The role of automated fare collection data in integrated transport planning: experience in Cape Town, South Africa

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Many developing countries have embraced Bus Rapid Transit (BRT) as a proverbial ‘silver bullet’ for improving mobility and have invested heavily in infrastructure. Three such systems are currently operational in South Africa, namely Tshwane (Pretoria), Johannesburg and the focus of this paper, the City of Cape Town. Many of the systems were expedited as showcase projects and assist with the public transport requirements for hosting the 2010 FIFA World Cup in South Africa. Post-world cup, these transit systems are turning out to be challenging to manage and run efficiently. Monitoring and agility is necessary to remain productive.

The Cape Town bus-based transit system, referred to as MyCiti, includes ten trunk lines connecting strategic nodes in the city, as well as 31 feeder routes. It is the only system in South Africa that has continually increased its service offering and network coverage. MyCiti is but one of a few available modes in the city’s multimodal transit system that also includes a commuter bus service, rail, and the well-known and well-established paratransit mode that has proliferated in developing countries over the past few decades [1].

For MyCiti, passengers use their MasterCard contactless PayPass cards to pay for transit and are required to tap into the system (on the bus for feeder services, and at the entrance of larger transit stations) as well as out. Since transfers between lines at the major stations occur within the confines of the station, and do not require a passenger to tap out/in again, such transfers and connections are not picked up by the system in the transaction logs.

In this paper/presentation we will cover three aspects of using the automated fare collection (AFC) data. We first show and report a few methods for processing the AFC data to provide summary statistics, mainly for monitoring purposes, of the usage of the system and the similarity of travel demand over different days. This is useful for the City of Cape Town as it has a large proportion of leisure travel both during the week and over weekends. Knowing the route connectivity, we make a
first attempt at establishing a macroscopic fundamental diagram for public transport, building on the work of [1,2].

Secondly, we compare the AFC data with the Travel Survey conducted in the City of Cape Town during 2013. More specifically, the City included a travel diary component in which persons report entire activity chains for all household members. Each trip mode, of which MyCiTi is one of the explicit choices, is also captured in the diary. Since the trip diary is a strategically important source of data on which much of activity-based modelling relies (in Cape Town), we compare the reported diary trips versus the actual AFC transactions recorded.

The third contribution shows how we augment the AFC data with a Multi-Agent Transport simulation (MATSim) model to estimate the walk-to and walk-from portions of people’s activity chains when using the MyCiTi system.

References