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Pedaling the Future (The Regulatory Dilemma of Electric Bicycles in the Modern Transport Age)

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ABSTRACT

The rise of electric bicycles in Indonesia has created regulatory challenges due to their ambiguous classification within the legal framework of transportation. This study addresses the problem of unclear classification and insufficient legal regulation of electric bicycles, which impacts safety, compliance, and enforcement. The objective is to analyze the position of electric bicycles under Indonesian law and propose an ideal regulatory model to address these issues. Using normative legal research, this study employs statute, case, and conceptual approaches to examine relevant laws, compare international frameworks, and develop recommendations. The findings indicate that current regulations, such as Minister of Transportation Regulation No. PM 45 of 2020, lack specificity and enforcement mechanisms, leaving gaps in legal certainty and safety measures. Drawing from China's robust regulatory framework, this study proposes revisions to Indonesian law, including clear classification, mandatory safety features, and enforceable sanctions. These measures aim to ensure safe and sustainable use of electric bicycles in Indonesia.

Keywords: electric bicycles, regulatory framework, legal reform

Background

The rapid advancement of science and technology has introduced new challenges to society, the nation, and the state.[1] One of these challenges is evident in the development of transportation systems, particularly in road traffic. Various types of transportation are being modified to become more modern, reflecting the increasing reliance on advanced technology in society. This reliance demonstrates that technology has become an indispensable necessity for supporting national development, as envisioned by the Indonesian Constitution of 1945. Among these advancements, transportation plays a critical role in facilitating the movement of goods and people, both domestically and globally.

The term "transportation" originates from the Latin word *transportare*, with *trans* meaning "across" or "to another side" and *portare* meaning "to carry" or "to transport." In essence, transportation involves moving goods or individuals from one place to another. This activity has become a fundamental human need, supporting daily activities and serving as a barometer for the progress of civilizations.[2] Societal advancements can often be measured by the sophistication of the technology employed in transportation activities. Scholars such as Abdulkadir Muhammad define transportation as a series of activities involving loading goods or passengers into a vehicle, transporting them to their destination, and unloading them. Similarly, R. Soekardono emphasizes the essence of transportation as the movement of goods and people to maximize efficiency and utility. Regardless of the definition, transportation fundamentally involves the process of moving from one location (embarkation) to another (debarkation) using a mode of transport.

As populations grow, the need for mobility increases proportionally. Indonesia, with a population of approximately 269 million according to Worldometers, ranks fourth globally, contributing 3.49% to the world population. This population density necessitates effective and efficient urban transportation systems. However, the reliance on motorized vehicles far exceeds the use of non-motorized ones, as evidenced by data from the Indonesian National Police from 2016 to 2017, which recorded significant growth in motor vehicle ownership. Motorcycles saw the highest annual increase at 7.49%, followed by trucks at 6.51%, passenger cars at 6.26%, and buses at 0.89%. This trend highlights society's dependency on motorized vehicles for daily transportation needs.

This dependency has environmental repercussions, as the transportation sector significantly contributes to urban air pollution. The combustion of fossil fuels in internal combustion engines releases pollutants such as CO2, CO, NOx, HC, SOx, PM10, and Pb, which contribute to atmospheric issues such

[1] Rahman, I., Muhtar, M. H., Mongdong, N. M., Setiawan, R., Setiawan, B., & Siburian, H. K. (2024). Harmonization of Digital laws and Adaptation Strategies in Indonesia focusing on E-Commerce and Digital transactions. *Innovative: Journal Of Social Science Research*, *4*(1), 4314-4327.

[2] Brown, W. J. (2015). Examining Four Processes of Audience Involvement With Media Personae: Transportation, Parasocial Interaction, Identification, and Worship. *Communication Theory*, *25*(3), 259–283. https://doi.org/10.1111/comt.12053

as acid rain, stratospheric ozone depletion, and global climate change. Carbon monoxide (CO), in particular, is a major contributor to global warming. For example, a car consuming 7.8 liters of fuel per 100 kilometers and traveling 16,000 kilometers annually emits approximately 3 tons of carbon dioxide into the atmosphere. The International Energy Agency estimates that the global transportation sector must contribute one-fifth of the total reduction in greenhouse gas emissions by 2050 to mitigate these environmental impacts.[3]

In response to these challenges, technological advancements have emerged to reduce environmental harm, particularly through the development of electric-powered transportation. Among these innovations is the electric bicycle (e-bike), which was initially categorized as a non-motorized vehicle relying solely on human power. Today, e-bikes are equipped with electric motors, making them a hybrid between traditional bicycles and motorized vehicles. The increasing adoption of e-bikes offers solutions to issues such as rising fuel prices, noise pollution, and air pollution. Powered by rechargeable batteries, e-bikes eliminate exhaust emissions, reduce fuel consumption, and operate silently. They resemble conventional scooters in functionality but can be charged within hours for immediate use.

Indonesian transportation law categorizes vehicles into three types: motorized vehicles, non-motorized vehicles, and battery-based electric vehicles. Motorized vehicles are defined as those powered by mechanical engines, excluding rail-based vehicles. Non-motorized vehicles rely on human or animal power. Battery-based electric vehicles (KBL berbasis baterai) are powered by electric motors, receiving energy directly from onboard or external batteries. Electric bicycles, classified as "certain vehicles," are typically two-wheeled and equipped with electric motors. These classifications simplify vehicle identification and facilitate the assignment of legal rights and responsibilities.[4]

Technological advancements have spurred continuous innovation in both motorized and non-motorized vehicles. For example, motorized vehicles such as motorcycles and cars, which originally relied on gasoline, now include electric-powered options. Similarly, non-motorized bicycles have evolved into electric bicycles that combine human power with electric motors for propulsion. E-bikes, although similar in appearance to conventional bicycles, differ in several key aspects. They are equipped with rechargeable batteries (250-1000 watts) and electric motors that provide pedal assistance or act as primary propulsion. With average speeds of 25 km/h and peak speeds of up to 80 km/h for some models, e-bikes represent a fusion of traditional and modern transportation.

However, the integration of technology and transportation also introduces new challenges. For instance, disputes have arisen regarding the classification of electric bicycles. PT. Migo, a provider of electric bicycles, claims its products fall under the bicycle category due to their pedal functionality. However, the body design of Migo bicycles, particularly those operating in Jakarta, resembles that of scooters, causing ambiguity in their classification. This discrepancy has led to regulatory conflicts with authorities such as the Jakarta Transportation Agency and the Metro Jaya Police Directorate, which argue that Migo bicycles should be classified as motorized vehicles. Under Article 49 of the Traffic and Road Transport Law, motorized vehicles must undergo safety testing before being operated on public roads. Migo bicycles, lacking type test certification and license plates, are deemed non-compliant with traffic regulations, particularly Articles 64 to 70 of Law No. 22 of 2009 concerning vehicle registration and identification.

The absence of proper regulatory oversight raises safety concerns, especially since electric bicycles are often used by minors. Reports of reckless e-bike usage have resulted in traffic accidents, including fatalities. For instance, a 12-year-old child in Bandung died in a collision with a garbage truck, while a child in Makassar was struck by a box truck. In Gorontalo, over four traffic accidents involving e-bike users have been recorded. These incidents highlight the risks of allowing electric bicycles on busy urban roads without adequate safety measures.

In response to these issues, the Indonesian Minister of Transportation issued Regulation No. PM 45 of 2020 on "Certain Vehicles Using Electric Motors." Article 1(7) defines electric bicycles as two-wheeled vehicles equipped with electric motors. However, this definition does not explicitly categorize e-bikes as motorized vehicles, as they still incorporate pedals alongside electric motors. Furthermore, the regulation lacks provisions for criminal sanctions against violators, resulting in legal uncertainty and impeding law enforcement efforts.[5] The existing regulatory framework fails to address the evolving needs of society, underscoring the necessity for dynamic legal development to keep pace with technological advancements.

The ongoing debate regarding the classification and regulation of electric bicycles reflects broader challenges in balancing innovation with public safety and environmental concerns. While providers like PT. Migo emphasize the traditional aspects of e-bikes, regulatory authorities stress the need for compliance with motorized vehicle standards to ensure road safety. These differing perspectives underscore the need for clear and comprehensive legislation that accommodates technological progress while safeguarding societal interests. The growing use of electric bicycles, particularly among children, necessitates stricter regulations to prevent accidents and promote responsible usage. By addressing these challenges, Indonesia can harness the benefits of technological innovation in transportation while minimizing its risks and fostering sustainable development.

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Formulation Of The Problem

Based on the description above, it can be formulated problems in this study include:

1. How is the position of electric bicycles in terms of Law Number 22 of 2009 on road traffic and transportation ?
2. What is the ideal electric bike setup model in Indonesia ?

Research Methods

This study employs a normative legal research method, also known as normative law research, which focuses on analyzing legal norms that are applicable within society. It conceptualizes law as a set of norms or rules that guide human behavior. This method is particularly suitable for the research focus, namely the regulations contained in Law Number 22 of 2009 on Road Traffic and Transport, specifically concerning electric bicycles. Normative legal research encompasses the inventory of positive law, examination of legal principles, legal doctrines, synchronization of laws both vertically and horizontally, and systematic legal analysis. The study adopts a library research method to gather data from relevant sources, including general references such as books and encyclopedias, as well as specific references like journals, theses, and dissertations directly related to the research problem.

Several approaches are integrated into this research, including the statute approach, case approach, and conceptual approach. The statute approach involves an in-depth review of relevant laws and regulations, such as Law Number 22 of 2009 and Minister of Transportation Regulation Number PM 45 of 2020. This approach views law as a systematic, comprehensive, and inclusive framework with interrelated legal norms. The case approach examines real-life legal cases that have reached final and binding decisions, such as traffic accidents involving electric bicycles. A comparative approach is also employed to analyze and contrast legal frameworks governing electric bicycles in Indonesia and other jurisdictions. Additionally, the conceptual approach draws from legal doctrines and principles to build an ideal model for the regulation and enforcement of laws related to electric bicycles.

The legal materials used in this study are categorized into primary, secondary, and tertiary sources. Primary legal materials include the 1945 Constitution of the Republic of Indonesia, Law Number 22 of 2009 on Road Traffic and Transport, and Minister of Transportation Regulation Number PM 45 of 2020. Secondary legal materials consist of legal literature, academic journals, and other scholarly works that provide explanations and interpretations of primary legal materials. Tertiary legal materials, such as legal dictionaries and encyclopedias, offer additional context and supplementary information to support the analysis. The collection of legal materials is conducted through library research, while the analysis of these materials is performed qualitatively by organizing and categorizing primary and secondary legal data.

The analysis of legal materials is carried out using a descriptive-analytical approach, wherein the data is systematically described and contextualized based on relevant theories and principles. This method enables the researcher to identify legal implications, formulate predictions, and draw conclusions from the research findings. The study aims to address legal issues related to the use of electric bicycles and to propose recommendations for developing more adaptive regulations that align with societal needs and technological advancements. This analysis is expected to contribute to more effective legal enforcement and ensure legal certainty in the use of electric bicycles in Indonesia. By adopting a systematic and comprehensive approach, the study provides a solid foundation for understanding and resolving the legal challenges associated with electric bicycle usage in the context of modern transportation systems.

Discussion

1. The Position Of Electric Bicycles In Terms Of Law Number 22 Of 2009 On Traffic And Road Transport

Bicycles have recently regained popularity among Indonesians, driven by the rising cost of fuel. This increase has led many individuals, previously reliant on motorcycles, to transition to bicycles. Amid escalating fuel prices, new low-emission vehicles have emerged as part of efforts to reduce carbon emissions and dependency on global oil prices. One such innovation is electric vehicles, with electric bicycles becoming particularly prevalent.[6] Electric bicycles, defined as two-wheeled vehicles equipped with an electric motor, are considered user-friendly and are often perceived by the public as equivalent to conventional motorcycles. This perception has led to a tendency for users to disregard road safety regulations.

As the use of electric bicycles has grown, the Indonesian government, through the Ministry of Transportation, issued Regulation No. PM 45 of 2020 concerning Specific Vehicles Using Electric Motors. This regulation, enacted on June 22, 2020, includes provisions and obligations for electric bicycle

[6] Rissman, J., Bataille, C., Masanet, E., Aden, N., Morrow, W. R., Zhou, N., Elliott, N., Dell, R., Heeren, N., Huckestein, B., Cresko, J., Miller, S. A., Roy, J., Fennell, P., Cremmins, B., Blank, T. K., Hone, D., Williams, E. D., De La Rue Du Can, S., . . . Helseth, J. (2020). Technologies and policies to decarbonize global industry: Review and assessment of mitigation drivers through 2070. *Applied Energy*, *266*, 114848. https://doi.org/10.1016/j.apenergy.2020.114848

users. The regulation also aligns with the constitutional rights of citizens, as outlined in Articles 28A to 28J of the 1945 Constitution, which guarantee recognition, protection, and legal certainty for all individuals while ensuring respect for others' human rights in a lawful and orderly society.[7]

In Indonesia's legal framework, vehicles are categorized into motorized vehicles, battery-based electric vehicles, and non-motorized vehicles. Motorized vehicles are defined as those powered by mechanical engines, excluding rail vehicles, while battery-based electric vehicles (KBL) are powered by electric motors with energy supplied by batteries, either internally or externally. Non-motorized vehicles, on the other hand, are propelled by human or animal power. Electric bicycles, however, occupy an ambiguous position within these classifications. Some are categorized as electric motorcycles, while others are treated as bicycles. This ambiguity necessitates further examination of the differences between conventional bicycles, electric motorcycles, and electric bicycles to determine the legal classification of electric bicycles within Indonesia's transportation laws.

Electric bicycles are governed by Regulation No. PM 45 of 2020, yet the regulation does not detail specific sanctions for violations on public roads. This lack of clarity has led many to treat electric bicycles as conventional bicycles, resulting in widespread ignorance of road safety rules. To address this regulatory gap, the Ministry of Transportation has referred to speed limits outlined in Regulation No. PM 33 of 2018 on Motor Vehicle Type Testing. Electric bicycles capable of speeds equal to or exceeding 40 km/h are classified as electric motorcycles, while those with lower speeds are treated as bicycles and exempt from motor vehicle requirements such as licenses or registration.

The absence of penalties in Regulation No. PM 45 of 2020 raises significant questions about the legal framework for electric bicycle use. This regulatory gap contributes to a lack of compliance among users, potentially infringing on the rights of other road users. Traffic accidents involving electric bicycles are becoming increasingly common, often attributed to reckless behavior. According to data from the Integrated Road Safety Management System (IRSMS) of the Indonesian National Police, 107 electric bicycle accidents occurred nationwide as of mid-2023. This includes nine incidents reported in June, 59 in July, and 39 in the first three weeks of August.

Given these incidents, the state must play a role in addressing the issues arising from electric bicycle use. Regulation No. PM 45 of 2020 outlines the technical requirements for electric bicycles, emphasizing the need for safety features before operation on public roads. A key aspect of ensuring safety is the provision of dedicated electric bicycle lanes, which aim to protect both users and other road users. However, the regulation lacks provisions for penalizing violations, creating a legal loophole that undermines the regulation's effectiveness.

To develop a comprehensive policy framework for electric bicycles, Indonesia could draw lessons from China, a major producer of electric bicycles exported to Indonesia.[8] The constitutional basis for such policies lies in Article 28J of the 1945 Constitution, which mandates respect for others' rights in an orderly society, and Law No. 39 of 1999 on Human Rights, which emphasizes the protection of human dignity and environmental harmony. The absence of clear legal sanctions, however, often leads to uncertainty and complicates law enforcement.

Sanctions for electric bicycle violations must be outlined in national laws or local regulations, as stipulated in Article 15(1) of Law No. 12 of 2011 on the Formulation of Legislation. This provision states that criminal provisions can only be included in laws, provincial regulations, or district/city regulations. Thus, local governments play a crucial role in regulating sanctions for electric bicycle violations. While Regulation No. PM 45 of 2020 governs the use of electric bicycles, local governments are responsible for implementing penalties through regional regulations. By establishing a clear legal framework, including sanctions and safety standards, Indonesia can address the growing challenges associated with electric bicycles. Such measures will not only enhance road safety but also ensure the rights and obligations of all road users are upheld, contributing to a more sustainable and orderly transportation system.

2. Model Setting Electric Bike In Indonesia

Bicycles have regained popularity in Indonesia due to rising fuel prices, which have prompted many individuals to switch from motorcycles to bicycles. This shift is part of a broader trend toward adopting low-emission vehicles to reduce carbon emissions and dependency on global oil prices. Among these innovations, electric bicycles stand out as a popular choice. Defined as two-wheeled vehicles equipped with an electric motor, electric bicycles offer convenience and efficiency. However, they are often perceived as equivalent to conventional motorcycles, leading to unsafe road usage behavior.

In Indonesia, the growing use of electric bicycles has prompted regulatory responses. The Ministry of Transportation issued Regulation No. PM 45 of 2020 concerning Specific Vehicles Using Electric Motors. This regulation provides guidelines and obligations for electric bicycle users, ensuring safety and orderliness. It aligns with constitutional guarantees of human rights, as outlined in Articles 28A to 28J of the 1945 Constitution, which emphasize the right to legal protection, recognition, and equitable treatment under the law. Article 28J further mandates respect for the rights of others within societal order.[9]

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Under Indonesian law, vehicles are categorized into motorized vehicles, battery-based electric vehicles (KBL), and non-motorized vehicles. Motorized vehicles are powered by mechanical engines, excluding rail vehicles. KBL refers to vehicles driven by electric motors with energy supplied by batteries, either internally or externally. Non-motorized vehicles rely on human or animal power. Electric bicycles, however, occupy an ambiguous position within these classifications. While some are treated as electric motorcycles, others are considered bicycles, necessitating further examination of their legal classification within Indonesia's transportation framework.

Electric bicycles in Indonesia are generally classified as KBL based on Presidential Regulation No. 55 of 2019, which governs battery-based electric vehicles. However, there are no detailed laws explicitly addressing their use, creating legal ambiguity. For instance, Regulation No. PM 33 of 2018 specifies that vehicles capable of speeds equal to or exceeding 40 km/h are classified as motorized vehicles, while those with speeds below 40 km/h are categorized as bicycles. Despite these guidelines, electric bicycles often blur the lines between motorized and non-motorized classifications due to their pedal-assisted design.

In China, electric bicycle regulations are more comprehensive. The country has implemented standards such as GB 17761-2018 and GB 42296-2022 to govern the use and safety of electric bicycles. These regulations require manufacturers to register electric bicycles before sale, ensuring compliance with safety standards. China classifies electric bicycles as bicycles if they meet specific criteria, including a maximum speed of 25 km/h and the presence of pedals. Unlike Indonesia, China does not require electric bicycle users to possess a driver's license, although riders must be at least 12 years old or accompanied by an adult. Safety measures, such as battery testing and overload protection systems, are strictly enforced under GB 42295-2022 and GB 42296-2022.

In Indonesia, Regulation No. PM 45 of 2020 outlines certain obligations for electric bicycle users, such as the use of designated lanes and adherence to safety standards. These include the installation of headlights, functional braking systems, reflectors, bells, and a maximum speed limit of 25 km/h. Electric bicycles are restricted to specific areas, such as residential zones, tourist areas, office complexes, and other non-road environments. However, the regulation lacks provisions for sanctions, which undermines its enforcement. The absence of penalties has led to a lack of discipline among users, resulting in traffic accidents and safety concerns.

According to the Integrated Road Safety Management System (IRSMS) of the Indonesian National Police, there were 107 electric bicycle-related accidents nationwide in mid-2023, with incidents increasing significantly in subsequent months. These accidents highlight the urgent need for stricter regulations and enforcement. Currently, Indonesia's approach to electric bicycle regulation focuses primarily on guidance rather than enforcement, with an emphasis on encouraging the use of designated lanes without imposing penalties for violations. This regulatory gap has led to growing calls for more comprehensive and enforceable rules.

China's approach offers valuable lessons for Indonesia. The stringent requirements for battery safety, speed limits, registration, and safety features have significantly reduced risks associated with electric bicycles. Moreover, China differentiates between electric bicycles and electric motorcycles based on speed and functionality, providing clearer legal classifications. This distinction allows for tailored regulations that address the specific risks and requirements of each vehicle type.

In contrast, Indonesia's regulatory framework remains vague and inconsistent. Electric bicycles are often treated as conventional bicycles due to their pedal functionality, leading to confusion among users and authorities. The lack of clear legal definitions and enforceable sanctions has hindered efforts to regulate their use effectively. As the popularity of electric bicycles continues to rise, the absence of specific and enforceable regulations poses significant risks to road safety and public order.

The Ministry of Transportation's reliance on speed limits to classify electric bicycles reflects the limitations of the current regulatory framework. Electric bicycles with speeds exceeding 40 km/h are classified as motorized vehicles, requiring registration and compliance with motor vehicle regulations. However, most electric bicycles in Indonesia operate within the 35-40 km/h range, creating ambiguity about their classification and legal status. This ambiguity underscores the need for clearer and more specific regulations.

The introduction of Regulation No. PM 45 of 2020 represents a step toward addressing these issues, but its lack of enforcement mechanisms limits its effectiveness. The regulation's emphasis on safety features and designated lanes is commendable, but the absence of penalties for violations undermines its impact. To address these shortcomings, Indonesia should consider adopting elements of China's regulatory framework, such as mandatory registration, safety inspections, and enforceable sanctions.

The increasing use of electric bicycles in Indonesia presents both opportunities and challenges. While they offer a low-emission alternative to conventional vehicles, their growing popularity raises concerns about road safety, legal compliance, and environmental impact. The lack of clear and enforceable regulations has created a regulatory vacuum that jeopardizes public safety and undermines efforts to promote sustainable transportation. By learning from China's experience, Indonesia can develop a more robust regulatory framework that addresses these challenges while fostering the growth of electric bicycle usage.

In conclusion, the regulation of electric bicycles in Indonesia requires significant improvement to address the challenges posed by their increasing use. The current framework, while a positive step forward, falls short in terms of enforceability and specificity. The absence of sanctions for violations has

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led to widespread non-compliance, contributing to traffic accidents and safety concerns. By adopting a more comprehensive and enforceable regulatory approach, Indonesia can ensure the safe and sustainable use of electric bicycles, aligning with global best practices and promoting public safety.

Conclusion

The position of electric bicycles as vehicles in Indonesia does not yet have a clear classification in the perspective of transportation law. To determine its status, further studies are needed by comparing different types of vehicles. Electric bicycles that can travel up to 40 km/h or more can be categorized as electric motorcycles, while those that are only able to reach a maximum speed of 25 km/h, as stipulated in Article 3 Paragraph (2) of the Minister of Transportation regulation number PM 45 of 2020, are classified as ordinary or conventional bicycles. However, the current regulation only regulates the procedure for using electric bicycles without including sanctions for violations. Therefore, local regulations are needed to follow up on these rules, and the use of electric bicycles should be contained in more specific laws, such as the revision of Law Number 22 of 2009, to clarify the enforcement process.

As a suggestion, the SAT and then the National Police are expected to continue to educate the public about the Prohibition of the use of electric bicycles on the highway through publications and cooperation with the central and local governments to ensure the availability of facilities and infrastructure that support the enactment of the law. The government needs to supplement the existing rules with the provision of special lanes for electric bicycles and encourage the revision of Law Number 22 of 2009 to contain clear prohibitions and sanctions for violations of the use of electric bicycles. In addition, the public needs to increase legal literacy and awareness of the obligation to use electric bicycles in accordance with the rules to support safety and order on the road.

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