

MRT JAKARTA: A SHORT EVALUATION AFTER 1 YEAR OF OPERATION

Aleksander Purba¹

¹Engineering Faculty, University of Lampung, Indonesia 35145

ABSTRACT

Jakarta has been planning the MRT project since the 1980s, but it has been canceled several times for a number of reasons, including the economic crisis in 1990s. The implementation of sustainable Jakarta MRT entails coordination among different sectors and levels of government. An increase in public transport would be more realistic if accompanied by disincentive mechanisms for users of private vehicles on the one side and incentives for public transport users on the other. Like it or not, the city's next job is to change people's behaviours through both educative and repressive measures. Within the framework of an integrated MRT development, the government should start thinking about reliable feeders connecting MRT routes to settlement centres. In addition, pedestrian paths linking shelters to central business districts and offices need also be improved. In the long term, the growth of settlements and new activity centres in the city's master plan needs to be integrated into the MRT. Building affordable apartments downtown to shorten residents' commuting journeys is unavoidable. As experienced by such cities, the built environment has significant impacts on the activity-travel behavior of private housing residents, partly because they could self-select into the types of residential environment matching their travel preference.

Keywords: MRT Jakarta, Evaluation, Integrated, Travel behavior

INTRODUCTION

The year 2019 has been marked by important milestones in the modernization of the country's railway transportation system with the inauguration of the first ever rail-based mass rapid transportation system and the development of the first high-speed train. On March 23, President Joko "Jokowi" Widodo inaugurated Jakarta's MRT system, marking a new era in Indonesia's railway transportation system. After almost a year since it began commercially operating, the Jakarta MRT has become an importation means of transportation for Jakarta residents. Phase 1 connects Lebak Bulus to Bundaran HI along 20.1 kilometres and consists of 13 stations (7 elevated stations and 6 underground stations). The Indonesian Ministry of Transport approved this plan in September 2010 and invited tenders. Construction began in October 2013. Phase 1 was opened for free service on 24 March 2019. Commercial service began on 1 April 2019. Phase 1 is expected to serve 212,000 passengers per day. This expected capacity may be maxed out to 960,000 per day. The 20.1 kilometres distance is covered in under 30 minutes. Within its first month of operations, 82,000 passengers used the line daily. The charged fare for a trip on the MRT starts at Rp3,000, increasing by Rp1,000 for every station passed. A trip spanning the entire existing line in 2019 would cost a passenger Rp14,000.

A refundable Rp15,000 deposit is required to purchase a single journey ticket, in addition to fares required for the journey. The Jakarta MRT employs a cashless fare payment system. A dedicated contactless smart card known as the 'Jelajah' can be

purchased from the ticketing machines or ticket offices located at every station. The Jakarta MRT is expected to stretch across over 108 kilometres, including 26.9 kilometres for the red line (from Lebak Bulus to Kota) and 87 kilometres for the yellow line (from Cikarang to Balaraja).

Otherwise, during Covid-19 emergency period the number of MRT passengers jumped significantly. Referring to report on Tuesday, March 17, there were only 32,000 passengers from regularly 100,000 per day. It went further down to 28,000 on Wednesday and 24,000 on Thursday. The policy limits the number of MRT passengers on board of one car for only 60 people or 360 per train set of six cars or less than 30% of capacity. This paper focuses on the evaluation of projected and actual ridership of MRT Jakarta after one year of operation and after the heading, respectively.

A CASE STUDY: MRT JAKARTA

The Jakarta mass rapid transit (Indonesian: moda raya terpadu Jakarta or Jakarta MRT) is a rapid transit system in Jakarta, the capital city of Indonesia. The system is operated by PT MRT Jakarta (Perseroda), a municipally owned of the city of Jakarta. Jakarta is the capital city of Indonesia, harbouring 10 million inhabitants, one-third of the population of Greater Jakarta. It is estimated that over four million residents of the surrounding Greater Jakarta area commute to and from the city each working day. Transport issues have increasingly begun to attract political attention and it has been foreseen that without a major

transportation breakthrough, the city will have complete traffic gridlock by 2020, as illustrated in Fig. 1.

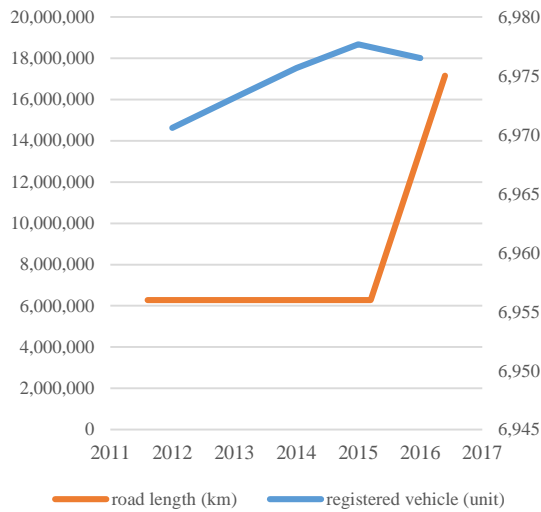


Fig. 1 Relationship between road length and registered vehicle

Previously, public transportation now mainly consists of the TransJakarta bus rapid transit system with a length of 230 kilometers and phase 1 of the MRT project was funded through a soft loan (Rp 16 trillion) from JICA with a 30 years tenure and 0.25% interest per annum. Trial run conducted since December 2018 until February 2019.

Besides serving as trial run and form of machinist familiarization prior to full operation, the parallel trial run is also part of the company's campaign to encourage the people of Jakarta to use public transportation modes in order to reduce congestion. Key performance and map of the line are shown in Table 1 and Fig. 2, respectively.

Table 1 Key performance of the line

Length network	20.1 km
Number of stations	13
Distance between stations	0.8~2.2 km
Track width	1,067 mm
Travel time	± 30 minutes
Headway	5 minutes
Operation hours	05:00~24:00
Targeted no of passenger	130,000 person/day
Number of train	16 (include 2 sets for reserve)
Electricity	60 MVA
Train operation system	Automatic train operation
Signaling system	Communication based train control
No of employees	520 (2018)



Fig.2 Line map of MRT Jakarta

URBAN REGENERATION

As perform by the MRT operating experience in other countries -though different in every city and country- MRT Jakarta is also designed to support the region's economy and improve the quality of life. Table 2 shows several of them, including the ongoing and will be implemented. Based on long experiences of such cities, it is undeniable that the development of MRT will lead to job losses since the city's transportation sector is more capital-intensive by nature. Thus the government needs to explore every avenue dealing with the process of adaptation and the transfer of transportation sector employers in stages through capacity building, capital assistance and provision of new jobs

Table 2 The city's potential regeneration

Growth development
10.83 million m2 new mixed development area Rp242.2 trillion growth of property value related to TOD 153,776 reduced parking lots
Contribution to regional income
Rp742 billion/year from land & building taxes in TOD area Rp182 billion/year tax contribution from rental office & retail Rp15.4 trillion contribution from buying property taxes (PJB/BPHTB)
Social & environmental contribution
34,047 units potential development of affordable housing in TOD area 639,380 employed workers 210,000 m2 area of public activities 739,000 m2 park and public open space 149.1 km development of sidewalk 56,854 m2 riverside area

As development of bicycle line is relatively a new project in Jakarta, its implementation may take a long time, such as the experience of other cities. Though as experienced by Beijing, public bicycle has been defined as a component of public transit by the authorities of Beijing. As a continuation of the public transit, public bicycle is helpful to implement a new trip mode of "Public Bicycle + Public Transit + Public Bicycle" to improve the accessibility of Public Transit. The new scheme of PBS is operated by professional public bicycle rental company, but funded by a state-owned enterprise under the supervision of the government.

The main profit point of private company does not rely on rental fees, but on the sale of maturation of bike rental technological system [1]. More advance, as performed by Brisbane, there is more scope for interventions based around the adoption of smart transport measures to shape attitudes and encourage changes in travel behaviour.

This work also indicates that both land use planning and complementary transport measures can impact on travel behavior [2]. Referring to Chava, Newman, and Tiwari [3], for increasing sustainable mode share especially among new build residents, measures need to be taken to encourage intensive mixed land use developments in new TODs like the traditional old residential area. To encourage walking, cycling and to provide safe access to PT, neighbourhood NMT infrastructure needs to be improved. In addition, to reap significant metro ridership benefits and to ensure transit equity, the TOD policy must include affordable housing policies, to accommodate people with low income and low vehicle ownership, as their

willingness to use the metro is higher than the gentrifies.

At city level, for the metro to attract more TOD residents it is necessary to expand the metro influence area beyond walking distance destinations by integrating with other existing modes of travel such as bicycles, IPT and buses [3]. Based on the Regional Regulation of the DKI Jakarta Provincial Government No. 9/2018, the Company is granted the right to conduct property development and management at stations, station areas and depots as well as concession rights to manage and develop land, buildings both underground and above ground in all areas in stations and depots and in outside the stations and outside the depots in a certain area to be commercialized through ways of being leased or making cooperation to create potential income other than direct income from ticket sales. In accordance with Governor Regulation No. 140/2017, MRT Jakarta is assigned as the main operator included developing TOD along the line with the following functions: to coordinate land and or building owners in regional planning and development, to encourage efforts to accelerate the development of TOD infrastructure and facilities in accordance with the city design guidelines, to coordinate the land and or building owners, tenants and other stakeholders in the TOD area management, maintenance and supervision, and to monitor the TOD area development. Referring to Hong Kong experienced, the built environment has significant impacts on the activity-travel behavior of private housing residents, partly because they could self-select into the types of residential environment matching their travel preference. However, when it comes to public housing residents, density, accessibility, and self-containment have no significant impacts on their activity-travel behavior. Because they are not likely to self-select where to live and daily infrastructures and services are mandated in public housing development, the access to these facilities at the local level helps overcome transportation constraints of public housing residents in low-density (or suburban) areas. That is, neighborhood planning matters to activity-travel behavior of public housing residents in Hong Kong.

COMPANY ACHIEVEMENT

After about one year of operation, the financial performance of the company is shown as following figures. They are asset, equity, expenditure, income, and total asset and total equity, respectively. It is important to note that since its establishment until the end of 2018, the company has not yet operated commercially and has not yet distributed dividends to shareholders. The funding for MRT Jakarta project is sourced from the capital investment made by the company's shareholders comprising DKI Jakarta

Provincial Government, through the Regional Capital Investment (PMD) scheme. Project construction and development funders consist of grants (49%) and loans (51%). One of the company's best achievements is asset growth increased 37%, it was in line with the company physical progress at the end of 2018.

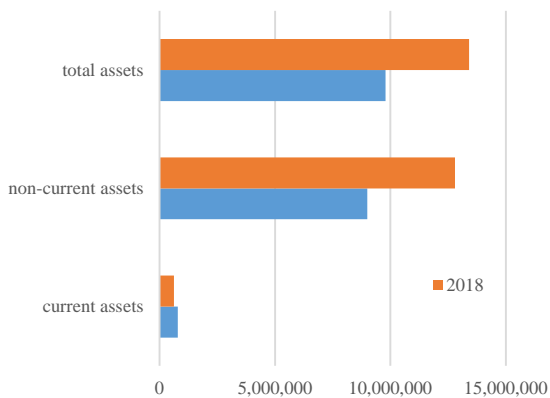


Fig. 3 Company's assets

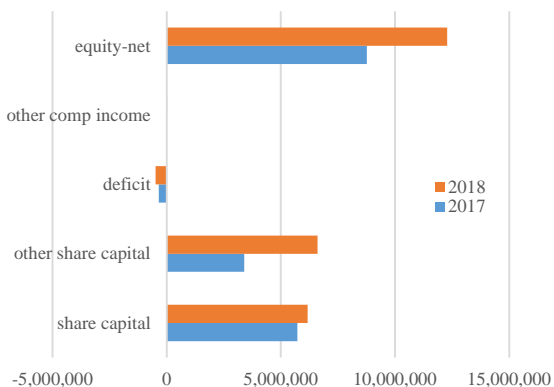


Fig. 4 Company's equity

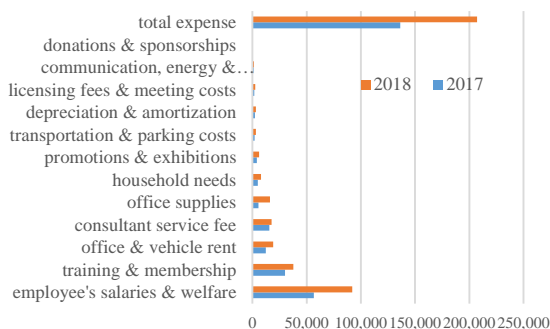


Fig. 5 Company's expenditure

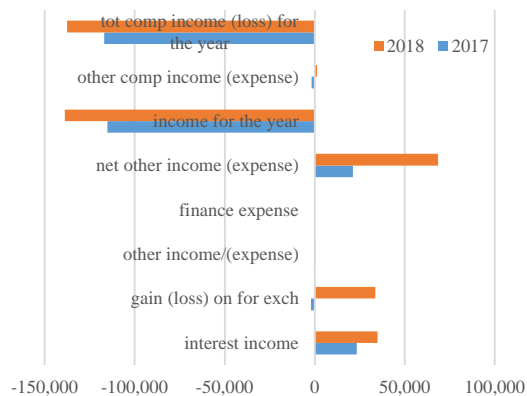


Fig. 6 Company's income

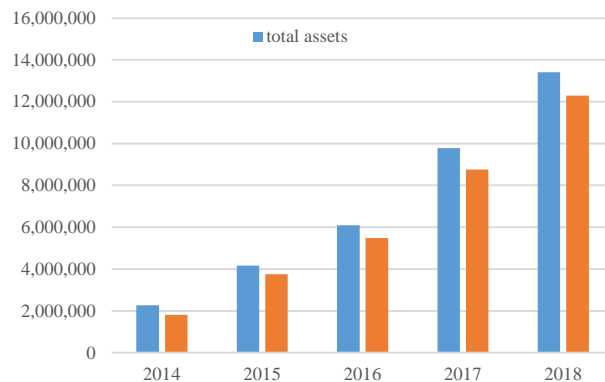


Fig. 7 Total assets and equity (2014-2018)

DISCUSSION

As experienced in other countries, challenges for the MRT and public transportation in the new line is to increase the passenger capacity. While the initial targeted daily ridership of 130,000 is a good target to aim for in the short term, it requires built environment characteristics measured in a neighbourhood-based unit, including residential density, distance to transit and bus stops within 500 m, significantly affect public transit behavior including travel distance, travel time and transit mode choice [4]. It is important to note that the number of passengers differs from station to station. The minimum volume is 964 passengers per day, while the maximum is more than 66,715 passengers per day refers to Metro Stations in Bangkok. The area around the metro station also ranges from the lowest population density (1995 population/km²) to the highest (19,814 population/km²). The residential area comprises all metro stations. The station with the lowest density in the residential area has approximately 420,000 m² of residential floor area units. The highest portion of the

commercial, industrial, and mixed use relative to the residential area. Most stations are at a distance of less than 1 km from municipal public service facilities, landmarks, and retail services. The average distance from the metro stations to these locations is less than 300 m. Access to public transport facilities is found to vary from station to station [5]. Hong Kong experiences suggested the built environment has significant impacts on the activity-travel behavior of private housing residents, partly because they could self-select into the types of residential environment matching their travel preference. However, when it comes to public housing residents, density, accessibility, and self-containment have no significant impacts on their activity-travel behavior. Because they are not likely to self-select where to live and daily infrastructures and services are mandated in public housing development, the access to these facilities at the local level helps overcome transportation constraints of public housing residents in low-density (or suburban) areas. That is, neighborhood planning matters to activity-travel behavior of public housing residents in Hong Kong [6]. Moreover, the Washington metropolitan area as the study case: Household car ownership was found to be significantly associated with residential density, employment density, land use mix, average block size, and distance from CBD. The factors of residential density, average block size, and distance from CBD were found to have significant effects on commuter's transit, and walk and bicycling mode choice. Meanwhile, the mode of walk and bicycling was also influenced by employment density around residential location. People living in high density areas may travel less due to increased accessibility but they can also travel more due to reduced travel costs [7], [8]. Another cities of the USA are shown different findings: even classified by its transit connection, station Park (Salt Lake City region) is more of a TAD (transit adjacent development) than a TOD. Huge parking lots dominate the space between the commuter rail station and other components of the development [9]. In Los Angeles, Chakrabarti [10] concluded it is unrealistic to expect that transit can win over auto in a large number of circumstances. Transit agencies need to invest in better bike-transit and rideshare- (or car share-) transit integration for creating truly multi-modal cities, and improving door-to-door connections via active or shared travel modes. But most of literatures stated mixed land-use policies reduce transport energy consumption. When mixed-use land also has a good jobs-housing balance, transport efficiency is even greater. Mixed land-use policies should be encouraged to shape urban development in more sustainable ways during China's ongoing rapid urbanization [11]. Regarding the costs Zolnik [12] found at the household-level, private-vehicle commuting costs for the 55-to-64 age cohort are slightly less than for the 45-to-54 age

cohort. Comparing Whites and Asians, costs are lower for Asians. In the \$75,000-to-\$99,999 and greater-than-or-equal to-\$100,000 income categories each spent \$0.21 more on the work trip than respondents in the \$25,000-to-\$49,999 income category. Private-vehicle commuting costs for respondents in the manufacturing, construction, and maintenance occupational category are higher than for respondents in the professional, managerial, and technical occupational category. Costs are also higher for males than females.

CONCLUSION

The Jakarta MRT has been just a dream the people of Jakarta have had for equalizing with the advanced transportation systems present in foreign developed countries. Referring to financial highlights, the MRT asset growth increased by 37% during 2017 to 2018 period. It was in line with the company physical progress while the company has not operated commercially due to trial run conducted since December 2018 until February 2019. MRT Jakarta announced it has surpassed the target of 65,000 passengers since its first day of commercial operation. Neighbouring countries such as Malaysia, Singapore, Thailand and the Philippines have long since developed MRT systems to cope with traffic congestion in their respective capital cities. Despite having smaller populations than Jakarta, Singapore and Kuala Lumpur have more extensive city rail networks. Singapore has 129.7 kilometres of MRT and 28.8 kilometres of feeder LRT (Light Rail Transit). Kuala Lumpur has 175 kilometres of city commuter trains, 56 kilometres of MRT, 57 kilometres of high-speed rail (ERL) and 8.6 kilometres of monorails. All in all, the benefits of MRT will be fruitless if the city does not draw up supporting policies as experienced of another city around the globe.

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