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Delhi Metro Rail System and the Need for An Inclusive Last-mile Connectivity System

| Geetanjali Sharma



Discussion Paper

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AUGUST 2022

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ABSTRACT

The Delhi Metro-Rail [DMR] System is an essential mode of mass transit that facilitates an integrated urban public transport system. However, poor last-mile connectivity impacts the DMR system's ridership and makes it less inclusive for socio-economically marginalised groups. It is important to understand the issues related to last-mile connectivity because it is essential to providing accessible, affordable, comfortable, and sustainable transportation in metropolitans like Delhi. This paper uses the '4As framework' and argues for an inclusive last-mile connectivity system for the DMR that focuses on the needs of the different categories of commuters. The paper highlights concerns regarding existing policy measures and lists recommendations for a more integrated and inclusive last-mile connectivity system.

Keywords: Last-mile connectivity, Delhi Metro-Rail System, inclusive transportation, accessible transportation

INTRODUCTION: LAST-MILE CONNECTIVITY AND DELHI METRO RIDERSHIP

Last-mile connectivity refers to the various public transit systems that connect the ‘first’ and the ‘last’ points of commuters’ journeys, that is, the starting point of a commuter’s trip to the public transit system and their final destination. Various forms of travel are used for last-mile connectivity. These include formal and informal public transport [IPT] and private modes of travel.

According to the 2011 Census, public transport systems account for over 60% of total urban trips in cities with a population of more than 50 lakhs (Irani, 2022). The DMR System is a fast and safe mode of mass transport that facilitates the movement of people across the city (Ministry of Housing and Urban Affairs, 2017). However, despite its benefits and growing demand for transit options, the mass transit system has not achieved its level of projected ridership. For example, Delhi Metro’s actual average daily ridership for 2019-20 was 51.97% of the projected figure (Ministry of Housing and Urban Affairs, 2021).

According to Farah Irani (2022), poor last-mile connectivity to and from the metro stations is one of the primary reasons for the low ridership of the Delhi Metro. Last-mile connectivity is also vital in creating an inclusive public transport system since it determines the quality of access to mass-transit public transport systems such as the metro. Here, quality refers to the degree of accessibility in terms of ease of access, sense of safety, comfort, affordability, etc. The quality of access, while only a component of the total journey of a metro rail system, directly influences its ridership. Therefore, it is essential to discuss the current status and issues related to last-mile connectivity by focusing on the needs of different types of commuters to provide a more inclusive and efficient mass transit public transport system.

This paper is divided into two broad sections. The first section looks at the status of inclusivity of existing last-mile connectivity in the Delhi metro. It adopts the ‘4As framework’ of accessibility, affordability, availability, and acceptability for this analysis. The second section builds on the limitations highlighted using the framework. It discusses the concerns and recommendations regarding existing policy measures and provides a more integrated and inclusive last-mile connectivity system for the Delhi Metro Rail Corporation [DMRC].

SECTION 1: THE ‘4 A’S FRAMEWORK’

This section uses the “4A’s framework” (Joshi et al., 2021a) to highlight the need to recognise the accessibility, affordability, availability, and acceptability of DMR’s last-mile connectivity measures. These measures are essential for creating an inclusive transport system for different categories of commuters, especially the socio-economically marginalised groups across class, gender, physical ability, and age. Ensuring affordable and accessible last-mile connectivity and enhancing the availability and acceptability of different modes of transport improves the quality of access to metro stations.

Availability:

Availability refers to the status of the transport services made readily available to the passengers, such as route possibilities, timings, frequency, etc. Making last-mile connectivity

measures more available would entail scaling and expanding the presence of different transport modes for commuters. This ensures that commuters of the DMR system can use last-mile services to complete their metro journey seamlessly.

The DMRC provides multiple transport services for last-mile connectivity, such as metro feeder buses, e-rickshaw services, e-scooter services, cycle sharing services, cab aggregator services, and auto-rickshaw e-booths. However, there are only a few metro stations where these services are available. Table 1 shows the low availability of these services at select stations to the total number of stations, i.e., 254 stations.

Table 1: Status of Last-Mile Connectivity Services Provided by DMRC

Type of last-mile Service	Number of Stations Where the Service is Available	Proportion as per Total Stations of DMRC
Metro-Feeder Buses	9	3.54%
E-Rickshaw	30	11.81%
E-Scooter	5	1.97%
Pedal Cycles	11	4.33%
Battery Powered Cycles	41	16.14%
Cab Aggregate Services	40	15.75%
Auto-Rickshaw E Booth	1	0.39%

Source: DMRC (n.d.)

The Delhi Transport Corporation [DTC] also provides 174 non-AC CNG buses on the 32 routes available at 69 metro stations. However, the infrequent service of such feeder buses, especially during peak hours, means commuter usage is poor (Irani, 2022).

Additionally, the lack of extra-mile services makes travel more time-consuming. The extra time and inconvenience faced while travelling from home to a transit station and from the station to the destination is a significant deterrent to the use of the Delhi metro.

Affordability:

Affordability refers to the ability of passengers to make journeys and afford transport costs without foregoing other essential activities based on their income. The lack of sufficient availability of existing formal last-mile connectivity services leads users to rely on Informal Public Transport [IPT] services.

Although IPT is a convenient mode of transport, especially for last-mile connectivity, it is expensive and often costs over 50% of the total journey fare (Irani, 2022). Even for middle-income groups, a person using the Delhi metro is likely to spend 25% of the total journey cost to get to the Metro station or to travel from the Metro station to the destination (Centre for Science and Environment, 2019). Unskilled and skilled daily wage labourers spend around 20% of their income on transport (ibid.).

This is higher than the global benchmark of 10% to 15%. An unaffordable metro system restricts the access and mobility of workers in the informal sector (Joshi et al., 2021a).

Furthermore, this lack of adequate available measures and the reliance on expensive IPT services adversely impact the use of the metro by vulnerable groups, such as women. For example, based on a 2020 survey of working women in Delhi (Tayal & Mehta, 2021), women with low-income levels and students are the major groups that cannot afford to use private transportation. Therefore, the absence of affordable last-mile connectivity measures excludes disadvantaged groups, such as women and people from low-income brackets.

Accessibility:

Within transport and mobility infrastructure, the accessibility framework keeps in mind that the degree of mobility by different commuters is socially constructed and produced within a context of asymmetric power relations based on their identity and ability (Joshi et al., 2021a). Here, the focus is on making transport measures physically accessible to people across different categories, especially the socially marginalised groups such as people with disabilities, the elderly, children, women etc.

Accessibility of last-mile connectivity, in this context, relates to creating an accessible physical infrastructure for different categories of commuters. This includes sidewalks, ramps, and technologies that require specific physical or sensory capabilities for usage, especially by the elderly and people with disabilities (Joshi et al., 2021a). A 2015 study by the DMR investigated the status of last-mile connectivity through different modes of transportation. It was found that walking and informal public transport were the most common modes used for both access and egress, followed by buses and private transport (Ann et al., 2019). This is important because the lack of accessibility for these two modes of mobility impacts the accessibility of last-mile services the most for Delhi metro users.

Acceptability:

Acceptability refers to the perceptions about the transport service guided by factors such as personal security, the state of vehicles, etc. (Carruthers et al., 2005). A safe system would ensure the physical security of vulnerable groups such as women, children, the elderly, and people with disabilities (Joshi et al., 2021b). Safety and feelings of security are tied to physical harm, such as accidents and health issues, and the attitude of the transport staff, such as friendly or unfriendly drivers (Luiu et al., 2018). Based on a 2020 survey, over 47% of working women cited safety problems related to last-mile connectivity as a challenge of travelling via the Delhi metro system (Tayal & Mehta, 2021).

Acceptability of transport services also means ensuring a comfortable system for a pleasant trip. A comfortable and acceptable last-mile connectivity infrastructure must also be resilient against adverse weather conditions. Measures like shading, lighting, seating on footpaths or bus stops (Joshi et al., 2021b), and including seasonal variations impacting the external environment for commuters can be adopted.

SECTION 2: LAST-MILE CONNECTIVITY: DISCUSSION AND CONCERNS FOR POLICY

In the last decade, transport approaches in existing policies have prioritised people over automobiles. For example, the 2014 National Urban Transport Policy [NUTP] mandates that pedestrians and non-motorised transport [NMT] should be given precedence as first and last-mile connectivity facilities (Ministry of Urban and Housing Affairs, 2014). NMTs should be provided within 50 metres of metro stations. However, such an approach views transport only through the lenses of infrastructure and greater private sector involvement and not user experience (Joshi et al., 2021a).

Even when policies like the Draft Master Plan of Delhi [MPD] 2021-2041 mention the need for inclusivity in transport services, the focus remains only on providing an inclusive infrastructure for last-mile connectivity (Delhi Development Authority, 2021). Thus, for any effective and inclusive change to transport policies, understanding the user and their perception of transport is key to planning and implementation (Joshi et al., 2021a).

In this section, the paper discusses concerns regarding existing policy measures relevant to last-mile connectivity through the four integrational recommendations by Farah Irani (2022). Irani recommends physical, institutional, service, and informational integration of last-mile connectivity services. This framework advocated for a more inclusive last-mile connectivity system for the Delhi Metro, mindful of the needs of different categories of users.

Service Integration:

Service integration entails increasing the availability of existing last-mile connectivity services. This means enhancing operational efficiency, increasing the coverage of feeder services provided by DMRC and DTC, and scaling up the existing measures. However, most of the technologies and business models adopted to enhance the service at metro stations are small-scale pilot projects that deploy feeder services to metro systems (Irani, 2022).

One way of promoting large-scale service integration is pushing for transit-oriented development. In this context, the Ministry of Urban Development's National Transit-Oriented Development [TOD] Policy (2015) and draft MPD 2041 (2021) promote transit-oriented development aligned with mass transit to increase public transport usage. New Delhi was one of India's first cities to adopt TOD. These policies focus on improving first and last-mile connectivity within an 'influence area,' that is, a walking distance of 500–800 metres near the transit station such as the metro (Ann et al., 2019). However, TOD strategies for enhancing last-mile connectivity cover only 50% of the passengers who walk to stations and very few passengers who travel by other modes.

Integrating the various public transport, IPT, and NMT modes with metros will achieve better service and connectivity at stations for vehicular and pedestrian traffic's smooth and orderly movement (Irani, 2022). While policies such as the draft MPD 2041 mention multimodal integration facilitation for first and last-mile connectivity as part of its objectives, the plan requires a further emphasis on physical integration.

Physical Integration:

Physical integration of last-mile connectivity measures focuses on bringing stations closer to residential areas and prominent destinations and adding new stations to the existing network. Creating a comfortable walking and cycling environment near metro stations and providing infrastructure for e-mobility and shared modes are other effective physical interventions to ensure structured last-mile connectivity systems (Irani, 2022).

Physical integration must also focus on inclusive services for vulnerable groups across gender, ability, age, etc. While MPD 2041 and TOD emphasise the lack of a dedicated pedestrian and cycling infrastructure, they do not explicitly comment on the needs of commuters. For instance, a recommendation for female commuters is to provide functional streetlights. Additionally, increasing the number of women-operated e-rickshaws and taxis in the evening and better police patrolling can address concerns regarding last-mile connectivity (Tayal & Mehta, 2021). People with disabilities and the elderly require clear footpaths for walking and disability-friendly infrastructure. Furthermore, seasonal variations must be considered for walking, cycling, or other NMT facilities, and infrastructural support should be planned per user needs (Joshi et al., 2021a).

Institutional Integration:

Last-mile connectivity via multimodal integration requires institutional integration. Institutional integration implies better coordination and collaboration across central, state, and municipal bodies. Even though the DMRC provides multiple services to enhance last-mile connectivity, several independent agencies plan, manage, and operate modes of transport. These agencies are not accountable to each other and often lack coordination. At the same time, no single agency has been mandated to integrate different public transit services and private modes (Irani, 2022).

In its 2020 report on the traffic situation in Delhi, the Parliamentary Standing Committee on Home Affairs recommended multimodal integration at metro stations to enhance last-mile connectivity (Rajya Sabha, 2020). Subsequently, plans for 59 stations were confirmed for Phase III of the metro project. Another 96 stations are being finalised. However, the committee argued that the lack of coordination among the executing agencies — the DMRC, the Public Works Department, and the Municipal Corporation of Delhi — adversely affects the swift implementation of these plans (Irani, 2022).

In this context, the Ministry of Housing and Urban Affairs' Metro Rail Policy, 2017, provides an integrated approach to the planning and management of urban transport. The State Governments are required to constitute the Unified Metropolitan Transport Authority [UMTA] (Ministry of Housing and Urban Affairs, 2017). However, the UMTA is yet to be constituted in Delhi. A Parliamentary standing committee has also expressed displeasure over this delay of more than four years. The committee highlighted that Delhi is part of the six states yet to constitute the UMTA (Indo-Asia News Service 2022).

Thus, one of the recommendations is to have a mobility department within the urban local bodies to coordinate all urban transport service providers in the city. Such departments can regulate the IPT services, understand the demand for last-mile transport services, and make strategic interventions for better coordination till the UMTA is implemented (Joshi et al., 2021b). This would also help plan for a single comprehensive mobility plan with a dedicated shared budget across various agencies for strategic investment in the city's mobility infrastructure (ibid.).

Informational Integration:

As part of informational integration for enhancing last-mile connectivity, commuters must better understand available transport measures at metro stations. Providing real-time service information on the arrival and departure of feeder services will encourage commuters to use public transport modes, such as the metro (Irani, 2022). Installing a GPS in transport vehicles such as IPT, adopting an open data policy that can help prepare transit apps for commuters, and integrating other mass transit modes with ITMS can help introduce an Intelligent Transit Management System [ITMS] (Joshi et al., 2021b).

Furthermore, there is a need to enhance the level of information available to government agencies by conducting regular socio-economic surveys. These surveys must include passenger opinion surveys and operator surveys on last-mile connectivity modes of transport (Joshi et al., 2021c). Passenger opinion surveys will help understand comfort, safety, and accessibility issues. Operator surveys can focus on collecting data on the livelihood details of drivers, such as earnings, ownership of vehicles, and challenges in operations.

CONCLUSION

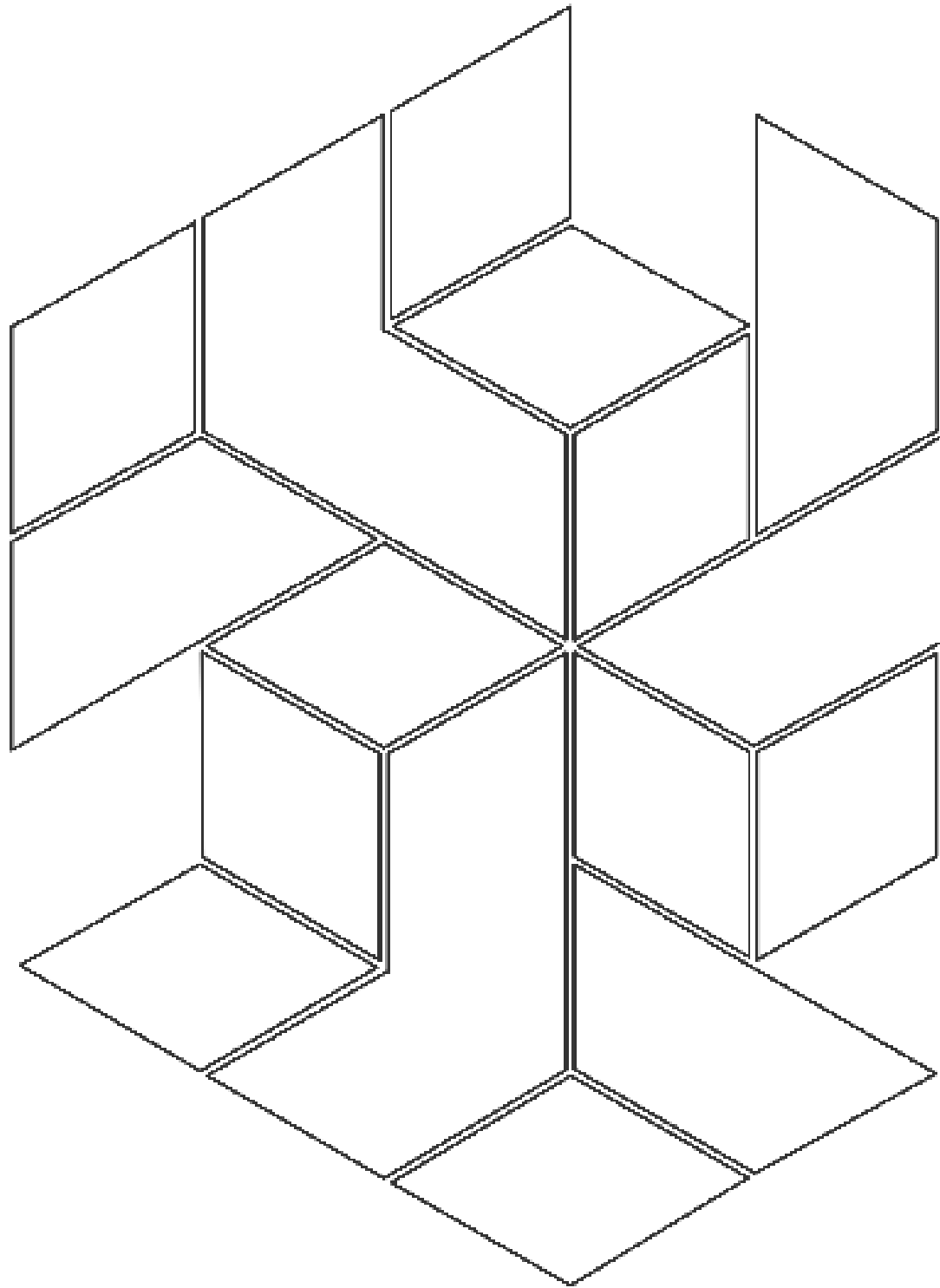
Currently, there is insufficient data on the impact of last-mile connectivity services on metro systems or the reduction of private vehicle usage. This makes assessing the importance of last-mile connectivity measures difficult in the broader discussion around integrated urban transport systems. Using the '4As Framework', which focuses on the availability, accessibility, affordability, and acceptability of transport services, this paper discussed the status of the DMR system's last-mile connectivity measures. A framework centred around the needs of different categories of users allows us to argue for the need to make the DMR system an inclusive public mode of transport.

Subsequently, the paper discussed concerns regarding existing policy frameworks to highlight the limitations in the approach of existing last-mile services and relevant policies. Based on this, the paper discussed the recommendations made using secondary literature across four forms of integration, service, physical, institutional, and informational, to enhance last-mile connectivity services for the DMR system.

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