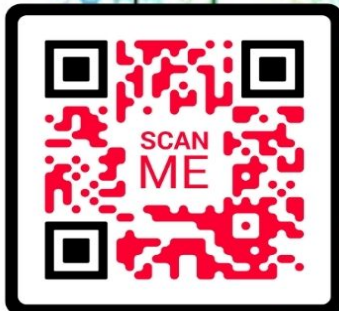


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ISSN (ONLINE) 2598-9936



INDONESIAN JOURNAL OF INNOVATION STUDIES
PUBLISHED BY
UNIVERSITAS MUHAMMADIYAH SIDOARJO

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Electric Vehicle Adoption for Sustainable Economic Growth in Greater Madura

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Abstract

In the context of global sustainability challenges, the transition from fossil fuel dependency to greener alternatives in transportation is vital. The Greater Madura region of Indonesia, with its substantial natural resources and escalating mobility needs, presents a unique opportunity for implementing electric vehicles (EVs) as a sustainable solution. This study explores the barriers to and facilitators of EV adoption in this region through qualitative methods including interviews and expert judgements with stakeholders across government, industry, academia, and the consumer base. The findings reveal that while there is significant potential for EVs to contribute to green economic growth, challenges such as inadequate charging infrastructure and limited public awareness persist. However, strategic investments in infrastructure, comprehensive policy support, and enhanced public engagement are identified as critical drivers for successful EV integration. The study underscores the importance of multi-stakeholder collaboration in achieving sustainable mobility and economic development in Greater Madura.

Highlights:

The study identifies critical infrastructural and regulatory barriers to electric vehicle adoption in Greater Madura.

It highlights the role of multi-sectoral collaboration in fostering a supportive environment for electric vehicles.

The research emphasizes the need for increased public awareness and engagement to facilitate the shift to electric vehicles.

Keywords: electric vehicles, green economy, sustainable development, infrastructure development, stakeholder collaboration

Published date: 2024-01-17 00:00:00

Introduction

Transportation activities on all fronts, both land and sea, have resulted in a large surplus of refined petroleum products such as gasoline, diesel and kerosene [1]. In Indonesia, transportation using fossil fuels is relatively increasing every year. The most widely used means of transportation are motorbikes and cars. In Indonesia, the large number of motorbikes and cars causes serious traffic jams [2]. This problem also leads to air pollution due to burning fossil fuels which contain pollutants that are dangerous for the environment. Moreover, with the increasing use of fossil fuel vehicles, air pollution will also definitely increase. Technological innovation, such as the production of electric vehicles, is needed to overcome this problem. This vehicle is also a driving force for green economic growth in Indonesia, especially in the Madura metropolitan area, especially Greater Madura.

Madura Raya is an area that is rich in natural resources but also has serious challenges related to pollution and environmental impacts due to the use of conventional motorized vehicles. Along with population growth and economic growth, the need for mobility in the region is also increasing. However, the use of fossil fuel electric vehicles raises serious problems related to air pollution and other negative impacts on the environment and public health.

Electric vehicles are one way for humanity to adapt to climate change [3]. This electric vehicle promises to reduce carbon emissions [4]. With the development of electric vehicle innovation, public awareness of the environment is also increasing. It is hoped that the environment will become more balanced and climate problems will be resolved. Electric vehicles are increasingly expected to achieve the goal of zero greenhouse gas emissions because they emit fewer pollutants than cars that use fossil fuels, gasoline or diesel [5], [6].

Electric vehicles also have a positive impact on the implementation of green economy programs. The green economy program has been around since 1992, when the UN conference in Rio de Janeiro accepted it as a sustainable development concept [7], [8].

This concept aims to address economic growth and environmental sustainability. The UN Environment Program describes the green economy as economic growth that aims to improve welfare and social justice while reducing the risk of environmental damage [9]. This concept also provides a new paradigm in economic development, one of which is supported by increasing the transportation sector to a higher level [10]. The electric vehicle being developed is part of the innovation that will encourage the success of the green economy program in the transportation sector. In Indonesia, battery-powered electric vehicles help reduce carbon emissions. As an economic product, electric vehicles will become part of environmentally friendly economic products [11].

As dependence on oil increases, the existence of electric vehicles brings a breath of fresh air to the international community. Currently, the main raw material for batteries is nickel, which is being developed on a large scale by battery manufacturers and electric vehicle manufacturers throughout the world. Currently, the high price of electric vehicles, the lack of electric vehicle charging options, and the lack of incentives from the government are the three main obstacles to the widespread adoption of electric vehicles in Indonesia [12].

The biggest challenge in achieving a green economy is adapting existing economic systems to sustainable principles. Efficient and sustainable use of natural resources, reducing greenhouse gas emissions, and protecting natural ecosystems are part of this transformation. On the other hand, there are also opportunities to move towards a greener economy, including the development of cleaner and environmentally friendly technologies. Renewable energy, waste management, sustainable agriculture and environmentally friendly transportation can drive sustainable economic growth while reducing negative impacts on the environment [13].

There are many challenges to achieving a sustainable green economy. The main challenges that need to be overcome include changes in consumption and production patterns, dependence on fossil energy, gaps in production capacity and access, and political uncertainty. But this is also a great opportunity to accelerate the transition to a more sustainable and environmentally friendly economy. The transition to an environmentally friendly economy will be driven by increased resource efficiency, innovation in environmentally friendly technologies, increased public awareness and participation, as well as investment and business opportunities. In the long term, the economic benefits of this transition will be very attractive for business and society. In addition, it should be emphasized that supportive, coordinated and consistent policies are essential. Policies with clear regulations and incentives can encourage investment and progress towards a sustainable green economy. Active community participation and the involvement of all stakeholders are very important to ensure that the policies and actions taken meet the needs and expectations of the community. In general, the transition to a sustainable green economy requires the cooperation of various stakeholders, including government, industry, society and international organizations. By overcoming existing challenges and taking advantage of existing opportunities, we can build a sustainable economy and maintain environmental stability in the long term [13].

As a result of the problems described above, electric vehicles are a hope for a transition from dependence on fossil fuel vehicles to alternative electric fuels that are more environmentally friendly. This transition will be an effective step to overcome the negative impacts of climate change [14].

The formulation in this research aims to explore the electric vehicle innovation model as a strategy to encourage green economic growth in Madura. Through a critical literature review, this research will discuss the contribution of electric vehicles to the Green Economy, their impact on the tourism sector and coal industry, as well as the latest developments in the electric vehicle industry in Indonesia. Meanwhile, this discussion aims to provide an in-depth understanding of the role of electric vehicles in the context of green economic growth in Madura. First, the contribution of electric vehicles to the Green Economy will be discussed, including the economic and environmental implications of electric vehicle adoption. Next, the impact on the tourism sector and coal industry in Madura will be analyzed. Finally, the discussion will cover the latest developments in the electric vehicle industry in Indonesia and their implications for Madura.

In evaluating the literature, the review will pay attention to the accuracy of the data, the consistency of the arguments, and the relevance of the findings to the Madurese context. The literature analysis will also consider the diverse viewpoints of researchers and practitioners, and look for weaknesses and strengths in the approaches used. In this way, the discussion will provide a comprehensive and critical understanding of the contribution of electric vehicles to green economic growth in Madura[15].

The electric vehicle innovation model can be the right solution to overcome these challenges. Electric vehicles are vehicles that use electricity as an energy source. Not only is it environmentally friendly because it does not produce direct emissions when used, this vehicle is also more energy efficient than traditional fossil fuel vehicles. In the Madura metropolitan area, the introduction of electric vehicles could be an important step in encouraging environmentally friendly economic growth, combining sustainable economic growth with environmental protection initiatives.

Methods

The research method used in this study is a qualitative approach with descriptive methods [16]. Qualitative research methods aim to understand and explain the phenomena studied in depth, with an emphasis on meaning and context [17]. The main aim of this descriptive research is to create a systematic and accurate picture of the facts, characteristics and relationships between the phenomena being studied. Data collection techniques used in this research include observation, interviews, literature surveys, and expert judgment.

By using this combination of data collection techniques, it is hoped that the research can produce a comprehensive and in-depth understanding of the electric vehicle innovation model to encourage green economic growth in Greater Madura. The author used a purposive sampling technique to identify informants in this research. The purposive sampling technique is a method for identifying informants in this research by selecting them according to the author's criteria and needs. The selected informants were experts from various academic and practitioner fields. The description of the variable dimensions used in the questionnaire includes Electric Vehicle Technology, Electric Charging Infrastructure, Support Policy, Industrial Ecosystem and Innovation, Community Adoption and Awareness, Green Economic Growth.

Results and Discussion

Based on the results of interviews with various parties related to the electric vehicle innovation model to encourage green economic growth in Madura Raya, several things can be concluded in table 1-5.

No	Question	Answer
1	What do you think about the potential for using electric vehicles to support green economic growth in Greater Madura?	As an industry involved in the development and production of electric vehicles, we believe that Madura Raya has great potential to become a center for green economic growth based on electric vehicles. The use of electric vehicles will not only help reduce greenhouse gas emissions, but also create new opportunities for the automotive industry and electric charging infrastructure.
2	What is the role of industry in encouraging the adoption of electric vehicles in Greater Madura?	Our industry has committed to supporting the government and people of Greater Madura in encouraging the adoption of electric vehicles. We continue to innovate in

		developing electric vehicle technology, increasing production efficiency and reducing costs so that electric vehicles become more affordable for the public.
3	HowtWhat challenges does the industry face in implementing the electric vehicle innovation model in Madura Raya?	One of the main challenges we face is limited charging infrastructure. We also need to overcome constraints in the supply of components and raw materials for electric vehicle production. Additionally, we strive to increase public awareness of the benefits of electric vehicles and overcome regulatory barriers that may hinder the growth of the electric vehicle industry.
4	What steps is the industry taking to overcome these challenges?	Our industry is working with the government and related parties to expand the electric charging infrastructure network in Greater Madura. We are also investing in research and development to improve electric vehicle production efficiency and expand the local component supply base. In addition, we are active in outreach and education campaigns to increase public awareness about the benefits of electric vehicles.
5	Whatindustry's contribution to the green economy in Madura Raya?	Our industry is committed to being part of the solution in creating a green economy in Greater Madura. We not only create new jobs and increase local income through electric vehicle production, but also strive to reduce our carbon footprint and improve environmental quality by reducing exhaust emissions.
6	What are the suggestions for the government and other stakeholders in supporting the growth of the electric vehicle industry in Madura Raya?	We encourage the government to provide greater incentives and support for the electric vehicle industry, such as tax exemptions or subsidies for purchasing electric vehicles. In addition, further investment needs to be made in electric charging infrastructure and workforce training to support sustainable growth of this industry.

Table 1. Interview Results from Industrial Elements

No	Question	Answer
1	What do you think about the potential of the electric vehicle Innovation Model in supporting green economic growth in Greater Madura?	As an academic, I believe that the electric vehicle Innovation Model has great potential to become a driver of green economic growth in Greater Madura. The use of electric vehicles will not only help reduce air pollution and carbon emissions, but will also open up new opportunities in creating jobs, developing related industries, and increasing investment in environmentally friendly infrastructure.
2	How The role of academics in	As academics, we play a role in

	supporting the implementation of the electric vehicle innovation model in Madura Raya?	providing a deep understanding of the technology and environmental impact of electric vehicles through research, education and advocacy. We can also be a partner for government and industry in formulating policies that support the development of electric vehicles and the green economy as a whole.
3	How challenges faced in encouraging the implementation of the electric vehicle Innovation Model in Greater Madura?	One of the main challenges is that public awareness and understanding of the benefits and technology of electric vehicles is still limited. In addition, there needs to be significant investment in electric charging infrastructure and supportive regulations to create a conducive environment for the growth of electric vehicles in Greater Madura.
4	What steps can be taken to overcome these challenges?	As academics, we can play a role in increasing public awareness through outreach campaigns, seminars and scientific publications about electric vehicles. We can also conduct research to identify effective policies and strategies to support the development of electric vehicles in Greater Madura.
5	Whatacademic contribution to the green economy in Madura Raya?	We are committed to being an agent of change in realizing a green economy in Greater Madura through research, education and advocacy. We strive to generate knowledge and innovative solutions that can support the transformation towards sustainable mobility and sustainable economic growth in the region.
6	What Suggestions for the government and other stakeholders in supporting the growth of the electric vehicle Innovation Model in Madura Raya?	We encourage the government to strengthen cooperation with educational institutions and industry in developing policies that support the development of electric vehicles and related infrastructure in Greater Madura. There is also a need for incentives and financial support to facilitate investment and research in this area.

Table 2. Interview Results from Academic Elements

No	Question	Answer
1	What do you think about the contribution of the electric vehicle innovation model in supporting green economic growth in Greater Madura?	I believe that the electric vehicle innovation model has great potential to support green economic growth in Greater Madura. By adopting electric vehicles, we can reduce air pollution and carbon emissions that are detrimental to the environment, while opening up new opportunities in creating jobs and increasing investment in environmentally friendly technologies.
2	What is your experience of using an electric vehicle and its impact on	As an electric vehicle user, I have experienced the benefits firsthand.

	daily life?	The use of electric vehicles provides a quieter, more efficient and environmentally friendly driving experience. Apart from that, lower operational costs are also a significant advantage for me.
3	How Challenges faced in using electric vehicles in Madura Raya?	One of the main challenges I face is the limited availability of charging infrastructure in Greater Madura. I also face problems related to the distance and charging speed of electric vehicle batteries. Apart from that, local community awareness about electric vehicles also still needs to be increased.
4	What are your hopes and aspirations as consumers regarding the development of electric vehicles in Madura Raya?	As a consumer, I hope that the government and relevant stakeholders can increase investment in electric charging infrastructure and provide incentives for electric vehicle users, such as tax exemptions or subsidies. I also hope there are more electric vehicle options available on the market with affordable prices and adequate features.
5	What consumer contribution in supporting the growth of the electric vehicle innovation model in Madura Raya?	As a consumer, I am ready to support the development of electric vehicles by continuing to use and promote the advantages of electric vehicles to others. I am also willing to provide input and feedback to the government and electric vehicle manufacturers to continue to improve the quality and availability of electric vehicles in Madura Raya.
6	Whats Any suggestions for the government and electric vehicle manufacturers in increasing the adoption of electric vehicles in Greater Madura?	I advise governments and electric vehicle manufacturers to focus on developing a more extensive and accessible charging infrastructure for electric vehicle users. Apart from that, they can also carry out outreach campaigns to increase public awareness about the benefits and advantages of electric vehicles. With these steps, I am sure that the adoption of electric vehicles in Greater Madura can increase significantly.

Table 3. Interview Results from User Elements (Users)

No	Question	Answer
1	How role of the government in supporting the development of electric vehicles in Madura Raya?	As the government, we have a responsibility to create a conducive environment for the development of electric vehicles in Greater Madura. We have launched various policies and programs to encourage electric vehicle adoption, including tax incentives, subsidies and investment in electric charging infrastructure.
2	How What steps has been taken by the government to support the electric vehicle innovation model?	We have collaborated with various stakeholders, including industry and research institutions, to develop

		strategies and policies that support the electric vehicle Innovation Model. One of the concrete steps that has been taken is launching an incentive program for electric vehicle manufacturers and electric vehicle users, as well as expanding electric charging infrastructure throughout Greater Madura.
3	How challenges faced by the government in implementing the electric vehicle Innovation Model?	Although we have taken positive steps, there are still several challenges that need to be overcome. One of them is limited resources and budget to develop adequate electric charging infrastructure. We also face challenges related to public awareness and lack of understanding about the benefits of electric vehicles.
4	What are the government's hopes for the electric vehicle innovation model in Madura Raya?	We hope that the electric vehicle Innovation Model can be the main driver in encouraging green economic growth in Greater Madura. With wider adoption of electric vehicles, we hope to reduce carbon emissions, create new jobs and increase energy independence in Greater Madura.
5	What the government's future plans and strategies regarding the electric vehicle Innovation Model?	We will continue to work closely with all relevant parties to identify and overcome the challenges faced in implementing the electric vehicle Innovation Model. We will also continue to strengthen collaboration with industry, research institutions and the community to develop more effective strategies in encouraging the adoption of electric vehicles in Greater Madura.

Table 4. Interview Results from Government Elements

No	Question	Answer
1	How experience in running a business as an electric vehicle trader in Madura Raya?	As an electric vehicle trader in Madura Raya, I have seen an increase in public interest in these environmentally friendly vehicles. We have succeeded in attracting customers by providing a wide selection of quality electric vehicles at competitive prices.
2	What is the role of electric vehicles in encouraging green economic growth in Greater Madura?	Electric vehicles have great potential to encourage green economic growth in Greater Madura. With wider adoption of electric vehicles, we can create new jobs in the automotive industry and support the development of electric charging infrastructure.
3	How challenges faced in running a business as an electric vehicle trader?	One of the challenges we face is the public's lack of understanding about the benefits and technology of electric vehicles. We also face stiff competition from conventional vehicle traders. Apart from that, the

		limited availability of electric charging infrastructure is also an obstacle in expanding the electric vehicle market in Greater Madura.
4	What hopes and aspirations regarding the electric vehicle innovation model in Madura Raya?	We hope that the electric vehicle Innovation Model can accelerate the adoption of electric vehicles in Greater Madura and create a cleaner and healthier environment. We also hope that the government and other stakeholders can provide greater support in developing electric charging infrastructure and increase public awareness about the benefits of electric vehicles.
5	What future plans and strategies in developing the electric vehicle trading business?	We will continue to innovate in providing quality electric vehicle products at affordable prices. We will also collaborate with the government and other institutions to develop electric charging infrastructure and increase public awareness about the benefits of electric vehicles. With these steps, we are optimistic that we can continue to contribute to encouraging green economic growth in Madura Raya.

Table 5. Interview Results from Merchant Elements

Expert Judgment Results

Experts who provide expert judgment regarding the electric vehicle innovation model to encourage green economic growth in Madura Raya can provide views based on their knowledge and experience in this field. The following is an expert judgment from an expert that: "Innovation in the development of electric vehicles has great potential to become a catalyst in encouraging green economic growth in Greater Madura. By introducing electric vehicles more widely, we can not only reduce carbon emissions and air pollution, but also open up new opportunities in the automotive industry and related sectors. To achieve this, it is important for governments and other stakeholders to work together to develop electric charging infrastructure, provide incentives for the use of electric vehicles, and increase public awareness about the environmental and economic benefits of electric vehicles. With these steps, Madura Raya can be an example in implementing the electric vehicle innovation model to achieve sustainable green economic growth."

Apart from that, expert judgment from an academic stated "As an academic who is an expert in the field of green economy and transportation, I believe that the electric vehicle innovation model has great potential to encourage green economic growth in Madura Raya."

The following are several points that I can convey as answers from experts regarding the electric vehicle innovation model to encourage green economic growth in Greater Madura, namely: (a) The importance of collaboration, both collaboration between government, industry, universities and civil society, is very important in developing and implementing the electric vehicle Innovation Model. By involving various parties, we can optimize resources and ensure the successful implementation of this model, (b) Supporting Infrastructure: Investment in adequate electric charging infrastructure is a crucial step to support the growth of electric vehicles. The government needs to play an important role in building environmentally friendly infrastructure and providing incentives for electric vehicle users. (c) Technological Innovation: Technological development related to electric vehicles, including batteries and charging systems, needs to be continuously encouraged. Universities can play a role in research and development of new technologies that can improve the efficiency and performance of electric vehicles. (d) Public Education and Awareness: Socialization and education to the public about the benefits of electric vehicles for the environment and economy is very important. Universities can be agents in increasing public awareness through educational programs and outreach campaigns and (e) Supportive Regulations: The government needs to develop regulations that support the development of electric vehicles, including fiscal incentives, strict emission standards, and infrastructure development policies. Lecturers and academics can provide valuable input in the policy formulation process.

No less important is the expert judgment from practitioners, namely "As a practitioner in the electric vehicle

industry, I believe that the electric vehicle innovation model has great potential to encourage green economic growth in Madura Raya." The following are several points that I can convey as answers from experts regarding the electric vehicle Innovation Model to encourage green economic growth in Madura Raya: (a) Large Market Opportunity: Madura Raya has large market potential for electric vehicles. With a fairly large population and the need for mobility continuing to increase, electric vehicles can be an attractive solution for the people of Greater Madura, (b) Investment in Infrastructure: Significant investment is needed in electric charging infrastructure and other supporting facilities. Industry practitioners can play a role in building adequate infrastructure to support the growth of electric vehicles in Greater Madura, (c) Collaboration between Government and Industry: Collaboration between local government and the electric vehicle industry is very important in creating a conducive environment for green economic growth. Industry practitioners can work together with the government to develop policies that support the use of electric vehicles, (d) Technological Innovation: The development of technology related to electric vehicles must continue to be encouraged. Industrial practitioners have an important role in developing new technology that can increase the efficiency and performance of electric vehicles, as well as reduce production costs and (e) Education and Counseling: It is important for industrial practitioners to provide education and counseling to the public about the benefits of electric vehicles for the environment and the economy. This can be done through marketing campaigns, training and outreach programs.

By integrating all these aspects, Madura Raya has great potential to become a center for electric vehicle innovation and encourage green economic growth in the region. As an industry practitioner, I am ready to contribute to these efforts. Contains research findings whose results and discussion are not separated. In this discussion, the author examines these findings and refers to theoretical and empirical studies. The presentation of the discussion is systematic, critical analysis, and informative. The use of tables, figures, etc. is only as support to clarify the discussion and is limited to truly substantial support, for example tables of statistical test results, pictures of model test results, and so on.

Discussion

The development of Electric Vehicles in Indonesia has played a significant role in providing solutions for environmentally friendly transportation, as well as reducing operational and maintenance costs. One of the steps being taken is to shift the focus from conventional fuels to electric vehicles, which is being encouraged by government policy [18]. Efforts to accelerate the adoption of electric vehicles include infrastructure, regulatory and production aspects. The government continuously encourages people to gradually switch to electric vehicles, which is reflected in the increase in the number of electric motorbikes which reached around 10,300 units. It is anticipated that the implementation of the Presidential Regulation will accelerate the adoption of electric vehicles in society. Indonesia can take examples from other countries that have been successful in making similar transitions and integrating electric vehicle policies into national transportation policies [18]. Electric vehicle sales data over the last three years shows an increase, reflecting a continued commitment to the development of electric vehicles as part of the energy transition [19].

Electric Vehicles in Achieving a Green Economy have become the center of attention in efforts to achieve sustainable and environmentally friendly economic development. The green economy concept describes a holistic approach in overcoming social, economic and environmental crises. Implementation of a green economy requires changes in lifestyle, both at the industrial and individual levels, especially in the context of the energy and economic crisis. Protection of the economic ecosystem is considered capable of bringing prosperity to future generations. In principle, the formation of a green economy involves the consistent application of five principles, which include the ability to create social prosperity, achieve equality between generations, conserve and restore natural resources, and increase consumption to support the next generation [20]. Developing countries are actively encouraging the concept of a green economy with the aim of creating an economic system that is environmentally sustainable and provides benefits to society. The role of industry is important in developing a green economy. The increase in motorized vehicle use in Indonesia is a significant trend, with the government supporting the development of electric vehicles as a solution to support energy security and reduce environmental impact. For example, electric cars produced and sold in Indonesia aim to reduce pollution levels and have a positive impact on the environment [21].

The use of electric vehicles has great potential in overcoming air pollution problems in cities. The development of electric vehicles has a significant impact in reducing pollutant emissions such as CO, NO_x, HC, SO₂, and PM. The advantages of electric vehicles include high efficiency, minimal environmental impact, low noise levels, and dependence on renewable energy sources [22]. At the national level, Indonesia is active in developing electric cars to support the reduction of greenhouse gas emissions and develop itself as the center of the global electric vehicle industry. The government is also trying to relocate the nickel industry and process it into lithium batteries, the main component of electric vehicles. Nickel export regulations have been tightened since December 2019 [23]. It is hoped that electric vehicle innovation can help realize a green economy, with full support from the government and cooperation between countries such as South Korea. This investment can open up new opportunities to create jobs and support green economic growth. Infrastructure development, such as electric charging stations, is also needed to increase the availability and accessibility of electric vehicles for the public [20].

The influence of electric vehicles on the green economy is an interesting topic in the context of the vehicle industry,

especially with the use of electrical energy as the driving force, replacing fossil energy. These characteristics give electric vehicles an environmentally friendly aspect, reducing carbon emissions that have the potential to cause global warming if used widely. Electric vehicle innovation is also expected to play a role in supporting the development of a green economy, especially in Indonesia, which is currently experiencing rapid growth in the adoption and production of electric vehicles by several leading manufacturers such as Hyundai, Toyota, Tesla, and others. Full support from the Indonesian government, especially through cooperation with South Korea, in investing in the development of electric vehicles is an important indicator in efforts to achieve a green economy. At the local level, public interest in electric vehicles in Indonesia is very high, where electric vehicles are not only considered an environmentally friendly solution, but also have the potential for significant economic value. Therefore, significant efforts are needed from the government and companies to develop electric charging infrastructure, making it easier for electric vehicle users to charge, which in turn will increase public trust and adoption of electric vehicles. The adoption of electric vehicles has significant implications for the Green Economy, in line with findings from research conducted by [9], [15], [20], [24]-[26]

The Electric Vehicle Innovation Model can be a driver of green economic growth in Greater Madura. This model integrates electric vehicle technology with policy, infrastructure and economic initiatives to stimulate the adoption of electric vehicles as a sustainable mobility solution [27]. Through this model, it is hoped that an environment that supports the adoption of electric vehicles will be created, which will ultimately produce sustainable economic benefits, reduce environmental impacts, and improve the quality of life of the people of Greater Madura. The implementation of electric vehicles is considered a key strategy in achieving the goal of reducing emissions from the transportation sector, especially in Indonesia. The Indonesian government has actively encouraged the development of electric vehicles with an ambitious target, namely 20% of new car sales will be electric vehicles by 2025[24]. This step is expected to not only reduce emissions but also create new jobs in the manufacturing and services sectors related to electric vehicles.

The green economy concept is also considered an important step to increase government revenues through the implementation of green taxes and reducing fossil fuel subsidies. The government has sought to increase the use of renewable energy sources, such as solar power, to reduce dependence on fossil fuels[20]. In addition, the green economy is expected to contribute to the development of sustainable tourism in Bali, which is a significant contributor to the country's economy. It is hoped that the application of green economy principles in tourism can help reduce the environmental impact of tourism activities and create new jobs in the sector [9].

Overall, implementing a green economy in Indonesia is considered a key strategy in achieving sustainable development and reducing the country's carbon footprint. The adoption of electric vehicles, the promotion of renewable energy sources, and the application of green economy principles in tourism are expected to contribute to this goal. The potential for electric vehicles to increase income is also visible from a macroeconomic perspective. Electric vehicles have great potential in changing Indonesia's economic landscape towards a more sustainable and environmentally friendly future. With wider adoption of electric vehicles, particularly in the context of electric cars, Indonesia can create new jobs, reduce dependence on fuel imports, and reduce the negative environmental impact of conventional transportation [28], [29].

It is hoped that the application of Green Economy to electric vehicles in Greater Madura can be an effective strategy to reduce the negative environmental impact of conventional transportation and increase people's income. By adopting electric vehicles, which operate without fossil fuels and produce harmful exhaust gases, Madura Raya can accelerate the transition to a sustainable green economy.

By overcoming these challenges through the development of adequate infrastructure, increasing public awareness, improving policies and regulations, as well as efforts to ensure an adequate supply of raw materials, Madura Raya can increase the use of electric vehicles and support the transition towards more environmentally friendly transportation.

Conclusion

This research concludes that electric vehicles have a significant impact on the Green Economy. Mass production of vehicles without fossil fuels in developing countries is the key to realizing Green Economy policies with more competitive prices and increased use of electric vehicles. Apart from that, tourism also plays an important role in the Green Economy by overcoming the impacts of climate change and global warming through the use of glass in hotel buildings or buildings. The impact of the coal industry sector cannot be ignored, because Green Economy policies and implementation greatly influence this sector. The development of electric vehicles in Indonesia, since the issuance of related regulations in 2019, has shown a significant increase. Collaboration between companies in producing electric vehicle innovations not only drives economic growth in the automotive sector, but also creates jobs and investment. In addition, electric vehicles help reduce air pollution and the impact of greenhouse gases through reducing vehicle exhaust emissions.

Suggestions for future research are to explore the economic and environmental impacts of electric vehicle adoption in more detail, including further analysis of investment potential, effects on employment, and cost-benefit comparisons of electric vehicle use. In addition, future research can further explore renewable energy-based

electric vehicles and environmentally friendly charging infrastructure. Comparative analysis between countries that have adopted electric vehicles and countries that have not, as well as case studies of successful experiences and challenges faced, can also provide valuable insights for future policy and practice.

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