ABSTRAK

YONES RAMANUGRAHA. ANALISIS PERBANDINGAN SEPEDA MOTOR BERBAHAN BAKAR BENSIN DENGAN SEPEDA MOTOR LISTRIK MENGGUNAKAN METODA *TOTAL COST OF OWNERSHIP (TCO*) . Dibimbing oleh Dr. Ir. Zainal Arifin., MBA

Penelitian ini bertujuan untuk menganalisis perbandingan konsumsi energi dan biaya kepemilikan antara sepeda motor listrik dan sepeda motor berbahan bakar fosil dalam penggunaan transportasi harian. Pendekatan yang digunakan adalah kuantitatif dengan desain quasi-experimental melalui pengujian langsung di lapangan. Objek penelitian terdiri dari sepeda motor listrik Polytron Fox dan sepeda motor bensin Honda Beat tahun 2023 yang diuji dengan jarak tempuh masing-masing sejauh 1000 km di wilayah Kota Padang.

Data primer diperoleh melalui pengujian penggunaan kendaraan secara nyata, sedangkan data sekunder diperoleh dari tarif energi, biaya pajak, dan estimasi depresiasi kendaraan. Analisis dilakukan menggunakan pendekatan *Total Cost of Ownership* (TCO) yang mencakup biaya energi, biaya perawatan, pajak kendaraan, dan depresiasi. Selain itu, dilakukan analisis sensitivitas untuk menguji pengaruh perubahan harga energi terhadap total biaya kepemilikan kendaraan.

Hasil penelitian menunjukkan bahwa sepeda motor listrik memiliki konsumsi energi sebesar 0,0431 kWh/km, sedangkan sepeda motor bensin memiliki konsumsi bahan bakar sebesar 0,0257 L/km (Pertalite) dan 0,0186 L/km(Pertamax). Biaya energi kendaraan listrik tercatat sebesar Rp62,252 per km, jauh lebih rendah dibandingkan kendaraan bensin yang mencapai Rp257 (Pertalite) dan Rp238 (Pertamax). Nilai *Total Cost of Ownership* kendaraan listrik sebesar Rp367,752 per km, lebih rendah dibandingkan kendaraan bensin sebesar Rp502,250 per km (pertalite) dan Rp483,250 per km (pertamax), Hal ini menunjukkan bahwa kendaraan listrik memberikan penghematan sebesar Rp 134,498per km atau sekitar 26,77% untuk bahas bakar pertalite dan penghematan sebesar Rp 115,498 per km atau sekitar 23,90% untuk bahan bakar pertamax .

Analisis sensitivitas menunjukkan bahwa kendaraan listrik memiliki tingkat ketahanan biaya yang lebih tinggi terhadap fluktuasi harga energi dibandingkan kendaraan berbahan bakar fosil. Dengan demikian, sepeda motor listrik terbukti lebih efisien secara energi dan lebih ekonomis dalam jangka panjang, sehingga berpotensi menjadi alternatif transportasi yang lebih berkelanjutan di wilayah perkotaan.

Kata Kunci: kendaraan listrik, konsumsi energi, biaya operasional, *Total Cost of Ownership*, efisiensi energi

ABSTRACT

YONES RAMANUGRAHA. *COMPARATIVE ANALYSIS OF GASOLINE-FUELED MOTORCYCLES AND ELECTRIC MOTORCYCLES USING THE Total Cost Of Ownership (TCO) METHOD. Supervised by* Dr. Ir. Zainal Arifin., MBA

This study aims to analyze the comparison of energy consumption and ownership costs between electric motorcycles and gasoline-powered motorcycles in daily transportation use. The research employs a quantitative approach with a quasi-experimental design through real-world driving tests. The research objects consist of a Polytron Fox electric motorcycle and a 2023 Honda Beat gasoline motorcycle, each tested over a total distance of 1,000 km in the urban area of Padang City.

Primary data were obtained through direct vehicle testing under actual driving conditions, while secondary data were collected from energy tariffs, vehicle tax records, and depreciation estimates. The analysis applies the Total Cost of Ownership (TCO) approach, which includes energy costs, maintenance costs, vehicle taxes, and depreciation. In addition, a sensitivity analysis was conducted to evaluate the impact of energy price fluctuations on total ownership costs.

The results of this study indicate that electric motorcycles have an energy consumption rate of 0.0431 kWh/km, while gasoline-powered motorcycles consume 0.0257 L/km when using Pertalite and 0.0186 L/km when using Pertamax. The energy cost of electric motorcycles was IDR 62.252 per km, which is significantly lower than that of gasoline-powered motorcycles, amounting to IDR 257 per km for Pertalite and IDR 238 per km for Pertamax. The Total Cost of Ownership (TCO) analysis further revealed that electric motorcycles incurred a cost of IDR 370,752 per km, which was lower than gasoline-powered motorcycles, with TCO values of IDR 502,250 per km for Pertalite and IDR 483,250 per km for Pertamax. Consequently, electric motorcycles provide a cost saving of IDR 134,498 per km (approximately 26,77%) compared with motorcycles using Pertalite, and IDR 115,498 per km (approximately 23,90%) compared with motorcycles using Pertamax.

The sensitivity analysis reveals that electric motorcycles exhibit greater cost stability against energy price fluctuations compared to gasoline-powered vehicles. Therefore, electric motorcycles are proven to be more energy-efficient and economically advantageous in the long term, making them a viable alternative for sustainable urban transportation.

Keywords: *electric motorcycles, energy consumption, operational cost, Total Cost of Ownership, energy efficiency*