SOUTH AND SOUTHERN AFRICA – ARE DISRUPTIVE TRANSPORT TECHNOLOGIES READY? AN EXPLORATION OF JOURNEY PLANNING TOOLS FOR URBAN PUBLIC TRANSPORT SYSTEMS IN SOUTH AFRICA

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ABSTRACT

This essay engages with the question of whether disruptive transport technologies are ready to meet the needs of the South African context to deliver impactful solutions through the lens of journey planning tools. Through three examples – technology, schedule unreliability, and paratransit inclusion – the essay investigates how journey planners thus far have addressed context-specific considerations to provide tools that can be inclusive of a wide spectrum of public transport users in South African cities. The essay finds that existing journey planners have not addressed these considerations adequately, thereby limiting their ability to meet the information needs of users.

1. INTRODUCTION

The 2019 Southern African Transport Conference poses a question through its theme "Disruptive transport technologies – is South and southern Africa ready?". South and southern Africa certainly are seeing their fair share of new technologies entering the market with everything from e-hailing services like Uber to data collection apps and initiatives digitising paratransit systems like WhereIsMyTransport and GoMetro that are disrupting what the future of mobility could look and feel like for passengers. While these new technologies promise to change the transport user experience, whether all technologies will actually alter, for better or for worse, the transport landscape is a matter of how well they can adapt to the local context to reach intended beneficiaries. Hence, the question could be flipped around and posed as "South and southern Africa – are disruptive transport technologies ready?"

A lens through which to investigate this question is multimodal journey planning services – tools that helps users travel between two points using a combination of modes to optimise the journey based on cost, travel time, least transfers, etc. – which has increasingly become a part of the commuter's decision-making toolbox in the Global North (e.g. CityMapper, Moovit, Transit) and is now making its way into South African cities. Studies into the effects of integrated multimodal information on user's perceived control over journey decisions are limited (Shaheen et al., 2016), but research and examples point to the potential for journey planning tools to increase knowledge about alternatives available and reduce effort in acquiring these travel options (Kenyon and Lyons, 2003). Journey planning mobile tools offer the potential to simplify the public transport experience, providing travellers with journey guidance on complex systems that otherwise would be time-consuming to dissect and make calculated decisions in with only piecemeal information sources (Chorus et al., 2007). Though it has been argued that habitual behaviour reduces the need to seek out travel information (Aarts et al., 1997; Pronello et al., 2017), unfamiliar travel situations or volatile conditions pose choice-making environments that can prompt individuals to use information to make alterations to their mode and/or route of travel (Lyons, 2006). Integrated multimodal information in particular has the potential to make users aware of their available travel options, enable informed choices, and help them successfully navigate to their destination (Ibid.).

However, for a journey planning tool to be an effective information source for public transport users in South African cities it must be ready to embrace context-specific challenges. Integrated multimodal information is needed, as opposed to unimodal information, which requires users to consult multiple sources to make an informed decision, and as such entails that apps go beyond offering the minimum static timetables and routes and conform to the technological capabilities of the intended users. There are numerous context-specific challenges to be addressed in order to build a tool that is inclusive of different user types, but this paper will focus on only three: user-technology compatibility; relaying uncertainty in scheduled systems; and including paratransit systems. This essay will argue that, thus far, no journey planning tool offered in South Africa has taken all these challenges into consideration to provide an inclusive solution that meets the user and mobility conditions of the South African market. This argument will be explored through three examples of context-specific factors that impact technology utility and the level to which existing tools meet these considerations.

2. MATCHING USER TECHNOLOGY CAPABILITIES

Understanding and catering to the technological capabilities of intended users means providing tools users both have access to and have the skills to adequately use (Gigler, 2011; Cancro, 2016). A common form of a journey planning tool is a mobile application which is a current disruptive technology in the Global North, and though numerous attempts (e.g. Gauteng on the Move, Moovit, the unofficial MyCiTi app) have been made to launch similar applications in South Africa, this tool's delivery style may be unsuitable to the South African context. Currently, journey planning tools are designed as mobile and web-based applications to be accessed through a smartphone and/or computer and require familiarity with maps and navigational commands. Further research is needed to understand how technological skills affect who can and cannot access different journey planning tools and to assess navigational literacy and people's capacity to successfully understand different public transport delivery formats (e.g. maps and timetables) in the South African context. This section will instead focus on access to the technology component and how this might affect who is included and excluded from access to journey planning information.

Journey planning tools, in the form of mobile applications, were launched by metropolitan and provincial departments in two South African cities and catered to smartphone users but failed to include feature phone users. Both Cape Town (TCT app in October 2014; deprecated early 2019) and the Gauteng province (Gauteng on the Move in March 2018; deprecated mid-2018) launched multimodal journey planning apps for smart phones. However, in 2014 when the TCT app was launched only 45% of households sampled in the Western Cape said they could access Internet via a cellular phone. By 2018 when Gauteng on the Move was released, household access to Internet-capable mobile devices in the Gauteng province was 63% (SSA, 2015; SSA, 2018). The actual number of households willing to use data to access the Internet required to power a journey planning app via their phone may be less as high data costs could reduce willingness to pay for data to acquire travel information. By contrast, in 2014, household access to cellular devices (feature phones) was 94% in the Western Cape and in 2017, 98% in the Gauteng (SSA, 2015; SSA, 2018). Though the tender for the second phase of the TCT app in late 2015 called for USSD to be supported to reach feature phone users, amongst other features, the call was subsequently withdrawn (CoCT, 2015). International providers of information such as Moovit and Google also limit their services to smartphone devices.

In the local private sector, GoMetro has developed journey planning information for USSD, meaning feature phone owners can access information on train services. However, the number of existing public transport users this information could reach is limited, as according to the General Household Survey in 2017 less than 8% of reported public transport trips in South Africa were made using a train (this figure includes trips made on the Gautrain rapid rail, so the actual percentage is likely lower) (SSA, 2018). A drawback of providing unimodal information, such as this, will be expanded on in the following section.

3. CAPTURING AND NAVIGATING UNRELIABLE SYSTEMS

When not communicated, service disruptions, whether they are strikes, cancellations, or delays, affect users' ability to smoothly use public transport to move around the city. Information needs to match the physical service provided, otherwise repeated misinformation will lead to decreased trust in the information technology and result in its diminished use (Schooley et al., 2011). Information unreliability leads to two negative effects: (1) the traveller is less likely to seek information, and (2) unreliable information is less likely to reduce uncertainty and increase choice quality (Chorus et al., 2007; Bifulco, 2014). While research has not yet investigated the effects of service unreliability on trust in information for African transport systems, research from international contexts has found that information can reduce travel uncertainty (Wijayaratna and Dixit, 2016) and though travel uncertainty affects public transport use, this can be mitigated through real-time information (Rahman et al., 2013; Bifulco, 2014; Wijayaratna and Dixit, 2016).

In short, to reduce travel uncertainty and increase information reliability, a journey planner should capture and feedback the deviations from planned operations in the system so that the individual can mitigate travel risk. For example, high service unreliability on the trains means that providing scheduled information alone would misrepresent the actual nature of the services. In 2017, in the week from 30 November to 6 December 57% of trains in the local Western Cape train service were cancelled, the most heavily affected route was 14% on time, and just 40% of the trains on the least affected line were on time during the morning peak (Payne and Washinyira, 2017). While the GoMetro app updates passengers via messages on Metrorail service disruptions, delays, and cancellations, its unimodal nature means that in the case of a serious service disruption the user cannot easily access information on alternative methods of travel. Multimodal information could at least in part overcome this limitation by providing other modes to complete the journey. However, multimodal journey planning apps too should consider means of integrating information reflective of reality rather than the planned schedule into the journey options given to the user. Departure and arrival time unreliability can have knock-on effects in journeys involving transfers beyond affecting expected arrival times, as delays or cancellations may mean that the traveller is unable to satisfactorily connect to their next mode of travel. Real-time information (updates on arrival and departure times) provides a promising avenue for mitigating the effects of schedule unreliability (Lyons, 2006; Grotenhuis, 2007; Rahman, 2013; Pronello, 2017) and is currently being tested and developed on MyCiTi services by the City of Cape Town (CoCT, 2018). However, real-time updates would need to be widespread across services to provide users reliable information on their complete trip, particularly where modal transfers are involved to improve the value of journey planning information (Grotenhuis, 2007).

4. INCLUSION OF PARATRANSIT SYSTEMS

In South Africa where two-thirds of the public transport trips are made by paratransit (Van Ryneveld, 2018), excluding these services from information technologies both excludes people who depend on paratransit for mobility and overall limits people's capacity to make decisions across the full spectrum of the public transport network (Zegras et al., 2015). In some cases where paratransit is the only public transport option, for those unfamiliar with its services, the lack of information creates mobility blind spots in the city. Despite the high-reliance on minibus taxis and recent data collection efforts that have made the information journey planners need available (e.g. GoMetro, WhereIsMyTransport), there have been very few initiatives (e.g. Gauteng on the Move, Public Transport App) to include paratransit in multimodal journey planners. Added to this is the need to rethink the journey planning standards that rely on methods developed to represent scheduled systems (Eros et al., 2014). Multimodal journey planners for South African cities need to represent as accurately as possible these paratransit operations which differ from scheduled systems in that they do not have predefined stops, may alter routes to maximise seat turnover, and do not run on a schedule but rather have frequencies that will alter over the course of the day and week depending on different variables (Williams et al., 2015; Behrens et al., 2016). Including and better representing paratransit services in a journey planner could provide greater information coverage and reach a larger pool of potential beneficiaries.

5. CONCLUSION

Currently, no integrated multimodal journey planning tool on the South African market meets all three challenges posed in this paper. In terms of meeting technological capabilities of users, existing apps cater to smartphone and/or computer users and require access to Internet, but no tool offers USSD information across multiple modes. In regard to capturing travel uncertainty in scheduled systems, tools currently are limited to sending out messages on disruptions but do not provide real time advice on travel times. Despite the heavy use of paratransit in South Africa, even fewer tools have attempted to incorporate information on paratransit in their journey plans. The omission of these considerations means that certain groups of public transport users, such as feature phone users or paratransit-dependent users, are excluded from access to potentially disruptive journey planning information. Further research would need to be done into what forms solutions might take to respond to these three challenges and how these solutions would affect a journey planner's effectiveness as a public transport decision-making tool.

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