Centre for Rapid Insights

ARTHA GLOBAL

Survey: Commuting Patterns & the Mumbai Metro

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The Centre for Rapid Insights conducted an IVR survey on people's perception of the Mumbai Metro, and factors that are likely to shape a commuter's decision to use it. The respondents are part of CRI's opt-in panel. The survey was conducted across the Mumbai City and Suburban Districts.

The survey results focus on aspects such as connectivity, accessibility and affordability of the metro system, which in turn may determine metro usage. The key audience for this policy brief comprises policymakers, with the objective of assisting them in policy formulation and implementation.

You can read more about CRI's survey methodology here[1].

The development of Mumbai's metro system

As part of the Mumbai Metro Master Plan, the Mumbai Metropolitan Region Development Authority (MMRDA) is collaborating with organisations to build 14 metro lines extending over 337.1 km. The metro aims to alleviate road congestion, overcrowding on the suburban train network, and facilitate better connectivity between key areas in the city. In particular, the metro system is expected to facilitate greater mobility along the east-west corridors, improve access to key financial districts, and to major transit hubs. The metro's promise is significant, but it is important to understand factors that will shape its uptake. At present, only 2% of Mumbai's residents use the metro.

A developed metro system can contribute significantly to minimising pollution, and improving overall productivity.[2] As the metro is built, it could foster a series of other positive externalities. [3]So far, three lines have been operationalised, covering under 14% (46. 5km) of the overall length of the planned metro system; they have had a relatively low uptake. Although there is a

[1] Centre for Rapid Insights survey methodology note

[2]The primary routes that link Central Business Districts (CBDs) and residential areas in Mumbai are heavily congested, therefore, restricting access to labour markets. This impacts overall economic productivity. Congestion has other severe consequences- Mumbai is among the most polluted cities, with transport emissions constituting over 26% of PM2.5 contributors. Mumbai's PM2.5 levels exceed the world average and WHO prescribed limit by 3% and 6% respectively.

[3] The benefits of a metro network are clear, as seen in studies of other cities' metro systems. For example, the Delhi Metro has allowed for equitable mobility, enabling citizens of the National Capital Region (NCR) to access vital centres of health, employment and education. This in turn contributed to improving metrics including women's workforce participation, literacy rates and access to healthcare. The Manila metro system also allowed traffic to be diverted away from the densely packed roads, and minimised exposure of commuters to harmful PM2.5 emissions.

steady increase in the number of people using the metro (5% per month)[4], it is worth examining factors that influence relatively low uptake. With two metro lines expected to be operational by 2024, and five more to be opened by 2025, it is integral to identify and strengthen the incentives to use the metro.

State of public transit in Mumbai

About 88% of Mumbai's population relies on the existing public transit system, which is severely overburdened. Yet, disproportionate investments are being made to develop infrastructure that caters to a relatively small share of private vehicle users, as seen with a spate of infrastructure projects spanning the coastal road, to the Trans-Harbour Link. The road networks have not been able to accommodate the overwhelming increase in private, motorised vehicles and congestion has increased dramatically in Mumbai, where limited land remains for the extension of private vehicle-centred transport infrastructure.

In contrast, the well-connected[5] suburban rail system regularly carries approximately 7.5 million people, more than three times the number of passengers that it was initially intended to carry. The consequences of this are not confined to mere inconvenience, but also extend to endangering lives[6].

State-owned BEST runs the bus-based public transit system in Mumbai which carries approximately 3.5 million passengers in a fleet of 4,336 buses. However, these buses have limited capacity to cater to a large population, and are expected to manoeuver through highly congested roads which allow for an average vehicle speed of only 8.1 km/hour.

Survey Methodology & Results

The following questions were asked to respondents (*n = 2553)*

1. How do you usually commute to work?
    a. Bus/train

[4] This is partly attributed to the reliability of the metro system during monsoon, when compared to the bus and suburban rail system. The railway tracks were submerged on numerous instances, leading to delays and unpredictability. Similarly, vehicle movement on roads was often obstructed due to flooding.
[5] Around 49 12-car suburban trains, which can carry over 3,000 people, are expected to be converted to 15-car trains at the time of writing. This is expected to increase the carrying capacity of these trains by 25%. Considering the good connectivity of the suburban network and a greater capacity to carry passengers, it might continue to bear a large share of travellers. Despite this, the initiative to augment the capacity of the 8-coach metro train, with an existing capacity to carry 2, 352 people, might contribute to attracting more commuters— provided that the expansion of the system is executed as planned.
[6] The risk of accidents and propensity to be distressed in overcrowded suburban trains is extensively covered. Furthermore, other perceptions associated with overcrowded trains reflect dissatisfaction, and can be used to attract users to the metro. A study conducted by Sahu et al., 2018 revealed that users perceive in-vehicle travel time to be 81% higher while travelling in densely packed trains, with nearly all seats occupied. Also, when compared to men, the perceived decline in utility of a crowded train is higher for women. Considering the perceptions on the existing suburban network, more people can be encouraged to travel by the metro as it develops as a reasonable alternative.

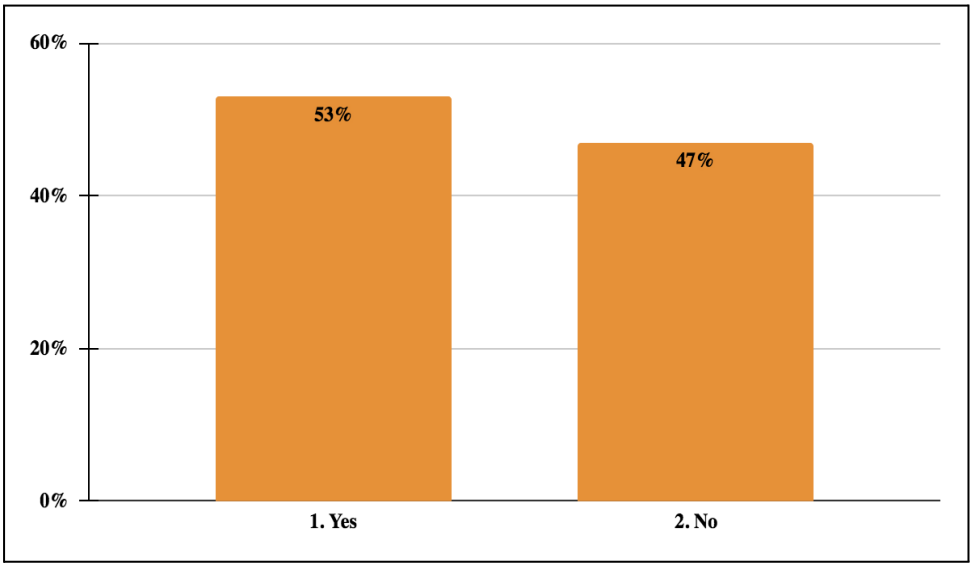
   b. Walking/cycling
   c. Cars/scooters/bikes
   d. Taxi/auto rickshaw
2. Will you use the metro when it opens?
   a. Yes
   b. No
3. What will convince you to use the metro?
   a. Price of the ticket
   b. Access to a bus/taxi/auto stand outside the station
   c. Awareness of the route/connectivity

Key insights based on the survey results have been substantiated below:

1) First and Last mile connectivity is an important determinant influencing the use of any form of public transportation, including the metro.[7]

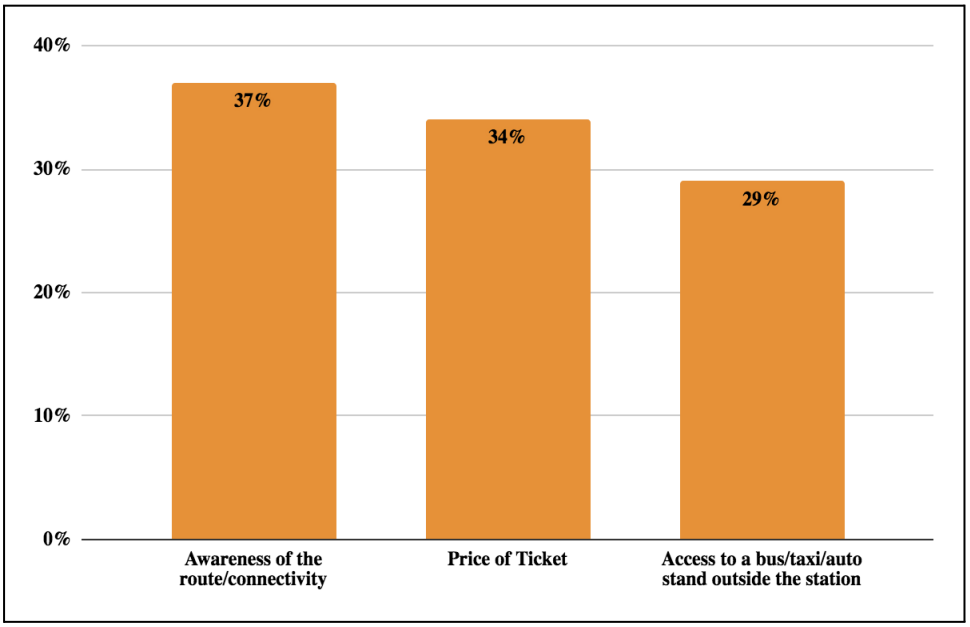
Among those who were **not** inclined to use the metro (704 respondents), 37% and 29% of the respondents felt that they would consider travelling by metro based on improved connectivity, and proximity to bus, taxi or auto rickshaw stands respectively. Therefore, improved feeder connectivity can ameliorate metro usage.

Figure 1: Share of respondents who are likely to use the metro (n=1492)



[7] Singh et al., 2019, in their study on the Mumbai metro system, emphasised the utility of a well-planned bus-based feeder system. They sought to design a bus-based feeder system for lines 2A and 7, while prioritising 'nodes' (metro stations) having higher demand. Swami and Parida, 2015, in their research covering the Delhi metro, have also highlighted the need to ensure efficient feeder connectivity, which in turn contributes to improving overall interconnectedness within the city. Therefore, the need to simultaneously improve other modes of public transit (bus systems, for instance) is implied.

Figure 2: Factors having the potential to influence metro usage (n = 468)



2) Price is a crucial determinant in shaping people's decision to use or not use the metro

53% of the respondents (788 people) stated that they were interested in using the metro, and within this group, 42% suggested that their preference was attributed to the price of the ticket. Of the respondents (704 people) who were **not** inclined to use the metro, 34% of them suggested that a decline in the price of the ticket may encourage them to use it.[8]

3) The metro has the potential to attract a significant share (almost 50%) of bus and train-users. This can potentially contribute to reducing congestion, and therefore, the minimisation of transport emissions.

4) The Mumbai metro may not be able to attract a considerable section of the people who usually commute by foot. Around 54% of respondents who commute by foot stated that they were less inclined to use the metro. This could be due to proximity to the area of work, concerns regarding affordability, due to the lack of connectivity between prime areas (or a combination of more than one of these factors).

[8] Mumbai's residents spend about Rs. 1220 on transportation, as per the last Comprehensive Mobility Plan (2016). The monthly pass for the metro line running from Versova to Ghatkopar is priced at Rs. 1400, with unlimited rides. However, considering that the metro continues to be expensive for a significant section, the Maha Mumbai Metro Operation Corporation Limited (MMMOCL) introduced a 15-20% discount for regular travellers on newly launched lines, 2A and 7. A discount such as this may incentivise increased ridership to a certain extent.

Conclusion

The effective implementation of the Mumbai Metro Master Plan can contribute towards improving accessibility to prime areas, reducing congestion and pollution. Its design and implementation are also structured to improve safety and accessibility for the elderly, children, women and people with disabilities. However, it remains crucial to develop and implement policies that facilitate targeted improvements and greater uptake.

As suggested, improved first and last mile connectivity is among the factors that could incentivise metro usage. Improved access to bus, auto rickshaw or taxi stands outside the metro stations could influence greater uptake of the Mumbai metro. The price of the ticket is also an important determinant of metro usage.

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