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Analysis of Makassar City Government's Readiness to Adopt Electric Vehicles Transportation Policy

Sumardi*[1], Fatma[1]

[1]*Department of Government Studies, Universitas Pancasakti Makassar, Indonesia*

*Email: sumardi@unpacti.ac.id

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Abstract: The Indonesian government has taken significant strides towards promoting the adoption of electric vehicles (EVs) by offering subsidies to the public and encouraging local governments to embrace this sustainable transportation solution. This research aims to assess the preparedness of local governments, with a particular focus on Makassar City, in implementing policies to facilitate the integration of electric vehicles into their transportation systems. Employing a qualitative research approach, this study delves into statutory documents and regulations to gauge the progress and readiness of Makassar City's government in embracing EVs. The findings indicate that while the Makassar City Government has taken initial steps by introducing programs such as the Mobile Doctor Service Car program, Co'mo Car Electric Motor Program (Te'tere), and providing electric vehicles for officials, there is still a notable absence of comprehensive policies governing the use of electric vehicles. To ensure the sustained growth of EV adoption in Makassar City, it is imperative for the local government to formulate and enact relevant regulations, be it through regional laws, mayoral decrees, or other legal frameworks. These regulations should encompass various aspects of electric vehicle usage, including incentives, charging infrastructure, and sustainability practices. Additionally, the study underscores the importance of establishing a robust network of public electric vehicle charging stations to support the growing EV community in Makassar City. These facilities will play a pivotal role in enhancing the convenience and accessibility of electric vehicles for both residents and visitors, thus further promoting their adoption.

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INTRODUCTION

Conventional transportation is one of the factors that affect air quality damage (Umar et al., 2021), especially in urban areas in many countries (Xie et al., 2021), such as in Indonesia, especially in Makassar City (Surya et al., 2020). Currently, governments in many countries are considering other accommodative policies, including encouraging the use of electric vehicles (Farfan-Cabrera, 2019). Encouraging the use of electric vehicles is considered to improve air quality, especially in dense urban areas (Guo et al., 2020).

Electric vehicle policy is very crucial because conventional vehicles are currently also considered one of the primary sources of greenhouse gas emissions (Khalili et al., 2019), global warming (Acar & Dincer, 2020), and climate change (Love et al., 2010). This trend requires a severe response from the government (Gong et al., 2020), especially the Indonesian government (Maghfiroh et al., 2021). The Indonesian government is initiating a transportation policy by considering using electric vehicles as a sustainable

development effort and reducing existing problems (Wangsa et al., 2023). Several advantages can be obtained by converting the use of conventional vehicles by using electric vehicles.

Using electric vehicles can help reduce the impact of environmental damage (Sun et al., 2019). Adopting electric vehicles also minimizes dependence on fossil fuels such as gasoline or diesel, which deplete and trigger rising fuel prices (Koengkan et al., 2022). In addition, electric vehicles are much more efficient than conventional vehicles because they can convert most of the energy generated from the battery into motion (Zhang et al., 2020).

This energy efficiency can have a significant impact on the government. By improving energy efficiency, the government can reduce operational costs (Alam et al., 2019), especially in the public sector, such as transportation (Wang et al., 2020). It can also reduce dependence on imported energy (Zhu et al., 2020). Indonesia has great potential to produce electric vehicles independently because it has resources (Pirmana et al., 2023), especially the raw materials needed to produce electric vehicle batteries, such as nickel which is spread across the Sulawesi region (Gultom & Sianipar, 2020). This potential has made the Indonesian government consider using electric vehicles, especially in Makassar City.

In Indonesia, the growth rate of electric vehicle users from year to year has experienced relatively good growth. This data can be seen in Graph 1. below. This relatively good growth rate needs to be responded to immediately by making policies, including by the City Government of Makassar. The distribution of the use of electric vehicles is generally concentrated in urban areas.

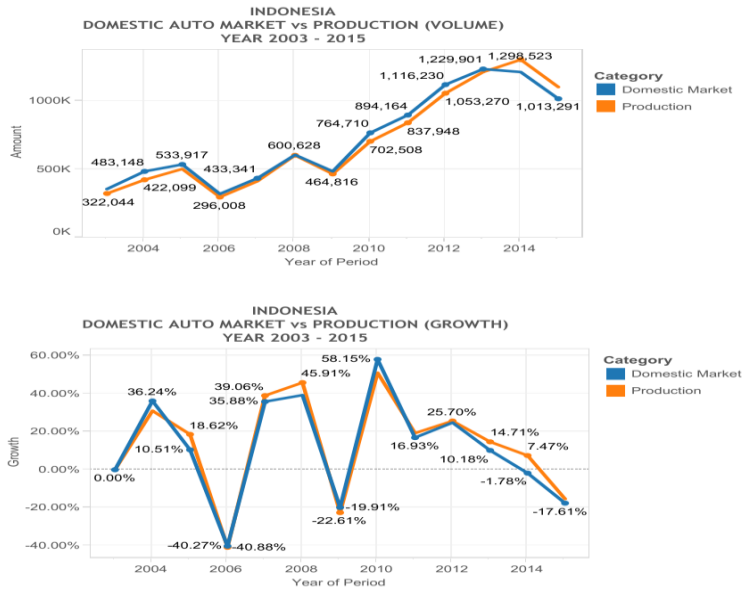

Figure 1. Growth in the Use of Electric Vehicles

Makassar City Government recently procured 20 electric cars for government officials in early 2023. The procurement was by instructions from the President of Indonesia, Joko Widodo (Rustam, 2023). In addition, based on information on the government's official website, it was also announced that electric vehicles are

increasingly in demand in Makassar. The Makassar City government's seriousness followed this trend in providing infrastructure for Public Electric Vehicle Charging Stations (SPKLU) and Home Charging. The advantages of home charging include convenience and convenience, as well as lower charging costs compared to public charging stations in public places (Haddadian et al., 2015). Many studies on electric vehicles have been carried out, but very few studies have been found that analyze the readiness of local governments, especially in Makassar City.

The primary objective of this research study is to delve into the preparedness of the Makassar City government in facilitating the integration of EVs into their transportation infrastructure. In pursuit of this goal, several pertinent research questions have been formulated to guide our investigation. These questions have been meticulously crafted to provide insights into the policy challenges at the regional level and to reveal the proactive measures undertaken by the Makassar City government in promoting the adoption of electric vehicles.

One of the key research inquiries focuses on understanding how the Makassar City government is gearing up to establish the necessary infrastructure to support the effective use of electric vehicles. This question seeks to uncover the physical and logistical preparations, such as the development of charging stations and the adaptation of roads and traffic systems, that are crucial for the successful integration of EVs into the city's transportation ecosystem.

Additionally, another critical question being explored in this study pertains to the government's initiatives aimed at stimulating public interest (Karman et al., 2021), and participation in electric vehicle adoption. This query aims to shed light on the strategies, incentives, and awareness campaigns that the Makassar City government has deployed to encourage residents and businesses to embrace electric vehicles as a sustainable and eco-friendly transportation option.

By addressing these research questions, this study aspires to provide a comprehensive understanding of the challenges and opportunities faced by local governments, with Makassar City as a specific case study, in their transition towards electric mobility. The findings will not only help identify areas where policy adjustments and improvements may be needed but also showcase the innovative efforts and responses of the Makassar City government in promoting a greener and more sustainable transportation future for its citizens.

RESEARCH METHOD

The research method used in this study is a qualitative approach that includes various important stages to collect, analyze, and interpret relevant data (Sagena et al., 2023). The research stages were carefully designed to provide an in-depth understanding of the Makassar City government's readiness to integrate EVs into its transportation infrastructure.

The data collection approach used involved direct observation of the electric vehicle infrastructure in Makassar City. This involved direct observation of various aspects of the relevant infrastructure, such as charging stations and road infrastructure, with the aim of

gaining a clear understanding of the extent to which this infrastructure is ready to support the use of electric vehicles in the city. In addition, the direct use of electric vehicles on the streets of Makassar City was also an important part of this method. This allowed the researcher to experience using electric vehicles in an everyday environment and identify challenges and opportunities that may be faced by electric vehicle users.

In addition to field observations, the research also involved in-depth document analysis. Document analysis involves a thorough study of various types of documents, including reports, relevant regulations and other sources of information. These documents include presidential instructions related to the use of electric vehicles, regulations from the Ministry of Energy and Mineral Resources, and regulations from the Ministry of Transportation and the Ministry of Industry relating to electric vehicles. This document analysis is an important foundation for understanding the existing policy framework and regulations governing the use of electric vehicles at the national level.

After data collection, the next stage is data processing and analysis. The data that has been collected is presented in a systematic way, and then data reduction is carried out to identify the most relevant and significant information. The results of this analysis were used to answer the formulated research questions. In addition, to ensure the validity and reliability of the research results, data triangulation was used. This means that data obtained from various sources, such as observation, electric vehicle use, and document analysis, were compared and verified to ensure their suitability.

In this series of stages, the research results that have been processed and analyzed are interpreted to provide a deeper understanding of the Makassar City government's readiness to adopt electric vehicles. These results are also used to provide substantial answers to the research questions posed, as well as to identify potential challenges and policy recommendations that can support the wider use of electric vehicles in Makassar City. This method comprehensively integrates field observations, document analysis, and data analysis to provide deep insights into relevant research topics.

RESULTS AND DISCUSSION

Analysis of National Regulations on Electric Vehicles

The relatively good growth rate of electric vehicle use in Indonesia was welcomed by the government, which made various regulations, including Ministerial Regulation of Energy and Mineral Resources Number 13 of 2020, Minister of Transportation Regulation Number 65 of 2020 concerning Conversion of Electric Motorbike Driven Motorbikes to Battery-Based Electric Motorcycles, and Minister of Industry Regulation Number 6 of 2022 concerning Specifications, Development Roadmaps, and Provisions for Calculating Domestic Component Level Values in Electric Vehicles, Ministerial Regulation of Environment and Health Forest No. P. 20/ MENLHK/ SETJEN/ KUM. 1/3/2017, concerning Euro 4 type emission quality standards for motorized vehicles. The Association of Indonesian Automotive Industries (GAIKINDO) welcomes the steps taken by the Indonesian government regarding the implementation of policies regarding the application of Euro4 emission standards. GAIKINDO's positive attitude follows

GAIKINDO's capacity as a forum for automotive industry players in Indonesia, especially from manufacturers (production) and car distributors.

For the automotive industry, these regulations are critical. This makes the level of competition wide open; for example, Indonesia now has the opportunity to widen its export destinations efficiently. Several points in the development of the national automotive industry need to be known. Among other things, Indonesia's automotive industry is already independent to meet domestic needs. This can be seen in the various car products in the Indonesian market. Many have used relatively high levels of domestic component levels (TKDN).

Based on data from the ASEAN Automotive Federation (AAF), Indonesian car sales in 2018 it has reached 1.08 million units (32.32 percent) of the total 3.34 million car sales units in the ASEAN region. Then, the country with the second most car sales is Thailand, followed by Malaysia in third. Indonesia will remain a leader in ASEAN. This is the same as the government's mission to increase the population of electric cars in Indonesia. This immense export opportunity should trigger automotive manufacturers in Indonesia to be more severe and swift in investing in RnD and electric car production. If the government succeeds in facilitating industry players with supportive regulations and incentives, Indonesia can become a production base for hybrid and electric car vehicles to be exported worldwide.

The Indonesian government can use incentives in issued policies to attract investment into Indonesia and attract its population to use electric vehicles. Policy incentives are an effective way to gain increased EV sales by increasing the attractiveness of switching from conventional vehicles to electric vehicles (Langbroek et al., 2016)

Table 1. 2016 ACI Overall Competitiveness Rankings of Indonesian Provinces

Rankings	Rated Power	Province
1	3,2008	DKI Jakarta
2	2,0817	East Java
3	1,4636	Central Java
4	1,3309	West Java
5	0,9956	East dan North Kalimantan
6	0,9658	South Sulawesi
7	0,6697	Bali
8	0,6482	South Kalimantan
9	0,5486	North Sulawesi
10	0,3967	Special Region of Yogyakarta
11	0,2579	Banten
12	0,0935	Riau Islands
13	-0,0019	Central Kalimantan
14	-0,0767	Central Sulawesi
15	-0,1837	Riau
16	-0,1951	Southeast Sulawesi
17	-0,2804	West Kalimantan
18	-0,3062	Lampung
19	-0,3356	West Nusa Tenggara
20	-0,4338	Bangka Belitung Islands
21	-0,4473	Gorontalo
22	-0,4493	South Sumatra
23	-0,4878	West Sumatra
24	-0,558	North Sumatra

25	-0,6513	Bengkulu
26	-0,6909	Aceh
27	-0,7292	West Papua
28	-0,7668	Jambi
29	-0,8476	Maluku
30	-0,9933	West Sulawesi
31	-1,306	North Maluku
32	-1,3927	East Nusa Tenggara
33	-1,5192	Papua

Source: (Sidabutar, 2020)

The policies issued may be constrained by their implementation when they enter the regional government system. The current decentralization in Indonesia has caused changes in the governance structure, including in Makassar City. Only now, a policy has been made by the City Government of Makassar to welcome the rapid growth in the use of electric vehicles. Even though the prospects for the electric vehicle business are up-and-coming, to maintain a healthy business climate for electric vehicles, the local government should make policies either by regional regulations, mayoral regulations, or regulations on a lower scale.

The data results emphasize several important aspects in the context of government policy, implementation, and its impact on the growth of the electric vehicle industry in Makassar City, Indonesia. A common problem that often occurs in the policy context is the gap between policy formulation at the national or central level and its implementation at the local government level. Good policies can be constrained by various factors when they have to be implemented by local governments. These can include differences in local conditions, available resources, and different understandings of the policy. Good coordination and an in-depth understanding of the implementation challenges are essential to ensure the policy can produce the expected impact.

References to decentralization in Indonesia show that this policy has significant relevance in the Indonesian context. Deconcentration authorizes local governments to manage their own local affairs, including the implementation of policies related to electric vehicles. This creates opportunities to adapt national policies to suit local conditions and needs.

The introduction of policies by the Makassar City Government that support the growing use of electric vehicles shows awareness of the potential of the emerging electric vehicle industry. Electrification of transportation is a global trend, and Indonesia, with its large population and challenges related to air pollution, has great potential in this industry. However, emphasis is placed on the importance of local-level policies (regional regulations, mayoral regulations, or regulations on a lower scale) to create a healthy business climate for electric vehicles. This could include fiscal incentives, development of charging infrastructure, or regulations on the use of electric vehicles.

Thus the complex dynamics between policy formulation, implementation at the local level, and impact on industry growth. It also highlights the importance of collaboration between central and local governments in achieving larger development goals, including supporting technological innovations such as electric vehicles and maintaining a cleaner environment.

Electric Vehicle Policy in Makassar

The Makassar Regional Planning and Development Agency (Bappeda) is preparing an electric vehicle roadmap. Several steps have been taken to develop the use of electric vehicles in the future. For example, it provides public service transportation based on electric vehicles. The Makassar Health Office, for example, is being encouraged by the Dottoro car program (mobile doctor service), which uses 43 units of electric vehicles and five units of Co'mo cars. This year there is already a budget allocated in the APBD. Apart from that, there is a Tettere or electric motorbike whose function will be a mobile market. The prototype was released in 2021, and a second version will soon be issued as an improvement with a targeted number of 153 units. It is targeted to enter all urban villages in Makassar immediately. The budget for these two programs has been included in the Makassar City Government.

Furthermore, there is also an electric bus designed by the Makassar City Government. It is just that this project is not yet detailed because it is still in the refinement stage. Procuring these vehicles is carried out in stages because it takes up a significant budget. Makassar City Government plans to procure 20 electric cars for government officials as official vehicles with a budget of 20 billion.

Electric vehicles must be supported by facilities such as electric refueling or public electric vehicle charging stations. Currently, there are only three public electric vehicle charging stations belonging to the State Power Plant (PLN) located at the Governor's Office, Hertasning Street, and Ratulangi Street. At present, the South Sulawesi, Southeast Sulawesi, and West Sulawesi Distribution Main Unit State Power Plants have provided a total of 5 SPKLUs, 3 of which are in Makassar City, 1 in Pare-Pare City, and 1 in Kendari City. Only a few SPKLUs are one of the factors that the Makassar City Government must immediately pay attention to communicate and collaborate with PLN to add SPKLU units in Makassar City.

The need for more facilities is one of the main obstacles for consumers to switch from conventional to electric vehicles. Several steps must be taken to welcome the transition from conventional to electric vehicles: (1) increasing vehicle mileage; (2) expanding public charging infrastructure that will give drivers the confidence to complete their trips and power up their vehicles when needed. For green transportation to become a reality, we cannot focus on one particular aspect of transportation and ignore other factors that can influence energy management. A fully integrated framework in which all energy-conscious entities are required to enable sustainable transportation, i.e., an integrated, complete, intelligent transport management system. Integration of the Transportation Management System is only possible with the cooperation and collaboration of car manufacturers, scientists, power companies, governments, and standards organizations (Sidabutar, 2020).

The Makassar Regional Planning and Development Agency (Bappeda) has taken important steps to design an electric vehicle action plan. One of the concrete steps mentioned is the provision of electric vehicle-based public transportation services. For example, the Dottoro Doctor Car Program which uses 43 units of electric vehicles and five units of Co'mo cars in the health sector. The fact that the budget for this program has been

budgeted in the Regional Revenue and Expenditure Budget (APBD) shows the seriousness of the Makassar City Government in encouraging the adoption of electric vehicles.

Efforts to develop an electric motorcycle that will serve as a mobile market. The prototype has been released in 2021, with plans to develop a second version that will include 153 units. This is another example of the innovation in sustainable mobility that the municipality is pursuing.

The city government is also planning to procure 20 electric cars for government officials with a budget of 20 billion rupiah. This shows a commitment to set a positive example and support the use of electric vehicles in the public sector.

However, one of the main challenges faced is the lack of charging infrastructure for electric vehicles. The text notes there are only three public electric vehicle charging stations currently in the city. To encourage the transition from conventional to electric vehicles, there needs to be significant investment in more widespread and accessible charging infrastructure. This will give drivers confidence that they can charge their electric vehicles easily wherever they are.

The importance of cross-sector cooperation in realizing a sustainable transportation system. This includes cooperation between vehicle manufacturers, scientists, energy companies, governments, and standards organizations. In the era of sustainable mobility, collaboration between all stakeholders is key to achieving common goals in terms of renewable energy and green transportation.

Overall, the electric vehicle policy in Makassar dimension illustrates the Makassar City Government's commitment to adopting electric vehicles as part of their sustainable mobility vision. Despite the challenges, this effort reflects a positive drive to create a cleaner and greener urban environment.

CONCLUSION

This research highlights the importance of electric vehicle-related policies in the context of the need to address the negative impacts of conventional vehicle use. Currently, conventional vehicles are considered as one of the main sources of greenhouse gas emissions, global warming, and global climate change. Therefore, a firm response from all levels of government, from the central government to local governments, is crucial in dealing with this trend.

The Indonesian central government has taken some important steps by issuing a number of regulations related to the use of electric vehicles, such as Presidential Instruction Number 7 of 2022 on the use of electric vehicles, Minister of Energy and Mineral Resources Regulation Number 13 of 2020, and several other regulations governing various aspects of the use of electric vehicles. However, special attention should be given to the local government level, such as the Makassar City Government.

From the results of this study, it appears that the Makassar City Government is still in the preparation stage to deal with the transition from conventional vehicles to electric vehicles. Although it has started the initial steps with programs such as Mobile Doctor Service Car, Electric Motor Program Co'mo Car (Te'tere), and provision of official electric

vehicles for officials, there is still a need to develop a more comprehensive policy at the regional level. These policies should cover various aspects, including incentives, charging infrastructure, and sustainable practices.

Therefore, to maintain a conducive business environment for electric vehicles, the Makassar City Government should immediately issue regulations that support the use of electric vehicles. This can be done through regional regulations, mayoral regulations, or other relevant regulatory frameworks. In addition, the provision of facilities in the form of vehicle charging stations is listed below.

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