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Research Paper

Acceleration of the Battery Electric Vehicle Program through Carbon Tax and Strategic Management between Government Institutions

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Abstract

The implementation of the Sustainable Transport Strategy aims to reduce global warming through the generation of environmentally friendly energy, the reduction of carbon emissions, and the fight against extreme climate change. The use of vehicles in Indonesia, most of which still use gasoline-fueled motor vehicles, produces polluting emissions and can cause various problems. This study aims to find solutions to government policy management to realize the transition to sustainable transportation through battery electric vehicles. This study uses a descriptive qualitative research design. Data collection in this study uses literature studies by collecting sources on the concept of sustainable development in the field of transportation, in the context of renewable energy. The data processing process carried out in qualitative descriptive research includes data reduction, data presentation, and verification or inferring data. The analysis technique used is in-depth analysis which means in-depth analysis techniques. The results show that to answer these problems, the Indonesian government needs to increase the use of electric motor vehicles both for public and private vehicles, and the right policy-making strategy is needed to target the acceleration of the battery electric vehicle program can be significant. Through carbon tax policies and supporting consumer convenience which includes the construction of charging station infrastructure, spare parts distribution, and increasing mechanical competence, the level of public awareness to switch to using battery electric vehicles.

Keywords *battery electric vehicle, carbon tax, consumer convenience*

INTRODUCTION

The priority of Indonesia's development strategy is to realize sustainable development goals (Ferawati, 2018). The implementation of the strategy in sustainable transportation is related to efforts to reduce global warming through the creation of clean energy, reducing carbon emissions, and dealing with extreme climate change. The use of transportation in Indonesia, which is still dominated by oil-fueled motor vehicles, causes exhaust gas pollutants that can trigger various problems. Both from damage to ecosystems and public health. The use of oil-fueled motor vehicles also does not support the pillars of sustainable development. The pillars include social, economic, environmental, legal, and governance development (ITC-ILO, 2018).

In addition to the environmental aspect, there are economic issues related to the application of these oil-fueled motor vehicles. The issue is related to the amount of fuel subsidies issued by the

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government to support community mobility (Pirmana et al., 2023). Fuel oil consumption tends to be more abundant and expensive. In addition, although the cost of producing oil-fueled motor vehicles tends to be cheaper, the cost of handling the impact is not comparable to the tax set by the current government. Electric motor vehicles that are considered more environmentally friendly and can handle global issues have production costs that are considered quite large. So that not all people can reach it. However, when calculated with the cost of fuel every day, electric motor vehicles will be much more efficient, cheaper, and efficient. The scarcity of battery refueling points is also the cause of people who are less interested in buying electric motor vehicles. It should also need strategic management so that all people in various layers can get Recharging Electric Vehicle Energy easily.

Based on these problems, the Indonesian government began to intensify the use of electric motor vehicles. Both for mass and personal vehicles. However, there is a need for targeted strategic management so that the community can support the transition program of motor vehicles from oil-fueled to electric-fueled. Therefore, this study aims to find solutions to government policy management to realize the transition to sustainable transportation through electric motor vehicles.

LITERATURE REVIEW

Electric Vehicles

KBLBB is an acronym for battery-based electric motor vehicles, hereinafter also known as KBL (electric motor vehicles) (Perpres 55, 2019). Electric Vehicle (EV) is all types of passenger vehicles driven by electric motors either in whole or in part, for example in systems with a combination of fuel motors (Utami, Yoesgiantoro, and Sasongko, 2022). Battery Electric Vehicle (BEV) includes a group of vehicles driven only by electric motors that can be translated as battery electric vehicles (KLB). KLB is an electric vehicle that uses batteries to store electrical energy, which is then converted into mechanical energy by an electric motor. The electrical energy of this type of battery is obtained from charging from an outside source of electrical energy such as the power grid.

Carbon Tax

According to the Tax Foundation, (2022), a carbon tax is a tax imposed on any carbon emissions that may hurt the environment. The carbon emissions referred to in this sense are carbon dioxide, methane, and other greenhouse gases. The carbon tax will generally be applied to all economic activities that generate carbon emissions, both production and consumption activities. Judging from Selvi and Rachmatulloh (2020) its function, argue that carbon taxes play a regulatory role. According to the website of the (Direktorat Jendral Pajak, 2021), taxes have several functions, including regulatory functions. The regulatory function means that taxes are a tool used by the government to achieve a goal. Carbon tax is said to have a regulatory function because it is applied to achieve a specific goal, namely reducing carbon emissions.

General Electric Vehicle Charging Station and General Electric Vehicle Battery Exchange Station

SPKLU is a facility in charges electricity for motor vehicles and battery-based electricity for the public. The popular public fast charging station is the fast charging of electric cars with only 20-30 minutes, the fast charger is suitable for the proposed tram system general fast charging system the normal fast charging system has the right supporting materials, particularly the difference between indoor charging system and public places on the EVSE and OBC AC/DC is located in the charging station and so on the vehicle only has control of the vehicle it is a functional component of HVDC.

SPBKLU battery exchange process only takes 3-5 minutes. This station is a solution for electric motorcycles so that they can charge quickly by exchanging an empty battery for a full battery. With these two facilities, it will be very easy for the community to carry out various activities without worrying about recharging the electric vehicle power.

Spare Parts

Spare parts are a tool that supports the procurement of goods for equipment used in the production process (Helmud, 2021). Based on the above definition, spare parts are the main factors that determine the course of the production process in an enterprise. So it can be said that these spare parts have a considerable role in a series of company activities. Spare parts as part of the stock are available for the general needs of vehicle maintenance (Usman, Jeffry, and Aziz, 2022). Good spare parts inventory management allows the company to achieve this level of maximum service and can reduce, even eliminate excessive storage costs.

Mechanics

According to Amini, Sharifani, and Rahmani (2023), a mechanic is a professional who has knowledge and skills throughout the engineering field, i.e. has the expertise to understand, maintain, and repair various machines, including cars and other mechanical equipment. The mechanic's responsibilities include inspection, maintenance, and repair to ensure the machine is working properly and safely. The mechanic is also responsible for diagnosing problems in the machine and looking for the right solution to solve them. They are mechanics who use a variety of mechanical gauges and specialized equipment to aid in the maintenance and repair process. A mechanic must always keep abreast of the latest technological developments to answer the challenges of the growing machinery industry. The mechanical profession requires a high level of skill and requires formal training. A mechanic must have in-depth knowledge of the theory and basic principles of machining, as well as practical skills in the use of mechanical tools.

METHODOLOGY

Research Method

This study is a research that focuses on the field of sustainable transportation on environmentally friendly fuel systems by examining logical and systematic variables in efforts to limit oil-fueled vehicles to reduce carbon emissions. This study uses a descriptive qualitative research design. Understanding qualitative research is Research whose problem-solving orientation is carried out with a tendency toward exploration and discovery (Rosyada, 2020). Qualitative descriptive research is derived solely from the reference to the identification of the different properties of the relationships of a group of people, objects, or events that will later form a classification scheme. The qualitative approach is perceived as a research method that analyzes non-numerical data in an unstructured manner that generally utilizes interviews, documents, and observations to obtain data (Thelwall and Nevill, 2021). Data collection in this study uses a literature study (library search) by collecting sources on the concept of sustainable development in the field of transportation in the context of renewable energy. The data processing process carried out in qualitative descriptive research includes data reduction; data presentation, and verification or inferring data (Mudjiyanto, 2018).

Broadly speaking, the analysis technique used is in-depth analysis which means in-depth analysis techniques on aspects of understanding each problem to be studied. So that the analysis does not only look at research problems in general but research problems will be studied in depth from case to case. This is because the qualitative methodology has a different nature of the problem between one and the other but is still interrelated. Conclusion making through an in-depth understanding of each problem studied by finding improvement and innovative solutions to these problems (Government of Indonesia, 2022).

FINDINGS AND DISCUSSION

Government Policy To Accelerate The Implementation of Battery Electric Vehicle Use Program

The acceleration of the use of battery-based electric motor vehicles in Indonesia has been pursued by the government through the presidential instruction of the Republic of Indonesia number 7 of 2022 on the use of battery-based electric motor vehicles as operational official vehicles and/or individual vehicles of Central and local government agencies (Government of Indonesia, 2022).

Although the president's instructions and various regulations related to battery-based electric vehicles have been established, as well as the convenience related to policies have been made easier, it still has not had a significant impact on the acceleration of the implementation of the battery electric vehicle use program. The current policy that has been set is to offer various conveniences related to regulations that are generally used by transportation users. In addition, the government has also legalized the conversion of fueled motor vehicles other than motorcycles with fuel motor drives into electric motors through Minister of Transportation regulation number 15 of 2022. To have a significant impact, there needs to be a centralized policy management that is coercive and executed evenly for all Indonesian people. In this study, the policy that is considered to have a significant impact is the regulation relating to the National Economic Policy and development policy relating to the provision of user facilities. With the rules that force through economic policies and rules that support comfort through the policy of providing user facilities, the public will be more quickly aware and willing to follow the program of using battery-based electric motor vehicles.

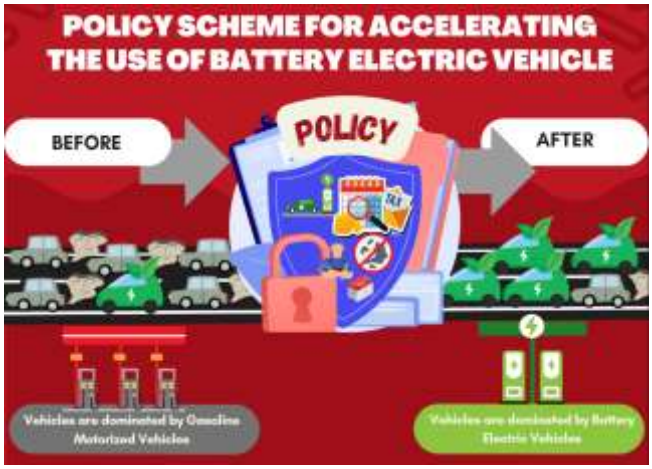

Figure 1. Scheme for improving the perception of the use of electric vehicle batteries

Management of Restrictions on Oil-Fueled Motor Vehicles Through a Carbon Tax

The National Economic Policy that is considered to force and have a significant impact on society is fiscal policy. To make restrictions on a large scale and a national scale, the fiscal policy instrument on sustainable transportation that is considered appropriate is a carbon tax. This carbon tax policy scheme can be applied by levying a tax on every motor vehicle that produces exhaust or carbon emissions. This study proposed regulatory management by providing an increase of 10% at each rate per year. For example, in the first year, the carbon tax rate for motor vehicles fueled by oil is Rp30 per kilogram of CO2. Then in the second year will be given an increase of 10%, so that it becomes Rp33 per kilogram of CO2. In the third year, it will increase again by 10% from Rp33 per kilogram of CO2, which is Rp36.3 per kilogram of CO2. Likewise, so on until the owner of a motor vehicle fueled by oil gets a very high carbon tax policy for his vehicle. The weighting is an effort to force users of oil-fueled motor vehicles will soon switch to electric motor vehicles by considering all the conveniences and facilities obtained. The amount of CO2 emissions produced by motor vehicles will also continue to increase along with the level of efficiency of vehicle engines. So the restriction of oil-fueled motor vehicles will soon have a significant impact through the carbon tax

policy.

Provision of Supporting Facilities For Battery-Based Electric Motor Vehicles

The acceleration of the implementation of the battery electric vehicle use program through fiscal policy in the previous discussion has the characteristics of force, while this discussion will emphasize more on policy management that facilitates and gives many benefits to the user community and the environment. The main reason for providing supporting facilities is to simplify the process of Use and improve security, safety, and efficiency. In this study, the proposed provision of the main supporting facilities is the provision of SPKLU / SPBKLU, spare parts, and mechanical power that is adequate and easy to reach. mechanical personnel and workshops should also have the competence to convert oil-fueled motor vehicles into battery-electric vehicles. Conversion is different from repair. The difference is in the replacement of oil-fueled engine structures to electric ones. It is necessary to have special equipment and materials that ensure the safety of consumers and mechanical personnel. So there is a need for government directives related to this so that the acceleration of the implementation of the battery electric vehicle use program is immediately implemented.

Policy Implementation Collaboration Scheme Between Government Agencies

In supporting the transition of conventional vehicles to electric vehicles, there is a need for good coordination between agencies/institutions, this is because each has a different task in supporting the national electric vehicle ecosystem.

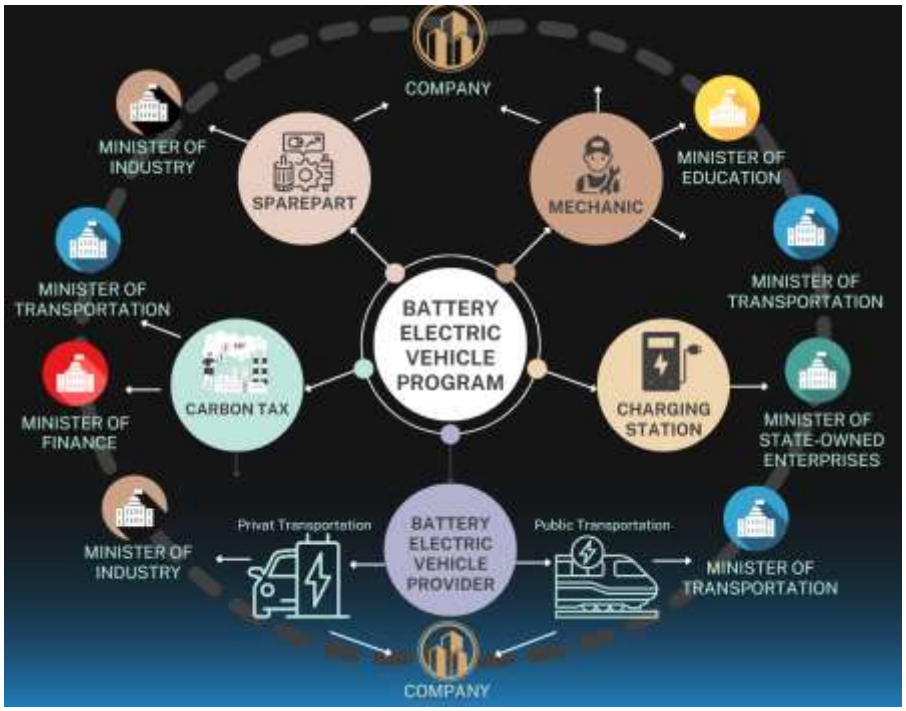

Figure 2. Scheme of collaboration policy implementation between government institutions

CONCLUSION AND FURTHER RESEARCH

The results showed that the policy implementation of the battery electric vehicle usage program has been implemented using regulatory instruments set by the government. All government agencies according to their roles have their respective obligations in supporting the implementation of this program. However, the policy set still has no significant impact on accelerating the implementation of the program. Even though the air condition in urban areas of Indonesia has been heavily polluted by pollution.

So in this study, the authors propose several policy instruments with a coercive nature and still

consider supporting facilities that increase consumer confidence. Fiscal policy through a progressive carbon tax instrument, namely an increase in the rate of 10% each year, can increase the acceleration of the program gradually. In addition to increasing public awareness to want to switch to battery electric vehicles, it is necessary to consider their comfort factor. The strategy includes building a charging station in conjunction with a marketing strategy, distributing spare parts evenly, qualified mechanical competence of the machine, and collaboration between government agencies in its implementation. By ensuring the comfort, security, and safety of consumers, as well as coercive fiscal policies, it is expected that these policies can progress significantly.

There needs to be further research related to the implementation of battery electric vehicle policy by taking into account economic and environmental policies towards the electric vehicle industry and society. Continuous evaluation of the implementation of government policies related to the development of the electric vehicle industry, the development of electric vehicle conversion workshops, and the improvement of the mechanical competence of machines need follow-up and attention from government authorities.

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