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Theoretical overview of barriers affecting the green transformation process in logistics organizations

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Abstract

The green transformation process in logistics organizations faces multiple barriers that hinder the transition toward sustainable practices. Economically, the original costs for green infrastructure and technologies are high, frequently deterring investment, especially among small to medium enterprises. Regulatory hurdles arise from inconsistent and evolving standards, making it difficult for organizations to align practices globally. Technologically, a lack of mature green innovations and structure poses challenges in expanding sustainable solutions. Organizationally, resistance to change, lack of awareness, and limited expertise further obstruct green initiatives. These barriers emphasize the need for cohesive policy support, rocketed investment in green technology, and education to foster an organizational culture that embraces sustainability. Addressing these issues can enhance the logistics sector's contribution to reducing environmental impact and advancing toward a sustainable future.

Keywords: Green transformation process, logistics organizations, barriers

Introduction

We all know that our nature is getting affected by environmental activities, and it must face many challenges in order to tackle them. The global shift towards sustainability has placed significant pressure on logistics organizations to adopt greener practices. While the potential benefits of green logistics, such as reduced environmental impact, cost savings, and enhanced brand reputation, are well-documented, numerous barriers hinder the implementation of sustainable initiatives. This theoretical overview delves into the key barriers that impede the green transformation process within logistics organizations. By understanding these obstacles, organizations can develop effective strategies to overcome them and successfully transition to more sustainable operations. In the present scenario, not only individuals but also businesses and companies are showing an increased concern for the protection of the environment ^[1, 2].

The concept of "green" revolves around fostering environmental sustainability while simultaneously driving economic growth. This model not only minimizes environmental impacts but also offers businesses significant opportunities for economic advancement. By reducing pollution and production costs, the green approach enhances customer satisfaction, builds a positive corporate image, strengthens brand reputation, and provides a competitive edge. Furthermore, it opens doors for exporting products to environmentally conscious markets ^[3]. The green supply chain model supports businesses in integrating environmental considerations into supply chain management processes, such as eco-friendly product design, sourcing sustainable materials, restructuring production steps for environmental compatibility, and managing reverse logistics post-product lifecycle. These efforts collectively help reduce and control the negative environmental impacts of supply chain activities ^[4].

With growing emphasis on environmental and sustainability concerns both nationally and globally, it is imperative for businesses to incorporate these aspects into their operational strategies. Adopting a green supply chain allows companies to cut costs, improve customer satisfaction, and seize emerging market opportunities. This not only boosts profits but also represents a critical step toward creating a more sustainable and livable world ^[5]. The term "green transformation" refers to the systemic shift necessary to establish an environmentally

friendly economic framework. This transformation focuses on designing energy sources, production methods, and products with minimal environmental impact, aiming to conserve natural resources and mitigate climate change [6]. As global population growth accelerates, the depletion of natural resources and the emergence of environmental challenges, such as climate change, underscore the urgency of green transformation. Protecting natural resources and minimizing environmental harm are essential steps toward ensuring a sustainable future [7]. A core element of this transformation involves transitioning energy systems to renewable sources, reducing waste, improving energy efficiency, promoting eco-friendly products, and raising environmental awareness. Governments and corporations worldwide are already advancing these goals. For instance, companies manufacturing electric vehicles strive to decrease dependence on fossil fuels, while some nations are making significant investments in renewable energy to phase out fossil fuel use [8]. Green transformation offers numerous advantages, including enhanced sustainability, economic benefits, job creation, and improved environmental health. It represents a fundamental step toward building a better world where future generations can thrive [9].

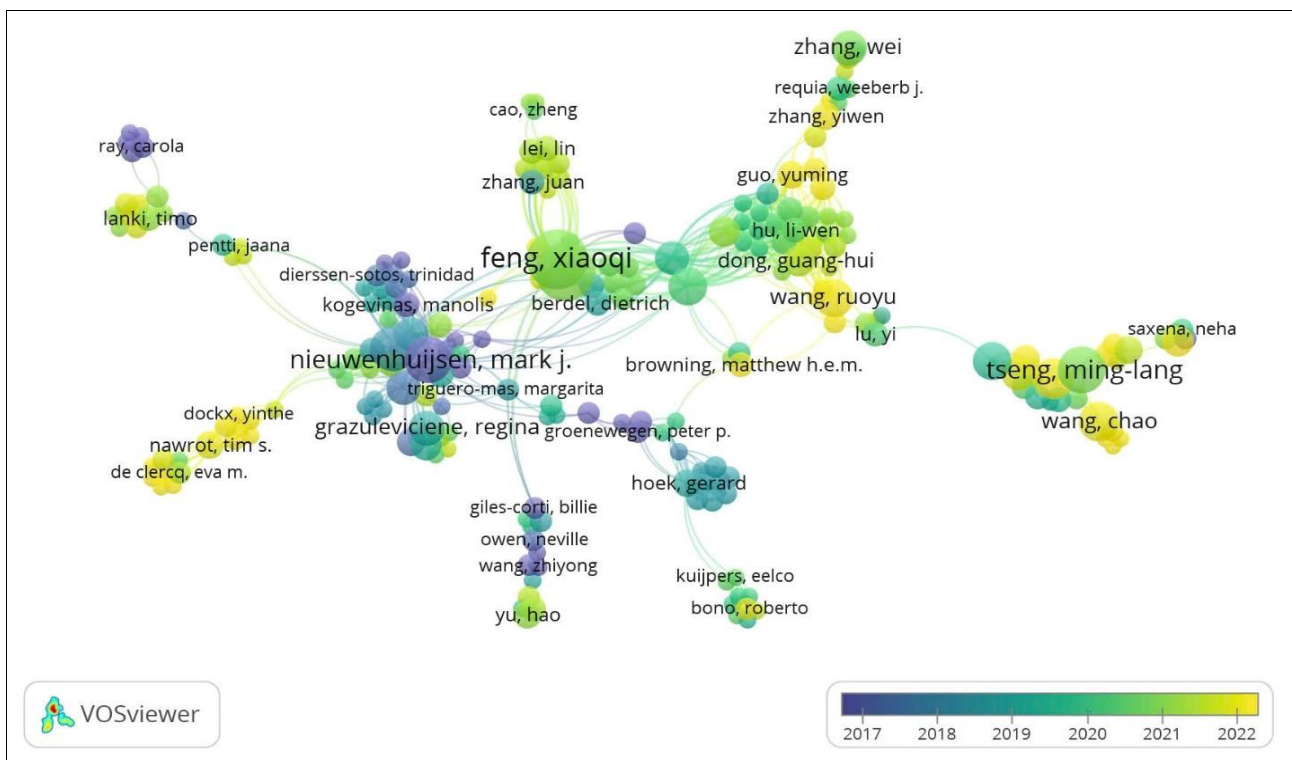
Research Methods

This study provides a method for the collection, synthesis, and analysis of previous research related to the two concepts of barriers affecting the green transformation process and logistics organizations scientifically and systematically. The research steps were carried out as follows: In the first step, the research identified keywords for searching databases including: “barriers affecting the green transformation process” and “logistics organizations”. The

databases used to search for publications include Google Scholar, ResearchGate, and Scopus. The selection of high-quality journals is considered an important task to ensure the publication of a quality article. Therefore, this study primarily chose journals from the Scopus database system, a reputable database owned by Elsevier Publishing (Netherlands). In the final step, the research proceeded to use the statistical method for the publications supported by VOSviewer 1.6.20 software. Next, the study conducts an in-depth analysis of the contents of 13 journals through the keywords identified that are related to the research topic.

Research Results

The first and foremost, the results of the co-citation analysis are presented with the support of VOSviewer software to identify the network of articles and classify authors who research within a specific thematic group in this field. To classify the thematic groups, the author conducted a qualitative analysis by reviewing the contents (titles, abstracts, keywords) of the studies within the same group, coding, and naming the thematic groups. Then, the author classified the keywords in these two stages into five corresponding thematic groups (based on the results of the co-citation analysis). The keywords in this stage were compared with each other, and based on the emergence of new keywords, the author argued the future research trends. Research on the barriers affecting the green transition process in logistics organizations has been conducted by numerous authors from around the world from 2017 to the present. This also shows that the research topic on barriers affecting the green transition in logistics organizations is one of the trends that many scholars are quite interested in. [10].



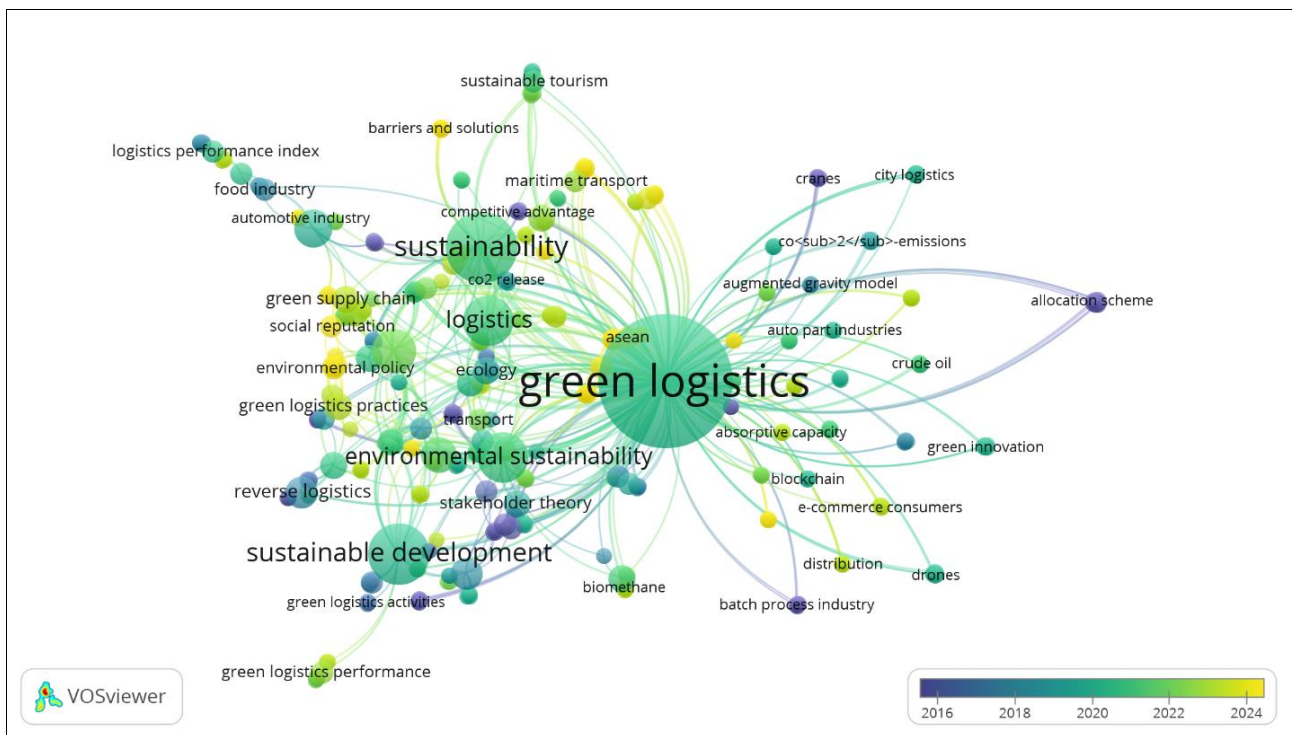
Source: Statistical results from VOSviewer 1.6.20 software.

Fig 1: The number of authors in the study of barriers affecting the green transformation process in logistics organizations around the world from 2017 to 2022.

As shown in Figure 1, the results indicate the presence of corresponding clusters. In which, each circle represents the author's name and the year of publication of the reference, the size of the circle indicates the number of citations, and the thickness of the connecting line between two circles represents the degree of correlation between the two studies. Regarding the main author clusters, the image is divided into various colored clusters, representing groups of authors with close ties in their research. In addition, the green, yellow, and purple clusters represent groups of authors who have been active during different time periods (from 2017 to 2022). Prominent authors such as Feng, Xiaoqi and Nieuwenhuijsen, Mark J. are located at the center of the network, indicating that they have numerous connections and play an important role in this field. Additionally, Tseng, Ming-Lang is also a prominent author in the yellow area and has strong connections with many other authors, especially

in recent studies. (2021-2022). The color bar at the bottom (2017-2022) shows the authors and studies emerging over time. The yellow clusters are concentrated on the right side and near authors such as Tseng, Ming-Lang and Wang, Chao, reflecting more recent studies. The connections between authors from different regions are represented by connecting lines. These lines have varying thicknesses, indicating the level of collaboration. Smaller groups, such as the cluster of Lanki, Timo, and Pentti, Jaana, may represent independent research teams or focus on more specific topics.

The research continues to use VOSviewer 1.6.20 software to classify keywords for the research problem from 2016 to 2024 and obtained the following results: (Annals-XXI, 2018; Li, 2021; Liu *et al.*, 2024; Zazykina & Bukova, 2021)

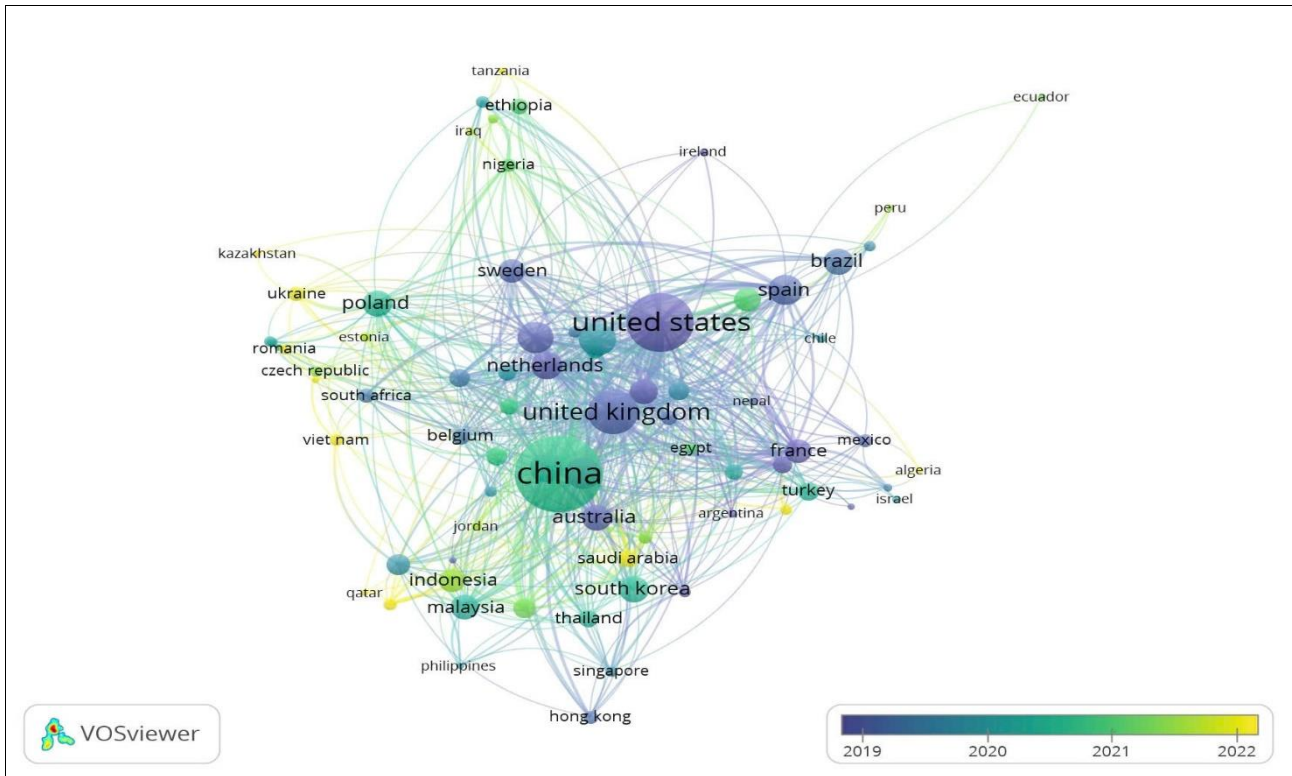


Source: Statistical results from VOSviewer 1.6.20 software

Fig 2: Keyword map in the study of factors influencing the green transition process in logistics organizations from 2016 to 2024.

The analysis of "green logistics" reveals 39 keywords classified into four main groups: sustainability, technology, international cooperation, and diversification. The sustainability group highlights a shift in logistics from traditional to green models, with keywords such as "sustainable tourism" and "sustainable development." The technology group, featuring terms like "blockchain," "artificial intelligence," and "drones," showcases the growing role of technological advancements in optimizing logistics and improving transparency. International cooperation, represented by keywords like "ASEAN," emphasizes regional collaboration in developing green logistics. Finally, the diversification group includes terms

like "green logistics practices" and "green supply chain," reflecting the variety of green solutions, such as renewable energy use, route optimization, and packaging reduction. Green logistics plays a critical role in advancing sustainability by reducing environmental impact in supply chain operations. Its applications span multiple industries, illustrating broad relevance, while recent research trends address modern challenges such as e-commerce and biofuels. The transition from foundational topics to contemporary issues highlights the dynamic nature of the field and its ability to adapt to global demands, underscoring its significance in promoting sustainable development and meeting evolving supply chain challenges.



Source: Statistical results from VOSviewer 1.6.20 software.

Fig 3: Results of the analysis of countries that have been and are in the process of green transition in the logistics organizations from 2019 to 2022.

Countries with significant influence: the United States, China, European countries (the UK, Germany, France...), and some Asian countries (Japan, South Korea, Singapore) have the highest number of research and connections, indicating that they are centers for researching and implementing green logistics solutions. These countries have many connections with other nations, indicating close international cooperation in this field. In addition, the countries participating in this research come from various regions worldwide, suggesting this is a global issue.

Prominent countries: USA: As one of the pioneering countries in the research and development of green technology, the USA has many large companies investing in sustainable logistics solutions. China: With its large-scale production and the need to reduce pollution, China is setting many ambitious goals for green transformation in logistics. European countries: The European Union has set ambitious climate goals and encourages its members to implement green transitions in various sectors, including logistics. Southeast Asian countries: Countries like Singapore, Thailand, and Vietnam are increasingly recognizing the importance of green logistics and are making efforts to catch up with this trend.

The VOSviewer chart provides an overview of the countries actively participating in the green transition in logistics. Although the United States, China, and European countries are leading the way, many other nations are also striving to contribute to a more sustainable future.

Conclusion

Research on the factors influencing the green transition process in logistics organizations is becoming a trend shortly. The compilation and classification of articles on the barriers affecting the green transition process in logistics

organizations from Scopus, ResearchGate, and Google Scholar show that studies on barrier factors have been conducted from more angles than studies on the green transition process in logistics organizations. Therefore, the next research direction could examine the factors influencing the green transition process in logistics organizations in aspects such as education and access to capital. In addition, aspects such as social capital and motivation have also received very little attention in research, and future studies could delve deeper into these factors. In summary, the results of this study provide an overall picture of the field of behavior participation in entrepreneurial activities for future research. During the data collection process, although the author also conducted a synthesis and selection based on various sources such as Scopus, ResearchGate, and Google Scholar, the study focused only on articles published in reputable journals and excluded conference proceedings. Additionally, the topic of barriers affecting green transition in logistics organizations is still relatively new, resulting in a limited number of articles.

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