

Development of an Economical Driving Cycle for 3-Wheelers: A Framework for Emission Estimation Studies

Sankha Jayawardhana¹, Kushan Aponsu², Sajana Gamage³ and Loshaka Perera⁴

Abstract

A driving cycle reflects typical driving behavior within a specific area, considering factors such as road infrastructure, traffic flow, vehicle mix, and driving conditions with its primary purpose being the measurement of emissions and fuel consumption. Driving cycles also aid in designing traffic control systems and simulating traffic flows. This study develops a driving cycle for 3-wheelers, which are widely used across the South Asian region. Sri Lanka serves as a case study, where on-board driving data was collected as GPS data in urban and suburban areas during peak hours. The cycle was developed using a micro-trip-based construction method, with data analyzed through programming techniques. The results include an average speed of 15.12 km/h, an average running speed of 19.73 km/h, an average acceleration of 0.285 m/s², and an average deceleration of 0.3236 m/s². The driving mode percentages for acceleration, deceleration and cruising or idling were 40.58%, 33.84% and 25.58%, respectively.

This driving cycle can be tested on a chassis dynamometer to obtain emission levels for 3-wheelers, offering an economical approach to emission estimation. The methodology is adaptable across South Asia and provides insights for policymakers to regulate 3-wheeler emissions.

Keywords: *Driving Cycle, Three wheelers, Emission estimation.*

1. University of Moratuwa, Katubedda, Moratuwa 10400, Sri Lanka. sankha_apple@icloud.com
2. University of Moratuwa, Katubedda, Moratuwa 10400, Sri Lanka. kushandil97@gmail.com
3. University of Moratuwa, Katubedda, Moratuwa 10400, Sri Lanka. sajanapeshitha@gmail.com
4. University of Moratuwa, Katubedda, Moratuwa 10400, Sri Lanka. loshakap@uom.lk