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Developing an Electric Transportation System to Support Sustainable Tourism in the Medan City Area

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Abstract

This study examines the potential integration of electric transportation systems in supporting sustainable tourism in Medan City, North Sumatra. Medan City, as a metropolitan city with a large population, faces the challenges of traffic congestion and air pollution due to the increase in the number of vehicles. Through a qualitative approach with literature studies, this research aims to understand how the integration of electric transportation systems can overcome these challenges. In this study, the concept of sustainable transportation and sustainable tourism became the theoretical basis. Sustainable transportation must meet environmental, economic, and social aspects, while sustainable tourism aims to reduce poverty while maintaining environmental sustainability and local wisdom. The research method involves the analysis of literature relevant to transportation and tourism in Medan City.

Keywords: Electric transport; Medan City; Sustainability tourism; Environmental; Social aspects

1. Introduction

Medan City is the capital city of North Sumatra Province which has an area of 265.10 km2 or 3.6% of the total area of North Sumatra Province. In 2023, Medan City has a population of 2,530,493 people, making Medan City the 5th largest city in Indonesia. With a population of more than two million, Medan City is categorized as a metropolitan city. As the provincial capital classified as a metropolitan city, Medan City is a parameter for the progress of other cities in North Sumatra Province.

The value of Gross Regional Domestic Product (GRDP) in 2021-2023 shows that Medan City has the largest GDP value compared to other surrounding regions. Broken down based on the type of business field, the transportation and warehousing sector is one of the sectors with a large average growth. In transportation activities, the increase in growth is certainly in line with the increase in the number of residents in Medan City. The greater the population, the greater the need for transportation.

Although Medan City has fairly complete transportation facilities but the transportation system in Medan City is still messy, some people still complain about the current transportation system, the increasing number of vehicles is the main cause of air pollution and usually causes congestion. In the context of sustainable tourism, the integration of electric transport systems is a promising solution to address these challenges.

The development of an electric transportation system in Medan City not only offers solutions to reduce carbon emissions but also has the potential to support a sustainable tourism sector. The city of Medan, known for its natural beauty and cultural richness, has the opportunity to integrate electric transportation technology with existing tourism infrastructure, thus creating a unique experience for tourists and improving the quality of life of the locals.

2. Literature Review

2.1. Sustainable Transportation

Sustainable transportation is defined as a transportation system in which fuel use, vehicle emissions, safety levels, congestion, and social and economic access do not cause negative impacts that cannot be anticipated by future generations (Richardson, 2000).

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Another definition of sustainable transportation is that transportation must have three aspects that are met (OECD, 1996 and NRTEE, 1996 in Brotodewo, 2010):

1. Environment, transportation that does not cause air, water, and soil pollution and does not use excessive resources.
2. Economy, transportation that is affordable by the community and can meet the needs of productive urban transportation operational costs.
3. Social transportation that can support the realization of a healthy social environment, minimize noise, congestion, and can improve social justice and health levels.

While sustainable transportation systems according to the Center of Sustainable Transportation are:

1. Enable access to the basic needs of individuals and communities that must be met safely and consistently for human health and ecosystems, and by equity between generations and generations.
2. Affordable, efficient operations, many choices of transportation modes, and support economic movements.
3. Limit emissions and waste to match environmental adaptability, minimize the use of non-renewable resources, limit the use of renewable resources, recycle used components again, and minimize land use and noise generation.

2.2. Sustainable Tourism

The purpose of sustainable tourism is to reduce poverty, by respecting socio-cultural authenticity, and responsible use of environmental resources, and not only encouraging but also facilitating and empowering communities so that they are able to participate in the production process and get various direct benefits from tourism activities (Ministry of Tourism and Creative Economy, 2012).

According to John Sulistyadi *et al.* (2019: 3-4) The benefits that can be obtained from sustainable tourism are:

1. New local business opportunities and economic strengthening

   Creation of new business opportunities such as ecotourism, accommodation, transportation and environmentally friendly energy, energy and water efficiency and environmentally sound waste management, learning and cultural centers, strengthening income for the local economy to become more self-sufficient, reducing leakage and strengthening local production chains.

2. Decent job field creation

   The creation of quality workplaces due to decent work that is environmentally friendly will increase the prosperity and purchasing power of the population, help reduce poverty and as consumption will re- enter the local economy. The demand for manpower also opens up opportunities for local-level training and facilities for workforce capacity and capability development.

3. Tourist attraction and market creation

   Tourism destinations that are better managed and sustainable can attract more qualified tourists. As well as being able to reach target groups from various market sources. In industrial practices, it does not interfere with society and the environment but rather contributes to the sustainability of the region / region.

4. Controlled investment attractiven

   Long-term resource conservation, community development and good infrastructure, ensure a good business environment now and for the future. This makes the destination more attractive and has the opportunity to capture investors. At the same time it helps convert the wealth of community heritage.

5. Business networking

   A strong multiplier effect can be seen in the tourism sector through tourist spending on various goods and services consumed. Expenses such as tour guide fees, restaurants, handicraft shops, local transportation and other goods and services in both the formal and informal economic sectors.

6. Income tax

   Legal enterprises that meet fiscal and legal obligations are a source of revenue for the government. The next stage of the government will use the funds for Development.

3. Literature Review

This research is qualitative research with an approach used based on literature studies by looking for theories that are relevant to the problems found. Literature study is a literature study by utilizing literature references by collecting materials that are in accordance with the object of research. These references can be searched from books, journals, research report articles and Internet websites. The literature used by researchers is related to transportation and tourism in Medan City.

4. Results and Discussion

4.1. Electric Transportation System Integration

The integration of electric transportation systems can be an effective solution to overcome the challenges of traffic congestion in Medan City. Here are some ways integrations can help solve traffic congestion issues:

1. Reduce the number of private cars: By providing efficient and convenient transportation alternatives, such as electric buses, people are likely to abandon their private cars. This reduces the number of vehicles on the road and reduces congestion.
2. Fixed schedules and planned stops: Integrated electric transportation systems with fixed schedules and predetermined stops can improve traffic flow. Passengers know when and where to get on and off, reducing road confusion and vehicle congestion.
3. Infrastructure improvements: Infrastructure improvements, such as modern bus stops and electric bus lines, increase travel speeds and reduce the risk of buses getting stuck in traffic, so more people use public transport.
4. Technology support: The use of technology in electric bus operations, such as passenger information systems and traffic management, can control vehicle flow and reduce congestion.
5. Reduce pollution: Electric buses reduce CO2 emissions compared to traditional electric vehicles. Not only does this protect the environment, but it can also improve air quality, which is often worse in high-traffic areas.
6. Improve accessibility: Integrated electric transport improves accessibility to different parts of the city, making travel more efficient and reducing the need to pass through congested areas1

The integration of electric transportation systems, if implemented correctly, can be a major step towards a sustainable solution to traffic congestion in Medan City.

4.2. Electric Transportation Systems

The electric transportation system can play an important role in improving access to major tourist attractions in Medan City. Here are the contributions of electric transport systems**:**

1. Efficiency and Speed: Electric vehicles tend to be more efficient and able to provide faster service than fossil fuel-powered vehicles This allows tourists to reach destinations such as the Grand Mosque, Kesawan, and Maimun Palace faster
2. Reduce congestion**:** More eco-friendly electric vehicles reduce congestion on major roads and make commuting to tourist attractions easie.
3. Convenience: Electric transportation systems are often equipped with the latest technology to improve passenger comfort, such as **real-time** information and electronic payment systems

4.3. Transforming the Electric Vehicle Ecosystem in Indonesia

Figure 1. Electric Vehicle Ecosystem Transformation

The development of an electric transportation system in Medan City has great potential in supporting sustainable tourism. With high population growth and urbanization, an efficient and environmentally friendly transportation system is key to reducing congestion, improving air quality, and providing better access to tourist destinations. The implementation of electric transportation can minimize carbon emissions and utilize renewable energy, in line with the principles of sustainable development.

The process of transitioning the transportation sector from fossil-based vehicles to battery-based electric motor vehicles (KBLBB) or supported by the issuance of policies providing tax assistance and incentives for the purchase of new and converted electric vehicles. A number of electric vehicle charging station (SPKLU) development projects have been implemented, both by the government and the private sector. The development aims to address concerns related to mileage and accelerate the adoption of electric vehicles across the country.

5. Conclusion

The development of an electric transportation system in Medan City has great potential in supporting sustainable tourism. With high population growth and urbanization, an efficient and environmentally friendly transportation system is key to reducing congestion, improving air quality, and providing better access to tourist destinations. The implementation of electric transportation can minimize carbon emissions and utilize renewable energy, in line with the principles of sustainable development.

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