International Journal of Advanced Multidisciplinary Application | IJAMA
Volume 3 Issue 11 Nov 2026
ISSN No: 3048-9350

Sustainable Mobility and Circular Economy: Evaluating Kerala's KSRTC Free Travel Scheme for Women and Transgender Persons

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Abstract

The transition from a linear economy to a circular economy requires a broader understanding of resource efficiency, sustainable consumption and inclusive development beyond conventional practices of recycling and waste reduction. The transportation sector is particularly significant in this transition, as shared mobility can improve the utilization of existing infrastructure while potentially reducing resource consumption, congestion and environmental pressures. Against this background, the present paper examines Kerala's KSRTC free travel scheme for women and transgender persons as a case of socially inclusive public transportation and explores its potential relevance to circular economy principles. The study is motivated by a recent newspaper report on the Kerala High Court's dismissal of a petition challenging the scheme, wherein the State highlighted objectives such as women's employment opportunities and economic and social empowerment. Using a conceptual case-study approach, the paper analyses the scheme through the social, economic and environmental dimensions of circular economy.

The study argues that affordable public transportation can promote shared mobility, improve access to employment and education, and potentially enhance the utilization of transportation assets while reducing dependence on individual vehicles. At the same time, financial sustainability, fleet capacity, fossil-fuel dependence and vehicle lifecycle management remain important challenges. The paper proposes a Circular Public Transportation Model integrating shared mobility with electric buses, renewable energy, efficient fleet management, repair, refurbishment, reuse and recycling of vehicle components. The study concludes that public transportation policies can serve as an important pathway towards a socially inclusive and environmentally sustainable circular economy, provided that social welfare objectives are integrated with financial and ecological sustainability.

Keywords: Circular Economy, Sustainable Mobility, KSRTC, Public Transportation, Shared Mobility, Social Inclusion, Resource Efficiency, Sustainable Development.

1.INTRODUCTION

The circular economy represents a transformative economic framework designed to dismantle the traditional "take–make–use–dispose" linear model in favor of closed-loop systems that maximize resource efficiency, eliminate waste, and foster long-term sustainability. The transportation sector serves as a critical focal point in this systemic transition, primarily because heavy reliance on private vehicles fuels excessive fuel consumption, heightened carbon emissions, severe traffic congestion, accelerated resource depletion, environmental pollution, and the chronic underutilization of public infrastructure. Within this paradigm, public transportation emerges as a powerful circular driver by promoting shared mobility, allowing multiple users to maximize the utility of existing vehicles and infrastructure. A pertinent real-world example of this interplay is examined in *The Hindu* report, "HC dismisses petition against KSRTC free ride," which details the Kerala High Court's dismissal of a Public Interest Litigation (PIL) challenging the free travel scheme for women and transgender persons on KSRTC ordinary buses. This judicial outcome highlights an insightful case study demonstrating how socially inclusive public transit policies can advance broader goals of sustainable, resource-efficient urban mobility.

2.MATERIAL AND METHODS

The Kerala High Court dismissed a PIL challenging the free travel scheme for women and transgender persons in Kerala State Road Transport Corporation (KSRTC) ordinary buses.

According to the article:

- The petitioner questioned the government's order introducing the free travel scheme.
- The petitioner argued that the classification was "over-inclusive" because benefits were extended to all women irrespective of their economic, social or educational status.
- The State Government argued that the objective was to increase employment opportunities for women, particularly working-class women, through economic and social empowerment.
- The government also stated that the financial expenditure associated with the scheme would be borne by the State Government.
- The Court observed that it had limited power to interfere with such schemes when they serve a **public purpose** and remain consistent with the Directive Principles of State Policy.

The Court therefore dismissed the petition.

At first glance, free bus travel may appear to be a welfare policy rather than a circular economy initiative.

However, the scheme can be examined from a circular economy perspective through the concept of shared and sustainable mobility.

Traditional transportation model

Individual ownership → Private vehicle use → Fuel consumption → Emissions → Resource depletion

Circular/sustainable mobility model

Shared public transport → Higher utilization of existing assets → Lower resource consumption per passenger → Reduced emissions → Sustainable mobility

Public transportation creates an opportunity to use existing transportation assets more efficiently by serving multiple users through shared infrastructure, thereby supporting resource efficiency and sustainable consumption.

Connection Between KSRTC and Circular Economy

Circular Economy Principle	Application to KSRTC Free Travel Scheme
Resource efficiency	One bus can transport many passengers using the same vehicle and infrastructure
Shared consumption	Passengers share transportation services rather than individually owning vehicles
Asset utilization	Existing KSRTC buses and infrastructure can potentially be utilized more effectively
Reduced resource consumption	Greater public transport usage can reduce dependence on individual vehicles
Environmental sustainability	Potential reduction in fuel use and emissions per passenger when public transport replaces private vehicles
Social inclusion	Women and transgender persons receive greater access to mobility
Economic empowerment	Affordable/free mobility can improve access to employment and education
Sustainable cities	Public transportation can contribute to less congestion and more sustainable urban mobility

Research Problem

The transportation sector faces the dual challenge of ensuring environmental sustainability while promoting social inclusion. Although circular economy discussions traditionally focus on manufacturing, waste management and recycling, mobility is equally important in promoting resource efficiency and sustainable development. Public transportation offers opportunities to reduce dependence on individual vehicles, optimize the utilization of existing transport infrastructure and improve accessibility for different sections of society. In this context, Kerala's KSRTC free travel scheme for women and transgender persons provides an opportunity to examine whether social welfare-oriented public transportation policies can simultaneously contribute to resource efficiency, sustainable mobility and inclusive economic development from a circular economy perspective.

Objectives of the Study

The primary objective of this study is to examine the potential contribution of Kerala's KSRTC free travel scheme to sustainable mobility from a circular economy perspective. Specifically, the study aims to understand the relationship between public transportation and circular economy principles, examine the social objectives of the KSRTC free travel scheme, and analyse how shared public transportation can improve resource utilization. It also seeks to explore the potential environmental benefits of increased public transport usage, identify the challenges associated with implementing free public transportation schemes, and propose a suitable framework for integrating circular economy principles into public transportation policies.

Research Methodology

The present study adopts a descriptive and conceptual research design using a conceptual case-study approach to examine Kerala's KSRTC free travel scheme from a circular economy perspective. The study is based entirely on secondary data collected from various sources, including a newspaper report published by The Hindu, relevant government policies and orders, available Kerala State Road Transport Corporation (KSRTC) information, literature on circular economy and sustainable transportation, secondary reports and academic studies. Content analysis and conceptual analysis are employed to examine the relationship between the objectives of the free travel scheme and circular economy principles. The analysis focuses on the social, environmental and economic dimensions of sustainable mobility, particularly resource efficiency, shared transportation, accessibility and inclusive development.

Conceptual Framework

The conceptual framework of the study establishes a relationship between the KSRTC free travel scheme, sustainable mobility and circular economy principles. The introduction of free public transportation for women and transgender persons is expected to improve accessibility to public transport, thereby encouraging increased participation in shared mobility. Greater use of public transportation can potentially improve the utilization of existing transport assets and reduce dependence on individual vehicles. This transition may contribute to reduced resource consumption, lower environmental pressure and improved transportation efficiency. Consequently, sustainable mobility can serve as a pathway towards achieving circular economy objectives while simultaneously promoting social inclusion and economic development. The framework therefore highlights how welfare-oriented transportation policies can potentially integrate environmental sustainability with inclusive development.

Social Dimension of Circular Economy

The circular economy extends beyond environmental sustainability and resource conservation to include social inclusion and equitable access to essential services. Kerala's KSRTC free travel scheme seeks to improve transportation accessibility for women and transgender persons, particularly working-class women and individuals seeking employment and educational opportunities. Affordable and accessible public transportation can reduce commuting expenses, thereby removing an important financial barrier to participation in economic and social activities. Reduced transportation costs may encourage greater mobility, improve access to employment and education, and potentially increase participation in economic activities. Consequently, the scheme can be examined as an example of inclusive sustainable mobility that integrates social welfare objectives with broader circular economy principles.

Environmental Dimension

Public transportation has the potential to reduce the environmental burden associated with individual vehicle ownership and usage by encouraging shared mobility and improving the utilization of existing transportation infrastructure. For instance, transporting 100 individuals through several buses instead of 100 separate private vehicles may reduce the number of vehicles required, resulting in lower fuel consumption and emissions per passenger, reduced traffic congestion and more efficient use of transportation resources. Increased public transport usage can also potentially reduce pressure on natural resources and contribute to environmental sustainability. From a circular economy perspective, shared transportation promotes resource efficiency by maximizing the use of existing assets rather than encouraging individual ownership. However, these environmental benefits remain potential outcomes, as their actual extent depends on passenger utilization, vehicle efficiency and the degree to which public transportation replaces private vehicle journeys. Therefore, scheme-specific environmental benefits require validation through actual KSRTC ridership and operational data.

Economic Dimension

The KSRTC free travel scheme can also be examined through the economic dimension of sustainability, particularly its potential contribution to household savings and economic empowerment. By reducing transportation expenditure, the scheme may increase the disposable income of beneficiaries, enabling them to allocate additional financial resources towards essential household requirements such as food, education, healthcare, savings and skill development. Improved access to affordable transportation may also support employment opportunities and greater participation in economic activities. However, from the government's perspective, implementing a free transportation scheme involves financial commitments, as the State Government must compensate for the expenditure associated with providing these services. Therefore, achieving long-term economic sustainability requires balancing the social welfare benefits of free transportation with the financial and operational sustainability of KSRTC.

Proposed Circular Public Transportation Model

The study proposes a Circular Public Transportation Model that integrates shared mobility, resource efficiency, environmental sustainability and social inclusion within the KSRTC transportation system. The model begins with promoting shared mobility through increased public transportation usage, which can potentially improve passenger utilization and encourage efficient fleet management. Integrating electric and low-emission buses, along with renewable energy sources, can further reduce dependence on conventional fossil fuels and minimize the environmental impact of transportation operations. The model also emphasizes circular resource management practices, including battery reuse and recycling, responsible vehicle maintenance, repair and refurbishment of vehicle components, and efficient utilization of existing transportation assets. These interconnected practices can contribute to reduced resource consumption, lower environmental impact and improved operational sustainability. Ultimately, the proposed model demonstrates how KSRTC can integrate circular economy principles into its transportation practices while promoting socially inclusive and environmentally sustainable mobility.

3.RESULT AND DISCUSSION

Based on the conceptual analysis, the study demonstrates that public transportation systems, such as the Kerala State Road Transport Corporation (KSRTC), hold significant potential to advance circular economy principles through the shared use of transportation assets. Beyond its environmental implications, the KSRTC free travel scheme exhibits a prominent social inclusion and empowerment dimension by enhancing mobility for target populations. This improved access to public transit has the potential to reduce dependence on private vehicles while driving greater overall resource efficiency through shared mobility. However, the financial sustainability of non-fare or heavily subsidized travel schemes remains a central operational concern that requires balanced policy interventions. To maximize its contribution to a circular economy, public transportation must evolve beyond shared riding models to embrace comprehensive low-carbon and circular fleet management strategies.

To strengthen this conceptual assessment, the study outlines an evidence framework grounded in verifiable operational metrics, acknowledging that empirical evaluation requires scheme-specific data. Key proposed indicators include tracking passenger ridership and beneficiary trips using zero-fare or ticketing records to evaluate accessibility gains, as well as route-wise bus occupancy and passenger-kilometres to measure asset utilization. Furthermore, monitoring fleet availability, vehicle-kilometres, and service cancellations will clarify capacity constraints, while analyzing fuel consumption, operating costs, fare

reimbursements, and state compensation mechanisms will determine true resource efficiency and fiscal sustainability. From an analytical standpoint, a rise in beneficiary trips alone does not confirm reduced private vehicle usage or diminished emissions; robust claims demand baseline ridership metrics, verified mode-shift data, and standardized fuel-use records accounted for across seasonal and operational variations. Because publicly accessible, scheme-specific KSRTC datasets were unavailable for this case study, these environmental and operational outcomes remain anticipated theoretical benefits rather than measured impacts, highlighting the need for future empirical research using official Kerala Government and KSRTC reporting.

Recommendations

To realize these potential benefits and ensure long-term viability, KSRTC should adopt a multi-pronged operational strategy:

- **Transition to Sustainable Fleet Management:** Gradually replace conventional diesel buses with electric and low-emission vehicles, paired with the integration of solar and renewable energy across KSRTC depot infrastructure.
- **Implement Circular Operational Practices:** Establish systemic component repair, refurbishment, reuse, and recycling workflows to extend vehicle lifecycles and minimize material waste.
- **Optimize Operations via Data & Impact Tracking:** Utilize passenger and route data to refine bus schedules and reduce empty vehicle-kilometres. KSRTC should systematically track key performance indicators, specifically fuel saved, CO_2 emissions avoided, passenger and vehicle utilization rates, and total energy consumption.
- **Maintain Fiscal and Strategic Balance:** Design targeted government compensation and fare-reimbursement mechanisms to safeguard KSRTC's operational sustainability, ensuring that future transport policies harmoniously integrate affordability, accessibility, environmental sustainability, and financial balance.

4.CONCLUSION

The KSRTC free travel scheme demonstrates that public policy, social inclusion, and sustainable transportation can effectively intersect with circular economy principles. Although the scheme was primarily introduced with objectives centered on mobility, employment opportunities, and social empowerment, it offers significant potential to advance circularity by encouraging shared mobility and driving more efficient utilization of existing transportation assets. Ultimately, maximizing the circular economy impact of such initiatives requires moving beyond shared transit alone—strengthening the scheme through fleet electrification, renewable energy integration, optimized route planning, and rigorous component repair, refurbishment, reuse, and recycling across vehicle lifecycles.

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