



GOING UNDERGROUND

China's mostly underground metro networks have expanded at an incredible pace. What is the scale and importance of these urban rail systems and how have they affected society?

By Mark Andrews

It is not yet eight on a Tuesday morning but line 7, which shuttles commuters in from the northern suburbs of Shanghai, is already jam-packed as it approaches downtown. Throngs of passengers stand shoulder to shoulder in metro rail cars, with next to no personal space between them, using one hand to grab a hold of any surface to balance themselves while using the other to hold a mobile phone offering up entertainment in the form of TV dramas and social media messages.

This is the daily scene in Shanghai on what is now the world's largest metro system, comprised of 16 lines, with more under construction.

Permanent way

The city's first metro line only opened in 1993, but the system has since expanded at an incredible pace, much like transportation networks all across China. The system now offers a track length of 676 km (420 miles), compared to New York City subway system, opened in 1904, which has 394 km.

Last year alone, China's total investment into metro systems was RMB 547 billion (\$79 billion). China Association of Metros' figures show that in 2018 there were 185 metro lines operating in 35 Chinese cities, totaling 5,700 km in length and delivering 21 billion trips annually.

"As the sustained growth of industry and cities is dependent on high-quality transport links, the current investment in Chinese subway and tramway systems is reminiscent of the early development of the railways in Europe in terms of scale of construction and national prominence," says Simon Johnston, editor of *Tramways* and *Urban Transit*, a British publication on light rail transport.

"Beijing and Shanghai each have over 600 km of metro lines and rank as the top two [metro systems based on track length] globally," says Yang Yi, a transport specialist at the World Bank. The two cities now both service a daily average of 10 million riders.

But where did it all begin? China's first metro line, an east-west line through the heart of Beijing, was conceived in

the 1950s with the assistance of Soviet experts, and went into tentative operation in 1969. But the country's metro boom only began after the economic reforms of 1978 and beyond, with the main model being Hong Kong's Mass Transit Railway (MTR) system, which went into operation in 1979.

"A significant influence came from Hong Kong's MTR, which started with the sharing of expertise and then led to the MTR operating metro concessions in Beijing, Hangzhou and Shenzhen," says Alok Jain, Managing Director of Trans-Consult Asia China. "It has also emulated the railway-property model of the MTR."

The development of new subway lines in Hong Kong is largely paid for by property development rights being sold or rented off along the new routes.

Chongqing is one city that has implemented such an approach. "What makes the rail system in Chongqing different is that a few segments—those in rural or remote suburban areas—are built based on the speculation of future urban development," says Zhong Haotian, transportation researcher at Texas A&M University. "In this way, it could capture the increased land value due to land use changes (from agriculture to urban land) and use it to reinvest in the system."

Zhong adds that China has a major advantage in terms of speed of development in that all land is government-owned, "meaning the government can capture increased land value due to urban development." He notes that Shenzhen has also used this system and compares it to the United States where the government would only be able to benefit from increased land value through taxation.

Thanks to central planning and an often low starting point in development, metro systems have been very much linked to the growth of China's cities. "The best investments are linked to city-building aspirations, so are often formed as part of wider development," says Johnston.

Development of the networks, however, has generally been conventional. "China's subways follow the traditional model of linking key passenger generators

with the first lines, building upon this with further new lines being developed concurrently and delivered in stages," adds Johnston.

Hong Kong's MTR is one of the most profitable subway systems in the world and has the highest fare box recovery ratio—the amount of operating expenses covered by fares—of 187%. This, however, has not carried through to the Chinese mainland systems.

"The fares on Chinese subway systems are artificially set low," says Jain. "Hence, despite heavy utilization, cost recovery has been an issue. As Chinese subway profitability is not published, it is difficult to determine how close or how far they are from breaking even."

Jin Yongxiang, a general manager at a Beijing subway consultancy, previously estimated to *Caixin* that "the liability of subway projects nationwide adds up to more than RMB 1 trillion," or \$158 billion. "From a macro perspective, that's a huge debt burden."

Yang points out that tickets being set at an artificially low price is largely for the purpose of affordability. Even still, subway ticket prices tend to exceed those of buses. In Shanghai, fares start at RMB 3 (\$0.44) and rise according to distance to a current maximum of RMB 15, whereas most bus fares are a flat rate of RMB 2. Nanjing's subway prices, on the other hand, vary between RMB 2 and RMB 4.

Typically, metro stations sell either one-way tickets or tokens, along with pre-paid charge cards similar to London's Oyster or Hong Kong's Octopus. In some cities such as Guangzhou and Nanjing, these transportation cards give a discount over the standard single fare. Many systems also allow the use of mobile payment apps instead of having to purchase physical tickets or cards.

"Chinese society had to make a transition from super cheap buses to using relatively expensive subway systems," says Geeta Kochhar, assistant professor at Jawaharlal Nehru University. "This transition was painful for some, but over a period of time, Chinese society is adapting to a subway system, [offering] larger and

faster connectivity, and speed to travel between distances.”

All aboard

With such fast expansion, often come problems.

“Question marks have been raised by some Western industry commentators about the rapid pace of construction and strict opening timetables,” says Johnston. Subway construction in China has experienced a number of sometimes fatal instances of tunnel collapses and sinkholes.

In Guangzhou during the construction of Line 6, a 100m² sinkhole swallowed a number of homes in 2013. Eight died from a tunnel collapse in the southern city of Foshan in 2018. Operationally, the worst accident was when two trains collided in 2011 in Shanghai, leaving 271 injured. A more recent accident saw a driver killed and three injured during trial operations of a new line in Chongqing earlier this year.

Despite questions over the safety of its infrastructure, Chinese commuters generally believe that day-to-day operations are relatively safe.

Almost all metro lines in China have glass walls and doors along all platforms preventing passengers from being able to access the tracks, making metro suicides almost unheard of in China. In Tokyo, the Chuo commuter line—operated by the East Japan Railway Company—has such frequent suicides that they have even been dubbed Chuocides.

Mandatory luggage scanning security

checks in stations also add to passenger safety. “The feeling of general safety stands out in China,” says long time China resident Tuomas Harjumaaskola. “In many countries you don’t often see personnel at subway stations or on trains.”

Mind your manners

While people generally feel safe when taking metro trains in China, some have complained of poor behavior from fellow passengers.

“People often push me out of line, rest their phone on my shoulder during a crowded commute, eat on the metro and watch videos on their phones without using headphones,” says McCall Mintzer, a graduate student studying in Shanghai.

“Take Guangzhou as an example, I found that people seldom line up, seldom follow the direction-arrow signs and seldom follow the rule of ‘let passengers alight first’,” says Klavier Wong, a postdoctoral researcher at the Academy of Hong Kong Studies, Education University of Hong Kong. “On some extremely busy lines, this behavior causes severe chaos on platforms and on trains.”

Wong believes part of the problem lies in the design of the platforms and user throughput channels.

“Customer service, passenger information systems and signage are often not thought out very well,” says Jain at Trans-Consult Asia. This results in poor flow of people on platforms who are changing lines, as well as confusion over which exit to take.

Chinese metros usually have television screens on both the trains and platforms which are often playing educational videos on how to ride the subway in a socially acceptable manner. They cover topics such as allowing people off the trains before boarding, not talking loudly on phones, and what is not allowed to be carried on board.

Recently the Beijing subway announced a crackdown on certain activities on the subway, such as eating, drinking, a single person taking up multiple seats, and the playing of music without using headphones. Wrongdoers will have their personal social credit scores cut.

According to Kochhar, the situation is likely to be improving. “People have become more conscious about overall public good. Higher earnings and standard of life have changed the concept of acceptable behavior in China.”

Anonymous independence

But the existence of metro networks is changing Chinese cities, society and culture in other profound ways.

“The subway is turning suburbs into cities, resulting in the re-aggregation, deployment and migration of populations and resources. These result in bringing about huge changes to people’s lifestyles, social activities and thoughts,” says Zhang Qian a doctor of psychology at East China Normal University.

For families, this means the location of housing in relation to workplaces has become less important. As people move to more distant and cheaper residential areas, which often have more pleasant environments, the overall footprint of cities has grown.

“People are finding it easier to find jobs in far-off places and travel from their homes; rather than leaving their families and staying in rented apartments to make a living,” says Kochhar. “Therefore, in that sense families are able to stay together.”

Change, though, is not restricted to working lives and can improve quality of life in other ways. “It shortens travel time, thereby effectively extending leisure time,” says Zhang. “It also expands the range of

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EVER EXPANDING | China's existing metro systems nationwide



Source: The Financial Times

family activities, which enables people to have a greater radius of space to choose leisure, residence and employment, thus reducing the opportunity cost of work and living.”

Along with the development of the metro trend, the surge in China’s urban population and advances in mobile technology has come an element of anonymity, as people—particularly young adults—are able to travel further distances independently.

This is a long way from China’s past where society was very much centered on interactive communities. Nowadays those on public transportation, especially the metro, rarely even make eye contact. Metro stations in China have mobile internet coverage and usually offer free Wi-Fi, making this sense of anonymity for

passengers even easier to maintain.

Digital consumption, however, seems to vary according to the time of day. “During morning commutes, it gravitates toward news-reading, video watching or flipping through an e-novel,” says Michael Norris, strategy and research manager at AgencyChina. “In the evening, there’s far less reading and more attention is given to music and video.”

Norris goes on to mention that in terms of entertainment, more planning often goes into longer commutes. “If I had to take long journeys every day, I’d probably download documentaries to watch, and carry a power bank,” says Harjumaaskola.

Ironically, while those in transit may feel anonymous, AI-monitoring of Chinese passengers has increased, with video surveillance and facial recognition

technologies being introduced widely. The city of Jinan, in the northeastern province of Shandong, now allows ticketless entry, charging passengers through facial recognition technology alone.

Next step

The fast and large-scale construction of metro systems across China in recent years is continuing, with a further 600 km of lines either planned or already under construction in various cities across China. But the rail lines come at a cost to the overall system because they almost all run at a loss due to the low fares.

To reach financial self-sustainability and reduce the high debt levels carried by local governments will mean raising prices for consumers. Whether or not that is feasible is the key question for the future. ■