

## Alternative models to forecast household car ownership in South Africa

Motorised transport has a significant impact on both fiscal resources and the environment. Car ownership studies should therefore continue to be an integral part of development planning. The CSIR and the University of Pretoria (UP) have developed an alternative household car ownership modelling approach for South African urban areas that moves away from existing race-based classifications. The model has been calibrated successfully for the City of Johannesburg, and tested for other Gauteng areas.



CSIR researcher Mathetha Mokonyama

In a paper published in the September 2007 edition of the *Journal of the SA Institution of Civil Engineering*, CSIR researcher Mathetha Mokonyama and co-author Dr Christo Venter of the UP explore a household car ownership modelling approach that is not reliant on the classification of the population into race groups, but instead uses household income and spatial attributes of an area, captured in terms of dwelling-unit types. "Although socio-economic disparities within the various population groups may still be prevalent, analytical models of household car ownership do not have to rely on racial groupings for effective forecasting," Mokonyama explains. "The present model uses income and, for the first time, dwelling-type variables to indirectly represent the household's asset base and lifestyle choices in relation to its car ownership likelihood."

"Past South African car ownership modelling studies made a distinction between the different population groups in an attempt to minimise data aggregation errors as a result of differing economic profiles of the population groups," Mokonyama explains. "Racial distinctions made it easier to model average trip generation rates within the respective areas allocated to different population groups by apartheid planning policies. However, the democratisation of the country has resulted in growing spatial and economic integration amidst fundamentally changing market conditions, rendering the use of racial distinctions in transportation modelling exercises difficult and increasingly irrelevant."

Despite current low levels of household car ownership in South Africa - 74% of all households did not own cars in 2003 - growth in car ownership is accelerating, especially in metropolitan areas where competition for road space is resulting in increased congestion and environmental costs. "A 1997 forecast by the Department of Transport indicated that, in the years between 1996 and 2020, the South African gross car population would grow by 64%, resulting in 8,7 million cars by 2020 (or 160 cars per 1 000 human population). This forecast still appears valid, and is also indicative of a relatively high future growth potential in car-based travel demand," Mokonyama says.

The paper provides limited benchmarking of South African household car ownership against published literature, and concludes that localised research on behavioural market responses is critical. "Transport planning practitioners in South Africa need to treat imported behavioural research conclusions with circumspection prior to making major decisions. This further calls for increased investment in localised travel behavioural research," the paper states.

Topical issues such as development density and lifestyle choices within the context of the emerging nature of household car ownership in South Africa are also investigated, with the authors acknowledging that the

transitional nature of the South African economy presents some analytical challenges. "While making advances in household car ownership modelling, the approach should be seen as transitional, given the uncertainties around the changing nature of consumer behaviour in South Africa at present, and perhaps used with caution over long-forecast horizons," the authors state. "It is recommended in particular that further work be conducted on the effects of rising energy prices, expanded household access to credit and the introduction of more affordable cars on household car purchasing patterns, especially among the lower to medium-income strata."

The secondary purpose of the paper is to profile the nature of household car ownership in a typical urban area in South Africa and to show the application of the proposed modelling approach in a typical planning exercise, using the City of Johannesburg Metropolitan Municipality and Gauteng as case studies. "The model we developed would typically be used by a local authority in estimating both existing and future car ownership in its planning area. Due to the limited financial resources of government, the model needs to be relatively affordable to maintain and use," Mokhonyama points out.

The results of the model, supported by other qualitative considerations, point to a potentially explosive growth in car ownership in historically disadvantaged areas of South African cities, as middle class incomes grow. The paper concludes that further research is needed on the relationship between households' residential and lifestyle choices and their vehicle ownership and use patterns, in order to broaden our understanding of the long-term behavioural implications of transport policy implementation. The latter includes aspects such as travel demand management, public transport improvements and the development of more innovative models for providing access to private vehicle use, such as flexible or on-demand car-sharing schemes.