Real fuel consumption in the main logistic corridors of Colombia

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Abstract

Fleet managers state that fuel consumption accounts for 50% of the operating costs of their cargo and passenger vehicle fleets. Aiming to reduce these costs, transport companies contract telematics services to track their units and monitor fuel consumption along with other variables. The gathered information is used to alert managers on events like excessive fuel consumption, abrupt breaks and needs of mechanical maintenance. We propose the use of this information to determine the fuel consumption of cargo vehicles at each km of the main roads of a given region and the influence of altitude, road grade and vehicle age on it. As a case study we studied the fuel consumption in the main logistic corridor of Colombia which are characterized by having a highly variable topography. Toward that end, we compared the fuel consumption monitored by a telematic system on 46 vehicles of different cargo capacity with the estimated by an energy balance model and observed that they are highly correlated ($R^2 > 0.99$). Then, we used the calibrated model to obtain the km-by-km fuel consumption. This information is used by authorities to obtain a close estimation of the cost of cargo transport, the greenhouse gases emissions, and to identify locations with unusual high fuel consumption. Furthermore, the slope of the linear correlation (C_f) decouples the fuel consumption associated to driving style (human factors) from other influencing factors. Then, we observed that the effects of altitude and vehicle age on fuel consumption are negligible and that most of the vehicle technologies studied has not improved in practice their real energy performance during the last 20 years.

Keywords

Freight transport, Specific fuel consumption, Telematics, Vehicle energy efficiency