WEP Warwick Evans Publishing

International Journal of Social Sciences and Public Administration

ISSN: 3005-9836 (Print), ISSN: 3005-9585 (Online) | Volume 6, Number 2, Year 2025
DOI: https://doi.org/10.62051/ijsspa.v6n2.08
Journal homepage: https://ijsspa.org

Review of Research on Green Transportation

Chongguang Wang*

College of Tourism, Xi 'an International Studies University, Xi'an, China
*Corresponding Author: Chongguang Wang

ABSTRACT

Green transportation, as a sustainable development concept, aims to minimize the negative environmental impacts of transportation and promote the ecological, economic, and social harmony of transportation systems. This study systematically reviews the evolution of the green transportation concept and its core characteristics, summarizing research hotspots and trends in green transportation from domestic and international literature. It focuses on analyzing the temporal evolution, keyword co-occurrence, and clustering results of relevant studies. The findings reveal that green transportation has become a critical direction in global transportation development, driven by policy support, technological innovation, and increased public awareness. The research covers various dimensions, including low-carbon, health, safety, efficiency, and equity. The study concludes by proposing that future research should further explore the synergies between green transportation and urban development to provide theoretical and practical guidance for building sustainable green transportation systems.

KEYWORDS

Green Transportation; Sustainable Transportation; Low-Carbon Transportation; Transportation Development Level; Keyword Analysis; Literature Review.

1. INTRODUCTION

The research on green transportation originates from pressing environmental issues, urban transportation challenges, and the urgent need for sustainable development in human society. With global climate change, environmental pollution, and resource depletion becoming increasingly severe, the energy consumption and environmental burden caused by traditional transportation methods have continued to intensify. Meanwhile, the rapid pace of urbanization has led to a surge in transportation demand, exacerbating issues such as traffic congestion and pollution. Against this backdrop, green transportation characterized by new energy, intelligence, and sharing has emerged, becoming a key development trend in the transportation field. Governments worldwide have introduced policies and regulations to support green transportation, increased investment, and promoted technological and model innovations in this domain. Furthermore, heightened public environmental awareness has turned green travel into a social consensus and lifestyle[1].

Green transportation is not merely a new mode of transportation but a new concept that emphasizes minimizing environmental impacts during transportation processes, reducing greenhouse gas emissions, and balancing environmental, ecological, economic, and social interests. It aims to build a diversified urban transportation system that is convenient, safe, efficient, environmentally friendly, visually appealing, and beneficial for ecological and environmental protection, with public transportation as its core. This system seeks to coordinate urban transportation and urban development, improve traffic efficiency, protect historical and cultural heritage, and purify urban

environments using scientific methods, technologies, and measures. At its core, green transportation prioritizes accessibility, orderliness, individual travel safety and comfort, minimal land and energy consumption, harmonious integration with living and ecological environments, and scalability of transportation systems[2].

2. CONCEPTUAL REVIEW OF GREEN TRANSPORTATION

2.1. Definitions of Green Transportation in International Studies

The concept of green transportation was first proposed by Chris Bradshaw of Canada in 1994. Bradshaw classified transportation modes based on their environmental impact intensity, ranging from low to high, into six categories: walking, cycling, subway, buses, motorcycles, and cars. He suggested that the development of green transportation aims to achieve a combination of accessibility, orderliness, safety, comfort, low energy consumption, and minimal pollution[4].

2.2. Definitions of Green Transportation in Domestic Studies

In China, most scholars agree that urban green transportation is a comprehensive and complex system that integrates 'people,' 'habitat,' and 'environment.' In 2003, the Ministry of Housing and Urban-Rural Development and the Ministry of Public Security defined green transportation as an urban transportation system aligned with the trends in human habitat development[5].

3. BIBLIOMETRIC ANALYSIS OF GREEN TRANSPORTATION LITERATURE

This study retrieved literature related to the concept of 'green transportation' from both CNKI and Web of Science (WOS). The search terms included 'Green Transportation', 'Sustainable Transportation', 'Low-Carbon Transportation', 'Sustainable Development of Transportation', as well as their English equivalents.

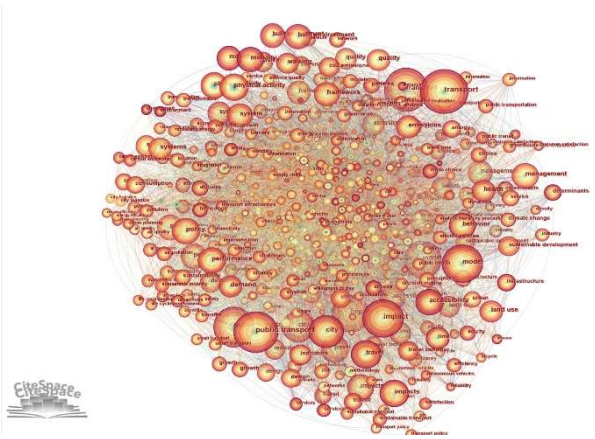

Figure 1. Keyword co-occurrence

Through keyword co-occurrence analysis, Figure 1 identifies keywords with frequencies exceeding 200. The most frequent terms include "transport" (501 occurrences), "public transport" (452 occurrences), "impact" (415 occurrences), "travel mode" (392 occurrences), "city" (302 occurrences), "policy" (231 occurrences), "impacts" (223 occurrences), "accessibility" (222 occurrences),

"performance" (215 occurrences), and "built environment" (201 occurrences). These high-frequency keywords reflect core areas of interest in green transportation research.

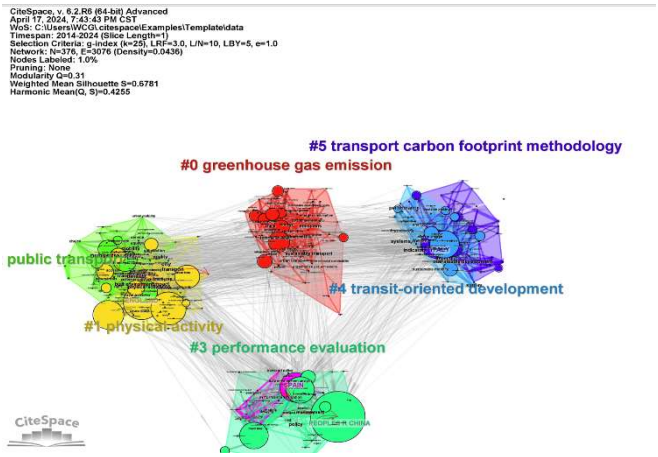

Figure 2. Keyword clustering

Keyword clustering analysis revealed six major clusters: #0 greenhouse gas emissions, #1 physical activity, #2 public transit, #3 performance evaluation, #4 transit-oriented development, #5 transport carbon footprint methodology, and #6 land use change. These clusters represent distinct research domains within the broader field of green transportation.

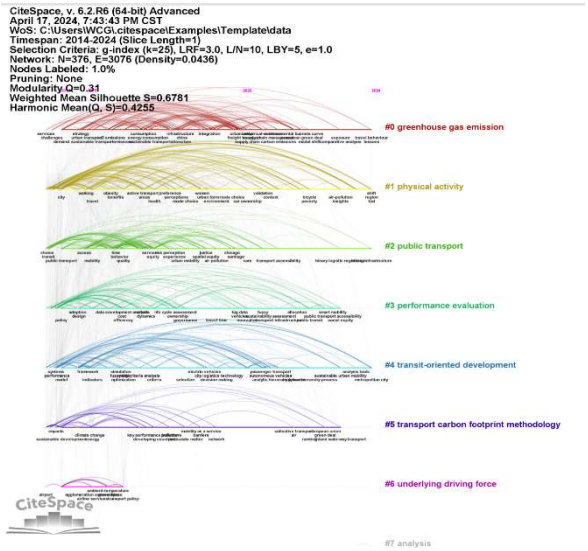

Figure 3. Time diagram

Figure 3 (keyword timeline chart) illustrates the evolution of research themes in the field of urban sustainable transportation. Keywords within the same cluster are positioned on the same horizontal line in the timeline. The timeline reveals clusters ranging from #0 to #7, with Cluster #0 (greenhouse gas emissions) exhibiting the largest scale and longest research timespan. This cluster encompasses keywords such as travel behavior analysis, exposure analysis, sustainability assessment, urban transportation challenges, urban infrastructure, transportation planning, urban transportation strategies, carbon emission chains, and technology evaluation.

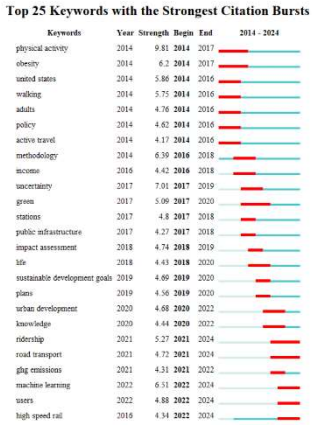

Figure 4. Keyword emergence

Figure 4 highlights changes in keyword intensity over time. Keywords such as "physical activity," "obesity," and "United States" exhibited high intensity in 2014. Meanwhile, terms such as "urban development" and "knowledge" emerged suddenly as research hotspots in 2020, suggesting a shift in focus during that year. Observing the frequency and intensity of keywords over different periods reveals emerging research trends. For instance, from 2016 onward, the intensity of "methodology" and "income" steadily increased, reflecting growing academic interest in research methodologies and financial issues. Strong correlations between certain keywords, such as "public infrastructure" and "impact assessment," observed in 2017 and 2018, suggest a focus on evaluating the environmental impacts of public infrastructure projects during this period.

4. CONCLUSION AND DISCUSSION

Research on green transportation focuses on addressing the challenges of global resource constraints, environmental issues, and urbanization, highlighting its crucial role in sustainable development. Through a systematic review of domestic and international literature, this study identifies several key conclusions: Green transportation is characterized by sustainability, systematic integration, a people-centered approach, and harmonization. It emphasizes ecological friendliness and operational efficiency while aiming to meet individual travel needs. The keyword co-occurrence and clustering analyses reveal that the primary research hotspots in green transportation include greenhouse gas emissions, travel behavior, transit-oriented development, and carbon footprint evaluation. Recent years have seen increasing attention to health benefits, social equity, and technological innovation. Under the guidance of policies and advancements in technology, future research should prioritize the optimization of comprehensive evaluation methodologies and explore the integration mechanisms between green transportation systems and urban development, particularly in the context of accelerated urbanization and urgent low-carbon transition demands.

Despite significant progress in the theory and practice of green transportation, several challenges remain unresolved. First, the existing evaluation index systems for green transportation often lack universality and applicability across different cities and regions. Future studies should adapt these systems dynamically to accommodate the unique characteristics of individual cities. Second, although big data and artificial intelligence provide innovative tools for green transportation research, integrating multidimensional data effectively to enhance scientific rigor remains an area requiring further exploration. Third, while green transportation policies have been widely adopted globally, there is insufficient evaluation of their implementation outcomes and long-term impacts, necessitating the establishment of systematic monitoring and feedback mechanisms. Lastly, regional disparities in resource endowments, technological levels, and socioeconomic conditions significantly influence the

priorities and pathways for green transportation development. Future research should focus on addressing these imbalances more comprehensively.

In conclusion, the study of green transportation is not only essential for tackling global environmental and resource challenges but also plays a vital role in advancing sustainable urban development. Strengthening the integration of theoretical research and practical applications, optimizing the construction and management of green transportation systems, and ensuring a balance among ecological, social, and economic dimensions in urbanization processes will provide robust support for achieving these goals.

REFERENCES

[1] Xi, J. (2024). Promoting modernization through harmonious coexistence between humans and nature in the construction of a beautiful China. Seeking Truth, 2024(01), 4–7.

[2] Wang, G. (2024, May 16). Interpretation of 'Urban Transportation Development Strategy Towards 2035.' Urban Transportation, 1–7.

[3] Hamilton, M. A. (1996). The TRIPS Agreement: Imperialistic, outdated, and overprotective. Vanderbilt Journal of Transnational Law, 29, 613.

[4] Björklund, M. (2011). Influence from the business environment on environmental purchasing: Drivers and hinders of purchasing green transportation services. Journal of Purchasing and Supply Management, 17(1), 11–22.

[5] Oviedo, D., Cavoli, C., Levy, C., et al. (2022). Accessibility and sustainable mobility transitions in Africa: Insights from Freetown. Journal of Transport Geography, 105, 103464.