

# **EVALUATE VEHICLE OPERATING COST BY VEHICLE CATEGORIES**

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## DECLARATION

I declare that this is my work and this thesis does not incorporate without acknowledgment any material previously submitted for a degree or diploma in any other University or Institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgment is made in the text. I retain the right to use this content in whole or part in future works (such as articles or books).

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Date: 05.03.2024

The above candidate has carried out research for the Master's thesis under my supervision. I confirm that the declaration made above by the student is true and correct.

Name of Supervisor: Dr. G.L.D.I. De Silva

Signature of the Supervisor:

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Date:

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## ABSTRACT

The transportation demand has been increasing and the planners and engineers have been trying to find the best solutions to overcome this problem. The cost of travel plays a major role in one's decision to select the transport mode in their day-to-day transportation decisions. Although travel time is considered the main attribute in their decision-making, the cost of using a vehicle is also considered as an important attribute. Therefore, the vehicle operating cost (VOC) is considered a vital piece of information that is frequently used in transport planning, mainly in demand model estimations and economic feasibility studies.

VOC can be separated as a fixed cost and variable cost based on what the cost being accounted for. Fixed cost is the component paid periodically, yearly, irrespective of the vehicle is used or not. The licensee fees, insurance fees, and gas emission fees are examples of fixed variable costs. On the other hand, variable costs, are the cost components that add up with the distance of travel. The fuel cost, tire cost, maintenance cost, and labor cost are examples of variable costs that are commonly considered. Vehicle type and its conditions can influence operating cost variables, where the vehicle condition can be identified according to the model year and the registered year of the vehicle. Road condition, travel speed, and road geometry are among other factors that can contribute to vehicle operating costs.

The VOC is unique to each country and understanding the vehicle operating cost and estimating it based on statistical methods for Sri Lanka was the objective of this research. The study looked at collecting data through data loggers of several vehicle categories over 1-year period. The data included fuel consumption cost, tire cost, maintenance cost, service cost, insurance & permit cost. The data was collected mainly for motorcycles, double cabs, and private cars,

The study was able to establish the VOC for the main vehicle categories expressed as a cost per km traveled and the study also established the variation of the operating cost as a function of the total distance traveled over one calendar year. According to the data analysis data in 2019,  $Y = aX^{-b} + c$  type interpolation gives the best-fitted line for the relationship between VOC per km (X) and travel distance in kilometer(Y).

**Keywords:** Vehicle Operating Cost, Fixed Cost, Variable Cost

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## LIST OF ABBREVIATIONS

| <b>Abbreviation</b> | <b>Description</b>                         |
|---------------------|--|
| VOC                 | Vehicle Operating Cost                     |
| ATRI                | American Transportation Research Institute |
| CUTS                | Colombo Urban Transport Study              |
| RUCS                | Road User Charges Study                    |
| GST                 | Goods and Services Taxes                   |
| FE                  | Fuel Economy                               |
| CPK                 | Cost per kilometer                         |
| VCPK                | Variable cost per kilometer                |
| FCPK                | Fixed cost per kilometer                   |