TRAFFIC CONGESTION IN JAKARTA AND THE JAPANESE EXPERIENCE OF TRANSIT-ORIENTED DEVELOPMENT

Policy Report
August 2020

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Executive Summary

Tokyo has the highest modal share of railways and the highest gross domestic product amongst major metropolitan areas in the world. During the period of high economic growth in the 1960-70s, the Japanese government controlled the urban development in the Tokyo metropolitan area to ease the concentration of population and industry. Transit-Oriented Development was adopted as a way of urban development along railways to reduce the usage of vehicles. The knowledge and experience that Japanese companies have accumulated are useful to solve problems associated with urbanisation in developing countries today. The Infrastructure System Export Strategy by the Japanese government stipulates that Japan will promote integrated development projects with new urban development and public transportation by utilising its experience with urban development along railways. This paper looks at the case of Jakarta, which is one of the most congested and polluted cities in the world. In Jakarta there are many ongoing mixed-use projects with shopping centers, residential areas, and office buildings. These projects are usually along highways and lack the link to public transportation. The experience of Tokyo shows that expanding the railway network is not enough to solve traffic congestion in a metropolitan area such as Jakarta. Large suburban population in Jakarta indicates a potentially large demand for commute to the city by railways such as the Mass Rapid Transit and Light Rail Transit. Facilitating a modal shift from vehicles to railways will ease traffic congestion and air pollution. To enable the modal shift, however, it is necessary to redevelop new towns around suburban stations and give residents seamless access to the railway network.

1. Introduction

The Japanese government is promoting overseas infrastructure investment especially in developing countries. The Infrastructure System Export Strategy formulated in 2013 by the government set the infrastructure investment target of 30 trillion yen to be achieved by 2020. Japanese overseas infrastructure investment has been increasing every year reaching 23 trillion yen in 2017.[1] In Southeast Asia, Japan is still leading in infrastructure investment, but competitors such as China and Korea are catching up fast. Therefore, it has become essential for Japan to differentiate its infrastructure exports from competitors by leveraging the strengths of Japanese companies. In fact, the Japanese government strategy for overseas infrastructure investment has become more diversified, focusing on various and comprehensive ways to utilise Japan's knowledge and experiences for solving problems with urbanisation in developing countries.

2. Transit-Oriented Development in Tokyo

The Tokyo metropolitan area has developed new towns along railways since the period of high economic growth in the 1960-70s. Today Tokyo has the largest population of all metropolitan areas in the world. The way of urban development along railways not depending on vehicles is called Transit-Oriented Development (TOD). Since the 1970s, the Japanese government has promoted TOD in the Tokyo metropolitan area to ease the concentration of population and industry according to the Plan for National Capital Region Development.[2] New urban railways and towns were developed in greenfield sites of the suburbs. One of the projects is the TOD project along the Den-En-Toshi (Garden City) Line. This project started in the 1960s with the construction of the railway line. The number of railway passengers increased gradually and land prices along the Den-En-Toshi Line increased rapidly too.[3] More recently, there is the TOD project along the Tsukuba Express (TX) Line, which began in 1993. Since the TX Line started operating in

[1] Cabinet Secretariat, Japan, "The Ministerial Meeting on Strategy relating Infrastructure Export and Economic Cooperation," June 3, 2019, http://www.kantei.go.jp/jp/singi/keikyou/dai43/gijisidai.html

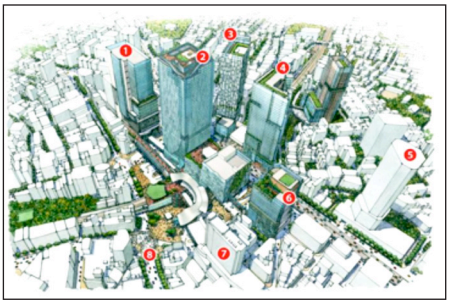
[2] The Plan for National Capital Region Development was formulated under the National Capital Region Development Act, which was established in 1956. The first Plan for National Capital Region Development was formulated in 1958, aiming to redeveloping the suburbs of Tokyo and decentralizing the population of the Tokyo.

[3] Muto, Masai, "Railway and area development" Japan Transport and Tourism Research Institute, 14 February 2020, https://www.jterc.or.jp/seminar200214-34.pdf

2005, the passenger number of the TX Moriya station and the population of Moriya city have increased every year.[4] In addition to the developments of greenfield sites of the suburbs, there are also many TOD projects around hub stations in the center of major cities in Japan. Most of these projects are redevelopment projects in brownfield sites and are intended to enhance the connectivity between stations and buildings by utilising a high-level and integrated complex usage. One of which is the redevelopment project around the Shibuya Station area in Tokyo. As many new buildings are under construction around Shibuya Station, the project is expected to improve the connectivity between Shibuya Station and the new buildings.

Figure 1. Redevelopment projects around Shibuya Station

The glass-clad Shibuya Hikarie (upper left), along with the Cerulean Tower (center right), completed in 2001 on the grounds of the former Tokyu Corporation headquarters, will eventually be joined by a host of new skyscrapers.



The renovated Shibuya Station area as it will look in 2027: 1. Shibuya Hikarie; 2. Shibuya Station skyscraper; 3. Shibuya Stream; 4. Shibuya Station Sakuragaoka exit condos and offices; 5. Cerulean Tower; 6. New high-rise in Dogenzaka; 7. Shibuya Mark City; 8. Shibuya scramble crossing.

Source: Kato, Jun, “Revamping Shibuya: A massive redevelopment project gives the station area a new look”, 30 May 2017, https://www.nippon.com/en/views/b07801/

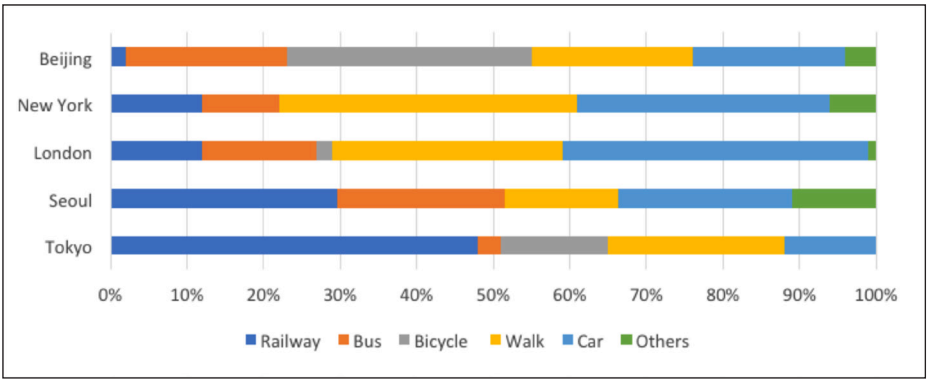
The overall contribution of TOD in Tokyo can be seen in that the modal share of railway is close to 50 per cent, much higher than other metropolitan areas such as Seoul, London, New York, and Beijing (See Figure 2). Moreover, there are studies showing that the modal share of public transportation, walking, and cycling strongly correlates with gross domestic product (GDP) of metropolitan areas.[5] In fact, Tokyo has the highest GDP

[4] Ibaraki Prefectural Government, “The effects of the opening of TX Line in Moriya city based on the national census,” March 2013.

[5] Toshi Solution Kenkyukai, “Toshi Yushutsu,” November 2015, Toyo Keizai Inc.

among major metropolitan areas in the world. This highlights the importance of utilising public transportation for sustainable development of high-density cities.

Figure 2. Modal share of major metropolitan areas in the world



Source: Ministry of Land, Infrastructure, Transport and Tourism, "White Paper on National Capital Region Development" June 2012.

3. The State of Jakarta's Traffic Congestion

In 2019, Jakarta was ranked the 10th most congested city in the world (see Table 1). Traffic congestion in Jakarta causes many problems. In 2018, Jakarta was the 10th most polluted capital city worldwide.[6] It was reported that a large percentage of the air pollution in Jakarta comes from approximately 3.5 million cars and 14 million motorcycles on the roads each day.[7] The economic loss including vehicle operation cost and time value cost caused by traffic congestion is estimated to be about Rp100 trillion or four per cent of the Jakarta metropolitan area's GDP in 2018.[8]

There are three main reasons for the traffic congestion in Jakarta. First, the population has been growing constantly. The population of 10 million in 2018 is predicted to reach 12.1 million by 2030 (see Figure 3). The Jakarta

[6] World Air Quality Report 2018"
[7] TEMPO.CO, "Easing Congestion to Reduce Air Pollution in Jakarta," 26 March 2019, https://en.tempo.co/read/1189142/easing-congestion-to-reduce-air-pollution-in-jakarta.
[8] TEMPO.CO, "Traffic jam in Greater Jakarta costs Rp100tn: JUTPI," 24 October 2019, https://en.tempo.co/read/1264081/traffic-jam-in-greater-jakarta-costs-rp100tn-jutpi,

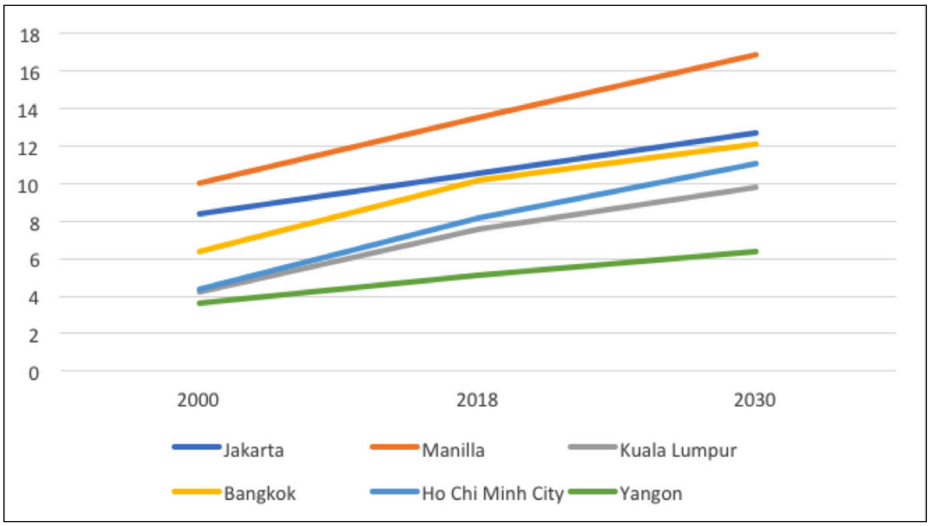
Table 1. Ranking of the world's most congested cities in 2019

1	Bengaluru (India)
2	Manila (Philippines)
3	Bogota (Colombia)
4	Mumbai (India)
5	Pune (India)
6	Moscow region (Russia)
7	Lima (Peru)
8	New Delhi (India)
9	Istanbul (Turkey)
10	Jakarta (Indonesia)

Source: "TomTom Traffic Index 2019"

metropolitan area has a population of 34 million - the 2nd largest after Tokyo among all urban areas in the world (see Table 2). Second, there is an imbalance between the number of vehicles and road length. In fact, the number of registered vehicles has increased by 8.3 per cent per year on average from 2000 to 2012, while the total length of paved roads has

Figure 3. Population transition in major cities in Southeast Asia (million)



Source: United Nations, "The World Cities in 2018"

grown by only 0.01 per cent per year.[9] The number of daily commuters from suburban areas such as Bogor, Depok, Tangerang, and Bekasi to Jakarta was estimated to be almost 1.4 million in 2015.[10] Third, there is a lack of public transportation. No rail transit system existed in Jakarta until the opening of Mass Rapid Transit (MRT) in 2019. Other Southeast Asian cities opened rail transit systems long before Jakarta; Manila in 1984, Singapore in 1987, Kuala Lumpur in 1995, and Bangkok in 2004.

Table 2. The ranking of largest built-up urban areas in the world in 2019

Rank	Country	Urban area	Population estimate
1	Japan	Tokyo-Yokohama	38,505,000
2	Indonesia	Jakarta	34,365,000
3	India	Delhi, DL-UP-HR	28,125,000
4	Philippines	Manilla	25,065,000
5	South Korea	Seoul-Incheon	24,315,000
6	India	Mumbai, MH	23,645,000
7	China	Shanghai, SHG-JS-ZJ	22,125,000
8	United States	New York, NY-NJ-CT	21,045,000
9	Brazil	Sao Paulo	20,935,000
10	Mexico	Mexico City	20,395,000

Source: Demographia, "Demographia World Urban Areas," 15th Annual Edition, April 2019.

4. Indonesia's Policy on Jakarta's Traffic Congestion

In 1992, Jakarta implemented a policy requiring private cars driving on the main roads of the central business district to have at least three passengers between 7am and 10am and between 4.30pm and 7pm. The policy had little effect to ease the city's congestion and led to an informal employment of "jockeys" who were paid by drivers to ride on vehicles to bypass the policy. The policy was suspended in 2016. Next, Jakarta implemented the

[9] Japan International Cooperation Agency "Preparatory survey on intelligent transport system project to mitigate traffic congestion in Jakarta (PPP infrastructure project)," March 2015, http://open_jicareport.jica.go.jp/pdf/12229852_01.pdf

[10] The Jakarta Post, "1.38 million commute into Jakarta daily," 17 February 2015, https://www.thejakartapost.com/news/2015/02/17/138-million-commute-jakarta-daily.html

"odd-even policy" that restricts access to selected roads to vehicles with odd-numbered license plates on odd-numbered dates and to ones with even-numbered plates on even-numbered dates. In 2019, the government expanded the policy to more roads and longer hours. The government also announced the implementation of the Electronic Road Pricing (ERP) system, which will charge vehicle owners for entering certain roads. It is estimated that 50 per cent of vehicles on Jakarta's roads are from outside the capital. The ERP system is seen as an effective measure to regulate the numbers of vehicles on the road and encourage people to switch to public transportation. By 2020, Jakarta aims to implement an Intelligent Transportation System (ITS) that applies information and communication technologies to mitigate the traffic congestion in the Metropolitan Priority Area (MPA).[11]

In the area of public transportation, TransJakarta Bus Rapid Transit (BRT) system started operating along a 12.9km corridor through the city center in 2004. In January 2019, the BRT system reached a length of 251.2km and a total of 155 routes. The BRT system was used by 189.8 million passengers in 2018 and aims to eventually serve one million passengers per day. The first MRT system started operating along the 15.7km North-South line in March 2019. The construction of the second phase of the North-South line, connecting the Hotel Indonesia traffic circle to Ancol in North Jakarta, is expected to begin in 2020. Eventually, the MRT network will be completed with two corridors, the North-South Line and East-West Line (see Figure 4). Moreover, the Light Rail Transit (LRT) system started operating along a 5.8km line with six stations in December 2019. While the MRT mainly operates inside the city, the LRT connects the suburbs to the city. The implementation of various modes of public transportation is expected to reduce traffic congestion.

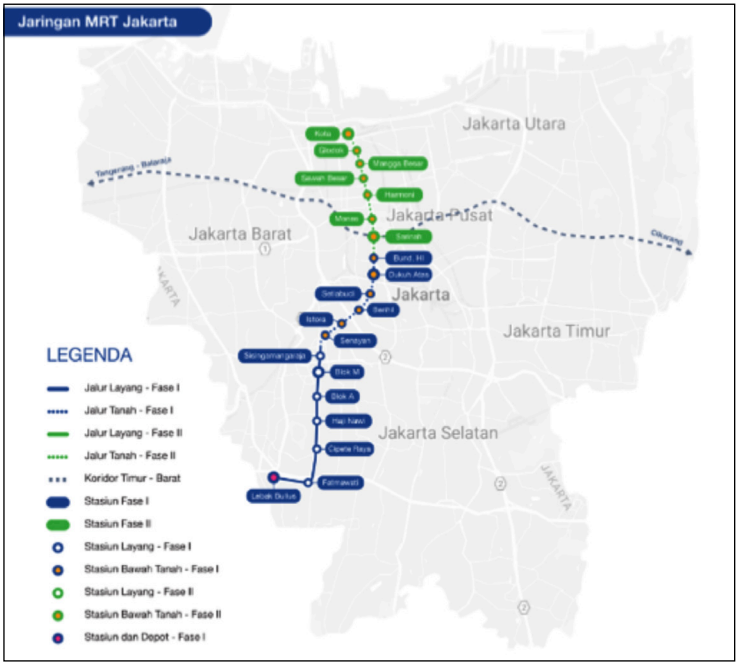
5. Japan's Strategy of Overseas Infrastructure Investment

The Japanese government formulated the Infrastructure System Export Strategy in 2013. The strategy is revised every year and the policy of overseas infrastructure investment is becoming more diversified.[12] The

[11] The Indonesian government and Japanese government agreed to establish the MPA in 2010 for investment and industry in the Greater Jakarta Area (Jakarta, Bogor, Depok, Tangerang, Bekasi).

[12] Cabinet Secretariat, Japan, "The Infrastructure System Export Strategy (revised on June 3, 2019)," http://www.kantei.go.jp/jp/singi/keikyou/dai43/siryou2.pdf

Figure 4. MRT Jakarta route map



Source: Peta Jarul MRT, MRT Jakarta

initiatives for solving traffic congestion, described in part two of the Infrastructure System Export Strategy, promote a combination of both hard and soft measures such as the development of road networks, the supply of road traffic information, and the development of public transportation. In developing countries, the strategy aims to export the knowledge and service of Japanese companies to solve problems such as housing shortages, traffic congestion, and air pollution in big cities. The Action Plan for Overseas Development of Japanese Infrastructure in 2019 by the Ministry of Land, Infrastructure, Transport and Tourism (MLIT) identified rapid motorisation as the main cause of traffic congestion and suggested that Japan should export the latest environmental technologies and promote "environmentally symbiotic urban development by utilizing the knowledge of traffic congestions, air and water pollution."[13] The Japanese government emphasises strategies to solve problems associated with urbanisation by developing infrastructure in an environmentally sustainable way.

[13] Ministry of Land, Infrastructure, Transport and Tourism, "The Action Plan for Overseas Development of Japanese Infrastructure 2019," http://www.mlit.go.jp/report/press/sogo05_hh_000197.html

Japan's Official Development Assistance (ODA) has supported projects in developing countries by promoting Japanese infrastructure exports. The Ministry of Foreign Affairs (MOFA) promotes the ODA policy as a means of international cooperation, and the Japan International Cooperation Agency (JICA) coordinates ODA projects under the jurisdiction of MOFA in three major components: technical cooperation, grants, and loans. In 2018, the expenditure of Japan's ODA was 17,250 million dollars. For example, phase one (15.7km) and phase two (7.8km) of the Jakarta MRT were financed by ODA loans. The construction stages from railroad cars to signal systems were carried out by Japanese companies such as Mitsui Bussan and Sumitomo Corporation. JICA predicts the annual passenger number of the East-West Line will reach 100,000 by 2030 and to 150,000 by 2040.[14] The Japanese government also promotes public-private partnerships (PPP) to mitigate investment risks of private companies for overseas projects. In 2014, the Japan Overseas Infrastructure Investment Corporation for Transport & Urban Development (JOIN) was established by MLIT to promote PPP. Main activities of JOIN are equity investment and technology transfer to infrastructure projects worldwide with private companies to promote the overseas expansion of Japanese infrastructure companies. JOIN has invested in more than 20 overseas infrastructure projects so far, among them, five urban development projects in Jakarta.[15]

6. Potential for Transit Oriented Development in Jakarta

The Japanese government promotes TOD for overseas infrastructure investment. The Infrastructure System Export Strategy stipulates that Japan will promote integrated development projects with new urban development and public transportation by utilising Japan's experience with urban development along railways. The Action Plan for Overseas Development of Japanese Infrastructure in 2019 also emphasised the importance of integrated developments such as TOD. In Jakarta, there are already ongoing projects by Japanese railway companies that have experience with TOD. For example, Mitsubishi Corporation, Nishi-Nippon Railroad, Hanshin Electric Railway, Keikyu Corporation, and JOIN launched a mixed-use urban development project in Bumi Serpong Damai (BSD) City located 25km

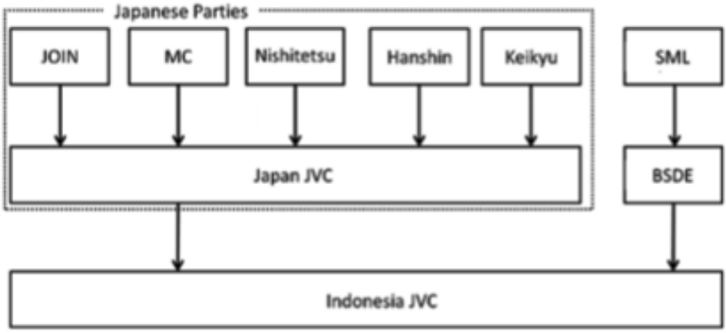
[14] Japan International Cooperation Agency, "Final Report of the JICA Preparatory Survey for Jakarta Mass Rapid Transit East-West Line Project," December 2013.

[15] More details on JOIN's projects can be found at: http://www.join-future.co.jp/english/our-mission/investments.html

southwest of central Jakarta in 2017 (See Figure 5). In response to rising population and housing demand, this project will build about 1,000 landed houses and shop houses within a 19ha greenfield site in the suburb of Jakarta. The investment will be made by the Japanese companies and JOIN into a joint venture company in Japan (Japan JCV), which will co-invest alongside BSDE into a joint venture company in Indonesia (BSDE: PT BSD TBK is an Indonesia-based company affiliated to Sinarmas Land (SML), one of Indonesia's largest real estate enterprises).

Figure 5. Mixed-use urban development project in Bumi Serpong Damai (BSD) City

Project Organisation



Project Outline

Land Area	Approx. 19 hectares
Number of Units	Approx. 1,000 units comprised of landed houses and shop houses
Total Investment Commitment by Japan JVC	Up to Approx. JPY 10 billion (Inclusive of up to JPY 3.4 billion by JOIN)

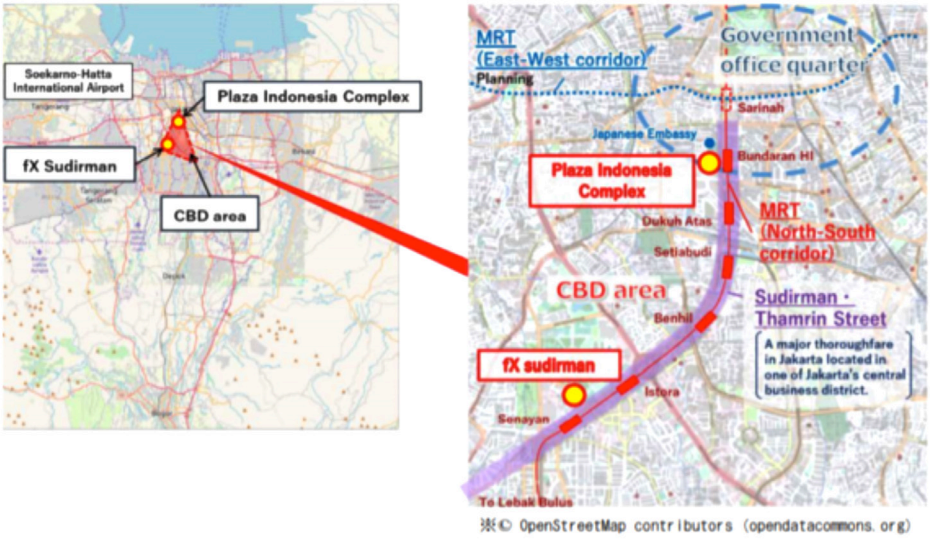
Project Image

Source: JOIN, "JOIN Supports the Mixed-use Urban Development Project in the suburb of Jakarta," October 2016.

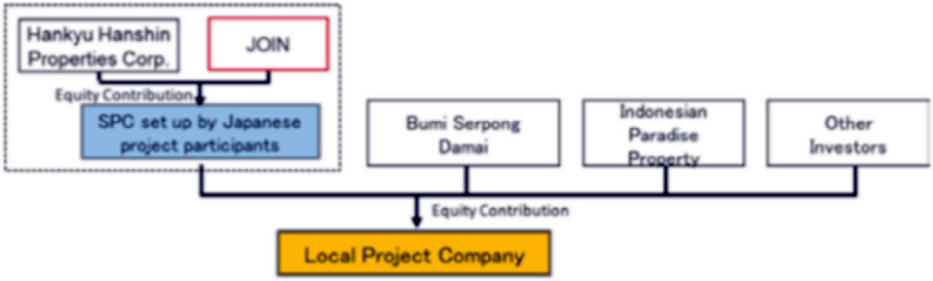
Since June 2019, Hankyu Hanshin Property and JOIN (The Japanese consortium) have participated in the urban redevelopment project in the central business district of Jakarta (Plaza Indonesia Project) involving Jakarta's landmark buildings: The Plaza Indonesia Complex and fX Sudirman shopping mall (See Figure 6). The project is a brownfield project aiming to improve the connectivity of the buildings to the adjacent new stations of the Jakarta MRT North-South Line. Specifically, the plan is to build air corridors between buildings and develop underground streets to connect the buildings to the new station. The Japanese consortium will participate in the operation and management of the Plaza Indonesia Complex and fX Sudirman shopping mall by utilising Hankyu Hanshin group's expertise in urban redevelopment

of brownfield sites in Japan. For example, the company has redeveloped container yards and an old freight station under the Umekita Project by building new office and residential buildings connecting to Osaka Station and other buildings, as well as creating public spaces such as parks.

Figure 6. The Plaza Indonesia Project



Project Scheme

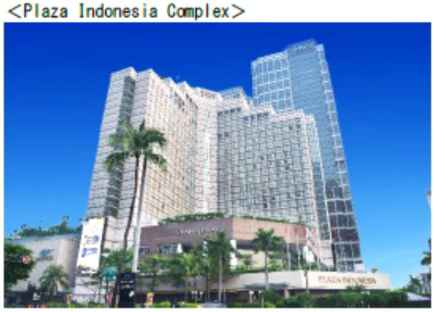


Project Summary

Usage	Plaza Indonesia Complex, fX Sudirman
Site Area	Approx. 6 ha
Total Floor Area	Approx. 280,000 m^2

Project Facilities

<Plaza Indonesia Complex>



Lower Middle : Plaza Indonesia Shopping Center
Middle : Grand Hyatt Jakarta Hotel
Back Right : The Plaza Office

<fx Sudirman>

Source: JOIN, "JOIN Supports the Urban Development Project - Plaza Indonesia Project - in the center of Jakarta," July 2019.

The two projects (BSD City and The Plaza Indonesia) are in line with TOD-related polices of the Indonesian government. For example, the Metropolitan Priority Area Master Plan, which was approved in 2012 by the Indonesian government and Japanese government, prioritises MRT-based new urban transport systems including station plaza development.[16] The Jabodetabek (Jakarta metropolitan area) Urban Transportation Policy Integration (JUTPI) Phase Two - a technical cooperation between the Indonesian government and Japanese government - is considering TOD projects. One of the aims of this project is to enhance the capacity of urban transportation related agencies to implement TOD projects. This shows the interests of the Indonesian government in collaborating with Japan to incorporate the TOD concept into the Jabodetabek.

Many ongoing urban development projects in the Jakarta metropolitan area are mixed-use developments with shopping centers, residentials, and office buildings. These projects are usually along highways and lack the link to public transportation. The experience of Tokyo shows that expanding the railway network is not enough to solve traffic congestion in metropolitan areas such as Jakarta. Jakarta's large suburban population indicates a potentially large demand for commute to the city by railways such as the MRT and LRT. Facilitating a modal shift from vehicles to railways will ease traffic congestion

[16] Japan International Cooperation Agency, "Jabodetabek Metropolitan Priority Area (MPA), 3rd Steering Committee,"
https://www.jica.go.jp/french/news/press/c8h0vm00001ner7c-att/121009_01.pdf

and air pollution. To enable the modal shift, however, it is necessary to redevelop new towns around suburban stations and give residents seamless access to the railway network.

7. Conclusion

Japan needs to differentiate the way of overseas infrastructure investment from competitors in order to promote the overseas expansion of Japanese companies. TOD can be advantageous for Japanese companies as they have accumulated experience and knowledge of urban development along railways since the 1960s. The Tokyo metropolitan area has the highest modal share of railways amongst major metropolitan areas in the world. Therefore, the way of urban development along the railways in Tokyo is a useful experience for developing countries aiming to expand their network of public transportation.

The Japanese government is promoting TOD in the Infrastructure System Export Strategy and the Action Plan for Overseas Development of Japanese Infrastructure. The MPA Master Plan and the JUTPI in Jakarta are examples of Japanese involvement using TOD. The experience of Tokyo suggests that TOD is essential for solving problems associated with urbanisation such as traffic congestions and air pollution as well as for sustainable development of metropolitan areas such as Jakarta. To this end, the planned expansion of the railway network needs to be combined with urban development along the railways to give residents seamless access to rail stations, enabling a modal shift from vehicles to public transport.

About the Authors

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Mr **Shunta Hayashi** is a Director for Policy Planning and Coordination at the Ministry of Land, Infrastructure, Transport and Tourism, Japan. Previously, he was involved in planning the strategy of overseas infrastructure investment at the International Policy Division, Policy Bureau. He obtained his Bachelor of Law in 2015 from the University of Tokyo. He was a Visiting Associate at RSIS from October 2019 to March 2020.

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