

Review Paper

A Systematic Literature Review of Green Supply Chain Practices in the Electric Vehicle (EV) Industry

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Abstract: The rapid development of the electric vehicle (EV) sector has made sustainability one of the main strategic priorities, not only in the reduction of tailpipe emissions but also in the supply chain as a whole. This research paper provides insights about Green Supply Chain Management (GSCM) within the EV industry through systematic literature review as the research methodology. About 20 peer-reviewed articles are studied in this process published between 2015 and 2025 according to PRISMA guidelines. The literature consisted of peer-reviewed scholarly articles and industry reports, which were examined to derive the common GSCM practices, drivers of adoption, barriers, and the results of implementation. The results indicate that the regulatory pressure, market need, technological innovation, and supply chain teamwork are a strong push factor to GSCM adoption whereas high cost, supply chain complexity, resource dependency and regulatory fragmentation act as a constraint to implementation. The review finds that successful GSCM implementation improves environmental performance, operational efficiency, risk resilience and competitive advantage as a strategic guide to industry practitioners and policymakers.

Keywords: Green Supply Chain Management (GSCM), Electric Vehicle (EV) Industry, Sustainable Supply Chain, Systematic Literature Review, GSCM Adoption Drivers and Barriers, Environmental and Operational Performance

1. Introduction

The electric vehicle (EV) market has grown at a high rate because of increased worries about climate change, more severe environmental laws, and an increase in the demand of environmentally friendly mobility solutions. EVs have been advanced by governments and industries across the world as one of the primary mechanisms of mitigating greenhouse gas emissions in the transport sector. The sustainability of EVs, however, is not just the product of their use-phase emissions, but also the supply chain performance of this product [1]. About 30 to 40% of EV's complete life time carbon effluents accounts to battery production. One 75kWh lithium ion battery emits about 4.5 to 7.5 tons of carbon dioxide in production process [2]. The lithium ion battery recycling is less than 5% now and the CAGR% is substantially growing between 20 to 28% [3]. The EV production involve about 30000

unique parts while only 6% of companies depict complete supply chain in production [4]. On Green Supply Chain Management has become a very important framework that can enhance sustainability in EV supply chains. This review differs from prior EV–GSCM studies by integrating upstream sourcing, downstream recycling, and policy implications into a single framework.

1.1 Problem Statement

Though electric vehicles are popularly regarded as environmentally friendly substitution to internal combustion vehicles, their supply chains are problematic in terms of sustainability. Environmental and social risks are caused by the mining of essential minerals, battery manufacturing, which generates a lot of carbon, complicated international transportation, and the lack of recycling facilities. Over 70% of global cobalt supply



originates from the Democratic Republic of Congo, often under poor labor conditions. Additionally, the implementation of the Green Supply Chain Management practices is not uniform among EV manufacturers and multi-tier suppliers, which results in the incoherent implementation and diverse performance results. It is important to note that less than 5% EV batteries are now being recycled globally [5]. Such discrepancy between sustainability claims and real supply chain practices compromises the credibility of environmental claims, regulatory requirements and competitiveness over the long term. To overcome these issues, a systematic knowledge of the drivers, barriers, and strategic implications of the GSCM implementation in the EV industry is needed.

1.2 Aims and Objectives

The study conducts a critical analysis of Green Supply Chain Management practices applied in the electric vehicle industry to determine the key drivers, obstacles, and strategic opportunities of achieving a sustainable competitive advantage.

- To examine and integrate fundamental Green Supply Chain Management (GSCM) practices used in the electric vehicle (EV) sector.
- To determine the most important internal and external forces that affect the implementation of GSCM in EV supply chains.
- To investigate the key obstacles that impede the successful application of GSCM practices by EV manufacturers and suppliers [6].
- To identify strategic opportunities for GSCM to improve sustainability performance and competitive advantage in the EV sector.

1.3 Research Questions

1. RQ1: What are the current practices of Green Supply Chain Management in the EV supply chain?
2. RQ2: What are the major drivers of GSCM use in the EV industry?
3. RQ3: Which obstacles impede the introduction of GSCM at various levels of the EV supply chain?
4. RQ4: Which strategic opportunities in the EV industry result from the integration of GSCM practices?

1.4 Scope and Contribution

The review is based on upstream sourcing to downstream recycling and reverse logistics, which provides a coherent system to serve future research and industry strategy formulation.

2. Conceptual Foundations and Theoretical Background

2.1 Green Supply Chain Management (GSCM): Concept Overview

GSCM is a management approach that incorporates environmental considerations into the supply chain to improve firms' performance and sustainability [7]. It involves the procedure of managing the supply chain operations, beginning with sourcing and concluding with delivery by minimizing the ecological impact and wastage. GSCM is a visionary approach that contributes to gaining a competitive edge and sustainable outcomes rather than meeting legal regulations. It allows logistic partners, manufacturers and suppliers to coordinate their supply chain operations with similar goals towards the environment.

Resource based view: The key GSCM dimensions include eco design, green procurement, reverse logistics, green logistics and cleaner production and these create competitive edge for business. Green procurement selects suppliers, which are socially responsible and reduce the extraction of resources and unethical processes. Eco design and cleaner production reduce waste, use of energy, and product life cycle emissions [8]. Reverse logistics assists in the creation of the circular approach via reuse, remanufacturing and recycling procedures and reusing improves positive results in environmental resilience. Green logistics concentrates on achieving achievable performance in transport, use of low-carbon fuel and reduction of packaging waste to lower environmental effects. All the mentioned dimensions lead to improved environmental performance and supply chain resilience [9].

2.2 EV Supply Chain Characteristics

Institutional theory: Unlike traditional automotive chains, EV supply chains are based on the use of important minerals, batteries and recovery system. One of its characteristics is an upward dependency of nickel, cobalt, and lithium, all necessary to create lithium-ion batteries [10]. These minerals are obtained through the centralized mining networks which lead to environmental effects, ethical issues, and supply risk and price fluctuations, creating regulatory stress on companies. When responsible sourcing and traceability are lacking, refining and

extraction of these materials increase reputational risks for EV manufacturers.

Battery manufacturing is the most strategic and energy-consuming process, which has a strong impact on the costs and sustainability results regarding EVs. EV manufacturers rely on power electronics, multi-level suppliers of batteries and components, which influence the environment [11]. Mapping GSCM with Downstream, logistics and distribution ensure worldwide shipment of heavy batteries, cautious packaging, charge ecosystem connectivity, post-sale service, and end-of-life battery management involving recycling partnerships and second-life applications supports in responding external institutional stress by the organizations [12].

3. Review Methodology

The systematic literature review method is applied in this review paper to analyze the GSCM practices in the EV industry with particular emphasis on drivers, barriers and strategic opportunities. The corresponding literature was obtained in popular databases, such as Scopus, Web of Science, IEEE Xplore, ScienceDirect, and Google Scholar [13]. The targeted keywords were utilized such as electric vehicle supply chain, green supply chain management, battery recycling, circular economy and sustainable procurement Initially 512 articles were opened while abstract was studied after selecting 176 articles. Inclusion and exclusion criteria were predetermined based on relevance, quality, and academic rigor, which centered on credible industry reports, as well as peer-reviewed journal articles and conference papers published in a designated period [14]. After screening the title and abstracts, those full-text articles that met the criteria were reviewed and coded. 48 articles were studied for identification of the main research gaps to be addressed in future studies and was achieved through the thematic analysis of the selected literature and categorizing. Inclusion was published between 2015 to 2025 with the information into GSCM practices, drivers of adoption, barriers to implementation, and performance outcomes.

4. Green Supply Chain Practices in the EV Industry

The Electric Vehicle sector is greatly influenced by Green Supply Chain Management. It considers the environment at every step of the product lifecycle, from the extraction of raw materials to the recycling of the product at the end of its life [15]. The main reason for this situation is the emphasis on sustainability in EVs, where traditional vehicle manufacturing processes do not exert much influence on batteries, ores, and their recycling.

These six areas are the most important ones in the industry [16].

4.1 Sustainable Sourcing and Green Procurement

Green procurement integrates environmental and social criteria into supplier selection and procurement. The situation is critical in the electric vehicle sector, as it depends on the extraction of resources that consume huge amounts of energy, such as lithium, cobalt, and nickel [17]. Manufacturers tackle this issue by conducting sustainability audits and certifications of equal standards. For example, ISO 14001 assesses energy consumption and waste management gradually [18]. To minimize the possibility of facing ethical and environmental challenges in the mining sector, businesses adopt and enforce responsible sourcing codes of conduct and traceability requirements.

4.2 Cleaner Production and Green Manufacturing

The current trend aims to maximize energy use and reduce pollution during the production stage. Owing to the high energy demand in battery cell production, companies choose a more energy-efficient and renewable energy route to reduce the total lifecycle emissions of vehicles. The application of lean-green integration allows the industry to reduce waste, have better control over chemicals, and use water in a closed-loop system [19]. Thus, the company not only reduces its environmental impact but also remains within the law.

4.3 Transportation and Green Logistics

Green logistics changes the way products are distributed, making it the least damaging to the environment in terms of carbon and material waste. The supply chains of electric vehicles consist of heavy batteries and materials moving globally. Thus, companies rely on AI-driven planning for eco-friendly distribution and routing optimization. Using less harmful packing materials is another area that companies give great importance to. They switched from using non-returnable containers and non-recyclable materials to returnable and recyclable ones [20]. This is vital, especially when it comes to the secure and regulated transport of delicate battery parts.

4.4 Sustainable Product Development and Eco-Design

Eco-Design intends to decrease pollution to the largest extent by creating a smokeless fire. The development of electric vehicles requires manufacturers to implement lightweight materials, which enable extended driving range and smaller battery designs. The new technology allows only defective battery components to be discarded instead of disposing of entire batteries. When designing for

disassembly, ensure standard fasteners and marking methods, as such would consequently take less time for remanufacturing and recycling [21]. The system reduces mineral mining operations because it needs fewer newly mined materials for its production requirements.

4.5 Reverse Logistics and Closed-Loop Supply Chains

Reverse logistics is required to deal with product returns, including used parts and materials that need to be moved through the supply chain to be reused or recycled. The EV industry needs to implement this practice because it provides an effective method for managing the environmental hazards that arise during battery disposal. The take-back process of products directly impacts how closed-loop electric vehicle supply chains develop their operations, which include remanufacturing activities, recycling processes, and refurbishment work. The process creates resources that enable manufacturers to safeguard their material assets through motor remanufacturing and battery material recycling.

4.6 Battery Lifecycle Management

The second-life applications function as part of the battery management system. The repurposing of vehicle batteries, which have reached their end-of-life, results in their use for stationary energy storage and renewable energy systems. The complete process requires businesses to establish battery tracking systems, which include battery passports that monitor all aspects of each battery's origin and composition and operating record [22]. The system establishes complete transparency from the beginning to the conclusion of the supply chain process, which leads to enhanced trust among all parties involved.

5. Drivers of Green Supply Chain Adoption in the EV Industry

The implementation of the GSCM practices in the EV (electric vehicle) production is affected by the various elements like regulatory pressure, market expectations, advancement in technology, economic encouragement and collective supply chain dynamics. Generally, the EV are most effective and recognized as better option than the engine vehicles at usage. The overall EV's sustainability performance depends on battery production, end-of-life management, upstream sourcing, and logistics. Mostly of the companies are forced to include the green principles in the supply chain rather than only concentrates on the vehicle emissions.

Regulatory and Policy Drivers

Policy and regulatory operators are used to increase the green supply chain management implementation in the EV industry. This also stimulate innovation as

governments are primary operators to increase the frameworks like emission reporting instructions, extended producer accountability, and economic objectives to decrease the lifecycle ecosystem effects [23]. These regulations need the various manufactures to increase clarity, combine the sustainability metrics, and observe the upstream activities into the supply chain actions. Carbon disclosure and reporting are needed to companies to avoid and decrease the emissions on supply networks and connect the suppliers in performance and developments [24]. Policy procedures also proceed with closed loop systems and management for the vehicle batteries, connecting the compliance with the material recovery and avoiding the waste.

5.1 Market Demand and Customer Drivers

Market needs and people's expectations clearly affect the implementation of the GSCM in the EV sector. Environmentally focused people evaluate the EV brands based on the sustainability of growth. It also includes the manufacturing vehicles using low carbon, accountability for end life management, sourced materials, instead only focus on the performance. The people view of green supply chain practices mainly increased purchasing intentions, and it also presents the value of sourcing brand trust and transparency, effectiveness. EV manufacturers that present verified sustainability with circular activities and clear reporting build the people's loyalty and credibility. Greenwashing is able to damage reputation and avoid confidence [25]. People are environmentally concerned and willing to pay the premiums for the products that further drive companies to integrate GSCM into the main plan.

5.2 Economic and Competitive Drivers

Economic motivations are primary for GSCM adoption, mainly in the EV industry, to decrease operational expenses and increase efficiency [26]. Sustainable practices, such as optimized logistics, energy-efficient production, waste reduction, and recycling, can lower expenses and improve resource usage. This also improves cost competitiveness in the market. GSCM also allows companies to differentiate their strategies by increasing environmental performance, allowing green market sections, and increasing brand value. This also supports competitive advantage. Integrating sustainability into the supply chain operations are used for cost efficiency and competitiveness, supporting the business for the GSCM adoption in the manufacturing business [27].

5.3 Technology Drivers

Technological advancement is also the main Driver of the GSCM adoption in EV by increasing efficiency, transparency, and environmental control over difficult supply chains. Virtual traceability technologies, such as blockchain and other virtual platforms, allow the tracking of supplier compliance, origins, and lifecycle emissions, decrease the risk, and are used for regulatory reporting. Studies have shown that technologies can improve environmental performance through improved data coordination and visibility [28].



Fig.1. AI-driven approaches for Sustainable Logistics

IoT-based monitoring allows the practical measurement of energy use and other emissions for continuous improvement. AI-driven logistics also avoid transportation emissions by 10 to 20% through inventory optimization and route, making the GSCM a strategic performance driver.

5.4 Supply Chain Collaboration Drivers

Supply chain collaboration is primary in GSCM by aligning environmental goals over stakeholders. Collaborative practices, such as joint training, reduction targets, and sustainability scorecards, improve sustainability performance and innovation in supply chains. Working with partners and suppliers' increases the sustainability performance of the supply chain and improves environmental results and competitive abilities [29]. Collaboration functions in the form of compelling suppliers, partner pressure to adopt certification, eco-practices, and traceability systems to remain competitive.

6. Barriers to Green Supply Chain Implementation in EV

The Electric Vehicle (EV) sector is practically identical to the concept of sustainability. The actual implementation of Green Supply Chain Management (GSCM) encounters deep-rooted structural challenges. The capital expenses involved are about 26% and higher logistics expenses are involved with processes including in cite expenses. The EV supply chain is highly globalized, with a high dependence on highly specific technology, and the complicated mineral dependence creates a significant amount of uncertainty with only 6% visibility. Although it is generally accepted that the long-term strategic advantages of green supply chain integration are indisputable as there are no global standards established. The realization of this integration is often troubled by the fact that the associated financial, technological, and organizational issues are inseparable.

6.1 Financial and Cost Constraints

The biggest impediment to moving to green supply chains is high cost of infrastructure and fleet conversion. Cleaner production technologies and renewable energy resources are costly to invest. It is difficult to imagine a scenario where many firms can afford such costs against a backdrop of intense price competition. The major obstacle that is mentioned by 26 percent of logistics operators is the high initial capital expenditure. In addition, 43 percent operational limitations contain a short range of driving. These financial limitations are high especially on the Tier-2 and Tier-3 suppliers who are more concerned about the survival of their operations within a short time notwithstanding the green investment [30].

6.2 Supply Chain Complexity and Visibility

The multi-tier structure of the EV supply chain poses significant governance and transparency issues. Motor companies have minimal transparency in complicated international supplier chains, especially in the upstream mining and refining of important minerals such as lithium, cobalt, and nickel. A typical EV includes almost 30,000 parts, but only 6 percent of companies indicate full supply chain visibility. According to this, it is validated that complexity directly causes the visibility crisis, thereby explaining why the vast majority of technology investments (92%) fail to deliver on sustainability goals due to fragmented data [31].

6.3 Technological and Infrastructure Barriers

The lack of infrastructure and low digital maturity considerably affect the EV supply chain by limiting

circular practices. Lithium-ion battery recycling is not more than 5 percent worldwide, mostly because of high processing costs and poor financial feasibility. Although the expansion rate of specialized recycling facilities is estimated at 28.2% CAGR, the existing capacity still does not correspond to the current pace of the rising quantity of end-of-life batteries [32]. Moreover, poor charging infrastructure and grid preparedness limit sustainable logistics processes and the further implementation of green transportation solutions throughout EV supply chains.

6.4 Resource and Material Constraints

Resource dependency is another unique obstacle in the EV supply chain. The limited supply of crucial minerals, such as lithium, cobalt, and nickel, to politically unstable or restricted regions of trade poses a high level of supply vulnerability and geopolitical dependency. These dangers diminish the security of supply and interfere with the uninterrupted implementation of sustainability standards. In addition, high price volatility and a lack of alternatives in suppliers tend to compel manufacturers to make cost and material availability their primary goals rather than pursuing green sourcing goals.

6.5 Regulatory Fragmentation and Standardization Issues

Different international market policy frameworks pose significant compliance challenges to global EV companies. Inequalities in green regulations, carbon reporting, and recycling requirements complicate the management of cross-border production networks.



Fig.2. Implementation challenges of battery recycling regulations

The absence of standardized requirements concerning battery recycling, lifecycle carbon assessment, and sustainability labeling makes the implementation less efficient. In the absence of clear and unified global standards, firms will experience high uncertainty in

investment decisions and problems in comparing the performance of suppliers in various regions [33].

6.6 Organizational and Behavioral Barriers

Behavioral and organizational barriers are the major hindrances to the adoption of GSCM in the EV industry. Sustainability goals are usually overwhelmed by resistance to change, short-term efficiency priorities, and production pressures. In addition, lack of capability through limited expertise, lack of training, and inability to commit to leadership limit GSCM efforts to compliance-oriented initiatives as opposed to strategic transformation.

7. Evidence from prior empirical studies: Impact of Green Supply Chain Practices

The transition to electric vehicles is inextricably linked to the sustainability of the supporting supply chain. Recent empirical studies have shown that green supply chain management (GSCM) is not just a supporting corporate social responsibility activity but a main strategic performance driver. The subsequent sections discuss the different impacts of GSCM on the EV industry according to recent longitudinal and cross-sectional studies [34]. The evidence presented here is drawn from prior empirical studies, while interpretive comments are noted separately to avoid conflating data with author analysis.

7.1 Environmental Performance: Decarbonization and Circularity

GSCM practices are mainly responsible for lowering the carbon footprint in the production of electric vehicles. Reported evidence shows that battery production accounts for 30–40% of an EV’s lifecycle emissions, with a single 75 kWh battery emitting 4.5–7.5 tons of CO₂ during manufacturing. Even if EVs do not emit anything from the tailpipe, their production, especially battery-making, is still very carbon-intensive and even more so than Internal Combustion Engine (ICE) vehicles. The use of renewable energy in battery “gigafactories” along with the application of green logistics has resulted in a substantial reduction in Scope 3 emissions [35]. The evidence indicates that Circular Supply Chain Management (CSCM) is an integrative approach that drastically reduces the demand for virgin lithium and cobalt and fosters reuse, recycling, and material recovery, which is a great benefit to the environment because mining activities, which are environmentally unfriendly, will be reduced in their extent.

7.2 Economic Performance: Efficiency and Market Valuation

Despite the high capital costs of green technologies, they indicate a “Green Premium” in terms of operating

efficiency and investor appeal. Lean-green manufacturing processes can eliminate waste-related costs in the production of electric vehicles by 12% to 18% at most. Empirical evidence shows that over 70% of global cobalt supply originates from the Democratic Republic of Congo, often under poor labor conditions. This reported efficiency gain is consistent across multiple empirical studies. This depicts about emphasis on cost savings from waste reduction and energy optimization. Electric vehicle companies with supply chains that have excellent Environmental, Social, and Governance (ESG) ratings cite lower costs of capital because investors are increasingly imposing penalties on companies with “brown” supply chains due to carbon taxes and border adjustment mechanisms that are likely to take place.

7.3 Social Performance: Ethical Sourcing and Transparency

The social aspect of GSCM in the EV sector revolves around the topic of “Conflict Minerals” and is thus a major focus area. Blockchain technology can be regarded as a traceability system that allows complete and open monitoring of the supply chain, while also supporting the certification of moral labor practices. Empirical evidence show that over 70% of global cobalt supply originates from the Democratic Republic of Congo, often under poor labor conditions [36]. Conducting supplier audits is a requirement not only to prevent labor violations but also to enforce compliance and accountability, thus reducing the number of said violations across Tier-2 and Tier-3 suppliers. Customers are increasingly willing to pay extra for electric vehicles that assure “fair-mined” materials, which has a direct influence on the market share and value of the brand.

7.4 Risk and Resilience: Building "Anti-Fragile" Supply Chains

The functionality of Green Supply Chain Management is a resilience mechanism for global disruptions. Closed-loop systems can absorb approximately 30–40% of lithium price fluctuations, indicating that firms experience only 60–70% of the impact compared to those without recycling practices the incorporation of recycled materials instead of virgin materials increases the resilience of EV companies. The process of closed-loop battery recycling not only reduces dependence on new materials but also ensures a steady supply of lithium and impedes the fluctuation of prices for raw materials.

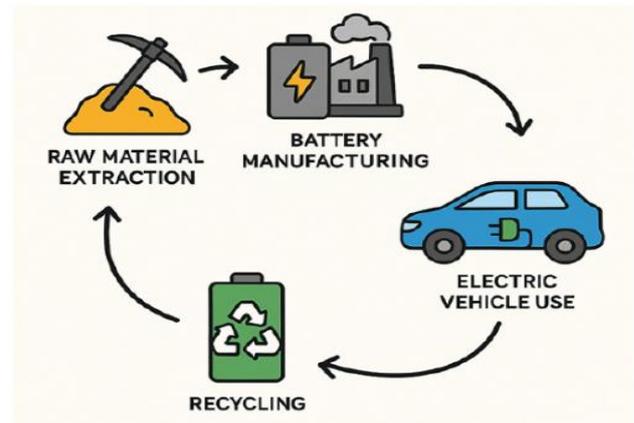


Fig.3. Closed-loop Battery Recycling

Therefore, closed-loop systems can absorb approximately 30–40 percent of the impact of lithium price changes (in other words, these companies experience only approximately 60–70 percent of the price impact compared to firms that do not practice recycling) because of the circular reuse of the materials obtained and the lesser dependency on the external lithium supply [37]. Evidence indicates that stronghold of closed-loop systems is primarily due to the entire cycle of cost-cutting, steady supply of materials, and better technological and economic results in recycling processes. GSCM practices and policies further keep firms “future-proofed” against changing regulations, such as the EU Battery Regulation, which minimizes the risk of incurring non-compliance fines.

8. Research Gaps and Future Research Directions

The topic of GSCM in EV sector is being researched more, however, significant research gaps remain.

8.1 Gaps in Empirical Studies

The foremost limitation of existing research is lack of strong empirical evidence. Current studies are distinct in terms of their earthly focus, supply chain extent, and research techniques. Some fail to give proper evidence.

Some studies have focused only on single countries or distinct regions which often limits the understanding of how different laws, market conditions, and regulations affect GSCM adoption. However, the electric supply chain does not belong to one country or region [38].

In addition, it is remarkable that most of the studies undertaken are cross sectional. This is simply because they have sustainability practices in focus at only one time point. Therefore, to obtain a clear picture, longitudinal analysis and cross- country studies are needed to compare

developing and developed countries [39]. Future research should therefore adopt longitudinal panel designs, multi-country comparative studies, and mixed-method approaches to capture dynamic changes in GSCM adoption.

8.2 EV-specific research and Measurement gaps

Most research has been concentrated on vehicle manufacturing. Tier-1 and Tier-2 providers function as backbone of electric vehicle sustainability, however, the information on them is scarce [40]. Hence, future research should include supply chain mapping, governance, and traceability with upstream networks such as mining and battery materials. Some studies use economic indicators, such as waste minimization and emission reduction, to measure the findings, which limits the capture of broader sustainability. Using key performance indicators helps achieve fruitful outcomes. Future studies should expand measurement frameworks to include social indicators like labor practices, community impacts and resilience indicators like supply chain stability under disruption followed by environmental and economic metrics.

8.3 Theoretical Gaps

The studies available for research regarding green supply management of EV production are highly descriptive and devoid of values. It is important to understand regarding resource based and institutional theories along with stakeholder elements for promoting circular economy concept in EV industry. The upcoming studies need to address gap by mapping GSCM with EV production into theoretical dimensions. This enhances transparency and engage stakeholders into processes effectively.

9. Conclusion

The current research highlighted that GSCM is an optimal environment practice for electric vehicle sector. Literature figured out some major approaches that have equal importance. They include green logistics by low-emission transportation, cleaner manufacturing through energy efficient technologies, and recognition of eco-friendly procurement, renewable energy, responsible sourcing of essential minerals, and optimized distribution. Some of the main drivers for GSCM adoption include supply chain collaboration, technology, economic, customer, market demand, policy, and regulatory drivers. The study spotted few essential green supply chain practices such as green procurement, sustainable sourcing, green manufacturing, and logistics. The research stated that electric vehicle supply chains often undergo upward dependencies to develop lithium-ion batteries.

Systematic literature review performed to provide clear road maps for finding meaningful and necessary information. Implementation of green supply chain in EV posed barriers such as supply chain complexity, lack of visibility, technological, infrastructure issues. Similarly, it is identified that regulatory fragmentation, standardization, resource, cost, financial, and material constraints are the main reason for moving the concept back to start. Utilizing multi-tier structure often failed 92% to delivered sustainability goals. A few strategies such as moving to lean-green manufacturing premiums eliminated the wastage by 12 to 18%. Implementing supplier audits ensured fair mined minerals. Anti-fragile supply chains reduced the impact of lithium battery prices. The information provided in this review is useful for developing responsible sourcing and innovation policies. Finally, the whole study provided guidance to make better decisions in future.

Author Contributions

Muhammad Asif conceptualized the study, designed the research framework, conducted the systematic literature review following PRISMA guidelines, and prepared the original manuscript draft. Tahir Shabbir contributed to data collection, literature screening, analysis of green supply chain management practices, and interpretation of results. Atif Mohiuddin Syed supervised the research, validated the methodology, critically reviewed and edited the manuscript, and contributed to the discussion and finalization of the paper. All authors read and approved the final manuscript.

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