Can Electric Motorcycles Overtake Two-wheeled Gasoline-Powered in Southeast Asia?

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Abstract

Motorcycles two-wheeled gasoline-powered with internal combustion engines (ICE) and resulting CO_2 pollution are very large in Southeast Asia, including Indonesia, Malaysia, and Vietnam. The adoption of technology innovation in electric motorcycles (EM) can be utilized to achieve a target of the transport sector's zero emissions by 2050. The EM technology innovation provided transportation solutions that are environmentally friendly, energy-efficient, and lower operating and maintenance costs. But, the adoption rate of EM in Southeast Asia still needs to improve and faces challenges of adoption-diffusion problems, i.e., product, process, innovation, and business. The early adopter has inconvenience and anxiety about their daily mobility needs over long distances. The charging infrastructure and battery capacities are critical components for solving the problem. First, users with high mobility who drive beyond the maximum mileage, if they run out of power, will stop and wait a long time for the battery to be fully charged again. Second, the scenario is to increase the battery capacity to 2-3 times the usual capacity to increase the vehicle's mileage without recharging it during a trip. There is an example of a dilemma in making a business strategy. Will electric motorcycles fail to overtake two-wheeled gasoline-powered? Can we achieve a target for the transport sector's zero emissions by 2050? The intervention instruments used early supply chain integration to solve the challenges and problems of adopting **Electric Motorcycles in Indonesia were conducted by the** University Centre of Excellence for Electrical Energy Storage Technology, Universitas Sebelas Maret. We also promoted an equivalent annual cost (EAC) to compare the options between improving battery capacity and infrastructure of charging by considering the cost of owning, operating, and maintaining for an extended period of the electric motorcycle market. Comparing the three countries is needed to obtain comprehensive input for economies of scale in global market competition. We offer to assess an EM Ecosystem in Malaysia and Vietnam. The novelty of research that is expected from this research is developing an EAC model suitable for the electric motorcycle market in the Southeast Asian market. Thus, the research results can provide the option of strategies for designing the global competitiveness of the electric motorcycle market and helping **Electric Motorcycles Overtake Two-wheeled Gasoline Powered in Southeast Asia.**

Keywords:
Battery capacity, early supply chain, equivalent annual cost, infrastructure charging, **Electric Motorcycle**

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Biography
Wahyudi Sutopo is a professor in industrial engineering and Head of Industrial Engineering and Techno-Economics Research Group, Department of Industrial Engineering, Universitas Sebelas Maret (UNS), Surakarta, Indonesia. He is also a researcher for the center of excellence for electrical energy storage technology (CoE-EEST), the president of the industrial engineering and operations management (IEOM) society for Indonesia's professional chapter, and the Director of IEOM Asia Pacific Operation. His educational background is the profession of an engineer from UNS (2018), a Doctor and Bachelor in industrial engineering from Institut Teknologi Bandung (2011 & 1999), and a master of management science from Universitas Indonesia (2004). He has professional qualifications as an Executive Professional Engineer (IPU) since 2022. His research interests include supply chain engineering, engineering economy & cost analysis, and technology innovation & commercialization. Dr. Sutopo has completed research projects with more than 50 grants and carried out research projects funded by the Institution of Research and Community Services - UNS, Ministry of Research and Technology / National Agency for Research and Technology, Indonesia Endowment Fund for Educational (LPDP), PT Pertamina (Persero), PT Toyota Motor Manufacturing Indonesia, and various other companies. He has written 13 books (text and chapter), made five copyrights & 4 patents. He has initiated commercializing research outputs of UCE-EEST UNS related to energy storage technology and electric vehicle conversion through start-ups where he is one of the founders, namely PT Batex Energi Mandiri and PT. Ekolektrik Konversi Mandiri. Dr. Sutopo has published articles over 190 documents indexed by Scopus with H-index 13. His email address is wahyudisutopo@staff.uns.ac.id.

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