STUDY ON THE DEVELOPMENT OF GREEN LOGISTICS PACKAGING FOR E-COMMERCE ENTERPRISES IN GUANGDONG

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This Independent Study has been Approved as a Partial Fulfillment of the Requirement of International Master of Business Administration in International Business Management

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ABSTRACT

With the rapid development of China 's e-commerce, while driving rapid economic growth, the amount of logistics packaging waste has also increased rapidly, posing challenges to ecological and environmental protection. This paper adopted qualitative analysis methods , based on the 3R theory of circular economy, to analyze the existing problems in the development of green logistics packaging for e-commerce enterprises in Guangdong and proposes corresponding strategies . The research objectives of this paper were: 1) To analyze the development problems of green logistics packaging for e-commerce enterprises and 2) To propose suggestions for the development of green logistics packaging for e-commerce enterprises in Guangdong based on the problems. Through qualitative research method,this paper interviewed 20 experts in E-commerce, this paper found that: 1) The main problems currently facing the development of green logistics for e-commerce enterprises in Guangdong Province are the widespread phenomenon of excessive or repeated packaging, the difficulty of recycling, the imperfect logistics packaging recycling system, and the immaturity of green logistics packaging technology, high difficulty; 2) The response strategy to these problems is to use reduced and standardized packaging, build a recycling system, strengthen technology research and development updates, the government should increase policy support and strengthen supervision.

Keyword: Guangdong E-Commerce Enterprise, Green Logistics Packaging, 3R Theory of Circular Economy.

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CHEN LEWEI
December 2, 2023

Declaration

I, *Chen Lewei*, hereby certify that the work embodied in this independent study entitled "**Study on the development of green logistics for e-commerce enterprises in Guangdong**" is result of original research and has not been submitted for a higher degree to any other University or institution.

Chen Lewei

(Chen Lewei)

December 2,2023

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Chapter 1 Introduction

1.1 Research Background

In recent years, with the intensification of global climate problems and environmental degradation, achieving sustainable development has become a major challenge facing countries(Ma, Murshed, and Khan 2021). China's economy has achieved significant growth in the past few decades, which has also put great pressure on environmental quality and natural resources (Chenghu et al. 2021). Theories such as green logistics, reverse logistics, circular logistics, and waste logistics have been continuously improved and developed (Khan and Qianli 2017).

The green logistics evaluation system has become a standard for measuring the greening of enterprise logistics operations. The circular economy is an economic model for the sustainable development of the economy, resources, and environment. Circular economy is one of the main policy tools for reducing waste emissions, and protecting natural resources, biodiversity, and ecosystems (Pan et al. 2017). The CEO is focusing on reducing emissions, reusing, and recycling these three R's in different production processes to make them cleaner, more environmentally friendly, and more cost-effective. At present, scientific literature on China's CE policy mainly focuses on stimulating clean production at the enterprise level, promoting industrial symbiosis at the industrial cluster level, and establishing networks at the ecological industry regional level to improve the effectiveness of productivity (Khan et al. 2017).

The sustainable supply chain plays a significant role in the environmental and financial performance of a firm (Judge and Douglas 1998). In the last couple of decades, companies have shown more willingness to implement environmentally friendly practices in their businesses. There is no doubt that there are some motivating factors influencing firms to go towards sustainable development, such as financial gains, and cost reduction in terms of recycling, reuse, and remanufacturing. Using advanced logistics management concepts and logistics technology, green logistics can make intensive use of resources. This reduces energy consumption, reduces environmental pollution, and effectively reduces energy and environmental pressure. Achieving green economic development has become an important choice to promote local sustainable development and achieve the unification of economic, social and environmental benefits. "Logistics technology is the most reasonable way to complete logistics tasks. Today, in the pursuit of high efficiency, the connection between technology and management is getting closer and closer. Advanced technology is crucial to the support of modern logistics management. In this networked society In China, modern logistics management not only requires advanced storage and transportation tools, sufficient storage space, efficient packaging and loading and unloading equipment, but also convenient transportation and throughput capabilities. In addition, logistics management is inseparable from the support of networks and advanced communication facilities. Advanced network facilities are the cornerstone of logistics management,

which greatly promotes the connection between logistics enterprises and upstream and downstream enterprises, timely contact with internal logistics, and faster delivery of goods (Liu et al. 2018).

The swift expansion of China's e-commerce sector, propelling robust economic growth, concurrently precipitates a surge in logistics packaging waste, presenting formidable challenges to ecological and environmental preservation. Official statistics for the year 2020 reveal that the burgeoning e-commerce industry in China yielded an excess of 10 million tons of logistics packaging waste. The subsequent year, 2021, marked a significant milestone as the e-commerce logistics business volume in China surpassed 100 billion units for the first time, with the associated logistics packaging waste escalating. The escalating logistics business volume in the e-commerce domain has led to a proportional upswing in the consumption of logistics packaging materials, consequently generating a substantial volume of packaging waste. This escalating trend accentuates concerns regarding resource depletion and heightened environmental impact (Bracking 2012).

The concept of green logistics is based on protecting social and environmental sustainability (Khan and Yu 2019). By reforming logistics links such as transportation, storage, packaging, loading and unloading, circulation and processing, green logistics can achieve the purpose of reducing environmental pollution and resource consumption. Circular economy theory can guide the development of green logistics. Starting from a regional green logistics development evaluation system based on circular economy theory, it aims to provide a measure of green logistics development from the regional economic level.

Guangdong Province, distinguished as the leading province in China for e-commerce logistics business volume and growth rate, is also notably burdened with a considerable quantity of logistics packaging waste. In 2020, the e-commerce logistics business volume in Guangdong Province surged to 20.05 billion units, reflecting a remarkable year-on-year escalation of 32.6%, constituting 20% of the national total. Concurrently, the cumulative logistics packaging waste in Guangdong Province reached 2 million tons, similarly constituting 20% of the national total. The untreated disposal of such substantial waste quantities poses a grave risk of environmental pollution and burden (Liu and Ma 2022).

Green logistics packaging refers to the packaging materials and methods used in the logistics process, which can effectively reduce resource consumption and environmental pollution, and conform to the principles of circular economy and sustainable development. Green logistics packaging is conducive to improving logistics efficiency, reducing logistics costs, protecting product safety, and is also conducive to protecting the ecological environment and reducing the difficulty of waste disposal. (Liu Jinping, 2022). With the rapid growth of e-commerce logistics packaging volume, the accumulation of packaging waste has shown an astonishing explosive growth.

Therefore, the development of green logistics packaging for e-commerce companies is imperative. (Du, & Li, 2022).

Many policy and operational challenges in the modern logistics industry's transition to green growth need to be addressed quickly. Compared with the traditional green logistics development concept, green development is a new concept based on human nature. Due to the lagging development of technical means, operational scale, operational models and standardization, traditional logistics has many shortcomings such as low efficiency and labor intensity; information is easily leaked; financial loopholes are everywhere; and there are different views on green. Some scholars believe that to implement green logistics in the Internet environment, a two-pronged approach is required (Laari, Töyli, and Ojala 2017). The government and enterprises should stand in their respective perspectives and jointly implement strategies to promote the vigorous development of green logistics.

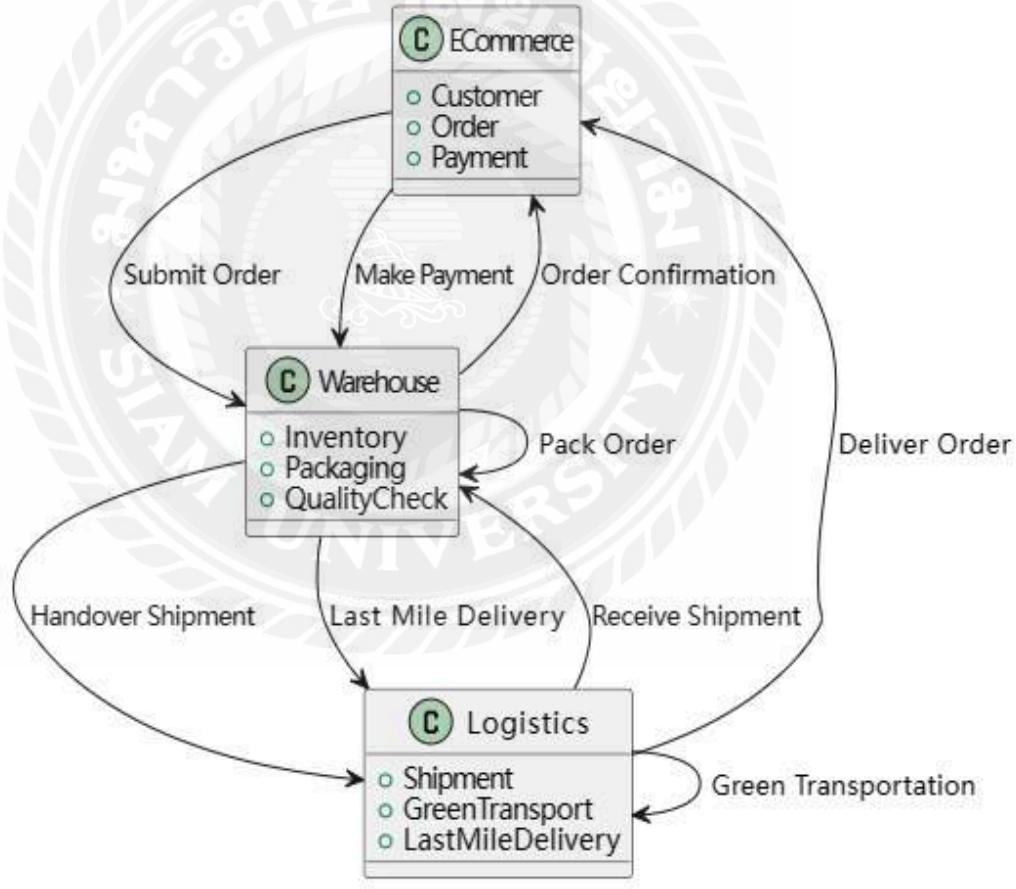

Figure 1 E-Commerce Green logistics Packaging Flow Chart

1.2 Research Problems

At present, although the development of "green" logistics packaging of Chinese e-commerce companies is showing a positive trend overall, the actual results are still far behind people's expectations. On the one hand, the popularity of "green" e-commerce express packaging is still relatively low and has not yet reached scale. A survey report

shows that many express delivery products are still "over-packaged", and there are still only a few businesses that actively use green packaging. The greening of logistics packaging only starts with large enterprises with sufficient financial strength, and cannot be extended to enterprises that account for half of the market share. Small express delivery companies and platform merchants, and most consumers say they have never come into contact with green express packaging(ZhaoYan,2020). On the other hand, the "green" development of e-commerce express packaging is uneven among different regions. Enterprises in some economically underdeveloped areas have poor awareness of actively promoting the green transformation of packaging. At the same time, there are also certain differences in the green packaging policies and guidelines formulated by different regions.

At the same time, the development of green logistics packaging of Chinese e-commerce enterprises is in its early stages, and the theoretical research on green logistics packaging of e-commerce enterprises is still in its infancy. All existing theoretical research is focused on green packaging of e-commerce logistics in China, but China has a large land area. There are certain differences between various provinces. The current research does not have targeted research on the development of green logistics packaging for e-commerce enterprises in Guangdong Province. Therefore, this paper believes that only by clarifying the problems faced by e-commerce enterprises in Guangdong Province in the process of developing green logistics packaging Only by solving these problems can truly promote the development of green logistics packaging for Guangdong e-commerce companies. Therefore, the main research question of this paper is what problems Guangdong e-commerce companies face in the process of developing green logistics, and how to solve these problems. This paper hopes to fill the research gap on green logistics packaging in Guangdong Province (Dekker, Bloemhof, and Mallidis 2012).

This thesis aims to delve into the critical issues facing the field of green logistics, articulating five specific and well-defined research problems. Firstly, address the optimization of packaging materials and methods to achieve optimal resource utilization and reduce environmental impact. Secondly, in light of the exponential growth in e-commerce logistics packaging, explore the challenges in formulating and promoting strategies for green logistics packaging. In the practice of green logistics, seek to reconcile the balance between enhancing efficiency and minimizing environmental impact. Within the context of e-commerce logistics, delve into the challenge of effectively managing and reducing packaging waste. Lastly, focus on ensuring effectively management and reduce packaging waste in e-commerce green logistics. These research problems encapsulate key challenges in the field of green logistics, providing valuable directions for future research and practical applications.

1.3 Objective of the study

This paper summarizes the current research status of the development of green logistics packaging for e-commerce companies, and draws out the problems and solutions currently faced by Chinese e-commerce companies in the development process of green logistics packaging. It conducts demonstrations through qualitative research methods and explores the issues facing Guangdong e-commerce companies. The problems faced in the development process of green logistics packaging are analyzed based on the 3R theory of circular economy, and corresponding countermeasures are proposed. Therefore, this paper has the following objectives:

1.To study the problems faced by Guangdong e-commerce companies in developing green logistics packaging;

2.To propose countermeasures for the development of green logistics packaging for Guangdong e-commerce enterprises in response to the problem.

These objectives collectively contribute to a comprehensive and nuanced understanding of green logistics packaging, addressing critical issues and providing actionable insights for sustainable and efficient practices.

1.4 Scope of the study

This paper mainly studies the e-commerce enterprises in Guangdong Province. The author read a large number of research documents before the research, summarized and analyzed the existing relevant literature, and based on the 3R theory of circular economy, through the interview method, he conducted an analysis of the e-commerce industry in Guangdong Province.

Scope 1: Packaging Material Optimization and Environmental Impact and E-commerce Logistics Packaging Strategies and Implementation.

This study will focus on assessing and optimizing various packaging materials in the context of green logistics. The scope includes conducting a life cycle analysis to understand the environmental impact of different materials, providing insights into sustainable choices. The research will delve into formulating and proposing practical strategies tailored specifically for e-commerce logistics packaging. The scope extends to the implementation phase, addressing challenges and opportunities associated with integrating green practices into the e-commerce supply chain.

Scope 2: Balancing Efficiency and Environmental Impact in Green Logistics and Waste Management in E-commerce Logistics Packaging.

This aspect of the study aims to explore methodologies and practices that strike a balance between advancing logistics efficiency and minimizing environmental impact within the broader context of green logistics practices. The scope encompasses examining real-world applications and case studies. The study will investigate effective waste management strategies within the e-commerce logistics environment, including recycling initiatives, waste reduction measures, and collaborative efforts with

stakeholders. The scope extends to assessing the feasibility and impact of various waste management approaches.

Scope 3: Product Safety and Quality Assurance in Green Logistics Packaging and Circular Economy Integration in Green Logistics Packaging.

This scope involves establishing protocols and guidelines to ensure the safety and quality of products in the context of green logistics packaging. The study will explore testing methodologies, industry standards, and best practices to maintain product integrity. The study will examine the integration of circular economy principles throughout the lifecycle of green logistics packaging. This scope includes exploring closed-loop systems, material reuse strategies, and evaluating the economic and environmental implications.

These defined scopes collectively contribute to a thorough exploration of green logistics packaging, offering insights into specific areas of concern and providing a framework for sustainable and environmentally responsible practices.

1.5 Research Significance

It is of practical significance to study green logistics and its evaluation system from the perspective of regional economic sustainable development. This perspective involves recognizing both the positive and negative impacts of corporate logistics activities and strategically promoting the advancement of green logistics. Green logistics, while optimizing production costs and enhancing customer service for shippers, is not without drawbacks which contributes to energy consumption and environmental pollution. An effective evaluation of the green logistics system is crucial, revealing the need for logistics enterprises to minimize resource consumption and environmental impact while fostering economic development (Chunguang et al. 2008).

The development of green logistics packaging for e-commerce companies must be implemented. Guangdong Province, as the province with the largest volume and growth rate of e-commerce logistics business in China, is also one of the provinces that generates the largest amount of logistics packaging waste. Therefore, the specific situation may be different from other provinces. Research on the development of green logistics packaging for e-commerce companies in Guangdong Province can better help Guangdong e-commerce companies point out the direction in developing green logistics packaging.

Practical Research Significance of Green Logistics Packaging in E-commerce Enterprises. Practices for Sustainable Operations which explanation of researching the actual impact of green logistics packaging in e-commerce enterprises aids in formulating sustainable operational practices. Practical research helps businesses understand how to integrate sustainability goals into daily operations for economic and environmental benefits.

Cost-effectiveness and Efficiency Improvement which explanation of analyzing the practical cost-effectiveness of green logistics packaging in e-commerce and

strategies for improving logistical efficiency. Practical research assists businesses in understanding the actual returns on investment in green packaging and optimizing logistics processes for efficiency.

Risk Management and Compliance Practices which explanation of studying the practical impact of implementing green logistics packaging on risk management and regulatory compliance in e-commerce logistics. Practical research helps businesses establish effective risk management systems and ensure compliance within regulatory frameworks.

Enhancement of Brand Reputation and Market Competitiveness which explanation of improving brand reputation and market competitiveness through studying consumer responses to green logistics packaging. Understanding actual market feedback helps businesses adjust their packaging strategies, meet consumer expectations, and increase market share.

Waste Management and Social Responsibility Practices Waste Management and Social Responsibility Practices which explanation of analyzing the practical effectiveness of green logistics packaging in waste management and fulfilling social responsibility. Through practical research, businesses can develop more effective waste management strategies and enhance levels of social responsibility.

Supply Chain Innovation and Competitive Advantage which explanation of researching the actual impact of green logistics packaging on the entire supply chain to implement innovations. Practical research can reveal how sustainable developments in the supply chain through green logistics packaging contribute to gaining a competitive advantage.

Increase in Consumer Satisfaction and Loyalty which explanation of studying the actual impact of green logistics packaging on consumer satisfaction and loyalty. Practical research helps businesses understand how green packaging influences the consumer shopping experience, increasing brand loyalty.

Strategic Decision Support which explanation of examining the actual support role of green logistics packaging in strategic decision-making for businesses. Practical research provides decision-makers with real data and insights to guide the future development of enterprises which explanation of analyzing the practical effectiveness of green logistics packaging in waste management and fulfilling social responsibility. Through practical research, businesses can develop more effective waste management strategies and enhance levels of social responsibility.

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Chapter 2 Literatures Review

2.1 Introduction

Green Logistics is a new concept that was put forward in the mid-1990s, and there is no uniform definition at present. Some foreign scholars have different descriptions of the concept of green logistics. ZhangShuhong sees Green Logistics as an environmentally responsible logistics system, which involves sourcing raw materials and products, the greening of the forward logistics process of production, packaging, transportation, warehousing, and delivery to the end user (Zhang,2012).

This paper takes e-commerce enterprises in Guangdong Province as the research object to study the problems and countermeasures for the development of logistics packaging of e-commerce enterprises in Guangdong. Although there have been many research results on green logistics packaging of e-commerce companies before, most of them were research on green logistics packaging of national e-commerce companies. Focusing on specific regions, studying the problems faced by e-commerce companies in the development of green logistics packaging is a new research field created by this paper. Provide theoretical research on the development of green logistics packaging for Guangdong e-commerce enterprises that is more in line with the actual situation.

1. Sustainable development Theory which explanation of investigating green logistics packaging within the framework of sustainable development theory aids in understanding how businesses drive sustainable development through innovative practices. Theoretical research reveals how innovation is introduced, implemented, and evolves continuously within the context of green logistics packaging (Li,2005).

The common point of the above definition is that Green Logistics is eco-friendly logistics, also known as ecological, ecological logistics. Its fundamental aim is to reduce resource consumption and waste emissions; this aim is essentially the unification of economic, social and environmental interests; this is also the goal of sustainable development. Therefore, green Logistics, can be called Sustainable Logistics General logistics activities are mainly to achieve the profit of enterprises, to meet customer needs, expand market share, and so on, these goals are ultimately to achieve the economic interests of a subject. The goal of Green Logistics is in the above-mentioned, economic interests, but also the pursuit of resource conservation, environmental protection, both economic and social attributes of the goal. Although the goal of resource conservation, Environmental Protection and economic benefit is the same from the macro-perspective and long-term benefit, it is contradictory to a certain period and a certain economic subject. According to the ultimate goal of green logistics, enterprises must set out from the basic principle of promoting economic sustainable development in both strategic and tactical management, while creating the temporal and spatial benefits of goods to meet the needs of consumers, the emphasis is on maintaining natural balance of nature and protecting natural resources, in accordance with the requirements of the ecological environment, for the benefit of future generations, the right to exist and develop. In fact, Green Logistics is a combination of the principle of

sustainable development and the concept of modern logistics, a modern logistics concept.

2. Life Cycle Assessment Theory which explanation of applying life cycle assessment theory to study the impact of green logistics packaging on the entire product life cycle. Theoretical research can offer profound insights, helping businesses understand the environmental implications of packaging choices throughout various stages of a product's life (Cai et al,2015).

The whole life cycle of a product, from raw material acquisition to consumption to end-of-life, will have an impact on the environment. And the green logistics includes from the raw materials acquisition, product production, packaging, transportation, distribution, and delivery, to the end-user in the hands of the green forward logistics process, it also includes the ecological management and planning of the reverse logistics process of return goods and waste recovery; therefore, its scope of activities covers the entire life cycle of products from production to end-of-life disposal Different logistics activities in different stages of life cycle have different green methods. From the different life cycle, the green logistics activities are green supply logistics, green production logistics, green distribution logistics, waste logistics and reverse logistics; From the operation of logistics activities, generally including green transport, green packaging, green circulation and processing, green storage.

3. 3R theory of circular economy in E-commerce Enterprises. Ecological Modernization Theory which explanation of the researching the impact of green logistics packaging on the ecological modernization of e-commerce enterprises contributes theoretically to expanding our understanding of ecological modernization. Constructing a theoretical framework helps deeply comprehend how green logistics packaging facilitates the ecological modernization process at the organizational level. how green logistics packaging alters the dependence on resources within e-commerce enterprises, based on resource dependence theory. Theoretical research can delve into the structure of resource dependence, providing businesses with more sustainable and flexible resource management strategies.

These theoretical research significances contribute to a deeper theoretical understanding of the mechanisms through which green logistics packaging influences e-commerce enterprises, providing robust theoretical support for academia and industry alike.

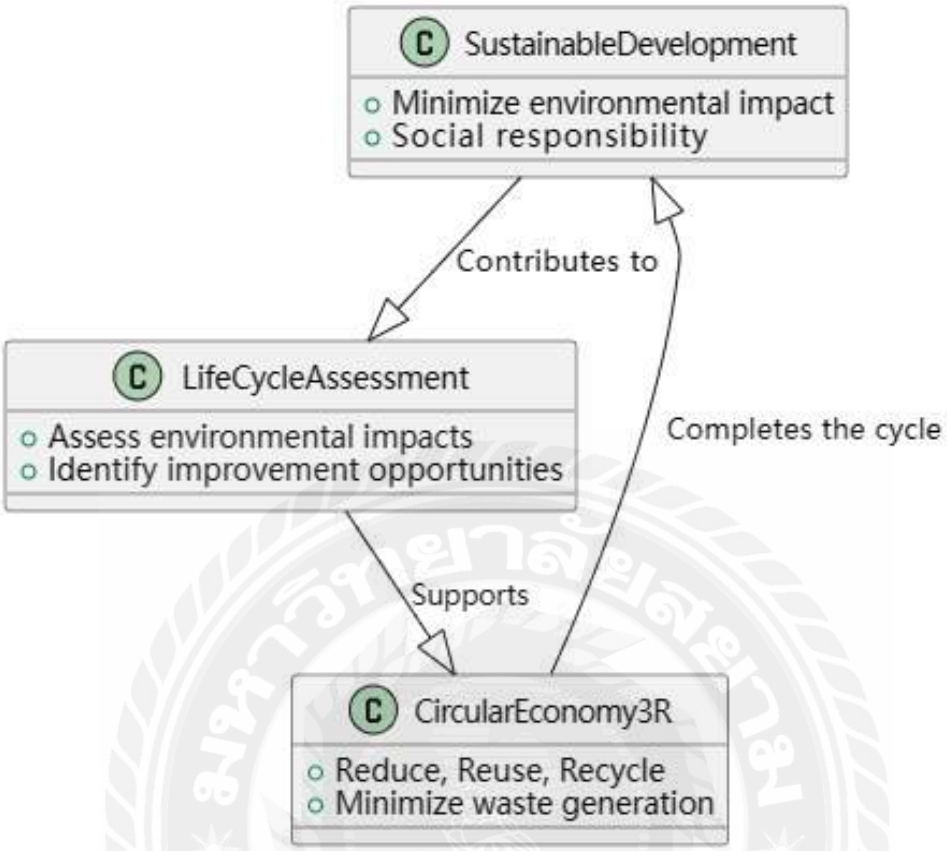

Figure 2 Theoretical Significance E-commerce Green Logistics Packaging

2.2 3R Theory

Significant changes in urban mobility transport and product distribution have occurred during periods of social segregation and closure measures, representing unsustainable development of the urban environment (Settey et al. 2021) . As a result, some market developments have changed permanently in recent years, with online shopping becoming more popular among city dwellers, including the purchase of fresh stuff and other perishable products through e-commerce platforms (Liu 2021). The acceleration of urbanization and the demand of cities for supplies and materials, the increase in e-commerce, and the emergence of new forms of purchasing and consumption habits have increased the number of products purchased online, enables the circulation and delivery of goods in cities around the world (Ehrler, Schöder, and Seidel 2021). E-commerce can be understood as buying and selling goods or services online through the internet (Pourrahmani and Jaller 2021), whether business-to-business (B2B) , consumer-to-consumer (C2C) , or business-to-consumer (B2C) (Cano, Londoño-Pineda, and Rodas 2022) . E-commerce and home delivery often reduce the movement of consumers and the flow of non-sales items between warehouses and physical stores, compared with purchases in physical stores, generate positive consumer perceptions of environmental impacts (Mangiaracina et al. 2016).

E-commerce activities may result in environmental impacts from packaging, labeling, transportation, energy consumption, and information flow, thereby generating carbon emissions and costs (Prasertwit and Kanchanasuntorn 2021). Likewise, last-mile logistics in e-commerce is related to travel time and distance savings to reduce fuel consumption, waiting time, energy consumption, vehicle usage, alternative energy sources, and carbon dioxide emissions (Viu-Roig and Alvarez-Palau 2020). In addition to its impact on the environment, e-commerce last-mile logistics also affects the economic and social dimensions of sustainability (Mangiaracina et al. 2016), which means the improvement and protection of natural resources, the economy, and quality of life (Akıl and Ungan 2021). Therefore, e-commerce can improve business efficiency, reduce consumers' information collection costs and purchase prices (Lee and Li 2006), and provide cost savings and discounts compared with traditional channels, positively affecting sustainable consumption during the pandemic (Tran 2021).

Reduce refers to the use of appropriate and scientific design methods that meet the basic functions of materials and ensure the protection of goods and ease of transportation. It aims to minimize the use of materials or use lighter materials as much as possible, in order to reduce resource consumption and the burden on the environment (Kumar 2015).

Zhang believes that choosing lightweight and low-density materials can not only save raw materials but also improve space utilization, making transportation and storage easier. Several commonly used packaging materials, such as metal, plastic, glass, etc., can be optimized through certain scientific and technological means to achieve lightweight. The reduction and lightweight design of materials does not necessarily mean the reduction of product quality, but rather the optimization of materials while ensuring that they meet packaging standards and basic functions, in order to reduce resource consumption and total waste. Perhaps the difference in lightweight design is only a few millimeters each time it is optimized, but with the accumulation of production and use over time, its volume is huge, and the resource savings are significant (Zhang et al. 2015).

Reuse refers to the reuse of packaging, achieving secondary value or even multiple times on the original packaging, and realizing recyclable value. For food packaging materials, food safety is the most important, and being able to use it to package food means ensuring safety. The principle of reusing the vast majority of materials can be achieved; Secondly, ensure the integrity of the packaging components themselves. For example, used containers such as milk bottles and tea cans can be used to hold objects or liquids after cleaning and disinfection, provided that they are intact. Otherwise, due to the characteristics of glass products, it is easy to scratch the user after being knocked, which cannot guarantee the safety of use (Seroka-Stolka 2014).

McKinnon pointed out that plastic materials are widely used due to their low cost and cost, and have already filled every corner of life. Whether it is food packaging or supermarket shopping bags, plastic materials are used. However, after plastic is

discarded, it can remain in nature for up to 200-400 years, or even 500 years. Due to its own material characteristics, it is difficult to degrade, resulting in long-term deep-seated ecological problems. Modern packaging design material properties can mostly meet the principle of reusability. What is needed is the low-carbon concept guidance of the design itself, and the audience has a low-carbon awareness to reuse packaging to achieve maximum utilization efficiency (McKinnon, 2010).

Recycle refers to the principle of requiring packaging materials to be recyclable and reused. The materials meet the standard of recyclability and are processed through certain technologies to form new forms of materials for reuse. It can also be called the "material recycling design principle". For example, paper materials are processed into recycled paper through multiple processes such as crushing, decolorization, and pulping, which is then reused in office supplies, saving resources and reducing carbon dioxide emissions (Bouchery et al. 2017).

Liu found that recyclable materials need to meet the principle of recyclability before technical processing, and finally achieve reuse. Nowadays, "Made from 100% recyclable materials" has become an essential slogan for enterprise packaging. Like Tetra Pak packaging, which is a common liquid food composite paper packaging in daily life, most well-known food brands at home and abroad use Tetra Pak packaging. The materials in its sterile packaging are made of paper, aluminum foil, and polyethylene plastic composite, of which cardboard accounts for 75%. It is a 100% recyclable and regenerated raw fiber material. If it is fully recycled and reused, it can save about 9000 tons of raw pulp per year (Liu and Ma 2022).

This proposal for a regional green logistics development evaluation system draws inspiration from the theory of the circular economy. The research centers on regional green logistics, addressing two crucial dimensions. First, it focuses on the intrinsic green evolution of logistics, encompassing environmentally conscious management and operations at the enterprise level, internal collaboration within the logistics industry, and enhancements to regional logistics infrastructure. This holistic approach aims to foster the green development of the regional logistics sector. Second, the study emphasizes the pivotal role of the logistics industry in advancing regional green economic initiatives. Logistics, in this context, is integral to the broader regional green economy. The paper adopts the theory of the circular economy as a guiding principle, constructing an evaluation index and model to facilitate the harmonized development of green logistics, regional economies, environments, and resources across enterprise, regional, and societal levels (Khan and Zhang 2021).

It helps to promote the development of the green logistics industry. A single logistics company cannot meet all the logistics services of any cargo owner. It needs to form an internal collaboration between logistics companies to meet the supply chain logistics needs of the cargo owners while reducing the environmental impact and resource consumption of the entire supply chain (Cheng et al. 2023). The promotion of government policies on environmental protection and the development of regulations

are crucial for the logistics industry. Logistics enterprises, operating independently, contribute significantly to resource allocation. The disorderly development of the industry has led to substantial resource waste. Strengthening green environmental protection and resource-related policies and regulations in the development of the logistics evaluation system, including the implementation of relevant indicators, is essential. This approach serves as a guide to exhibit the logistics industry's commitment to green development and sustainability (Setyadi et al. 2023).

2.3 Green logistics

In the mid-1980s, Richard F. Poist pointed out that the development history of the logistics discipline can be divided into three stages: The first stage is the early logistics stage. At this stage, people's attention mainly focuses on two aspects: modal cost and modal rate. Research, the first task of the research is to design an efficient transportation system. The second stage is logistics. The research focus in this era is total cost, total profit and total channels. The main goal of the research is to design an efficient logistics system rather than a simple transportation system. The third stage is new logistics. Logistics research in this era considers all channels of the entire enterprise. Under this channel, companies begin to fully integrate their logistics systems with the company's mission and goals. The sign is that companies begin to integrate logistics. Coordinates other business tasks such as production and marketing. (Poyster, RF 1986)

Since then, Richard F. Poist proposed the second phase of the "New Logistics Era" and introduced the concept of comprehensive responsibility. Since the concept of full responsibility focuses on the economic and welfare contributions of logistics to enterprises, both the corporate and social effects of logistics must be considered when making decisions. Richard F. Poist believes that logistics can help companies solve various potential social problems and difficulties, including consumption patterns, employee education and training, occupational health and safety, hunger and homelessness, environmental and ecological issues, etc. The logistics industry can well control environmental pollution and maintain ecological security through packaging, pollution control, and energy resource conservation. (Poyster, RF 1989)

Thereafter, articles on environmental issues in logistics began to appear increasingly in mainstream business publications. However, at this time, general academic journals rarely published such articles. In the early 1990s, there were only three articles in logistics academic journals studying environmental issues in the logistics field.

Further literature research shows that before 1990, there was almost no environmental research related to logistics in academia. After 1995, this topic began to attract academic attention, and "International Distribution & Logistics Management" published a special issue titled "Environmental Issues in the Logistics Field". Since then, research results on environmental issues have continued to appear in various logistics magazines. (Carter, CR and Ellram, LM 1998)

Wang’s definition of green logistics is: Green logistics refers to the process of planning, controlling, managing and implementing the logistics system through advanced logistics technology and environmental management concepts with the goal of reducing pollution emissions and reducing resource consumption. It includes both green management of forward logistics and green management of reverse logistics, which together constitute the integrated management of the enterprise's green logistics system. (Wang, 2004)

Deng’s definition of green logistics is: Green logistics refers to the use of advanced logistics technology to plan and implement logistics activities such as transportation, warehousing, packaging, loading and unloading, and circulation processing with the goal of reducing environmental pollution and resource consumption. It is the link between green logistics and green logistics. Supply entities and green demand entities overcome the time, space and process obstacles of green economic management activities and realize the effective and rapid flow of green goods and services. (Deng, 2011)

Xia and Li’s definition of green logistics is: Green logistics refers to logistics activities such as transportation, warehousing, packaging, loading and unloading, circulation and processing that are planned and implemented using advanced logistics technology, with the goal of reducing environmental pollution. LF. Green economic management activities are the process of connecting green supply entities and green demand entities, overcoming space and time barriers, and realizing the effective and rapid flow of green goods and services (Xia and Li, 2005).

The mainstream domestic view is that the green logistics system should at least include green transportation, green warehousing, green loading and unloading, green packaging, green circulation processing, green information collection and management, green indicator system for the logistics industry, green enterprise logistics management, green logistics policy and many other aspects.

2.4 Green logistics packaging

The three major categories of green logistics refer to green transportation, green packaging and green circulation processing. Green packaging originated from "Our Common Future" published by the United Nations Committee on Environment and Development in 1987. In June 1992, the United Nations Conference on Environment and Development adopted the Rio Declaration on Environment and Development and Agenda 21, setting off a green wave. Actions with ecological environment protection as the core have been launched around the world.

"Green packaging" is also called "environmentally friendly packaging" or "ecological packaging". Green packaging should be packaging that is harmless to the ecological environment and human health, recyclable, and can promote the sustainable development of the national economy. In other words, the entire process of packaging products from raw material selection, product manufacturing, use, recycling and

disposal should comply with ecological and environmental protection requirements. It includes ecological and environmental protection requirements such as saving resources, reducing energy, avoiding waste, easy recovery, recycling, incineration or degradation. The content of green packaging with the advancement of science and technology, the development of packaging will also have new connotations. (Wang, 2007)

Green packaging generally should have five levels of connotation:

1. Implement packaging reduction. On the premise of meeting the functions of protection, convenience, sales, etc., the amount of packaging used should be as small as possible.

2.Packaging should be easy to reuse or recycle. Reuse can be achieved by producing recycled products, utilizing heat through incineration, and improving soil through composting.

3.Packaging waste can degrade and decay. In the end, permanent garbage will not be formed, thus achieving the purpose of improving the soil. Reduction, reuse, recycling and degradability are recognized principles of green packaging development in the world today.

4.Packaging materials should be non-toxic and harmless to humans and living organisms. Packaging materials should not contain toxic elements, germs or heavy metals; or these contents should be controlled below relevant standards.

5.The entire life process of packaging products from raw material collection, material processing, product manufacturing, product use, waste recycling to final disposal should not cause public harm to the human body and the environment. (Wang, 2007)

2.5 Green packaging for e-commerce enterprise logistics

The main features of green e-commerce logistics packaging are as follows: First, the selection of packaging materials is more environmentally friendly, such as using bio-based, degradable, recyclable and other materials to reduce the use of non-material materials. Biodegradable plastics; secondly, packaging design should be more reasonable, such as adopting lightweight, simplified, and intelligent methods to avoid excessive packaging and repeated packaging; thirdly, packaging recycling should be more efficient, such as establishing large-scale application and recycling of recyclable express packaging mechanism to improve recycling and reuse rates; fourth, packaging management is more digital, such as applying cloud computing, big data, artificial intelligence and other modern information technologies to strengthen the optimization of supply and demand matching, inventory turnover, and scientific loading. (Zhang, 2016)

The goal of green packaging for e-commerce logistics is to minimize resource consumption and environmental pollution while meeting the needs of e-commerce logistics business, and achieve the coordination and unity of economic, social and

ecological benefits. Specifically, it is necessary to achieve sustained growth in express delivery business volume and a steady decline in the total amount of express packaging waste, to achieve neutral goals of matching express packaging material consumption with express delivery business income, and matching express packaging carbon emissions with the national peak carbon emissions.

The value of green logistics packaging to e-commerce companies is mainly reflected in the following aspects: First, it helps enhance the competitiveness and innovation capabilities of e-commerce companies' logistics links, reduces corporate operating costs and energy consumption, and improves e-commerce efficiency. Service Level. quality and customer satisfaction; second, it is conducive to promoting the transformation, upgrading and structural optimization of the e-commerce logistics industry, and promoting the development and application of new models, new business formats, and new technologies. Dependence on resources and damage to the ecological environment; fourth, it is conducive to enhancing consumers' green consumption awareness and behavior and cultivating good social trends.

Under the "double carbon" goal and the concept of circular economy, it is of great significance and urgency for e-commerce companies to develop green logistics packaging. On the one hand, the "double carbon" goal puts forward new requirements for my country's economic and social development, requiring all walks of life to accelerate low-carbon transformation and achieve carbon neutrality at the peak carbon level. As a representative of the new economy and a new driving force for economic development, the e-commerce logistics industry is promoting consumption upgrades and economic growth while also facing environmental pressure brought by express packaging waste. Effective control and reduction. On the other hand, the concept of circular economy provides new ideas for my country's economic and social development, requiring all walks of life to strengthen resource conservation and recycling to achieve green development. As a representative of emerging industries and a leader in consumption upgrading, the e-commerce logistics industry is also facing the problem of waste of express packaging resources while meeting consumer needs. It is necessary to strengthen the promotion of express packaging recycling and achieve efficient use and recycling of resources. (Zhao and Guo, 2022)

Relevant studies point out that with the development of human society and economy, environmental degradation and resource scarcity continue to intensify. How to better protect the environment and rationally utilize resources has become a topic of increasing concern. As an important part of economic activities, how to deal with logistics activities? Taking the road of harmonious green logistics development is worthy of our deep thought. In today's era of rapid technological development, due to the popularization of computer networks, e-commerce activities have gradually entered people's lives. Using e-commerce to manage logistics activities can effectively promote the "greening" of logistics. (Chen et al. 2017)

Kumar pointed out that the main features of green e-commerce logistics packaging

are as follows: First, the selection of packaging materials is more environmentally friendly, such as using bio-based, degradable, recyclable and other materials to reduce the use of non-material materials. Biodegradable plastics; secondly, packaging design should be more reasonable, such as adopting lightweight, simplified, and intelligent methods to avoid excessive packaging and repeated packaging; thirdly, packaging recycling should be more efficient, such as establishing large-scale application and recycling of recyclable express packaging mechanism to improve recycling and reuse rates; fourth, packaging management is more digital, such as applying modern information technologies such as cloud computing, big data, and artificial intelligence to strengthen supply and demand matching, inventory turnover, and optimization of scientific loading.(Kumar, 2015)

Zhang believes that the goal of green packaging for e-commerce logistics is to minimize resource consumption and environmental pollution while meeting the needs of e-commerce logistics business, and to achieve the coordination and unity of economic, social and ecological benefits. Specifically, it is necessary to achieve sustained growth in express delivery business volume and a steady decline in the total amount of express packaging waste, to achieve neutral goals of matching express packaging material consumption with express delivery business income, and matching express packaging carbon emissions with the national peak carbon emissions. (Zhang et al, 2015)

Seroka-Stolka pointed out that under the "double carbon" goal and the concept of circular economy, it is of great significance and urgency for e-commerce companies to develop green logistics packaging. On the one hand, the "double carbon" goal puts forward new requirements for my country's economic and social development, requiring all walks of life to accelerate low-carbon transformation and achieve carbon neutrality at the peak carbon level. As a representative of the new economy and a new driving force for economic development, the e-commerce logistics industry is promoting consumption upgrades and economic growth while also facing environmental pressure brought by express packaging waste. Effective control and reduction. On the other hand, the concept of circular economy provides new ideas for China's economic and social development, requiring all walks of life to strengthen resource conservation and recycling to achieve green development. As a representative of emerging industries and a leader in consumption upgrading, the e-commerce logistics industry is also facing the problem of waste of express packaging resources while meeting consumer needs. It is necessary to strengthen the promotion of express packaging recycling and achieve efficient use and recycling of resources. It is necessary to strengthen the promotion of express packaging recycling and achieve efficient use and recycling of resources. It is necessary to strengthen the promotion of express packaging recycling and achieve efficient use and recycling of resources.(Seroka-Stolka, 2014)

McKinnon believes that green logistics refers to the use of advanced logistics

technology to plan and implement logistics activities such as transportation, warehousing, packaging, loading and unloading, and circulation processing with the goal of reducing environmental pollution and resource consumption. It is the link between green logistics and green logistics. Supply entities and green demand entities overcome the time, space and process obstacles of green economic management activities and realize the effective and rapid flow of green goods and services (McKinnon, 2010)

Blanco believes that the value of green logistics packaging to e-commerce companies is mainly reflected in the following aspects: First, it is conducive to enhancing the competitiveness and innovation capabilities of e-commerce companies' logistics links, reducing corporate operating costs and energy consumption, and improving e-commerce efficiency. Service Level. quality and customer satisfaction; second, it is conducive to promoting the transformation, upgrading and structural optimization of the e-commerce logistics industry, and promoting the development and application of new models, new business formats, and new technologies. Dependence on resources and damage to the ecological environment; fourth, it is conducive to enhancing consumers' green consumption awareness and behavior and cultivating good social trends (Blanco and Sheffi, 2017)

2.6 Theoretical framework

The origin of the 3R theory of circular economy can be traced back to the 1970s, when people began to pay attention to issues of environmental protection and sustainable development. The 3R theory refers to the principles of Reduce, Reuse and Recycle, aiming to minimize resource consumption and waste generation.

Initially, the concept of circular economy was mainly proposed for the issues of waste management and resource recovery. However, as time goes by, people gradually realize the importance of circular economy and expand it to wider areas, including product design, production process and consumption habits (Julianelli et al. 2020).

The development of the 3R theory of circular economy is mainly driven by the following factors:

1. Increased environmental awareness: People are gradually paying more attention to environmental issues and are aware of the limited resources and the impact of waste on the environment.

2. Resource shortages and rising prices: As global resources become increasingly scarce and prices rise, circular economy has become a more cost-effective way to utilize resources.

3. Technological progress and innovation: The emergence of new technologies and innovations provides more possibilities for the circular economy, such as waste recycling technology and the development of sustainable energy.

4. Policy support and regulation formulation: Governments and international organizations are paying increasing attention to the circular economy and promoting

the development of the circular economy through policy support and regulation formulation.

In general, the origin and development of the 3R theory of circular economy is a long-term process, aiming to achieve the goals of effective utilization of resources, reduction of waste generation and environmental protection. This theory is constantly evolving and improving, providing important guiding principles for achieving sustainable development (Guarnieri, Cerqueira-Streit, and Batista 2020).

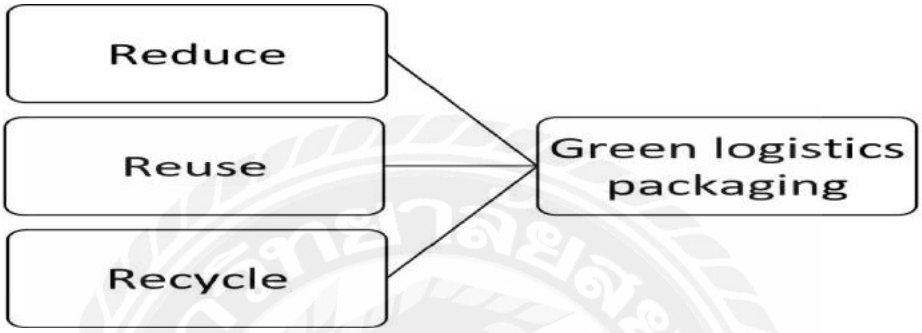

Figure 3 Theoretical framework

Chapter 3 Research Methodology

This paper adopts a qualitative analysis method. Based on a literature review of the 3R principle, an interview outline was designed, and 20 experts and industry personnel related to e-commerce enterprises in Guangdong Province were interviewed. The problems in green logistics packaging of e-commerce enterprises in Guangdong Province were summarized, and corresponding countermeasures were proposed for the identified problems.

3.1 Analysis of interview data based on "Reduce"

In the interviews, 15 experts and scholars mentioned the issue of excessive packaging. Some e-commerce companies in Guangdong mainly deal in beauty products, and they are afraid of damage during transportation. In order to avoid damage, using a large amount of packaging materials is the best choice for companies. At the same time, for the pharmaceutical e-commerce industry, drugs themselves are prone to deformation, damage, and moisture. Therefore, in order to deliver the goods to consumers intact, a large number of shock-proof and moisture-proof plastic materials must be used for packaging. At the same time, relevant industry experts said: Their company has conducted a survey and found that consumers have not established the principle of simplicity and moderation. Some consumers even think that good products are tightly packaged, so they have to use excessive packaging to cater to consumer psychology. Based on interviews with many experts, we found that e-commerce companies in Guangdong Province currently have a very serious over-packaging problem.

3.2 Analysis of interview data based on "Reuse"

During the interviews, 18 experts mentioned difficulties in reuse. Some experts said that the logistics packaging materials currently used by Guangdong e-commerce companies mainly include cartons, plastic bags, tapes, internal fillers, woven bags, etc. Among them, only cartons and woven bags can be recycled, and most of the others are difficult to Naturally degradable, non-recyclable, and even harmful to the human body. At the same time, some experts said that Guangdong Province is mainly based on light industry and has a large number of e-commerce companies in the clothing category. The clothing industry has low packaging requirements and mainly considers cost factors. Therefore, most packaging materials are of poor quality and have low reuse value.

3.3 Analysis of interview data based on "Recycle"

In the interviews, 17 experts all mentioned the difficulty of recycling. Taking JD.com as an example, some experts said: Because JD.com is a comprehensive e-

commerce company, their different products use different types of packaging with different specifications, making recycling difficult and costly. Another expert said that his e-commerce company mainly deals in electrical appliances, and the packaging of electrical products is mainly cardboard boxes. Due to the lack of an incentive system, consumers are more willing to sell cardboard boxes to waste recycling stations to get money, so they Recycling is very difficult. At the same time, some experts said that many e-commerce companies themselves have excessive packaging and use a large amount of tape during the packaging process. Therefore, the packaging is seriously damaged when disassembling and cannot be easily separated, so it is difficult to recycle, decompose, and recycle. Some experts said that Guangdong Province is mainly based on light industry, judging from the data of clothing e-commerce companies, while clothing e-commerce companies do not have high packaging requirements. Due to cost considerations, most packaging materials are of poor quality and difficult to recycle.

Chapter 4 Finding

Put forward corresponding suggestions based on the "3R" principal theory of circular economy. Theory of "reduce, reuse, and recycle" in the circular economy points out the processing direction from the front-end input, the middle-end process, and the back-end output. It also completely addresses the current urgent logistics packaging and garbage recycling. It can be solved from these three aspects (Liu et al. 2018).

4.1 Input terminal - "Reduction"

Reduction belongs to the input side, that is, at the source of production, full consideration must be given to saving resources, improving the utilization rate of resources per unit product, and preventing and reducing the generation of waste. Specific to logistics packaging, we can start from the following aspects.

In the process of logistics packaging, the principle of reduction should be fully taken into account, various consumables should be reduced as much as possible, and packaging should be done appropriately, that is, under the conditions of meeting specific transportation packaging performance requirements, with the smallest packaging volume, the least packaging materials, and the most convenient Storage and transportation methods achieve packaging protection for products. Specifically, during the implementation process, firstly, legal standards from relevant national departments are needed, such as the existing standards such as " Logistics Packaging Supplies" and "General Rules for Restricting Excessive Packaging of Goods". However, the specific requirements for logistics packaging are not clearly stated in the standards. The operability is poor; the second is the need to establish an effective supervision and operation mechanism, with supervision and even punishment mechanisms for all levels of e-commerce platforms and sellers, logistics companies, and production companies; the third is to provide standardized packaging operation guidance and training for all types of enterprises , Enterprises must also conduct strict internal training for internal operators, so that reduction will be deeply rooted in the hearts of the people from top to bottom (Seroka-Stolka, and Ociepa-Kubicka 2019).

4.2 Operation process - "Reuse"

Reuse means that the products produced can be used repeatedly, and the use and service time can be extended in the operation of economic activities. Specifically, the construction of logistics packaging and recycling system can start from the following.

4.2.1 Strengthen packaging R&D innovation

Greening logistics packaging raw materials is one of the root causes of solving pollution problems. The government needs to strengthen the technological research and development of green express packaging materials and take the lead in establishing a

technology research and development department to develop express packaging materials that are environmentally friendly, degradable, recyclable, not easily extruded and deformed, and meet the production and operation requirements of logistics companies.

At the same time, it is necessary to giving full play to the main role of enterprises in innovation, building a platform for industry, academia and research to promote the green development of the logistics industry, and developing and designing recycling boxes of various sizes that are durable, environmentally friendly, convenient for circulation. The first is to work hard on the material itself to develop packaging materials that are durable and convenient for subsequent recycling; the second is to design product functions that are convenient for recycling multiple times. Currently, many companies are testing the waters in these two aspects, such as JD.com's "Qingliu Box", Cainiao Station's "Return Box Plan", Suning's "Drift Box Plan", etc. (Sbihi and Eglese 2010).

4.2.2 Increase policy support

The R&D and innovation of enterprise packaging technology is a very important task that requires a large amount of human, material and financial investment. Therefore, it requires policy encouragement and support at the national level. For example, the government can provide financial subsidies to logistics packaging green R&D institutions to encourage them to conduct research and development of environmentally friendly packaging technologies. In addition, the government can also set up special funds for technological transformation or innovation to provide financial support to enterprises and promote technological progress.

In short, the research and development and innovation of enterprise packaging technology require the joint efforts and support of the whole society. The government should provide more policy support and financial investment to promote the progress and development of packaging technology.

4.2.3 Strengthen usage and recycling supervision

After good packaging is developed, it needs to be widely publicized and strengthened supervision and use during the process of introducing it to the market. New reusable packaging containers are more expensive. How to guide companies and consumers to use and supervise them is a difficult problem. For enterprises, it is more about encouraging and supervising use, such as conducting random inspections and reporting on usage on a regular basis, rewarding enterprises that recycle packaging products, and imposing certain fines for those who do not use packaging products in accordance with regulations; for informants, you can consider " In this model of "paid use - recycling - paid recycling", consumers pay a certain deposit at the beginning of use. After the logistics receives it, if they are willing to keep it, they can keep it for themselves. If they keep it, they can do it at the recycling site. Return and get your

deposit back. A sound and convenient recycling system is needed here. We can try to build a recycling system that links community residents, community properties, logistics companies and recycling processing centers. Each party has a dedicated person to manage it.

4.3 Output end - "Recycling" and "final processing"

Recycling - belongs to the output end, aiming to recycle waste into resources to reduce the final disposal volume, which means that products are required to be turned into usable resources again after completing their use functions. In order to ensure re-recycling, recycling and environmental protection, there are requirements for materials at the source of production - recyclable and quickly degradable; for logistics packaging waste that currently uses materials that cannot be recycled, it needs to be mandatory Garbage classification and harmless treatment of final waste (Pazirandeh and Jafari 2013).

In view of the current situation that the cost of new degradable and renewable logistics packaging materials on the market is high and the degree of market application is not high, the state should study and introduce financial support policies to provide necessary funds for all aspects of production, research and development, and use of environmentally friendly packaging materials. Support and give preference to industries engaged in packaging recycling, production, and use of renewable resources. In addition, packaging standards and specifications for the logistics industry should be introduced as soon as possible to strengthen daily supervision; for enterprises, actively seek and explore various green environmentally friendly materials and packaging recycling solutions, and actively Respond to and implement relevant standards and regulations for various types of green packaging; individual consumers should improve their awareness and awareness of environmental protection and implement garbage classification, processing and recycling.

Chapter 5 Conclusions and Recommendations

5.1 Conclusions

5.1.1 Problems faced by Guangdong e-commerce companies in developing green logistics packaging

According to the above interviewed, it can be seen that the main problems currently faced by the green logistics development of e-commerce enterprises in Guangdong Province are the widespread phenomenon of excessive or repeated packaging, the difficulty of recycling, the imperfect logistics packaging recycling system, the immature green logistics packaging technology, and the difficulty of reuse. Therefore, study on the challenges faced by e-commerce enterprises in the development of green logistics in Guangdong Province reveals key issues, including excessive packaging, recycling difficulties, insufficient recycling systems, immature technology, and reuse challenges.

In addition, through the interview, this paper also obtains the following research conclusions. Firstly, is the excessive energy consumption and environmental pollution, Guangdong, as one of the largest e-commerce logistics provinces, its logistics packaging expansion will lead to increased energy consumption (Guo, 2020). This is a major challenge as it leads to environmental degradation and undermines the sustainability efforts of the logistics industry. And the growth of logistics business has led to environmental pollution, posing a threat to local ecosystems and public health. The discharge of pollutants in the process of cargo transportation and handling urgently needs to pay attention to the development of sustainable logistics.

The second is causing traffic jams within cities. The expansion of e-commerce logistics has led to traffic jams in Guangdong cities. More logistics businesses have created more demand for logistics delivery, the increase in the flow of goods and vehicles in urban areas requires strategic planning, and better logistics plans are needed to improve overall efficiency in order to mitigate congestion-related challenges.

Finally, the relevant personnel on the green logistics packaging awareness is not strong, the adoption of green express packaging difficulties, e-commerce companies in the adoption of green express packaging face difficulties. This includes challenges in implementing environmentally friendly materials and practices that raise logistics costs and require innovative solutions to overcome these barriers, such as government funding.

5.1.2 Countermeasures for the development of green logistics packaging for Guangdong e-commerce enterprises in response to the problem

Propose and countermeasures for the development of green logistics packaging for Guangdong e-commerce enterprises are as follows:

Firstly, implement green manufacturing and integrate new green environmental protection strategies. To address the shortcomings in green express packaging, e-commerce enterprises in Guangdong should adopt green manufacturing (Kao et al.,

2020). This involves the application of new green environmental protection strategies to improve the efficiency and sustainability of packaging processes.

Secondly, increase research and development efforts to develop sustainable packaging materials. E-commerce enterprises should focus on developing and integrating sustainable packaging materials (Wang et al., 2022). This requires increasing research and development efforts in the packaging production industry.

Thirdly, carry out education on green logistics strategies and raise public awareness. Carry out educational activities to raise public and industry stakeholders' awareness of the importance of green logistics (Feng, 2023). These measures contribute to behavioral change and increased adoption of environmental practices.

Fourthly, develop comprehensive recycling plans and collaborative recycling plans. E-commerce enterprises should establish comprehensive recycling plans for express packaging and collaborate with local authorities and communities to improve recycling efficiency and reduce environmental impact (Guo, 2020).

Finally, the government should develop incentive measures to encourage sustainable industry behavior - the government and industry institutions should encourage e-commerce companies to adopt sustainable logistics practices. This may include providing tax incentives or subsidies for environmental initiatives to encourage businesses to invest in green logistics

In summary, adopting these strategies not only addresses the identified challenges but also promotes the overarching objectives of optimizing packaging practices, balancing efficiency and environmental impact, and ensuring product safety and quality in the realm of green logistics for e-commerce enterprises.

5.2 Recommendations

This paper mainly starts with literature research on green logistics packaging in e-commerce, analyzes existing theoretical research, and uses qualitative analysis to interview and investigate 20 experts and scholars in the e-commerce industry in Guangdong Province based on the 3R theory of circular economy. It identifies the problems faced by the development of logistics packaging in e-commerce enterprises in Guangdong Province, and proposes corresponding strategies based on the 3R theory of circular economy. During the research process, this paper is mainly based on existing literature and expert opinions, and does not involve specific enterprise research. Meanwhile, experts and scholars mainly come from the e-commerce industry, not specifically targeting the logistics and packaging industries. I hope that future researchers can use more research methods and introduce more research objects on the basis of this paper, providing more practical guidance for the development of green logistics packaging in e-commerce enterprises.

The study primarily conducted literature research and qualitative analysis of expert opinions to explore the challenges and propose strategies for green logistics packaging

in e-commerce in Guangdong Province. Based on the findings, recommendations are provided from three perspectives: policy, management, and future research.

5.2.1 Policy Recommendations

Government policies play a crucial role in shaping the direction of sustainable practices in e-commerce logistics packaging. For the e-commerce industry, the guidance of government policies is the vane that determines the sustainable practice direction of logistics packaging. Policymakers should actively encourage and promote the development and implementation of regulatory frameworks to incentivize e-commerce companies to adopt green logistics packaging practices that are consistent with circular economy principles. For those companies that actively respond to policy calls and engage in green logistics packaging practices, policymakers should provide them with economic incentives or tax exemptions and other preferential measures. This approach can effectively promote the transformation of companies towards sustainable solutions and promote the development of entire industries. In addition, policymakers should also aim to promote industry collaboration, especially between government, academia, and industry stakeholders. Through cooperation, we can jointly formulate standards and regulations that promote the development of green logistics packaging and provide a solid guarantee for the sustainable development of the industry. At the same time, this kind of cooperation will also help improve the overall level of the industry and promote the healthy development of the e-commerce logistics packaging industry.

5.2.2 Recommendations for Management

Effective management practices are essential for the successful implementation of green logistics packaging strategies. Recommendations for e-commerce enterprises include: Adopt the 3R Principle: Embrace the Reduce, Reuse, Recycle principle in packaging processes to minimize waste and environmental impact. Implement strategies that prioritize product protection with the least packaging materials and volume. Invest in technology which explore and invest in emerging green logistics packaging technologies to overcome challenges related to recycling, technology immaturity, and difficulty in reuse. Establish collaborative platforms which could create collaborative platforms, possibly through industry-university partnerships, to share best practices and design innovative, durable, and environmentally friendly packaging solutions.

5.2.3 Recommendations for Future Research

To enhance the depth and breadth of future research, the following recommendations are proposed: Diversify Research Methods: Future researchers are encouraged to employ a mix of research methods, including case studies, surveys, and data analytics, to provide a more comprehensive understanding of the challenges and opportunities in green logistics packaging. Expand research objects which include a

broader range of research objects, extending beyond expert opinions to encompass specific enterprises in the logistics and packaging industries. This will offer more nuanced insights into real-world applications. Engage multidisciplinary experts which could collaborate with experts from diverse fields, including logistics, packaging, and sustainability, to enrich the research perspectives and generate holistic recommendations for the e-commerce industry.

In conclusion, the implementation of these recommendations can contribute to the advancement of green logistics packaging practices in e-commerce, fostering a sustainable and environmentally responsible future.

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