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SYSTEMATIC REVIEW
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Electric Vehicle Shared Services: A Decade of Innovation, Challenges, and Transformative Impact on Sustainable Urban Mobility — A Systematic Literature Review

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Abstract:

Introduction: Research on Electric Vehicle Shared Services (EVSS) has significantly grown over the past decade, emerging as a transformative solution to urban mobility challenges while advancing sustainable transportation. Through innovation and scalable mobility solutions, EVSS has garnered attention for their potential to address pressing environmental issues, including climate change and urban air quality.

Material and Methods: This Systematic Literature Review (SLR) examines the evolution, challenges, and impacts of EVSS from 2014 to 2023. A total of 52 studies were analyzed using the PRISMA methodology, ensuring a comprehensive and rigorous evaluation of the literature. Key themes were identified to synthesize trends, challenges, and benefits associated with these services.

Results: Findings reveal a significant growth in EVSS research driven by technological advancements, supportive policy frameworks, and heightened global awareness of environmental issues. Studies highlight that EVSS can achieve a reduction in greenhouse gas emissions by 14–65% compared to traditional vehicles, alongside notable improvement in local air quality. These benefits are pivotal in global efforts to mitigate climate change and enhance urban environmental health. Moreover, EVSS provides affordable and flexible transportation options, particularly for underserved populations, contributing to social equity. Integration with public transportation systems further reduces traffic congestion and enhances urban mobility efficiency.

Discussion: Despite their promise, EVSS faces several challenges. Limited charging infrastructure necessitates significant investment in public charging networks. High upfront costs for purchasing and maintaining electric vehicle (EV) fleets remain a financial obstacle for operators. Furthermore, user perception issues, such as range anxiety, require targeted public education campaigns to enhance acceptance. Collaborative efforts among policymakers, community organizations, and private operators are crucial for addressing these barriers and maximizing the potential of shared EV services.

Conclusion: EVSS represents a transformative approach to achieving sustainable urban mobility. Their environmental, social, and mobility benefits underscore their role in addressing critical urban challenges. However, overcoming adoption barriers will require a robust and coordinated policy framework alongside investments in infrastructure and public engagement strategies. Continued research and stakeholder collaboration are essential for unlocking the full potential of EVSS in fostering sustainable and equitable urban transportation systems.

Keywords: Electric vehicle shared services, Global awareness, PRISMA, Supportive policy, Technological advancements, Urban mobility.

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1. INTRODUCTION

1.1. Background

Electric Vehicle shared services (EVSS) have gained increasing recognition as a pivotal element of modern transportation systems, offering a sustainable alternative to traditional vehicle ownership models [1]. Growing concerns about environmental sustainability and urban congestion have catalyzed a shift toward shared mobility solutions, particularly those utilizing electric vehicles (EVs) [2]. The rapid advancement of technology, coupled with increased governmental incentives and policy support, has further accelerated the expansion of EVSS [3]. However, while the EV market continues to grow, a critical gap remains in understanding users' experience and satisfaction, which are fundamental to driving the widespread adoption of these services [4].

User experience encompasses an individual's interaction with a service, significantly influencing their satisfaction levels and future behavioural intentions [5]. These intentions include continued service usage and the likelihood of recommending the service to others [6]. Positive user experiences with EVSS can foster consumer loyalty and facilitate market penetration [7], ultimately contributing to the reduction of greenhouse gas emissions associated with fossil fuel consumption [8]. However, recent studies suggest that the complexity of integrating EVSS into urban transport systems requires a deeper investigation into how user perceptions are influenced by factors such as digital accessibility, real-time service monitoring, and dynamic pricing strategies [9].

Despite the growing interest in EVs and their potential benefits [10], empirical research comparing user experiences between EVSS and traditional car-sharing or private vehicle use remains limited [11]. Previous studies have predominantly focused on adoption strategies for EVs while overlooking the practical aspects of user satisfaction with these services. Studies indicate that user satisfaction is influenced by multiple factors, including vehicle reliability [12], accessibility of charging infrastructure [13], and overall service quality [7]. However, emerging literature emphasizes that the success of EVSS depends on psycho-logical determinants such as trust in autonomous vehicle technology, perceived environmental impact, and alignment with urban mobility preferences [14]. This identifies a knowledge gap that this systematic literature review (SLR) intends to fill by synthesizing key findings on EVSS.

Moreover, psychological factors influencing user acceptance of EVSS highlight the importance of understanding consumer perceptions and experiences [7]. While the literature suggests that EVs offer numerous benefits, such as lower operational costs and environmental advantages [15], their market share remains relatively low compared to traditional combustion-engine vehicles. This discrepancy underscores the necessity of a comprehensive study that explores the nuances of user experiences within the context of EVSS [16].

By identifying factors that contribute to user satisfaction and perceived comfort [17], this review aims to bridge the existing knowledge gap and provide insights into how EVSS can be optimized to better meet consumer needs [18]. In particular, this research examines how technological [19], regulatory [20], and societal factors shape the adoption of EVSS [21]. Additionally, this review integrates recent perspectives on the role of smart infrastructure development and digital twin technology in enhancing service reliability and user engagement [22]. It also examines the role of government policies and innovations in overcoming barriers to implementation [23], which are critical to scaling EVSS in urban settings. By incorporating these novel perspectives, this study aims to provide a more contemporary and holistic analysis of the evolution and future potential of EVSS.

1.2. Research Objectives

This systematic literature review (SLR) aims to achieve the following research objectives, aligning with the gaps identified in the background and responding to the emerging need for deeper insights into the field of EVSS:

- To synthesize the key findings from curated articles in the Scopus database concerning EVSS. This objective seeks to comprehensively summarize the contributions of existing research in the field, providing a foundation for understanding the current state of knowledge.
- To conduct an in-depth analysis of the 52 selected articles that meet the inclusion criteria, focusing on identifying common research patterns, methodological approaches, and significant findings. The analysis helps uncover gaps in the literature and offers insights into future research directions.
- To identify and analyze global research trends in EVSS, investigating the key factors influencing the adoption and growth of EV-sharing business models across various geographical and economic contexts. This objective

provides a broader understanding of the factors driving EVSS development in different regions, highlighting regional differences and trends.

- To examine the major challenges and barriers faced in implementing EVSS from technological, regulatory, and societal perspectives. This objective explores how technological innovations and government policies contribute to overcoming these challenges, providing a comprehensive understanding of the hurdles involved in EVSS adoption.
- To evaluate the environmental and social impacts of adopting EVSS, specifically in reducing carbon emissions and improving access to sustainable transportation. This objective assesses how the widespread adoption of EVSS contributes to environmental sustainability and social equity, particularly in urban settings.
- To investigate the role of EVSS in mitigating urban challenges such as traffic congestion, pollution, and limited access to sustainable transportation. This objective explores how EVSS can enhance urban mobility, improve air quality, and contribute to the overall sustainability of urban transport systems.

1.3. Research Questions (RQ)

To achieve the research objectives, the following research questions are proposed:

RQ1 What are the key findings from the articles curated using the PRISMA method from Scopus, covering the past decade (2014-2023) on EVSS?

RQ2 What in-depth insights can be derived from the 52 eligible articles on EVSS in Scopus?

RQ3 How has research on EVSS evolved globally, and what are the key factors influencing the adoption and growth of EV-sharing models across different geographical and economic contexts?

RQ4 What are the main challenges and barriers to implementing EVSS, including technological, regulatory, and societal acceptance issues? How do technological innovations and government policies address these challenges?

RQ5 What are the environmental and social impacts of adopting EVSS, particularly concerning carbon emission reduction and enhanced accessibility to sustainable transportation?

RQ6 How does EVSS contribute to mitigating urban challenges, such as traffic congestion and pollution, while enhancing access to sustainable transportation in urban areas?

1.4. Structure of the Article

The article is organized as follows: it begins with a methodology section describing the SLR approach used to collect, evaluate, and synthesize relevant studies on EVSS. The results section presents the key findings related to the research questions, focusing on factors influencing user satisfaction, challenges in adoption, and psychological and social factors. In the discussion, the findings are compared with existing literature to highlight new insights and identify gaps. The article concludes with implications for both theory and practice, offering recommendations for future research and practical strategies to improve EVSS and enhance adoption.

2. STATE OF THE ART

EVSS has emerged as a transformative force in urban mobility, offering a sustainable alternative to private car ownership while addressing environmental and congestion challenges [1]. The increasing adoption of EVSS aligns with global efforts to reduce greenhouse gas emissions and promote energy-efficient transportation systems [2]. However, despite the growing body of literature on EV adoption, few studies comprehensively examine user experiences, satisfaction, and the critical factors influencing the expansion of EVSS [24].

Previous research has primarily focused on the adoption of EVs, emphasizing financial incentives, technological advancements, and policy interventions [25]. However, a significant gap remains in understanding user-centric factors such as service reliability, accessibility of charging infrastructure, and perceived convenience [26]. Studies suggest that user experience and psychological acceptance play crucial roles in the continued use of EVSS, yet these dimensions remain underexplored in systematic literature reviews [7].

A key challenge in EVSS research is the lack of standardized frameworks for evaluating user satisfaction across different regions and economic contexts [27]. While some studies have addressed market penetration and business models [28], there is still a need to analyze how different regulatory environments and government policies influence adoption rates [21]. Furthermore, although technological innovations such as smart mobility applications and AI-driven fleet management systems have been explored [19], their real-world impact on service efficiency and user experience requires further investigation.

From a methodological perspective, existing studies on EVSS often rely on case studies or regional analyses, limiting the generalizability of findings [18]. The application of SLR methodologies, such as the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA), allows a more structured synthesis of global research trends, providing insights into adoption patterns, service challenges, and environmental benefits [18]. This approach also facilitates the identification of research gaps, such as the need for more empirical studies on user behaviour and long-term service sustainability.

Given the interdisciplinary nature of EVSS, future research should integrate perspectives from transportation engineering, behavioural sciences, and policy analysis to develop a holistic understanding of adoption dynamics [8]. Addressing these gaps would contribute to optimizing EVSS models, improving user engagement, and enhancing the sustainability of urban transport networks.

3. METHODOLOGY

3.1. SLR Methodology

This study employs the Systematic Literature Review (SLR) methodology, adhering to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines to ensure a comprehensive and transparent review process. PRISMA is essential in this research for several reasons that support the quality and reliability of systematic review outcomes [29]. One of PRISMA's primary strengths is its ability to facilitate a more structured and robust analysis. By following the PRISMA flow and checklist, researchers can ensure that each step in the review process, from the literature search to the selection of relevant studies, is conducted with methodological rigor. PRISMA requires researchers to justify their decisions during the selection and analysis of studies, which supports transparency in reporting the procedures followed (**supplementary material**).

Furthermore, PRISMA aids in identifying and minimizing bias in the literature selection process [30]. This guideline enhances the selection and evaluation of articles, making them more objective and replicable and ensuring that the review process is not influenced by subjective judgment. Such objectivity is particularly crucial for increasing the reliability of findings in SLR research, especially when evaluating multidisciplinary literature or studies with varying research methodologies. PRISMA has proven to be an effective tool for improving the quality of systematic research. As a widely adopted guideline in scholarly literature, it is recognized by many reputable international journals and research bodies for providing a clear structure to researchers. PRISMA has been extensively utilized in the health sciences and has been extended to various other disciplines, including technology, social sciences, and education [31].

By adhering to the PRISMA standard, this study ensures the accuracy and consistency of the SLR methodology and reassures readers that the review process follows established and accountable procedures [29]. This adherence is critical for enhancing the credibility of the findings and supporting the trustworthiness of the research within the academic community. Overall, the adoption of PRISMA in this SLR establishes a strong foundation for ensuring high transparency, thorough analysis, and reliable conclusions, aligning with international standards for systematic reviews and meta-analyses.

3.2. Application of the PICO Framework in EVSS Research

This study employs the Population, Intervention, Comparison, and Outcome (PICO) framework to systematically examine user experiences in EVSS. The framework provides a structured approach to analyzing factors influencing user satisfaction, behavioural adoption, and the broader impact of shared EV mobility [32]. By utilizing PICO, this research ensures a comprehensive synthesis of existing literature, facilitating comparative insights into emerging trends and challenges within the EV-sharing ecosystem.

3.2.1. Population (P)

A diverse set of stakeholders influences the adoption and expansion of EVSS, each playing a critical role in shaping the success and scalability of this mobility solution. This study identifies two primary groups: individual users and policymakers/industry stakeholders, who contribute to the broader ecosystem of sustainable urban transportation. By examining the behavioural, economic, and regulatory factors affecting these groups, this study provides a holistic understanding of the determinants driving EV-sharing adoption and user satisfaction.

3.2.1.1. Individual Users: Adoption Patterns and User Profiles

Individual users represent a diverse segment of urban residents engaging with EVSS, ranging from tech-savvy early adopters to first-time users unfamiliar with shared mobility models [33]. The growth of Mobility-as-a-Service (MaaS) platforms has reshaped urban travel behaviours, with many consumers transitioning from private car ownership to flexible, on-demand EV-sharing solutions [34]. These users prioritize convenience, cost savings, and environmental sustainability, making EV-sharing an attractive alternative to traditional car ownership or fossil fuel-based ride-hailing services [17].

However, barriers to adoption persist, particularly among first-time adopters or individuals with limited exposure to shared mobility ecosystems [35]. Psychological and behavioural factors—such as range anxiety, trust in shared vehicles, perceived service reliability, and technological familiarity—affect user willingness to adopt EV-sharing services [36]. Additionally, socio-demographic characteristics—such as age, income levels, and digital literacy—play a role in determining user preferences and satisfaction levels [37]. Therefore, this study considers both intrinsic motivations and external barriers that shape user engagement with EV-sharing platforms, offering insights into how providers can enhance service adoption through personalized pricing models, improved infrastructure, and targeted awareness campaigns [38].

3.2.1.2. Policymakers and Industry Stakeholders: Enablers of EV-Sharing Adoption

Beyond individual users, policymakers, urban planners, and industry stakeholders form a crucial segment of the population influencing the regulatory landscape, infrastructure development, and policy frameworks for EV-sharing mobility. Policymakers are responsible for establishing urban mobility regulations, offering incentives for EV adoption, and ensuring that EV-sharing aligns with national sustainability goals [39]. Many governments have implemented subsidies, tax exemptions, and urban planning policies to encourage EV-sharing as a sustainable trans-portation alternative, recognizing its potential to reduce congestion, lower emissions, and optimize urban mobility networks [40].

However, regulatory challenges remain a major constraint in EV-sharing scalability, as inconsistent policies, fragmented urban planning strategies, and a lack of standardized EV-charging infrastructure hinder seamless integration into existing transportation ecosystems [41]. Industry stakeholders, including EV manufacturers, mobility service providers, and smart city developers, must colla-borate with governments to address these challenges by improving vehicle interoperability, expanding charging networks, and leveraging data-driven solutions to optimize service efficiency [42].

3.2.2. Intervention (I)

This study examines the adoption and implementation of EVSS as a sustainable alternative to conventional transportation. As urban areas face increasing congestion and environmental concerns, EV-sharing services have emerged as a promising solution to reduce carbon emissions, improve energy efficiency, and enhance urban mobility [40]. This study evaluates the intervention by analyzing service efficiency, technological infrastructure, regulatory and policy support, and the environmental and economic implications.

A key aspect of EVSS is service efficiency, which directly influences user adoption and satisfaction. The reliability and availability of EV-sharing networks depend on effective fleet distribution management, real-time demand prediction, and user-friendly booking systems [23]. Dynamic pricing models and adaptive routing strategies further improve operational efficiency [43]. However, challenges such as vehicle availability during peak hours and station overcrowding remain critical concerns that must be addressed.

Another essential factor is technological infrastructure, which plays a fundamental role in the success of EVSS. The widespread adoption of these services depends on the availability of well-distributed charging stations, efficient battery technology, and seamless digital integration [44]. The accessibility of fast-charging stations significantly reduces range anxiety, which is often cited as a barrier to EV adoption [45]. Additionally, mobile app integration enhances the user experience by providing real-time vehicle tracking, charging station availability, and automated billing systems. However, charging network interoperability across different service providers remains a challenge, particularly in regions with fragmented regulatory environments [2].

Regulatory and policy support also plays a pivotal role in shaping the adoption and expansion of EVSS. Governments worldwide have introduced various policy measures, including financial incentives, carbon emission regulations, and supportive legal frameworks to encourage the transition to shared EV mobility [46]. Subsidies for EV manufacturers and tax reductions for shared mobility services have accelerated adoption, particularly in urban centres with strong public transport networks [47]. Additionally, stricter emission regulations have incentivized private operators to transition from fossil fuel-based vehicle-sharing services to electric alternatives [48]. From an environmental and economic perspective, EVSS significantly reduces carbon footprints and optimizes urban energy consumption. Shared EVs offer a more sustainable alternative to private car ownership by lowering per capita emissions and promoting multi-modal transport integration [49].

3.2.3. Comparison (C)

A comparative analysis is essential to determine the advantages and challenges of EVSS relative to traditional mobility options. This study systematically compares EVSS with private car ownership and fossil fuel-based car-sharing services, considering key factors such as economic feasibility, environmental sustainability, operational effi-ciency, and user experience. The goal is to assess whether EVSS offers a superior alternative in terms of cost savings, carbon reduction, and overall service optimization [50].

The first comparison examines EVSS *versus* private car ownership, focusing on each option's economic, environmental, and spatial implications. Private vehicle ownership remains the dominant mode of transportation in many regions due to its perceived convenience and independence. However, it entails substantial financial burdens, including purchase costs, maintenance expenses, insurance fees, and fuel expenditures [51]. In contrast, EVSS eliminates these costs by offering on-demand vehicle access without a long-term financial commitment [11]. Additionally, EV-sharing addresses these concerns by reducing dependence on vehicle ownership and optimizing fleet usage, thereby improving urban space efficiency [52].

The second comparison evaluates EVSS *versus* traditional fossil fuel-based car-sharing services. Car-sharing models that use Internal Combustion Engine (ICE) vehicles have gained popularity as an alternative to private car ownership, offering users flexibility without the financial obligations associated with ownership. However, these services still rely on fossil fuels, leading to higher emissions, noise pollution, and greater long-term environmental costs [53]. In contrast, EV-sharing minimizes these issues by utilizing renewable energy sources and reducing operational emissions, contributing to cleaner urban environments [54].

Finally, user satisfaction and experience are critical determinants of EVSS adoption and success. Studies suggest that EVSS provides a more seamless and technologically advanced user experience, with features such as real-time availability tracking, automated payment systems, and enhanced connectivity through mobile applications [55]. However, concerns remain regarding range anxiety, charging infrastructure availability, and perceived reliability, which may impact user trust in EVSS compared to fossil fuel-based alternatives that benefit from widespread refuelling networks [2]. Addressing these concerns through expanded charging infrastructure, faster-charging technology, and government incentives could enhance user confidence in EV-sharing models.

3.2.4. Outcome (O)

Understanding the adoption, effectiveness, and broader societal impact of EVSS is critical for assessing its long-term viability as a sustainable mobility solution. This study explores key outcomes related to user adoption trends, environmental benefits, equitable access to transportation, service quality, and the regulatory landscape. By systematically evaluating these dimensions, this research aims to provide a holistic perspective on the transformative potential of EVSS in urban mobility ecosystems.

One of the primary outcomes assessed is user adoption trends, which analyze the factors influencing individuals' willingness to transition from private car ownership or traditional fossil fuel-based car-sharing services to EVSS platforms [56]. The adoption of EVSS is often shaped by perceived convenience, cost savings, environmental consciousness, and government incentives [57]. However, several barriers persist, including range anxiety, concerns over charging infrastructure reliability, and unfamiliarity with EV technology [42]. Understanding how these psychological and infrastructural factors influence adoption is essential for designing targeted interventions that encourage the transition to EV-sharing solutions.

From an environmental perspective, EVSS is widely recognized for its potential to mitigate carbon emissions, improve energy efficiency, and enhance urban air quality [58]. Traditional ICE vehicles remain a major contributor to greenhouse gas (GHG) emissions, exacerbating climate change and urban pollution levels [59]. Conversely, EV-sharing promotes low-emission transportation options, reducing the overall carbon footprint per passenger-kilometer travelled [60]. Furthermore, when powered by renewable energy sources, the environmental benefits of EV-sharing are amplified, positioning it as a crucial enabler of sustainable urban mobility transitions [61].

A crucial dimension of EVSS is equitable mobility access, particularly in ensuring sustainable transportation options for underserved and low-income communities. Traditional car ownership remains financially burdensome, creating barriers to mobility independence for economically disadvantaged populations [62]. EV-sharing has the potential to bridge this accessibility gap by offering affordable, flexible, and on-demand transportation options, thereby reducing transportation-related inequalities [2]. However, ensuring EV-sharing reaches marginalized communities requires strategic infrastructure placement, inclusive pricing models, and targeted government subsidies [63].

In evaluating user satisfaction and service quality, this study examines key determinants such as vehicle availability, pricing structures, convenience, and charging infrastructure reliability [7]. While EVSS provides cost savings and environmental benefits, user retention is heavily influenced by perceived ease of use, technological integration, and network coverage [55]. Ensuring a seamless user experience through smart fleet management, AI-driven demand forecasting, and real-time service optimization is essential for enhancing customer satisfaction and long-term adoption [64].

Finally, this study identifies regulatory, technological, and market-related challenges that impact the scalability and widespread adoption of EVSS. Regulatory barriers, including inconsistent policies, lack of standardization, and fragmented legal frameworks, hinder large-scale EV-sharing implementation [65]. Technological challenges, such as battery range limitations, charging infrastructure inadequacies, and fleet management complexities, require continuous innovation and strategic policy interventions [44]. To overcome these barriers, public-private partnerships, government incentives, and advancements in battery technology are essential for facilitating a smoother transition toward widespread EVSS adoption [18].

By employing the PICO framework, this study systematically evaluates the current state of knowledge in EVSS, offering insights into global trends, adoption challenges, and the transformative potential of EV-sharing for urban sustainability.

3.3. Screening and Selection Process

This study employs an SLR methodology to explore relevant literature on shared services for EVs. The PRISMA guidelines were adopted to ensure a rigorous and transparent review process. Each step of the PRISMA framework was carefully implemented to minimize bias, enhance transparency, and strengthen the validity of the findings. The detailed steps of the screening and selection process are illustrated in the PRISMA flow diagram (Fig. **1**) and are described as follows:

3.3.1. Identification

The identification phase began with a comprehensive literature search conducted in the Scopus database, selected due to its broad coverage of high-impact, peer-reviewed journals and conference proceedings [66]. Compared to other academic databases such as Web of Science (WoS), IEEE Xplore, ScienceDirect, and Google Scholar, Scopus provides a more extensive repository of interdisciplinary research, particularly in areas related to sustainable mobility and transportation technology [67]. Furthermore, Scopus offers advanced search functionalities, including citation analysis and keyword mapping, which facilitate the refinement of relevant studies [68].

To ensure a comprehensive yet focused search, specific keywords related to EVSS were used. The search query included “electric vehicle” OR “electric bike” OR “electric car” AND “share services” OR “sharing” in the TITLE-ABS-KEY fields. This combination was formulated based on previous systematic reviews in the field of shared mobility and keyword co-occurrence analyses from existing studies [69]. The inclusion of both “electric bike” and “electric car” ensured that the search captured a broad spectrum of EVSS, including micro-mobility solutions and car-sharing platforms.

The initial search yielded 2,707 records, reflecting the growing academic interest in EV-sharing technologies. However, to ensure that the findings remained relevant to the current technological landscape and policy developments, a temporal refinement was applied, limiting the search to publications from 2014 to 2023. This timeframe was chosen because:

- 2014 marks the beginning of significant policy initiatives and advancements in EVSS, such as the launch of large-scale electric car-sharing programs in major cities [70]
- Rapid technological improvements in battery efficiency and charging infrastructure have accelerated since 2014, influencing the feasibility and scalability of EV-sharing systems [71]
- Most recent studies (2018–2023) focus on integrating digital platforms, AI-driven fleet management, and smart mobility ecosystems, which were not widely explored in earlier research [69]

As a result of this refinement, 613 records published outside the specified timeframe were excluded, leaving 2,094 records for further screening. The next phase involved filtering these records based on document type, language, and accessibility to ensure that only high-quality, peer-reviewed studies were included in the final analysis.

3.3.2. Screening

The screening stage involved filtering the identified records based on document type, language, and accessibility to ensure the relevance and quality of the articles. Regarding document type screening, from the 2,094 records, 1,005 were excluded because they were not journal articles but conference papers, technical reports, or other non-relevant documents. This left 1,089 records eligible for the next step. Only articles written in English were considered, as they are accessible to an international audience. Consequently, 83 articles in other languages were excluded, leaving 1,006 records for further evaluation. Accessibility was a key criterion, and only open-access articles were included. This criterion excluded 514 records that were not available in open-access format, reducing the dataset to 492 records for eligibility assessment.

3.3.3. Eligibility

The remaining 492 records were evaluated in the eligibility phase to ensure alignment with the research objectives and methodological rigor. All 492 articles were assessed for their quality, including citation metrics, keyword alignment, and topical distribution related to EVSS. Despite being classified as open access, 167 articles could not be retrieved due to technical issues or publisher restrictions, reducing the accessible records to 325. Among these 325 accessible articles, 273 were excluded because they lacked relevant keywords, such as “electric vehicle” or “electric bike” in conjunction with “shared services” or “sharing”. These articles did not meet the inclusion criteria for analyzing EVSS, leaving 52 articles eligible for the final analysis.

3.3.4. Included

In the final inclusion stage, 52 articles were retained for detailed analysis. These articles comprehensively addressed topics related to EVSS, examining various technical, economic, social, and environmental dimensions. These selected studies form the foundation of the SLR, enabling the synthesis of key findings and the development of recommendations for advancing research and practice in this field.

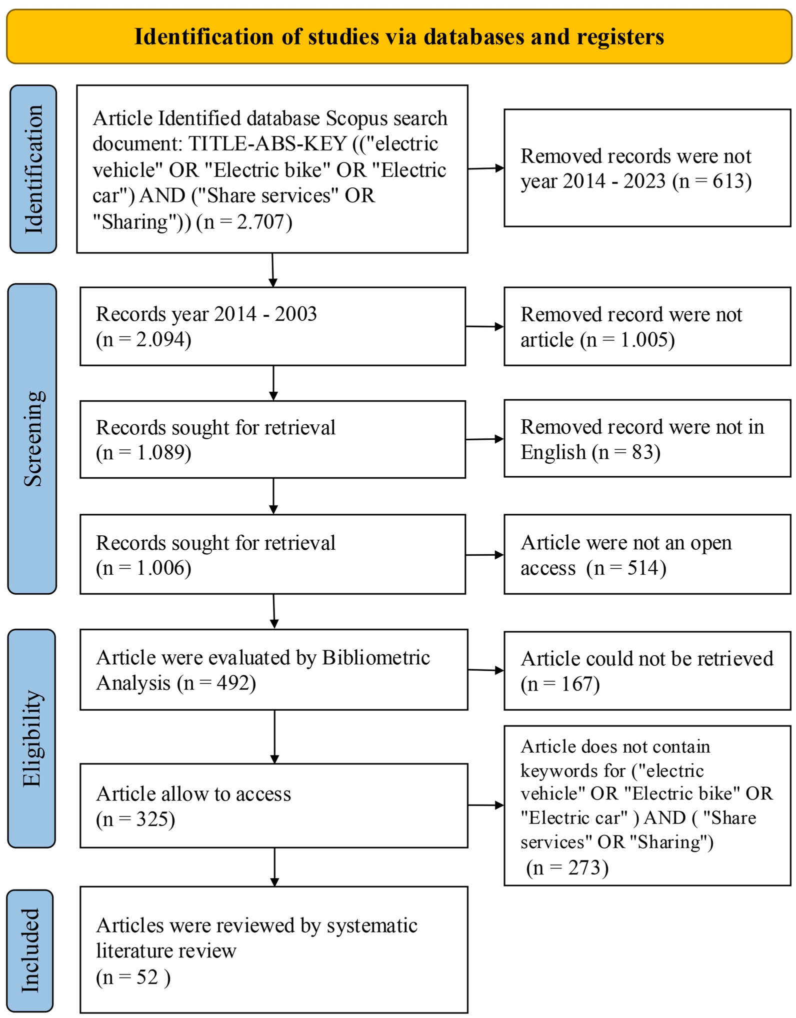

Fig. (1). PRISMA flow diagram.

Table **1** provides a detailed breakdown of the iterative refinement process, specifying the number of documents at each stage of exclusion and inclusion, thereby offering a quantitative overview of the selection steps. By adhering to PRISMA guidelines and documenting each decision point, this study ensures methodological rigor, allowing for future replication and verification of findings. This systematic approach to literature selection enhances the credibility of the study's results and establishes a clear, reproducible pathway for other researchers exploring similar topics.

Table 1. The refinement of search query.

Refinement	Number of Documents	Document Excluded
First refinement (Identification)	2,707	1,701
Second refinement (Screening)	1.006	695
Third refinement (Eligibility)	325	263
Fourth refinement (Included)	52	

3.5. Study Selection and Sample Size Justification

This SLR determined the sample size based on a rigorous study selection process aligned with the PRISMA methodology and the PICO framework. The selection criteria were designed to ensure the inclusion of high-quality and relevant studies that contribute to a comprehensive understanding of EVSS. The final sample size of 52 studies was obtained through a systematic screening of Scopus-indexed articles, focusing on peer-reviewed journal papers published between 2014 and 2023. The rationale behind this sample size is based on the principle of theoretical saturation, where additional studies did not yield significantly new insights into the research questions.

A qualitative synthesis approach was applied, emphasizing thematic analysis rather than statistical inference to ensure the adequacy of the sample size in achieving reliable and meaningful results. Unlike primary empirical studies that require formal statistical tests to determine sample adequacy, SLRs rely on predefined inclusion and exclusion criteria to ensure comprehensiveness and relevance. Furthermore, a citation-based approach was used to assess the impact and representativeness of selected studies, ensuring that key contributions from leading researchers and institutions were incorporated.

4. RESULT

4.1. RQ1 What are the Key Findings from the Articles Curated using the PRISMA Method from Scopus, Covering the Past Decade (2014-2023) on EVSS?

Publications on EVs in the context of shared services have demonstrated significant growth over the past decade. Early research in this domain was limited, but since then, there has been a steady annual increase in both the number of publications and their citation impact. By 2023, the field had produced 1,183 publications with 39,065 citations, highlighting the growing global interest in EVSS as a critical aspect of shared services.

The increase in publication numbers aligns with rising global awareness of the importance of EVs as a sustainable transportation solution. Each phase of growth in publications reflects heightened attention from the research community and stakeholders, underscoring the role of EVSS in advancing the adoption of EVs (Table **2**).

Table 2. Documents of EVSS in the last 10 years.

Year	*f*	Total Cited	Average Cited
2014	65	2,961	3
2015	73	3,856	31
2016	83	4,175	113
2017	72	3,428	35
2018	81	4,089	53
2019	182	7,750	42
2020	186	6,040	24
2021	191	4,174	21
2022	100	1,340	15
2023	150	1,252	5
Total	1,183	39,065	33

The table and graph depicting the annual distribution of publications (see Fig. **2**) underscore the quantitative growth in EVSS-related research over the past decade. The graphical representation highlights an exponential increase in EVSS research output, reflecting the academic community's response to the urgent need for sustainable transportation solutions.

The data reveal that while China leads in the total number of publications, the United States demonstrates a higher average citation rate. This indicates that U.S-based publications may have a more significant influence within the global research community, as they are frequently cited and regarded as highly relevant and impactful in advancing knowledge on EVSS (Table **3**).

The table of country contributions illustrates that several advanced economies play pivotal roles in advancing EVSS research. Alongside China and the United States, countries such as the United Kingdom, Italy, and Germany have substantially contributed to EVSS-related studies. This trend underscores the interdisciplinary nature of EV adoption, which involves stakeholders across various regions.

Table 3. Top-contributing countries in EVSS research (2014-2023).

Rank	Country	*f*	Total Cited	Average Cited
1	China	118	2,584	22
2	United State	73	3,334	46
3	United Kingdom	47	2,657	57
4	Italy	32	893	28
5	German	29	692	24
6	India	29	214	7
7	Netherland	27	860	32
8	Sweden	19	629	33
9	France	19	423	22
10	Poland	17	411	24

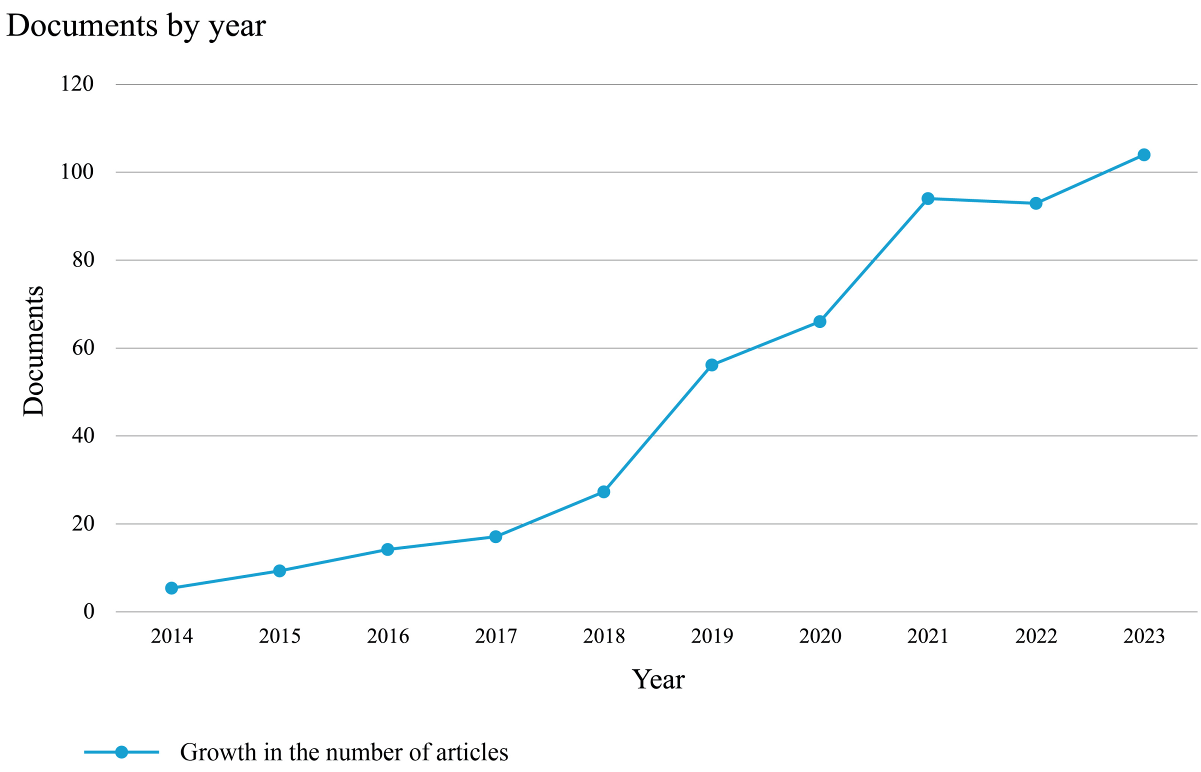

Fig. (2). Quantitative distribution of the publication in EVSS 2014 - 2023.

4.2. RQ2 What In-depth Insights can be Derived from the 52 Eligible Articles on EVSS in Scopus?

A detailed analysis of the 52 eligible articles on EVSS indexed in Scopus reveals significant trends and insights. As summarized in Table **4**, these articles were distributed across 20 peer-reviewed journals. Approximately 85% of the articles employed quantitative methodologies, reflecting the dominance of numerical data and empirical analysis in this field. This indicates a strong reliance on statistical evidence to assess the effectiveness, trends, and adoption of EVSS technology.

4.3. Key Findings from Journal Analysis

Among the analyzed journals, *Sustainability (Switzerland)* published the most articles (16, Q1), highlighting the critical focus on sustainability as a primary dimension of EVSS. *Energies* contributed 12 articles (Q1), underscoring the importance of renewable energy and efficiency in the EVSS domain. Other journals, such as Applied Sciences and Transportation Research Part A, provided insights into technological innovation and transport policy, with three articles each. This distribution suggests that EVSS research is primarily driven by evidence-based policy initiatives aimed at advancing energy sustainability and transport innovation.

4.4. Quantitative *vs*. Qualitative Approaches

The dominance of quantitative methodologies (85%) indicates the widespread use of statistical models, mathematical simulations, and large-scale data analyses to evaluate EVSS efficiency, predict demand patterns [72], and measure environmental impacts, including carbon emissions and energy consumption. The remaining 15% of the articles employed qualitative or mixed-methods approaches, often focusing on user experiences, policy challenges, and public perceptions of EVSS.

4.5. Identified Research Themes

Based on leading journals such as Sustainability and Environment, studies highlight the role of EVSS in reducing carbon emissions through shared mobility and the integration of renewable energy systems. Operational efficiency focuses on optimizing route planning, fleet management, and charging strategies to enhance service efficiency. Additionally, studies analyze regulations, incentives, and challenges associated with implementing EVSS in urban transport systems [73]. Approximately 80% of the articles were published in Q1 journals, indicating the high quality and global relevance of EVSS research (Table **5**).

4.6. Research Insights by EV's Type

E-Car (21 articles), as the dominant category, primarily addresses operational efficiency. Studies evaluate energy consumption during usage and its impact on vehicle energy efficiency [74]. Analyses of emission reduction highlight the significant carbon reduction potential of adopting e-cars as alternatives to traditional vehicles [75], as well as policy and incentives. The research examines government policies, including subsidies and tax incentives, that drive the widespread adoption of e-cars [11]. Findings suggest that e-cars hold significant potential to become the backbone of shared mobility, especially in urban areas with adequate charging infrastructure [76].

Table 4. Peer-reviewed journals on EVSS research.

Journal	No. Of Article	Journal Rank
Applied Sciences (Switzerland)	3	Q2
Data	1	Q2
Electronics (Switzerland)	1	Q2
Energies	12	Q1
IEEE Access	1	Q1
International Journal of Mathematical, Engineering and Management Sciences	1	Q2
International Journal of Renewable Energy Research	1	Q3
International Journal of Sustainable Transportation	1	Q1
Journal of Energy Storage	1	Q1
Research in Transportation Business and Management	1	Q1
Resources, Conservation and Recycling	1	Q1
SAGE Open	1	Q1
Sensors	1	Q1
Smart Cities	1	Q1
Sustainability (Switzerland)	16	Q1
Transportation Research Part A: Policy and Practice	3	Q1
Transportation Research Part C: Emerging Technologies	1	Q1
Transportation Research Part D: Transport and Environment	2	Q1
Vehicles	1	Q2
World Electric Vehicle Journal	2	Q1
TOTAL	52	-

E-Bike (10 Articles) explores its role as an eco-friendly, short-distance mobility solution. Trends indicate the growing adoption of e-bikes for daily commutes, particularly in densely populated urban areas [72]. Integrating e-Bikes with bicycle lanes and sustainable urban mobility ecosystems is a recurring theme [55].

Table 5. Research on EV types in EVSS studies.

EV	No. of Article	Remarks
e-Bike	10	Significant focus on short-distance mobility solutions
e-Car	21	Dominant category with an emphasis on operations, technology, and policy
e-Scooter	12	Micro-mobility and urban mobility solutions
Others	9	Charging stations, EV systems, customer satisfaction, smart cities
TOTAL	52	-

E-scooters (12 Articles) investigate their role as micromobility options in urban environments. Key areas of focus include analyzing e-scooter use in multimodal transportation systems [77], examining user safety challenges and the need for effective public-use regulations [78], and evaluating e-scooters' potential to reduce reliance on conventional motorized vehicles [73].

The remaining studies (9 Articles) examine supporting elements of EVSS, focusing on availability, optimal location, and fast-charging technologies to support EV services [79]. Studies analyze user perceptions of convenience and cost efficiency in EVSS [80] and emphasize EVs' role in enhancing energy efficiency and mobility management within smart city ecosystems [81].

The studies reviewed provide a holistic understanding of the infrastructure and technological requirements for optimizing EVSS. This research establishes a robust foundation for future advancements in policy-making, technology development, and best practices that encourage sustainable EV adoption.

4.7. RQ3 How has Research on EVSS Evolved Globally, and what are the Key Factors Influencing the Adoption and Growth of EV-sharing Models across different Geographical and Economic Contexts?

Research on EVSS has grown significantly over the past decade, primarily driven by increasing global awareness of sustainability and the urgent need to reduce carbon emissions [82]. From 2014 to 2023, studies predominantly focused on advancements in battery technology and policy incentives [11], implementation efficiency, and operational optimization [83], as well as empirical investigations into the environmental impacts of EV adoption, such as reductions in CO_2 emissions and air pollution [84]. Research also includes adaptive policies and behavioural studies [23]. Global research priorities during this decade included integrating innovative urban frameworks, leveraging digital technologies to enhance service connectivity and efficiency [81], and developing sustainable transport policies such as green mobility incentives. Additionally, regional studies analyzed contextual challenges and opportunities for EV adoption across developed and developing economies [85].

Several contextual factors influence the adoption and growth of EVSS [86]. Innovations in battery technology, including increased energy storage capacity, reduced charging time, and lower battery costs, have been identified as primary drivers of EV adoption [87]. Furthermore, the availability of strategically located and well-maintained charging infrastructure significantly impacts the speed of EV service adoption [88]. Lower ownership and operational costs of EVs compared to conventional vehicles serve as strong motivators despite higher initial purchase costs. Government subsidies, such as tax reductions and financial support for infrastructure development, are also pivotal in promoting EVSS [89]. Shifts in user behaviour, including a growing preference for environmentally friendly mobility solutions and shared economy models, have further driven EV adoption [90]. Moreover, user perceptions regarding convenience, accessibility, and safety are critical determinants of widespread acceptance [91]. Pro-environment policies, such as restrictions on fossil-fuel vehicles in urban areas, have accelerated the implementation of EVSS [84]. Additionally, government initiatives that facilitate public-private collaborations, fiscal policies, and infrastructure investments have significantly contributed to the expansion of EV services [92].

The evolution of EVSS varies significantly across geographical and economic contexts [93]. Regions such as China, Europe, and the United States benefit from advanced charging infrastructure and innovative technology ecosystems that support EV adoption. Furthermore, strong policy frameworks in these regions have facilitated innovation and the rapid expansion of EVSS [85]. In contrast, nations in Southeast Asia, India, and Latin America face challenges such as limited infrastructure and high initial implementation costs [94]. However, these markets have significant opportunities for micro-mobility solutions like e-bikes and e-scooters, which provide cost-effective and efficient mobility alternatives [95].

4.8. RQ4 What are the main Challenges and Barriers to Implementing EVSS, including Technological, Regulatory, and Societal Acceptance Issues? How do Technological Innovations and Government Policies Address these Challenges?

Recent research highlights that while EVSS holds significant potential to reduce carbon emissions and enhance mobility efficiency, various challenges still hinder their implementation [42]. The need for sufficient charging infrastructure, particularly in suburban and rural areas, remains a significant barrier to EVSS adoption [96]. Furthermore, charging times for EVs remain considerably longer compared to refueling conventional vehicles, limiting the operational efficiency of shared services [97]. Although battery costs have decreased over time, the initial purchase price of EVs remains relatively high. In addition, the limited lifespan of batteries and the high cost of their replacement further constrain the adoption of EVSS [98].

Regulatory barriers, such as inconsistent policies across countries or regions, pose significant challenges to the adoption of EVSS [78]. This inconsistency is particularly evident in the need for coordinated charging technology and standardized infrastructure interoperability. Moreover, insufficient fiscal incentives in developing countries, com-pared to developed nations, exacerbate these challenges. Another notable issue is the absence of comprehensive legal frameworks addressing insurance, safety, and liability concerns for service providers operating EVSS in public spaces [5].

Public perceptions of EVs also present barriers to their adoption. Concerns regarding range anxiety (*i.e.*, limited driving range) [99], vehicle reliability [12], and charging infrastructure accessibility significantly deter potential users [100]. Additionally, the perception that EVs are less convenient than conventional vehicles persists, especially in emerging markets. The successful implementation of EVSS necessitates a cultural shift from private ownership to shared mobility models [18]. User acceptance of shared EV technology is further influenced by demographic, economic, and educational factors [74].

Technological innovations are crucial to addressing the barriers to implementing EVSS [101]. Advances in battery technology, including increased energy density and fast-charging solutions, help mitigate range limitations and reduce charging times [93]. Emerging technologies such as solid-state batteries and intelligent battery management systems also have the potential to lower costs and extend battery lifespans [102]. Digitalization enables real-time fleet management, route optimization, and vehicle performance monitoring, significantly improving operational efficiency [19]. The development of smart charging stations integrated with renewable energy sources, such as solar photovoltaic systems, accelerates the transition to sustainable EVSS [103].

Governments play a strategic role in facilitating the implementation of EVSS through effective policies and incentives [104]. Key interventions include investments in expanding and making charging station networks more affordable, as well as policies supporting renewable energy-based infrastructure to enhance the appeal of EV services [105].

Economic incentives, such as subsidies for operational costs and EV ownership, tax reductions, and grants, can significantly accelerate the adoption of EVSS. Governments can also offer financial incentives to companies integrating EV technologies into their shared mobility models. Regulatory support facilitates cross-regional EV adoption, including standardizing charging technologies and establishing interoperability frameworks [79].

Additionally, pro-environment policies, such as restrictions on conventional vehicles in urban areas, can drive the transition to EV-based services [106]. Public education and awareness campaigns highlighting the environmental and economic benefits of EVSS are essential for fostering social acceptance and encouraging adoption [107].

4.9. RQ5 What are the Environmental and Social Impacts of Adopting EVSS, particularly Concerning Carbon Emission Reduction and Enhanced Accessibility to Sustainable Transportation?

The adoption of EVSS plays a crucial role in global efforts to reduce carbon emissions and enhance environmental sustainability. Empirical studies indicate that transitioning from fossil-fuel-powered vehicles to EVs in shared mobility services contributes substantially to carbon emission reductions [54]. EVs produce zero tailpipe emissions, significantly decreasing CO_2 emissions in urban environments [108]. Several studies suggest that EVSS can reduce carbon emissions by 30–50% compared to conventional vehicle-based services [48]. A comprehensive quantitative analysis reveals that a conventional gasoline-powered vehicle emits approximately 2.31 kg of CO_2 per litre of fuel consumed, with a fuel efficiency of 12 km per litre [109]. Assuming an annual travel distance of 15,000 km, a typical fossil-fuel vehicle emits approximately 34.65 tons of CO_2 per year. If EVSS replaces these vehicles, achieving a 30–50% reduction in emissions, the CO_2 savings per vehicle would range from 0.87 to 1.45 tons per year. A metropolitan area adopting 100,000 EVSS would translate to an overall carbon reduction of 87,000 to 145,000 tons of CO_2 annually, equivalent to removing 19,000 to 32,000 gasoline-powered cars from the roads. From an energy efficiency perspective, EVSS optimizes transportation resources through a shared mobility approach, reducing the number of private vehicles on the road [110]. This improvement in efficiency directly lowers fossil fuel consumption and carbon emissions in the transportation sector [48].

Additionally, these environmental benefits translate into better air quality, which reduces public health risks, particularly respiratory diseases that are often associated with urban air pollution [2]. Beyond environmental impacts, EVSS also has significant social implications by enhancing accessibility to sustainable transportation [111]. E-cars, e-bikes, and e-scooters offer more affordable and flexible mobility options compared to private vehicle ownership [4]. This improvement increases transportation accessibility for individuals in low-income groups and communities with limited access to public transit systems.

Moreover, EVSS facilitates the development of multimodal transportation systems by integrating EV solutions with public transportation networks [112]. The adoption of shared mobility models reduces the number of private vehicles on the roads and alleviates traffic congestion. Furthermore, with enhanced operational efficiency, EVSS optimizes the utilization of urban transportation infrastructure [77].

4.10. RQ6 How does EVSS Contribute to Mitigating Urban Challenges, such as Traffic Congestion and Pollution, while Enhancing Access to Sustainable Transportation in Urban Areas?

Traffic congestion remains one of the most pressing challenges in urban areas, particularly in large cities with high vehicle densities [113]. EVSS plays a pivotal role in addressing this issue. Shared mobility services facilitate a paradigm shift from private vehicle ownership to the shared use of EVs [110]. Studies indicate that a single shared EV can replace six to ten private vehicles, significantly reducing the number of vehicles on the road [114].

Integrating digital technology in EVSS enables vehicle usage optimization and route efficiency. These advancements help reduce travel time, energy consumption, and urban traffic density [115]. Moreover, EVSS can be integrated with public transportation systems, such as buses and trains, to enhance first-mile and last-mile mobility [116]. This integration encourages a shift from private vehicle reliance to collective transportation systems, which are more efficient and sustainable [110], thus reducing dependency on private vehicles [117].

Air pollution caused by emissions from conventional vehicles is another critical environmental challenge in urban areas. The adoption of EVSS significantly contributes to improving air quality. Since EVs produce zero tailpipe emissions, they help reduce CO_2, NOx, and particulate matter (PM2.5) [118]. When supported by renewable energy sources, the shared use of EVs further contributes to the decarbonization of the transportation sector. For instance, cities like Amsterdam have demonstrated a reduction of up to 40% in carbon emissions by integrating EVSS into urban mobility networks [119]. As the number of conventional vehicles decreases, pollutant emissions from fossil fuel combustion are minimized, leading to improved public health and a lower prevalence of respiratory disease associated with air pollution [120].

EVSS also significantly enhances access to sustainable transportation systems, especially in urban areas with limited public transport options [110]. These services offer more affordable transportation alternatives compared to private vehicle ownership, thus improving accessibility for individuals from economically disadvantaged groups. Micromobility solutions, such as e-Bikes and e-Scooters, provide flexible and convenient mobility options for urban populations [121].

Strategically located infrastructure, such as charging stations, supports sustainable mobility and accelerates the adoption of EVs in metropolitan areas [122]. Integrating EVSS with smart city systems facilitates more efficient and environmentally friendly urban transportation planning [81]. The contributions of EVSS extend beyond mitigating pollution and congestion; they also create positive socioeconomic impacts [123]. Reduced air pollution improves public health and the quality of urban life. Furthermore, EVSS aligns with the vision of sustainable cities by promoting transportation that is efficient, environmentally friendly, and inclusive [124].

5. DISCUSSION

5.1. Synthesis of Findings

This section integrates the findings from the four research questions (RQ3, RQ4, RQ5, and RQ6) to provide a comprehensive understanding of the role of EVSS in transforming urban mobility towards sustainability. It focuses on how user satisfaction and convenience influence adoption alongside research evolution, implementation challenges, environmental and social impacts, and contributions to urban issues.

Findings from RQ3 reveal that research on EVSS has evolved significantly, transitioning from conceptual studies to data-driven and technologically advanced approaches. Key drivers of adoption include technological innovations, government policies, and geographical-economic contexts. The availability of charging stations and advancements in battery technology are critical for enhancing user satisfaction. Economic incentives, pro-environmental regulations, and investments in charging infrastructure have been pivotal in the growth of EVSS. Developed countries benefit from strong policy support and advanced technologies. In contrast, developing nations face challenges related to infrastructure and costs, though micro-mobility solutions, such as e-bikes and e-scooters, show promise.

RQ4 identifies various barriers to implementation, including technological limitations, regulatory constraints, and challenges in social acceptance. Despite these obstacles, technological innovations and supportive government policies play a crucial role in overcoming them. Limitations in charging infrastructure and high battery costs remain major hurdles. Financial incentives, technical standardization, and public awareness campaigns can enhance user acceptance. User perceptions of convenience, efficiency, and reliability significantly impact adoption rates, improving satisfaction through fast-charging solutions, optimized routing systems, and supportive government policies.

Findings from RQ5 emphasize the environmental benefits of EVSS, including significant reductions in carbon emissions and urban air pollution due to zero tailpipe emissions. Integrating these services with renewable energy sources further amplifies their positive environmental impact [41]. Additionally, EVSS provides inclusive and flexible mobility solutions, particularly for urban populations with limited access to public transportation. Reducing environmental impact contributes to user satisfaction, while increased accessibility enhances comfort and adoption rates.

RQ6 highlights the role of EVSS in alleviating urban challenges, such as traffic congestion and pollution while improving access to sustainable transportation. The shift from private vehicle ownership to shared EV use reduces the number of vehicles on the road and dependence on fossil fuels. Micro-mobility options, including e-bikes and e-scooters, complement public transport and support the development of more efficient urban transport ecosystems.

Overall, the integration of RQ3, RQ4, RQ5, and RQ6 findings underscores that user satisfaction and convenience are pivotal to the adoption of EVSS. Efficient battery technologies, extensive charging infrastructure, and innovative service solutions enhance user comfort and operational efficiency [21]. Additionally, environmental benefits, such as reduced emissions and improved air quality, provide further incentives for user adoption.

5.2. Limitations

This SLR, conducted using the PRISMA methodology, acknowledges several limitations that may affect the findings and their generalizability. A key limitation is a potential for selection bias due to the inclusion criteria, which may have inadvertently favoured certain types of research, leading to gaps in coverage. Moreover, this SLR relies exclusively on Scopus-indexed articles. While Scopus is a reputable database, excluding other sources such as WoS, IEEE Xplore, ScienceDirect, and Google Scholar may have restricted the scope of the review. Future SLRs should incorporate multiple databases to ensure a more comprehensive analysis.

Additionally, findings from this SLR may not be universally applicable across different contexts. Factors such as geographical location, cultural differences, and socioeconomic conditions significantly influence the adoption and perception of EVSS. Furthermore, as this study synthesizes existing literature without direct empirical validation, variations in study methodologies and sample populations may introduce inconsistencies, affecting reliability. Another limitation is the temporal scope—the rapid evolution of EVSS means that past research may not fully capture the latest technological advancements, policy shifts, or market trends. Future research should prioritize regular updates of SLRs to maintain relevance.

5.3. Future Research Directions

To enhance the understanding of EVSS and address existing gaps, several future research directions are proposed:

- Future SLRs should integrate multiple databases beyond Scopus, such as the WoS, IEEE Xplore, ScienceDirect, and Google Scholar, to mitigate selection bias and ensure broader literature coverage.
- Research tracking the evolution of EVSS over time can provide insights into how technological advancements, policy changes, and user behaviours shape service adoption and sustainability.
- Examining how EVSS is perceived and adopted across different geographical and socioeconomic contexts can uncover localized challenges and opportunities, informing region-specific policies and implementation strategies.
- Future studies should integrate perspectives from urban planning, environmental science, economics, and social psychology to gain a more comprehensive understanding of the factors influencing EVSS adoption.
- Qualitative research emphasizing user feedback can identify barriers to adoption and areas for improvement, ensuring services align with consumer expectations.
- Research should assess the effectiveness of government policies and incentives in promoting EVSS, and identify best practices for regulatory frameworks.
- Quantitative approaches, such as effect size estimation and heterogeneity assessment, can enhance the empirical validation of findings across multiple studies, improving reliability and generalizability.
- Future research should explore innovations such as autonomous EV-sharing and smart charging solutions to understand their potential for integration into existing mobility systems.

By pursuing these directions, future research can offer valuable insights to inform policy, enhance service delivery, and foster innovation in electric vehicle shared services (EVSS).

CONCLUSION

This SLR examines the evolution, challenges, and impacts of EVSS from 2014 to 2023, highlighting their role in advancing sustainable urban mobility. By analyzing 52 studies, this review highlights the technological, environmental, and social dimensions of electric vehicle shared services (EVSS). The increasing adoption of these services, particularly after 2019, reflects a global commitment to sustainable transportation driven by advancements in EV technology and policy support. China and the United States lead in research and implementation, while Europe plays a crucial role in policy development and infrastructure investments.

Technological advancements in battery efficiency, digital fleet management, and smart charging solutions are key to enhancing EVSS feasibility and performance. However, barriers such as limited charging infrastructure, high costs, and regulatory inconsistencies continue to pose significant challenges. Addressing these constraints is critical to maximizing the benefits of EVSS in reducing transport-related emissions and improving urban air quality. Empirical evidence suggests that shared EVs can reduce greenhouse gas emissions by 30–50% compared to conventional vehicles, reinforcing their role in climate change mitigation.

To accelerate adoption, targeted policy interventions and market-driven incentives are necessary. Governments must implement subsidies, tax reductions, and infrastructure investments to enhance service accessibility. Additionally, integrating EVSS with public transportation and smart city frameworks can optimize multimodal mobility and reduce congestion. Digital innovations, such as AI-driven fleet management and dynamic pricing, can further enhance service efficiency. Linking EVSS with micro-mobility solutions, such as e-bikes and e-scooters, can strengthen first- and last-mile connectivity.

The findings of this SLR highlight geographic and socioeconomic disparities in EVSS adoption. While developed countries benefit from established infrastructure and policies, developing nations face affordability and accessibility barriers. Overcoming these disparities requires collaborative efforts among governments, industry stakeholders, and international organizations.

In conclusion, EVSS represents a transformative approach to sustainable urban mobility, offering significant environmental, economic, and social benefits. Strengthening adoption through policy support, technological innovation, and user-centered strategies is key to maximizing its impact. A multi-stakeholder approach involving researchers, industry leaders, and policymakers will be crucial in shaping the future of EV-sharing mobility and fostering efficient urban transport systems.

AUTHORS' CONTRIBUTIONS

I.H.: Study concept and design; M.S.: Conceptualization. All authors reviewed the results and approved the final version of the manuscript.

LIST OF ABBREVIATIONS

EVSS = Electric Vehicle Shared Services

SLR = Systematic Literature Review

EVs = Electric Vehicles

PICO = Population, Intervention, Comparison, and Outcome

GHG = Greenhouse Gas

WoS = Web of Science

CONSENT FOR PUBLICATION

Not applicable.

STANDARDS OF REPORTING

PRISMA guidelines and methodology were followed.

AVAILABILITY OF DATA AND MATERIALS

The data supporting the findings of this article are derived from peer-reviewed articles indexed in the Scopus database. As such, no primary data has been deposited in an external repository.

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CONFLICT OF INTEREST

The authors declare no conflict of interest, financial or otherwise.

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SUPPLEMENTARY MATERIAL

Supplementary material is available on the publisher's website along with the published article.

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