five-Year Plan for National Economic and Social Development of the People's Republic of China and the Vision 2035 emphasizes the imperative to enhance efforts in preventing and controlling plastic pollution throughout the whole spectrum of activities. The "Guiding Opinions of the State Council on Accelerating the Establishment of a Green, Low-Carbon and Cyclical Economic System" mandates the promotion of a green, low-carbon lifestyle and the comprehensive advancement of plastic pollution treatment across the whole supply chain [4].

China's GB/T 37422-2019, titled "Green Packaging Evaluation Methods and Guidelines," provides a comprehensive definition of "green packaging." According to this standard, green packaging refers to packaging that minimizes harm to human health and the ecological environment, while also protecting resources and energy. This definition emphasizes the need for green packaging to fulfil the functional requirements throughout the entire life cycle of packaging products. Since 2017, there has been a significant increase in the implementation of plastic restriction and ban laws by national and municipal governments. These policies have led to stricter regulations on the recovery, regeneration, and recycling of packaging materials (Table 1) [10].

Table1: China's Policy for Plastic Restriction (2007-2023) [10]

January 2007	General Office of the State Council	Notice Regarding Limitations on the Utilization of Plastic Shopping Bags in the Process of Production and Commercial Transactions (Also known as Plastic Restriction)
July 2011	General Administration of Quality Supervision, Inspection and Quarantine, and related other departments	Notice on Focusing on Special Actions to Restrict the Use of Plastic Shopping Bags in Production and Sales
April 2013	National Development and Reform Commission and other related departments	Notice on Strengthening the Implementation of Restrictions on the Production and Sale of Plastic Shopping Bags
May 2017	State Administration of Market Supervision and Administration	GB/T 33761-2017 Green Product Evaluation Guidelines
May 2019	State Administration of Market Supervision and Administration	GB/T 37422-2019 Methods and Guidelines for Evaluating Green Packaging
January 2020	National Development and Reform Commission and the Ministry of Ecological	Guidelines for Further Strengthening Plastic Pollution

	Environment	Control (Also known as New Plastic Restriction)
July 2020	National Development and Reform Commission and the Ministry of Ecological Environment and other nine departments	Notice on Efficient Plastic Pollution Prevention Work

The National Development and Reform Commission and other departments issued Guidelines for Further Strengthening Plastic Pollution Control in January 2020, proposing an orderly and effective control of plastic pollution. This Guidelines is the new iteration of the Plastic Restriction Order, replacing the 2007 " Notice Regarding Limitations on the Utilization of Plastic Shopping Bags in the Process of Production and Commercial Transactions "[11].

The legislation is widely regarded as China's most stringent plastic limitation to date. The Guidelines suggests using a systematic approach to prohibit and regulate the production, sale, and utilization of certain plastic items, while concurrently promoting the adoption of alternative products. Moreover, it proposes the prohibition of ultra-thin plastic shopping bags with a thickness below 0.025mm in terms of production and sale. The proposition to prohibit non-biodegradable plastic bags and disposable plastic tableware is presented at three distinct time points: 2020, 2022, and 2025. By the year 2025, it is expected that a comprehensive management system will be established to supervise the production, distribution, consumption, recycling, and disposal of plastic products [12].

As a result, Beijing has set a target to discontinue the utilization of non-biodegradable single-use plastic shopping bags by the end of 2024. In September 2020, Shanghai also issued the Implementation Plan aimed at enhancing measures for the control of plastic pollution. By the the year 2020, a mandate was implemented to assume a leading role in the prohibition and regulation of the manufacturing, distribution, and utilisation of specific plastic commodities within vital industries, including catering, hotels, hospitality, and mail delivery. As a result, the objective of completely eliminating plastic waste in landfills was successfully attained. Production and sale of ultra-thin plastic purchasing bags with a thickness of less than 0.025 millimetres and polyethylene agricultural land film with a thickness of less than 0.01 millimetres are forbidden. Plastic manufacturers are prohibited from using medical refuse as a source of raw materials. The importation of refuse plastics is strictly prohibited [12].

Issues related to plastic packaging in China

Currently, there is a lack of recognition about the significance of advancing a low-carbon economy, and the environmental sustainability of plastic packaging. First, there is not a significant demand among consumers for green plastic packaging. Consumers now lack a comprehensive understanding of low-carbon economic development, as well as the proper manufacture and utilization of green packaging products. There exists a misconception among consumers, who mistakenly associate green packaging materials solely with degradable materials. Green plastic packaging products typically cause higher research and development expenses compared to traditional ones. Consumers in the packaging industry typically prioritize price as their primary determinant, so hindering the full realization of market sales for environmentally-friendly plastic packaging products [4,13].

With regard to plastic packaging producers, there is the phenomenon of over-packaging for gifts such as mooncakes, cigarettes and alcohol. The fundamental causes of this issue extend beyond the actions of sellers and manufacturers in the business sector, encompassing irrational customer behaviour as well as influence of traditional culture. The available data indicate that currently, a majority of commodities in China exhibit the issue of excessive packaging. Beijing alone contributes to almost half of the total volume of household waste, with over half of this waste being attributed to over packaging in one year. The management and disposal of this excessive packaging necessitates an annual expenditure of over 300 million yuan, thereby imposing a significant burden on China's economic and social progress. Furthermore, a significant number of firms in China exhibit limited enthusiasm towards investing in green packaging. This lack of commitment, to some extent, hinders the overall development

of technological innovation in China's plastic packaging industry [4, 13].

The development of e-commerce has accelerated the growth of the express delivery market and plastic products are the primary components of express packaging. The generation of plastic waste from express plastic packaging not only results in leads to a significant waste of resources but also exacerbates the degradation of the ecological environment. Consequently, it becomes crucial to establish environmentally sustainable logistics systems and foster the advancement of a circular economy as viable solutions to address this issue [6]. Studies have showed that the present recovery rate for plastic and paper packaging in China's express delivery industry is less than 10%. Specifically, difficult-to-recycle express packaging materials such as adhesive tapes and plastic fillers are landfilled into nature along with other household waste, and do not degrade for tens to hundreds of years, occupying a large amount of land resources and negatively impacting the ecological environment [3].

Conclusions and Recommendations for sustainable packaging

China has increasingly focused on the governance of plastic packaging, with its plastic packaging management policy evolving from a narrow focus on key areas to including the entire life cycle of governance. This has led to the establishment of a more comprehensive framework for managing plastic packaging pollution [14].

Improve the local plastic packaging regulations and standards

There is a need to accelerate the development of local standards concerning plastic packaging in order to enhance the green packaging standard system. This can be achieved by integrating the existing standards across the entire lifecycle of plastic packaging, including production, usage, transportation, recycling, and utilization. The focus should particularly be on addressing the significant gaps in the recycling and utilization stages [15]. The local legislation in Fujian Province on plastic pollution is an excellent example. Fujian Province investigates the effectiveness of implementing the national plastic product prohibition catalogue and the utilization of standards to facilitate the enforcement of local laws, regulations, and policies. The creation of an information disclosure system and the establishment of enterprise legal person trustworthy commitment are also aimed at enforcing discipline by recording instances of breach of trust on the enterprise legal person [11].

Eco-friendly packaging design

The consideration of environmental protection is crucial during the product design and development phase of the supply chain. Enterprises and designers should be encouraged to incorporate a greater proportion of natural and renewable raw materials in their packaging design [16]. Enterprises should prioritize long-term considerations and prioritize product structure modification, technical transformation, and product upgrading. Within the framework of the circular economy, there is a noticeable upward trajectory in the research, development, and production of biodegradable express packaging products. Moreover, the market for such products exhibits substantial potential for further enhancement. The e-commerce and logistics sectors must consider the financial implications of packaging and the environmental advantages associated with it. It is crucial to adhere to national regulations aimed at addressing plastic pollution, which may involve prohibiting the use of inexpensive and hazardous plastic packaging materials. These industries should compel their suppliers to enhance their green design capabilities, such as adopting reusable plastic packaging, employing packaging designs that consist of a single material or can be easily separated into different materials, and incorporating recycled materials into their production processes [2].

Developing reuse and recycling Technology

Establishing a technological innovation and industrial system that prioritizes plastic packaging recycling and complements it with plastic deterioration is necessary. Due to limitations in both the availability and cost of degradable plastics, the complete substitution of traditional plastics in the short term is challenging. Consequently, efforts to combat plastic pollution should prioritize the recycling of high-quality plastics. It is imperative to provide strong support for the comprehensive management of waste plastic packaging recycling, establish a robust domestic waste treatment industrial chain, and enhance the collection and categorization of domestic garbage. This proposal entails actively endorsing the substitution of petroleum-derived plastics with bio-based alternatives, advancing the development of cost-effective and high-performing manufacturing methods for biodegradable plastics, advocating for the utilization of all-biodegradable plastics in disposable packaging materials, and establishing a comprehensive system for the categorization and disposal of all-biodegradable plastics [11].

Establishment of an educational system for ecological philosophy

In order to promote sustainable practices, it is essential to enhance public awareness and encourage the adoption of eco-friendly behaviors and lifestyles [4]. This may be achieved through the rigorous enforcement of current legislation and policies, alongside intensified publicity efforts. By emphasizing the reduction of disposable plastic packaging and discouraging excessive packaging, individuals can be guided towards embracing green consumption and adopting sustainable living habits. Establishing an active and successful synergistic green education system is of paramount importance. The implementation of green education necessitates the active involvement of educational institutions, as well as the collaborative efforts of governmental bodies, schools, communities, and families, in order to develop a comprehensive green education framework. The government assumes a prominent role in promoting environmental education. It is imperative for the government to guarantee the widespread dissemination of green education, encompassing individuals of all age groups and educational backgrounds, rather than limiting its focus solely to the youth. Furthermore, educational institutions serve as the primary foundation for green education, playing a crucial role in promoting and enforcing environmental protection laws and policies. They also play a vital role in cultivating a sense of environmental responsibility among individuals. Enhancing the green education system within educational institutions is unquestionably vital for fostering the enduring and sustainable advancement of environmental education. Good family-based environmental education serves as a fundamental component of green education, playing a crucial role in nurturing environmentally responsible attitudes and behaviors among young individuals [14].

References

1. Wang, Y., & Wang, Y. (2021). Research on the Application of Environmentally Friendly Packaging Materials in the Sustainable Development of Logistics. *IOP Conference Series Earth and Environmental Science*,781(3),032025.
2. Silva, N., & Molina, K. (2023). Replacing plastic with corrugated cardboard: A carbon footprint analysis of disposable packaging in a B2B global supply chain—A case study. *Resources, Conservation & Recycling*,191,106871.
3. Sundqvist, H., & Åkerman, M. (2021). Sustainability governance and contested plastic food packaging —An integrative review. *Journal of Cleaner Production*,306, 12711.
4. Wei, H. (2023). Accelerate the reduction of plastic packaging waste and promote the development of green and low-carbon cycle. *Resource Recycling*, 07,13-15.
5. Li, X. (2023). Business volume of 110.58 billion pieces completed in 2022 Express service covering

- 95% of the country's established villages. https://www.gov.cn/xinwen/2023-01/18/content_5737679.htm.
6. Zhang, B. (2023). Research on the Pollution Status and Countermeasures of Single-Use Plastic Packaging in Express Delivery Industry. *Green Packaging*, 02,55-59.
 7. Ishimura, Y. (2022). The effects of the containers and packaging recycling law on the domestic recycling of plastic waste: Evidence from Japan. *Ecological Economics*, 201,107535.
 8. Zhang, Y. (2022). Regarding China's plastic pollution management, the plastic strategies and actions of developed nations and regions. *China Economic & Trade Herald*, 06,58-60.
 9. Niu, R. (2022). EU promotes plastics recycling. *The People's Daily*, 16, January 10, 2022.
 10. Meng, H. (2021). Research On Green Development Path of Plastic Packaging Industry Chain. *Plastics Packaging*, 02,14-19.
 11. Zhuang, L. (2022). Examining the Green Development Strategy of Fujian's Plastic Packaging Industry Against the Context of New Plastic Restrictions. *The Light & Textile Industries of Fujian*, 12,35-38.
 12. Plastic Worlds. (2023). Domestic and international "plastic restriction" is once more strengthened! New regulations on biodegradable plastics; the direction of plasticization development. <https://baijiahao.baidu.com/s?id=1756517875085103379&wfr=spider&for=pc>.
 13. Zhu, L., & Wei, Z. (2023). Low Carbon Economic Development and Technological Innovation in Plastic Packaging Industry. *Green Packaging*, 01,15-18.
 14. Cao, X., & Li, Z. (2021). China's Green Education Legislation Development in the Context of Ecological Civilization. *Journal of Southwest Minzu University (Humanities and Social Sciences Edition)*, 05,109-115.
 15. He, Y. (2022). Recycling Status and Reuse Strategy of Express Plastic Packaging Under the Background of Green Logistics. *Plastics Additives*, 01,58-61.
 16. Li, J. (2021). Developing a world-class international green plastics supply chain. *Green Packaging*, 03,14.