TOWARDS THE EMPOWERED COMMUTER: EXPLORING INFORMATION BEHAVIOUR OF INFORMAL PUBLIC TRANSPORT USERS

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ABSTRACT

Information is emerging as one of the key dimensions of mobility, and as an important lever through which sustainable access can be promoted in Sub-Saharan African (SSA) cities. Information acts as an enabler of transport, by allowing travellers to make informed decisions on whether, when, and how they travel. The lack of information can also act as a barrier to accessing desired services, with consequences for the attainment of equity and human development goals. Little is known about what information passengers need and how they find and use information. This paper reports on a qualitative mixed-methods study to explore information behaviour amongst informal transport passengers in Tshwane, South Africa. We use the theory and methods of information science (with information behaviour as a subdiscipline) to provide a lens for the investigation. We collected mobility data through travel diaries, user-submitted photos of the travel context and voice messages to explain these, and in-depth individual interviews combined with drawings of situations where respondents used information and its sources (called information horizon mappings). The drawings and interviews revealed the information-poor environment within which informal transport operates, and the strong reliance on other people as well as tacit embedded knowledge for gaining access to information. The paper concludes by offering directions for further research around digital information.

1. INTRODUCTION

As settlements expand and become more complex, transport systems typically evolve from single-mode, direct routes to more multimodal, complex networks. In order to navigate this increasing complexity, users have a growing need for accurate information in order to make decisions about their travel. The study of the role of information in transport is relatively new. Understanding the provision of public transport information is especially pertinent for informal public transport[1] which has grown into the largest provider of public mobility in Sub-Saharan Africa (SSA). Despite this market dominance, informal public transport services like minibus-taxis provide no systematic sources of information about their operation, in part because their ecosystems are made up of many individual

[1] Informal public transport, or paratransit, is characterized by informal operations under light or no government regulation and control, fragmented ownership, and flexible service patterns using small vehicles. See Behrens et al., 2015 for a more in-depth description of the mode and its issues.

operators. Outside of the cities and communities they operate in, little is known about how their passengers need, find, and use information.

The growing interest in transport information on informal modes is underscored by several recent developments. Firstly, there have been growing efforts to collect better data on informal transport services (Klopp & Cavoli, 2019; Klopp et al., 2017). These efforts by local NGOs, universities and technology companies such as Digital Matatus and WhereIsMyTransport have resulted in growing databases on routes and services (e.g. DigitalTransport4Africa.org), and have been used to support resilience planning (WhereIsMyTransport, n.d.), analyse service patterns (e.g. Jia et al., 2022; Saddier & Johnson, 2018) and accessibility patterns (e.g. Andreasen & Møller-Jensen, 2017). Despite this effort, the uses of this data are still limited questions remain about how users can directly benefit from this data.

Secondly, public transport apps are now being developed for emerging market contexts that incorporate informal transport data, such as Rumbo (an Android application by WhereIsMyTransport currently operating in Mexico City, Lima, and Bangkok). Yet these are not yet widely adopted and questions around their efficacy and suitability in the SSA context are unanswered. Additionally, differential access to technology (especially smartphones) may create a barrier to segments of the population, raising questions about equitable access to the new digital information landscape.

This study is aimed at exploring information needs, practices, and behaviours amongst a segment of public transport users in SSA. We focus on passengers of informal public transport (minibus-taxis) in Tshwane, South Africa. The research takes a strongly qualitative-based cross-disciplinary mixed methods approach to understanding information behaviour, using a combination of exploratory techniques from the transport and information science literatures. Information behaviour is a sub-discipline of information science that focuses on the study of all information activities such as information seeking, defining information needs, information sharing, information use and information encountering (Case & Given, 2016; Fourie & Julien, 2019). The intersection between travel behaviour and information behaviour leads to several specific research questions:

- What institutional and societal factors shape the information landscape for informal public transport services?
- Which information-seeking strategies do passengers employ when in need of information on public transport? What is involved in identifying suitable sources, accessing them, and using the information? What are the costs of insufficient, wrong, or untimely information?
- How does information (or the lack of it) affect travel behaviour choices and the ability to access destinations?
- What are the potential opportunities for better information provision in the public transport industry, such as through digital technologies or leveraging social networks, to support innovation and improvement of sustainable transport alternatives?

The research project is still ongoing; this paper reports on initial findings only, focusing specifically on the second and third questions above. It starts with a brief overview of public transport information policy and sources in Tshwane. Then follows a discussion of the mixed-methods research design and methods used. Finally selected preliminary results and conclusions are offered.

2. INFORMATION LANDSCAPE IN TSHWANE

2.1 Transport Information Policy Environment

A review of government documents revealed that the provision of public transport user information is covered in policy documents on all levels of government. Strategies, implementation plans, and regulations are available to guide contracting authorities, regulators, and operators in achieving the policy.

In South Africa, one of the twelve strategic national transport policy objectives for public transport is "To provide universal, centralised information for all modes of public transport to assist public transport users and ensure that public transport is integrated with respect of the information, scheduling, routing and integrated ticketing systems" (NDoT, 2017, p. 43). This objective is echoed at the provincial level; a key initiative in the 5-year implementation plan (2012-2017) is the creation of a Gauteng-wide Public Transport Data Warehouse (including Tshwane and neighbouring municipalities in the region) to provide reliable supply and demand data for planning, operations, and user information. This initiative is reportedly underway.

The City of Tshwane has adopted the national and provincial stance on the provision of user information. The City's ITS strategy specifies Automated Public Transport Management Systems (APTMS) linked to a Central Control Centre as the backbone for passenger information dissemination. All traveller information will be collated in the Control Centre and disseminated in a coordinated manner to websites, call centres, social media, commercial radio stations, commercial traffic services, variable message signs and parking guidance signs (COT, 2015).

2.2 Supply of Public Transport Information

Users need public transport information for a variety of reasons at different stages of the trip. The literature (e.g. Ryseck, 2019) contains several efforts to understand the range of information types. We adapted this list to provide baseline knowledge of how these information types are currently provided on public transport systems in Tshwane, based on field visits and web searches (Table 1). The table covers both formal modes (municipal bus/BRT, Metrorail, and Gautrain) and informal modes (minibus-taxis), even though the rest of the study focuses on informal modes only. This allows us to contrast the information available to minibus users with that available to users of other modes.

Information needs encompass a wide range of information types, which are grouped by five attributes: supply, reliability, fares, safety and security, and comfort and convenience. Table 1 shows that information is provided from a variety of sources. Some operators provide supply information through media reports, brochures, maps, signs, timetables, and fare tables. However it is observable that passengers also substantially depend on informal and social communication channels to access information, for instance through direct observation, oral communication, the use of hand signals, and print media. Digital sources include real-time information systems such as variable message signs, SMS, websites, apps, and social media as well as verbal announcements used to relay information about delays[2].

[2] A more in-depth discussion of these sources can be found in Venter et al., 2023.

Table 1: Information needs and information sources in current public transport systems in Tshwane

Legend: Formal sources Informal / social sources

Information Need/Attribute		Information Sources							
		Info Desk	Verbal	Print	Static sign	Dynamic signs	Vehicle destination board	ICT	Self-observation
Supply	Frequency	At counter	Other users	Timetables	Timetables	Realtime		Websites	Visual observation
	Journey times	At counter	Other users	Maps	Maps			Social media	Visual observation
	Destination information	At counter	Other users Drivers	Maps	Maps		Realtime	Call centre	Visual observation
	Accessibility information	At counter	Other users		Signage on vehicles			Websites	Visual observation
	Connections/feeder services	At counter	Other users	Maps				Websites	Visual observation
	Coverage	At counter	Other users	Maps	Maps			Websites	Visual observation
	Custom journey plan							Journey planner	
Reliability	Waiting times	At counter	Other users			Realtime		SMS	Visual observation
	Delays	At counter	Other users			Realtime		Web alerts	Visual observation
								Social media	
Fares	Ticket prices	At counter	Other users	Fare tables	Fare tables			Websites	Visual observation
	Discounts	At counter	Other users	Brochures				Social media	Visual observation
	Payment method	At counter	Other users	Marketing				Call centre	Visual observation
Safety and Security	Security personnel	At counter	Other users	Media reports				Media reports	Visual observation
	Security equipment	At counter	Other users	Marketing				Marketing	Visual observation
Comfort and convenience	Seat availability		Other users	Media reports					Visual observation
	Vehicle and facility characteristics	At counter	Other users	Marketing				Marketing	Visual observation

Information sources vary significantly across modes: the more informal and decentralised a mode's operations are, the more passengers depend on informal and socially transmitted information sources. Despite some recent attempts at providing webbased information portals that cover multiple modes (e.g. GautengontheMove[3]), a wide variation exists in the scope and quality of information in circulation. Table 1 also suggests information gaps exist that are not adequately addressed by current sources, including custom journey planning and service delays.

This listing of sources does not imply that passengers' actual information needs are satisfied, as the impact of information is determined by its accessibility, usability, accuracy, and timeliness. In addition, the information behaviour literature shows that many contextual and personal factors mediate a user's ability to access and apply information and that the information people state when asked about their needs for information does not always fully reflect the information they require to cope with situations such as commuting (Case & Given, 2016). The qualitative part of the study was aimed at exploring current information behaviour patterns and constraints and to identify needs for further research.

3. RESEARCH DESIGN AND METHODOLOGY

The role of information within mobility has been studied from a theoretical perspective (e.g. Donald et al., 2014; Fu & Juan, 2017) as well as a more applied perspective to explore the potential role of traveller information systems on travel behaviour (e.g. Kenyon & Lyons, 2003; Chorus et al., 2006; Pronello et al., 2017). However previous research has generally not been located within a theoretical framework of information seeking behaviour (Fourie & Julien, 2019), which provides different methodologies and theories that might be instructive in the transport field. There has also been a very limited focus on cities of the global South. We thus relied strongly on the broader field of information behaviour research to select methods for data collection that would allow us to collect data that could delve deeper into the personal experiences and daily challenges of minibus-taxi users, and in line with Savolainen's (1995) notion of everyday life information seeking (ELIS) as a way of "mastery of life".

A small sample of 31 people (of which 10 were used as a pilot sample) were recruited from the researchers' personal networks and the database of a professional fieldwork company. Selection was purposive on the basis of being regular users of minibus-taxis, and covering a wide range of home and work locations within the greater Tshwane area.

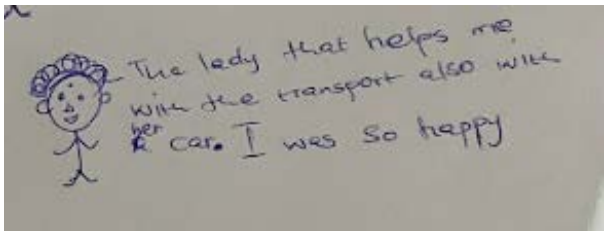
Three methods of data collection were used, offering us different sources of information to triangulate and compare with the subject literature: paper-based travel diaries, photovoice (photos/video clips and voice messages) and information horizon interviews (drawings showing information sources and recorded interviews). Case & Given (2016) and Sonnenwald et al. (2001) offer more detail on the use of these methods in information behaviour research. Travel diaries provided descriptive quantitative information on all trips undertaken for three days prior to the interview day, intended to provide context for the subsequent interviews. The photovoice method asked participants to provide any kind of audio-visual recording illustrating their daily travel experience, sent to the researchers via WhatsApp. From the study alone, excluding the pilot, we received 347 photos, 26 videos,

[3] This initiative by the Gauteng Provincial Government to provide a single user entry point for transport information in the province is no longer active. Another platform, MovingGauteng (started by a group of transport enthusiasts), is also no longer available. However, their Facebook and Twitter pages remain live but the content is limited to repositioning information from third parties.

and 216 voice messages. Finally, we conducted a face-to-face interview with each participant, to deepen understanding of the information sources people turn to in a specific context, how they position themselves to the information sources, and whether they were satisfied with the information they received. Participants had to describe two travel incidents – one from their daily commute and another while travelling to a place they had never been to before. We combined the interviews with information horizon drawings, a visual method that asks participants to draw themselves and the sources they consulted, to number the sources in the order of importance. This also helps to explore the affective dimensions of the experience, for instance by using smiley or unhappy faces when drawing themselves. Each also had to give their "story" a name.

Figure 1 shows examples of positive and negative experiences obtained from the respondents.

Samantha:



Khumo:

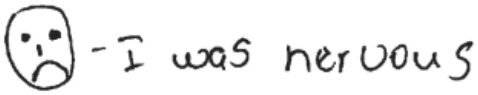


Figure 1: Examples of information horizon drawings obtained during interviews

4. RESULTS: GENERAL OBSERVATIONS AND DISCUSSION

The participant profile included the following (combining the pilot and main samples):

- Gender with which they best associated: 12 men, 19 women.
- Age: ranged between 21 and 57.
- Ethnic group with which they best associated: African.
- Language most spoken: Setswana; other languages mentioned included Sepedi, Zulu, Shona, Sotho, English, and Afrikaans.
- Travel modes used: Participants used mostly minibus-taxis and walking, with occasional use of buses, tuk-tuks, or ride-sharing with family or friends.
- Trip purposes covered: 50% home to work/university or back home. Rest are a variety of shopping, personal business, or social/visiting purposes.
- Regularity of trips: 75% were regular or daily, 15% irregular, and 10% first-time trips.

The data was very rich in terms of the range of experiences captured. Data were analysed using thematic analysis, looking for patterns and repeated themes across respondents and data sources. We discuss here some of the most important observations from an information behaviour perspective.

4.1 The Importance of Information in the Travel Experience

Information was shown to be part of everyday mastery of life (Savolainen, 1995) where it is needed for people to find solutions to the mobility challenges they face. These challenges stem, in part, from the complexity of the transport environment that users must navigate.

Complexity is reflected firstly in the large number of individual actions, decisions, and considerations that collectively make up the travel experience; this means that the types of information sought vary widely across different stages of travel. For instance, pre-trip information helps to make early decisions about whether, when, where, and how a trip will be taken. It typically relates to all five information attributes (see Table 1), and is greater for new/irregular passengers. At the departure point (either at a rank or roadside), users require supply information related to the best route to use, the departure time of services, service delays (reliability) and how to identify the correct vehicle. Once in the vehicle**,** passengers need information to confirm that they have boarded the correct vehicle, how to show or buy their fare, and whether to stand or sit (comfort). More importantly, they need to know at what point they are on the journey, how and where they will get off and how they will indicate to the driver that they need to disembark. At the destination, users may need wayfinding information on how to exit the station, directions to popular destinations and landmarks as well as how to locate their destination.

A second level of complexity stems from the multimodal nature of many passengers' travel patterns, involving multiple linked trips with one or more transfers in between. For example, Bobo[4] (in his travel diary) explained how he left home, bought goods, donated blood, applied for job vacancies, shopped again and returned home – involving two taxis on the street, one taxi from a taxi rank, and walking – in the course of one day. People have many needs for information when navigating such complexity. The fact that information needs vary across different trips of the journey suggests that the situation is more complex than shown in Table 1. Thirdly, informal modes by their nature are flexible and adaptive, with routes, departure times, stop locations, and sometimes even fares changing according to conditions. Information helps to deal with this fluidity, even during regular or daily trips.

There is a limit on the value of information, however: transport options are often so limited that information cannot solve every problem (or even relieve uncertainty and anxiety, as the conventional view holds), but rather serves to prepare people to brace for the inevitable. For example, several respondents recounted long walks to/from the taxi stop, which were unavoidable regardless of what else they may know or wish to know. Once in a taxi, passengers have to wait until it is full before it departs. It does not help to ask the driver when the taxi will depart.

Figure 2 illustrates some of the travel conditions as submitted by passengers through their photovoice exercise. Passengers' observations confirm previous work documenting the generally poor user experience on informal modes (e.g. Luke & Heyns, 2020), but highlight the specific role of information in this context. For instance, formally provided taxi ranks, being more structured, tend to provide clearer destination signage and orderly operations as compared to the rest of the environment within the mode operates.

[4] Participants were asked to choose pseudonyms for themselves, to preserve anonymity of responses.

(a) Poor road to walk through to get to destination

(b) Taxis are scarce on this road during off-peak hours

(c) Waiting for a taxi at night on the side of the road

(d) Formal taxi stop, no signage

(e) A vendor at a taxi rank

(f) Queuing at bus terminal

Figure 2: Travel context shown in photos shared by participants

4.2 The Social Nature of Information Seeking

Since most minibus-taxi environments are poorly signed (with the exception of some destination signs at more formal ranks and occasional marking of vehicles), taxi users are very dependent on other people to provide them with the right information. This immediately raises issues of trust. Participants seemed to prefer asking others of the same gender, drivers, and especially queue marshalls (at ranks) who were perceived as being more authoritative and trustworthy. Many respondents did not describe this dependence on others as a problem. Yet it could open the door for misinterpretation and misbehaviour. May described an incident where she was unsure of how to get to her destination, and a fellow passenger eagerly spoke to the taxi driver on her behalf. Yet, when she ended up at the wrong location, the other passenger just got off and said nothing, leaving May unsure of whether her information need was mis-translated by the passenger with seemingly good intentions and/or misinterpreted by the taxi driver. This incident emphasised the deep vulnerability and marginalisation of many minibus-taxi users. Passengers are especially vulnerable when needing information on where to get off a taxi. For that information, they often depend on the driver and fellow passengers. A common strategy for dealing with trust issues is to triangulate information requested from more than one source, e.g. different fellow passengers, plus a driver or marshall.

The social nature of information seeking raises questions of inclusion on the basis of language, culture, and verbal ability. For instance, Paseka said that sometimes “I am

afraid to ask" and "I feel like a burden to ask", which effectively denies her the option of using a taxi. Language recurred as an important dimension of vulnerability. Some passengers said that if they ask questions in English, they often get ignored. Having to ask in the vernacular raises problems for non-South Africans or non-locals who do not speak the local, vernacular language. For example, Dephine, who is not a South African citizen, was adamant that she only asks her friend for information and when on her own, she only turns to the queue marshals and drivers – never passengers.

There is also a non-verbal language that has developed within the taxi industry, in the form of the system of hand signals used to flag down taxis going to specific destinations. Respondents described these signals as being learnt from childhood from their parents or from a friendly neighbour, landlord, or colleague. Learning the correct signals may be a barrier to travelling to new destinations or using taxis in new areas. Many passengers respond by closely watching what others do – evidence of the importance of situational awareness in successfully navigating the system.

4.3 Information Poverty – Evidence of Unmet Needs

Overall, we found very strong evidence of what is labelled as *information poverty*, which has been used to describe subgroups that are persistently excluded and isolated due to a lower ability to access, process, and use information to their benefit (Case & Given, 2016). Informal passengers tend to have a very small circle of people on whom they can rely for help, similar to other work reported on information behaviour (Fourie et al., 2022). Formal sources of information are almost non-existent, so that seeking and sharing information is almost totally based on oral communication, as noted above. Questions are most frequently asked before leaving home (or another place of departure) and at the taxi rank.

This raises questions of agency, and what happens when people are not able or willing to access the information needed to make a trip. We encountered a few examples of long-term harm resulting from poor travel experiences, for instance Keaun who missed a doctor's appointment because a taxi dropped him at the wrong location due to either miscommunication or lack of care, after which he could only get a new appointment in a year's time. However we also heard stories of drivers going out of their way to help vulnerable passengers, once they know the need. Sometimes passengers claim agency by resorting to walking, as a way of taking control of a situation that does not serve them or about which no information is available. For instance, Barrel shared how he had to get to hospital late at night after breaking his arm and there were very few taxis around and none going that way, leaving him and his brother waiting on the side of the road in the dark for a long time for a taxi. Barrel said multiple times during his interview "I prefer to walk".

4.4 Use of Digital Technology

We found some limited use of digital technology to address information gaps. A few of the younger participants such as Tebogo (38) and Katlego (28) spoke of how they make use of Google Earth to identify new locations they are travelling to. Landmarks are noted and this information is used to describe where they are going and to verify that they are travelling in the right direction. Participants also access digital maps and directions provided on websites. Technology is sometimes used to access more responsive modes of public transport when there is a time pressure and limited information on minibus-taxi services. On trips to new locations, Tebogo said she often uses ride-hailing because it is safer, saves time and takes her where she wants to go. However, cost limits this to an irregular practice.

The online information provided by formal systems seems to attract limited use. Reasons for this include ignorance (most formal bus users were not aware of the service information provided on apps, social media and websites), preference (e.g. Lynette (45) who said she preferred to speak to people rather than use technology), and lack of trust of these sources. Social media provides a way for some respondents to combine their need for up-to-date information with the need for triangulating with other sources (especially other passengers). For example, Nene (34) mentioned that she consults the local newspaper's Facebook page for information on fare changes. The researchers have also encountered elsewhere that users of specific modes set up WhatsApp groups and Facebook communities to share information in near-real time, for example about train delays amongst Metrorail users. However we did not encounter this practice in the current sample.

5. CONCLUSIONS AND RECOMMENDATIONS

Methodologically the study highlighted the usefulness of using qualitative research techniques to understand the context within which travel takes place. The context of where people find themselves in specific situations and including time, place, people and their culture and technology, is very important in information behaviour research (Case & Given, 2016; Fourie et al., 2022). The understanding of contexts, situations and surroundings can and should influence initiatives and attempts to make an impact. We are also exploring affect and emotion as dimensions of not only information behaviour but also travel behaviour – and the fact that behaviour can trigger or change emotional experiences (Case & Given, 2016) that may affect long-term behaviour. We suggest that the transport field should pay greater attention to the emotional landscape of the public transport experience, if we are to understand how to promote its use as a choice and not just as a mode of force.

The transport policy environment broadly acknowledges the importance of user information in supporting service quality; the application of this policy seems to be very haphazard. The formal provision of travel-relevant information varies greatly between modes and places: the more formal and "modern" systems pay more attention to passenger information, while informal modes provide very little systematic information. Within the minibus-taxi mode, what little information is provided is concentrated at formal ranks and terminals, although even here the informal exchange of information through verbal communication by drivers and queue marshalls is very important. As marshalls and taxi officials are generally seen as authoritative and trustworthy sources, they could potentially be resourced better to fill immediate information gaps for passengers.

In general, all three methods of data collection showed a deep vulnerability of the situation which users of informal transport have to endure on a daily basis. There is very strong evidence of what can be called information poverty, and a very small circle of people on whom users can rely for help. Taxi passengers employ an array of strategies to navigate this landscape, using tacit knowledge transferred between people, e.g. learning from a trusted local (when newly arrived in an area), or a parent or family member. One example is the information needed to hail the correct taxi on the street, which requires use of a hand signal that is not listed in any manual. Passengers need to master the "art" of asking questions and using the right language and protocol. This raises issues of trust, agency, and possible exclusion due to language barriers. Most importantly passengers need an ability to assess strangers as reliable sources of information and a certain amount of contextual emotional intelligence and "streetsmarts" as well as situational awareness.

This raises the question of whether there is the potential for digital channels to help fill the information gap by augmenting this dependence on tacit knowledge and social transmission of information. It seems unlikely that digitally delivered information (e.g. via smartphone apps) would be able to meet all needs, unless it is coupled with greater standardisation and predictability of taxi operations. As a starting point, high-level information about transport corridors might be useful to potential passengers unfamiliar with the service. Further research is needed to consider digital behaviour and preferences and the relationship between socially gathered and digitally provided information. In any future solutions – whether digital or analogue – it seems that engendering trust, whether derived socially or through consistent reliability of information, or both, will be key for providing value. As we have seen, these are contexts in which unreliable information can have very serious repercussions for users.

In terms of future work, ongoing research is being conducted to more concretely test the suitability of such digital means of information provision in the context of informal transport. The research is also being expanded geographically by repeating the same experiments amongst users of informal motorcycle taxis and minibuses in Uganda, Kampala. This will enrich our understanding of whether the same methodology can deliver useful insights in another context.

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