

Passenger transport research

by Mathetha Mokonyama*



In the future, challenges will be on integrating scholar transport contracts with normal public transport contracts

In South Africa, airport and airline services epitomise what many would like to see in everyday public transport. The CSIR investigates what it will take to provide a commercial public transport service in South Africa which resembles commercial air travel services.

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WHEN ONE commercial aircraft engine shows signs of failure, it makes news headlines. However, in the same country, when thousands of people are killed or maimed while using public transport, only a few raise their eyebrows. For many years, the Council for Scientific and Industrial Research (CSIR) has been conducting research that attempts to contribute towards a sustainable built environment, locally and internationally. This includes transport road infrastructure, settlement planning, and the management of public transport infrastructure. Established in 1945, the CSIR is a government-owned research institute that reports to the Department of Science and Technology, and

parliament through its board. Similar to numerous research areas such as bio-sciences and defence technologies, passenger transport research is a priority at the CSIR. The key theme in this research is service design.

Transport design

In many respects, passenger transport service design serves as the confluence of the needs of the community of transport users, operators and authorities. For example, the needs of users include minimum travel costs, safety and security, and service availability. For operators, transport services are a business. Therefore, while they would like to serve the needs of the users, these services need to

make business sense. Authorities are the custodians of living standards, and need to ensure that the transport service provided, meets the agreed standards of living. Service design itself is a wide concept that borrows advances in operations research, marketing, economics and engineering to design sustainable passenger transport services (especially public transport services) that meet our standards of living. Within the service design research theme, the CSIR is involved in the following areas (not mutually exclusive):

- **Travel behaviour modelling:** In order to design services that meet user requirements, it is important that designers understand the

evolutionary changes in user behaviour. To achieve this, we would typically set up experiments that enable us to measure such dynamics systematically.

- **Public transport contracts:** Contracts in public transport are the biggest instruments that control the quality of the ultimate product. When we complain about poor public transport, it is these contracts (or lack thereof) that are the root cause of the complaints. Similarly, calibrating the contracts requires a good knowledge of the economics of the modes, travel behaviour and user needs. Once again, tools such as the stated response surveys and qualitative surveys would enable us to design customer-centric contracts. There are, however, certain practicalities that make up contract design. These include negotiations and extent of institutional powers, which add extra challenges in the design process.
- **Data collection methods:** Transport data analysis is at the heart of passenger transport research. However, this is becoming increasingly expensive to collect using traditional methods such as paper and pen at the observation point. Therefore we continuously seek more cost-effective ways of gathering data. Recently we explored the use of cellphone technology to track the movements of travellers with potential application in ridesharing schemes.
- **Transport modelling:** This allows analysts to isolate some aspects of the transport system to help them create scenarios that will help with strategic decision making, and in some cases, the design of the infrastructure. We

have advanced in this regard to develop transport models based on dynamic systems (systems-thinking philosophy) that attempt to link both micro and macro aspects of transport. For example, in one model we attempt to simulate the evolution of a transport system (costs, travel demand) and its impact (environmental, economic) with changing public transport service quality.

Research

Much of the CSIR's core research is based on the strategy of building analytical capabilities. Once they are relatively confident about the usefulness of such capabilities, they publish such knowledge with the hope of finding industry partners to internalise the company in the market. Limited human capital remains the biggest challenge. It is difficult for CSIR researchers to specialise in fewer areas, while other crucial areas are neglected. Ultimately, we become generalists, and while useful in the South African market, it limits innovation and international competitiveness. The CSIR needs many more students to take up careers in this discipline to grow the profession meaningfully and use mechanisms such as bursary awards and internships to stimulate the market in this regard. Investment in post graduate studies such as masters degrees and doctorates is a priority. While research uptake has not been significant, some of the recent research has found application in the following areas:

- Patching historical transport data from numerous sources to create

time-series passenger transport trends for the Development Bank of South Africa.

- Using an aircraft cost model to advise airlines on the best choice of fleet for a given network.
- Modelling a combination of travel-demand management strategies (increased parking surcharges, improved public transport, park and ride facilities, etc.) for the City of Johannesburg.
- A series of in-depth surveys conducted a while ago at public transport facilities, led by Dr Oliver Page, revealing the nature of transport safety and security concerns from the user perspective. A book on the subject was also published.
- Modelling the ownership and use of cars in South Africa for input in air quality and energy demand modelling.

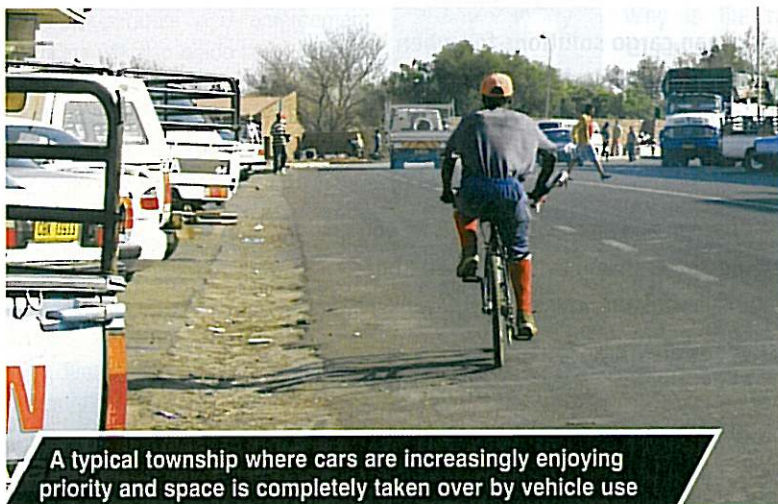
In the long term, the CSIR would like to measure its impact in terms of the following:

- entrepreneurs who take up the tools we develop for use in business development
- contributions to define the quality of life standards continuously
- contributing to the development and refinement of industry practice standards.

For research to make an impact, a stronger partnership with government, private sectors, users and academia is required. At the moment, the procurement strategies government uses are not always conducive for productive research. As a country, we are spending so little on transport research. **35**

Graph of the age distribution analysis of passenger cars in SA

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A typical township where cars are increasingly enjoying priority and space is completely taken over by vehicle use

