F-12: Mathematical modelling of Sri Lanka's operational vehicle fleet and its usage

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Statistics on the vehicle fleet in Sri Lanka are compiled by the Dept. of Registration of Motor Vehicles. Annual records of all new registrations have been maintained since 1928. However, of the vehicles that have been scrapped, only those which have been officially reported have been removed from the register. Accordingly, the present operational fleet is reported to be over 1 million vehicles. Computation of the operational fleet from vehicle revenue licenses issued and by fuel consumption estimates, places the active fleet at a much lower value.

Multiple Linear Regression was used in modelling the relationship between the survival rate of vehicles in a given registration series and the mean age of the series. Revenue license data was used in this calibration. Most vehicle types showed a s-curve where scrappage is low in the initial period, increasing in subsequent years to end up with a very low survival percentage, presumably those which are maintained as collectors' items. The regression modelling enabled the calibration of 11 different vehicle types as 2 part models, where the s-curve has been approximated into a linear-exponential relationship to facilitate analysis.

The relative use of different types of vehicles and the variation of usage with age of vehicles was also modelled using regression. Using field data collected, usage was modelled as a function of the negative exponential value of age of vehicle.

These models can be used to estimate the operational fleet by vehicle type and corresponding annual km operated. This information is necessary for transport planning in Sri Lanka.