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Assessing Charging Station Accessibility and Electric Vehicle Adoption in the Context of Sustainable Tourism

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Abstract

Sustainable tourism is important in balancing economic growth with environmental protection, ensuring destinations remain viable for future generations. In this context, electric vehicles are emerging as a viable solution for promoting low carbon travel within tourism destinations. The adoption of electric vehicles by tourists and consumers is strongly influenced by the accessibility of charging infrastructure. This conceptual paper examines the role of electric vehicle charging station accessibility in shaping electric vehicle adoption within the framework of sustainable tourism. The study interplays perspectives from sustainable tourism, green mobility and EV adoption literature. The paper highlights the influence of charging station accessibility on tourist confidence, destination choice and sustainable travel behaviour. The study discusses implications for destination planners, policymakers, a; importance of charging infrastructure in positioning destinations as sustainable and EV-friendly tourism hubs.

Keywords: Electric Vehicle, Charging Station Accessibility, Ev Adoption, Sustainable Tourism.

Introduction

Electric vehicles in India make up a modest but growing share of the overall vehicle market. The electric vehicle registration accounts to 3.38% of total vehicle registration. The sustainable development goals SDG 8.9 aims to implement policies by 2030 that promotes sustainable tourism particularly focusing on maximizing tourism’s economic benefits while protecting heritage as measured by indicator 8.9.1 - Tourism Direct GDP as a proportion of total GDP. India is in the process of promoting sustainable transportation to reduce carbon emission. In view of this, expanding EV charging infrastructure supports India’s transition to cleaner mobility while aligning with sustainable tourism objectives. This enhances the attractiveness of destinations committed to environmental sustainability. Electric

vehicle will be a solution to low carbon tourist mobility. Adoption of electric vehicle offers a tangible path to reduce greenhouse gas and carbon emissions. Despite growing consumer interest, technological advancements and all the efforts by the Government for electric vehicle adoption, inadequate charging stations continue to be a bottleneck. Charging station accessibility plays a crucial role in determining whether tourists and consumers feel confident using EVs. This study aims to explore the role of electric vehicle charging infrastructure accessibility in supporting the achievement of sustainable tourism.

Review of Literature

Existing literature on sustainable tourism emphasizes the importance of reducing environmental impacts while maintaining quality tourist experiences.

Gulzar et al. (2024) states the data-driven review of global EV charging infrastructures, emphasizing sustainable energy integration and deployment challenges that hinder EV adoption in tourism-heavy areas, calling for better planning to enhance accessibility. Insan et al. (2022). This paper analyzes the business viability of EV charging stations along Thailand's Khao Kho tourism route, demonstrating how strategic infrastructure deployment reduces range anxiety and boosts eco-tourism revenue while addressing accessibility gaps in rural destinations.

Du et al. (2024). The study models how charging station accessibility directly influences EV purchase intentions and usage in travel scenarios, revealing infrastructure density as a key barrier to sustainable tourism mobility. Soltanpur et al. (2025) This study focused on Level-2 chargers at tourist sites, the paper advocates strategic placement for overnight parking, showing how this enhances EV feasibility for sustainable tourism without fast-charging overload.

Arslangulova et al. (2024) gives insights on an evaluation framework for public EV charging accessibility, highlighting disparities in tourist regions and proposing metrics to improve equitable access for promoting low-carbon travel. Hu et al. (2025) examines growth patterns of EV charging networks, identifying factors like tourism demand that drive infrastructure expansion, yet underscoring urban-rural divides limiting adoption in remote scenic areas.

Wang et al. (2023) The research quantifies range anxiety in BEV users during trips, linking both distance and charging wait times to adoption barriers, with implications for better infrastructure in tourism routes. Henriques et al. (2024) This PRISMA-based review surveys AI applications in tourism, noting potential for optimizing EV charging networks and personalized routing to overcome accessibility issues in sustainable travel. NITI Aayog (2023). The report assesses India's EV charging grid integration, stressing infrastructure needs for tourism corridors to support adoption amid power constraints and rural divides.

Objectives

The objectives of the study are as follows:

1. To examine the role of EV charging station accessibility in promoting electric vehicle adoption within the context of sustainable tourism.
2. To explore the relationship between charging infrastructure accessibility and tourists' confidence and willingness to use electric vehicles.
3. To discuss how EV charging infrastructure contributes to destination attractiveness and competitiveness within sustainable tourism frameworks.

Sustainable Tourism and Green Mobility

The main objective of sustainable tourism is to balance economic growth with environmental protection. Transportation plays a central role in this balance, as it directly affects emissions,

congestion, and resource consumption. Therefore, green mobility has become an essential component of sustainable tourism strategies. It promotes transport options that are environmentally efficient and socially responsible. Sustainable tourism and green mobility intersect to minimize environmental impacts from travel while promoting eco-friendly transport options. Electric vehicles align closely with these objectives by offering cleaner mobility solutions for tourists and residents alike.

EV Charging Accessibility

Electric vehicle charging station accessibility is pivotal for electric vehicle adoption in sustainable tourism, as it alleviates range anxiety and enables seamless travel to remote destinations. It extends beyond the simple presence of charging points. It includes spatial accessibility, such as proximity to tourist attractions, hotels, and transport routes; temporal accessibility, including availability and waiting time; functional accessibility, such as ease of use and compatibility with different EV models; and informational accessibility, including signage, mobile applications, and real-time information. Strategic placement at attractions—like resorts with overnight charging or scenic hubs enhances eco-tourism. Inadequate or poorly communicated charging access can discourage tourists

Impact of Electric Vehicle Adoption in Tourism Context

Accessibility of charging stations is one of the major factors that affect the adoption of electric vehicles among tourists. If the charging stations are easily accessible, tourists will be less anxious about the range of their vehicles and will feel more confident about their travel plans. This confidence will have an impact on the tourists' travel decisions, including the route to be taken, the duration of stay, and even the destination. A destination that is easily visible with accessible charging stations will be considered EV-friendly, which will encourage tourists and consumers to switch to electric vehicles.

Implications

Enhanced EV charging accessibility in sustainable tourism carries profound implications for environmental conservation, economic growth, and policy innovation. The study highlights the need for destination-level planning that integrates tourism development with EV charging infrastructure. Policymakers can promote collaboration between tourism authorities and transport agencies to support sustainable mobility initiatives. From a destination management perspective, charging infrastructure can serve as a strategic asset that strengthens sustainable tourism branding and enhances visitor satisfaction. For tourism industry can enhance competitiveness by offering charging facilities and positioning themselves as EV-friendly.

Limitations and Future Research

As a conceptual paper, this study does not include empirical data or destination-specific analysis. This limits its ability to provide measurable evidence. Future research can build upon this framework by conducting empirical studies involving tourists, EV users, or destination case studies. Comparative analyses across urban-rural divides and cross-cultural surveys could validate scalable frameworks, while pilot interventions in emerging markets test policy impacts on EV uptake. Future studies should employ GIS-based simulations for optimizing charger placement in high-tourism corridors, integrating AI for dynamic demand forecasting.

Conclusion

The paper concludes that EV charging station accessibility is a critical yet often overlooked component of sustainable tourism development. Assessing EV charging station accessibility is crucial for accelerating electric vehicle adoption and advancing sustainable tourism by mitigating range anxiety and enabling low-carbon travel in diverse destinations. Without reliable and accessible charging infrastructure, the potential of electric vehicles to support low-carbon tourism remains constrained. Charging infrastructure should therefore be viewed as a strategic destination resource rather than a mere technical necessity. By integrating green mobility planning with tourism development, destinations can enhance both environmental sustainability and tourist confidence, paving the way for wider adoption of electric vehicles in tourism contexts.

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