International Journal of Environmental Sciences
ISSN: 2229-7359
Vol. 11 No. 23s, 2025
https://www.theaspd.com/ijes.php

From Tradition To Transition: Reviewing Kerala's Public Transport Through A Sustainability Lens

Anas K[1*], Dr. A.Meenakshi[2]
[1*]Research Scholar, Dept. of Commerce, VISTAS, Pallavarm, Chennai)
[2](Professor, Dept. of Commerce, VISTAS, Pallavarm, Chennai)

Abstract
Kerala's private bus system continues to serve as the backbone of mobility, providing affordable and widespread access across urban and rural regions, while simultaneously facing deep structural challenges. Despite its centrality, the sector has received limited scholarly attention through a sustainability lens. This article addresses that gap by applying the Triple Bottom Line (TBL) framework, aligned with the Sustainable Development Goals (SDGs), to critically examine the sector's economic, environmental, and social dimensions. Using five indicators—affordability, efficiency, emissions, accessibility, and livelihood the review draws on state transport reports, peer-reviewed research, and comparative cases from India and the wider Global South. Findings demonstrate that historical reliance on private entrepreneurs created a path-dependent hybrid regime, where private buses dominate despite KSRTC's presence, preserving inclusion but locking the sector into financial precarity and diesel dependence. Regulatory measures on fares, licensing, and safety have ensured affordability and coverage but remain undermined by weak enforcement, fragmented governance, and poor integration with urban mobility and climate commitments. Comparative insights from Tamil Nadu, Maharashtra, Colombo, and Bogotá show that Kerala's dilemmas echo those of other semi-formal bus regimes: indispensable for access yet resistant to systemic transition. Emerging opportunities digitalization, cooperative financing, and lowemission technologies can support reform, but they face constraints from infrastructure deficits, operator resistance, and institutional mistrust. The article concludes that Kerala's private buses require systemic, participatory, and culturally embedded reforms to reconcile accessibility and livelihoods with ecological responsibility, positioning them as a critical test case for sustainable mobility in the Global South.
Keywords: *Private bus services, Sustainable mobility transitions, Kerala transport governance Triple Bottom Line, Global South urban transport*

1. INTRODUCTION

Public transport systems have been known for a long time as key infrastructures that not only facilitate mobility, but also more general issues of development, equity, and sustainability. In most parts of the Global South, where car ownership is still modest and income disparities determine access to mobility, public and semi-public modes are the main channels by which individuals participate in economic, educational, and social life (Ghosh & Schot, 2019). These modes are not mere functional tools of movement but embedded socio-technical regimes representing past choices, institutional setups, and political economies of development. Studying them from a sustainability perspective uncovers contradictions that are particularly acute in settings where high human development outcomes are matched with ecological and economic vulnerabilities. Kerala, often lauded internationally for its unique "human development model" (Tharamangalam, 2010), presents one such case Figure 1.

Kerala's settlement patterns, characterized by dispersed urbanization, high population density, and extended rural–urban continuums, have historically shaped its dependence on road-based public transport. Rail networks are relatively limited in reach, while rapid transit systems like metro rail are confined to select urban centers such as Kochi (Joseph & Elias, 2024). In this landscape, buses have emerged as the backbone of everyday mobility. What distinguishes Kerala from many other Indian states is the prominence of private buses, which operate alongside the Kerala State Road Transport Corporation (KSRTC). Since the mid-20th century, private operators often small-scale entrepreneurs have provided the majority of daily commuting services across the state, including critical rural connections where state-run services are sparse (Narayana, 2011). This hybrid public– private system is not merely a matter of service delivery; it embodies deeper tensions around governance, equity, and sustainability.

The central role of private buses is evident in their contribution to social and economic life. For decades, they have enabled students, workers, and rural households to access education, employment, and markets at relatively low cost (Moolakatt, 2025). They also sustain livelihoods for thousands of drivers, conductors, and small

entrepreneurs, making the sector an integral part of Kerala's employment landscape (Joseph & Elias, 2024). However, these contributions coexist with longstanding challenges. Economically, private bus operators struggle with volatile fuel prices, fare regulation, and declining profitability. Many services have become financially unviable, leading to a gradual erosion of routes in certain regions (Narayana, 2011). Socially, passengers face issues of overcrowding, declining service quality, and safety risks, while workers in the sector often endure precarious conditions with limited social security (Datta & Ahmed, 2020; Shah, Viswanath, Vyas & Gadepalli, 2017). Environmentally, the sector remains almost entirely dependent on diesel, contributing to greenhouse gas emissions, air pollution, and climate vulnerabilities in a state already sensitive to ecological stress (Shekin & Freddy, 2025; Sasikumar, 2024).

These contradictions exemplify what scholars of mobility transitions identify as regime lock-in— situations where entrenched socio-technical systems persist despite growing pressures for change (Ghosh & Schot, 2019). In Kerala, the resilience of the private bus regime is rooted in decades of institutional arrangements, fare policies, and commuter reliance. Yet this lock-in increasingly conflicts with sustainability imperatives. Global frameworks such as the United Nations' Sustainable Development Goals (SDGs) call for inclusive, safe, affordable, and sustainable transport systems as central to both climate action and social equity. Nationally, India has embarked on ambitious transitions toward electric mobility and climate-smart urban planning (Shekin & Freddy, 2025). Kerala itself, despite its progressive developmental trajectory, has been slow to integrate private buses into these emerging sustainability frameworks.

The research gap becomes apparent in this context. Scholarship on Kerala's development has highlighted its achievements in human development (Tharamangalam, 2010), gender inclusion (Arun, 2017; Zehba, Rajendran & Firoz, 2025), and governance innovations (Moolakatt, 2025), but has given comparatively little attention to the sustainability performance of its transport sector. Studies of Indian transport transitions tend to focus on metropolitan contexts such as Delhi, Bangalore, or Kochi, where metro rail systems, electrification pilots, or urban smart mobility programs dominate policy discourse (Joseph & Elias, 2024). By contrast, private buses— which continue to serve as the lifeline for mobility in Kerala remain largely absent from sustainabilityfocused scholarship. This absence is problematic, given that private buses carry a significant proportion of passengers, generate critical employment, and are directly implicated in the state's climate and equity outcomes.

A further dimension of this gap lies in comparative perspectives. Across the Global South, privately operated buses are integral to everyday mobility in contexts ranging from Manila to Colombo. They often share similar characteristics: affordability, flexible routes, and deep social embeddedness, alongside environmental inefficiencies, labor vulnerabilities, and weak regulatory integration (Matovu et al., 2024; Kelkar & Arthur, 2022). Kerala's system thus provides a chance not only to learn about a distinctive state-level model in India but also to engage with wider theoretical discussions of semi-formal bus regimes in the developing world. Locating Kerala's private buses in these global discussions brings out their significance for grasping how local systems balance tensions between affordability, inclusivity, and ecological transformation.

In approaching these problems, this article takes up the Triple Bottom Line model of sustainability, exploring Kerala's private bus industry on its economic, environmental, and social aspects. Economically, consideration is given to the sector's revenue models, competition against KSRTC, and job creation. Environmentally, it evaluates the effects of diesel reliance, emissions, and possible directions toward electrification and greener fuels. Socially, it looks at questions of accessibility, affordability, inclusivity, and working conditions. These three columns are not separate but connected, and their interaction determines the opportunities for sustainable transition.

Global South Mobility Debates →
Sustainability challenges in public transport
Kerala Model → Strong human
development but transport contradictions
Systemic Contradictions → Economic, social, and environmental tensions
Research Gap → Lack of sustainabilityfocused reviews on private buses
Contribution → Reframe private buses as critical infrastructures for sustainable futures

International Journal of Environmental Sciences
ISSN: 2229-7359
Vol. 11 No. 23s, 2025
https://www.theaspd.com/ijes.php

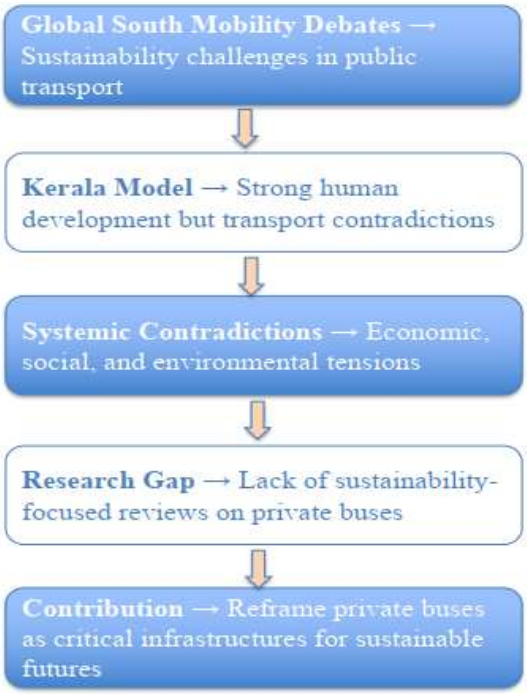

Figure 1: Systemic Contradictions and Sustainability in Public Transport: Reassessing the Role of Private Buses in the Kerala Model

This study situates Kerala's transport contradictions within wider Global South mobility debates, highlighting systemic tensions and the overlooked role of private buses illustrated in Figure 1. By identifying a research gap, it reframes these vehicles as pivotal infrastructures for sustainable futures.

2. Historical and Institutional Context

The history of private bus services in Kerala is not a tale of transport provision alone; it has to be placed within the state's overall political economy and its unique developmental trajectory. Contrary to the experience of most other Indian states in which the public corporations took control of passenger transport, Kerala institutionalized a hybrid regime, with privately owned buses traditionally offering the bulk of services alongside the state-owned Kerala State Road Transport Corporation (KSRTC) as a parallel provider Table 2. This hybrid structure is what scholars term institutional hybridity a juxtaposition of state and market logics within one sector (Tharamangalam, 2010). The persistence of this system over decades also shows path dependency and regime lock-in dynamics in which initial institutional decisions created self-reinforcing mechanisms that were resistant to later reforms (Ghosh & Schot, 2019).

2.1 Early Evolution (1950s–1970s)

After independence, Kerala's mobility landscape was one of scattered settlements, sparse rail coverage, and urgent need for cheap mass transport. Private entrepreneurs usually individuals or groups of families with limited capital then started bus operations to capture the niches left by insufficient state provision. These operators inserted themselves into local communities, adapting easily to rural and peri-urban mobility demands. By the 1960s, when KSRTC was officially constituted, private buses had already formed the backbone of day-to-day mobility.

This early dominance created a path-dependent trajectory: once commuters, regulators, and local economies became reliant on private operators, subsequent attempts to expand state-run services encountered structural constraints. The private sector's embeddedness in local livelihoods and daily routines meant that it could not simply be displaced without significant disruption. As Tharamangalam (2010) notes, such institutional arrangements were consistent with Kerala's broader negotiated model of development, where state, community, and private actors coexisted in a contested but interdependent balance.

Regulatory Formalization (1980s–1990s)

The rapid expansion of private buses necessitated regulatory frameworks to ensure service coverage, control fares, and prevent monopolization. Regional transport authorities were tasked with issuing licenses, approving routes, and monitoring operations. Fare regulation became one of the most contentious aspects of this oversight. The

state sought to maintain affordability for passengers, particularly students and low-income workers, while operators argued that controlled fares were unsustainable amid rising fuel costs. These disputes frequently resulted in strikes, service disruptions, and political interventions (Narayana, 2011).

This period also revealed the limits of regulatory capacity. While rules governing safety, scheduling, and vehicle standards were codified, enforcement remained inconsistent. Local-level political pressures often led to selective implementation, producing what can be termed regulatory ambivalence. As Sasikumar (2024) argues in the broader context of Kerala's political economy of sustainability, such ambivalence reflects the tension between developmental commitments to accessibility and the structural weakness of state institutions in enforcing compliance.

2.2 Liberalization and Financial Precarity (2000s–2010s)

The post-liberalization period introduced new pressures on Kerala's transport sector. Rising fuel prices, intensifying competition from KSRTC, and the growing affordability of two-wheelers and private vehicles gradually eroded the financial viability of many private bus operators. Operators faced what Narayana (2011) termed the pricing problem: fares fixed by regulatory authorities often lagged behind cost escalations, leaving little room for profitability. Many routes became economically unsustainable, resulting in service withdrawal, route abandonment, and a decline in the overall private fleet.

At the same time, globalization and migration reconfigured Kerala's mobility demands. Remittance-driven consumption patterns increased vehicle ownership, while urban centers such as Kochi began experimenting with modern transit projects like the Kochi Metro and the Water Metro (Joseph & Elias, 2024). These initiatives highlighted the contrast between state-led modernization and the relative stagnation of the private bus sector, which remained dependent on outdated diesel technologies and informal operating practices. As Luke (2022) observes, the globalization of Kerala's social and economic life widened the gap between aspirations for modern mobility and the persistence of semi-formal private bus systems.

2.3 Climate Commitments and Sustainability Pressures (2010s–present)

In recent years, climate change and sustainability debates have reframed the governance of transport in Kerala. The state has experienced devastating floods, rising fuel dependency, and mounting public health concerns linked to air pollution. In this context, the persistence of a dieseldominated private bus sector represents a structural contradiction: while Kerala has articulated commitments to sustainable development, its most widely used mode of transport remains environmentally unsustainable (Sasikumar, 2024). Efforts to introduce electrification or alternative fuels have been limited and sporadic, constrained by the financial precarity of small-scale operators and the absence of large-scale policy incentives.

Policy milestones during this period include attempts to integrate private buses into smart mobility plans, digital ticketing pilots, and proposals for route rationalization. However, these interventions remain largely incremental, reflecting Kerala's broader pattern of negotiated reform rather than systemic transformation. Regulatory bodies continue to balance between maintaining low fares for commuters and sustaining the financial viability of operators, producing a cycle of short-term adjustments rather than long-term sustainability planning.

2.4Comparative Insights: Kerala in Context

Kerala's reliance on private buses distinguishes it from many other Indian states. In Tamil Nadu, for instance, the state-run transport corporations have historically maintained a more dominant position, supported by stronger subsidy regimes. Maharashtra, by contrast, has witnessed greater formalization of private participation, with larger-scale corporate players entering the sector. In both cases, the proportion of private operators relative to public services differs significantly from Kerala's hybrid model, where private dominance has been sustained for decades despite state presence (Narayana, 2011).

Globally, Kerala's experience resonates with transport regimes in other parts of the Global South. In Colombo, Sri Lanka, and Manila, Philippines, privately operated buses and minibuses function as the backbone of everyday mobility, providing affordable but environmentally taxing services (Matovu et al., 2024). These systems share common characteristics: deep social embeddedness, financial precarity, and regulatory challenges. Kerala's case contributes to these debates by showing how institutional path dependency and political compromise can entrench private dominance, even in a state otherwise celebrated for strong developmental outcomes.

Table 1. Historical and Institutional Context of Kerala's Private Bus Sector

Subsection	Focus	Key Features	References

Early Evolution (1950s–1970s)	Expansion and community entrepreneurship	Private operators emerged as backbone of mobility; embedded in local livelihoods; filled gaps left by weak state provision	Tharamangalam (2010)
Regulatory Formalization (1980s–1990s)	Licensing and fare control	Regional authorities regulated routes, fares, and safety standards; sought affordability for students/workers	Narayana (2011)
Liberalization and Financial Precarity (2000s–2010s)	Post-liberalization pressures	Rising fuel prices, two-wheeler ownership, metro expansion; operators faced declining profitability	Joseph & Elias (2024)
Climate Commitments and Sustainability Pressures (2010s–present)	Sustainability debates and reforms	Growing awareness of emissions, floods, and public health; pilots on digital ticketing, smart mobility	Sasikumar (2024)
Comparative Insights: Kerala in Context	National and global comparisons	Kerala: private dominance in hybrid regime; Tamil Nadu: staterun dominance; Maharashtra: corporate private model; Global	Matovu et al. (2024)
		South: embedded systems semi-formal	

3. METHODOLOGICAL FRAMEWORK

This review applies a sustainability lens grounded in the Triple Bottom Line (TBL) framework, complemented by alignment with the United Nations Sustainable Development Goals (SDGs), to critically assess Kerala's private bus sector. The TBL framework allows the sector to be analyzed not only for its economic performance but also for its environmental footprint and social inclusivity, dimensions often overlooked in transport studies Figure 2. As Grossmann et al. (2022) argue, sustainability transitions must be evaluated through principles of social-ecological justice, highlighting the need to move beyond cost efficiency toward systemic assessments of equity and resilience. Integrating the SDGs provides additional normative scaffolding, particularly through SDG 11 (Sustainable Cities and Communities), SDG 12 (Responsible Consumption and Production), and SDG 13 (Climate Action), which connect Kerala's mobility challenges to global climate justice imperatives (Sharma & Bhatia, 2022). To operationalize this framework, five core indicators are employed: affordability efficiency, emissions, accessibility, and livelihood. These indicators reflect the multi-scalar impacts of private buses, spanning household economics, community inclusion, and environmental sustainability Table 2.

Table 2. Indicators for Assessing Kerala's Private Bus Sector and their SDG Linkages

Indicator	Definition / Focus	Relevant SDGs
Affordability	Fares in relation to household income; accessibility for low-income groups and students	SDG 1 (No Poverty), SDG 11 (Sustainable Cities)
Efficiency	Service frequency, reliability, operational cost-effectiveness	SDG 8 (Decent Work & Economic Growth), SDG 11
Emissions	Greenhouse gas output, local air pollution from diesel dependency	SDG 12 (Responsible Consumption), SDG 13 (Climate Action)
Accessibility	Geographic coverage, last-mile connectivity, inclusivity of marginalized populations	SDG 5 (Gender Equality), SDG 10 (Reduced Inequalities), SDG 11
Livelihood	Employment generation, labor conditions, resilience of small operators	SDG 8 (Decent Work), SDG 11

As Cohen (2025) emphasizes, the adoption of multi-dimensional governance metrics is particularly crucial in South Indian contexts where developmental success must be balanced against ecological constraints and social

equity. The evidence base for this review is built through triangulation of sources: state transport reports and regulatory documents provide empirical data on fares, fleet size, and licensing regimes; peer-reviewed studies on Kerala's development model and transport economy supply interpretive depth; and comparative scholarship from other Indian states and Global South contexts (e.g., Sri Lanka, Philippines) provides a baseline for situating Kerala within broader mobility transitions. This methodological pluralism responds to Srinivas's (2023) call to account for the institutional variety shaping regional pathways of sustainable transformation, particularly under conditions of crisis and precarity. By combining TBL with SDGs, operationalized through five concrete indicators and anchored in diverse data sources, this framework ensures a holistic evaluation of Kerala's private buses that is both contextually grounded and globally relevant.

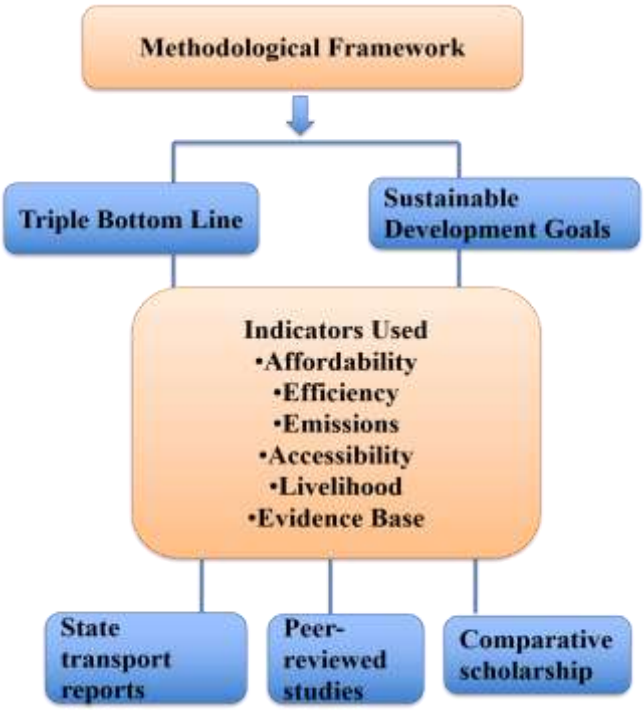

Figure 2: Evaluating Public Transport Sustainability: A Methodological Framework for Private Buses in Kerala

Figure 2: This framework integrates the Triple Bottom Line and Sustainable Development Goals to assess transport sustainability. Using indicators such as affordability, efficiency, emissions, and accessibility, it draws evidence from state reports, peer-reviewed studies, and comparative scholarship to analyze systemic transport contradictions.

4. Private Buses Through a Sustainability Lens

4.1 Economic Sustainability

The economic sustainability of Kerala's private bus sector is marked by a tension between financial precarity and livelihood generation. Narayana (2011) identified what he termed the "pricing problem," whereby fare regulation by the state sought to guarantee affordability for commuters but simultaneously undermined operator viability, especially during periods of escalating fuel costs. This regulatory imbalance has persisted, producing recurrent disputes between operators and state authorities over fare revisions, subsidies, and service withdrawals. In this context, the business model of private buses—typically run by small-scale entrepreneurs with limited capital— has remained structurally vulnerable to exogenous shocks such as fuel price volatility and inflationary pressures (Satheesh, 2025).

The competition and coexistence between private operators and the Kerala State Road Transport Corporation (KSRTC) further complicates economic dynamics. While KSRTC benefits from state subsidies and a formal institutional structure, its chronic deficits and operational inefficiencies have limited its ability to capture market share. Private operators, by contrast, dominate the sector through flexibility in scheduling and responsiveness to commuter demand, but without the institutional protections available to KSRTC. This asymmetric relationship

has created a hybrid regime where both actors coexist, often competing on profitable routes while leaving unviable services underserved (Sharma, 2024).

Employment generation remains one of the few areas where the private bus sector makes a consistently positive economic contribution. Thousands of drivers, conductors, and ancillary workers depend on this system for their livelihoods, making it a significant source of rural and semi-urban employment (Reddy & Naik, 2025). Yet these jobs are often characterized by precarity, limited social security, and vulnerability to regulatory and market fluctuations. Thus, while the sector sustains livelihoods and contributes to Kerala's broader economy, its financial model is structurally fragile, raising questions about long-term viability without systemic reform.

4.2 Environmental Sustainability

The environmental profile of Kerala's private bus sector is dominated by its reliance on dieselpowered vehicles, which contribute substantially to greenhouse gas emissions and local air pollution. Shekin and Freddy (2025) highlight how India's broader transition to electric mobility is marked by promise but also by significant ambiguity, particularly in semi-formal transport sectors such as private buses. In Kerala, the sector's small-scale, fragmented ownership structure has limited investments in cleaner technologies, leaving most operators dependent on aging diesel fleets.

The ecological consequences are considerable. KS and Rajan (2024), in their work on sustainable practices in Kerala, underscore how the absence of coordinated waste and emission management systems exacerbates environmental risks. For transport, this translates into an emissions-intensive regime poorly aligned with Kerala's climate resilience commitments. Sasikumar (2024) situates this within the political economy of sustainability, arguing that institutional ambivalence and fragmented governance have prevented systematic decarbonization of the transport sector.

Comparative insights reinforce the urgency of transition. Baviskar et al. (2015), in their analysis of Indian environmentalism, highlight how transport pollution in states like Kerala mirrors the industrial pollution crises of earlier decades: visible, acknowledged, yet inadequately addressed through regulatory action. Globally, Syaban and Appiah-Opoku (2024) illustrate similar challenges in Indonesia's land-use transitions, where ecological imperatives clash with entrenched economic and institutional practices. For Kerala's buses, this reflects a broader dilemma of **regime lock-in**— where economic precarity and regulatory inertia combine to perpetuate dependence on fossil fuels despite mounting ecological costs.

Transition prospects, though limited, are emerging. Pilot projects in electrification and discussions on compressed natural gas (CNG) adoption suggest potential pathways forward, but without systemic financial support or green financing mechanisms, private operators are unlikely to absorb the high upfront costs of fleet modernization. Thus, while Kerala has articulated commitments to sustainability, its private bus sector remains an ecological contradiction: indispensable for mobility yet environmentally unsustainable.

4.3Social Sustainability

The social sustainability of Kerala's private bus sector is perhaps its most complex dimension, balancing inclusivity and accessibility with issues of safety, labor precarity, and gendered vulnerabilities. Historically, private buses have provided critical last-mile and rural connectivity, ensuring that dispersed settlements are linked to educational institutions, workplaces, and markets (Joseph & Elias, 2024). Their affordability has made them indispensable for students, low-income workers, and rural households, embedding them deeply in Kerala's social fabric (Palackal, 2024).

Yet inclusivity does not automatically translate into equity. Zehba, Rajendran, and Firoz (2025) document how women in Kochi experience **time poverty** and mobility constraints that limit their ability to participate fully in urban life, with private buses often contributing to, rather than alleviating, these constraints. Safety concerns, overcrowding, and gendered harassment remain persistent challenges, echoing earlier findings by Datta and Ahmed (2020), who highlight the intersection of gender and urban violence in Kerala's transport systems. Shah et al. (2017) similarly underscore how women's mobility across Indian cities is shaped by systemic barriers that transport systems frequently fail to address.

Labor conditions for drivers, conductors, and ancillary workers further complicate the social sustainability profile. Satheesh (2025) situates these within broader labor–environmental conflicts, noting that precarious employment conditions in sectors such as transport reproduce vulnerabilities even as they sustain livelihoods. Baker et al. (2024) reinforce this perspective in their review of gendered labor participation in India's coastal economies, emphasizing how structural inequalities shape access to decent work. In Kerala's private bus sector, these dynamics manifest in long working hours, limited social protections, and vulnerability to fare disputes and

service disruptions. Despite these challenges, the sector's contribution to social connectivity remains significant. Private buses ensure that education and employment opportunities remain geographically accessible, reinforcing Kerala's broader developmental achievements. However, the persistence of safety risks, gender inequities, and labor precarity highlights the incomplete nature of this social sustainability, suggesting the need for more targeted interventions in regulation, inclusivity, and worker protections Table 3.

Table 3. Sustainability Assessment of Kerala's Private Bus Sector

Dimension	Indicators	Key Features	Challenges / Issues	Supporting References
Economic Sustainability	Business models, fare structures, employment	Dominated by smallscale entrepreneurs; regulated fares aimed at affordability; generates significant employment in rural and urban contexts	Fare regulation creates pricing imbalance; fuel price volatility; financial precarity of operators; weak safety nets for workers	Reddy & Naik (2025)
Environmental Sustainability	Emissions profile, energy sources, technology adoption	Nearly all buses run on diesel; critical role in Kerala's carbon footprint; limited electrification/CNG pilots	High greenhouse gas and particulate emissions; institutional ambivalence; fragmented ownership limits modernization; weak alignment with climate goals	Shekin & Freddy (2025)
Social Sustainability	Accessibility, affordability, safety, inclusivity, labor conditions	Provides last-mile and rural connectivity; indispensable for students, low-income groups; supports livelihoods	Gendered mobility challenges (safety, harassment); overcrowding; time poverty; precarious labor conditions; weak worker protections	Joseph & Elias (2024)

5. Policy and Governance

The governance of Kerala's private bus sector reflects a complex interplay of regulatory ambition, enforcement limitations, and fragmented integration into broader urban mobility and climate agendas. Since independence, the state has attempted to regulate fares, safety, and service coverage through regional transport authorities. Narayana (2011) highlighted that while fare regulation succeeded in ensuring affordability for students and working-class commuters, it simultaneously created persistent pricing imbalances that undermined the financial viability of private operators. Safety regulations, such as vehicle inspections and route monitoring, were introduced to improve service standards, yet their implementation has been inconsistent. Enforcement capacity remains weak, leaving space for overcrowding, route violations, and declining service quality to persist.

The regulatory dilemma can be understood through Ghosh and Schot's (2019) framework of regime lock-in, where early institutional choices create self-reinforcing dynamics. Kerala's hybrid system dominated by private operators but shadowed by KSRTC has produced regulatory inertia. Satheesh (2025) argues that this inertia is embedded in Kerala's political economy, where the state's developmental commitments to accessibility and affordability often clash with the precarious livelihoods of bus workers and the ecological unsustainability of diesel dependence. As a result, regulations have been more reactive than transformative, addressing short-term crises (fare strikes, safety incidents) without establishing long-term sustainability pathways.

Integration into urban mobility planning and climate commitments has also been limited. While projects such as the Kochi Metro and the Water Metro represent Kerala's ambition to modernize its transport infrastructure (Joseph & Elias, 2024), private buses have remained at the margins of these initiatives. Instead of being reconfigured into multi-modal systems, private buses often operate in competition with new modes. Narang (2021) critiques this as symptomatic of Kerala's fragmented environmental governance, where ambitious climate policies are articulated but poorly mainstreamed into sectoral practices such as transport. Consequently, the private bus sector remains disconnected from Kerala's climate adaptation and emission-reduction goals, perpetuating its diesel dependence.

Stakeholder perspectives reveal further governance challenges. For passengers, private buses continue to represent affordability and accessibility, yet concerns about overcrowding, safety, and gendered vulnerabilities persist. Operators view regulations as a source of financial stress, with fare caps and weak subsidies undermining profitability. Regulators, meanwhile, struggle to balance competing pressures from passengers demanding low fares, operators seeking financial relief, and policymakers promoting sustainability agendas. Alexander et al. (2024) demonstrate the potential for participatory governance in other Kerala sectors, such as ecotourism, suggesting that similar community-inclusive frameworks could improve accountability in transport governance. Yet to date, passengers and workers remain marginal in policy-making processes.

In sum, Kerala's policy and governance landscape for private buses is characterized by ambivalence and fragmentation: regulations exist but lack consistent enforcement, sustainability commitments are articulated but not operationalized, and stakeholder interests are acknowledged but not fully institutionalized. Moving toward effective governance will require systemic integration of private buses into Kerala's mobility planning, alignment with climate targets, and participatory mechanisms that give voice to both commuters and workers.

Table 4. Policy and Governance Dimensions of Kerala's Private Bus Sector

Policy / Regulatory Area	Intended Goal	Effectiveness	Key Challenges	Supporting References
Fare Regulation	Ensure affordability for students, workers, and low-income commuters	Maintains low fares, protects commuter access	Creates pricing imbalance; undermines operator profitability; recurrent strikes and disputes	Narayana (2011)
Safety Standards & Licensing	Improve service quality and passenger safety	Rules codified (vehicle inspections, route licensing)	Weak enforcement; overcrowding, unsafe driving, route violations persist	Ghosh & Schot
Service Coverage & Route Allocation	Guarantee connectivity in rural and underserved areas	Private buses extend reach beyond KSRTC coverage	Withdrawal from unprofitable routes; concentration on profitable corridors	Narayana (2011)
Integration with Urban Mobility Projects (e.g., Kochi Metro, Water Metro)	Develop multimodal, sustainable transport systems	Metro systems operationalized successfully	Private buses remain fragmented; competition rather than complementarity; weak institutional integration	Joseph & Elias (2024)
Climate Commitments	Align transport with SDG 11 & 13, reduce emissions	Policies articulated at state level	Diesel dependence persists; lack of electrification/CNG adoption; no green financing mechanisms	Sasikumar (2024)
Stakeholder Inclusion	Enhance accountability and participatory governance	Limited inclusion of passenger and worker voices	Decisions dominated by regulators and operators; weak institutional platforms for participation	Alexander et al. (2024)

6. Comparative Insights

Kerala's private bus regime, though distinctive in its institutional arrangements, shares many features with transport systems in other Indian states and across the Global South. Comparative analysis provides a crucial lens for situating Kerala's experience within broader debates on semiformal mobility regimes, regime lock-in, and sustainable transition pathways. These comparisons reveal not only structural similarities but also critical differences that highlight potential lessons for Kerala's policy future Figure 3.

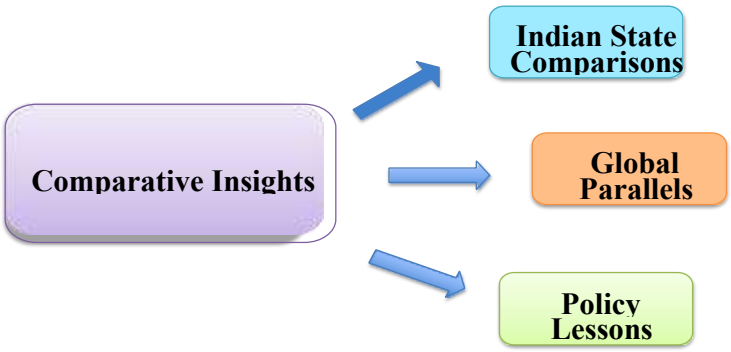

Figure 3: Comparative Insights into Kerala's Private Bus Regime

Figure 3 compares Kerala's private bus system with Indian states and global examples, highlighting shared challenges of semi-formal regimes and drawing lessons on affordability, modernization, and sustainability for future policy pathways.

Indian State Comparisons

The Indian landscape of bus transport governance exhibits significant diversity. In Tamil Nadu, state-owned transport corporations dominate bus services, with private participation restricted to a marginal role. Extensive state subsidies and centralized fare control have ensured widespread affordability but at the cost of persistent fiscal deficits. In contrast, Kerala's hybrid regime, in which private operators dominate route coverage, has avoided large-scale fiscal burdens but transferred financial precarity to small-scale entrepreneurs. Narayana (2011) notes that in Kerala, private buses cover nearly two-thirds of passenger trips, whereas in Tamil Nadu state corporations remain the primary carriers. This contrast illustrates Ghosh and Schot's (2019) observation that institutional path dependency shapes mobility regimes: Kerala's early reliance on private entrepreneurs created a self-reinforcing dynamic that persists, while Tamil Nadu's early consolidation of state control entrenched a public-sector-dominant regime.

Maharashtra presents yet another trajectory. Here, stratified participation exists: large corporate operators, smaller private players, and state corporations share the mobility landscape (Kelkar & Arthur, 2022). This has allowed greater fleet modernization but also risks marginalizing small operators. Kerala's resistance to corporate consolidation has preserved community-based entrepreneurship, but this has constrained investment in clean technologies and formalized governance structures. The lesson is that while Kerala has avoided exclusionary corporatization, it must address the downside of fragmented ownership—particularly its implications for ecological transition and labor protections.

6.1Global Parallels

Beyond India, Kerala's private bus system resonates with semi-formal mobility regimes across the Global South. In Colombo, Sri Lanka, privately operated buses carry the majority of daily commuters, often on overlapping routes with minimal coordination. Like Kerala, they provide critical affordability and rural reach, but their diesel dependence and fragmented ownership structures hinder modernization. Efforts at regulatory reform in Colombo—such as route franchising and centralized scheduling—demonstrate that semi-formal systems can be gradually formalized without displacing operators. For Kerala, this suggests that incremental integration mechanisms, such as digital scheduling platforms and pooled maintenance facilities, could balance inclusivity with modernization.

In Uganda, Matovu et al. (2024) document how informal and semi-formal operators sustain community mobility but reproduce vulnerabilities, particularly for women and low-income households. These parallels highlight that Kerala's challenges of inclusivity, gendered safety, and precarious labor are not unique but part of a broader developmental paradox of semi-formal transport regimes: they are socially indispensable yet structurally fragile

and environmentally unsustainable. Similarly, Thattantavide and Kumar (2024) emphasize that resilience in informal systems is often rooted in localized entrepreneurship, a strength Kerala shares, but which simultaneously limits large-scale technological adoption.

At the governance level, Cohen (2025) shows that global goals such as the SDGs often enter local governance selectively, with uneven uptake and adaptation. This dynamic is visible in Kerala: commitments to SDG 11 (Sustainable Cities) and SDG 13 (Climate Action) are articulated, yet the private bus sector remains excluded from meaningful climate strategies. This reflects a global pattern observed in Nairobi, Manila, and Jakarta, where diesel bus fleets persist despite sustainability rhetoric. Kerala thus exemplifies the implementation gap between global sustainability norms and local governance practices.

6.2Policy Lessons

The comparative insights offer several concrete lessons for Kerala. First, the Tamil Nadu model shows the risks of over-reliance on state corporations, but also the advantages of subsidy-backed affordability. Kerala can draw from this by restructuring fare support without fully absorbing operators into state control. Second, Maharashtra's stratified model suggests that corporatization may bring modernization but risks excluding small operators; Kerala must therefore pursue modernization without undermining livelihoods, potentially through cooperative models or public–private partnerships. Third, Colombo's experience illustrates that incremental formalization through route rationalization and digital integration—offers a viable path for hybrid regimes. Finally, global parallels underscore that without targeted policies, semi-formal bus systems risk remaining trapped in a cycle of affordability and accessibility offset by ecological unsustainability and social precarity.

7. Transition Pathways: Opportunities and Constraints

Kerala's private bus system has reached a pivotal moment where questions of modernization and sustainability can no longer be deferred. Opportunities for reform are evident in the adoption of digital tools, the mobilization of green financing, and the gradual modernization of fleets. Yet these possibilities are tempered by entrenched weaknesses: chronic financial precarity among operators, inadequate infrastructure for alternative fuels, strong resistance to regulatory reforms, and fragmented governance structures. Mapping these dynamics through the five sustainability indicators affordability, efficiency, emissions, accessibility, and livelihood makes clear that Kerala's transition will require more than technological change; it will demand institutional innovation and trust-building.

Opportunities

Digitalization has immediate potential to improve service quality and financial transparency. Realtime route data, unified ticketing platforms, and mobile payment systems can reduce leakages and increase efficiency while improving commuter confidence. Pilot experiments in Kerala's urban centers, such as digital interventions in Kochi's Water Metro, have shown that small-scale innovations can reshape user expectations and strengthen affordability through targeted fare subsidies (Dayson, 2025).

Green financing and fleet modernization are central to tackling the emissions burden. The capital cost of an electric bus remains two to three times higher than that of a conventional diesel vehicle, making direct adoption beyond the reach of small operators. Shekin and Freddy (2025) observe that India's electric vehicle agenda faces its greatest uncertainty in semi-formal sectors, where entrepreneurs lack access to structured credit. Innovative instruments—concessional loans, cooperative financing schemes, or state-backed guarantees—could reduce this barrier. As Menon (2025) argues, transitions succeed when financing is multi-layered, combining national subsidies with local credit mechanisms that support decentralized actors.

Collective models offer another pathway. Kerala's experience with women's group farming under Kudumbashree demonstrates how cooperatives can deliver both social protection and innovation (Mahalingam, 2022). A similar approach for bus operators could enable shared procurement, pooled maintenance, and collective bargaining, reinforce livelihoods while open avenues for modernization. Finally, Kerala's traditions of participatory governance provide a cultural advantage. Socially embedded reforms, if aligned with local governance networks, can secure legitimacy and ensure that transitions do not erode accessibility for rural or marginalized groups (Lekha & Kumar, 2024). This alignment between modernization and cultural acceptance will be vital in ensuring reforms are durable rather than short-lived.

Constraints

While serious constraints limit the scope of these opportunities. Financial fragility is the most fundamental: fare caps designed to maintain affordability have historically undermined operator viability (Narayana, 2011). With narrow margins, investment in technology or green vehicles remains impractical, creating a feedback loop between low fares, underinvestment, and declining service quality. Infrastructure gaps compound this challenge. Kerala lacks adequate charging depots or refueling networks for alternative fuels. Without coordinated state investment in these facilities, electrification will remain aspirational, locking operators into high-emission diesel dependence (Menon, 2025).

Operator resistance is another formidable barrier. Decades of contentious relations with regulators have produced deep mistrust. Digital ticketing is often viewed not as a tool for efficiency but as a mechanism of surveillance. Similarly, proposals for route rationalization are perceived as threats to operator autonomy and revenue. Shekin and Freddy (2025) caution that technical solutions cannot succeed without addressing questions of acceptance and legitimacy—an insight directly relevant to Kerala. Finally, policy fragmentation undermines systemic reform. Responsibilities are divided among the Motor Vehicles Department, the State Transport Authority, and urban development bodies, leading to poor coordination. As Narang (2021) and Dayson (2025) note, Kerala frequently articulates ambitious climate and mobility visions but struggles to embed them in sectoral practice. The result is that private buses remain disconnected from climate commitments and excluded from integrated urban mobility plans.

Table 5. Transition Pathways for Kerala's Private Bus Sector: Opportunities and Constraints

Sustainability Indicator	Opportunities	Constraints	Supporting References
Affordability	Digital ticketing enables targeted subsidies and reduces fare leakages.	Fare caps suppress revenue, leaving operators unable to invest in modernization.	Narayana (2011)
Efficiency	Real-time tracking, unified ticketing, and scheduling improve service reliability.	Operator resistance to digital monitoring and route rationalization limits implementation.	Dayson (2025)
Emissions	Green financing and cooperative procurement can support EV/CNG adoption.	High upfront costs of EVs; lack of charging/refueling infrastructure sustains diesel lock-in.	Shekin & Freddy (2025)
Accessibility	Cooperative models preserve rural coverage while enabling modernization.	Fragmented governance prevents integration with urban mobility and climate strategies.	Mahalingam (2022)
Livelihood	Cooperative structures protect small operators and create collective bargaining power.	Precarious earnings and mistrust in regulation foster resistance to reforms.	Shekin & Freddy (2025)

8. CONCLUSION

Kerala's private bus system illustrates both the achievements and contradictions of mobility in a developing, high human-development contextOn the one hand, it remains the workhorse of dayto-day mobility, providing low fares, deep rural and urban penetration, and crucial livelihood for tens of thousands of employees.On the other, its dependence on fragmented small-scale enterprises, diesel-fuelled fleets inherited from the past, and delicate business models has made the industry financially shaky, environmentally unsound, and socially unbalanced. The historical reliance on private enterprise established a path-dependent regime in which access was privileged but at the expense of long-term viability. Regulatory measures such as fare caps, route licensing, and safety regulation have served to sustain commuter well-being, but lax enforcement and dispersed institutional responsibility have sabotaged systemic reform and rendered the sector poorly attuned to Kerala's environment and urban mobility objectives. Comparison with other Indian states, and analogy with Sri Lankan and Latin

American systems, demonstrate that Kerala's difficulties are shared, but typical of semi-formal bus regimes throughout the Global South: they offer essential inclusion but are incapable of modernization. The way forward is through digital integration, cooperative lending for cleaner technologies, and participatory governance frameworks that serve to link operator interests with public policy goals. Yet, there are actual challenges to these pathways such as financial vulnerability, infrastructural deficiency, resistance from operators, and institutional fragmentation. Insights from Colombo and Bogotá show that transformation hinges on continued state investment, integrated governance, risk-sharing measures that safeguard livelihoods and allow ecological transition. The key task for Kerala, then, is to transcend piecemeal modifications and create an integrated, comprehensive framework that balances affordability and access with green responsibility and fiscal robustness. Then alone can the private bus industry transform from a path-dependent imperative to a pillar of sustainable mobility.

REFERENCES

1. Alexander, G., George, L. P., & Jayakumar, M. S. (2024). Local Community Participation in Ecotourism: Empowering Forest-Dependent & Indigenous Communities in Kerala, India. *Antrocom: Online Journal of Anthropology*, *20*(2).
2. Aravindakshan, S., Aku, H., & Tani, M. (2024). Growing cities, changing demands: Scope of urban agriculture as a sustainable agricultural intensification strategy in India. In *Sustainable Urban Agriculture* (pp. 113-133). CRC Press.
3. Arun, S. (2017). *Development and gender capital in India: Change, continuity and conflict in Kerala*. Routledge.
4. Baker, M., Isaac, L., Alkoyak-Yildiz, M., & Rao, B. R. (2024). Examining the major barriers to women's participation and employment in coastal activities of India's blue economy: a systematic literature review. *Environment, Development and Sustainability*, 1-45.
5. Baviskar, A., Sinha, S., & Philip, K. (2015). Rethinking Indian environmentalism: Industrial pollution in Delhi and fisheries in Kerala. In *Forging Environmentalism* (pp. 189-256). Routledge.
6. Datta, A., & Ahmed, N. (2020). Intimate infrastructures: The rubrics of gendered safety and urban violence in Kerala, India. *Geoforum*, *110*, 67-76.
7. Dayson, C. S. (2025). *Defining Temporary Urban Interventions from a Southern Perspective: A Case Study of Fort Kochi* (Doctoral dissertation, Politecnico di Torino).
8. Ghosh, B., & Schot, J. (2019). Towards a novel regime change framework: Studying mobility transitions in public transport regimes in an Indian megacity. Energy Research & Social Science, 51, 82-95.
9. Grossmann, K., Connolly, J. J., Dereniowska, M., Mattioli, G., Nitschke, L., Thomas, N., & Varo, A. (2022). From sustainable development to social-ecological justice: Addressing taboos and naturalizations in order to shift perspective. *Environment and Planning E: Nature and Space*, *5*(3), 1405-1427.
10. Joseph, G., & Elias, A. A. (2024). Assessing the sustainability and resilience of urban transit: The case of Kochi water metro. In *Sustainable and Resilient Supply Chain: Environmental Accounting and Management Focus* (pp. 141-157). Emerald Publishing Limited.
11. Karakislak, I. (2025). Understanding energy struggles through systems of power: A systematic review of intersectionality in energy social science and humanities. *Energy Research & Social Science*, *127*, 104324.
12. Kelkar, N., & Arthur, R. I. (2022). A review of governance and tenure in inland capture fisheries and aquaculture systems of India.
13. KS, F. A., & RAJAN PHILIP, D. S. (2024). CONCEPTUALISING A SUSTAINABLE PRACTICE MODEL FOR PLASTIC MANAGEMENT IN KERALA.
14. Lekha, N. B., & Kumar, P. (Eds.). (2024). *Routledge handbook of gender, culture, and development in India*. Routledge.
15. Loewenson, R., Colvin, C. J., Szabzon, F., Das, S., Khanna, R., Coelho, V. S. P., ... & Nolan, E. (2021). Beyond command and control: a rapid review of meaningful communityengaged responses to COVID-19. *Global Public Health*, *16*(8-9), 1439-1453.
16. Luke, M. (2022). Globalization and the Changing Geography of Social Life in Rural Kerala. *Journal of South Asian Development*, *17*(1), 7-31.
17. Mahalingam, M. R. (2022). *Building Capacity for Food Justice through Learning Pathways: Women's Group Farming in Kudumbashree, Kerala, India* (Doctoral dissertation, Arizona State University).
18. Matovu, B., Bleischwitz, R., Alkoyak-Yildiz, M., & Arlikatti, S. (2024). Invigorating women's empowerment in marine fishing to promote transformative cultures and narratives for sustainability in the blue economy: A scoping literature review from the Global South. *Mitigation and Adaptation Strategies for Global Change*, *29*(8), 83.
19. Menon, S. (2025). *Reinforcing infrastructures: capital, nature, and the translocal relationalities of urbanizing India* (Doctoral dissertation, The University of WisconsinMadison).
20. Moolakatt, R. A. (2025). Paths toward Sustainable Development in the 21st Century: A Comparative Analysis of "Exceptionalist" Development Models in Costa Rica and Kerala, India. *Berkeley Undergraduate Journal*, *39*(1).
21. Moosavi, S. M., Cornadó, C., Askarizad, R., & Garau, C. (2025). The Social Life of Residential Architecture: A Systematic Review on Identifying the Hidden Patterns Within the Spatial Configuration of Historic Houses. *Buildings*, *15*(12), 2120.
22. Narang, S. (2021). The Saga of Fish Workers in Kerala: Critical Environmental Law Perspective. *Issue 4 Int'l JL Mgmt. & Human.*, *4*, 840.
23. Narayana, D. (2011). The Pricing Problem of public transport in Kerala.

24. Nataraj, S., & Narayana, S. (2024). Literary Cartography of Performance Ecologies in Sheela Tomy's" Valli". *SARE: Southeast Asian Review of English*, *61*(2), 46-77.
25. Nidhi, G. (2025). Evolution of Foodscapes.
26. Palackal, A. (2024). Development, Inclusion, and Sustainability. *Routledge Handbook of Gender, Culture, and Development in India*.
27. Palozzi, G., Schettini, I., & Chirico, A. (2020). Enhancing the sustainable goal of access to healthcare: findings from a literature review on telemedicine employment in rural areas. *Sustainability*, *12*(8), 3318.
28. Ravindranath, R., Sarma, P. S., Sivasankaran, S., Thankappan, K. R., & Jeemon, P. (2024). Voices of care: unveiling patient journeys in primary care for hypertension and diabetes management in Kerala, India. *Frontiers in Public Health*, *12*, 1375227.
29. Reddy, B. S., & Naik, V. M. (2025). Economic Transitions: Tribal Pathways Through Black, Blue, and Green Paradigms. *Indiana Journal of Economics and Business Management*, *5*(3), 7-23.
30. Sasikumar, V. K. (2024). Political economy critique of climate change and sustainable development: An ethnography from rural (tribal) KeraladAn Asian case.
31. Satheesh, S. (2025). *Labour, Nature and Capitalism: Exploring Labour-environmental Conflicts in Kerala, India*. UCL Press.
32. Seyfried Cohen, L. (2025). *From Global Goals to Local Governance: Analyzing SDG5's Steering Effects on Gender Transformative Governance in South India* (Master's thesis).
33. Shah, S., Viswanath, K., Vyas, S., & Gadepalli, S. (2017). Women and transport in Indian cities. *New Delhi, India: ITDP India*, 10-1.
34. Sharma, K. R., & Bhatia, P. (2022). How Just and Democratic Is India's Solar Energy Transition?. *Climate justice in India*, 50-73.
35. Sharma, S. (2024). *From Strategy to Action: Actors in Shaping Sustainable Transitions*. Hong Kong University of Science and Technology (Hong Kong).
36. Shekin, S., & Freddy, H. J. (2025). India's Experiment with Electric Vehicles: Promise and Ambiguity in the Context of Environmental Security. In *Environmental Securitisation in India and China* (pp. 201-214). Singapore: Springer Nature Singapore.
37. Srinivas, S. (2023). When is industry 'sustainable'? The economics of institutional variety in a pandemic. *Review of Evolutionary Political Economy*, *4*(1), 75-107.
38. Syaban, A. S. N., & Appiah-Opoku, S. (2024). Unveiling the complexities of land use transition in indonesia's new capital city IKN Nusantara: A multidimensional conflict analysis. *Land*, *13*(5), 606.
39. Tharamangalam, J. (2010). Human development as transformative practice: Lessons from Kerala and Cuba. *Critical Asian Studies*, *42*(3), 363-402.
40. Thattantavide, A., & Kumar, A. (2024). Local food systems as a resilient strategy to ensure sustainable food security in crisis: Lessons from COVID-19 pandemic and perspectives for the post-pandemic world. *CABI Reviews*, (2024).
41. Yin, J., Feng, J., & Jia, M. (2024). Research on rural tourism environment perception based on grounded theory A case study of Beishan Village, Zhuhai City, Guangdong Province, China. *Heliyon*, *10*(11).
42. Zehba, F. M., Priya Rajendran, L., & Firoz, M. C. (2025). " Where Is the Time?": Time Poverty and Women's Urban Mobility Narratives in Kochi, India. *Urban Planning*, *10*.