Hiccups derail India's Metro expansion

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India's metro systems face overcrowding and service delays due to train shortages, impacting urban travel in cities like Mumbai, Bengaluru, and Kolkata.

India's Metro rail systems are meant to transform urban travel, replacing endless traffic jams with punctual, predictable journeys, but the travel experience in Mumbai, Bengaluru and Kolkata is getting compromised by too few trains and too many passengers.

Mumbai's reliance metro rail has eased traffic congestion on Andheri Kurla road. More and more people are travelling by metro in the city (Shutterstock)

Starting with the Kolkata Metro in 1984 in the hope of living up to the global success stories of the New York Subway and the London Tube, India now has 1,000km of operational metro lines, making it the third largest network at a country level, after China and the United States. Close to 350km of lines were added in the last five years. However, there are already complaints of suboptimal services.

Take Bengaluru's new Yellow Line, inaugurated by Prime Minister Narendra Modi last month. This stretch, which connects Electronic City to the central business district, runs at a peak frequency of 25 minutes. In fact, the civil works were ready by September 2024, but operations could not start due to a lack of trains. This abysmally long wait between two services is due to a shortage of train sets.

A BMRCL spokesperson said that a five-minute headway can be reached earliest in March 2026. Even in the other two lines — Purple and Green, train sets are fewer than one train per kilometre of network length, an informal standard referred to by sectoral practitioners.

In contrast, the Delhi Metro operates with a headway of less than two minutes on all key stretches during peak hours, which makes it comparable with services in cities in developed countries.

Unfortunately, this mismatch between infrastructure potential and operational delivery is not unique to Bengaluru. In Mumbai, Metro Line 1 — the city's only east-west mass transit corridor — was designed to run six-car trains, but operates with four-car rakes even as ridership has grown and overcrowding has become a daily feature with a headway of 200 seconds during rush hour.

Kolkata Metro, India's oldest underground network, runs at intervals of eight minutes even during rush hour for its key Blue and Green Lines— far behind global standards and insufficient for a metropolis of its size. But worse, the newly inaugurated airport corridor does not function on Saturdays and Sundays, and service ends at 8pm in the evening on other days. Similarly, the new Orange Line also operates at an interval of 25 minutes, which runs across the Eastern Metropolitan Bypass. A ministry of railway statement in March said that Kolkata Metro will receive 20 new eight-coach rakes by end of FY 2026. The metro is fully operated

by the Union government.

Mobility experts say these gaps reflect a systemic failure to align design, operations, and user behaviour. Choice riders — people who own cars but might take the Metro — will only shift if service is frequent, reliable, and comfortable. If travel time is longer than driving, or the trains are crowded, they'll go back to their cars. Captive riders — those without alternatives — will also leave as soon as they get an option, said Ashish Verma, professor and convener of Sustainable Transportation Lab at Indian Institute of Science (IISc), Bengaluru.

Globally, whether in China or Europe, designated urban rail services in rush hour operate with an average headway of 90 seconds with train sets having six to nine coaches, which translates to a carrying capacity of 70,000 passengers per hour per direction, Verma said. "So, when metro systems undersupply (capacity), they naturally attract lesser demand, and as a result, the impact of the material system to solve the mobility problem is minimal. At the same time, the cost of infrastructure remains the same — it's a colossal waste of the infrastructure," he added.

Verma also cautioned that crowding in the Indian scenario cannot be compared to that seen in developed economies. "In Indian metro systems, standard crowding is considered as five standees per square metre, and crush load is considered as eight persons per square metre. We witness crowding above 10 persons per square metre. But, no metro corporation in India really adopts any service standard related to crowding," he said.

In most mature Metro systems, the standard of crush load is six passengers per square metre.

The Delhi experience

Unlike the hiccups experienced in Mumbai, Bengaluru, and Kolkata, the Delhi Metro system has received timely upgrades from initial four-coach trains to six-car trains, and even trains with eight coaches on Blue and Yellow Line are in

line with the growing surge of commuters, which coincided with the growing length of the network.

Similarly, train frequency too was increased over time to address growing ridership demand, with early increases bringing peak-hour headways down to around 5-6 minutes to the current peak-frequency of less than two minutes. When asked what led to this, Mangu Singh, who retired as the managing director of Delhi Metro in 2022, said it was a functional planning and project management system.

He said timelines for key infrastructure such as civil works, signalling systems, depots, and stabling yards should be in the right alignment, and for that, tenders have to be floated accordingly.

"It can't be that even when civil works are done, services can't start due to want of rakes or the depot infrastructure is not ready when trains are ready to be shipped," he said, which unfortunately is the experience in the newly inaugurated lines.

Practitioners and experts said the standard delivery of metro rakes usually takes two to two-and-a-half years, and it is only bad procurement systems that can be blamed for this situation, especially when the projects start much after their original deadlines, unlike Delhi.

Lessons unlearnt for Bengaluru

For Bengaluru, train shortages have been a common feature since the initial days of metro operations after the network reached important parts of the city. To make matters worse, production delays linked to supply chain disruptions, geopolitical tensions with China, and "Make in India" local manufacturing clauses have added to the woes.

The initial detailed project report (DPR) in 2011 projected costs for the city's oldest Purple Line only for a three-coach scenario based on dated traffic estimates. This led to a delay in funds from the state government for acquiring coaches to run six-coach trains. The first six-coach train operated only in 2018, even though average daily ridership touched 300,000

with an operation length of 42.3km.

A recent study by WRI India stated that mobility demand data — what people actually need and how they travel — is almost entirely missing from Indian cities. Without this, investments risk being mismatched, leading to underutilised systems and worsening traffic, WRI said, arguing that despite metro rail networks expanding rapidly in Indian cities (with investments exceeding $25 billion in the 2010s and network lengths quadrupling), ridership in many cities remains far below projections.

A 2024 report by Indian Institute Technology (IIT) Delhi and The Infravision Foundation found most metro rail systems in India meet 25-30% of their projected ridership, with even Delhi only managing close to half of its projected ridership. Experts said this lack of data-driven decision-making has led to situations of mismatched supply.

With metros becoming a favourite politically, smaller cities have functional metro systems with hardly any demand. For example, the Indore Metro, which started functioning only in May, now operates one train an hour for six hours of the day due to a lack of demand. Interestingly, Pune Metro, which records about a third of its projected ridership, sent one of its reserve rakes to Patna on a three-year lease.

While in India, it is common to inflate projected ridership to ensure multilateral funding, an expert on condition of anonymity said that even when DPRs state that there is no case for a metro project, politicians go ahead with them, with Nagpur being one such case.

Why can't busier cities use these idle rakes?

An official currently working with the National Capital Region Transport Corporation (NCRTC) said that while common sense would dictate that idle rakes in smaller cities be used in busier metros, more often than not, it's technically unfeasible.

He said, "Due to the lack of any uniform standard set by any nodal authority for metro tracks, signalling systems, and train

control technologies, often metro corporations go for the standards followed by the firm selected through the tender process, making interoperability impossible in almost all cases."

Kolkata and Delhi have broad-gauge lines and standard-gauge lines for different routes. While Bengaluru and Kolkata use a third rail system for traction power, most other metros use an overhead catenary system.

Mumbai problem is more complicated

Unlike most of the metro networks in India, which are jointly owned by the state and the centre, the Mumbai Metro Line 1 is a public-private partnership project. This makes the issue more complicated, Singh said. He added that unlike in the case of Kolkata and Bengaluru, the Mumbai Metro Line 1 cannot be termed as a planning failure as the current ridership has matured over a period of a decade.

The metro authority in July had issued a statement that they had sought permission from the National Asset Reconstruction Company (NARCL), the government-supported bad loan aggregator, to acquire additional coaches to augment their rolling stock.

A Mumbai Metro One Private Limited spokesperson told HT that they are yet to hear back from them.