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Electric vehicles narratives in public conversation: the underrepresentation of scientific knowledge in media coverage

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Abstract

This study examines the representation of electric vehicle (EV) issues in Indonesian mass media to understand how science, policy, and public discourse intersect in the context of sustainable transportation. Through a mixed-method content analysis of three major online news outlets—Kompas.com, Detik.com, and CNN Indonesia—spanning the years 2023–2024, the research reveals that media coverage is dominated by government narratives, focusing heavily on policy initiatives, subsidies, and market trends. Meanwhile, perspectives from civil society, academics, and environmental advocates remain underrepresented. Scientific information—particularly concerning EV lifecycle emissions, battery supply chains, and broader environmental trade-offs—is largely absent or presented without sufficient depth or balance. The study argues that the media must adopt a more inclusive, evidence-based approach to science communication to better inform the public, support democratic participation in policy-making, and promote informed societal engagement with Indonesia's transition to sustainable transport.

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INTRODUCTION

Environmental issues have become a pressing concern for society as the damage caused by human activities continues to have far-reaching and serious consequences for both the environment and human well-being. Economic activities and industrialization, while essential to the global distribution of resources, are significant contributors to environmental degradation. According to the United States Environmental Protection Agency (EPA), the five major sources of greenhouse gas emissions are electricity and heat production, industry, agriculture and forestry, transportation, and building construction (US EPA, 2016). These sectors release various gases that negatively impact the environment, including carbon

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dioxide (CO2 - primarily from the burning of fossil fuels); methane (CH4 - primarily from agricultural practices and waste management); nitrous oxide (N2O - from both agricultural activities and the burning of fossil fuels); and fluorinated gases (F-gases, from industrial processes and the use of certain consumer products) (US EPA, 2016). These human-driven activities are key factors contributing to the ongoing environmental crisis.

Human mobility, facilitated by a transportation system that is largely dependent on the combustion of fossil fuels, is also seen as a significant contributor to global greenhouse gas emissions. In 2016, emissions from transportation, which includes land, sea, and air travel, accounted for approximately 24% of total global greenhouse gas emissions (Wang & Ge, 2019). The primary driver of these emissions is the widespread use of vehicles powered by internal combustion engines (ICE), which rely on fossil fuels, such as gasoline and diesel. This reliance on fossil fuel-based transportation is particularly pronounced in populous countries such as the United States, China, India, Brazil, and Indonesia, which are among the largest contributors to carbon dioxide (CO2) emissions from the transportation sector (Wang & Ge, 2019).

Economic and industrial activities, while essential for the distribution of resources and the advancement of welfare, often result in negative environmental consequences. This tension between economic growth and environmental preservation has led to the concept of sustainability, which seeks to find a balance between these two priorities. Sustainable development advocates for an integrated approach that considers both environmental concerns and economic progress. In 1987, the United Nations defined sustainability as "meeting the needs of the present without compromising the ability of future generations to meet their own needs" (United Nations, n.d.). Today, this principle is embodied in the Sustainable Development Goals (SDGs), in which 140 countries have committed to implementing sustainable development practices that strive to balance ecological sustainability with economic growth (United Nations, n.d.).

LITERATURE REVIEW

Mobile sustainability is fundamentally composed of two key components: the strategy for achieving sustainability and the main agents responsible for its implementation. Regarding the agents of sustainability three primary groups play pivotal roles in determining the success and realization of sustainable mobility (Holden et al., 2020). The first group is the expert (*homo bureaucratics*), which includes politicians (policymakers), bureaucrats

(policy implementers), scientists, and professional administrators. The second group is society (*homo civitus*), which encompasses local officials, non-governmental organizations (NGOs), activists, journalists, and international organizations. The third group is companies or industries (*homo economicus*), which represents market mechanisms and voluntary transactions among competing market players (Holden et al., 2020). These three agents, each with their own interests and spheres of influence, interact in complex ways to drive the implementation of mobile sustainability. Their cooperation and negotiation are crucial for achieving the desired balance between environmental, social, and economic factors in transportation systems.

To achieve sustainability in transportation, three primary strategic areas are emphasized: efficiency, modification, and reduction (Holden et al., 2020). Efficiency focuses on enhancing the performance and accessibility of transportation through technological advancements in both hardware and equipment. These improvements span various aspects of the transportation system, including vehicles (e.g., electric vehicles), infrastructure, and fuels (e.g., renewable energy sources). Modification involves a shift from a transportation system largely dominated by cars and airplanes to one that prioritizes collective forms of transportation, particularly well-functioning public transportation systems. This shift encourages the substitution of individual car and air travel with more energy-efficient modes such as buses, trains, and trams. Finally, reduction refers to minimizing the use of motorized vehicles, particularly for non-essential trips, by encouraging shorter travel distances and reducing overall travel. This can be facilitated through more efficient urban planning and altering existing transportation preferences. By combining these strategies—efficiency, modification, and reduction—the transportation sector can mitigate its negative environmental impacts and move towards sustainable mobility.

A key strategy for advancing mobile sustainability involves enhancing transportation efficiency through the deployment of electric vehicles (EVs). As a novel innovation, EVs contribute significantly to the goal of sustainable mobility, offering an environmentally friendly alternative to conventional vehicles. This is primarily due to their reliance on electricity, a cleaner energy source that reduces dependence on fossil fuels and mitigates the environmental impacts associated with their combustion. The shift from fossil fuels to electricity results in a significant reduction in greenhouse gas emissions across the lifecycle of the vehicle, making EVs a pivotal technology in the decarbonization of road transportation

(Evans, 2023). While reducing the frequency of vehicle use or eliminating personal vehicle travel altogether offers even more profound environmental benefits, such options remain impractical for many people who rely on daily mobility for essential activities.

The adoption of electric vehicles (EVs) and the transition to non-fossil fuel energy sources are widely recognized as pivotal solutions for promoting a more sustainable and environmentally friendly transportation system. Carbon dioxide (CO2) emissions, which have long been a significant byproduct of conventional vehicles, are expected to be significantly reduced through the development and expansion of the EVs ecosystem. Furthermore, electric vehicles are increasingly viewed as a critical strategy for achieving net-zero carbon emissions. In response to these environmental imperatives, policymakers around the world have implemented large-scale subsidy programs for both EVs manufacturers and consumers. These incentives are designed not only to accelerate the transition to electric mobility but also to encourage a broader adoption of clean energy alternatives. In addition to financial support, several countries have even proposed or enacted policies that seek to phase out vehicles powered by internal combustion engines or ICEs (Mills, 2023). For proponents of EVs technology, there is a prevailing belief that electric vehicles have reached an optimal balance in terms of both economic viability and operational efficiency, or have even surpassed the performance of traditional fossil fuel-powered vehicles. As such, the implementation of bans and subsidies is perceived as merely expediting what is seen as an inevitable shift toward a more sustainable transportation future.

Numerous studies have highlighted the positive role of electric vehicles (EVs) in reducing carbon emissions. Zola et al. (2023) emphasized that battery-powered EVs play a critical role in reducing carbon dioxide emissions, particularly in urban areas characterized by high concentrations of fossil-fuel vehicles. Consistent with this finding, Franzò & Nasca, (2021) showed that the total CO2 emissions over the lifetime of EVs are significantly lower than those of comparable internal combustion engine vehicles (ICEVs). According to Sudjoko et al. (2021), battery electric vehicles (BEVs) can reduce carbon emissions by as much as 50 percent over their life cycle when compared to ICEVs. Furthermore, additional research suggests that the widespread adoption of electric vehicles has substantial potential to reduce greenhouse gas emissions and improve air quality, although the overall environmental impact is contingent on several factors, such as the source of electricity and the materials utilized in manufacturing and operation (Dubey & Dubey, 2023). Notably, the use of renewable energy sources in EVs plays a pivotal role in minimizing their

environmental footprint. This is corroborated by Afifah et al. (2024) who assert that electric vehicles offer a significant advantage in reducing greenhouse gas emissions. Moreover, electric vehicles boast an energy efficiency rate of up to 80 percent, in stark contrast to fossil fuel vehicles, which typically extract only 12-30 percent of the energy from their fuel (Afifah et al., 2024).

Despite the widespread belief that electric vehicles (EVs) are the optimal solution for addressing carbon emissions and serving as a technological alternative for achieving green transportation, this view is not universally accepted. Critics argue that the environmental benefits of EVs may not be as substantial as claimed, particularly when the emissions associated with the upstream production of EV batteries are taken into account. The manufacturing process for these batteries, which use a range of minerals including copper, nickel, aluminum, graphite, cobalt, manganese, and lithium, is highly carbon intensive. In fact, the production of these batteries generates about ten times more emissions than the production of internal combustion engine (ICE) vehicles (Mills, 2023). In support of this argument, Mursalin & Susanto (2022) highlight that the production of lithium-ion batteries increases the carbon footprint and contributes to higher acidification and particulate emissions, which are in some cases, twice as high as those produced by fossil-fuel vehicles. Moreover, Jaššo et al. (2025) found that the production of EVs in the Czech Republic results in emissions that are 40% to 70% higher, depending on the battery size, compared to equivalent ICE vehicles. They found that the emissions generated during the manufacturing process can only be offset after the vehicle has traveled approximately 32,184 kilometers (Jaššo et al., 2025). This disparity in emissions is largely due to the significant carbon costs associated with battery production and the raw material extraction. In addition, regional differences in electricity production further complicate the environmental equation, with countries such as the Czech Republic and Poland exhibiting higher emissions from electricity generation for battery electric vehicles (BEVs) than for other vehicle types, while Slovakia has lower carbon emissions from BEVs in comparison to ICE vehicles.

In addition to the carbon emissions associated with the production of lithium-ion batteries, the environmental challenges associated with managing battery waste management pose significant ecological risks. Lithium-ion batteries contain hazardous materials such as lithium, cobalt, and nickel, which require careful disposal and recycling to prevent contamination of soil and water resources. However, the reality is that a large proportion of discarded batteries are not recycled efficiently, exacerbating the environmental burden and

contributing to the growing waste crisis (Afifah et al., 2024). Furthermore, the recycling process itself poses health risks, particularly to workers in recycling facilities. Toxic substances, such as mercury, can be absorbed through the skin, while other hazardous chemicals such as cadmium and lead can be inhaled or ingested, increasing the risk of adverse health effects (Franzò & Nasca, 2021; Racz et al., 2015). Therefore, it is essential that recycling practices are rigorously managed to minimize both human health risks and environmental damage, and to ensure that the benefits of electric vehicles are not undermined by inadequate waste management strategies.

Beyond the environmental and carbon emissions concerns, research has also identified several significant barriers that hinder the widespread adoption of electric vehicles (EVs) as a viable alternative to internal combustion engine (ICE) vehicles. A study conducted by Noel et al. (2020) examined these barriers in the context of Scandinavia and the Nordic countries, identifying 53 different challenges to EV adoption. The two main barriers identified were the perceived limited range of electric vehicles and their higher purchase price compared to ICE vehicles. In addition to these factors, the study identified several other critical barriers, including the insufficient availability of public charging infrastructure, low consumer awareness of EV technology, high psychological barriers to adoption, and a lack of sufficient incentives for consumers. These factors, among others, pose significant challenges to the transition from fossil fuel vehicles to electric alternatives and require comprehensive strategies to overcome these hurdles and accelerate the adoption of cleaner transportation solutions.

In Indonesia, the discourse surrounding electric vehicles (EVs) has gained significant traction, attracting the attention of various stakeholders, including the government, market players, and the general public. The Indonesian government has introduced subsidy policy packages to incentivize consumers to adopt EVs (Isdarmadji, 2023; Mursid, 2023; Sandi, 2023). The government views EVs as a green and environmentally friendly mode of transportation that will contribute to achieving carbon emission reduction targets. As part of this vision, the government has set an ambitious target of having two million electric cars and 13 million electric two-wheelers on the roads by 2030, supported by 32,000 electric vehicle charging stations or known as SPKLU (Adi, 2024). However, efforts to increase the adoption of EVs have faced significant criticism. Critics have raised various issues, including the policies themselves and the readiness of the necessary infrastructure to support EVs as a sustainable energy solution. One prominent criticism revolves around Indonesia's

reliance on coal as a primary energy source, particularly in coal-fired power plants (PLTU), which undermines the emission reduction goals associated with EVs. Studies have shown that coal-fired power plants account for up to 51 percent of the country's CO2 emissions (Sipayung, 2023), leading to skepticism about the environmental benefits of EVs in Indonesia (Afifah et al., 2024; Mursalin & Susanto, 2022). This discrepancy has fueled debates about the consistency of emission reduction claims for EVs (Setiawan, 2021; Muliawati, 2023). In addition, the subsidy policies aimed at promoting EV adoption have been criticized for lack of focus and poor targeting, further fueling public debate about the feasibility of the government's green energy transition (CNN Indonesia, 2023).

The ongoing controversies and diverse perspectives surrounding the role and potential of electric vehicles (EVs) as an alternative form of environmentally friendly transportation represent a compelling area of study. The growing urgency for effective solutions to address environmental degradation, particularly the emission of gases that contribute to climate change, has led some groups to express strong optimism about the widespread adoption of EVs. However, skepticism about the low emissions claims associated with EVs, coupled with criticism of ineffective and poorly targeted policy packages, has led others to view these vehicles as offering little advantage over existing modes of transportation. Furthermore, EVs are sometimes seen as political tools or examples of failed public policy initiatives.

The varying narratives, critiques, and controversies surrounding EVs exist at the intersection of technology, science, economics, politics, and society. Examining how these different dimensions interact and manifest in the public sphere, whether in the forms of government policy communication, mass media, or public discussion, is important to better understand which aspects have been the main concern and occupied the forefront of public narratives. The main objectives of communicating science in the society are to inform, to educate, and to engage public in understanding the scientific knowledge, so that society will be able to participate in policy making and to make informed decision making that is related to science issue in their daily live (Brossard & Leweinstein, 2009). Communication of EVs issues through mass media is one of the ways to communicate science behind it to the public. Good quality media reporting could be a way to increase awareness and comprehension regarding scientific concepts and rationale that are the bases of the technology and policy introduction. In turn, this awareness and comprehension will be the seed to a public engagement and a more democratic policy making.

This research seeks to explore which aspects of the EVs debate receive the most attention and which remain marginalized through media reporting and media discourse in Indonesian context. The study aims to contribute to a deeper understanding of the complex dynamics shaping the development and adoption of electric vehicles in Indonesia, which will help in understanding the communication processes and discourses surrounding science, technology, and political economy in the Indonesian context.

METHODS

This study employs a content analysis to examine the ways in which scientific information and knowledge about electric vehicles, gas emissions, lithium battery technology, and other related topics are represented in the Indonesian mass media. Content analysis allows for a systematic exploration of media content, including the textual elements, the theme of the piece, and source citation to show news emphasis. By examining these diverse elements, this study aims to uncover how electric vehicles are portrayed across various media platforms. The research combines both quantitative and qualitative methods. The quantitative analysis focuses on examining specific news elements, such as frequency of coverage, the prominence of certain terms, and the use of particular terms. Meanwhile, the qualitative analysis investigates the underlying patterns, themes, and relationships in the narratives surrounding electric vehicles, focusing on how scientific information is framed and communicated. The integration of these two approaches provides a comprehensive understanding of the dominant narratives surrounding EVs in the public sphere and offers insights into how these narratives are disseminated in the media.

The data for this study consist of news content about EVs from three popular online media outlets: Kompas.com, Detik.com, and CNN Indonesia, spanning the years 2023 and 2024. These media outlets were selected for their high popularity and the large volume of website traffic they receive, which indicate high readability. The focus on online media is based on the widespread accessibility and availability of digital platforms, which have become the primary sources of information for the public. Online news, easily accessible through search engines and produced in large quantities in a relatively short time frame, plays a significant role in shaping public knowledge and discourse. By examining these outlets, the study aims to capture a range of narratives and representations of electric vehicles that are disseminated to the Indonesian public.

Data collection and selection for this study are based on the indexing of news articles from online media that cover topics related to EVs. The content extraction process was facilitated using search engines by using relevant keywords to identify and gather relevant news articles that specifically address electric vehicles, which further filtered by their publication dates in the relevant time frame is specified in the beginning of the study. Once the news extraction was completed and resulting in a corpus of news articles, it was further sorted manually to ensure the inclusion of only the most pertinent news content for analysis. Through this two-step process, a refined corpus of data was generated that consisted of 100 news entries per media outlet totalling 300 news entries. This corpus data forms the foundation for the subsequent analysis in this study. All news entries were then coded into several themes inductively, based on the topics emerging from the data. Furthermore, the coded themes used to identify the ways in which the media framed the news through narratives and emphasis on the issue of EVs. This finding was then linked to the broader discourse of how the media presented science communication of environmental and technological aspects of EVs in the news.

RESULTS AND DISCUSSION

A media content analysis conducted on three national news portals in Indonesia identified several key emphases in how the media reported on electric vehicles (EVs). The analysis resulted in five main codes of the new categories that are the main theme of the news. Those five news categories are: (1) business aspects of EVs; (2) government policy aspects of EVs; (3) technology ecosystem and technical aspects of EVs; (4) natural resource aspects of EVs; and (5) environmental impact aspects of EVS. The content analysis also revealed the most frequent sources quoted in the news, which indicates whose point of views are considered important, and even dominate the news reporting, and from where the media gets its news authority. The subsequent section will explain each of the main themes found in the news reporting in all three media platforms.

Business Aspect of EVs

The analysis highlighting the business aspect of EVs revealed four main categories of news that consist of: (1) market conditions and market penetration of EVs; (2) investment in the development of EVs industry; (3) market competition among various EVs manufacturers or brands (covering both four-wheeled and two-wheeled vehicles); and (4) the types of electric vehicles currently available on the market, often accompanied by sales volume or information on specific vehicle models from different brands. The Table 1

presents the results of the quantitative analysis of the news coverage from the three portals, categorized by topics related to business aspects.

Table 1. News with the theme of EVs Business Aspects

Media	News Theme Business Aspects of EVs			
	Market Penetration/ Condition	Investment	Market Competition	Types/ Price
Kompas.com.	23%	4%	13%	21%
CNN Indonesia	34%	16%	22%	18%
Detik.com	7%	4%	6%	15%

The quantitative analysis of the news content, as shown in Table 1, reveals of the one hundred news entries analyzed, a significant emphasis was placed on the business aspects of the electric vehicle industry. Notably, Kompas.com and CNN Indonesia online devoted a larger proportion of their coverage to this topic compared to Detik.com. Reports on market penetration and market conditions frequently included statistical data on sales of electric vehicles, both motorcycles and cars, at the time the articles were published. These reports often made comparisons with sales figures from other Southeast Asian countries, such as Thailand, Vietnam, and Singapore, highlighting the regional context. Headlines such as "*Electric Vehicles Must Be Better Known to the Indonesian People*," "*Electric Cars Had a Long Indent, Starting to Accumulate in Early 2023*," and "*PEVS 2023 Reveals Prospects for Electric Vehicles in Indonesia*" provided insights into the market dynamics for electric vehicles in Indonesia. These articles also presented data on various vehicle brands that have begun to circulate, signaling their growing presence as a transportation option among the public.

In contrast, investment related news articles appeared at a considerably lower proportion across the three news portals. These reports highlighted various foreign investment projects coming to Indonesia to develop the electric vehicle industry. Such news often covered both planned and ongoing investments, reflecting Indonesia's commitment to advancing electric vehicle technology through strategic financial support which is an essential element of technology development. For instance, one report detailed that the total investment in electric vehicles, as announced by Indonesia's Minister of Investment, had reached US$42 billion (approximately IDR 640.13 trillion) from 2020 to 2023. According

to CNN Indonesia (2023), this investment included contributions from major international companies such as LG Energy Solution (South Korea), CATL (China), BASF (Germany), Ford (United States), and Volkswagen (Germany). These investments were primarily realized through the construction of manufacturing facilities and the development of supporting technologies. In addition, another notable piece of coverage discussed the collective commitment of Southeast Asian nations to advance electric vehicle technology, positioning the region as a potential global manufacturing hub. This initiative includes the harmonization of standards, investment regulations, infrastructure development, and the creation of essential components to support the electric vehicle ecosystem.

Another important topic within the business aspect category pertains to the competition among electric vehicle manufacturers and the variety of electric vehicles currently available for consumer use. News articles in this category tend to have a more commercial focus, detailing the different types of electric vehicles and their respective advantages. These reports also highlight specific manufacturers and their technological innovations. Furthermore, some news entries in this thematic category provide detailed lists of vehicle types, including their corresponding prices, for readers interested in purchasing electric vehicles.

Policy Aspect of EVs

The predominant themes that emerged in the news focusing on government policy on EVs were the provision of subsidies, incentives, or government assistance to consumers for the purchase of EVs, and the procurement of EVs for government agencies to use as operational vehicles. These policies are framed as critical steps in fostering the growth of the electric vehicle ecosystem in Indonesia. The quantitative analysis of news content, including a detailed breakdown of these topics, is presented in Table 2.

Table 2. News with the theme of Government Policy regarding EVs

Media	Government Policy News regarding EVs	
	Subsidies/ Incentives	Procurement/ Purchase
Kompas.com.	43%	3%
CNN Indonesia	35%	5%
Detik.com	68%	9%

The quantitative content analysis, as shown in Table 2, reveals a clear dominance of news related to subsidies, incentives, and government assistance, where nearly half of the

news articles (especially in the case of Kompas.com and CNN Indonesia) out of the one hundred analyzed were focused on this topic. This focus aligns with the government's efforts to promote the adoption of EVs technology, which is embodied in a policy framework that includes regulations designed to provide subsidies to individuals who purchase or convert their vehicles from internal combustion engine (ICE) models to EVs, both electric cars and motorcycles.

Government policy played a significant role in shaping the media coverage of EVs across the three news portals examined in this study. In particular, there was a marked increase in news volume in anticipation of the announcement of the fiscal incentives in buying EVs in March 2023. However, not all stakeholders were in favor of these incentives. One notable criticism came from a political figure who questioned the effectiveness of the policy in achieving its primary objective of environmental protection, particularly in terms of reducing greenhouse gas emissions. These critics argued that the incentives would have a limited impact because the electricity used to charge the batteries of EVs often still originates from fossil fuel-based sources, such as coal, which would continue to contribute to high CO2 emissions from power plants. These critics continue to claim that the environmental benefits of electric vehicles may be limited without a shift to renewable energy sources for electricity generation.

Another key government policy aimed at accelerating the adoption of EVs was the procurement of EVs within government institutions as operational vehicles. President Joko Widodo called on local governments, such as the DKI Jakarta Provincial Government, to take the lead in integrating EVs into all aspects of transportation. In addition, online transportation companies and state-owned enterprises (BUMN), such as DAMRI, were encouraged to integrate EVs into their operations. Although this policy was covered by all three news portals, it did not receive as much attention as the policy on subsidies and government incentives. However, this government policy has not been without criticism and differing perspectives. Controversies have arisen regarding the procurement of electric vehicles (EVs) for government institutions. A major concern is the perceived inefficiency of the budget allocation. For instance, the cost of electric cars for Echelon I Officials has reached nearly IDR 1 billion per unit, prompting critics to argue that such an expenditure is unjustifiable, especially given the competing need for funds in other more pressing sectors. Another concern is the potential for conflicts of interest. Some have raised alarms about the involvement of government officials with ties to the electric vehicle industry, suggesting that

such affiliations may compromise the objectivity of the decision-making process. Transportation experts have argued that government procurement priorities may be misaligned, asserting that the focus should be on EVs for public transportation rather than for official government use.

Technology Ecosystem and Technical Aspects of EVs

As a technological innovation, EVs not only offer improved energy efficiency but also have the potential to transform the mobility landscape through the development of an integrated technology ecosystem. In the analysis of news coverage, the recurring themes emerged regarding the technological ecosystem and technical aspects of EVs are related to charging infrastructure, energy management systems, and integration with smart grids. EVs rely on several key technical components, including lithium-ion batteries, electric motors, and power control systems. In addition to developing these core technologies, significant attention is being paid to overcoming technical challenges, such as increasing battery energy density and minimizing material degradation over time. Safety considerations also remain a top priority in the development process. Regulatory bodies are focusing on establishing safety standards to ensure that electric vehicles can operate safely in a variety of road conditions. These themes were also prevalent in the news coverage analyzed across the three media portals included in this study. The following are the results of the quantitative content analysis conducted of one hundred news articles that form the data corpus of this research.

Table 3. News with the theme of Technology Ecosystem and Technical Aspects of EVs

Media	Theme of Technology Ecosystem and Technical Aspects of EVs			
	Ecosystem		Technology Aspect	
	Technology Adoption	Charging Station	Safety	Component
Kompas.com.	22%	4%	1%	6%
CNN Indonesia	30%	8%	4%	11%
Detik.com	30%	13%	4%	7%

The quantitative analysis of news content, as shown in Table 3, indicates that media coverage of the EVs ecosystem and the technological aspects of EVs have garnered significant attention. The results suggest that the adoption of EVs in Indonesia has experienced positive developments. In line with the theme of the electric vehicle technology ecosystem, media coverage also highlighted the development of battery charging stations in

the content analysis of the three national news portals examined in this study. Known as SPKLU (Public Electric Vehicle Charging Stations), these facilities play a crucial role in the expansion of the EVs ecosystem. The availability of SPKLU is a key factor influencing the decision to purchase an electric vehicle. Several news reports have emphasized the efforts of both the government, through state-owned enterprises such as PLN, and private sector stakeholders, particularly electric vehicle manufacturers, in establishing a network of charging stations to support the growing number of electric vehicle users.

Media coverage of the technological aspects of electric vehicles (EVs) has often focused on the safety and accessibility of EVs components. Common concerns highlighted in the news include the safety of EVs in rainy conditions, the potential risk of fire in EVs, and related issues such as security and fire suppression mechanisms. In addition, discussions often focused on the performance and longevity of EV batteries, including advances in energy density that extend the range of electric vehicles. Other common themes included the reduction of charging times, facilitated by fast charging technologies that minimize user waiting times, and the operating cost benefits of EVs such as lower maintenance and fuel costs compared to conventional vehicles.

The content analysis of the news articles also identified several factors that continue to challenge the adoption of electric vehicles (EVs) from a technological perspective. The first factor is infrastructure limitations, particularly the uneven distribution of charging stations, with rural and non-urban areas being particularly underserved. In addition, issues related to charging speeds, which remain less competitive compared to conventional fueling, have also been highlighted. The second factor relates to the limitations of battery technology, including challenges related to increasing travel range, extending battery life, and addressing unresolved battery recycling issues. The third factor relates to consumer perceptions and habits, including concerns about the availability of charging stations and range anxiety, as well as a preference for conventional vehicles that are perceived as more practical and familiar.

Natural Resources and Environmental Impact of EVs

An important theme that emerges from the content analysis of electric vehicle news is the relations between electric vehicles and Indonesia's natural resources, which are critical to supporting the growth of the electric vehicle industry. The quantitative analysis of the news content of the three news portals indicates that Kompas.com devotes a quite significant portion of its coverage to discussing Indonesia's natural resources and their critical role in

the development of the EVs industry as compare to CNN and Detik.com (Table 4). Indonesia is well known for its significant natural resources, which are essential for the production of EVs components, particularly batteries. The country aims to become a leading hub for the development and production of EVs. Among the natural resources frequently highlighted in the news is nickel, a key material in the manufacture of lithium-ion batteries, particularly the nickel-manganese-cobalt (NMC) type, which are widely used in EVs. Indonesia is one of the world's largest producers of nickel, with major reserves located in Sulawesi, North Maluku, and Papua. In line with its strategic goals, the government has implemented a ban on the export of raw nickel ore to promote the downstream development of the domestic nickel industry, including the establishment of processing plants (smelters) and battery manufacturing facilities.

Table 4. News with the theme of Natural Resources Supporting Electric Vehicles

Media	News Theme Aspects of Natural Resources and Environmental Impact
	Natural Resources Supporting Electric Vehicles
Kompas.com.	43%
CNN Indonesia	8%
Detik.com	8%

Another mineral often discussed in relation to the development of the electric vehicle industry is bauxite, the primary raw material for aluminum production. Aluminum is valued for its light weight and durability, making it an ideal material for the construction of electric vehicle bodies. Indonesia’s bauxite reserves are mainly located in West Kalimantan, Riau, and the Riau Islands. The establishment of an aluminum refining industry in the country could provide high-quality materials essential for EVs production. In addition, the highly conductive mineral is often mentioned due to its extensive use in EVs, particularly in cables, electric motors, and electronic components. Indonesia's Grasberg mine in Papua, one of the largest copper mines in the world, is a major source of this important material. Copper is also a critical component in the infrastructure that supports EVs adoption, such as in the construction of charging stations.

The analysis of media coverage reveals that a significant number of public officials, private stakeholders, and entrepreneurs share the belief that Indonesia's abundant natural resources provide a strong foundation for positioning the country as a global hub for the EVs industry. This perspective emphasizes that Indonesia can achieve such a status through the

strategic use of its resources, infrastructure development, and the implementation of supportive policies. The country's natural resources wealth, particularly in key raw materials for battery production, such as nickel, cobalt, and bauxite, is seen as a critical asset in this endeavor. It is also believed that with the support of government policies, infrastructure investments, and international cooperation, Indonesia can accelerate its transformation into a leader in the global EVs market. If managed effectively, Indonesia has the potential not only to become a major player in the EV industry but also to lead the global transition to a low-carbon economy.

Table 5. News with the theme of Environmental Impact of Electric Vehicles

Media	News Theme Environmental Impact of Electric Vehicles
	Environmental Impact of Electric Vehicles
Kompas.com.	17%
CNN Indonesia	18%
Detik.com	7%

The purpose of this study is to examine whether the mass media, as a public platform for discussing issues related to public life, provides educational content on the environmental impact of EVs. Such educational information is based on scientific literacy, which emphasizes the dissemination of knowledge not only to inform the public but also to foster a dialogue that actively involves stakeholders in the issue at hand. The quantitative analysis of the news content reveals that this topic constitutes a relatively small portion compared to other topics, such as subsidy policies and market penetration. Of the one hundred news articles analyzed, those dealing with the environmental impact of electric vehicles account for only 10-20 percent of the total data corpus (Tabel 5).

Several environmental benefits of EVs are frequently highlighted in mass media coverage. These include: (1) reducing greenhouse gas emissions because EVs do not produce tailpipe emissions; (2) reducing local air pollution, which helps decrease the emission of nitrogen oxides and fine particulate matter, both of which are linked to health problems such as respiratory and cardiovascular disease; and (3) reducing dependence on fossil fuels, a major contributor to global warming. These three key environmental issues are commonly discussed in news coverage of EVs.

While the majority of views on electric vehicles emphasize their positive environmental impact, a smaller proportion of perspectives offer criticisms and concerns

about their environmental impact. These criticisms include: (1) the reliance on non-renewable sources of electricity, as electric vehicles may be charged using electricity generated by fossil fuel-fired power plants (e.g., coal or natural gas); (2) the environmental impacts of battery production, particularly the mining of raw materials such as nickel, cobalt, and lithium, which can lead to environmental degradation, water pollution, and the destruction of natural habitats; and (3) the challenges associated with battery waste management, as batteries have a finite life and can pose environmental risks if not disposed of properly. While these criticisms were noted in the media, they received a much smaller proportion of the coverage compared to other issues.

The relatively limited representation of the environmental impact of EVs in news coverage suggests that environmental concerns are not a primary focus in contemporary media discourse in the country. Furthermore, there is a tendency to treat the environmental benefits of EVs as an established fact that is rarely subjected to critical analysis or further examination. Despite the fact that the electricity that powers these vehicles is often generated by coal-fired power plants—a source of fossil fuel emissions—EVs continue to be portrayed as an environmentally friendly alternative without a detailed exploration of the potential reduction in CO2 emissions. As a result, media narratives around EVs often overlook the complexity of their environmental impact and fail to provide a comprehensive discussion based on empirical data and rigorous calculations.

Sources Quoted in the Media Reporting

Another critical aspect explored in this study of EVs news coverage is the selection and use of news sources (Table 6). The role of sources in journalism is pivotal as they have a significant impact on the credibility, accuracy, and impartiality of the information presented. Credible and authoritative sources can provide in-depth insights and reliable data, while less trustworthy or biased sources have the potential to distort the narrative and mislead the audience. By critically analyzing the sources cited in news coverage, readers are better equipped to identify bias and engage more thoughtfully with the content. This analytical approach not only supports informed decision-making but also fosters greater media literacy, enabling audiences to assess the quality and objectivity of the information they encounter.

The quantitative analysis of news content drawn from a data corpus of three online news portals reveals that government sources are the most frequently cited, followed by sources from the business and entrepreneurial sources. In contrast, sources from civil society organizations (CSOs), activists, politicians, innovators, consumer representatives, and

academics constitute a significantly smaller proportion of the cited material. This distribution highlights the dominant influence of government and business perspectives in shaping the discourse, while the contributions from other stakeholders remain comparatively limited.

Table 6. Sources Quoted in EVs News

Media	Sources in Electric Vehicles News						
	Government	Entrepreneur	CSO/ Activist	Politician	Innovator	Consumer	Academic
Kompas.com.	35%	41%	3%	3%	0%	1%	3%
CNN Indonesia	52%	44%	7%	2%	1%	1%	0%
Detik.com	81%	21%	6%	1%	1%	4%	5%

The prominent frequency of citations from government sources suggests that the government plays a dominant role in shaping the EVs agenda. The content analysis of the news reveals that the government is central to the adoption and uses of EVs, influencing the sector through policies, regulations, and strategic initiatives. This underlines the dependence of the EVs industry on government support, particularly in areas such as incentives, infrastructure development, and cooperation with foreign investors. The analysis also shows that media coverage of EVs is largely focused on policy and regulatory issues. News stories citing government sources often highlight key policy aspects, including roadmaps, fiscal incentives and industry regulations, reflecting the significant influence of government action on the growth of the sector.

The disproportionate representation of news sources suggests a potential imbalance in the perspectives presented in the media. The dominance of government sources in reporting can result in news coverage that does not adequately reflect the diversity of viewpoints of other key stakeholders, such as academics, industry players, consumers, and environmental groups. This imbalance can lead to biased reporting that focuses heavily on government narratives while neglecting challenges, criticisms, or alternative perspectives. In addition, this uneven sourcing signals a limitation in the media's ability to explore independent or critical viewpoints. Such a bias may arise from limited access to relevant non-governmental sources or from the media's tendency to prioritize sources that are considered most authoritative in EVs policy discussion. This narrow focus reduces the overall comprehensiveness and objectivity of the coverage.

The content analysis of three online media outlets in Indonesia revealed that the media coverage of EVs talked a lot about the business aspects of the industry, with a focus on market conditions, sales trends, investment, and the types and brands of EVs available on the market and their prices. However, the most dominant theme across the three national media portals was the provision of subsidies and incentives and government support for the uptake of EVs. This focus is in line with the recent momentum generated by the government's introduction of several policy packages aimed at fostering the adoption of EVs in Indonesia.

Other themes that appeared in the coverage included various technical aspects related to the use of EVs, such as the availability of charging stations as well as considerations related to vehicle safety and the necessary components for the operation of EVs. However, the relation between the use of electric vehicles and their environmental impact has only been addressed to a limited extent. Furthermore, the mechanism by which electric vehicles contribute to reducing carbon emissions was not sufficiently explored and did not emerge as a central theme in the coverage of the three national online news portals. This lack of emphasis on environmental impact suggests a gap in media's coverage of the wider environmental benefits and risks of EVs adoption.

From the analysis it was found that media coverage still contains quite limited scientific information about EVs. As mentioned previously, the media has the potential to play a pivotal role in communicating science in shaping public understanding behind the technology and policy of EVs with a balanced and evidence-based scientific knowledge about the risks and benefits of this technology. The approach that media reporting from the analysis showed there are not much of science information that is come from up-to-date and peer reviewed research that explicate the detail of environmental impact of the development and the uses of EVs as well as the information that explain the complexity of EVs technology that include battery supply chain, lifecycle emission, and energy dependence. As mentioned previously, there is a tendency of media reporting to treat or to assume that the environmental benefits of EVs as an established fact without covering the counter narratives based on scientific research that may still be ongoing. Ensuring accuracy of information, emphasizing science integrity behind the development of EVs and its technical support, and contextualizing the information with balanced risk and benefit of the technology used could help the public to gain better understanding regarding EVs.

In addition, the way media coverage of EVs heavily relied on the government perspectives and voices regarding the EVs is something that can be improved upon. The news coverage that includes citizen voices, public concerns, and even different points of view from researchers or community leaders who work on clean transport could provide more diverse voices that can lead to promoting dialog regarding EVs adoption and uses. The users-centered approach that frames the stories in relation to people's experiences about mobility, health, jobs, and other aspects relevant to EVs can also be an alternative side of the stories to avoid the heavy reliance on government and authority voices. The reporting approach that covers the stories of community responses could position the public concerns as voices that can shape policy of EVs adoption, not just passive recipients of expert knowledge and government policy.

In regards to the policy related to EVs, the media can play a principal role in educating the public by explaining how decisions are made, what conditions drive the policy, and who influence them. As the analysis showed, the news coverage about the policy of provision of subsidies, incentives, or government assistance for the purchase of EVs dominated the news about EVs. However, there were limited news stories that talked about the background of this policy in in-depth reporting. The news coverage that highlights policy process and the conditions that lead to the emergence of a policy could foster more public knowledge and in turn would lead to public involvement in policy making. In the long run, this public engagement would stimulate public agency in policy making regarding EVs, and environmental policy in general.

Media could enhance their capacity to communicate science through their news reporting by adopting some practical approach to bridge the gap between scientific knowledge and public understanding in the complex issues, such as environmental impacts of EVs. From the professional side, experts have suggested that encouraging specialization in science journalism to journalists or recruiting and assigning science-literate reporters to relevant issues could improve the quality of scientific reporting of the media (Fahy & Nisbet, 2011). This is also in line with suggestions to provide regular training and workshops to improve understanding of scientific terminologies, methods, and even uncertainties in sciences. Furthermore, the media could build closer and meaningful relationships with scientific communities, to be able to establish mutual trust with research institutions, universities and even individual scientists (Bucchi & Trench, 2014). An equally important

approach is to include diverse voices and local context, that also to include users, local communities, and underrepresented communities.

CONCLUSION

The content analysis of news coverage on electric vehicles (EVs) in Indonesia reveals a media landscape dominated by government narratives, with limited representation of diverse perspectives from civil society, academia, and the general public. This concentration of government and business sources shapes a discourse that heavily emphasizes policy, subsidies, and market developments, while paying little attention to broader scientific, environmental, and social dimensions of EV adoption. The lack of detailed, evidence-based scientific reporting—particularly on lifecycle emissions, battery supply chains, and the environmental trade-offs—hampers the media's role in fostering informed public understanding of the complexities surrounding EV technology.

Furthermore, the minimal inclusion of environmental impact narratives and insufficient exploration of the mechanisms through which EVs reduce carbon emissions highlight a critical gap in science communication. The media's tendency to treat the environmental benefits of EVs as a given, rather than engaging with ongoing scientific debates and uncertainties, limits public awareness of the full range of risks and benefits.

This narrow framing also diminishes the potential for democratic engagement. By prioritizing government sources and authoritative voices, media coverage risks side-lining citizen perspectives and failing to promote public dialogue. Incorporating a wider array of voices—such as researchers, consumers, environmental advocates, and community leaders—would not only enrich the discourse but also empower the public to actively participate in shaping EV policy.

To fulfil its potential as a vehicle for science communication, the media must adopt a more balanced and inclusive approach. This includes grounding stories in up-to-date scientific evidence, highlighting the policy-making processes behind EV incentives, and framing narratives around the lived experiences of diverse communities. Doing so will enhance public understanding, foster critical engagement, and ultimately contribute to more transparent, inclusive, and democratic policy-making related to EVs and environmental sustainability.

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