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## Aggrandize Non-Fare Box Revenues for MRTS Projects: Mumbai Monorail a Case Study

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### Abstract

Most of Mass Rapid Transit System (MRTS) projects around the world are unable to cover their operating costs with fare box revenues, let alone fund capital expenditures. We should all mind the funding gap, as it is a significant impediment to maintaining service quality and addressing growing urban mobility needs. Unfortunately, the understanding of transit systems can become chronic as public budgets are under growing pressure and the most direct solutions for increasing revenues are hard to implement. Increasing fares, for instance, has proved to be politically difficult and disproportionately affects the poor, who use public transport the most; and charging a price that fully covers the social cost of private vehicle usage (i.e., congestion charges) as a way to fund transit is also politically sensitive. In that context, transit operators are increasingly looking at new ways to tap additional sources of commercial revenue and make up for funding shortfalls, often through agreements with the private sector. In view of this most of the developing countries are also trying to build revenues from different sources apart from fare box revenues. In India, Metro cities like Delhi and Mumbai have started rethinking upon strategies for enhancing non-fare box revenues through different methods. These strategies are proved as a great rescuer for these MRTS operators to curtail the operation and maintenance cost deficit. This paper reviews the most popular non-fare box revenue performing MRTS systems. Then it describes the implementation strategies and need of time to generate the non-fare box revenue for MRTS systems with Mumbai Monorail as a case study. [1USD = INR 71.43]

*Keywords:* Non-fare Box Revenue; Transit Oriented Development (TOD); MRTS; Monorail; Metro.

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## 1. Introduction

The Mumbai Metropolitan Region Development Authority (MMRDA) was established in accordance with the Mumbai Metropolitan Development Act, 1974, on 26th January 1975. It is an apex body of the Government of Maharashtra that is responsible for the infrastructure development of the Mumbai Metropolitan Region. Maharashtra is the wealthiest state by Gross Domestic Product (GDP) and also the most industrialized state in India and also one of the most developed states in India, contributing 25% of the country's industrial output and 23.2% of its GDP (2010-11). It is the second most populous and third largest state by area. The broad responsibilities of the MMRDA include Preparation of Regional Development Plans, Providing financial assistance for significant regional projects, Providing help to local authorities and their infrastructure projects, Coordinating execution of projects and/or schemes in MMR, Restricting any activity that could adversely affect the appropriate development of MMR, etc. In particular, it conceives, promotes and monitors the key projects for developing new growth centers and brings about improvement in sectors like transport, housing, water supply and the environment in the Region (CTS 2008).

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- In particular, it conceives, promotes and monitors the key projects for developing new growth centres and brings about improvement in sectors like transport, housing, water supply and environment in the Region.

The Transport & Communications Division is engaged in - preparations of Master plans for Mass Rapid Transit Systems and DPRs., Project planning and Implementation of select Infrastructure projects, Identify land for Metro/Mono and commercial development, overall transport & town planning activities. The Transport & Communications division also specializes in urban transport coordination with overseas departments, providing technical assistance to state government as and when required. To sum up, Transport & Communications division is striving for the development of transport infrastructure in Mumbai Metropolitan Region (MMR).

### *1.1. Background of Mumbai city mass rapid transit system (MRTS) network*

Mumbai, has witnessed phenomenal growth of population and employment during the last few decades creating burden on exiting transportation infrastructure and has generated need for taking up fast and efficient transportation projects like Metro, Mono rail, BRTS, Smart Parking, Integrated ticketing, etc to meet up the increasing demand. Mumbai Metropolitan Region Development Authority (MMRDA) is the agency responsible for providing general directions for Urban Transport for Mumbai Metropolitan Region (MMR). Government of Maharashtra (GoM) is pursuing to improve urban mobility in Mumbai, Thane and Kalyan area through MMRDA which is the development agency for a large scale Metro Rail network. There is an aim to complete the bulk of this Mass Rapid Transit System (MRTS) network over the next 5 to 6 years. To this end, GoM has approved 191 kilometres of metro corridors for immediate implementation. Metro corridors 7 and 2A are under construction and are expected to be operational soon. MMRDA also plans to begin construction of five more Metro lines shortly.

### *1.2. Mumbai Monorail*

Today, bus services operate in crowded and narrow roads with very low average speed thus reducing commuter benefits wherein buses also add to traffic congestion. Where the systems like Metro or BRT cannot be implemented, Monorail can be easily implemented and can negotiate sharp turns and climb up and down steep gradients easily. The decision to introduce Chembur - Wadala - Sant Gadge Maharaj Chowk , a 20 km long Monorail corridor, as a feeder service to the other Transit System and to cater crowded and narrow congested areas was taken by the Authority in September, 2007. The below figure-1 shows the alignment of Mumbai Monorail phase-1 and phase-2. The system started its operation after opening its Phase 1 to the public in 2014 (MMRDA).

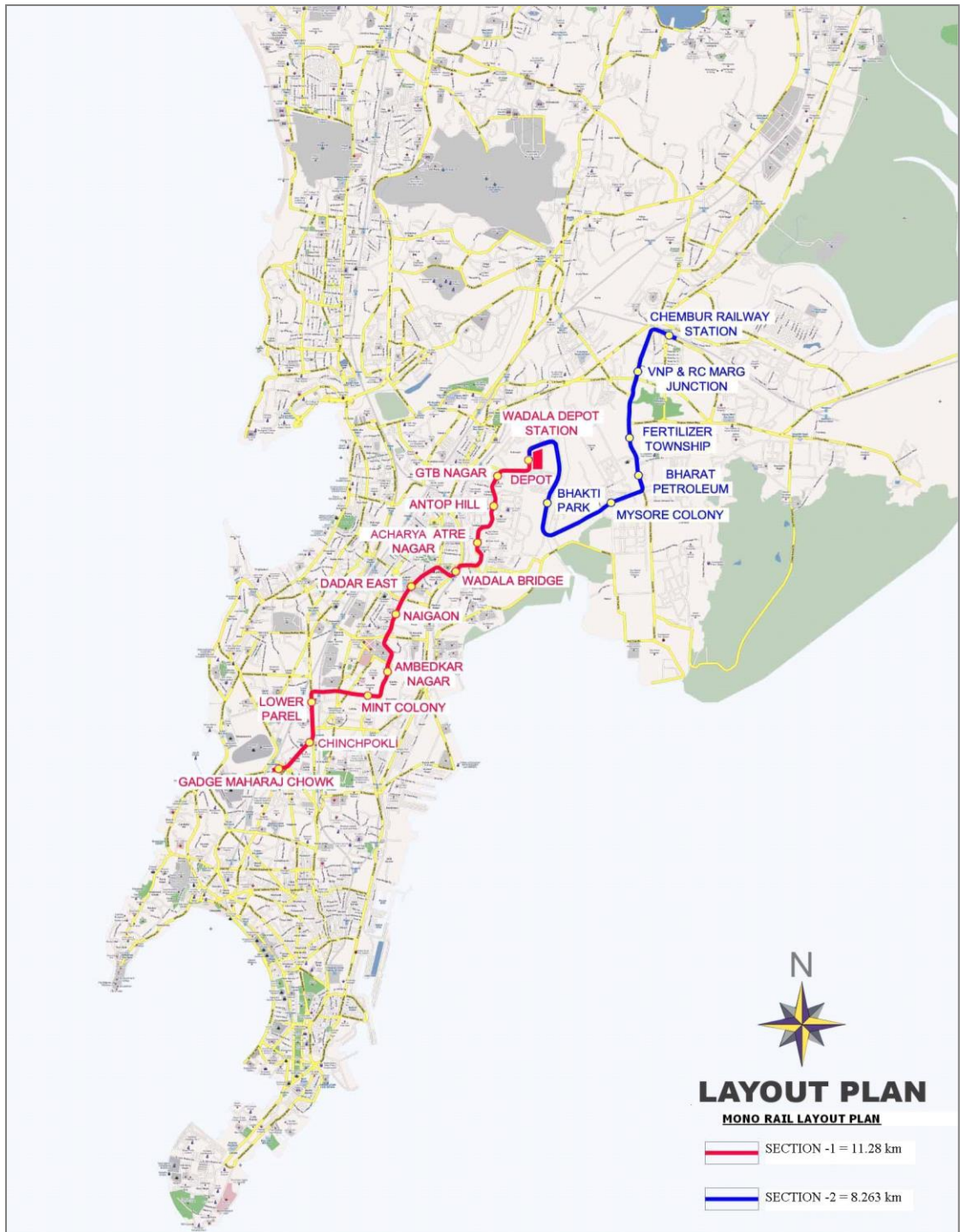


Fig. 1. Mumbai Monorail Alignment Plan, Source: MMRDA

### 1.2.1 Project Features

- Phase I (Wadala-Chembur) - 8.93 km
- Phase II (Sant Gadge Maharaj Chowk-Wadala) - 11.28 km
- Project cost excluding taxes - INR 2460 cr. (US\$ 344.39M)
- Date of Commencement - 14th November, 2008
- Design Headway - 3 minutes
- Train Composition - 4 cars
- Passengers Capacity - 562 Max Passengers
- Design Speed - 80 kmph
- Scheduled Speed - 31 kmph
- Operation Hours - 05.00 Hrs to 24.00 Hrs
- Journey Time : a. Phase I - 22 minutes
- b. Phase II - 32 minutes
- No. of stations - 17 Stations (MMRDA)

Figure-2 shows the pictures of Mumbai Monorail Station and Depot.



Fig. 2. Mumbai Monorail Station and Depot

Mono Rail carries 7,500 commuters per hour per direction and has the capacity to carry 1.5 to 2 lakh commuters daily. Many parts of the city which are not connected by suburban rail system or Metro rail will be connected by Monorail. Besides, Mono Rail will also be connected to suburban rail system at Wadala, Curry Road and Chembur. Likewise, Metro-II will be connected at V.N. Purav marg station. The Mono Rail will be an efficient feeder transit system benefiting commuters and will offer efficient, safe, air-conditioned, comfortable and affordable public transport (MMRDA).

## 2. Literature Review

Given the existing funding challenges in India, the central Government has issued directives urging state and local governments to explore innovative financing options such as Transit Oriented Development (TOD), value capture financing (VCF), advertisements, leasing of space, etc. GoM is seeking to integrate such initiatives into the development of new metro lines and monorail as a potential source of revenue generation as a means to maximize the economic benefits derived from the network. Revenue generation could include among other mechanisms such as development charge, 1% surcharge on stamp duty, TOD, commercial development at Metro and Monorail stations & depot buildings, advertisement & parking charges etc. The Mumbai Metro One, the only operational line connecting Versova and Ghatkopar, also rakes in a significant amount of non-fare revenue. Apart from advertising in the trains and the stations, they have allowed commercial establishments on the stations. According to Mumbai Metro One Private Limited (MMOPL) between June 2014 and June 2017, the Metro line 1 operators raked in INR 664M (US \$9.3M) as non-fare revenue [Benita Chacko, 2017]. According to data from international benchmarking programs Community of Metros and Nova, tariff revenues cover an average 75% of operating costs, while other commercial revenues provide about 15%, resulting in an operating deficit of 10%. There are of course examples of MRTS systems that do recoup their operating costs, such as Santiago de Chile and Hong Kong, but others like the Mexico City Metro

only cover half of their operating expenses with fare revenues. A study done by the World Bank Group (Daniel Pulido, 2014) talks about some of the best practices of enhancing non-fare box revenues around the world; these are as follows

### *2.1. Advertising*

The Government of Mexico City announced its intention to renegotiate the advertising management contract that it currently has with a private company to increase revenues from over 70,000 advertisement spaces. Technology can also help in generating extra advertising revenues: Madrid will soon launch a system that will display animated announcements along the tunnels of Line 8 and bring an additional US \$500,000 a year in revenues. Similar systems are already successfully operating in Beijing and Santiago.

### *2.2. Leasing of commercial spaces*

Franchising consultants have indicated that commercial spaces in the metros of Rio and Sao Paulo are under-priced, with lease spaces per square meter estimated to be 30% to 60% lower than in shopping centres. The National Public Transport Association (ANTP) of Brazil has also reported that various commercial spaces located inside the stations of Belo Horizonte Metro Line 1 are leased at prices significantly below market. In this context, public officials in Brazil are starting to look at ways to maximize revenue from commercial spaces. For instance, the State of Sao Paulo pushed to increase the share of non-fare revenues in the business model of the recently awarded Line 6 concession.

### *2.3. Station semi-naming rights*

The sale of naming rights or branding is also being exploited by various metro systems to get some extra cash. Since 2010, Dubai's Roads and Transport Authority (RTA) has earned more than US\$540 million from the sale of naming rights for 13 metro stations, and from leasing retail outlets inside stations. According to RTA, such revenues cover 60% of the network's operating and maintenance costs, with the intention of reaching 100% by 2017. In some cases, the sale of naming rights also results in added benefits for users. For instance, in 2011, the Baixa-Chiado metro station in Lisbon was remodelled and equipped with free Wi-Fi sponsored by Portugal Telecom (PT) as part of an agreement to name the station "PT Blue Station". The branding of stations as a funding mechanism is not limited to high-income countries. In India, following the experience of the Gurgaon Rapid Metro, the Mumbai Metro has recently auctioned station naming rights for 12 stations, at prices ranging between US \$250,000 and US \$1,000,000 per year for five years.

### *2.4. Merchandising*

The best illustration of metro systems' merchandising potential is probably the London underground, whose iconic logo and "Mind the Gap" announcement are recognized worldwide. The London Transport Museum earns about \$4 million annually from the sale of official merchandise. Developing city metros are following suit: Six months ago, two years after the Sao Paulo metro company issued guidelines for the exploitation of products bearing its name, the first store offering metro merchandise opened in the Consolacao Station on Line 2 of the city's Metro.

### *2.5. Consulting services and technology sales*

Urban transport operators in the developed world have long been offering consulting services internationally, including: RATP (Paris), MTR (Hong Kong), TMB (Barcelona), Metro de Madrid (Madrid) and Delhi Metro Rail Corporation (Delhi). This Metro de Madrid made about US \$25 million from consulting services alone in 2012. Metro companies in the developing world are starting to get into this business, and some of them are even making money by advising their peers on how to boost revenue. Metro de Santiago, for example, is helping the Panama City Metro

evaluate business opportunities to increase non-tariff revenues. In addition, Metro de Santiago also sold its “Multivia” fare card technology to the company in charge of deploying the electronic fare collection system in Panama City.

### *2.6. Land value capture*

An entrepreneurial way of capturing part of the increase in land value that results from transit investments (one that goes beyond imposing taxes) holds the greatest potential for increasing non-fare revenues. This can be done through various transactions with the private sector, including: selling or leasing land, charging real estate developers for the right to build taller buildings and participating in urban redevelopment projects. These mechanisms have been used with great success by rail operators in Tokyo (Tokyu Corporation) and Hong Kong (MTR Corporation), where the contribution of property and commercial developments to net operating profit has even exceeded that of transport operations. However, this experience has been hard to replicate in the developing world. In Latin America, Sao Paulo sold additional construction rights (known as CEPACs) to private developers, mobilizing about \$100 million for Line 4 of the city metro.

In sum, experience shows that transit agencies in developing countries can gain a lot from becoming more entrepreneurial. In 2012, Metro de Santiago generated US \$24M from advertising and leasing of commercial space. This was equivalent to 17% of fare revenues, higher than the average of 5-6% that is seen in Brazil and Mexico. Although a metro system’s potential to mobilize commercial revenue depends on a lot of factors that take time to change (users’ income, space availability, urban density and system demand), transit agencies can take steps to make the most out of this potential starting with the development of business plans and of smart partnerships with the private sector. Commercial activities will only become a significant source of funding when they are incorporated into system planning from the beginning, and are effectively embedded into the mission and objectives of transit agencies. The MRTS segment continues to operate with the limitations of challenging economics. At present, the operating cost of metro projects is very high.

The Delhi Metro by Delhi Metro Rail Corporation (DMRC) is arguably the most successful MRTS project in India with ridership levels touching new highs every year. But the year (2015-16) in which it carried 2.59 million passengers per day, it also reported a loss of INR 7.08 billion (US\$ 96.54M). Recent fare hikes meanwhile carry an imminent threat of ridership loss, with implications for revenue generation. Cost optimization and improved energy efficiency could help in reducing operations and maintenance costs. Going forward, even as government and multilateral agencies seem likely to remain predominant financiers, TOD, Value Capture Finance (VCF) and bond issues are expected to substantially raise revenues. These will not only plug financing gaps but also raise the financial sustainability of MRTS projects (Challenging Economics, 2017).

## **3. Case Studies**

There have been many instances of using transit investment as a driver in urban development. One such strategy is TOD. The names used for cases where transit investment and land use planning have been integrated to promote transit ridership. The only goal of TOD is not transit ridership; reduction in vehicle miles travelled (by promoting walking, biking and transit), improve accessibility (more activities close to transit) etc are also possible by TOD investment. Whereas there are many definitions of TOD, the essence is the same integration of transit and land use planning.

### *3.1. The city of San Diego: design guidelines for TOD*

The City of San Diego, one of the fastest growing urban areas in California, has adopted Design Guidelines for TOD as a key component in their Land Guidance and Urban Form programs. TODs are being used to help the city reduce urban sprawl, plan the urbanized area efficiently, encourage infill and redevelopment, and support the trolley and bus transit system. A particular focus of the guidelines is to encourage infill and redevelopment patterns and transit integration. The work includes an Implementation Strategy that outlines the steps necessary to fully adopt the



principles and specific recommendations of the design guidelines into city-wide zoning, street standards, and other policies. The process of preparation and adoption of the guidelines was inclusive and very effective. A committee was appointed which reviewed each guideline and modified it accordingly. These guidelines were then used to design the future development and redevelopment of an existing suburban station area, an industrial zone, and a shopping mall. Finally, city staff presented the ideas, guidelines, and illustrative designs to every neighbourhood group and community planning board within the city as shown in Fig.1. This exhaustive input and education process proved successful in both tailoring the guidelines to the unique qualities of San Diego and allowing people to understand the changes that were proposed (Calthorpe, Peter 1992). Calthorpe had developed TOD to address the ecology of communities. In the western countries, TOD was seen as an easily comprehensible solution for Regional Growth (Carlton, 2007). It also met the need of transit agencies for alternative revenue sources than the fare box revenues. In western countries, TOD is used for densifying certain areas but in India the cities already have higher densities. Hence TOD in Indian cities should be looked at as a tool for improving quality of life and financial means to provide infrastructure facilities. However, India is taking steps towards achieving the TOD guidelines and designing a well-planned city for its people, making itself sustained and pedestrian friendly.

### *3.2. Station area development in New Mumbai: integrated complex at Seawoods*

Seawoods Grand Central, an iconic complex, located at Navi Mumbai, is part of Nexus Group of Malls. Seawoods Grand Central Mall is India's one of the largest Transit Oriented Development (TOD). A TOD is a crossroad of enterprise and entertainment, culture and commerce; where offices, malls, restaurants and recreational spots converge around a transit station or stop. The mall is also going have a multiplex and an entertainment zone very soon. It is directly connected to the Seawoods railway station and closer to proposed Navi Mumbai Metro corridor. Figure-3 shows the aerial view and side view of the Seawoods Grand Central complex.



Fig. 3: Seawoods Grand Central Complex, Navi Mumbai

An Integrated Complex at Seawoods is proposed on The City and Industrial Development Corporation (CIDCO) owned land admeasuring 16.5 Ha. The site at Seawoods has a permissible FSI of 1.5 which will be translated into a development of approximately 25 lakh square feet (Seawoods grand central mall). The project involves the development of a railway station and a commercial complex along with all the necessary ancillary infrastructure facilities (e.g. parking). Unlike other railway station projects by CIDCO, which have been developed by CIDCO using its own resources, at Seawoods, it is proposed to appoint a developer for the construction. For developing the facilities through a third-party, it was decided that the developer would be required to construct the railway station at its own cost as per the CIDCO's specifications and thereafter handover the same to CIDCO.

### *3.3. Metro superstructure project: Beijing Metro Line 9 Guogongzhuang depot*

This metro superstructure project in Beijing was started in 2011. Now just above the depot are built eight buildings with 17 to 26 floors. The metro superstructure project uses the convenience of transportation depot or

metro subway station to build commercial buildings above it, so to attract customers and thus promote the Metro development. Figure -4 shows the satellite image and 3-Dimensional view of Beijing Metro Line 9 depot.

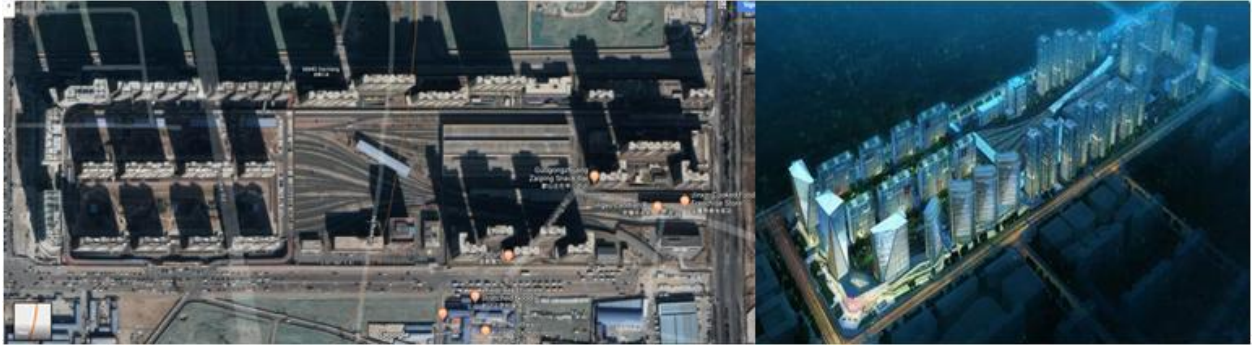


Fig. 4. Beijing Metro Line 9 depot satellite image and 3-Dimensional view

It is carrying out development and construction of civil buildings over the terminus garage, which is higher than 9m-13m from the ground level. For the government, the short-term revenue generation, such as the secondary land transfer fees, lease rent and the real estate sales taxes is huge. For Beijing metro company, the Guogongzhuang station has become one of the most popular sites on the 9th Metro line, effectively enhancing the subway utilization, reducing the operating costs and improving the convenience of the public life.

Due to the advantage of direct to a metro stop, these building's price is about 20% higher than surrounding estates. Because the metro superstructure project has huge benefits for the Government, the metro company and developers, so in the Chinese ultra-class cities and even ordinary first-class cities, the metro superstructure project is generally considered when planning new depot buildings. In Beijing, there are two more metro superstructure projects under construction. And in the whole China, at least 15 projects are going to start (Living on the rail-, 2017).

### 3.4. Hong Kong: rail + property by MTR

Hong Kong is one of the world's leading international financial centres with a long history of designing and implementing a robust and sophisticated multimodal public transportation network. Figure-5 shows the 3-dimensional view of Hong Kong's one of the station developments and view of Kowloon station developed by MTR.



Fig. 5. (a) Conceptual 3-Dimensional section view of Metro station in Hong Kong (b) Kowloon station



The network is estimated to move over 12 million passengers a day. It is estimated that over 90% of the daily journeys in Hong Kong on public transport, making it the highest rate in the world. In Hong Kong, all lands are public-owned (except the land on which St John's Cathedral stands) and the government has the “powers to lease and grant state land to the public for ownership for a limited period of time.” The Hong Kong rapid transit railway system, known as the MTR, is financed, constructed and operated by the Mass Transit Railway Corporation (MTR)- currently serving as a private entity with Hong Kong’s administration (HKSAR) serving as a large shareholder. Hong Kong’s “Rail + Property” development model has enabled the city to maximize the limited area available for development in an innovative and aesthetic manner while at the same time enables its transit agency to generate revenues to finance investments in transit infrastructure.

### *3.4.1 The main features of Hong Kong TOD project*

- Tool Adopted is Rail + Property Development Process
- Govt. grants property development rights of station & surrounding areas to MTR.
- MTR prepares Master Plans of “Station & Surrounding Sites”
- Land premium is negotiated with Govt. on a “Greenfield Basis”, prior to tendering development sites.
- In property developments, the Corporation enters into partnerships with reputable developers whereby the developers bear all development costs, including land premium and construction costs, and therefore all development risks. MTR supervises construction of projects and profit sharing either in form of percentage of profits or assets in kind.
- Integrated Rail + Property Development is cornerstone of the MTR’s success in Hong Kong. MTR is both the transit authority as well as the property owner.
- The percentage distribution of revenue generation is 63% : fare box revenue, 37% : non fare box revenue

### *3.4.2 TOD supportive policies and legal controls in Hong Kong*

The initial investment in Hong Kong’s mass transit system was limited to a 20 km stretch, constructed in 1972. In the early years, two agencies were charged with operating the rail service- Mass Transit Railway Corporation (MTR) and Kowloon-Canton Railway Corporation (KCRC). In 2000, MTR was partially privatized with no subsidies received from the government in theory. Subsequently, in 2007, MTR merged with Kowloon-Canton Railway (KCR) Corporation. Through its development control legal framework, transit- first policies and a shareholding in the MTRC, the government of Hong Kong has successfully created an environment that provides financial flexibility and development control which ensures public interest related to transit oriented developments in the city [14].

## **4. Need to generate non-fare box revenue for Mumbai Monorail**

Implementing such large scale transit projects requires a huge financial backing. These large scale projects when implemented, affects the existing city structure. Conventional sources for funding, including general taxes on labour, in many occasions have become harder to sustain for various reasons. Additionally in the existing grid of Mumbai’s transport system which majorly comprises of bus, railways and taxis would have its own impact in the overall ridership statistics. This change in ridership pattern would also have an impact on the station area. Nature of both the problems, of large scale finance and station area development, may be different but it becomes necessary to find a combine solution to them. Today with the Government investing in large scale Mass Rapid Transit System projects; it becomes necessary to understand the viability of the project beforehand. Various social, economic and environmental criteria need to be analysed in order to carry out this study. Mumbai Monorail, the first monorail project of India, was constructed for the city of Mumbai. It is the world’s second longest monorail after Osaka Monorail Main Line, Japan. MMRDA is the owner of the project. In November 2008, a consortium of Larsen & Toubro and Scmi Engineering (LTSE) was selected by the MMRDA to implement the project. The LTSE consortium, led by Larsen & Toubro (L&T), will implement the project on build-operate-transfer (BOT) basis. Table shows the major expenses for Mumbai

Monorail includes Operation and maintenance trip rate, security expenses and Project Management Consultant charges. These expenses of monorail needs to be curtailed in order to increase the profitability of the project.

Talking about Monorail expenses it includes, O&M Trip rates, Security expenses and Project Management Consultant (PMC) Charges. O&M Trip Rates refers to the charges MMRDA pays to monorail operating agency on per trip basis. Presently MMRDA pay INR 10, 600 (US \$148.4) per trip. In average there are about 270 trips/day carried out each day by monorail. Overall security expenses are about INR 90M (US \$1.2M) per year. It is assumed that Project Management Consultant services will cost approximately INR 7.5M (US \$ 1,04,997) per month as per the recent contract conditions. The said expenses are expected to raise at the rate of 5% per annum. Table-1 shows the various types of expenses occurs in operation of Mumbai Monorail of base year 2019- 2020.

Table 1. The details of expenses on this Monorail project

Expenses (Year 2019-2020)	In INR	In US\$
O&M Trip Rate	882132000	12349601
Security Expenses	174857143	2447951
PMC Charges	90000000	1259974
Total Expenses	1146989143	16057526

The estimated fare box revenue for the said project for the year 2018 - 2019 is INR 31,90,01,623 i.e. US \$4.46 M; which is only 30% of the total expenditure for the project per year. So the overall yearly deficit comes out to be about 70% yearly. It clearly indicates the need to find strategies to generate revenues from the sources other than the fares. The section - 5 describes ways by which this deficit can be minimized.

## 5. Ways to aggrandize non-fare box revenue for Mumbai Monorail

Various streams can be envisaged to generate additional revenues to either compensate a deficit in the fare revenue or create additional investments resources. The following are the expected planned targets solutions for non-fare box revenue for Mumbai Monorail with assumption that one dedicated team will head the same:

### 5.1. Advertisements

Advertising is one of the effective tools for generating non-fare box revenues. Authorities can offer spaces inside the station such as walls, civil structures and train compartments to companies for promoting their brands. The more the number of riders, the greater the money to be made as it means a product or brand's posters having greater chances of getting noticed. The scope for advertisements in Monorail is mainly on piers located along the corridor, on trains (inside and outside/wrapping), on railway stations (inside and outside), Advertisement through Announcements inside trains/LED Display. The usual practice is to give it advertisement tenders to third party advertisement display firms, who works out necessary arrangements required. These firms take tender for 3-5 years on lumpsum yearly fixed amount.

Advertisement on piers rates varies with respect to the location of piers and seasonal time period. Monorail is expected to get about INR 15M (US \$ 2,09,995) yearly revenue by leasing out the spaces on monorail piers. There are about 797 piers are available over 20 km long monorail alignment. Display of advertisement on rolling-stock outside part is also a lucrative revenue source. Generally referred as train wrapping. The rates for train wrapping are based on per train lumpsum. Monorail is expected to get about INR 0.8M (US \$11,199) per train per year. Advertisement inside and outside the stations depends on the display area available and the location of station. Monorail has about 8000 sq.ft. display space (inside/outside station) per station, which is expected to fetch about INR 160M (US \$2.24M) yearly revenue considering all 17 stations of monorail.

## 5.2 Co-branding of stations/semi naming rights

It allows companies and public sector entities the right to prefix their names before that of stations' for money. Thus, while they get a chance to promote themselves, metro operators and governments get a chance to fill their funds by selling naming rights. With greater footfalls, bidding prices for naming rights shoots up, thereby making it easier for authorities to keep fares affordable.

Semi-Naming Rights intends to associate with advertisers/ brands looking for a novel approach to engage their target demographics through semi-naming of selected metro stations. Since brand re-call is an important factor in advertising, the advertiser/ brand is assured of being highly visible and audible to the commuters throughout the day, ensuring top of the mind recall and leading to a marked increase in commuter's engagement with the brand. It is estimated to get INR 10M (US \$1,39,997) per year per station for semi-naming rights of monorail stations. This form has also become popular in India: Gurgaon Rapid Metro, Mumbai Metro line -1.

## 5.3 Roof-top Solar Power generation at Monorail Stations

A major part of this O&M is the electricity consumption for running the coaches and the stations. The average monthly consumption for the FY 2016-17 stood at 0.6M KWp and avg. monthly bill is approximately INR 45-50 lakhs (US \$63-70k) for phase-I. With the past trends, it is estimated that these electricity prices will only increase from time to time as electricity provider's increase these prices every few years. With an objective of partially fulfilling the electric energy requirements for the Mumbai Monorail operations & reducing the carbon footprints of the Monorail. All 17 stations for the Monorail are full elevated and located along the median of the roads. The depot for both phases is located in Wadala and is also fully constructed and operational. The total area available on roof of all stations is about 27,200 sqm. The capacity is considering 15 sq. mt. per KWp which is a thumb rule for metal rooftops. Hence, the solar power generation capacity has been worked to be about 2 MWp. The overall savings from solar power generation will be about INR 10M (US \$1,39,997) per year as per present electricity rates and it will increase year by year.

## 5.4 Licensing of space on monorail stations and piers for telecom towers

MRTS organizations can also lease out space to third parties to erect mobile telephone towers. This includes, licensing of space on selected piers & stations for placement and operation of telecom equipment for providing shared mobile (cellular) coverage; to augment non-operational revenue for MMRDA. The 1.5m X 2m space below the pier cap will be given for installation of small towers of telecom equipment. The bidders are generally third party service providers who lease out the towers to telecom operators. The average rates are INR 7k (US \$98) per pillar per month and INR 4.5k (US \$63) per sqm per month for stations. Also there are other leasing cost which includes license fees for OFC cable, Cable tray fees and maintenance changes on monthly basis which is charged extra to the licensee. It is estimated that this exercise for monorail will fetch revenue about INR 40M-80M (US \$ 0.56M – 1.12M) per year (Request for proposal document, MMRDA).

## 5.5 Optical fiber Cables (OFC)

An optical fiber cable, also known as a fiber optic cable, is an assembly similar to an electrical cable, but containing one or more optical fibers that are used to carry light. There are several other innovative lucrative revenue sources for metro authorities to tap on. One such is the option to lease out bandwidth on the metro's optical fibre (OFC) cables, which are used by data providers for internet transmission. Commercial entities, such as private telecom companies, mostly buy them for selling to end users. The Mumbai metro authorities are already planning on setting up an elevated network of OFC along the metro corridors being built. Relatively easy on the pursue, it would help them with quick bucks. Further, it would not require digging up of roads to lay them, since they would be on the metro and Monorail route.

MMRDA intends to lease the space on the cable trays along the viaduct of Monorail alignment. This will fetch the revenue to the authority up to INR 450M (US \$ 6.3M) per year for 20 km stretch of Monorail alignment.

## 5.6 Commercial/retail area development at stations

Another popular way to mop up money to support operating costs of Metros and Monorails is by allowing retailers to set up shop within the premises. Land or area can be leased for it. It helps small business establishments such as coffee shops, convenience stores, pharmacies, fast food stalls, ATM kiosks by banks and others to tap into the stream of commuters pouring in at both peak and non-peak hours. It also enables authorities to mint the much-needed money and busy commuters to grab a quick bite, withdraw money or quickly pick up stuff they need.

The benefits of commercial and retail activities in the stations are

- The Metro passengers benefit out of access to wide range of facilities
- Occupants of the commercial spaces get huge potential to expand business
- Rentals from shops, kiosks, bank automated teller machines and quick service restaurants are traditional source of alternate revenues.

## 5.7 Land value capture

### 5.7.1 TOD for financing of infrastructure projects

Using TOD as a Financial Model is one of the aspect in which the government can make a well informed decision about developing an area. Transit Oriented Development can help the government to generate revenue which can be used for laying out new infrastructure facilities on a large scale. Many Indian Cities like Delhi, Lucknow and Ahmadabad have already taken some steps to achieve transit oriented development. MMRDA is also considering this concept for Mumbai city along the metro and Monorail corridors.

One of the fundamental principles of smart development is the integration between land use and transportation. A major goal of TOD is to direct land development to where public transit and infrastructure is proposed. In case of Mumbai, though it is a brownfield development, many pockets in the suburbs near the transit node can be developed to realize more potential. TOD will explore the potential of development along the proposed Metro corridors. It will bring-out the opportunities for development in the form of underutilized brownfield properties, located along Mumbai MRTS corridors. TOD opens up dense developments near transit nodes through relaxed FSI norms, thereby increasing the developable area.

TOD limits urban sprawl thus helps in achieving compact and controlled developments and reduces the average travel time and household spends on transport. TOD creates a balanced mix of land use with residential use at a walking distance of 500 to 800 m from the transit station. This increases 'walkability', supports public transport use. Increase in the modal shift increases the ridership by improving access to transit stations. This enhances the financial viability of transit investments. TODs can also have a positive impact on society by reducing the volume of vehicles and congestion on the road network— resulting in reduced pollution, traffic congestion and crashes, as well as health benefits due to increased walking trips. TOD results in better places to live-work-play and mixed-use development with shared open spaces. All these add up to notably improved quality of life for citizens. MMRDA also intends to assess the potential of TOD along the proposed Metro and Monorail corridors in Mumbai. Currently MMRDA is in process to appoint consultants to carry out TOD study and prepare TOD plan for existing and proposed MRTS stations and corridors.

### 5.7.2 Commercial/property development at stations and depots

Commercial/property development at stations and on other urban land has been used as a key instrument for maximizing revenues in metro rail/ railway systems in cities around the world. Notable examples are Hong Kong and Tokyo. Metro rail implementing agencies should endeavor to maximize revenue through commercial development at stations and on land allocated for this purpose. Delhi Metro Rail Corporation (DMRC) has also taken up Property development initiative in which they also started planning of building commercial spaces in the Metro station building in Delhi and generate the revenues by leasing them. While sanctioning Delhi MRTS Phase-I project in 1996, the Union Cabinet had mandated that approximately 7% of the initial project cost should be generated through property development on lands transferred to DMRC for the project (DMRC, Property Development). In addition recurring



income should be generated through property development for paying back subordinate debts etc. in future years. DMRC set up a Property Development Wing in 1999, for implementation of this scheme.

#### *5.7.2.1 Commercial development of metro and monorail depot buildings by MMRDA*

The Monorail depot is located in Wadala and is also fully constructed and operational. The depot covers an area of 6.9 Ha. MMRDA is keen to explore the potential for commercial development of the open areas within the depot site employing the principles of Transit Oriented Development. In view of above MMRDA is in process of appointing consultant to prepare detailed planning at the Monorail Depot in Wadala. This free land will be utilized either for commercial or residential use (Request for proposal document, MMRDA). The revenue generated through this plan is yet to be estimated. Once the plans are ready, MMRDA will be able to ascertain revenue generation from this commercialization.

## **6. The way forward**

Public transit systems create opportunities for tapping non-fare box revenues through multiple sources. Large scale passenger movement create direct opportunities through increased potential for advertising and for additional passenger services provided through station kiosks, rental stalls, parking etc. among others. Further, land adjoining MRTS alignment and the air-space stations offer opportunities for real estate development in appropriate formats, which could unlock value for the metro and monorail systems.

The Ministry of Urban Development, (MoUD) India Metro rail policy 2017 talks about enhancing non-fare box revenue through conventional as well as innovative means. It states that the state Government shall commit the enabling policy and regulatory framework and provision of requisite permissions, clearances & licenses etc. for all avenues of exploiting non-fare box revenue such as advertisements, leasing of space, fire clearances etc. As per this Metro Rail policy, TOD and adoption of value capture finance (VCF) framework should be an integral part of the project proposal. The commitment should include commitment of transfer of the financial benefits accruing in the influence zone of the metro alignment on account of the TOD policies and VCF framework directly to the Special Purpose Vehicle (SPV)/agency implementing the metro rail project. The project report should specify the proposed quantum of such benefits being transferred to the project. This requirement should form a mandatory part of all metro rail project proposals. Metro rail implementing agencies should endeavour to maximize revenue through commercial development at stations and on land allocated for this purpose. Systematic adoption of (VCF) tools can help urban local bodies (ULBs) mobilize the additional funds they need to make infrastructure enhancements amid rapid urbanization (Metro Rail Policy, 2017). Considering the historic developments it is quite clear that government and multilateral agencies will remain principal financiers for MRTS projects. The non-fare box revenue enhancing strategies discussed in the paper are expected to significantly raise the revenues. These will definitely bung the financial gaps and will also raise the financial sustainability of MRTS projects, which seems a need of time.

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