

Public Transportation Management Strategies in a Low-Carbon Economy

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Abstract: The importance of public transportation in social and economic development is undeniable. With the rising concerns of environmental pollution and resource depletion in recent times, China has made significant efforts to transition towards a low-carbon economy. To advance this transition, it is imperative to confront the obstacles faced by public transportation and enact effective management strategies that promote both economic and environmental sustainability. In this regard, the author has evaluated the existing status of public transit within the context of a low-carbon economy and put forth targeted management approaches. This research is expected to make a valuable contribution towards enhancing the quality of public transportation management.

Keywords: Low-carbon economy; Public transportation; Transportation management

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1. Introduction

In the context of a low-carbon economy, it is crucial to conduct a comprehensive examination of the shortcomings in public transportation and, grounded in real-world conditions, offer pragmatic management strategies. By aligning with the low-carbon economic trend, this endeavor aims to advance the growth of public transportation in China. Embracing sustainable development for optimizing public transit not only enhances the comfort and safety of transportation for the public but also mitigates carbon emissions and conserves energy, thereby propelling China's public transportation sector toward an eco-friendly and low-carbon trajectory.

2. Low-carbon economy

A low-carbon economy represents a model grounded in environmental preservation and energy conservation. Within this framework, every enterprise is mandated to reduce energy consumption and minimize environmental pollutants during their operations and growth. In the context of striving for China's sustainable development objectives, the low-carbon economy fundamentally embodies the principles of environmental protection. While the continuous expansion of the public transportation industry has yielded favorable conditions and convenience for the public's mobility, the operational process of vehicles consumes more energy and generates

emissions, contributing to heightened environmental pollution. Consequently, in a low-carbon economy, it becomes imperative to prioritize the enhancement of public transportation management to foster the evolution of the public transportation sector.

The low-carbon economic model can be mainly segmented into three components. The initial aspect entails achieving zero-carbon development, necessitating the complete elimination of carbon emissions during the development of the public transportation industry. The second aspect is centered on carbon usage reduction, aiming to minimize carbon consumption in line with past public transportation advancements. The third aspect targets carbon emissions reduction, distinguishing itself from decarbonization by striving to reduce carbon emissions intensity below the level of carbon production. Realizing the objectives of low-carbon economic development is a gradual, long-term process. Transitioning from decarbonization to carbon reduction and ultimately attaining zero carbon is the overarching goal, which cannot be accomplished overnight.

3. Challenges in public transportation within a low-carbon economy

3.1. Inadequate urban road planning

In the current state of urban road planning, government departments are energetically fostering the development of the public transportation industry to meet the daily commuting needs of the public. However, constraints stemming from existing road infrastructure and systems hinder the formulation of comprehensive public transportation routes. Typically, road planning is limited to land use considerations, without a comprehensive analysis of population distribution. This results in an inadequately scientific and rational approach to public transportation road planning. Hence, road congestion frequently occurs in some segments, while others remain underutilized, leading to an inefficient use of public transportation resources and impeding progress toward sustainable development goals.

3.2. Limited public awareness of low-carbon initiatives

As the general public's living standards continue to rise, there is an increasing trend towards owning private vehicles, which are perceived as convenient and swift modes of travel. While public transportation is more environmentally friendly and energy-efficient, the public's awareness of low-carbon options remains relatively weak. Public transportation is not the primary choice for travel. Strengthening public awareness of low-carbon environmental protection is essential when implementing public transportation management in a low-carbon economy. Encouraging people to actively opt for public transportation and participate in energy conservation and emission reduction is key to advancing low-carbon economic development and achieving the "double carbon" goal.

3.3. Deficient information management in public transportation

Resource constraints in terms of talent, technology, and funding have resulted in a lack of informatization and intelligence in public transportation management in China. The general public faces challenges in accessing basic information about public transport through mobile phone applications or software programs. This includes accurate details about transport operations, such as arrival times, departure schedules, intervals, and final departure times, which are essential for flexible travel planning. While some regions have introduced apps and software programs, the information they provide regarding public transportation is often outdated, lacking real-time updates on traffic conditions and accidents. Consequently, passengers may experience delays and disruptions when using public transportation, leading many to prioritize driving their own vehicles.

4. Effective strategies for public transportation management in a low-carbon economy

4.1. Rationalization of public transportation routes

In the current phase, urbanization and industrialization are on the fast track. The robust expansion of the public transportation sector has enhanced the daily lives of the public and spurred local economic growth. However, it is undeniable that the rapid growth of this sector has led to substantial damage to the surrounding ecological environment, resulting in the wastage of natural resources. Therefore, in a low-carbon economy, there is a need for the judicious planning of public transportation routes to further the goals of low-carbon economic development ^[1]. On one hand, relevant government bodies and grassroots industrial organizations should prioritize the principle of “facilitating mass travel” and, when designing urban public transportation routes, consider controlling vehicle emissions while mitigating road congestion. On the other hand, to prevent the wastage of public transportation resources, authorities must enhance their strategic planning capabilities. This includes ensuring seamless intermodal connections between buses, subways, and other modes of transport, along with implementing road usage restrictions to maintain public transit efficiency while reducing carbon emissions, thus contributing to the achievement of sustainable development objectives.

4.2. Enhanced promotion of low-carbon awareness

In a low-carbon economy, the key to the rapid expansion of urban public transportation is securing public support and recognition. Given the currently weak awareness of low-carbon practices among the general population, there is a pressing need to intensify efforts to advocate low-carbon concepts and vigorously promote low-carbon economic, transportation, and travel models. Public enthusiasm should be mobilized to participate actively in low-carbon development to realize green and sustainable growth ^[2]. Strategies for increasing public awareness include: formulating preferential policies to encourage public transportation use by reducing fares; utilizing various communication channels, including official public transit website, WeChat official accounts, and popular media platforms such as TikTok and Weibo to communicate the advantages of using public transportation and the importance of low-carbon concepts. Traditional media such as radio and television stations, city newspapers, or through banners, pasting slogans, or social activities, community education, can also be utilized; engaging public figures, such as government members, social representatives, celebrities, and authoritative scholars, to experience public transportation and convey its convenience and efficiency, fostering broader public acceptance of the low-carbon economy and public transportation as a preferred travel option.

4.3. Augmentation of public transportation services’ intelligence

As society advances, the demand for personalized and customized mass transit services becomes more prominent. With China’s rapid technological progress, advanced information technologies are increasingly mature and available. In a low-carbon economy, it is crucial to actively incorporate these technologies into public transportation management to enhance the qualities and capabilities of urban transportation services. This should include the reduction of travel time, and closing the gap between public transportation and self-driving options. The adoption of information technologies can promote the informatization and intelligence of public transportation services ^[3]. For instance, it can introduce “one-stop” low-carbon and green travel services, dispelling misperceptions about long wait times and poor transfer efficiency, thus allowing passengers to experience the comfort and convenience of public transportation in the modern era. High-quality services can encourage the public to choose public transportation as their first option for travel, reducing vehicle emissions and reinforcing the low-carbon concept. To address shortcomings in urban public transportation information

management, collaboration with local universities and research institutes can be strengthened to cultivate a skilled workforce and improve the development of intelligent public transportation. Regular optimization and improvement of urban public transportation management information systems are essential to further the development of the urban low-carbon economy ^[4].

4.4. Promotion of new energy vehicles

In a low-carbon economy, the active promotion and utilization of new energy vehicles within public transportation management is vital for reducing carbon emissions. This plays a crucial role in China's sustainable economic and societal development. To achieve this, relevant government departments and industries should work diligently to establish centralized charging and fuel cell hydrogenation stations to facilitate the widespread adoption of new energy vehicles ^[5]. In addition, the replacement and upgrading of old public vehicles should be accelerated, supporting the development of the low-carbon economy and the achievement of sustainable development goals ^[6].

4.5. Reinforcement of public transportation management systems

To ensure that transportation management practices are standardized and effective, relevant government departments should establish comprehensive transportation management systems in accordance with China's current laws and regulations. Furthermore, the implementation of these systems should be rigorously enforced to enhance compliance among public vehicle operators ^[7]. These detailed systems should delineate responsibilities for managers and set precise standards for the conduct of public transportation drivers. Regular performance appraisals for both managers and drivers, coupled with corresponding reward and penalty measures, can be implemented to motivate adherence to the established systems ^[8]. To alleviate road congestion and ensure the smooth flow of traffic, relevant departments should make scientifically-based adjustments to public transportation plans. This includes the rational division of main roads, secondary roads, motor vehicle lanes, and pedestrian lanes, as well as the allocation of parking spaces to prevent unauthorized parking or obstructions of pedestrian walkways.

4.6. Increased involvement of government departments

To encourage businesses to actively participate in low-carbon economic development and effectively reduce carbon emissions, relevant government departments in China should increase their involvement ^[9]. For instance, companies that produce low-carbon, environmentally friendly public transportation can receive financial subsidies or preferential tax exemptions. Clear standards for carbon emissions for companies across various sectors should be established, with all companies mandated to engage in low-carbon and environmentally friendly practices. Special funds can be used to support companies developing clean energy, while government subsidies can incentivize public transportation companies to replace older, more polluting vehicles with new energy alternatives. Travel subsidies can be offered to passengers who choose public transportation, reducing the number of private vehicles on the road ^[10]. To enhance public satisfaction and acceptance of public transportation services and increase their willingness to utilize these services, relevant government departments should invest in supporting infrastructure based on the local context, aiming to create a more comprehensive public transportation services system that fosters the development of the low-carbon economy more effectively.

5. Conclusion

In summary, within a low-carbon economy, it is essential to intensify promotional activities during the

implementation of public transportation management. These efforts should aim to enhance public awareness of the low-carbon economy and encourage active participation in low-carbon travel. Simultaneously, through the development of relevant policies, the encouragement of new energy vehicle production companies, and the incorporation of diverse information technology solutions, public transportation service quality can be consistently elevated, motivating the public to make public transportation their preferred mode of travel. This multifaceted approach is vital for the advancement of the low-carbon economy.

Disclosure statement

The author declares no conflict of interest.

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