social sciences

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Assessing Accessibility of Transport and Universal Access in the City of Tshwane Using Expert Opinion

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Abstract: Universal design and access in transport are essential for ensuring the equal and independent mobility of people with disability and those with reduced mobility. Despite progressive legislation and policies, the implementation of universal design and access standards in transport systems remains inconsistent in the City of Tshwane. This study aims to assess the state of transport and universal access in the City of Tshwane using expert opinion. Transport experts were interviewed using a semi-structured interview guide to gather in-depth insights. Thematic analysis was applied to identify issues related to policy, infrastructure, and service delivery. Experts reported that while legislation supports universal access, implementation is inconsistent, particularly in informal transport sectors like minibus taxis. The findings reveal significant gaps between policy goals and implementation. The inconsistent application of legislation has resulted in new transport modes, such as the BRT systems and the Gautrain high-speed rail, being designed with universal access principles, while other modes lag behind in accessibility standards. An integrated transport system with universally designed infrastructure is recommended to improve transport access for people with disability and those with reduced mobility.

Keywords: people with disability; universal access; transport; urban transport; accessible transport

Citation: Duri, Babra, and Rose Luke. 2024. Assessing Accessibility of Transport and Universal Access in the City of Tshwane Using Expert Opinion. *Social Sciences* 13: 690. https://doi.org/10.3390/socsci13120690

Received: 25 November 2024
Revised: 16 December 2024
Accepted: 16 December 2024
Published: 19 December 2024

1. Introduction

Transport infrastructure and services influence the participation of people in daily activities and in accessing essential services (Cepeda et al. 2018; Naberushkina et al. 2022). However, for people with disability, this influence becomes even more critical (Wagner et al. 2024). One key to ensuring socio-economic participation for all is universally designed transport infrastructure and services, which allow people with disability to travel independently. Universal access in transport is not merely a matter of convenience but a basic right that impacts the lives of people with disability and society at large (Aarhaug and Elvebakk 2015). Many people with disability have not truly enjoyed this right, especially in developing countries (Cepeda et al. 2018).

Although the rights of people with disability are usually protected through legislation and policies, the concept of universal design, which emerged from the field of architecture, has been instrumental in shaping inclusive transport solutions (Zajac 2016). The seven principles that guide how the universal design concept is implemented (as outlined in the literature review) ensure that transport systems are not only usable by people with disability but by a broad range of diverse users, such as people with mobility disability, hearing disability, and visual disability (Aarhaug and Elvebakk 2015). Despite advances in theories such as universal design, transport barriers for people with disability have remained widespread (Chiscano 2021).

Following the ratification of the United Nations Convention on the Rights of Persons with Disabilities (UNCRPD) in 2007, South Africa has taken measures to improve transport access for people with disability. The government has developed some legislation and

policies to support the right of people with disability to participate in society. Comprehensive legislation and policies like the Integrated National Disability Strategy (1997); the White Paper on the Rights of Persons with Disabilities (2015); the White Paper on National Transport Policy (2021); the National Land Transport Amendment Act (NLTAA 2023) and the National Strategic Framework on Universal Design and Access underline South Africa's commitment to the concept of universal access. The White Paper on the Rights of Persons with Disabilities serves as a foundational guide that all spheres of government and stakeholders are expected to implement and uphold to create inclusive infrastructure and services. The White Paper is a cornerstone policy that guides policies, programs, and laws related to disability (Parliamentary Monitoring Group 2021).

However, in South Africa, the inconsistencies in policy implementation (Lister and Dhunpath 2016) and the complexity of designing a universally accessible transport system highlight the need for dedicated efforts to bridge the gap between policy and practice. Existing policies and legislation in South Africa emphasise universal access. Research indicates a significant gap between the development of these policies and their implementation (Lister and Dhunpath 2016; Vanderschuren and Nnene 2021). Infrastructure and service provision are fundamental to ensuring universal accessibility. Experts provide valuable insights into the technical and operational challenges that hinder the realisation of universal access. Therefore, the aim of this paper is to analyse the provision of transport for people with disability from a legislative and policy framework point of view. To address the aim of the study, the following two research objectives were formulated:

(1) To analyse the perceptions of experts around legislation and policies related to the provision of transport for people with disability, as well as the implementation thereof.
(2) To explore the perceptions of experts on infrastructure, service, and vehicular challenges faced in providing universally accessible transport services in the City of Tshwane.

The following are the study hypotheses:

Hypothesis 1: *There are varying levels of understanding of legislation and policies on universal access amongst transport experts in the City of Tshwane.*

Hypothesis 2: *The implementation of legislation and policies on universal access in transport is inconsistent across transport modes in the City of Tshwane.*

Hypothesis 3: *The lack of integrated transport infrastructure and universally accessible design standards impacts the mobility and accessibility of people with disability in the City of Tshwane.*

The research objectives address the disconnect between policy and practice. By focusing on expert opinions, the study contributes to a more comprehensive framework for improving transport accessibility in a South African urban context, especially for people with reduced mobility.

2. Literature Review

2.1. Theoretical Framework: Universal Design

The concept of universal design is explored in the context of transport infrastructure and services. Universal design is a concept that originally emerged as a disability-inclusive architectural design approach by the architect Ronald L. Mace (Audirac 2008). Over the years, the universal design concept evolved into a philosophy of design that has influenced and has been applied to many fields besides architecture (Audirac 2008). Mace (1998) defines universal design as "the design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialised design". Following the introduction of universal design, transport facilities and vehicles also adopted the concept. Unlike the medical point of view, disability is considered from a functionality perspective (Hidalgo et al. 2020); for example, universal design acknowledges

temporary limitations that can affect a person's ability to use transport, such as travelling with young children, carrying luggage, and injuries. Universal design is not only focused on providing access solutions to users with disability, but to all users (Aarhaug 2023). Universal design principles seek to make transport accessible for a diverse range of users, encompassing both people with disability and those with reduced mobility. The main focus of this study is people with disability; however, this study acknowledges and incorporates the broader category of reduced mobility.

The following are the seven key principles that guide how universal design is implemented (Center for Universal Design 1997) from a transport perspective:

Principle 1: Equitable Use. "The design is useful and marketable to people with diverse abilities". For example, in transport, Principle 1 applies to low-floor public buses equipped with entryways and ramps or lifts that allow people using wheelchairs, parents with strollers, and passengers with luggage to board and alight effortlessly (Zajac 2016). The design of buses with low-floor entryways benefits both passengers with disability and those without disability. At a station, automatic doors powered with sensors at entrances are not only convenient for people with disability but also for all users, irrespective of abilities.

Principle 2: Flexibility in Use. "The design accommodates a wide range of individual preferences and abilities". Transport design features should accommodate a wide range of preferences and abilities. Ticketing machines that offer options in purchasing tickets cater to passengers with different abilities, for example, a ticketing machine with a touch screen, voice commands, and manual buttons. Another aspect of Principle 2 is the possibility of adjustment to suit different user needs, for example, seats. Tip-up seats and wheelchair space have flexibility in the use of space in the sense that other passengers may use the space if passengers in wheelchairs are not present.

Principle 3: Simple and Intuitive Use. "The design is easy to understand, regardless of the user's experience, knowledge, language skills, or concentration level". For instance, clearly marked and intuitive transport maps and signage with universally recognisable symbols and multilingual information can assist all users. In addition, control buttons labelled with text in different languages and symbols are simple and intuitive to understand; for example, an elevator with different text and symbols accommodates users with different abilities.

Principle 4: Perceptible Information. "The design communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities". In transport, announcements for stops and routes made both audibly and visually on buses and trains ensure that passengers with visual or hearing impairments receive the necessary information (Chiscano 2021). Information and communication should be accessible to all users with different sensory abilities. "Perceptible information offers good legibility and readability and compatibility with a variety of devices and techniques used by people with disabilities" (Coxon et al. 2019). Through voice control, people with vision disability can access information from cell phone applications. The use of contrasting colours on signs enhances visibility for the visually impaired. Previous research reveals a lack of accessible information as a barrier to transport (Bjerkan and Ovstedal 2020; Park and Chowdhury 2018; Oksenholt and Aarhaug 2018; Randle and Dolnicar 2019; Wu et al. 2017). For people with disability, information is essential for trip planning. Therefore, tactile, visual, and auditory prompts accommodate a wide range of users.

Principle 5: Tolerance of Error. "The design minimises hazards and the adverse consequences of accidental or unintended actions". A design should alert users of potential hazards and minimise hazards and adverse consequences. For example, software that provides warnings before performing a delete action. Another example, at a train station, automatic train doors and platforms with tactile warning strips along the edge prevent accidental falls into train tracks. Automatic train doors have hindrance sensors that detect obstructions between train doors, thereby protecting all users.

Principle 6: Low Physical Effort. "The design can be used efficiently and comfortably and with a minimum of fatigue". In transport, activities that may require physical effort are boarding and disembarking vehicles for wheelchair users (Zajac 2016). Buses designed with

electromechanical spanning bridges or low-floor vehicles reduce or eliminate the physical effort required to assist wheelchair users to board and disembark vehicles (Velho 2019). In addition, for a person in a wheelchair or a person who is short in height, an ergonomically designed ticketing machine requires minimal effort to reach (Sze and Christensen 2017).

Principle 7: Size and Space for Approach and Use. "Appropriate size and space are provided for approach, reach, manipulation, and use regardless of the user's body size, posture, or mobility". For example, at a station, wider entrances and walkways can accommodate wheelchairs and other passengers with bulky luggage (Sze and Christensen 2017). Low-floor buses are designed with priority seating areas with sufficient space for wheelchair users, elderly passengers, and those with strollers or large luggage. Principle 7 emphasises size and space that can accommodate different body sizes, postures, or mobility levels.

By incorporating the universal design principles, transport systems can become more accessible, efficient, and user-friendly for everyone, ensuring that all passengers can travel independently and safely. However, research shows that transport systems across many cities from both developed and developing countries have failed transport users by not accommodating their needs.

2.2. Legislation and Policies Concerning People with Disability

There are various international conventions and agreements that advocate for the rights of people with disability. International conventions such as UNCRPD (2006) mandate member states to ensure the support and protection of the rights of people with disability. The aim of the UNCRPD (2006) is to "promote, protect and ensure that people with disabilities fully participate in society". South Africa is a signatory to various international conventions and agreements that advocate for the rights of people with disability, including UNCRPD (2006). Some of the obligations that should be undertaken by signatories to the UNCRPD (2006) related to transport include accessibility (Article 9) and person mobility (Article 20).

Article 9 of the UNCRPD states:

> *"To enable persons with disabilities to live independently and participate fully in all aspects of life, States Parties shall take appropriate measures to ensure to persons with disabilities access, on an equal basis with others, to the physical environment, to transportation, to information and communications, including information and communications technologies and systems, and to other facilities and services open or provided to the public, both in urban and in rural areas."*

One of the measures to achieve the goals of Article 9 is to identify and eliminate barriers through continuous accessibility audits and assessments and to implement plans and policies to remove identified barriers. Measures to promote accessibility are not limited to urban areas but are also extended to rural areas, where people with disability may face even greater challenges. The commitment to provide and improve accessibility can promote the full participation of people with disability in society. While Article 9 is focused on physical barriers in the environment, Article 20 specifically looks at assistive technologies to further improve the independence of people with disability.

In 1996, South Africa adopted the Bill of Rights, which is progressive and protects the rights of people with disability. The Bill of Rights is the foundational document for all other legislation and policies aimed at ensuring the rights of people with disability (Department of Social Development 2016). Some of the legislation to support the inclusion of people with disability in the transport system includes the National Building Regulations and Building Standards Act (103 of 1977), NLTAA (2023), National Road Traffic Act (93 of 1996), and the Promotion of Equality and Prevention of Unfair Discrimination Act (4 of 2000). Despite national legislation in South Africa that reflects international treaties and incorporates treaty requirements (Baldiga et al. 2017), "there is no comprehensive disability legislation that deals exclusively with matters of disability or with people with disabilities" (Grobbelaar-du Plessis and Grobler 2013).

Policies in South Africa with direct impact on people with disability include the Integrated National Disability Strategy (INDS) 1997 and the White Paper on National Transport Policy (2021). The vision of the White Paper on National Transport Policy (2021) is to

> *"provide safe, reliable, effective, efficient, environmentally benign and fully integrated transport operations and infrastructure that will best meet the needs of freight and passenger customers, improving levels of service and cost in a fashion that supports government strategies for economic and social development whilst being environmentally and economically sustainable."*

While the policy addresses various aspects of transport, it falls short in providing specific measures to ensure that the transport system is truly inclusive and accessible to all, particularly for people with disability. The policy does not provide specific measures on how infrastructure addresses the unique needs of people with disability. Although the policy mentions conducting access audits of infrastructure, it lacks clear mechanisms for monitoring and evaluating the implementation of accessibility measures. Effective monitoring and evaluation are essential to ensure that the intended improvements are achieved and to identify areas where further action is needed. Despite these shortcomings, the policy is a positive step towards improving access to transport.

The National Land Transport Amendment Act (NLTAA 2023) updates the National Land Transport Act (2009). The amendment act includes provisions to improve accessibility in public transport for people with disabilities and those with reduced mobility. The people with disabilities, along with people with reduced mobility, like the elderly, pregnant women, young children, scholars, and those who are limited in their movements by children, are now identified in the amended act as "targeted categories of passengers". Section 10A of the act defines and emphasises the requirements of accessible transport. Accessible transport means "transport that is accessible to all persons in the area, including, but not limited to, targeted categories of passengers, pedestrians, and cyclists to their intended destinations in a safe and convenient manner, and in relation to infrastructure means the design of facilities that are usable by all people to the greatest extent possible, with or without the need for adaptation or specialised design". Infrastructure needs to be designed to be usable by everyone without specialised adaptations. Municipalities are mandated to consider the needs of "targeted categories of passengers" in their public transport planning, but, overall, municipalities need to integrate these needs into mainstream transport infrastructure where possible. The act also mandates municipalities to determine reduced fares for "targeted categories of passengers". While the NLTAA (2023) is a positive step towards improving transport accessibility for people with disability, some areas remain vague and lack accountability mechanisms. However, the National Land Transport Strategic Framework (2023–2028) outlines several specific requirements for universal access in transport.

The National Land Transport Strategic Framework (2023–2028) provides guidelines to embed accessibility standards across public spaces and services, aiming to eliminate barriers that limit access and ensure participation for all, especially persons with disability. The framework outlines that service providers must develop and implement a Universal Design Access Plan (UDAP), ensuring reasonable accommodation and accessibility for all passengers, including those with disability, elderly people, children, and pregnant women. All transport systems must comply with the minimum standard for planning, design, construction, and operation to ensure universal accessibility. Over time, all the transport modes and infrastructure should be universally accessible. But most of all, continuous audits should be conducted to check the progress and address complaints from transport users.

To ensure that the principles of universal design and access in the framework are effectively integrated, there are areas that need further attention. For example, there is a great need for training professionals such as engineers, architects, planners, and other service providers about universal design (Lanteigne et al. 2022; Watchorn et al. 2023). Without proper understanding of universal design, the implementation of these principles

can be a challenge and inconsistent (Khalil et al. 2021; Lanteigne et al. 2022; Watchorn et al. 2023). Although the framework emphasises the importance of monitoring and evaluation, there is no clear, robust system in place to track progress, identify areas for improvement, and conduct regular audits. To improve compliance and accountability, legislative measures such as penalties for non-compliance are required, while incentives should be given to organisations that comply with universal design standards (Agarwal 2020; Al Zamil and Alsharhan 2023).

The purpose of the guidelines is to give effect to the legislation; however, both the NLTAA (2023) and the guidelines lack specifics. Despite comprehensive legislation and policies, the implementation and enforcement of policies is not consistent and often leaves gaps between policy and practice. Coxon et al. (2019) acknowledge how complicated it is to implement accessibility legislation, as it requires good design. Hidalgo et al. (2020) also highlight the implementation of policies as the main challenge for most Latin American countries.

3. Materials and Methods

3.1. Study Setting

This study was conducted within the metropolitan municipality of Tshwane, one of three largest metropolitan municipalities in South Africa, situated in the Gauteng province. This metropolitan municipality was strategically chosen because of the concerning trend of a significant increase in people living with some form of disability within Tshwane (Stats SA 2018). Qualitative research methods were employed in data collection and analysis. A semi-structured interview guide was utilised to gather data from the participants.

3.2. Study Sample

A total of six interviews were conducted to gain a deeper understanding of universal access in Tshwane, as shown in Table 1. The selected participants had different specialisations, roles, and experiences within the transport sector. This diversity ensured a comprehensive understanding of the transport system and its accessibility in the City of Tshwane. The experts were selected based on their knowledge, experience, and professional roles in the transport sector, particularly in areas relevant to universal access. Participants with expertise in transport planning, policy development, infrastructure design, or public transport services were selected. Some held positions such as transport economists, planners, directors of transport planning, public transport specialists, and research leadership. Experts were also selected for their specific involvement in projects, policies, or research focusing on universal access and transport systems for people with disability or reduced mobility. Participants were required to have geographical knowledge of transport systems within the City of Tshwane to ensure relevance to the study area. The snowball sampling technique was used, where initial participants referred others with relevant expertise to the study. Through a referral network, the right participants were identified.

The study sample size was guided by the concept of information power. The concept of information power focuses on the quality and relevance of data obtained from a sample rather than the sample size when designing qualitative studies (Morse 2015). According to Morse (2015), information power refers to the quality and usefulness of information available within a sample to answer the research question. The more relevant to the study and richer the information gathered from participants is, the fewer participants are needed (Malterud et al. 2016). Some of the factors that contribute to information power include the specificity of the research question, the richness of the data, the quality of the data, and the analytical strategies used. Data were collected during the COVID-19 pandemic; as such, data collection was conducted by telephone, Zoom, and email to ensure the safety and availability of participants. Each interview was carefully planned to fit within a 20 to 40 min window, allowing sufficient time to gather detailed insights. All interviews were audio recorded to ensure accuracy and enable detailed analysis of the response.

Table 1. Background information of transport experts.

	Position	Expertise	Gender	Data Collection
Expert 1	Director of Transport Planning	• Policy development • Transport planning • Universal design	Male	Telephone
Expert 2	Transport Planner	• Policy development • Transport planning • Universal design	Female	Zoom
Expert 3	Transport Economist	• Sustainable transport • Urban mobility • Universal access	Male	Zoom
Expert 4	Research Group Leader	• Urban mobility • Universal design	Female	Email
Expert 5	Public Transport Specialist	• Public transport infrastructure planning • Public transport services	Female	Zoom
Expert 6	Transport Economist	• Transport economics • Sustainable transport	Male	Email

3.3. Data Analysis

Data analysis was conducted through thematic analysis, as Bryman and Bell (2017) emphasise that thematic analysis is the most appropriate tool where people's opinions, experiences, knowledge, or values are explored. As the themes were preconceived from the literature, a deductive thematic approach was followed (Braun and Clarke 2006). Based on the literature, the factors associated with the provision of universally accessible transport services include the following: transport legislation and policies, transport infrastructure and services, and vehicle manufacturing. These three themes were used to analyse the study findings.

3.4. Ethical Considerations

The University of Johannesburg granted ethical approval for this study, and the research adhered to all ethical requirements as per the University of Johannesburg's policy. To ensure confidentiality, the identities of the participants have been kept anonymous. The participants were informed about the purpose of the study, procedures, risks, and benefits of the study beforehand. The participants were also informed that they could withdraw from the interview and the research at any time without giving a reason. All the participants gave verbal consent to participate and to ensure voluntary participation.

4. Results

4.1. Legislation and Policies Concerning People with Disability

Transport experts were asked for their views on existing legislation and policies regarding transport for people with disability. As indicated in the literature review, the Bill of Rights, which forms the basis of policies and legislation protecting the rights of people with disability, is recognised by respondents as being incorporated into transport law.

> *"South Africa is one of the most progressive countries in relation to legislation and policies. Both the National Land Transport Act (2009) and National Policy on People with Disabilities (2016) demonstrates this understanding."* —Transport Expert 6

Whilst viewed as progressive, not all respondents felt that the legislation was specific enough with regards to people with disability, but instead regarded it as somewhat fragmented, implying that there did not appear to be a comprehensive policy for transport for people with disability.

"The legislation does not talk directly with people with disability. There is a misalignment of transport policies and they do not fully cover UNCRPD. South African policies are not governing [the] provision of universally accessible transport." —Transport Expert 3

On the other hand, many experts are of the opinion that the legislation clearly describes the requirement for universal access, but that implementation is problematic.

"The current legislation is clear and is specific in addressing the needs of the disabled for all spheres of government. The challenges are in the implementation of the resolutions, as set out in the legislation by transport authorities. For example, legislation stipulates the following as per the DoT Public Transport Strategy: [the core network (both road and rail corridors as well as their precincts and stations) is 100% accessible to wheelchair users and others with special needs such as the blind and the deaf. In addition, the designs of the space at the stations, terminals and on the vehicles should be user friendly and child friendly. Special needs user organisations will form part of the Network advisory planning and monitoring team]. But the roll out of projects related to public transport facilities is slow and oftentimes does not reach the poor communities where some disabled persons reside." —Transport Expert 5

A further issue that is highlighted is related to the informal nature of transport services. While it is asserted that the legislation provides for universal access, it is not possible to monitor this in the case of uncontracted services. Many of the public transport services provided in South Africa are informal, such as minibus taxi services, and therefore universal access may not be implemented or monitored in this type of service.

"In my knowledge universal access is addressed in the legislation and policy, this even filters down to strategic data collection such as household surveys. The issue is the inability to manage universal access in the context of uncontracted services." —Transport Expert 4

Monitoring is therefore difficult, given the high level of informal transport service provision. The issue of monitoring is problematic, regardless of the formal or informal nature of the infrastructure and service provision, and more needs to be done to ensure that compliance is monitored and enforced.

"Legislation should always be reviewed to ensure compliance and that persons with disabilities are treated with dignity. Monitoring of progress of implementation of transport policies: There needs to be a measure of how far South Africa is with regards to the implementation of disabled facilities in key transport facilities, such as the airports, intermodal facilities, bus stations, etc." —Transport Expert 5

Legislation therefore seems to be in place; however, all participants are in agreement that implementation and ongoing monitoring and evaluation are not always evident, and, where they are apparent, they are relatively superficial and do not meet the broader needs of the community of people with disability.

4.2. Infrastructure Design and Service Accessibility

Given the lack of implementation of policy and legislation, it is evident that the designs of infrastructure and services are therefore likely to be problematic. Although some experts believe that there is minor progress in a few selected areas, in general, the implementation of universal access initiatives remains piecemeal, with a lack of broad applicability.

"Transport infrastructure in the city of Tshwane needs to be improved to accommodate the needs of all the commuters. Although there is progress which is seen through the infrastructure and services of buses such as A Re Yang, the progress is very slow." —Transport Expert 2

It is noted that A Re Yang is a rapid transit bus system in the City of Tshwane, which is designed using the principles of universal access as core values and provides concessions to people with disability; however, the service is limited to particular routes and does not provide broad accessibility (A Re Yeng 2024; Pretoria Rekord 2017). In the preceding

section, it was indicated that implementation was challenging, particularly as infrastructure and service provision are fragmented and may be provided by the national government (e.g., Metrorail), provincial government (e.g., Gautrain), local government (e.g., A Re Yeng), or informally (e.g., the minibus taxi industry). This exacerbates the issues related to implementation and progress monitoring.

> *"Public transport system in South Africa's cities is fragmented. Development and implementation of transport network[s] can be difficult. The modes of transport such as mini-bus taxis and buses could be feeding rail and BRT networks. Infrastructure could be designed better to have connected infrastructure talking to the environment."* —Transport Expert 1

> *"Transport infrastructure is mostly inaccessible. Sidewalks and cycle paths are either unavailable, or if available they are disconnected, unsafe and not maintained. Wayfinding of minibus taxi ranks or bus stops is hardly available. Formal minibus taxi ranks/bus stops aren't generally designed for safety and universal access; they do not cater for children, women with children or passengers with luggage let alone the disabled. Basic maintenance is also limited in facilities. New transport systems (BRT and Gautrain) offer improved access, safety, information, ablution services, etc."*

—Transport Expert 4

> *"Lack of clarity for informal services [and] taxi industry needs requirements for universally accessible services, i.e., vehicle modifications, wheelchair spaces, ramps, etc. Universal access requirements come with a cost and government can assist with funding so that operators can afford to implement regulations."* —Transport Expert 4

Most of the issues appear to be related to fragmented infrastructure and service provision. There is a broad consensus that all transport modes need to be integrated and that, from a universal access perspective, this enables all users to move seamlessly from mode to mode.

> *"There is a need of integrated transport infrastructure and services."* —Transport Expert 3

One of the experts asserted that this may require that contracting authorities oversee infrastructure and service provision, ensuring that all service providers are compliant in terms of the requirements of the various acts.

> *"Improvement can therefore take place when all transport systems are legally bound through new, demand responsive service contracts to implement universally accessible services. Contracting authorities need to provide the requisite infrastructure such as universally accessible stops and stations; and operations should include accessible services such as demand responsive/dial a ride service for people unable to travel to stops, etc."* —Transport Expert 4

By implication, this requires a far higher level of involvement from the contracting authorities to monitor and ensure compliance, as well as a coordination of efforts between the various levels of government involved in infrastructure and service provision. Importantly, as the informal sector is a major player in service provision, this should also be covered in implementation and monitoring.

4.3. Inclusivity in Vehicle Design

Universal access not only relates to infrastructure access, but that vehicle design should also comply with design standards to facilitate access by all users. Vehicle manufacturing companies manufacture vehicles as per customer specifications.

> *"... manufacturers produce based on demand of such products."* —Transport Expert 6

The United Nations Convention on the Rights of Persons with Disabilities (UNCRPD), as ratified by South Africa in 2007, is one of the human rights conventions that has been widely accepted (Baldiga et al. 2017). The governing of vehicle manufacturing should

promote universal accessibility in transport. This is, however, highlighted as an area that experts believe is not well controlled.

> *"Government is failing to control what vehicles need to be manufactured. The government should give specifications on what should be manufactured. Bus manufacturers are not going to comply with universal access principle if the government is not enforcing these principles."* —Transport Expert 1

This is problematic within existing bus contracts, but even more difficult within the informal transport industry.

> *"Lack of regulations on universal access for minibus taxis, outdated bus contracts for provincial buses means that there is no push for operators to require modified vehicles. Manufacturers custom make what operators/service contracts specify."* —Transport Expert 4

> *"Taking into consideration that taxis account for 60% of public transport, the challenge is that there is no specific law that regulates that the minibus taxi industry must use vehicles that can cater for disabled persons."* —Transport Expert 5

Although the government introduced a "compulsory safety standards and taxi recapitalisation programme which aims to replace old and unsafe taxis with newer taxis" (Department of Transport 2020), the interior design of minibus taxis does not accommodate, and remains inaccessible to, people who use wheelchairs. The design of minibus taxis does not accommodate commuters who use wheelchairs; there is no space for wheelchairs. Moreover, the steps at the entrance of the taxi make it difficult for those with mobility disabilities to enter the vehicle. In general, the transport experts have indicated that it is a government responsibility to ensure that manufacturers are held accountable for producing vehicles that are to universal access standards.

> *"It is the responsibility of government to specify national specs for vehicles to the manufacturers."* —Transport Expert 6

> *"The government should have strict measures on what should be manufactured."* —Transport Expert 2

Although it is the responsibility of the government to provide and enforce vehicle specifications, given that manufacturers produce to order specifications, as universally accessible vehicles are more expensive to manufacture, this is only likely to be implemented if enforced punitively or if encouraged. To this end, it is suggested by some experts that incentives could be a method for encouraging compliance within the private sector.

> *"Universal accessible vehicles come with costs; therefore, the government can assist private operators with funding so that they can afford to acquire vehicles which are accessible. The government should also give manufacturers specifications on what should be manufactured."* —Transport Expert 1

> *"The government should promote manufacturing of universally accessible vehicle. There should be incentive so that private bus companies acquire buses with universal designs."* —Transport Expert 2

The issue of high costs associated with procuring universally accessible vehicles, however, remains problematic, with one expert suggesting that not all vehicles be required to comply with universal access laws but that a portion of the fleet be targeted.

> *"Instead of the whole fleet complying, it is important to have some vehicles which accommodate the needs of all commuters."* —Transport Expert 3.

Whilst more financially accessible, this implies other complications, such as routing and scheduling issues, as well as the problems and costs associated with a lack of fleet uniformity. Other experts suggest that a more collaborative approach to vehicle design be adopted, specifically between manufacturers and service providers.

> *"Passenger transport vehicle manufacturers, such as Toyota, have formed partnerships with the taxi industry and are designing vehicles that are custom-made to meet the*

> *needs of the taxi industry, including incorporating COVID-19 preventative measures in their designs. For example, the public-private partnership between Toyota and the Department of Trade and Industry, through the Automotive Masterplan, has facilitated the manufacturing of the Hiace Ses'fikile. Such initiatives demonstrate that collaboration between manufacturers and end-users is possible. However, thus far, these efforts have not extended to adequately catering for the needs of persons with disabilities."* —Transport Expert 5.

This suggests that compliance might require a multi-pronged approach, considering vehicle manufacturers, contractors, as well as special arrangements for the private and/or informal sectors.

5. Discussion

This paper sought to establish the current state of universal access in transport within the City of Tshwane and the issues that need to be considered within the current environment. The first consideration was the legislation that describes universal access within the Tshwane transport environment. Experts were fundamentally divided on the extent to which universal access was described by the law. Some felt that it was comprehensively described, whereas others were not clear on where and how it is described. Several participants specifically cited legislation and strategy documents such as the National Land Transport Act (2009) and the Department of Transport's Public Transport Strategy, with most respondents agreeing that the legislation was sufficient, progressive, and adequately described, although one participant felt that the legislation is not specific enough for people with disability and did not adequately cover the requirements of the UNCRPD. This is also evidenced through the amended NLTAA (2023), where special needs passengers are described as "Targeted Categories of Passengers". Despite varying opinions on the legislation, it is evident that legislation may not be comprehensive; however, provision is made for transport for people with disability. On the other hand, the implementation monitoring of policy, legislation, and guidelines is universally recognised as problematic. Although special needs users should be part of network planning advisory and monitoring groups, the implementation thereof is not evident and, in particular, does not reach the poorest communities, where the majority of users with disability reside. Furthermore, the legislation tends not to be enforced in the informal sector, which provides the majority of public transport services. Whilst legislation exists, the low levels of implementation imply redundancy. This is reinforced by the keynote address of President Ramaphosa at the Transport Summit on Universal Accessibility in Gauteng, 25–26 April 2024 (Department of Transport 2024b), who stated that "despite this enabling legislation there are still many areas where a lot more work is needed to make the national transport system fully accessible".

The inconsistent application of legislation has led to new modes of transport, such as the BRT systems and the Gautrain, a high-speed rail system in the Gauteng Province (in which the City of Tshwane is situated), being designed using the principles of universal access. These types of modes (BRT and rail) are geared at providing the backbones to the Integrated Rapid Public Transport Network plans for South African cities (Department of Women, Youth and Persons with Disabilities 2021; ITDP Africa 2021). Whilst newer and mass public transport modes of transport attempt to accommodate users with special needs, these are currently limited systems and are furthermore reliant on feeder systems, such as buses, cars, informal transport such as minibus taxis, and non-motorised transport. While the IRPTNs seek to offer broader integrated network transport services to the general public (eThekwini Transport Authority 2024), these networks currently consist of a number of different services offered by a number of different service providers, and the proposed IRPTNs are still dominated by informal transport (Stats SA 2021) and supplemented by legacy bus services (Cokayne 2024). These complex systems have not managed to achieve any meaningful level of integration to date (Parker 2024). Whilst there are pockets of universal access implementation, the feeder system provides little access for people with disabilities, implying that access to the broader mass transit modes remains extremely limited.

With regards to ensuring universal access through vehicle design, the key issue facing the industry is the apparent lack of specifications for users with disability. The compulsory specifications for M2 and M3 vehicles (minibuses and buses) of the South African Bureau of Standards (SABS) (2015, VC8023) currently do not make provisions for design standards for people with disability. Suggestions from the participants indicated that the government needs to provide such standards for public transport vehicle design and ensure that there is sufficient collaboration with vehicle manufacturers to ensure appropriate design for universal access. There are, however, cost concerns, which are considered to be significant impediments to the purchasing of appropriately designed vehicles, particularly in countries such as South Africa, which are struggling to meet the basic mobility needs of its citizens, without consideration of those with special needs. This is often exacerbated by the duty and taxation policies on imported vehicles (Venter et al. 2020), suggesting that the government needs to take this into consideration when designing and enforcing vehicle standards.

6. Conclusions

Based on the results of the expert interviews, it is apparent that universal access is clearly included in policy and legislation but may not necessarily be comprehensively described and aligned with the requirements of the UNCRPD. Further, although universal access is considered to be a core value of some of the newer public transport services, the broader public transport system, which seeks integration of services into a rapid public transport network (IRPTN), lacks the implementation of any substantive form of universal access in the older provincial services and the informal sector. A lack of integration in services and the incorporation of the informal public transport services into the broader network are critical to the overall poor universal access coverage. The implementation of existing policies and the enforcement of legislation are critical to furthering these aims. Additionally, the lack of a comprehensive set of vehicle design and manufacturing standards for public transport vehicles exacerbates the current issues. This suggests that compliance and provision of a transport system that caters to the needs of people with disability requires a multi-pronged approach, considering vehicle manufacturers and contractors, special arrangements for service provision by the private and informal sectors, clearly defined and described policies, and legislation and guidelines for infrastructure and services, as well as clearly articulated design standards for public transport vehicles. Recommendations are made based on these considerations.

Universal access is described in law; however, there are varying perceptions of the appropriate legislation, the requirements of the legislation, the applicability of the laws (government or public-funded transport services or any services providing public transport services), the area of application (vehicles, services, infrastructure), and the broader requirements for implementation, enforcement, monitoring, and evaluation. It is therefore recommended that a comprehensive scan and audit of the transport-related policies, legislation, and guidelines be conducted to determine and describe the overarching framework. This could be used to set the basis for a set of clear guidelines for policy makers, service providers, transport planners, licensing bodies, and municipal authorities, amongst others. This framework should also be compared to the best practices, universal access guidelines, UNCRPD recommendations, and constitutional obligations to identify current gaps and areas for improvement.

Given the general participant consensus that implementation is more problematic than the legislation itself, it is recommended that city audits be conducted to determine the state of implementation across a variety of urban areas in South Africa, comprising both the formal and informal sectors, with specific reference to the legal requirements of both. Infrastructure, vehicle design and licensing, and service requirements should be included in the audits.

Given the broader framework arising from the legislative audit, the requirements in terms of data collection, advisory committees, and monitoring need to be clearly outlined, and recommendations provided for assisting transport planners and municipal authori-

ties in ensuring that these are conducted on a regular basis. Guidance also needs to be provided for sanction mechanisms for non-compliant service providers, municipalities, vehicle manufacturers, etc. Roles for monitoring and evaluation need to be clearly defined and described.

According to participants, there is a fundamental lack of any form of enforcement of universal design and access principles in the informal sector. While the sector provides informal public transport services, operating licenses are issued by provincial authorities (Department of Transport 2024a). Furthermore, ranking facilities are generally provided by municipal authorities, as outlined in the NLTAA (2023). Collectively, this suggests opportunities for some implementation of universal design and access principles. It is recommended that basic requirements for municipalities and operators be clearly described and enforced.

Public participation is enshrined in South African law, and specifically in relation to public transport, as outlined in the NLTAA (2023). Prior research (Duri and Luke 2022; Vanderschuren and Nnene 2021) suggests that people with disability are rarely consulted with regards to their transportation needs. While some forums exist for public participation, for example, the Transport Forum, the Integrated Development Plan Forums, and the Ward Committees and Ward Forums, many people with disability are from poorer communities, making them amongst the most vulnerable and disenfranchised communities. Specific provisions need to be made for the public participation of all people with disability, and included in any guidelines.

From an urban planning perspective, the government is required to ensure that its policies regarding integrated rapid public transport networks are implemented. While the implementation of newer modes has started to address some of the shortcomings of the system, the policy and legislation require addressing the system as a cohesive whole. Informal modes and older systems need to be prioritised, particularly as these still carry the vast majority of users. In particular, informal transport services need to accommodate all users. It is suggested that this be addressed firstly through infrastructure, which is provided by city authorities, and that this be filtered down to services through the issuing and renewal of operating licenses and enforcement.

Authorities need to consider vehicle design standards for universal access of public transport vehicles. Due consideration needs to be given to (a) applicability within the environment (robustness), (b) collaboration with vehicle manufacturers and bus body builders, (c) duties and taxation provisions for imported public transport vehicles, (d) ongoing maintenance costs, (e) contract awards, and (f) the issuing and renewal of operating licenses.

Limitations to the study are primarily related to the small sample size. While only six interviews were conducted, the limitation was overcome by ensuring that the participants were experts within their fields, specifically in South Africa, where there is a limited number of experts with the requisite knowledge of the subject matter and fewer still that are able to provide specific insights into the issue in the City of Tshwane. The selection of experts ensured a broad range of specialist inputs and expertise, thus providing reliability to the study. A further limitation to the study is also the confines of the City of Tshwane as the study area. Cities within South Africa, whilst governed by national transport policies, have transport services provided by national government, provincial government, local government, as well as informal transport service providers. Different cities are thus likely to have different experiences of universal access implementation. One of the future research directions should therefore be focused on the replication of the research across other South African cities, seeking unique experiences as well as common problems, thereby identifying areas that need to be addressed through broader public policies and those that can be resolved through local metropolitan structures.

Finally, future research also needs to consider the needs of users. Whilst prior research (Okoro and Musonda 2019; Risimati et al. 2021; Thomas 2016) has considered the service and infrastructure needs of users, to the best of our knowledge, no research considers the participation of users in public processes, audits, implementation, and monitoring.

There is an urgent need for the broader participation of people with disability in public processes, thereby ensuring that needs are met, not only in policy but also in ongoing practice, is essential.

Author Contributions: Writing—original draft preparation, B.D. and R.L.; writing—review and editing, B.D. and R.L. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: The University of Johannesburg granted ethical approval for this study (Approval code: 2019TSCM-006PhD) and the research adhered to all ethical requirements as per the University of Johannesburg's policy.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The data that support the findings of this study are available from the first author upon reasonable request.

Conflicts of Interest: The authors declare no conflicts of interest.

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