

Perception of Information in Public Transport by People with Disabilities: A Singaporean Perspective

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Abstract

In employing a Universal Design approach, public transport developers need to be aware of the needs of People with Disabilities (PWDs) as they face greater challenges in commuting than the average person. Travel information needs to be accessible, useful, easy to understand and designed so that the traveller is provided with sufficient information on their requirements and procedure when using a public transportation service. The current study aids the development of autonomous mobility for public transportation in Singapore by identifying information and communication barriers in the current public transport system, especially for PWDs. This is done by shadowing participants during a typical public transport commute and conducting individual interviews to gain an in-depth understanding of the needs and concerns of PWDs (N=10). The initial data obtained is useful for the research team as it allows for the proposal of solutions to improve the current public transport information system to prepare for the deployment of autonomous vehicles (AVs).

Keywords: Information, Public Transport, People with Disabilities, Design studies

Problem statement

People with Disabilities (PWDs) face specific challenges in public transportation that differ than that of non-PWDs such as mobility issues, inaccessible public transport services and inconvenience in navigating via public transportation (Cacioppo & Hawkey, 2003; Mackett & Thoreau, 2015). In Singapore, aligned with the ratification of the UN convention on the Right of Persons with Disabilities (UNCRPD) in 2013 and the Enabling Masterplan (2012-2016) (MSF, 2016), measures have been taken to promote a more inclusive public transport system for PWDs, with fare concessions and more accessible infrastructure (e.g. wheelchair-accessible ramps, tactile indicators in train stations for those with visual impairments, etc.) being made available (Wong, 2017). However, numerous barriers have been identified in transportation by the Disabled People Association (DPA) in Singapore, such as information and communication barriers (e.g. lack of information in accessible bus stops) and technological barriers (e.g. inaccurate travelling information being displayed) (DPA, 2015). Current studies indicate that a lack of access to information in appropriate formats, regardless of the type of information (e.g. accessibility information, public transport service information, fare information, route changes), act as a significant barrier to travel for individuals with sensory and physical disabilities (Venter *et al*, 2004). People with sensory disabilities (e.g. blind and/or

deaf individuals) require information in a format that they can easily perceive and understand. Travel information should therefore be provided in a range of different media such as colour-contrast information, tactile surfaces and auditory information (Mashiri *et al.*, 2005).

Research objectives

The current study is presently ongoing¹ as part of a research programme in Singapore that aims to develop a public transport system for Singapore based on AVs. One part of the research programme focuses on the design of the information within the public transport system. The aims are to:

1. Identify information and communication barriers in the current public transport system in Singapore for PWDs;
2. Prioritise public transport concerns together with PWDs via shadowing and interviews; and,
3. Propose design solutions together with PWDs for improving the current public transport information system and prepare for the deployment of AVs for public transportation in Singapore.

Methodological approach

Identify information and communication barriers in the current public transport system in Singapore

In order to improve the information and communication system, an analysis of the current situation is needed. Current reports from diverse associations, literature, as well as on-field observations are used to list the issues encountered by PWDs while traveling in public transport.

Prioritise PWD public transport concerns via shadowing and interviews

The research team is in contact with non-profit organisations in Singapore associated with PWDs for participant recruitment. Participants are asked to take part in a shadowing study with an interview. If participants decline the shadowing, the research team conducts the interviews only, with consent. The goal of shadowing is to observe the commuting experience of PWDs. Shadowing begins upon meeting the participant, typically at public bus stops or train stations located in Singapore. The researcher accompanies the participant throughout the journey. The researcher takes note of any difficulties the participant may encounter during the journey. Shadowing ends when the passenger alights from the bus or exits the train station. The shadowing lasts approximately 30 to 60 minutes. After shadowing, the researcher interviews the participant, lasting up to 30 minutes. The interviews aim to address challenges faced in decision-making during the travel, pre-journey information required to initiate the journey and perceived availability of accessible information. A thematic analysis is conducted of all the participants' data to determine the barriers that prevent accessible public transport use for PWDs. Participants are given incentives for their participation in the study.

Proposing design solutions with PWDs

In the later stages of the study, the research team aims to organise design workshops as a collaborative effort with organisations associated with PWDs. Participants are to materialise their concerns and ideal public transportation service in the form of design solutions together with the facilitators. Two design workshops are planned with ten participants each.

¹ The study has been approved by the Institutional Review Board of the Nanyang Technological University (IRB-2018-07-051).

Preliminary and expected results

Identify information and communication barriers in the current public transport system in Singapore

With regards to barriers for all users of public transportation, Ongel *et al.* (2018) identified features from the current public transport system in Singapore that may be improved in consideration of the Service Quality criteria according to the European Standard 13816 (CEN, 2002) and Universal Design principles (The Center for Universal Design, 1997). Among others, most travel information (e.g. bus arrival information) is only available via smartphone applications, excluding passengers who do not use a smartphone. Further, when passengers are travelling via bus, bus stop names on the station are not always readable (Figure 1), which may result in passengers missing their designated stops, thus increasing inconvenience and travel time. These issues – identified for the entire population – are even more problematic for PWDs, who may have difficulty in using smartphone applications.



Figure 1: Left: Public bus stop in Singapore with indistinct signage displaying bus stop name (red circle). Right: Enlarged image of bus signage.

Regarding PWDs, information and communication barriers identified by the Disable People's Association in Singapore (DPA, 2015) include:

- Confusing tactile surface ground indicators at MRT stations;
- Under-publicised information in emergency protocols;
- Bus captains' language of communication (some are only fluent in Mandarin, thus causing a communication barrier); and
- Lack of information on accessible bus stops.

Prioritise public transport concerns together with PWDs via shadowing and interviews

Currently, ten participants (five wheelchair users and five visually-impaired individuals) have been interviewed and one visually-impaired participant has participated in the shadowing study.

Current findings reveal that the participants' primary concerns include navigating in large crowds at public transport stations and within the mode of public transport, and in having sufficient quality information available that effectively directs them to their destination (Table 1).

Table 1: Excerpts from the interviews conducted

Participant description	Statements by the participants during the interview
No. 1 – Blind person with walking cane	“If the bus stop has something to announce that this bus number is coming it will be very helpful. Sometimes we can take three, four buses so the best is that they announce all the buses.”
No. 2 – Blind person with walking cane	“I think the tactile should be made more available, there are some tactile then it is lost in the middle.”
No. 3 – Blind person with walking cane	“I also notice sometimes the tactile is in the centre so when we are walking we are blocking the passage.”
No. 4 – Blind person with guide-dog	“I prefer the train routes because it is easier to get where I want because of the announcement system... the other alternative way is I ask the bus driver to inform me when I am reaching my stop.”

Additionally, findings reveal that information at public transport services in Singapore can be inconsistent, as with tactile flooring in train stations for instance. Further, PWDs face difficulties in that bus arrival timings are only digitally displayed at certain bus stops. Consequently, blind participants emphasised that only certain buses in Singapore have auditory announcements when approaching bus stops. This lack of information has resulted in some PWDs altering their travel routes altogether for more convenient and informative travel. Other barriers of information include emergency cases, where staff in train stations are to adhere to protocols that assist PWDs. It is important to note this because in an autonomous vehicle with no staff present, PWDs have to rely on the information available to them to allow them to respond appropriately in the event of an emergency.

Currently, this study lacks deaf participants, but the researchers plan to reach this group of users with specific needs during the coming months.

Propose design solutions together with PWDs

The design workshops have yet to be conducted and are expected to be organised in July 2019. Expected findings are in the form of concrete design solutions created together with the PWDs that address their specific needs for suitable information in public transport.

Conclusion

The preliminary results from the current study showed that in designing accessible public transport-related information for PWDs, it is important to incorporate visual information, auditory information and tactile information. Participants have given both positive and negative feedback regarding the quality of information available and elaborated on why some modes of transport are preferred over others with regards to information available. The study also highlighted that PWDs reliance on staff assistance for providing information or guiding them to their mode of public transportation. It is especially important for public transport developers to address this, especially with regards to the future implementation of Autonomous Vehicles (AVs) in Singapore.

The next part of the current study will be to extend the shadowing and interviews to 20 persons and organise the design workshops with PWDs. These workshops will help by providing information with regards to designing appropriate information systems that would be compatible with the deployment of AVs in the future.

Acknowledgement

This study is part of a research programme funded by the National Research Foundation (NRF) Singapore under its Campus for Research Excellence and Technological Enterprise (CREATE) programme.

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