Urban Transport Accessibility in the Digital Era: A Study of the Mobility Needs, Preferences, and Travel Patterns of People with Disabilities

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Abstract

Inclusive public transportation is essential for the independent mobility of persons with disabilities, yet the digitalization of transport services in Jakarta does not necessarily address the differing needs across disability types. This study examines the mobility characteristics, accessibility perceptions, and mode choice preferences of persons with physical disabilities, deaf individuals, and persons with visual impairments in Jakarta through a mixed-methods approach involving 71 respondents, combining descriptive statistics, Principal Component Analysis, and Binary Logit Model with interviews and focus group discussions.

The findings show that accessibility barriers faced by all respondents stem not from vehicle conditions, but from service and information systems that fail to accommodate their needs: reliance on ride-hailing due to inadequate feeder services, dependence on visual safety monitoring due to audio-based warning systems, and loss of orientation when audio announcements are missed. These findings indicate that Jakarta's digital transport system remains designed around users who can see, hear, and move without assistance, highlighting the need for inclusive transportation policies that address service and information accessibility alongside physical infrastructure.

Keyword: Accessibility, Persons with Disabilities, Digital Transportation, Visual Disabilities, Hearing Disabilities, Physical Disabilities

Introduction

Public transportation is a basic urban service that determines equitable access to economic opportunities and social participation (Martens, 2015). In Jakarta, a city of over 10.6 million residents, persons with disabilities continue to face systemic accessibility gaps despite existing services (Guzman & Oviedo, 2018; WHO, 2023), as accessibility efforts have largely focused on physical infrastructure under the assumption that mobility barriers are primarily physical-spatial (Pereira et al., 2017; Soltani et al., 2019).

However, persons with physical disabilities, deaf individuals, and persons with visual impairments each face distinct barriers shaped by different functional and sensory needs, yet are frequently treated as a homogeneous group, leaving disability-specific needs underrepresented in policy recommendations (Park & Chowdhury, 2018; Ali & Abdullah, 2023; Ariansyah et al., 2025). Meanwhile, the rapid digitalization of Jakarta's transport services through integrated systems, navigation applications, and ride-hailing is often expected to improve accessibility, yet without inclusive design, it risks introducing new barriers rather than resolving existing ones (Chiscano & Darcy, 2022; Durand et al., 2022). This study addresses these gaps by jointly examining the mobility characteristics, accessibility perceptions, and mode choice preferences of these three groups in Jakarta, providing a comparative basis for inclusive transportation policy.

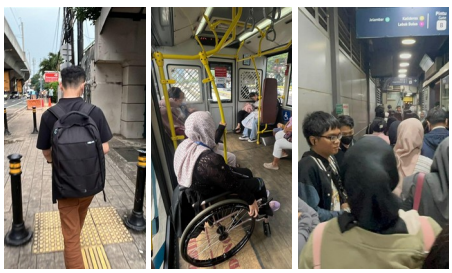
Research Method

This study used a mixed-methods approach combining quantitative and qualitative data from 71 respondents with visual, hearing, and physical disabilities, recruited through disability organizations in Jakarta (Pertuni, Komloving, Gerkatin, Sunyi Coffee, Yayasan Visi Maha Karya, and Yayasan Cheshire). Data were gathered via perception questionnaires and structured observations of Jakarta's multimodal public transport system, with each respondent completing six stated choice scenarios (426 observations total).



Picture 1. Questionnaire Data Collection

The questionnaire, administered face-to-face or via guided interviews, covered socio-demographic data, Likert-scale perceptions, and a stated choice experiment with two unlabeled alternatives designed in NGene using a fractional factorial design. This was complemented by in-depth interviews, focus group discussions, and shadowing observations based on the eight-stage accessible journey chain framework.



Picture 2. Observation Data Collection

Data were analyzed in three stages: descriptive statistics, Principal Component Analysis (varimax rotation) to identify accessibility and technology perception components, and Binary Logit modeling using the Apollo package in R, with the best model selected via log-likelihood, McFadden's pseudo-R^2, AIC, and BIC. Findings were then integrated through a convergent mixed-methods approach to produce disability-specific and cross-disability policy recommendations.

Discussion & Result

This study shows that people with hearing, physical, and visual disabilities are active and captive public transport users. However, their mobility independence relies heavily on personal adaptation, including the use of smartphones, Google Maps, and ride-hailing services to overcome accessibility barriers. While digitalization supports mobility, it cannot replace the need for accessible infrastructure and reliable information throughout the journey.

Although all groups adopt similar coping strategies, Binary Logit models reveal that mode choice is driven by different accessibility needs. Visual safety information and staff communication are most important for deaf users, feeder services and staff assistance for people with physical disabilities, and reliable audio information for people with visual disabilities. Across the three groups, model fit ranged from adequate to good (McFadden Pseudo R^2 = 0.34–0.46), confirming that these attributes reliably explain mode choice behavior.

Table 1. Beta Coefficients Binary Logit DCM

Visual		Hearing		Physical	
Variable	β	Variable	β	Variable	β
Physical Accessibility	0.74	Visual Accessibility	0.84	Availability of Service Information	0.86
Information Reliability	0.79	Visual Safety Warning Information	1.60	Availability of Pick-up Feeder Service	1.10
Human Assistance & Facilities	0.64	Staff Communication Assistance	0.86	Availability of Assisting Staff	0.54
Waiting Time	-0.85	Cost	-0.01	Service Fare	0.01
Perceived Comfort & Certainty of Transit Service	-0.27	Age	0.63	Service Punctuality	-0.27
Type of Visual Disability	-2.77	Motorcycle Taxi (Ojek) as First Mile	-1.01	Perceived Digital Ease	1.29
Duration of Visual Disability	0.91	Proximity to Halte as First Mile	-0.76	Congenital Disability	-2.62
Frequency of Public Transport Use	-0.99	Health Related Trip Purpose	0.77	Transcare Usage	-2.18
Use of Access by KAI Application	0.92	Mild Hearing Impairment Level	-1.03	Below Average Income	2.26
		Speech to Text Application Use	-0.89	Long Distance Last Mile	2.59
				Walking Last Mile	-0.85
				Medium Distance Last Mile	2.23
				Existing Train Use	-1.86

Conclusion

These findings highlight the need for disability-specific, rather than one-size-fits-all, accessibility policies.

The study concludes that inclusive public transport requires a systemic approach beyond physical infrastructure, integrating standardized audio and visual information, trained staff, improved feeder connectivity, and accessible digital platforms. These measures should be incorporated into transport planning through meaningful participation of people with disabilities.