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The Industry-Education Integration of Logistics Transportation in Supply Chain Management under "Dual Carbon Target"

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Abstract: The aim of this paper is to investigate the industry-education problem of nurturing logistics transportation talents in supply chain management under the "Dual Carbon Target" of China. First, it provides a comprehensive overview of the fundamental principles underlying green supply chain management and examines the implications of "Dual Carbon Target" on its implementation. Furthermore, it explores the challenges faced by enterprises in meeting carbon emission constraints, highlights the innovations and advancements in low-carbon technologies, and analyzes the mechanisms of carbon trading markets and policy support. Building upon this analysis, the paper further examines the demand for skilled professionals in the field of green logistics transportation and proposes recommendations for establishing a framework of industry-education integration to nurture logistics transportation talents specialized in green supply chain management within university programs. Finally, it provides recommendations for policy support and the establishment of a guarantee system while proposing future development trends, which can serve as guidance for continuous improvement in the industry and other prospects that are beneficial to the economy and society.

Keywords: "Dual Carbon Target"; Logistics Transportation; Supply Chain Management; Industry-Education Integration.

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1.Introduction

Under the backdrop of globalization and rapid economic development, the significance of supply chain management is increasingly emphasized. Green supply chain management, as an innovative and sustainable mode of managing supply chains [1], possesses undeniable importance. It not only focuses on the efficiency and cost-effectiveness of the supply chain but also incorporates considerations for environmental protection and social responsibility. The promotion of sustainable development and the attainment of mutually beneficial economic and ecological outcomes have become contingent upon it. Green supply chain management plays an indispensable role in safeguarding the environment. Traditional supply chain management often neglects environmental concerns, leading to significant pollution and ecological damage throughout the supply chain process. By optimizing supply chain processes, advocating for green technologies and materials, reducing waste and emissions, green supply chain management effectively mitigates environmental pollution and ecological damage while preserving the ecosystem's integrity to achieve sustainable development.

In terms of economic benefits, green supply chain management offers significant advantages. By enhancing supply chain

efficiency, reducing operational costs, improving corporate image and market competitiveness [2], green supply chain management can generate tangible economic benefits for enterprises. Additionally, as consumers' awareness of green products and services continues to grow, green supply chain management also facilitates enterprises in exploring new markets and achieving greater economic gains [3]. Moreover, green supply chain management contributes to the promotion of sustainable societal development. Through embracing environmentally friendly and low-carbon practices, it enables the harmonious development of economy, environment, and society while making positive contributions towards building a harmonious society and attaining sustainable development goals.

In the current landscape of university education in supply chain management, we have observed significant advancements and progress at multiple levels. The system for training talents in green supply chain management, especially in logistics transportation, has demonstrated a relatively flawless structure. As the nurturing ground for talent development, colleges and universities shall not only provide comprehensive theoretical knowledge but also collaborate with enterprises to offer students ample practical opportunities. Students not only need to complete the study of basic courses, but also participate in the practice of scientific research and project, to improve their innovation ability and the ability to solve practical problems.

From the perspective of market demand, there is a growing need for cultivating talents in the field of logistics transportation in green supply chain management, particularly in relation to the demand for those in science and technology. As the "Dual Carbon Target" of China is being implemented more extensively [4], logistics transportation enterprises require specialized professionals with skills in green supply chain management. Universities are actively adjusting their talent training programs to meet this market demand. By initiating or participating in public welfare projects related to "Dual Carbon," universities can not only enhance their awareness and capacity for promoting social culture but can also contribute to establishing a robust and efficient carbon footprint management system.

2.Impacts of "Dual Carbon Target" on logistics transportation in supply chain management

2.1 Challenges of logistics transportation enterprises under the constraint of carbon emissions

Under the constraint of carbon emissions, logistics transportation enterprises are confronted with unprecedented operational challenges. With the growing global awareness of environmental protection, the promotion of "Dual Carbon Target" has rendered carbon emission quotas an increasingly significant constraint for enterprise operations. Logistics transportation enterprises must conduct production activities within strict limits on carbon emissions to ensure compliance with quotas and avoid potential penalties and reputational damage resulting from exceeding regulatory standards [5]. Thus, to establish a strong foothold in the fiercely competitive market, logistics transportation enterprises must devote greater attention to sustainable development by optimizing their production processes, enhancing resource utilization efficiency, and reducing carbon emissions. This necessitates substantial investments in both financial resources and technology while also requiring long-term vision and strategic planning for enterprise growth.

2.1 Promotion of low-carbon technologies

Driven by "Dual Carbon Target", logistics transportation enterprises are exploring low-carbon technological innovations to achieve the sustainable transformation of their supply chains. Based on the provided tabulated data, it is evident that several logistics transportation enterprises have made remarkable progress in areas such as energy storage, carbon trading management, carbon financial management, and zero-carbon factories. To enhance the training of logistics transportation talents specialized in green supply chain management, it is recommended that universities and research institutions strengthen their collaboration with enterprises and jointly establish an industry-education integration model. By enabling students to actively participate in low-carbon technological innovation projects, they can not only enhance their practical skills and foster innovative thinking but also gain a deeper understanding of the actual demands of logistics transportation enterprises, thereby establishing a robust foundation for future career development. Simultaneously, logistics transportation enterprises should reinforce the recruitment and training of talents specialized in technological green supply chain management to provide a solid talent pool that supports low-carbon technological innovation. Through such collaboration, we can collectively propel the advancement of technological green supply chain management and contribute to achieving "Dual Carbon Target".

2.3 Carbon trading market and policy support

To actively encourage logistics transportation enterprises' participation in the carbon trading market, the government has also implemented a series of policy support and incentive measures. For instance, tax incentives and financial support have been provided by the government to promote green supply chain management and low-carbon technology innovation activities among logistics transportation enterprises. The implementation of the policies not only reduces emission reduction costs for businesses but also enhances their market competitiveness, thereby promoting the establishment and development of green supply chains. The government also plays a crucial role in regulating and enforcing the carbon trading market [6]. It has enhanced oversight of corporate carbon emissions and imposed stringent penalties on those exceeding emissions, ensuring the equitable, impartial, and efficient functioning of the market.

2.4 Strategies for sustainable development of logistics transportation enterprises

The core content of sustainable development strategies for logistics transportation enterprise lies in the establishment of sustainable development goals. Logistics transportation enterprises should set clear targets and strive for efficient utilization of resources based on their own actual situation. Emission reduction targets encompass reducing carbon emissions and waste generation, while resource utilization efficiency targets involve enhancing energy utilization efficiency and minimizing water consumption. To accomplish these objectives, logistics transportation enterprises should formulate detailed action plans that include technological innovation, equipment upgrading, process improvement, and other measures. Regular assessment of goal achievement is necessary to ensure successful implementation.

3.The training of green supply chain and technology talents in logistics transportation

3.1 Problems of the existing education system

The lack of specialized courses and training programs in technological green supply chain management within the existing education system hinders students' ability to meet the practical demands of this field in terms of knowledge reserves and skill level. To address this issue, it is essential for the education system to enhance the integration and organization of technological green supply chain management concepts [7], while establishing a comprehensive training program and curriculum framework that enables students to fully acquire relevant knowledge and skills. However, the current education system falls behind industry demand in talent training for logistics transportation in technological green supply chain management. With the continuous improvement of social awareness regarding green environmental protection, the demand for talents in logistics transportation and technological green supply chain management is increasing. However, the existing education system's training mode and curriculum fail to keep up with industry development, resulting in a significant gap between talent training and industry demand.

3.2 Trend of industry development and demand for technology talent

With the strengthening of environmental protection regulations by governments worldwide and the growing consumer preference for eco-friendly products, green supply chain management industry is witnessing a rapid surge in technological development. Consequently, there will be a significant increase in demand for logistics transportation supply chain professionals with a strong environmental consciousness within the realm of supply chain management [8]. The individuals must not only possess expertise in traditional logistics transportation and supply chain management knowledge but also demonstrate profound environmental awareness and an unwavering commitment to sustainable development. The rapid growth of the industry will generate a demand for logistics transportation supply chain professionals with specialized expertise in various fields. However, there is a relative scarcity of highly skilled talents proficient in technological green supply chain knowledge and skills. This situation will somewhat impede the swift progress of the industry.

4.Design of training green supply chain and technology talents in logistics transportation

4.1 Optimization of curriculum

With the continuous enhancement of societal environmental awareness, technological green supply chain management has emerged as a pivotal determinant for logistics transportation enterprises' competitiveness. Consequently, it is imperative to augment the inclusion of technology and green supply chain management courses in the curriculum. The optimization

of curriculum should be directed towards interdisciplinary approaches by integrating diverse knowledge domains such as engineering, management, and economics [9]. These courses should focus on fostering students' innovative and practical abilities while guiding them to apply acquired knowledge in resolving real-world challenges. By incorporating interdisciplinary courses into their education, students can broaden their perspectives and enhance their overall aptitude to better adapt to future societal demands.

Case analysis and practice are crucial for enhancing students' ability to solve practical problems. Successful cases of technological green logistics transportation in supply chain management should be incorporated into the curriculum for thorough analysis and discussion. Through case studies, students can gain a comprehensive understanding of the practical operations and application scenarios related to technological green supply chain management, thereby improving their capacity to apply acquired knowledge in real-world situations. Simultaneously, practical teaching serves as an essential means of fostering problem-solving skills among students by providing opportunities such as internships and projects that enable them to exercise their abilities and qualities.

4.2 Strengthening of practical skills

Encouraging students to actively engage in innovative and entrepreneurial activities is a crucial approach to foster their innovation consciousness and practical competence. Schools can organize competitions on logistics transportation supply chain management, among other initiatives, to provide a platform for students to showcase their talents. Through active participation in these activities, students can enhance their capacity for innovative thinking and practical application while deepening their understanding of logistics transportation in green supply chain management. Additionally, inviting industry experts for school lectures and guidance sessions can offer students more opportunities for learning resources and hands-on experiences.

Arranging internships for students in logistics transportation enterprises is an effective approach to enhance their practical capabilities [10]. By participating in technological green logistics transportation projects within the enterprise, students can gain a profound understanding of actual business operations and acquire specific processes and methods related to green supply chain management. This internship and training model facilitates the application of theoretical knowledge into practical work, thereby improving students' professional competence and practical skills. Simultaneously, logistics transportation enterprises can also identify suitable talents through internships and training programs, providing robust support for their own development.

4.3 Construction of teaching staff

The construction of the teaching staff is crucial for cultivating talents of logistics transportation in green supply chain management, and it requires strengthening from multiple perspectives. Introducing exceptional talents serves as a significant approach to enhancing the teaching staff. By actively recruiting individuals with profound knowledge and experience in the field, we can rapidly elevate the overall competence of our teachers and establish a solid talent foundation for nurturing future experts in this field. Additionally, reinforcing training programs and communication channels also proves to be an effective means of improving teacher quality. The organization of teachers' participation in logistics transportation supply chain management can enable them to timely grasp the latest concepts and technologies in green supply chain, thereby enhancing their professional level and teaching ability. University-enterprise cooperation is also an essential approach to strengthen the construction of teaching staff. By establishing cooperative relationships with green logistics transportation enterprises, training can enhance their practical guidance skills, enabling them to better meet the requirements for educators in green supply chain management.

5.Conclusions and prospects

5.1 Summary of research

The paper aims to explore the impact of the "Dual Carbon Target" on the education of logistics transportation talents in supply chain management. We emphasize that there is a need to revise the training direction for educating students in logistics transportation of green supply chain management. Traditional education in logistics transportation focuses on efficiency improvement and cost control. However, in the new digital era, greater emphasis shall be put on students' understanding

of green and low-carbon concepts as well as enhancing their abilities for technological innovation in green logistics transportation. The implementation of the "Dual Carbon Target" for cultivating logistics transportation talents necessitates a comprehensive innovation in curriculum, teaching methods, and practical activities. Furthermore, the paper stresses the importance of practicality in talent development. By means of case analysis, field investigation, and other approaches, students can acquire theoretical knowledge on logistics transportation in supply chain management and apply it to solve real-world problems. Such a practical training approach contributes to enhancing students' overall quality and innovative capabilities, enabling them to better meet market demands under "Dual Carbon Target".

5.2 Development trend

With the increasing global awareness of environmental protection, the green low carbon concept is gradually gaining popularity. In the future, this concept will become the mainstream values across all sectors of society and drive industries towards a more environmentally friendly and sustainable direction. Technological innovation serves as another crucial factor in promoting the development of logistics transportation in green supply chains. As big data technologies such as Internet of Things mature, their application will play an increasingly important role in logistics transportation supply chain management. The utilization of the technologies will enhance the efficiency of managing and reduce costs for logistics transportation enterprises.

The realm of green logistics transportation supply chain management encompasses various domains, and future advancements will place greater emphasis on cross-border collaboration and cooperative development. By amalgamating the resources and technological advantages from diverse industries, we can collectively propel the technological innovation and progression of green logistics transportation in supply chain management. The trend towards cross-border cooperation and collaborative development will facilitate the establishment of a more comprehensive and efficient industrial chain and ecosystem within the sphere of green supply chain management.

5.3 Contributions to the industry, economy and society

With the growing focus on environmental protection and sustainable development, the promotion and implementation of the findings presented in this paper hold immense potential and profound significance. Primarily, within the current context of increasingly stringent environmental regulations and intense market competition, achieving a green and low-carbon transformation has become pivotal for logistics transportation enterprises to enhance their competitiveness. The promotion and application of the findings in this paper can also have a positive impact on regional economic development. The introduction of green and low-carbon technologies will drive the growth of related industries, such as energy-saving and environmental protection equipment, clean energy, thereby creating new opportunities for regional economic expansion. Cultivating talents with expertise in technological and green and low-carbon concepts will provide support for the innovative development of the regional economy. The talented logistics transportation individuals will dedicate themselves to research and developing more advanced green and low-carbon technologies to facilitate the eco-friendly transformation and upgrading of the regional economy.

Finally, the promotion and application of the findings in this paper will also contribute to enhancing overall environmental awareness in society. Through the dissemination and implementation of green and low-carbon technologies, individuals will develop a deeper comprehension of the significance of environmental protection, thereby fostering a sustainable lifestyle that is both environmentally friendly and resource-efficient. Simultaneously, by propagating and advocating for the principles of green living and low-carbon practices, individuals can be inspired to actively engage in environmental conservation initiatives, thus making valuable contributions towards the Earth's sustainable development.

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Conflict of Interests

The authors declare that there is no conflict of interest regarding the publication of this paper.

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