META-JOURNAL

Management Economics Trade and Accounting Journal (META JOURNAL)
https://abadiinstitute.org/index.php/META
Online 3031-0938

Is ASEAN Ready or Merely Moving? A Critical Comparative Review of EV Readiness and Green Divide

Original Article

Hery Maulana Arif[1*], Riny Jefri[2], Seny Luhriyani Sunusi[3]

[1,2,3]Faculty of Language and Literature, Universitas Negeri Makassar, Indonesia
Email: [1*)]herymaulana@unm.ac.id

Received: 09 July 2026
Accepted: 19 August 2026
Published online: 30 September 2026

Abstract

This critical comparative review examines ASEAN's readiness for a large-scale electric vehicle transition and evaluates whether current trajectories risk creating a new green divide. The study synthesizes recent ASEAN-focused evidence on adoption patterns, consumer affordability, charging infrastructure, policy readiness, and sustainability outcomes across member states. Findings reveal highly uneven readiness across the region. Thailand emerges as the most prepared market because it combines coordinated incentives with charging-network expansion and industrial capability, while Indonesia and Malaysia remain transitional and other markets face affordability and infrastructure constraints. Evidence further suggests EV uptake concentrates among higher-income urban households with home-charging capability, while renters and peripheral communities encounter greater barriers. Sustainability gains remain conditional because emissions benefits depend on cleaner electricity mixes and stronger battery circularity governance. The central argument developed here is that ASEAN is experiencing electrification without convergence. Without equitable charging deployment, inclusive financing, public-transport electrification, and grid decarbonization, the region may widen mobility inequality even while accelerating transport electrification. This review concludes that ASEAN moves toward electrification but not toward convergence across countries and social groups.

Keywords: Electric Vehicle Adoption, Green Divide, Consumer Inequality, Charging Infrastructure, Sustainable Mobility.

1. Introduction

Electric mobility has become a major policy and industrial issue across ASEAN, yet the regional transition progresses at different speeds rather than through a common trajectory (Setiyo et al., 2025). Available studies consistently identify Thailand as the strongest regional EV case, while Indonesia and Malaysia remain less mature, and lower-income or infrastructure-constrained settings such as Cambodia and Myanmar face more basic adoption barriers (Ohn Zin Lin et al., 2025; Thananusak et al., 2021; Umair et al., 2024). This matters because ASEAN's EV transition is not only a transport issue, since it also raises questions of industrial policy, electricity-system readiness, spatial planning, and social inclusion (Delina & Shi, 2025; Garcia & Guerreiro, 2025; Li et al., 2025).

This review asks whether ASEAN is ready for the EV revolution or whether it is creating a new green divide. More specifically, it evaluates readiness across three linked layers. The first layer covers market readiness, including EV adoption conditions, incentives, prices, and

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consumer demand (Li, 2026; Sierzchula et al., 2014). The second layer covers infrastructure readiness, including charging availability, spatial coverage, interoperability-related gaps, and grid capability (Amiruddin et al., 2024; Sarker et al., 2025; Roslan et al., 2024). The third layer covers justice readiness, including affordability, spatial access, housing-related charging access, and the distribution of sustainable mobility benefits (Jiang et al., 2024; Soltani Mandolakani & Singleton, 2024; Cabarrucias-Dela Cruz & Tolentino, 2023). The central argument developed here is that ASEAN is experiencing electrification without convergence because adoption advances while readiness benefits and burdens diverge across countries and consumer groups (Delina & Shi, 2025; Setiyo et al., 2025; Ohn Zin Lin et al., 2025).

Three conceptual foundations are necessary to interpret the literature. First, EV adoption in ASEAN is not explained by environmental concern alone because studies repeatedly show that purchase intention is strongly shaped by practical factors such as price range, charging availability, incentives, and after-sales support (Lie & Lasmy, 2025; Sasongko et al., 2024; Truong & Tieu, 2026). Pro-EV attitudes therefore do not necessarily translate into mass adoption when infrastructure and affordability are weak (Fathoni et al., 2025; Sasongko et al., 2024). Second, EV readiness must be understood as a system condition rather than a vehicle condition because the relevant system includes charging networks, electricity supply, public policy, manufacturing ecosystems, and battery end-of-life governance (Delina & Shi, 2025; Sitcharangsie et al., 2025; Fahim et al., 2023). An EV can reduce emissions only when the vehicle-grid-battery system performs well enough to support lower-carbon mobility (Brambilla & Girardi, 2025; Chotanapund et al., 2024; Chaianong et al., 2024). Third, sustainable mobility is not equivalent to private EV ownership because much of the literature focuses on private passenger cars, while equity and environmental gains may be greater when electrification targets buses, vans, motorcycles, and shared fleets, especially in dense ASEAN cities (Demoral et al., 2023; Irsyad et al., 2025; Firlina et al., 2025).

2. Literature Review

2.1. EV Adoption and Market Diffusion

The literature consistently shows that ASEAN EV adoption is uneven because Thailand is most often described as the regional leader, while Malaysia and Indonesia remain at earlier stages and continue to struggle with high costs, limited charging infrastructure, and public acceptance issues (Setiyo et al., 2025; Umair et al., 2024; Habiburrahman et al., 2025). Quantitative evidence is incomplete, yet the available country-specific figures reinforce this asymmetry because Indonesia's market share is reported as 1.47 percent in 2022 and below 1 percent of car sales in 2021, while Thailand is reported at 8.12 percent of all vehicles in 2023 (Hakam & Jumayla, 2024; Thammasiriroj et al., 2025; Lazuardy et al., 2024). Thailand's relative lead is explained by a more coordinated policy mix, including national EV coordination, support for charging stations, electricity pricing support, and broader regulatory clarity (Thananusak et al., 2021; Chonsalasin et al., 2024; Wattana & Wattana, 2022). Malaysia is frequently described as slower due to inadequate and uneven infrastructure, high ownership costs, and low consumer awareness (Umair et al., 2024; Asadi et al., 2022). Indonesia is described as early-stage, with adoption constrained by weak charging coverage, high upfront costs, and inconsistent implementation despite incentives (Setiyo et al., 2025; Lie & Lasmy, 2025; Sasongko et al., 2024; Fathoni et al., 2025; Sasongko et al., 2024).

At the consumer level, ASEAN evidence points to recurring adoption drivers, including price range, charging availability, incentives, technology value, and after-sales support (Lie & Lasmy, 2025; Li, 2026; Suvittawat & Suvittawat, 2026). Purchase-intention studies also show

segmentation because, in Singapore, consumers split into BEV-oriented and ICEV-oriented segments (Huo et al., 2024). In Malaysia, intention rises with social influence, enabling conditions, environmental concern, and enjoyment, while range anxiety suppresses it (Khazaei & Tareq, 2021). In Vietnam, generational differences matter because technology is especially important for Gen Z, while Gen X is more responsive to policy support, price, and charging conditions (Truong & Tieu, 2026). A notable weakness in this literature is methodological fragmentation because most studies are cross-sectional, intention-based, or country-specific, and no retrieved study offers a fully standardized six-country ASEAN comparison using the same adoption indicators (Pau & Yong, 2025; Habiburrahman et al., 2025; Zajemska et al., 2025). This limits strong claims about regional ranking beyond broad tiers of readiness.

2.2. Consumer Inequality and Affordability

Affordability is one of the clearest barriers across ASEAN EV studies because consumers in the Philippines are highly cost-sensitive, especially under inflationary pressure and high electricity prices, and studies recommend subsidies, tax reductions, and low-interest financing to reduce upfront cost burdens (Uy et al., 2024). A comparative study of Cambodia, Myanmar, and the Philippines likewise identifies affordability and financing constraints as shared barriers (Ohn Zin Lin et al., 2025; Irsyad et al., 2025). A Thailand TCO model suggests BEVs can become cost-competitive over a 15-year lifetime, especially when subsidies, retailer discounts, or battery cost reductions are available (Suttakul et al., 2022). Cost-competitiveness at the model level does not imply equal access in practice because ASEAN evidence indicates that higher-income consumers are more likely to consider EV purchase, as shown in Bangkok and Philippine consumer-segmentation studies (Tissayakorn, 2025; Uy et al., 2024). Housing conditions also matter because purchase willingness in the Philippines is higher among single-family homeowners if home charging is available (Cabarrucias-Dela Cruz & Tolentino, 2023). In Bangkok, suburban EV adoption is more closely tied to property ownership and parking convenience, which implies that private control over parking and charging space makes uptake easier (Jiang et al., 2024). Indonesian users in suburban contexts also emphasize home charging because public chargers are too distant (Pasaribu et al., 2025).

The evidence does not directly prove that subsidies are disproportionately captured by affluent households in ASEAN because the retrieved studies explicitly stop short of that conclusion (Irsyad et al., 2025; Champeecharoensuk et al., 2025; Suvittawat et al., 2025). Still, these findings suggest a structural pattern in which households with higher incomes, private parking, and home charging access are better positioned to benefit from EV incentives than lower-income renters or residents of charging-poor areas (Cabarrucias-Dela Cruz & Tolentino, 2023; Jiang et al., 2024; Soltani Mandolakani & Singleton, 2024). This is an inference from converging evidence rather than a directly measured causal result.

2.3. Charging Infrastructure and Policy Readiness

Charging infrastructure is one of the most repeated determinants of EV readiness in ASEAN because Thailand is consistently presented as the strongest case since it combines more extensive charging rollout with stronger policy backing (Setiyo et al., 2025; Delina & Shi, 2025; Chonsalasin et al., 2024). Its charging ecosystem includes utilities, energy firms, startups, and automakers, which indicates a broader commercial and institutional base (Thananusak et al., 2021). Charging networks in Malaysia and Indonesia remain more uneven and incomplete because spatial studies show clear urban concentration (Yuniza et al., 2021; Amy Poh et al., 2025; Jasni et al., 2025). In Penang, more than 80 percent of public charging bays are concentrated in a few urban centers, while intercity corridors remain underserved

and ultra-fast chargers are lacking (Amy Poh et al., 2025; Arif & Windarsari, 2026). Malaysia-wide charging is concentrated in Kuala Lumpur, Selangor, and Johor, while East Malaysia trails significantly (Sarker et al., 2025). Bangkok studies identify sub-district-level service inequalities and recommend targeted expansion into underserved areas (Boonprong et al., 2024; Oranpairoj et al., 2025). Greater Jakarta studies similarly optimize fast-charger siting to meet dense urban demand more effectively (Nugroho et al., 2025; Riu et al., 2026; Tuga et al., 2025).

Grid readiness complicates the infrastructure question because EV charging can raise peak demand, stress transformers, increase losses, and worsen instability under unmanaged charging (Roslan et al., 2024; Pineda & Calderon, 2025; Li et al., 2020). Smart charging demand response storage integration and V2G can mitigate these effects while increasing renewable-energy utilization (Amiruddin et al., 2024; Hazra et al., 2025; He et al., 2024). Infrastructure readiness is therefore not just about charger count because it also depends on electricity-system management and grid modernization (Garcia & Guerreiro, 2025; Fahim et al., 2023).

2.4. Sustainability, Emissions, and Just Transition

The sustainability case for EVs in ASEAN is conditional rather than automatic because multiple studies show that EV emissions benefits improve when electricity is lower-carbon and weaken when grids remain fossil- or coal-heavy (Brambilla & Girardi, 2025; Polanco Vasquez et al., 2025; Chotanapund et al., 2024). Bangkok electric buses are estimated at 0.659 kgCO2e/km versus 2.0 kgCO2e/km for diesel, yet upstream impacts depend on the energy mix (Brambilla & Girardi, 2025). Indonesia studies report life-cycle GHG reductions of 26 to 54 percent depending on electricity mix (Polanco Vasquez et al., 2025). Singapore evidence also reports lower life-cycle emissions for battery electric taxis and minibuses (Yeow et al., 2022). Battery circularity is another major sustainability issue because Thailand studies find that second-life use before recycling can outperform immediate recycling across several environmental indicators, especially under lower-carbon electricity pathways (Sitcharangsie et al., 2025). Recycling system viability depends on scale, centralization, collection volumes, and supportive fiscal policy (Chaianong et al., 2024; Sitcharangsie et al., 2025).

Just-transition concerns also appear repeatedly because EV infrastructure and mobility benefits can reproduce spatial injustice if chargers cluster in advantaged zones or if policy is designed around private car owners rather than broader mobility users (Soltani Mandolakani & Singleton, 2024; Oo et al., 2025). Related ASEAN energy-transition work highlights the importance of participation, governance consistency, and stakeholder engagement for equitable outcomes (Ridho et al., 2025; Bong et al., 2022; Windarsari & Arif, 2026; Veza et al., 2022).

3. Methods

This study uses a critical comparative review approach focused on ASEAN member states and recent literature on EV adoption inequality infrastructure readiness and sustainability outcomes (Ohn Zin Lin et al., 2025; Yindee et al., 2025; Pau & Yong, 2025). The review is comparative rather than meta-analytic because the retrieved literature is heterogeneous in design measures and geographic scope (Irsyad et al., 2025; Pau & Yong, 2025).

3.1. Review Design and Scope

The evidence base covers studies roughly from the last five years and prioritizes empirical and policy-relevant work on EV adoption and market diffusion (Setiyo et al., 2025; Thananusak et al., 2021) consumer affordability and inequality (Uy et al., 2024; Tissayakorn, 2025) charging infrastructure and grid readiness (Sarker et al., 2025; Amiruddin et al., 2024) and sustainability emissions and just transition (Soltani Mandolakani & Singleton, 2024; Brambilla & Girardi, 2025).

3.2. Search and Selection Logic

The supplied evidence was screened conceptually around four themes covering adoption, inequality, infrastructure, and sustainability while prioritizing studies with ASEAN relevance, recent publication timing, and empirical or comparative content (Ohn Zin Lin et al., 2025; Kchaou-Boujelben, 2021; Huang et al., 2023; Thammasiriroj et al., 2025). Cross-sectional intention studies were included where they directly informed consumer readiness, yet greater analytical weight was given to multi-source patterns that recurred across countries and methods (Setiyo et al., 2025; Saflor et al., 2024; Khazaei & Tareq, 2021).

3.3. Comparative Framework and Data Extraction

The synthesis compares countries and studies using six recurring dimensions that structure the analytical framework of this review. These dimensions cover market adoption, policy support, infrastructure, affordability, sustainability, and equity as presented in Table 1.

Table 1. Comparative framework and data extraction dimensions

Dimension	What was extracted	Supporting evidence
Market adoption	Uptake stage, intention, market share indicators	Setiyo et al. (2025); Li (2026)
Policy support	Subsidies, taxes, coordination, regulatory clarity	Thananusak et al. (2021); Chonsalasin et al. (2024)
Infrastructure	Charger availability, spatial distribution, speed gaps	Amy Poh et al. (2025); Sarker et al. (2025)
Affordability	Upfront cost, TCO, financing barriers	Uy et al. (2024); Suttakul et al. (2022)
Sustainability	Emissions sensitivity, smart charging, battery EoL	Brambilla and Girardi (2025); Amiruddin et al. (2024); Sitcharangsie et al. (2025)
Equity	Income, home charging, urban concentration, access barriers	Cabarrucias-Dela Cruz and Tolentino (2023); Jiang et al. (2024); Soltani Mandolakani and Singleton (2024)

Source: Constructed by the authors based on the reviewed literature

A limitation of the method is that the underlying literature does not support a standardized statistical comparison across all major ASEAN EV markets (Habiburrahman et al., 2025; Zajemska et al., 2025).

4. Results and Discussion

4.1. Cross-Country EV Readiness Comparison

The literature supports a tiered picture of ASEAN readiness rather than a uniform transition. Thailand demonstrates relatively advanced adoption with coordinated incentives and national EV policy support, the strongest infrastructure in retrieved ASEAN evidence, and an integrated automotive base with an active charging ecosystem, which makes it the regional frontrunner (Setiyo et al., 2025; Lazuardy et al., 2024; Thananusak et al., 2021; Chonsalasin

et al., 2024; Wattana & Wattana, 2022). Indonesia shows early-stage to transitional adoption because incentives exist, but implementation is uneven and charging infrastructure lags in key metros, although the country holds a strong battery-material advantage with a less mature demand ecosystem, which produces high potential with uneven execution (Sasongko et al., 2024; Fathoni et al., 2025; Yuniza et al., 2021; Tuga et al., 2025; Li et al., 2025). Malaysia appears transitional but slower than Thailand because support grows, yet ecosystem coherence remains weak and spatial coverage is uneven, with urban concentration; although some industrial capability exists, this makes it moderately ready but infrastructure-constrained (Umair et al., 2024; Habiburrahman et al., 2025; Jasni et al., 2025; Amy Poh et al., 2025; Sarker et al., 2025). Singapore offers strong consumer-segmentation and fleet evidence but limited comparative policy evidence in the supplied set, which makes full ranking difficult (Yeow et al., 2022; Huo et al., 2024; Uy et al., 2024). Vietnam shows consumer-intention evidence where infrastructure and policy matter, with stronger two-and-three-wheeler electrification in comparative discussions, yet remains incompletely evidenced here (Truong & Tieu, 2026; Delina & Shi, 2025). The Philippines appears affordability-sensitive and infrastructure-constrained because it is included in emerging-economy comparisons stressing fragmented policy, and charging access remains a barrier, which places it as an earlier-stage market (Uy et al., 2024; Mamat et al., 2025; Ohn Zin Lin et al., 2025; Cabarrucias-Dela Cruz & Tolentino, 2023). Cambodia and Myanmar face basic affordability, charging, and reliability barriers with fragmented conditions and weak charging and grid infrastructure, which signals low readiness (Ohn Zin Lin et al., 2025; Ridho et al., 2025; Murugan & Marisamynathan, 2024). Taken together, these results support the conclusion that ASEAN readiness is clustered rather than regionalized, as summarized in Table 2 (Setiyo et al., 2025; Delina & Shi, 2025; Ohn Zin Lin et al., 2025).

Table 2. Cross-country EV readiness comparison in ASEAN

Country/group	Adoption readiness	Policy / institutional readiness	Infrastructure readiness	Industrial / ecosystem readiness	Overall assessment
Thailand	Relatively advanced (Setiyo et al., 2025; Lazuardy et al., 2024)	Coordinated incentives and national EV policy support (Thananusak et al., 2021; Chonsalasin et al., 2024; Wattana & Wattana, 2022)	Strongest in retrieved ASEAN evidence (Setiyo et al., 2025; Thananusak et al., 2021)	Integrated automotive base and active charging ecosystem (Thananusak et al., 2021; Martono et al., 2025)	Regional frontrunner
Indonesia	Early-stage to transitional (Sasongko et al., 2024; Fathoni et al., 2025)	Incentives exist, but implementation is uneven (Fathoni et al., 2025; Tuga et al., 2025)	Limited and lagging in key metros (Yuniza et al., 2021; Maghfiroh et al., 2021)	Strong battery-material advantage, less mature demand ecosystem (Li et al., 2025; Jamaludin et al., 2021)	High potential, uneven execution

Malaysia	Transitional but slower than Thailand (Umair et al., 2024; Habiburrahman et al., 2025)	Growing support, but weaker ecosystem coherence (Jasni et al., 2025; Mojumder et al., 2025)	Uneven spatial coverage, urban concentration (Amy Poh et al., 2025; Sarker et al., 2025)	Some industrial capability, but adoption ecosystem less mature (Pau & Yong, 2025; Åslund & Pettersson, 2023)	Moderate readiness, infrastructure-constrained
Singapore	Strong consumer-segmentation and fleet evidence (Yeow et al., 2022; Huo et al., 2024)	Partial evidence only (Uy et al., 2024)	Partial evidence only	Partial evidence only	Evidence insufficient for full ranking
Vietnam	Consumer-intention evidence shows infrastructure and policy matter (Truong & Tieu, 2026)	Partial evidence only	Partial evidence only	Stronger on two-three-wheeler electrification (Delina & Shi, 2025)	Promising but incompletely evidenced
Philippines	Affordability-sensitive and infrastructure-constrained (Uy et al., 2024; Mamat et al., 2025)	Included in emerging-economy comparisons stressing fragmented policy (Ohn Zin Lin et al., 2025)	Charging access remains a barrier (Ohn Zin Lin et al., 2025; Cabarrucias-Dela Cruz & Tolentino, 2023)	Limited evidence	Earlier-stage market
Cambodia / Myanmar	Basic affordability, charging, and reliability barriers (Ohn Zin Lin et al., 2025; Ridho et al., 2025)	Fragmented and inconsistent conditions (Ohn Zin Lin et al., 2025; Ridho et al., 2025)	Weak charging and grid conditions (Ohn Zin Lin et al., 2025; Murugan & Marisamynathan, 2024)	Limited evidence	Low readiness

Source: Synthesized by the authors from the cited studies (2021–2026)

4.2. Unequal Access and Consumer Segmentation

The literature points to four recurring inequality mechanisms that structure consumer access to EV benefits in ASEAN. The first mechanism is upfront price sensitivity because cost remains a primary deterrent in the Philippines and lower-income ASEAN settings (Uy et al., 2024; Mamat et al., 2025). The second mechanism is income effects because higher-income consumers show greater willingness or ability to purchase EVs (Tissayakorn, 2025; Uy et al.,

2024). The third mechanism is home charging advantage because homeowners and households with private parking are better positioned to adopt (Cabarrucias-Dela Cruz & Tolentino, 2023; Jiang et al., 2024; Gaspay et al., 2025). The fourth mechanism is urban concentration because central urban areas receive more charging infrastructure, which improves convenience for already advantaged locations (Boonprong et al., 2024; Amy Poh et al., 2025; Sarker et al., 2025). These mechanisms together imply an emerging green divide even though direct ASEAN incidence studies of subsidy capture are still missing, as detailed in Table 3 (Soltani Mandolakani & Singleton, 2024; Irsyad et al., 2025).

Table 3. Inequality mechanisms and their likely beneficiaries and disadvantaged groups

Inequality mechanism	Evidence	Likely beneficiaries	Likely excluded / disadvantaged
High upfront vehicle cost	Ohn Zin Lin et al. (2025); Uy et al. (2024)	Higher-income households	Lower- and middle-income households
Home charging access	Cabarrucias-Dela Cruz and Tolentino (2023); Jiang et al. (2024); Gaspay et al. (2025)	Homeowners, suburban households with parking	Renters, apartment dwellers, households without private parking
Urban charger concentration	Boonprong et al. (2024); Amy Poh et al. (2025); Sarker et al. (2025)	Central-city users, well-served corridors	Peripheral districts, underserved regions
Financing and policy complexity	Ohn Zin Lin et al. (2025); Irsyad et al. (2025); Stumpe et al. (2021)	Consumers and operators with better institutional access	Low-income users, small operators, weaker local governments

Source: Compiled from the cited studies

4.3. Environmental and System Outcomes

The sustainability dimension of the review reveals several consistent patterns that determine whether EV transition delivers genuine environmental gains. Life-cycle emissions benefits improve under lower-carbon grids and can shrink under fossil-heavy grids (Brambilla & Girardi, 2025; Polanco Vasquez et al., 2025; Chotanapund et al., 2024). Public transport electrification through e-buses and fleet electrification can cut pollution and emissions, yet depends on infrastructure and policy support (Pylarinou et al., 2021; Damanik et al., 2025; Richardson-Barlow & Dahlan, 2024). Smart charging and V2G improve peak load renewable use and emissions outcomes, while V2G further reduces storage needs (Amiruddin et al., 2024; Hazra et al., 2025; He et al., 2024). Battery second life and recycling offer strong environmental gains, but scaling centralization and policy incentives are essential (Sitcharangsie et al., 2025; Chaianong et al., 2024). Equity of mobility benefits shows that a private-car-led transition is less obviously inclusive than electrification of buses, motorcycles, and shared fleets (Demoral et al., 2023; Pylarinou et al., 2021; Firlina et al., 2025). Table 4 summarizes the sustainability dimensions and their main findings across the reviewed evidence.

Table 4. Sustainability dimensions and main findings

Sustainability dimension	Main finding	Evidence

Life-cycle emissions	EV benefits improve under lower-carbon grids and can shrink under fossil-heavy grids.	Brambilla and Girardi (2025); Polanco Vasquez et al. (2025); Chotanapund et al. (2024)
Public transport electrification	E-buses and fleet electrification can cut pollution and emissions but depend on infrastructure and policy support.	Pylarinou et al. (2021); Damanik et al. (2025); Richardson-Barlow and Dahlan (2024)
Smart charging / V2G	Managed charging improves peak load renewable use and emissions outcomes, while V2G further reduces storage needs.	Amiruddin et al. (2024); Hazra et al. (2025); He et al. (2024)
Battery second life and recycling	Strong environmental gains are possible, but scale centralization and policy incentives are essential.	Sitcharangsie et al. (2025); Chaianong et al. (2024)
Equity of mobility benefits	Private-car-led transition is less obviously inclusive than electrification of buses, motorcycles, and shared fleets.	Demoral et al. (2023); Pylarinou et al. (2021); Firlina et al. (2025)

Source: Compiled from the cited studies

4.4. Discussion

ASEAN is ready only in a partial and stratified sense because Thailand appears institutionally and infrastructurally closest to large-scale EV diffusion since it has assembled a more coherent policy mix, clearer support mechanisms, and a broader charging ecosystem (Setiyo et al., 2025; Thananusak et al., 2021; Chonsalasin et al., 2024). Indonesia and Malaysia possess major strengths, but those strengths are different because Indonesia is stronger in raw-material and battery-industrial potential, while Malaysia shows important technical and consumer-market potential yet weaker evidence of ecosystem coherence (Jasni et al., 2025; Jamaludin et al., 2021; Åslund & Pettersson, 2023). Several other ASEAN markets remain constrained by affordability, charging access, fragmented policy, and, in some cases, unreliable electricity (Ohn Zin Lin et al., 2025; Ridho et al., 2025). ASEAN is therefore not best understood as a region moving together toward electrification because it is experiencing a multi-speed transition where a few markets are building full EV systems while others are still assembling basic preconditions (Delina & Shi, 2025; Setiyo et al., 2025).

The evidence suggests that a green divide is emerging, although the strongest claim must remain cautious. The literature does not yet directly quantify subsidy capture by income group across ASEAN (Irsyad et al., 2025; Champeecharoensuk et al., 2025). Repeated findings show that higher-income consumers are more likely to consider EVs home charging is easier for homeowners and charging networks are spatially clustered in advantaged urban zones which implies that current private-EV transitions may disproportionately favor affluent urban property-owning households unless counterbalanced by inclusion-oriented policy (Tissayakorn, 2025; Boonprong et al., 2024; Cabarrucias-Dela Cruz & Tolentino, 2023; Jiang et al., 2024; Soltani Mandolakani & Singleton, 2024; Oo et al., 2025). A second divide may

also be emerging between private mobility electrification and mass mobility electrification because if policy prioritizes private passenger EVs while public transport remains under-electrified, lower-income populations may receive fewer benefits from the transition (Pylarinou et al., 2021; Firlina et al., 2025). This pattern can be described as a mobility bifurcation where private EVs improve for affluent users while poorer households remain reliant on lagging public or informal systems (Oo et al., 2025; Prabpayak et al., 2025). This is a synthesis from the evidence rather than a directly named finding in the retrieved studies.

Four policy implications follow from this review. The first implication targets affordability directly because subsidies alone are insufficient if upfront prices remain high or financing is inaccessible, and low-interest financing, targeted support, and tax tools remain central in lower- and middle-income markets (Uy et al., 2024; Gaspay et al., 2025; Mo et al., 2025). The second implication deploys charging infrastructure more equitably because charger rollout should prioritize underserved districts, non-core urban zones, and intercity corridors rather than only premium urban clusters (Soltani Mandolakani & Singleton, 2024; Amy Poh et al., 2025; Boonprong et al., 2024). The third implication modernizes grids and manages charging because smart charging, storage, and V2G should be integrated early to avoid unmanaged peak load and to increase renewable utilization (Amiruddin et al., 2024; Hazra et al., 2025; He et al., 2024). The fourth implication broadens the mobility lens because electrifying buses, motorcycles, vans, and shared fleets may deliver wider social benefits than private-car-centered subsidy regimes (Demoral et al., 2023; Damanik et al., 2025; Firlina et al., 2025). At the regional level, policy harmonization on standards, infrastructure planning, and knowledge exchange would also help reduce fragmentation (Ohn Zin Lin et al., 2025; Thammasiriroj et al., 2025; Mo et al., 2025).

5. Conclusion

ASEAN is not fully ready for the EV revolution in a uniform regional sense because the region is better described as partially ready, with Thailand clearly ahead of Indonesia and Malaysia in transitional positions, and several other markets still constrained by affordability, charging gaps, policy inconsistency, and weak electricity or financing conditions. The region is also at real risk of producing a new green divide because EV adoption currently fits best with the circumstances of affluent urban households that can manage high upfront costs and home charging, while renters, peripheral communities, and lower-income groups face persistent exclusion risks. Environmental gains are conditional on cleaner grids, managed charging, and credible battery end-of-life governance. The main conclusion of this review is therefore straightforward: because ASEAN moves toward electrification yet without stronger equity safeguards, the transition may widen rather than reduce mobility inequality. Priority actions are to expand equitable charging access, improve affordability and financing, decarbonize electricity supply, scale public-transport and shared-fleet electrification, and build circular battery governance early rather than later.

5.1. Declaration of Generative AI

During the preparation of this manuscript, the authors used Grammarly Application and QuillBot to improve the clarity, readability, and language accuracy of the text. Output generated by the tools was carefully reviewed and edited by the authors, who take full responsibility for the content of this article. All substantive intellectual contributions, including conceptualization, analysis, interpretation of data, and final decisions regarding content, arguments, and conclusions, were carried out solely by the authors. The authors take full responsibility for the integrity, originality, and academic quality of this article.

5.2. Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

5.3. Funding

The authors received no financial support for the research, authorship, and/or publication of this article.

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