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JTTRI International Seminar on Railway and Area  
Development in Jakarta

一般財団法人運輸総合研究所

ジャカルタにおける鉄道整備と沿線開発に関する国際セミナー

# Railway and Area Development

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武藤 雅威

# Profile

## Masai MUTO

- 1989 M.Eng., Department of Civil Engineering, Tokyo University of Science
- 1989 R&D of Superconducting Maglev Train System, Railway Technical Research Institute
- 2001 D.Eng., Department of Civil Engineering, Tokyo University of Science
- 2005 Laboratory Head of Transport Planning, Railway Technical Research Institute
- 2013 General Manager, Strategic Research Division Railway Technical Research Institute
- 2010-2019 Part-Time Lecturer, Keio University
- 2013-2018 Visiting Professor, Tokyo University of Science
- 2019 JTTRI, Senior Research Fellow

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JTTRI Future Prospect

# Introduction

## (1) Objectives

- In order to solve problems such as serious traffic congestion caused by rapid population growth ASEAN cities, integration of railway and area development will be proposed based on the local conditions in each cities.

This presentation is one of the research outcomes from:

### “Research Group on Railway and Area Development” sponsored by JTTRI

- Dr. Shigeru Morichi, Professor Emeritus, GRIPS, as a director of this research group
- Collaboration with 18 experts from academic, public and private sectors

## (2) Directions

- Utilizing Japanese expertize and JTTRI long-accumulated know-how
- Case study in Hanoi, Bangkok, Jakarta, and Manila.



# Chapter 1: Challenges in Urban Railway Development

## Four case studies

### ■ Hanoi Metro Line 2 (Phase3)



<https://vietnamfinance.vn/tap-doan-sumitomo-muon-thuc-nhanh-du-an-do-thi-thong-minh-nhat-tan-noi-bai-20180303205654052.htm>

### ■ Bangkok MRT Orange Line



<https://www.mrta-orangelineeast.com/en/train>

### ■ Jakarta MRT North-South Line (Phase2)



<https://news.detik.com/berita/d-4491696/pagi-ini-mrt-jakarta-mulai-berbayar>

### ■ Metro Manila Subway Line 9 (Mega Manila Subway)



You Tube : FILIPINO PROUD CHANNEL

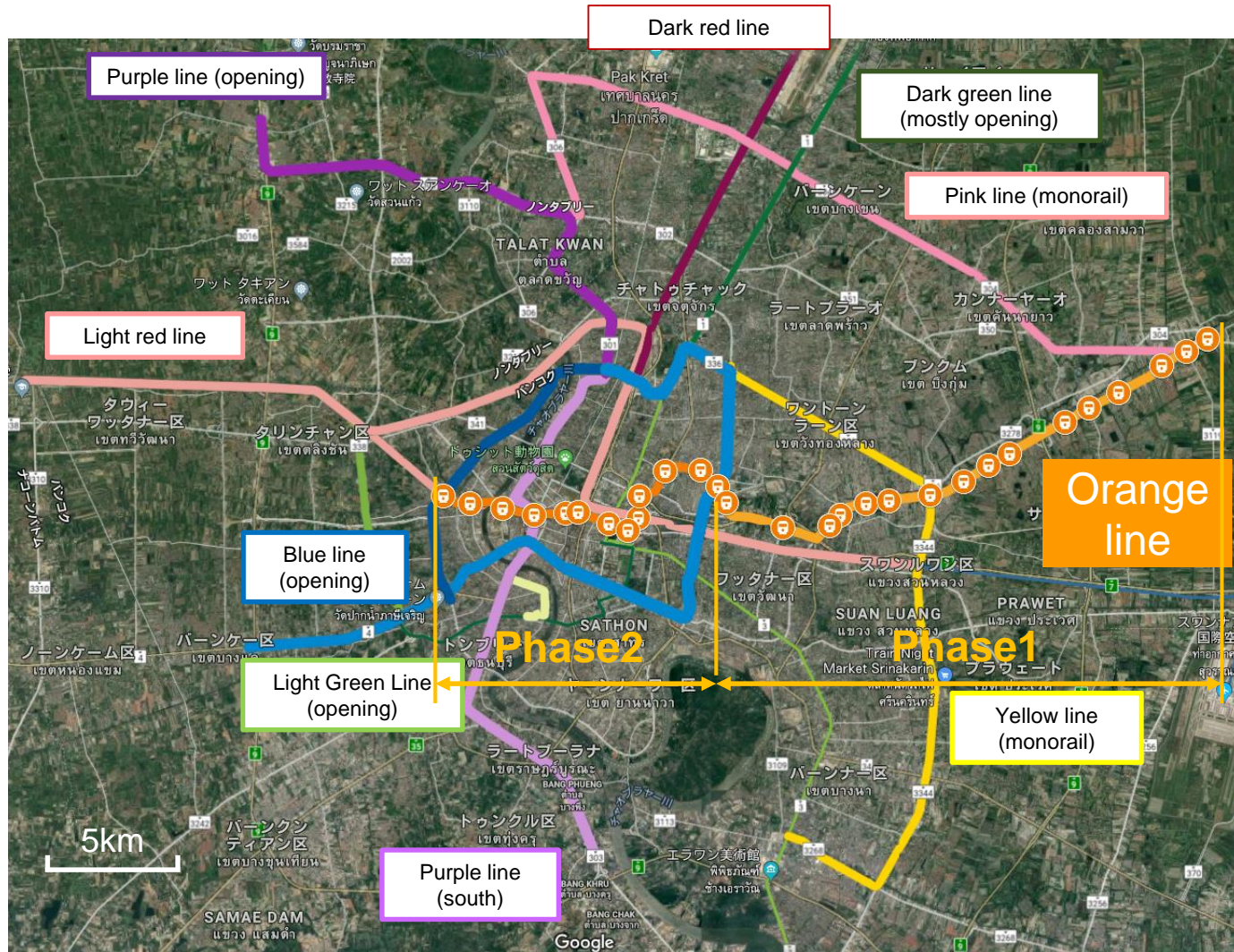
# Hanoi Metro Line 2 (Phase3)



(C) Mr. MUTO Masai, Japan Transport and Tourism Research Institute, 2020

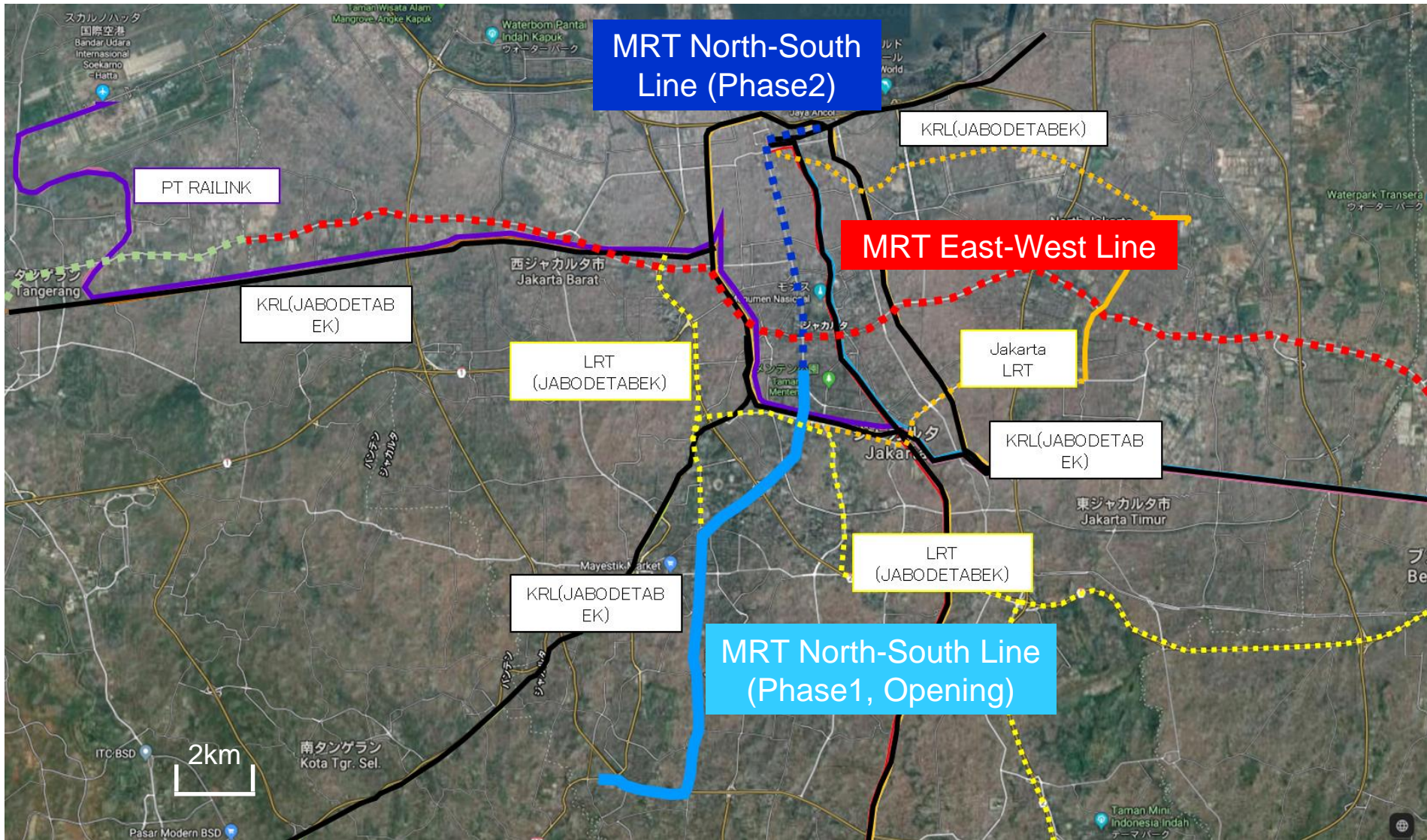


# Bangkok MRT Orange Line





# Jakarta MRT North-South Line (Phase2)





# Metro Manila Subway Line 9



# Challenge 1: Collaboration Between Railways and Area Development

In order to cope with the rapid population increase and rapid urbanization, many housing required. To provide accessibility to those housing, railway development to the new town becomes one of the social issues.

- Prevention of urban sprawl development by private-sector-led PPP (Hanoi)
- Local community development plan have not been well-established (Hanoi, Manila)
- No coordination between Railway PPP and TOD (Jakarta, Manila)
- Concrete policy and procedure for land readjustment for development are not established. (Hanoi, Bangkok)

Further discussion in 2.1

# Challenge 2: Securing Financial Resources for Railway Development

Due to government financial constraint, recent urban railway investments are usually relying too much on PPP.

- Due to limitation in tax-based budget, measures to utilize private funds are under consideration in the case of Jakarta
- Property tax system is not well-functioning (Bangkok, Jakarta, Manila)
- The suitable role for the private and the government in PPP is not clearly determined (Hanoi, Bangkok)

Further discussion in 2.2

# Challenge 3: Providing a High-Quality Railway System

The system of the railway which has been introduced does not meet the user demand

- Formulation of integrated railway and area development master plan (Hanoi)
- Overlapping route plans (Jakarta)
- Heavy Congestion in Low-capacity MRT3 (Manila)
- No organization to supervise multiple projects, including LRTs and subway (Manila)

Further discussion in 2.3



# Challenge 4: Integration of Railway Development with Social Infrastructure

The required railway-related infrastructures, such as station plaza, are not in consideration

- Infrastructure investment plans from the government and the private investors are independently developed without coordination (Manila)
- The construction of rail (LRT1, MRT3, MRT7) and bus transfer terminals at North Avenue is delayed due to legal conflict (Manila)

Further discussion in 2.4

# Challenge 5: Creating a Sustainable Urban Railway System

Loss and bankruptcy of railway companies are one of the most common issues in Asian Countries

- There are many cases of PPP failure in Asian urban railway projects.
- Lack of expertise in railway operations

Further discussion in 2.5

# **Chapter 2 Examination Items for Railway Development**

**2.1 Collaboration Between Railways and Area Development**

**2.2 Securing Financial Resources for Railway Development**

**2.3 Providing a High-Quality Railway System**

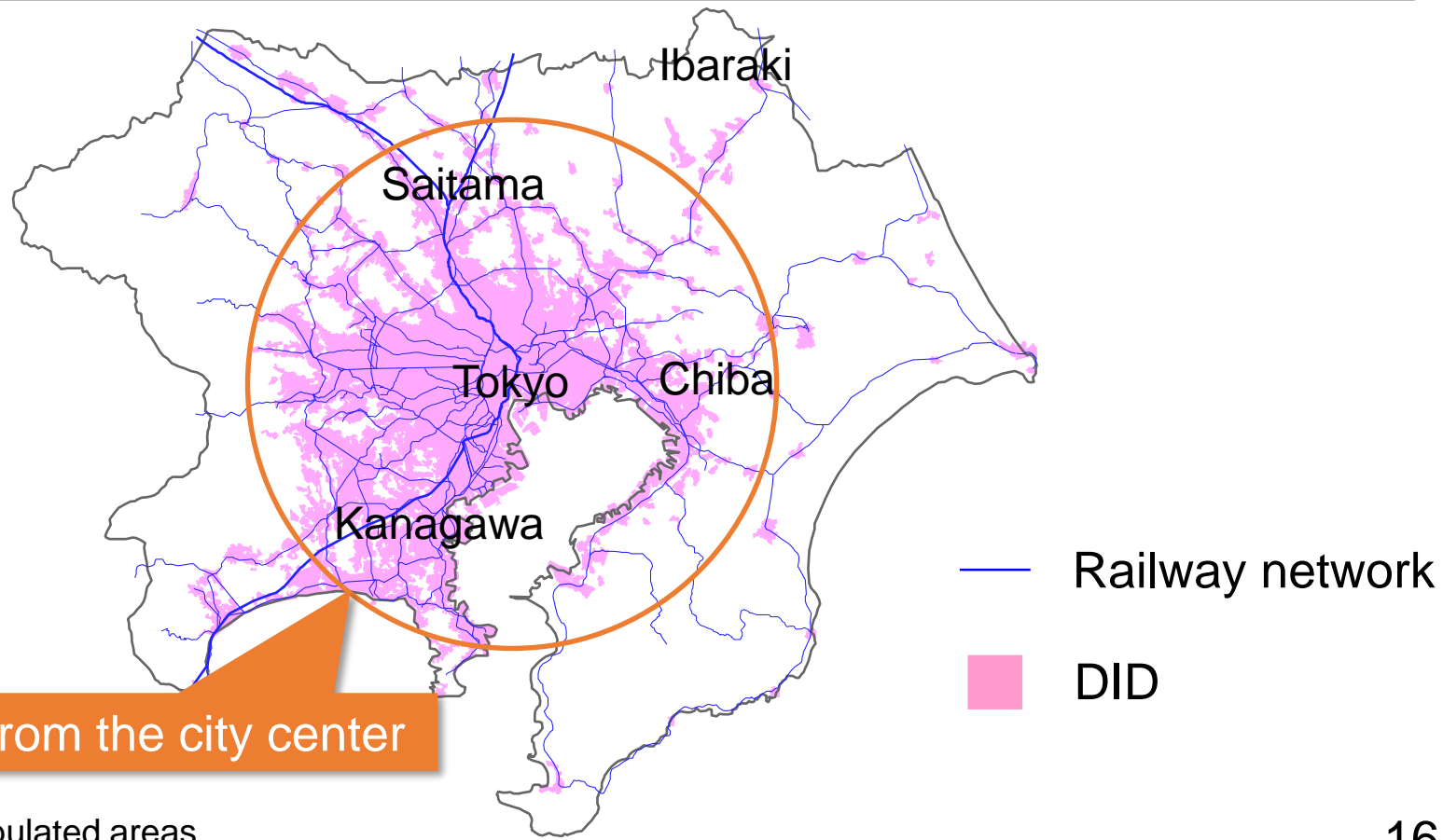
**2.4 Integration of Railway Development with Social Infrastructure**

**2.5 Creating a Sustainable Urban Railway System**

# 2.1 Collaboration Between Railways and Area Development

## Railway-Oriented High-Density Urban Development

The Tokyo metropolitan is developed by extend DID area to suburban along the railway lines



DIDs: densely populated areas,  
Defined by an area of density of 4,000 people/km<sup>2</sup> or more, or a basic unit blocks with population of 5,000 or more



# TOD

## **TOD (Transit Oriented Development) = Public Transportation-Oriented Developments**

Urban development which aims to promote public transit, not to increase automobile dependency

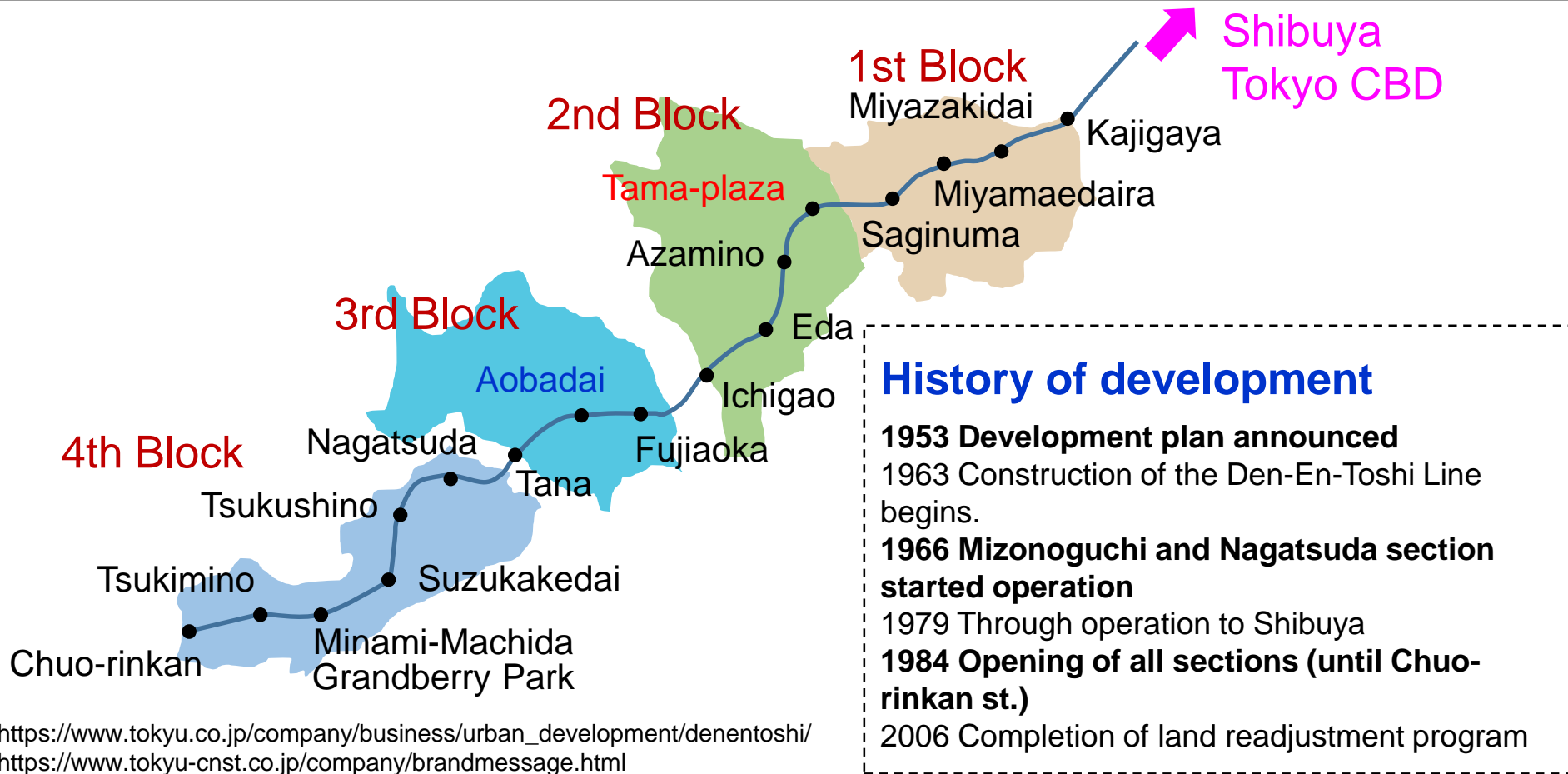


# Example of TOD in Japan

## TOD along Den-En-Toshi (Garden City) Line:

Integrated railway (Den-En-Toshi Line) and land development (with land readjustment program), taken by only one developer, Tokyu Railway.

- Total area  $\approx$  5,000ha, Population  $\approx$  620,000 (March 2017)
- The largest private land development project in Japan



[https://www.tokyu.co.jp/company/business/urban\\_development/denentoshi/](https://www.tokyu.co.jp/company/business/urban_development/denentoshi/)  
<https://www.tokyu-cnst.co.jp/company/brandmessage.html>



# Den-En-Toshi Line, near Aobadai Station, 1965

One year before opening



Aobadai st.

Fujigaoka st.

Ohyama Road

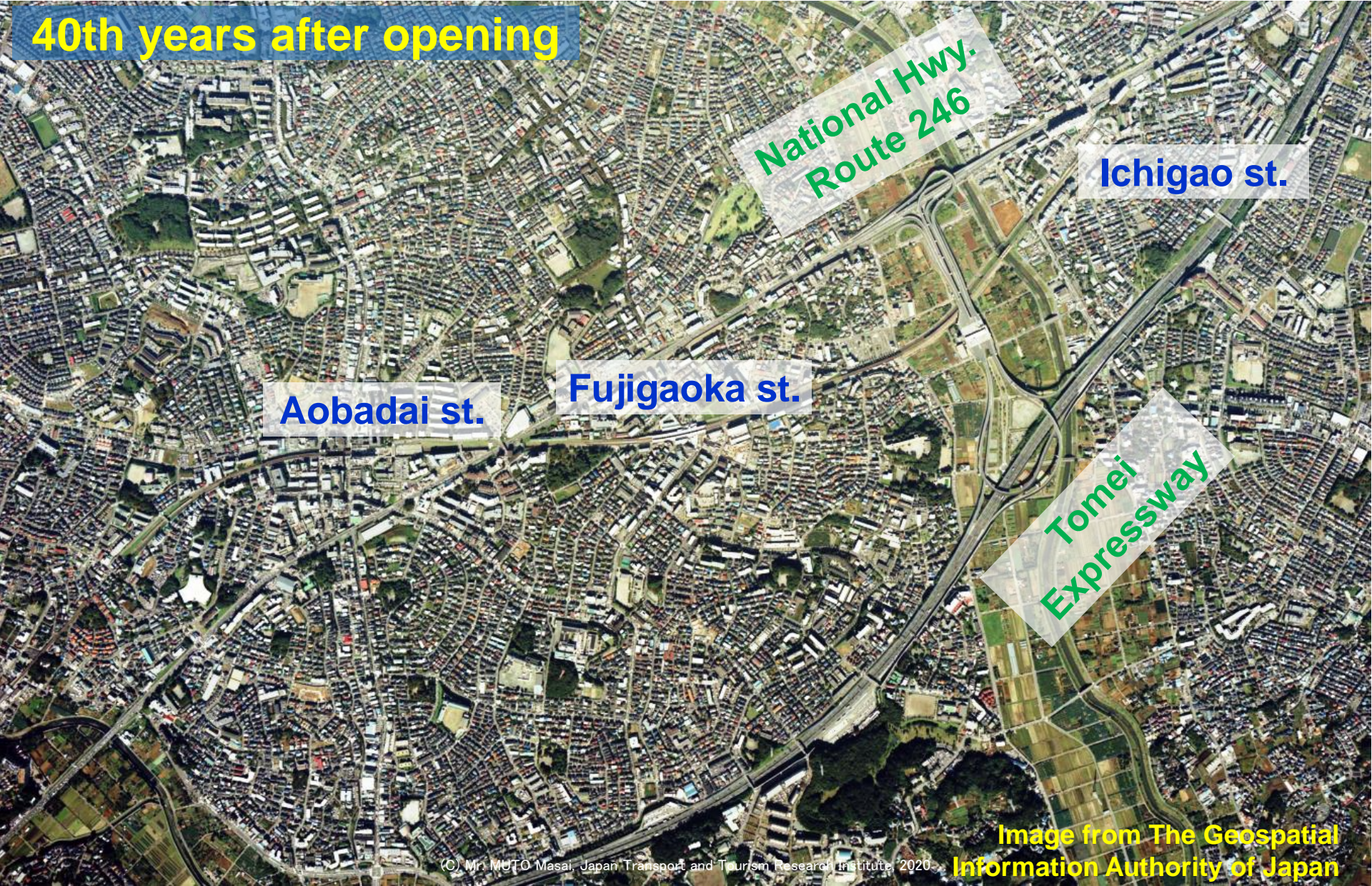
Ichigao st.

Image from The Geospatial Information Authority of Japan



# Den-En-Toshi Line, near Aobadai Station, 2005

40th years after opening

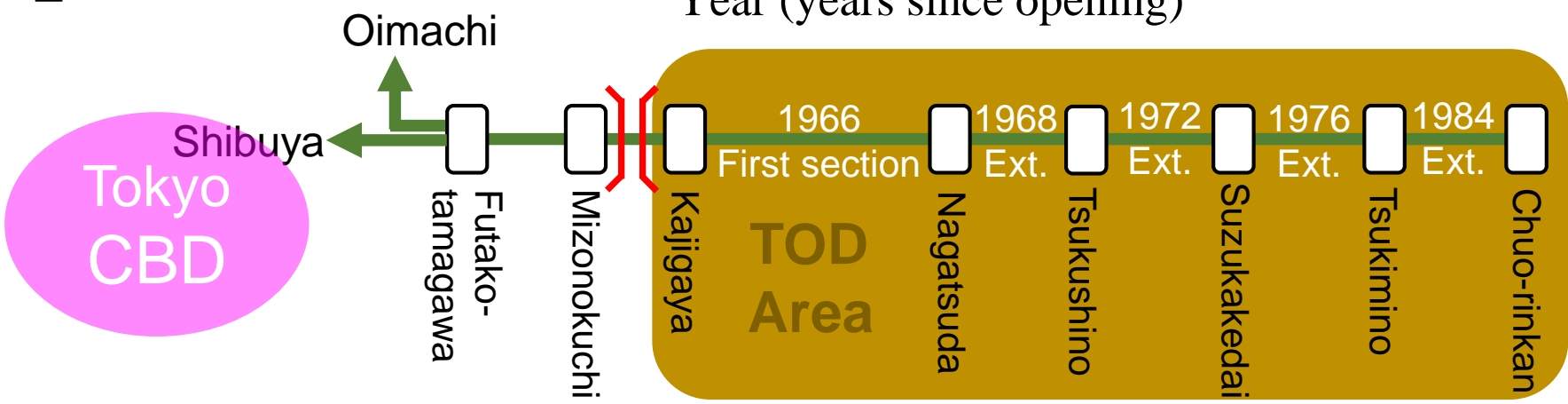
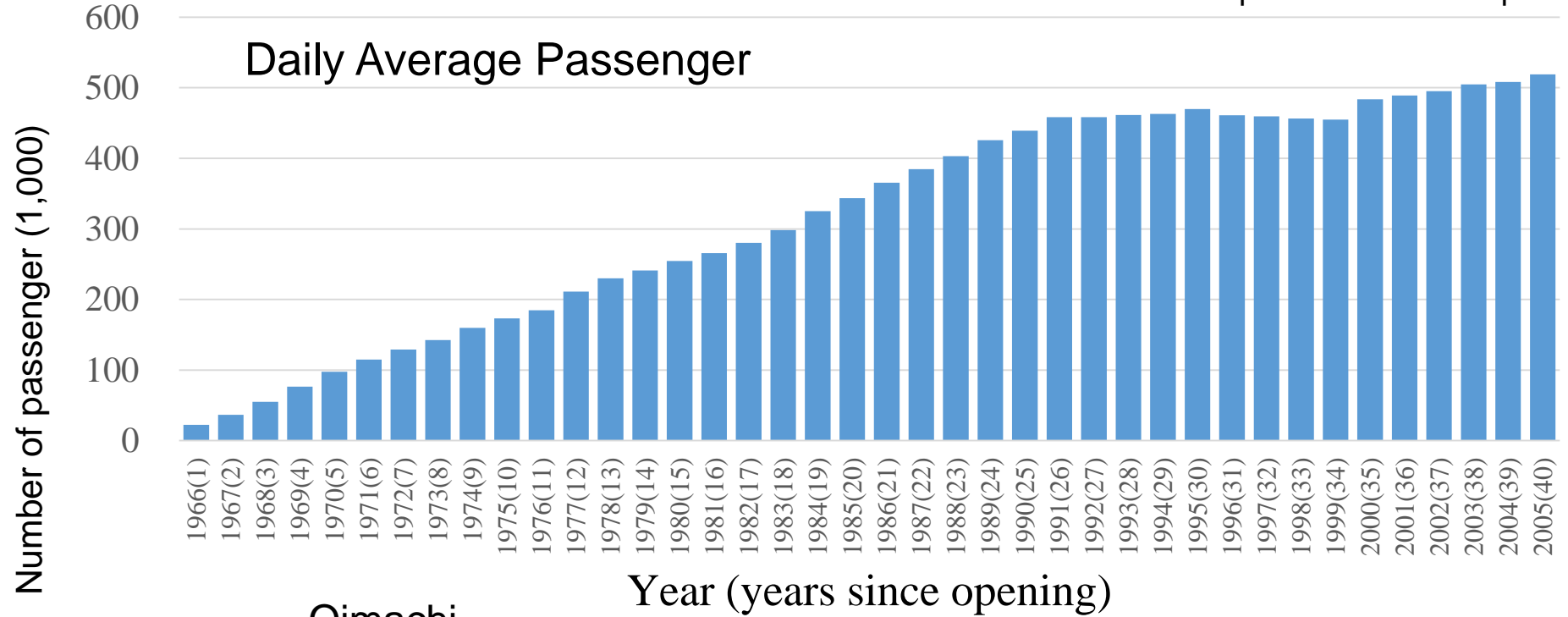




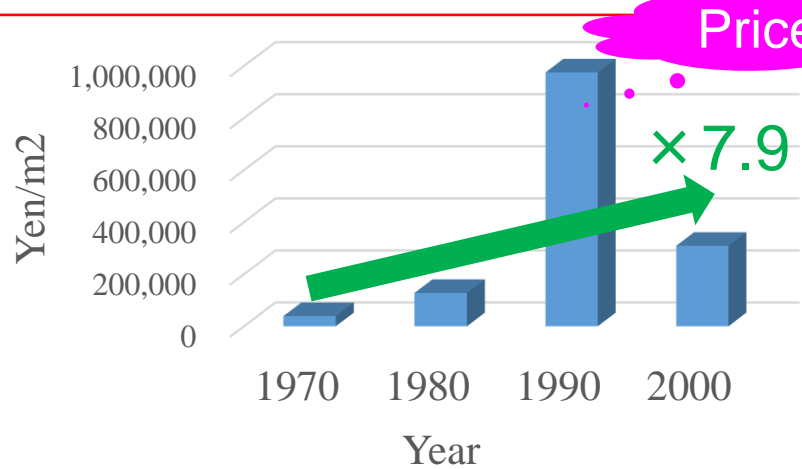
# Number of Users in Den-En-Toshi Line

## Kajigaya st. - Mizonoguchi st. Section

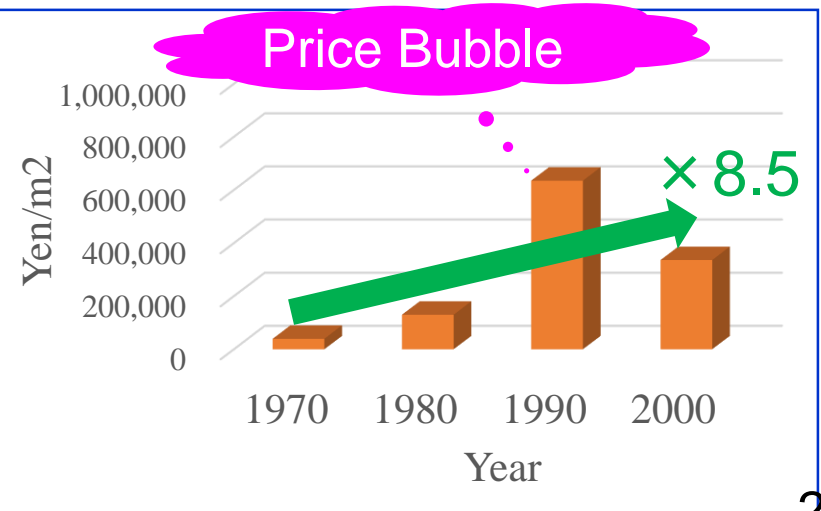
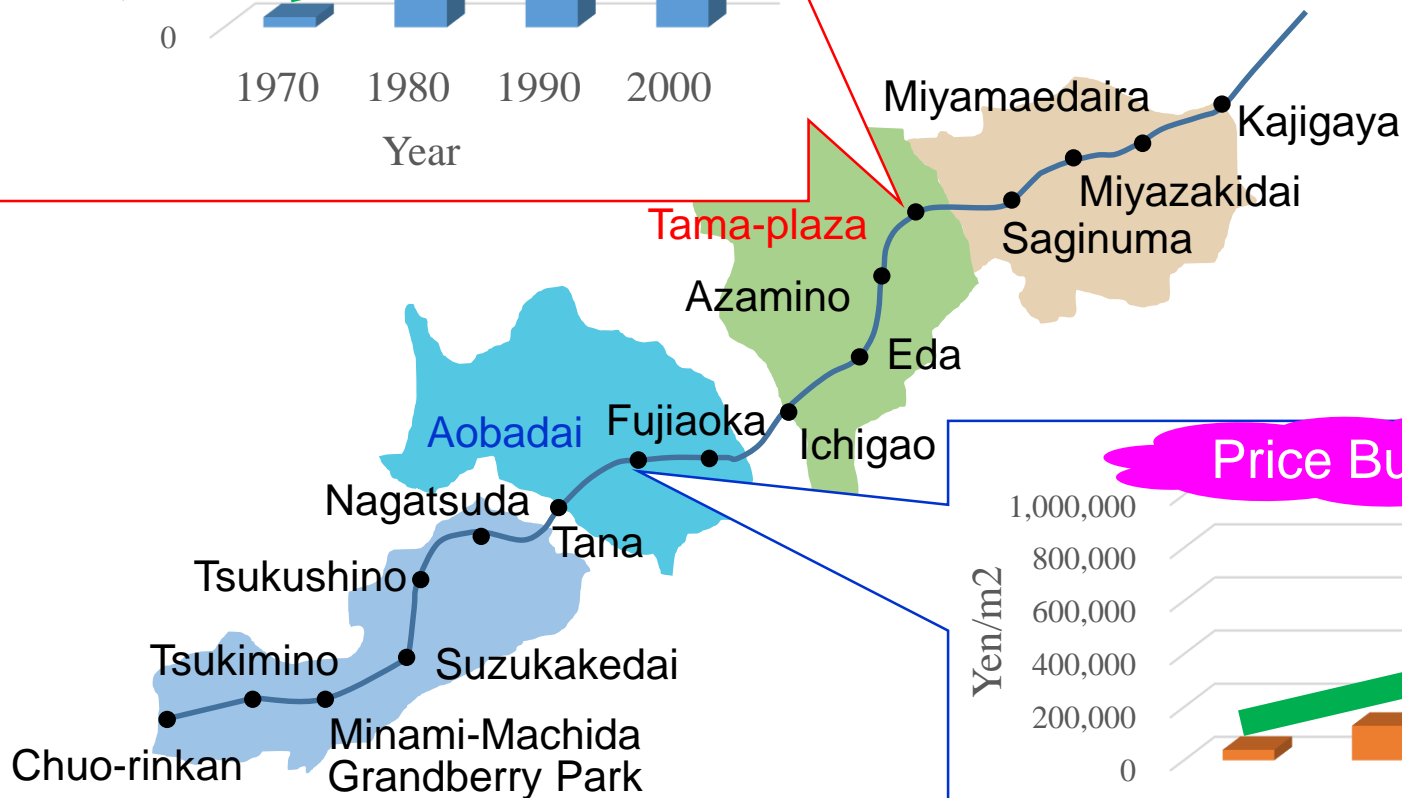
Based on the urban transportation annual report



# Land Prices Increase along Den-En-Toshi Line



Changes in residential land prices around stations



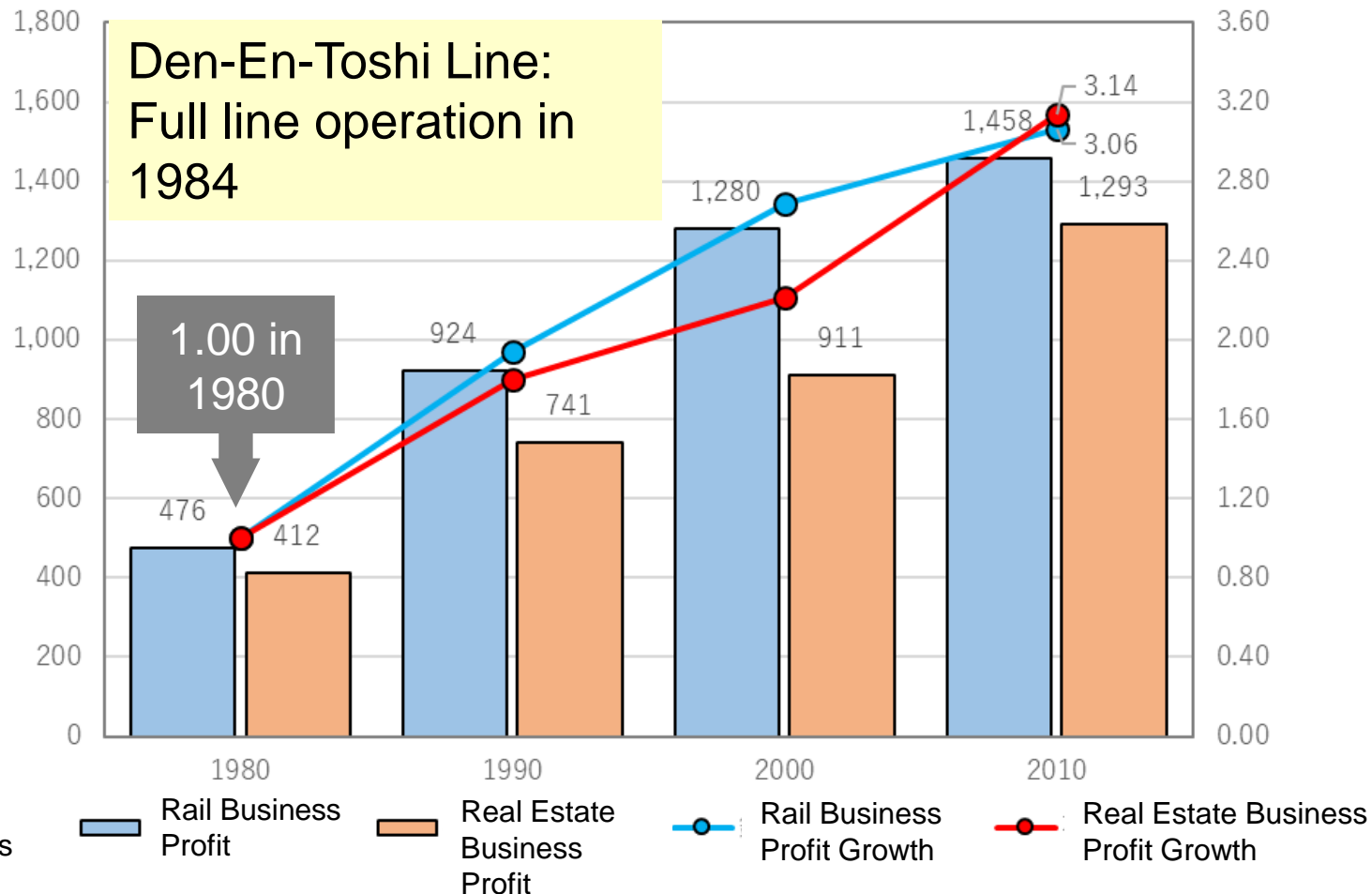
Based on the public assessed value from MLIT

# Shares of railway business and real estate business

## Profit from railway and real estate business of the Tokyu Railway

As railway and land development along railway are progressing, profit from the railway and real estate industries are also increasing.

Unit: 100 million yen/year



Source: Annual Railway Statistics Report

# Background of successful TOD along Den-En-Toshi Line

**Residential area development along railway line →  
Increase in railway demand → Increase in land price**

- **During the high-economic growth period in Japan**

**Rising in income level, Widespread of housing loan systems (from public financial institution)**

- **Strong promotion of urban development plans**

**Railway company took initiatives in land readjustment program**

**Strategically Promoting Business through Unified Brand Concepts**

**Daily life support and service business for local residents**



Mr. Keita GOTO

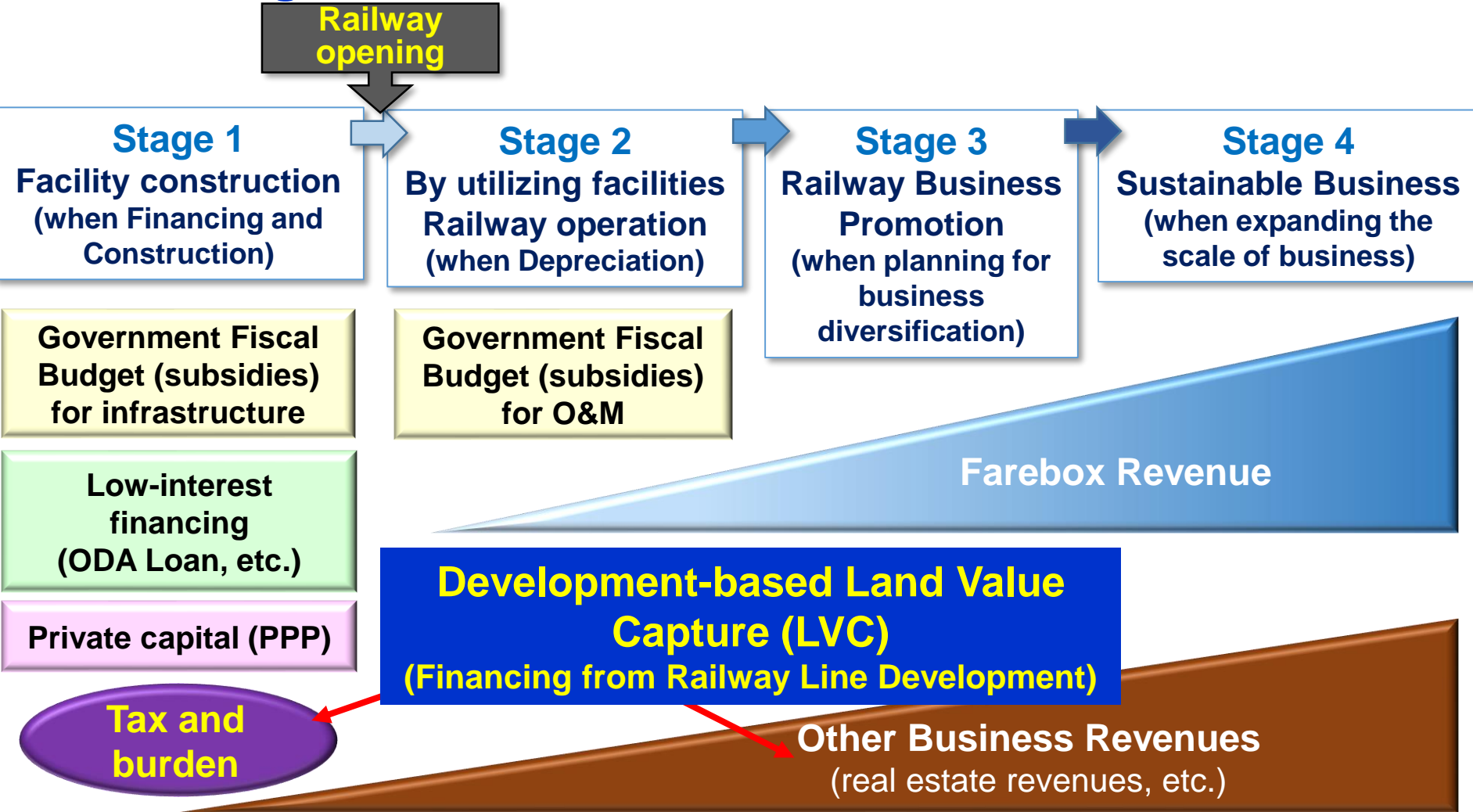
# 2.1 Collaboration Between Railways and Area Development

## ◆ Points to be considered in this section

- Residential area along railway line can be developed by,
  - Implementing land readjustment program
  - With the initiative from railway company
- As a result,
  - Land price rose
  - Railway demand increase
- This can be one of the a good examples of the Collaboration Between Railways and Area Development

# 2.2 Securing Financial Resources for Railway Development

## Stages in financing from railway construction to long-term management





# Development-based Land Value Capture

## Development-Based Land Value Capture (LVC)

The return of the profitability that will be obtained, or has been obtained by development along railway lines to the railway business



# Development-Based LVC Scheme

## (1) Tax-Based Scheme

Scheme	Contents	Examples
Land & Property Tax	Taxes impose on the value of a land or building. These taxes should be increase based on the development.	(in Japan) Fixed Asset Tax, City Planning Tax, Real Estate Income Tax
User Fee / Beneficiary Charge	Taxes and burdens imposed in advance by central/local government to property owners who will benefit directly from public investment	Beneficiary Charge in Midōsuji Line, <b>Minatomirai 21 Line (Japan)</b> <b>Business Rate Supplement (UK)</b> <b>Development Cost Charge (Canada)</b> <b>Impact Fee (USA)</b>
Financial Measures through Future Tax Increment	Development is funded by municipal/local government loans/bonds. Loans/bonds will be paid by the future increases in tax revenues, such as property tax.	<b>Tax Increment Financing (TIF) (USA)</b>

**Blue: will be further discussed**

Based on Suzuki, H., Murakami, J., Hong, Y. H., & Tamayose, B. (2015). Financing transit-oriented development with land values: Adapting land value capture in developing countries. The World Bank.



# User fee (1)

## Beneficiary Payments Scheme, Japan

A part of Minato Mirai 21 Line construction cost was procured as **a payment from large-scale developers along the line**

### Minato Mirai Line Investment Cost Breakdown

Capital (Mainly from local governments)	27 billion ¥
Beneficiary Payments	74 billion ¥
Japan Railway Construction, Transport and Technology Agency	129 billion ¥
Loans and Borrowings	27 billion ¥
<b>Total</b>	<b>257 billion ¥</b>

(Source: Yokohama City)

Developers: Mitsubishi Estate, Mitsubishi Heavy Industries, Yokohama City, Urban Renaissance Agency (UR), etc.

### Minato Mirai 21 Line

- Construction started in 1992
- opened in 2004
- 4.1km, 6 stations (all underground)



Source: [https://www.mm21railway.co.jp/info/route\\_map.html](https://www.mm21railway.co.jp/info/route_map.html)

# User fee (2)

## Business Rate Supplement (London, UK)

To support the construction of The Crossrail, the Greater London Authority levy the **additional business rate (property tax) for non-residential (commercial) property** rateable value above £70,000 with additional of 2 pences per pound (2%) of rateable value.

- 2008 Crossrail Act enacted, 2009 Business Rates Supplement Act enacted
- Crossrail Total budget of £17.6 billion (\$23.1 billion)
- £6.6 billion (¥870 billion) were raised through Business Rate Supplement

### Route Map Showing rail and air connections



### Crossrail (Elizabeth line from 2021)

- 118km, 41 stations
- Test run scheduled in 2020



<https://www.bbc.com/news/uk-england-london-48054789>, 26 April 2019

<https://www.london.gov.uk/what-we-do/business-and-economy/promoting-london/paying-crossrail-business-rate-supplement>

<http://www.crossrail.co.uk/>

# Development-Based LVC Scheme

## (2) Development-Based Scheme

Method	Contents	Examples
Land sale /leasing	Sale or rental of land or its development rights at the risen value after the public investment or regulatory changes	Rail Plus Property (R+P) program (Hong Kong)
Air right sale	Governments sell development rights extended beyond the limits specified in land use regulations (e.g., <b>FAR</b> ) to raise funds to finance public infrastructure and services.	Tokyo Station Rehabilitation (JP) TDR (USA) CePAC (Brazilian)
Land Readjustment	Through land readjustment, landowners lose some of their land in exchange of the new development. Some acquired lands are sold to finance public infrastructure.	Den-En-Toshi Line, Tsukuba Express Line (JP)
Comprehensive Urban Redevelopment	Landowners and developers establish a collaboration to consolidate fragmented lands to create roads and public spaces. Local government revises land-use regulations in redeveloped area, such as <b>FAR</b> bonus, or provide funding for public projects	Shiodome Redevelopment, Toranomon redevelopment (JP) King Cross Station Redevelopment (UK)

**FAR (Floor area ratio): Ratio of a building's total floor area to the size of the land on which it is built**

**Blue: will be further discussed**

Based on Suzuki, H., Murakami, J., Hong, Y. H., & Tamayose, B. (2015). Financing transit-oriented development with land values: Adapting land value capture in developing countries. The World Bank.

# Air Right Sale (1)

## Hudson Yard Development (New York, USA)

- Redevelopment project in railyard area (≈146ha)
- Other incentives to private developers
  - Subway no.7 extension
  - Provision of new public spaces



Air right sales: **T**ransferrable **D**evelopment **R**ight (**TDR**)

### Yellow: Eastern Rail Yards TDR

Air right purchase from railyard  
Based on TDR, Up to 33.0 FAR can be transferred (mainly commercial area)

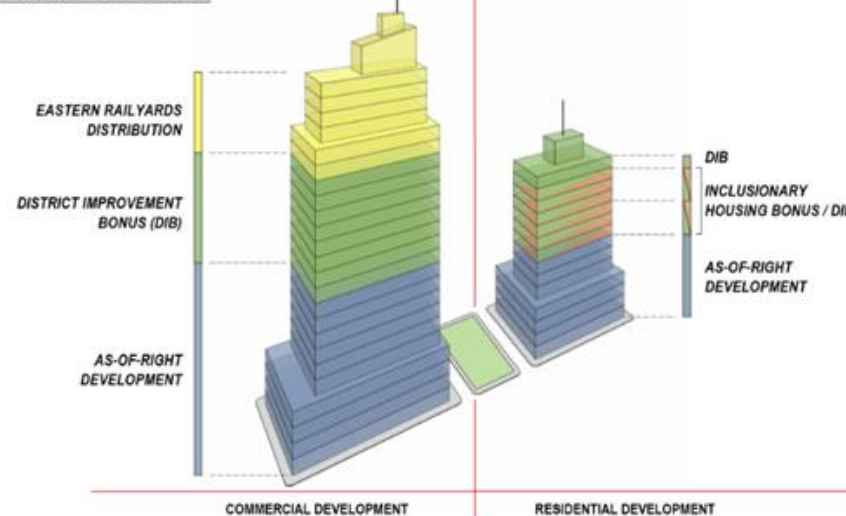
### Green: District Improvement Bonus FAR

Up to 8.0 FAR (800%) can be purchased  
\$100 per ft<sup>2</sup> at the beginning of 2005,  
Increase by inflation, current price = \$134.63

### Blue: Baseline FAR

Land Use & Density

Mechanism to Increase FAR





# Air Right Sale (2)

## CePAC: Certificados de Potencial Adicional de Construção (Certificates of Additional Construction Potential) (Sao Paulo and other cities, Brazil)

Urban development funding procured through the sale for air rights using the FAR transfer system.

- Baseline FAR in Sao Paolo = 100-200%
- If the landowner **wishes to construct the building beyond the baseline FAR, the certificate for an additional building is required.**
- The certificate is traded at the market price at the Sao Paulo Stock Exchange
- The certificate sales goes to Urban Development Fund

### Água Espraiada area

- Purchase at \$1,181 million (February 2013)
- Allocated for transportation infrastructures development, including monorails



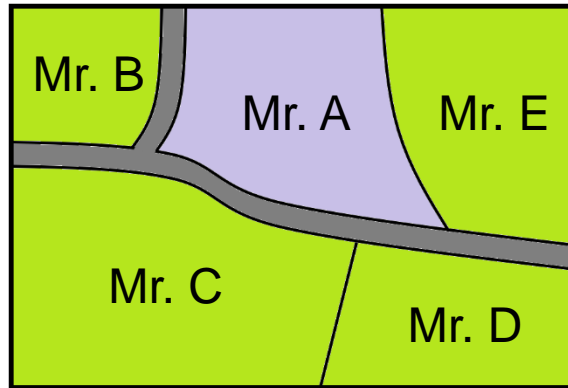
H.Suzuki, et al.; FINANCING TRANSIT-ORIENTED DEVELOPMENT WITH LAND VALUES

<https://parcourresearch.com/case-studies/ouc-agua-espraiada/>

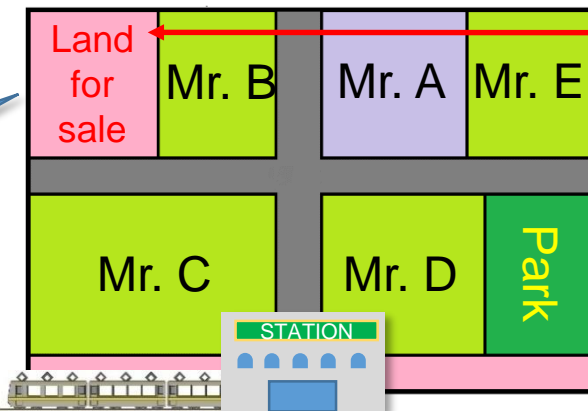
Julie Kim; CePACs and Their Value Capture Viability in the U.S. for Infrastructure Funding, Lincoln Institute of Land Policy Working Paper WP18JK1, 2018.9

# Securing railway ROW through Land Readjustment

Before



After



Fund for railway investment

Mr. A's original land

Readjust based on the data from the MLIT

Mr. A's remaining after readjustment

readjust

Public space (parks, roads, etc.)  
Reserved land (railway land, etc.)

Railway land

Although the amount of land decreases after the readjustment, **landowners have no loss** because their land value will rise from better accessibility

# Tsukuba Express

## Tsukuba Express and Area Development

58.3km, 20 stations, Opened in 2005

Land readjustment 21area, about 3,000ha



# Land Readjustment

## Tsukuba Express and Area Development (along Tokyo Pref. - Ibaraki Pref., Japan)

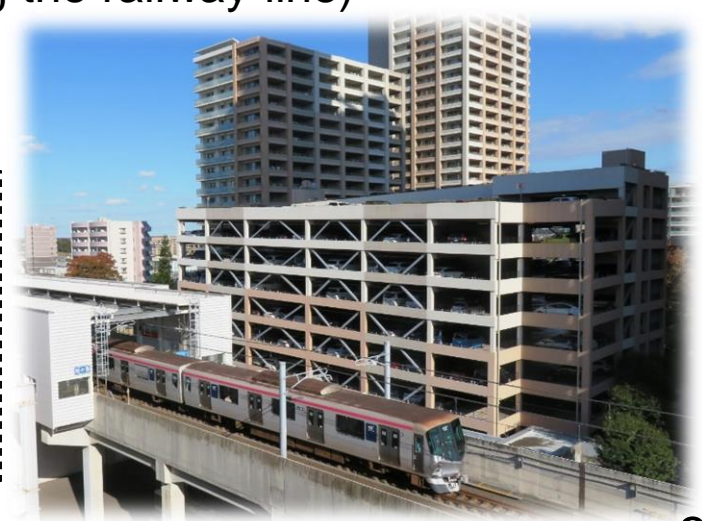
- Integrated planning and implementation of the railway development and land readjustment program through legislation
- In readjustment zone, some land has been acquired in advance so that the land for railway construction can be easily readjusted

### Act on Special Measures concerning Comprehensive Advancement of Housing Development and Railway Construction in Metropolitan Areas (1989)

- Urban development plan based on land readjustment program by public entities (Urban Renaissance Agency, Municipalities along the railway line)
- Increased in population and rail users (rail user, 2006: 195k/day, 2015: 340k/day)

#### Tsukuba Express (Metropolitan Intercity Railway Company)

- Joint capital from local governments along railway lines
- 58.3km, 20 stations
- Opening 2005





# Comprehensive Urban Redevelopment (1)

## Toranomon Redevelopment (Tokyo, Japan)

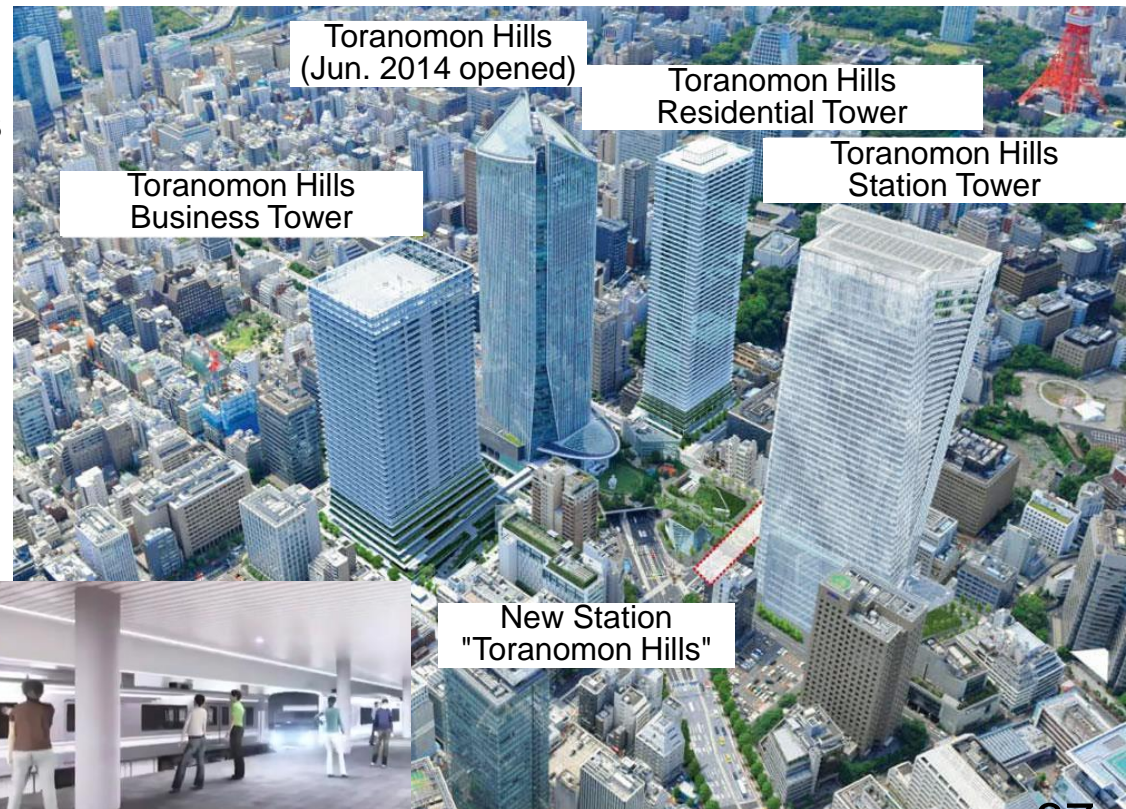
- Incentive to private developers from FAR bonus
- Local government provides the new subway station, as well as the shuttle BRT to Olympic Games venues
- Local disaster prevention functions (support for those who have difficulty returning home, independent-distributed energy systems)

### Redevelopment Summary

- Maximum FAR bonus of 1990%
- Planned as an international business center
- Private investment of about 400 billion yen
- Construction of “Toranomon Hills Station” (Completed in June 2020)



Source: Mori Building



# Comprehensive Urban Redevelopment (2)

## King's Cross Station Redevelopment (London, UK)

A joint development of a rail operator, LCR (London and Continental Railways) and other private companies

- Railway terminal stations redevelopment project in a conjunction with the construction of the High Speed 1 (HS1) (1996)
- LCR and DHL (logistics company) own the land. LCR is granted the real estate development around the station by the government.
- LCR, DHL and other developers jointly established the development company (2008)
- Redevelopment creates 22,100 jobs and 2,000 residents
- From railway operators, LCR has reorganized into property development company

Granary Square

**St. Pancras Station**  
(next to King's Cross)  
Eurostar terminal station



## 2.2 Securing Financial Resources for Railway Development

### ◆ Points to be considered in this section

- In railway business, there is a long gap between investment period and recovery period. In many cases, this gap could be longer than expected.
- To compensate for this, central and local government need to support railway development by grants, subsidies, and non-interest loans.
- From the viewpoint of the central and local government, the benefits are
  - Increase in the property tax income due to increase in land price
  - Accessibility improvement for local residents.
- From the examples of LVC, LVC has been proven to be an effective method to raise funding for the investment during the early stage of railway development.



# 2.3 Providing a High-Quality Railway System

## Characteristics and Functions of Urban Railways in the Tokyo Metropolitan Area (TMA)

- **Availability of railway master plan at the metropolitan area level**

Urban railway master plan in the TMA

- **Availability of mass transit systems with variety in functions**

High-speed rail, express and local trains, subways, monorails, AGT, etc.

- **Through operation**

Direct service between suburban rail and urban subway

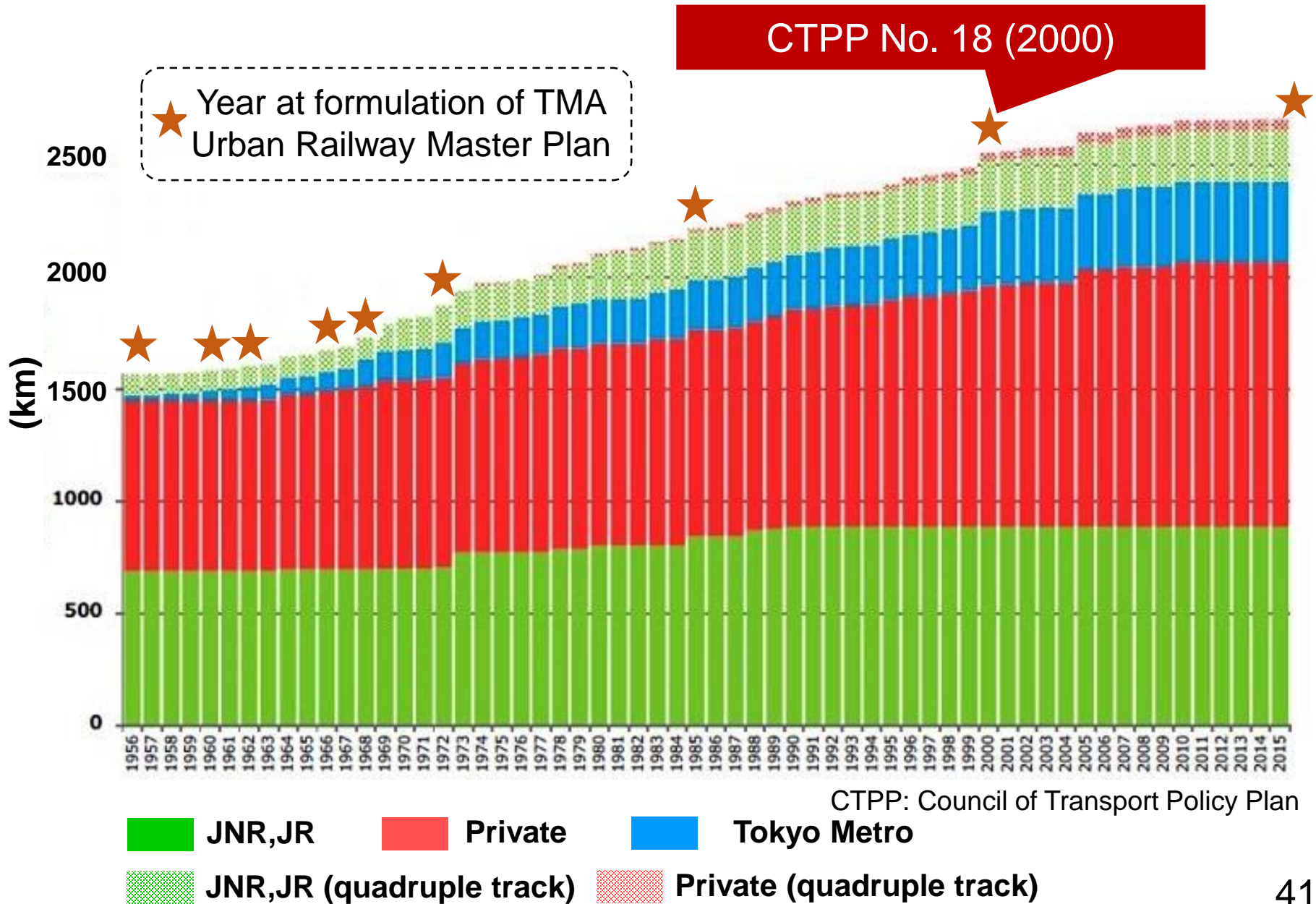
- **High-capacity loop line**

Circulating terminal stations at the edge of urban centers

- **Cooperation between railways and buses**

Bus as a feeder mode

# TMA urban railway network

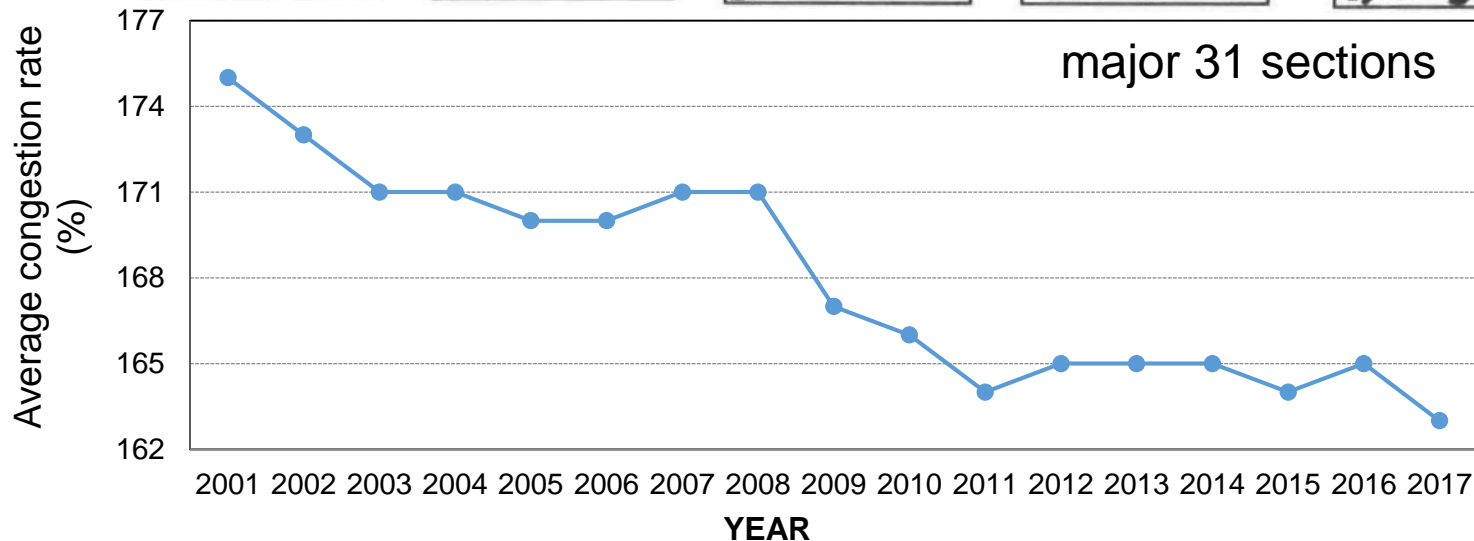
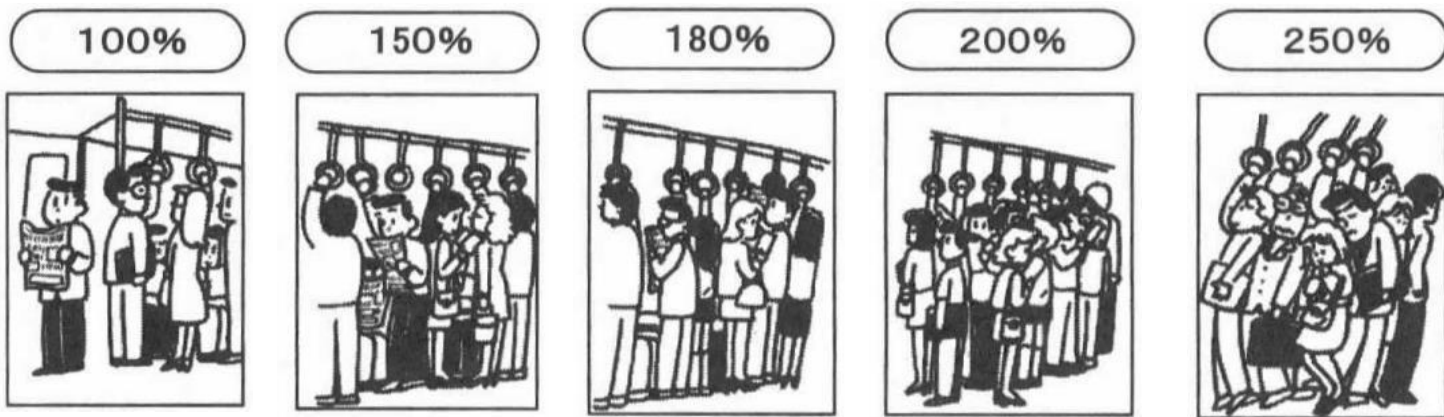


# CTPP No. 18: Highlights (1)

Setting policy issues

## Alleviation of in-train congestion

Targeted peak-hour congestion rate of 150% or less for major 31 sections, and 180% or less for other lines





# CTPP No. 18: Highlights (2)

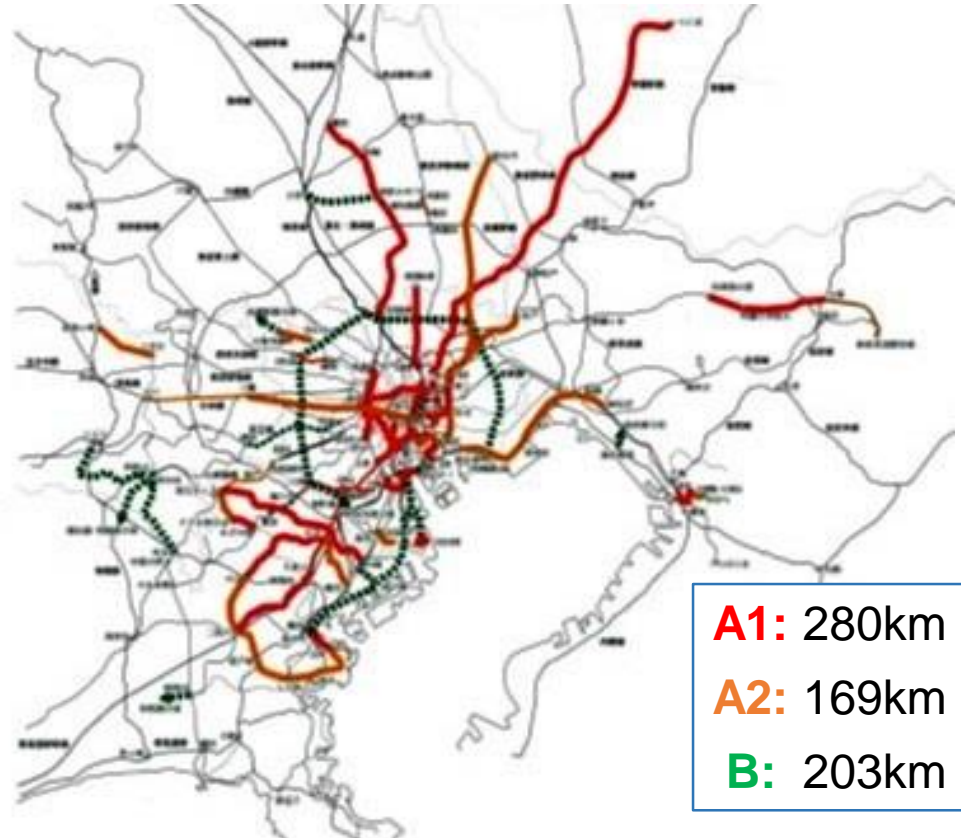
## Investment Priority

**A1**, **A2**, and **B** priority settings

### Priority evaluation criteria

- Demand trend
- Socio-economic impact
- Cost Effectiveness
- Financing (revenue and expenditure)
- Vision of implementing body

↓  
**Overall Score**



[Setting Investment Priority: Target Year = 2015]

**A1:** Routes that are appropriate to be opened by the target year

↳ In 2015, about 80% (223km) of A1 was opened

**A2:** Routes that are appropriate to start construction by the target year

**B:** Routes to be considered (after considering the needs and investment method)

# CTPP No. 18: Highlights (3)

## Legislation to support CTPP No. 18

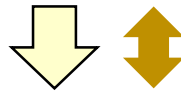
Act on Enhancement of Convenience of Urban Railways, etc. (2005)

Law enacted to support through operation between two (or more) lines

Railway Operator  
(existing railway company)

*Sotetsu  
and JR*

Infrastructure usage fee  
(based on the benefit)



Vertical  
separation

Railway Investment Entity  
(public entity)

*JTRR*

Loan  
Repay



Central  
Gov.  
1/3

Local  
Gov.  
1/3

Loans  
1/3

JTRR: Japan Railway Construction, Transport and Technology Agency

Kanagawa Pref. Construct a new link

Sotetsu

JR-East

to Tokyo CBD

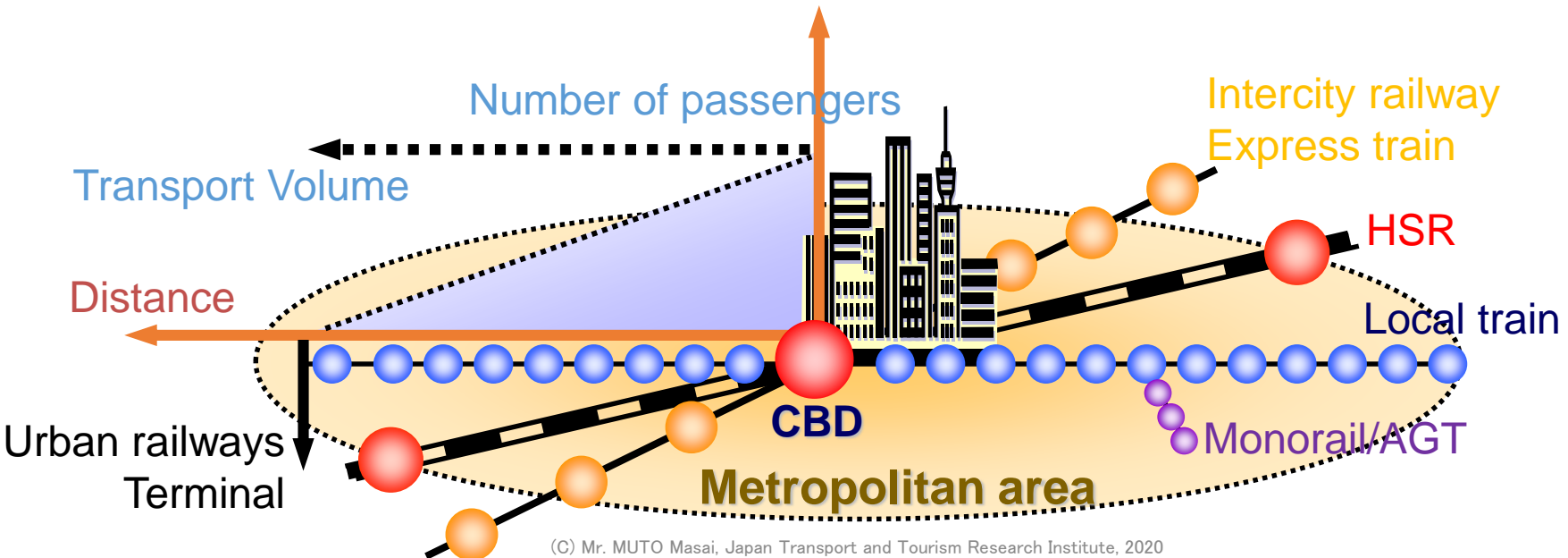
Through Operation

Sotetsu/JR through service line  
opened in November 2019



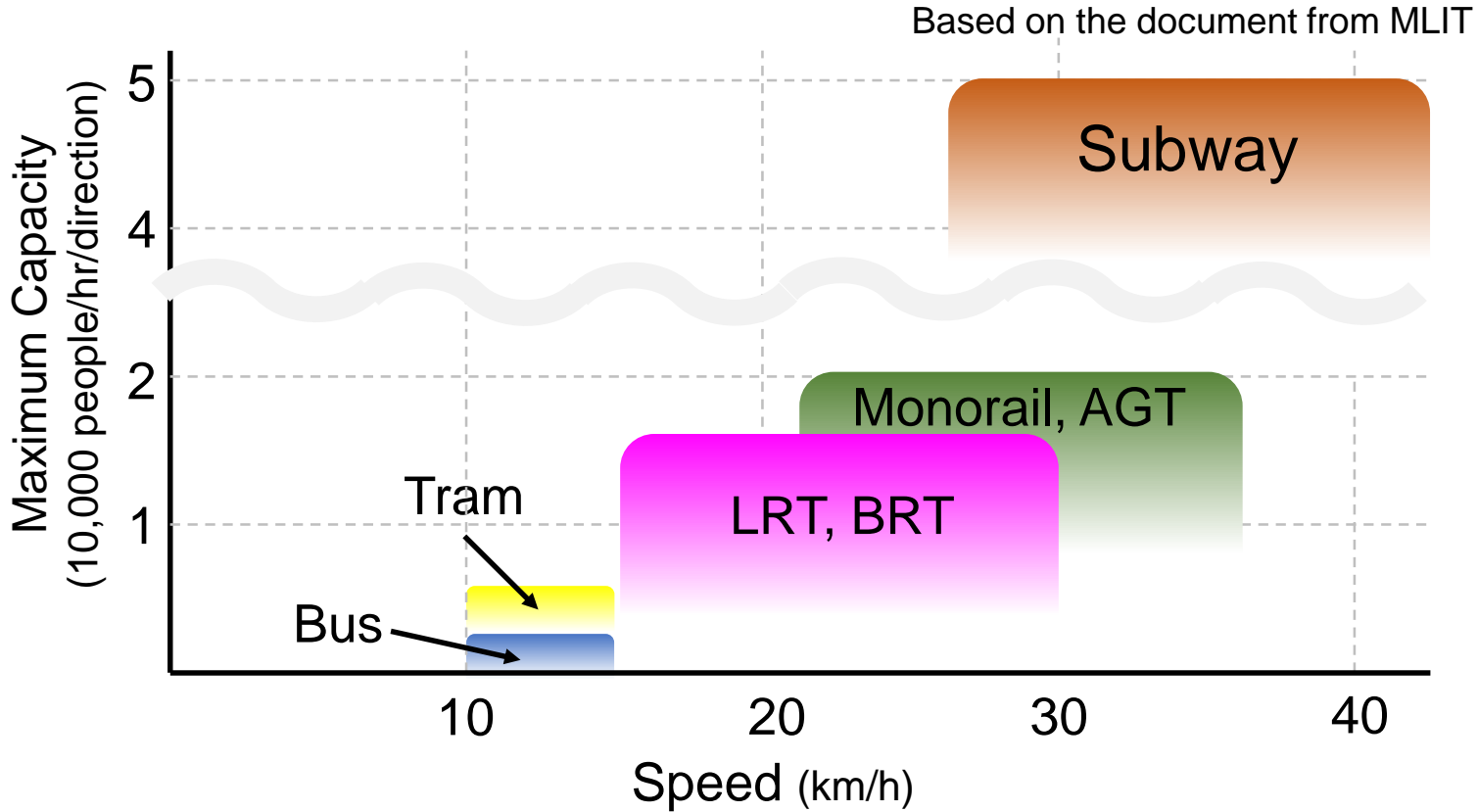
# Hierarchical Urban Railway Network in Tokyo

Type of railway	Distance between stations	Operating speed
Shinkansen (high-speed railway)	30 - 50 km	120 - 130 km /h
Inter-city railway (JR) Express train (private railway)	5 - 6 km	50 - 60 km /h
Local train (private railway)	1 - 2 km	40 - 45 km / h
Subway	0.5 - 1 km	30 - 35 km / h
Monorail/AGT	0.5 - 1 km	20 - 30 km / h



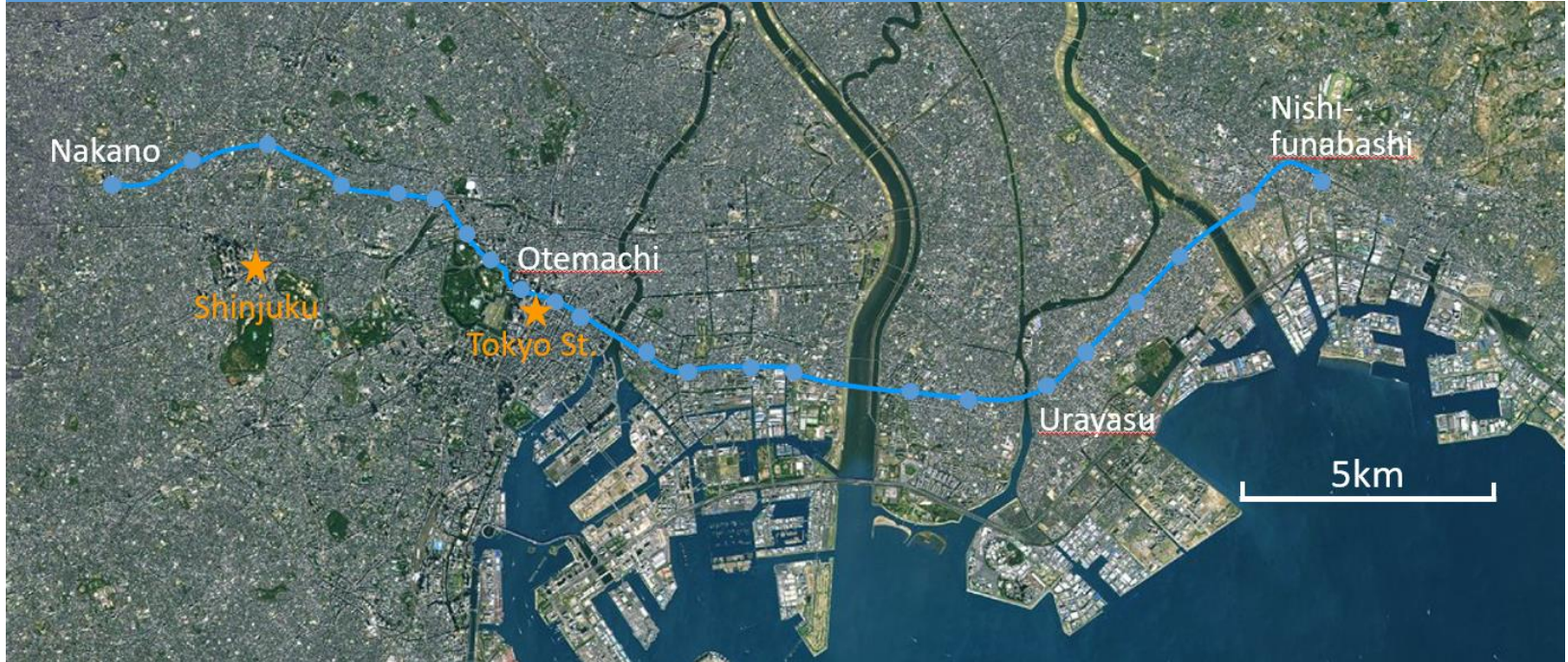


# Mass Transit System by Capacity-Speed Chart



Mass transit systems should be determined based on the future demand and land constraint (location)

# Tokyo Metro Tōzai (East-West) Line (30.8 km)

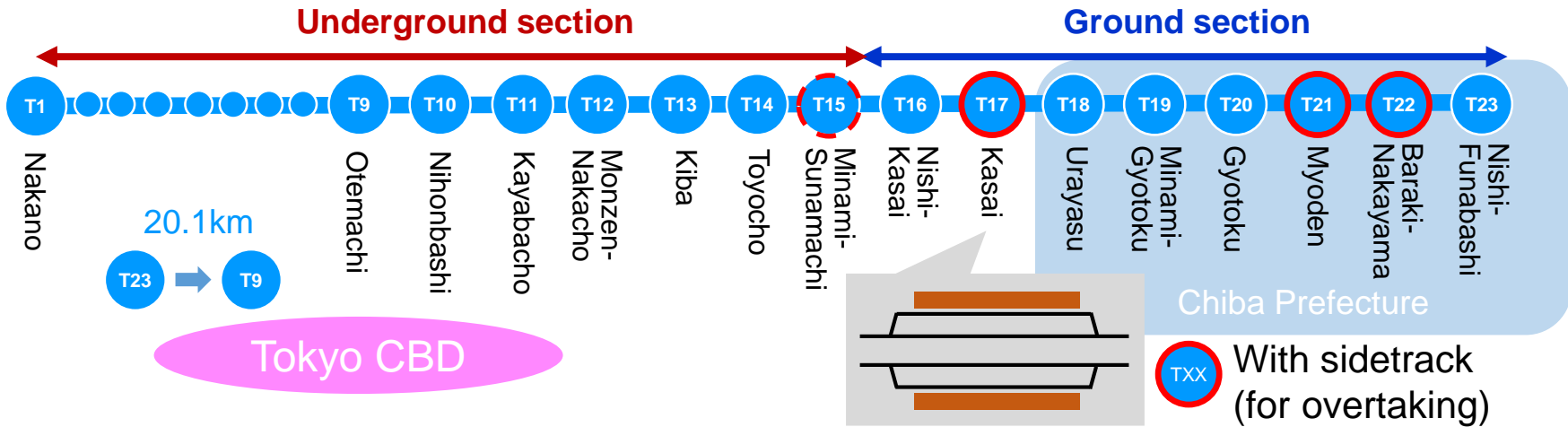


【東西線15000系】 Copyright © Tokyo Metro Co., Ltd. All rights reserved.

# Commuter Line: High Capacity with Express Service

**Tokyo Metro Tōzai Line (East Section)**  
High capacity operation with rapid service

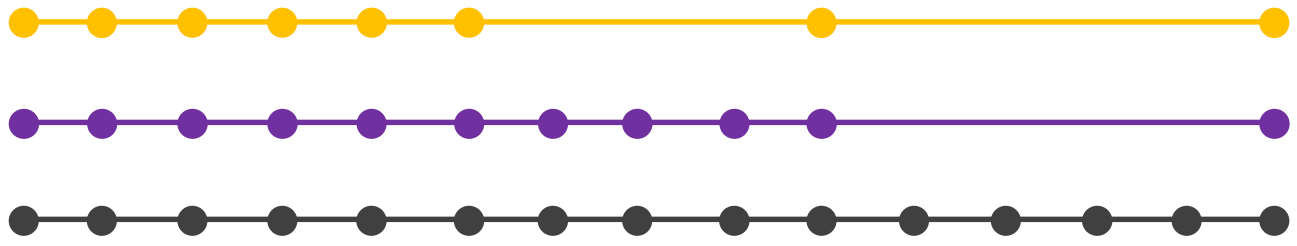
10-car train  
Inbound peak hour headway:  
7:00-7:59 = 19 trains



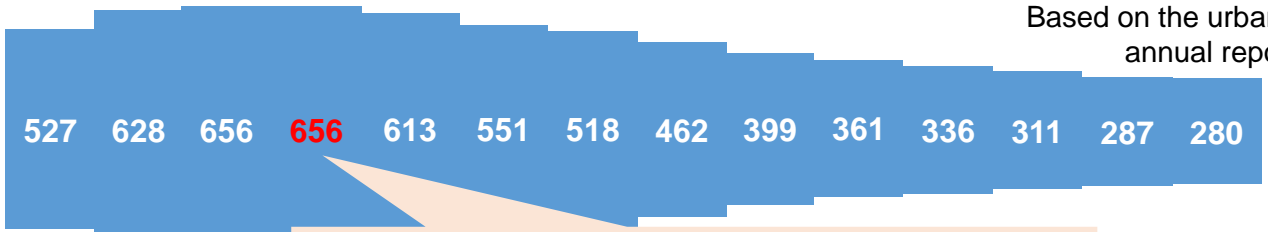
Rapid Service  
(23~26min.)

Commuter Rapid  
(29~36min.)

Local  
(31~43min.)



Sectional volume  
(round trip: thousand people/day)



**Highest congested section in the TMA**

Based on the urban transportation annual report 2013



# Through Operation

As tracks from different railway company are connected, trains from any company can serve through another company's track without stopping

## ◆ Advantages

[For users]

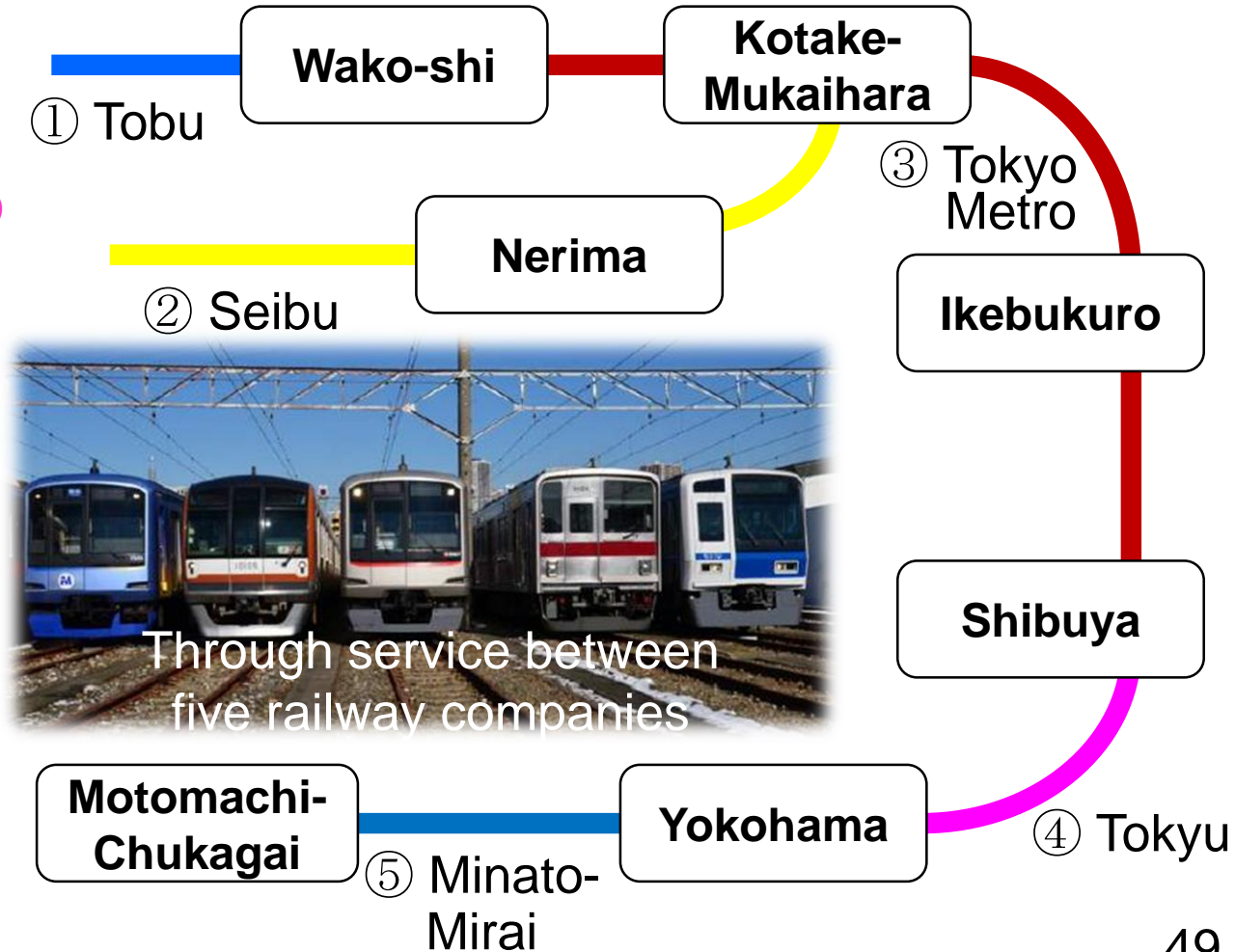
- Transfer is no required
- Faster travel to/from CBD

[For the operator]

- Increase in demand
- Smaller transfer stations (less platform)
- Encourage development along railway lines
- Train depots can be built in less populated area

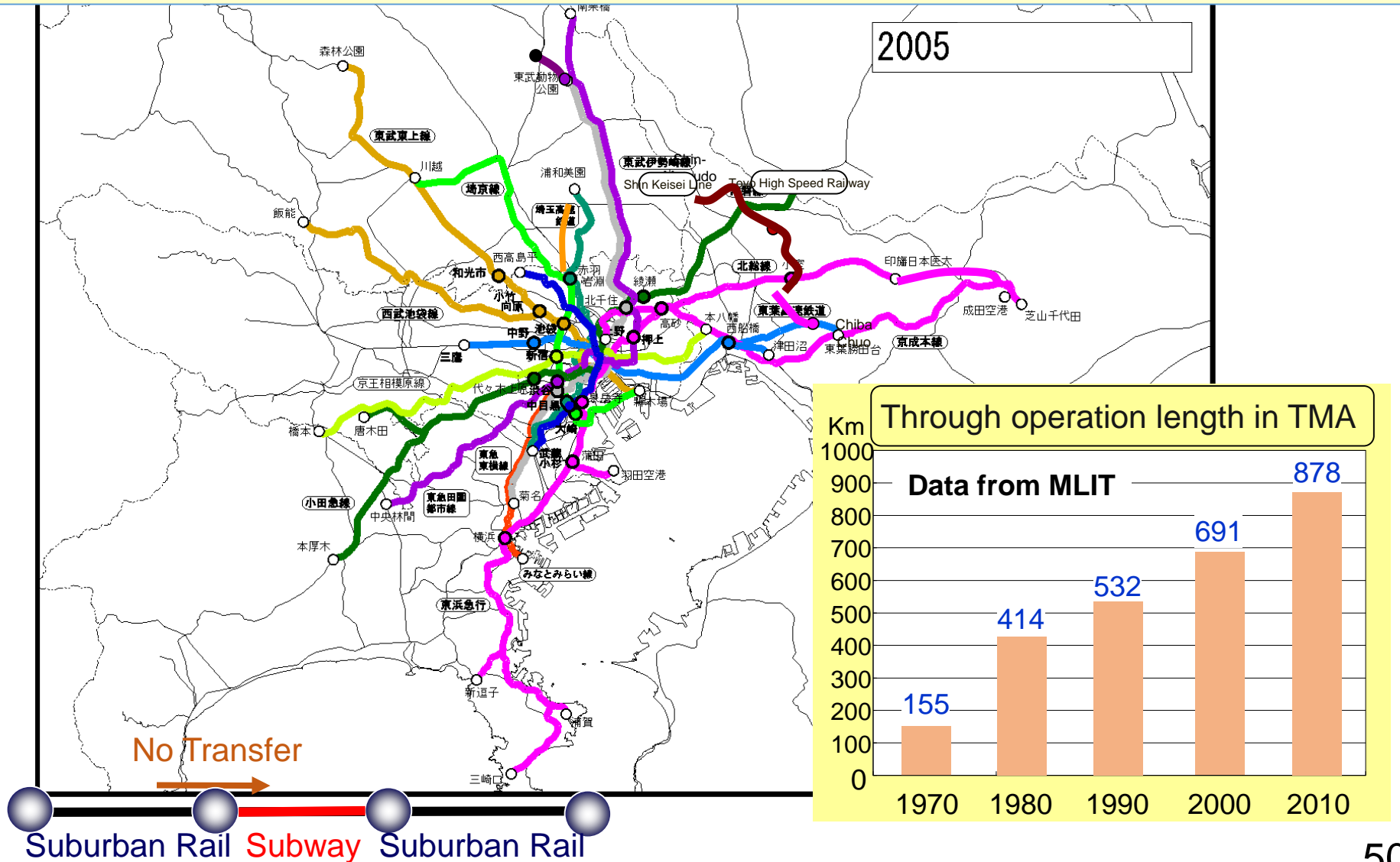
## ◆ Conditions

- Gauge must be match
- Signaling, Train set must be compatible



# Through Operation in Tokyo

From various railway companies in Tokyo  
➔ Creating integrated railway network



# Yamanote Line: Loop Line Connecting Other Rail Terminals



Morning peak hour\* condition  
in Yamanote Line

● Design Capacity

11 cars × 23 trains = 37,444  
person/hr

● Actual Volume

59,900 people/hr (160%  
congestion rate)

\* 7:45 to 8:45 between Shin-Okubo and  
Shinjuku

(FY2017 data)

- Railway development by private railway company is restricted inside the loop of Yamanote Line
- Travel inside the loop by through service from suburban rails to subway lines
- **HSR terminals in CBD**

**Forming Hierarchical Urban Railway Network**





# Cooperation between railways and buses

- Bus, taxi, private car and bicycle are important feeder services for urban railways.
- After the opening of the railway, trunk line bus which runs parallel to the railway should be converted to feeder bus.
- In Japan, in the past, there was an extensive investment in bus terminal. Therefore, there is an incentive to re-route the bus network



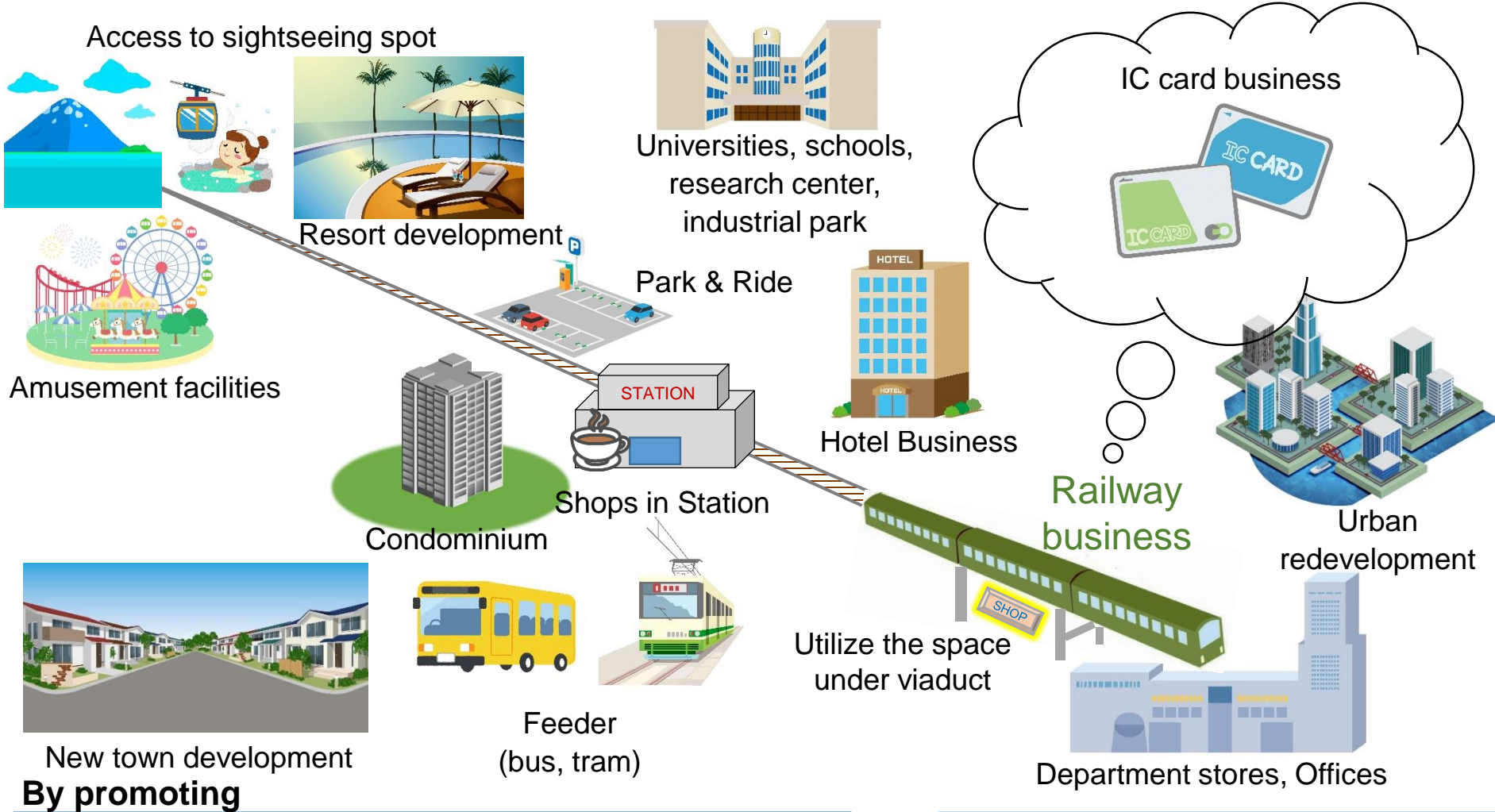
# 2.3 Providing a High-Quality Railway System

## ◆ Points to be considered in this section

- To improve efficiency in transportation, not only urban railways, but the combination of different types of mass transit system is suggested
  - Rail systems with sufficient transportation capacity for major corridors
  - Express operation for faster travel from major stations in suburban area
  - BRT/LRT as a feeder
  - Most of the CBD should be accessible by rail network
- Through operation between suburban rail and urban rail has advantages such as shortening of time and area development benefit

# 2.4 Integration of Railway Development with Social Infrastructure

## Multi-business model of Japanese railway companies



By promoting

**CBD: Commercial and Entertainment**  
**Suburb: University and Leisure facility**



**Weekday: Reverse direction trip**  
**Weekend: More demand**



# Connection between railway station and surrounding area

- As offices and commercial areas are developed around the station, tunnels, overbridges and skyways should be considered so that user can walk without crossing the road.
- In Japan, there are many underground shopping districts connecting stations and surrounding commercial areas
- Japanese railway companies earn a huge revenue from shop and restaurant rents inside the station.





# Station Plaza

- The station square is designed not only for feeder modes, but also for development around the station.
- In Japan, there is a design manual for the station plaza. The design must meet the future demand of pedestrians, private cars, kiss & ride, buses, taxis, bicycles, etc.
- Railway companies and local government share an investment cost. Central government also provide some subsidies. In some cases, railway operators and developers bear all the costs.

## Sendai Station East Entrance Station Plaza





# Park & Ride, Vehicle Sharing

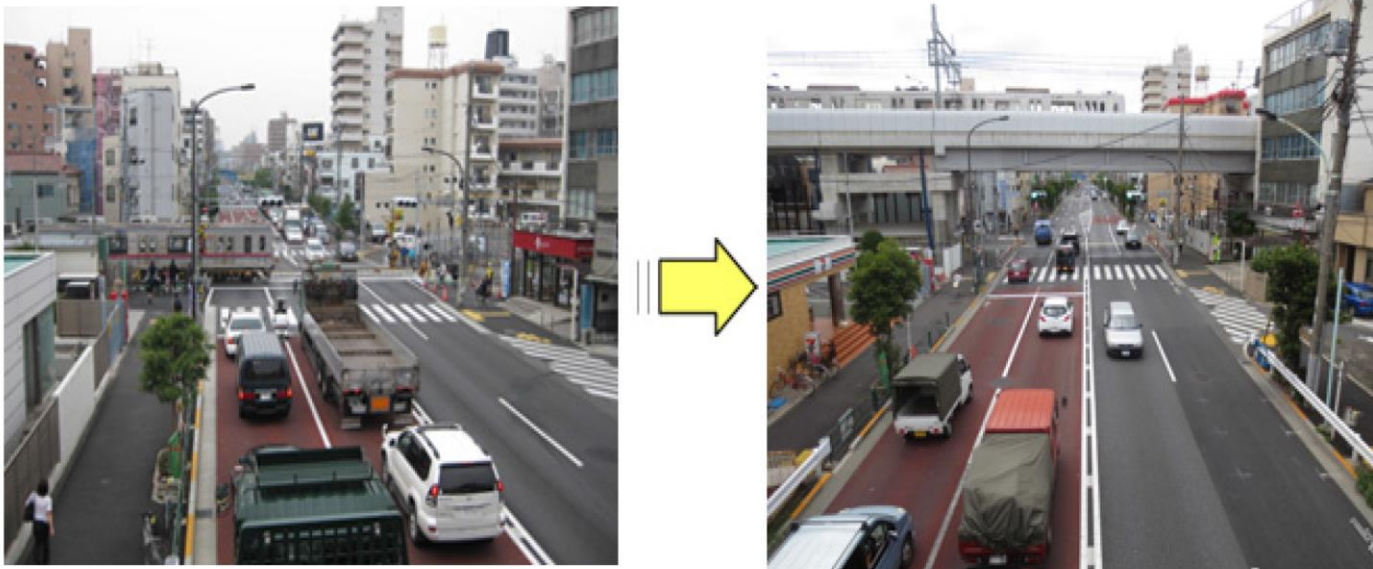


# Railroad Grade Separation

- Grade separation is introduced to reduce road congestion and traffic accidents
- Rail elevation is easier and cheaper than elevating roads
- In Japan, there is law stated that rail entity and road entity must share the cost of grade separation. Central government also provides subsidy.

[Continuous grade separation project cost sharing]

Rail entity shares the cost equal to the benefit (level crossing O&M cost reduction, reduction in accident). The rest is the burden to road entity.



From homepage of Bureau of Construction, Tokyo Metropolitan Government

(C) Mr. MUTO Masai, Japan Transport and Tourism Research Institute, 2020

## 2.4 Integration of Railway Development with Social Infrastructure

### ◆ Points to be considered in this section

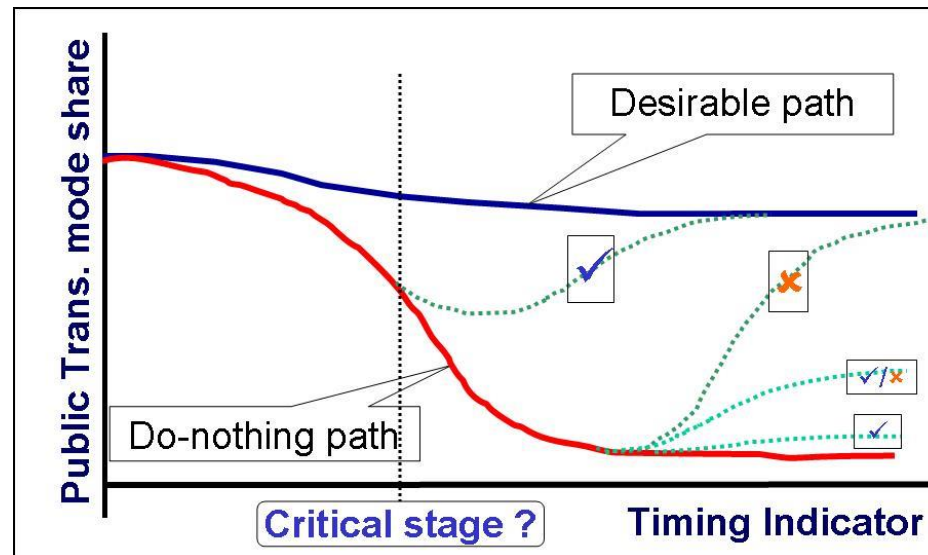
- For railway companies, there are opportunities to expand their business in other sectors
- Japanese railway companies earn a huge revenue from shop and restaurant rents inside the station.
- Station plaza is required for
  - Access space for feeder transport
  - Access to development around the station



# 2.5 Creating a Sustainable Urban Railway System

## Public transportation development in each development stages

- With economic grows, the car ownership rate increases and the public transportation usage rate decreases.
- At the right time, development in urban railways will reduce the share of automobile to the desirable level, but beyond that time, it will be difficult to increase the share of public transport to desirable level.
- Too early development of urban railway creates a risk of bankruptcy to railway operator due to high initial cost and low fare setting from low income level.
- Too slow means the spread of low density land-use in suburban area by car-oriented development, particularly using motorcycles.



# Example of Railway Development by PPP in Asian Countries

EPC: Engineering, Procurement, Construction

O&M: Operation and Maintenance

M&E: Mechanical and Electrical

Notes:

Government.
Public corporation
Private enterprise

Project	Scheme	EPC	
		Civil	M&E
KL PUTRA	BOT	PUTRA	
Bangkok Blue Line	BOT	MRTA	BEM
Delhi Airport Express	BOT	DMRC	DAMEPL
Kaohsiung MRT	BOT	Local Govt.	KRTC
Seoul Subway 9	BTO	Local Govt.	Metro9
Seoul DX line	BTO	Central Govt.	Shinbundang Railroad
Manila MRT3	BLT	MRTC	
Shanghai Metro line 11	Public	Shanghai Shentong Metro	
Taipei MRT Xinyi Line	Public	DORTS	
HCMC MRT 1	Public	MAUR	
JKT MRT	Public	PT MRT Jakarta	

O&M	Ownership	
	Civil	M&E
PUTRA		
BEM	MRTA	BEM
DAMEPL	DMRC	DAMEPL
KRTC	Local Govt.	KRTC
Metro9	Local Govt.	
Shinbundang Railroad	KRNA	
DOTC	MRTC	
Shanghai Shentong Metro		
TRTC	DORTS	
HURC		
PT MRT Jakarta		

7 routes are financed by PPP, 4 routes are financed by government

# Example of railway business by PPP in Asia

- Urban rail PPP projects in Asia: Many failure cases
  - Demand risk from low initial demand
  - Construction risks from rising of construction costs as well as project delay
  - Poor risk management from railway operator
- If there is no support from the government, return period in railway business is too long to attract private investor
- PPP is one of the great options, but lesson learn from failure cases should be carefully examined.

# Economically Sustainable Fare Setting

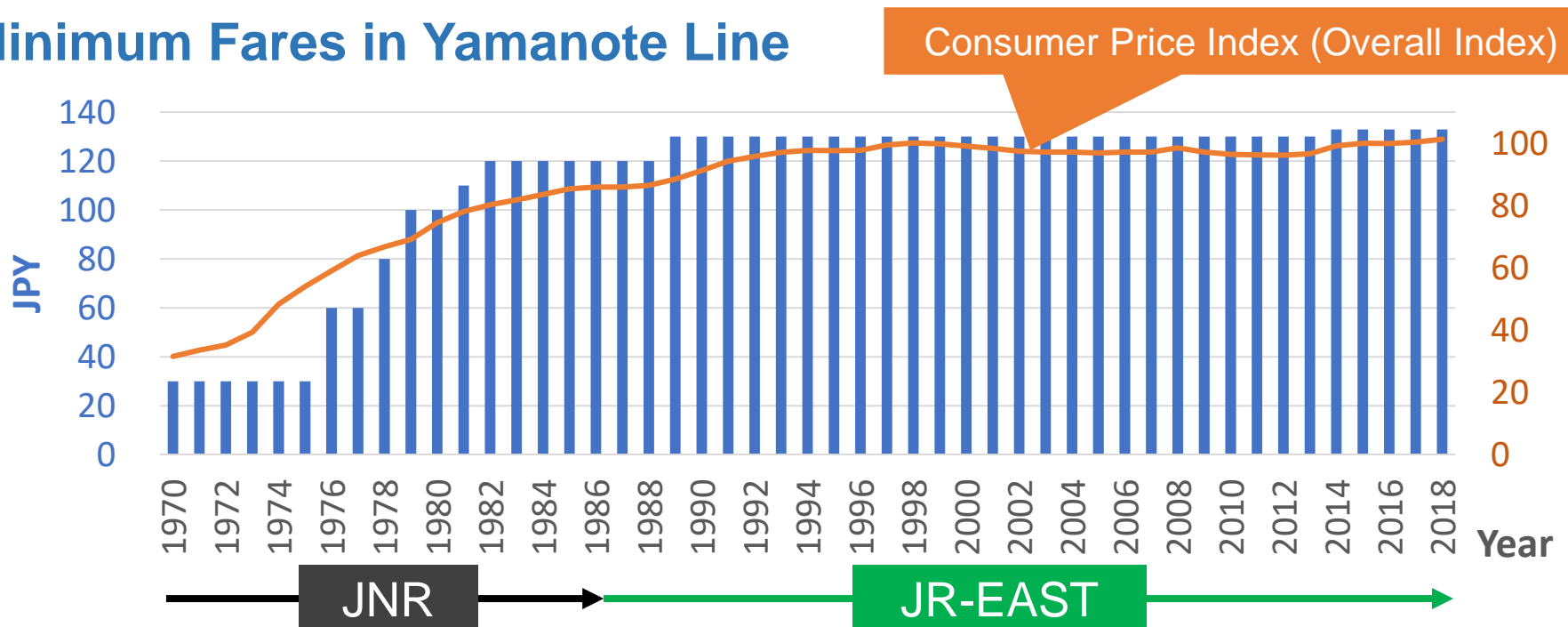
## ◆ Fare Regulations and Political Decisions

- Political decision tends to set the fares too low
- Fare setting should consider the total cost, which includes an appropriate profit in the total cost

## ◆ Fare Setting with The Consideration of Economic Growth

- Price indexing system

### Minimum Fares in Yamanote Line





# Business-Class Commuter Car

Why don't higher income people shift from car to rail?



JR-EAST Green Car



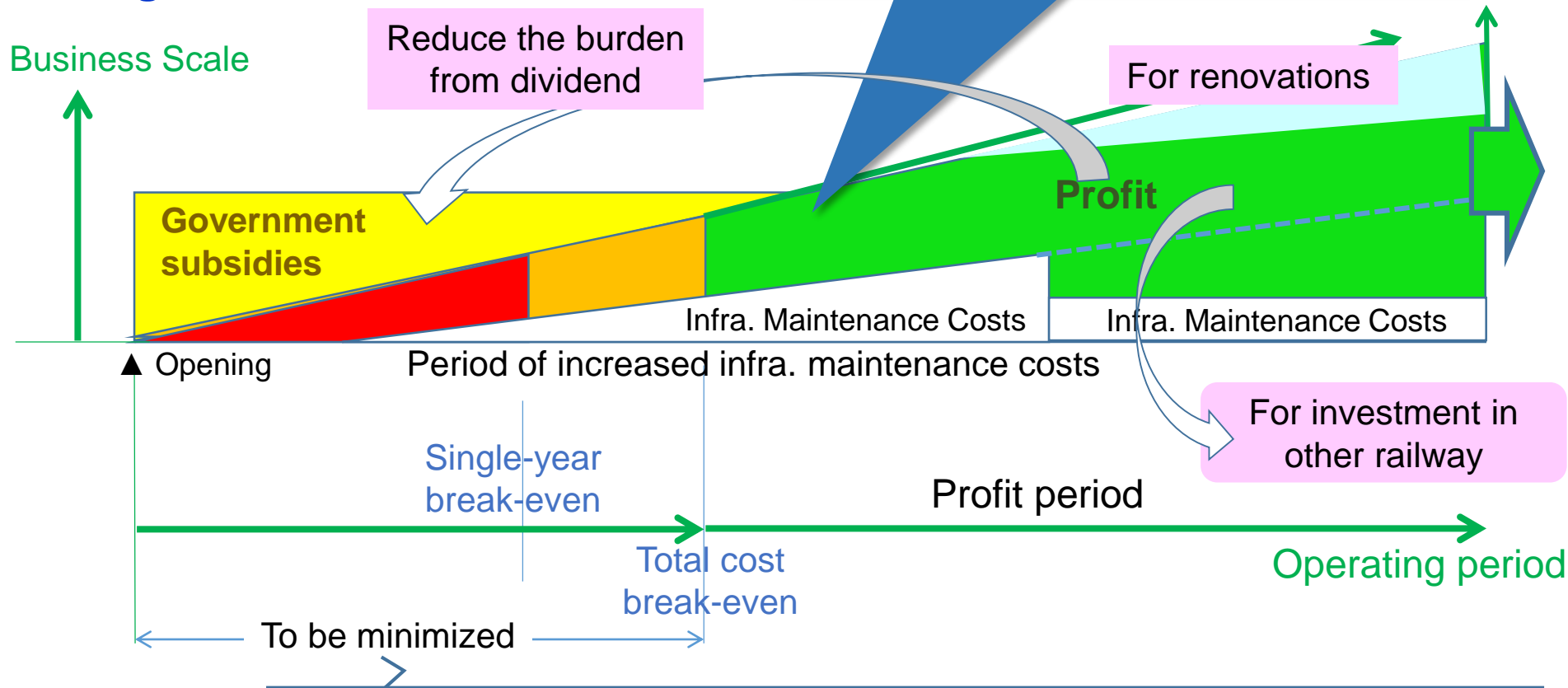
Fare =  
Basic Fare + 3 to 10 USD

Seibu Laview

# Towards Sustainable Urban Railway Management

## Concept of Sustainable Railway Management

Business Scale



- Borrow from low-interest loan source
- Operating cost reduction
- Increase profit (demand creation and expansion in related business)
- Efficient operation (infrastructure maintenance cost reduction)

# 2.5 Creating a Sustainable Urban Railway System

## ◆ Points to be considered in this section

- It is difficult to develop a transportation network with only PPP as a main source of investment.
- Government support is essential for a smooth progress of the project
  - Project coordination
  - Providing subsidies
  - Land use plan adjustment
  - Deregulation of development projects
  - Financial support to public infrastructure development
- It is important to **keep in mind that the railway is a profitable business**

# Financial Support Measures

## (1) ODA Yen Loan

Main organizations: JICA (Japan International Cooperation Agency)  
Application conditions: any developing countries

Example	Conditions	Overview	Total Loan
Construction of Jakarta Mass Rapid Transit Project	STEP	The construction of the first subway in Indonesia will help the increasing demand for transportation, alleviate traffic congestion, improve the investment environment, and reduce environmental impact.	137.3 billion yen
Metro Manila Subway Project	STEP	The first subway in the Philippines developed to respond the increasing transportation demand and alleviate serious traffic congestion in the Metro Manila area.	793.5 billion yen
Dhaka Mass Rapid Transit Development Project	Untied	Construction of mass rapid transit (MRT6 Line) in Dhaka City to meet transportation demand in Dhaka urban area	349.4 billion yen

STEP (Special Terms for Economic Partnership): Japanese supplier only

Untied: Can procure from any other countries

Loan rate (in general),  
ODA Yen Loans < ADB < IBRD (World Bank)



# Financial Support Measures

## (2) Overseas Loan

Main organizations: JICA (Japan International Cooperation Agency)  
Application conditions: any private enterprise in developing countries

Example	Overview
The Project for Improvement of Terminal Building at Palau International Airport	The project loan to a local corporation which includes expansion, renovation, operation, and maintenance of passenger terminal building at Palau International Airport

# Financial support measures

## (3) Overseas Investment

Main organizations: JBIC, JICA, JOIN

Application conditions: Investing institute is not the main investor

Example	Overview	Investment
UK Intercity Express Programme	(JBIC) A pound-based loan to ATEL, a consortium of Hitachi, Axa UK and John Laing <ul style="list-style-type: none"><li>• Created to design, manufacture, and maintain the train set</li><li>• Vehicle leasing and maintenance services to East Coast Main Line rail operators</li></ul>	£860 million (114 billion yen)
Suburban railway operation in Rio de Janeiro	(JOIN) Joint investment by Mitsui, JR West and JOIN for suburban railway operations in Rio de Janeiro	9.9 billion yen

JBIC: Japan Bank for International Cooperation

JOIN: Japan Overseas Infrastructure Investment Corporation for Transport & Urban Development

There are many financial support measures from Japan

# Selected Subsidy Systems for Urban Railway Development in Japan

System	Information	Regulations	Central Govt. Subsidy	Local Govt. Subsidy
Underground Mass Rapid Transit Subsidy	Partial subsidies for a new line construction costs as well as a large-scale improvement/renovation costs	(Related Instructions)	Maximum 35%	Maximum 35%
Airport Access Railways Subsidy	Partial subsidies for construction and renovation of airport access railways as well as railways to new town development	(Related Instructions)	18% (airport access rail), 15% (new town access rail)	Same as central government
Urban railway Service Improvement Subsidy	Subsidization of projects to improve service in an existing urban railway	Urban railways, etc. Convenience Improvement Business Act	1/3	1/3
Social Capital Development Grant	Supporting the Development of Social Infrastructure by Local Governments	(Related Instructions)	1/2 (after exclude the burden of railway operator)	1/2 (after exclude the burden of railway operator)
Infrastructure Subsidy	Promoting the construction of Monorails and AGT lines	Law Concerning the Promotion of Urban Monorail Development	1/2 of the infrastructure cost	The remaining amount from central govt. subsidy shown in the left

# Operation Support Measures

Through accumulate experience in high volume and high frequency operation, the support to human resource development can be provided.

- **Taiwan High Speed Rail (2003-2004)**  
JR Central and JR West provided trainings based on the experience and past achievement of Shinkansen systems in Japan
- **India High Speed Rail (2016~)**  
Supporting the establishment of training centers to High Speed Rail Corporation of India as well as the formulation and implementation of training programs.
- **Hanoi Metro (2017~)**  
Tokyo Metro established a local corporation for urban railway consulting.



Data from MLIT



Data from MLIT



Japanese  
Embassy at  
Vietnam  
Homepage



# Chapter 3: Toward Responding to Urban Transport Issues

## Situation of the MRT Jakarta North-South Line

(Please refer to slide 8 for the route map )

### Phase1

- ◆ Japanese first railway infrastructure export as a package
- ◆ Opening in April 2019
- ◆ ▪ BUNDARAN H.I. ~ LEBAK BULUS  
15.7km(9.2km elevated, 6.5km underground), 13stations(6stations underground)
  - The number of daily passengers exceeded 90,000 in last December. This far exceeds the original target of 65,000 people per day



<https://www.jakartamrt.co.id/2019/12/20/sepanjang-2019-penumpang-mrt-jakarta-terus-meningkat/>

### Phase2

- ◆ Construction started in March 2019
  - KANPUNG BANDAN ~ BUNDARAN H.I., 8.1km, 9 stations
  - In October 2018, a yen loan agreement of up to 70 billion yen was signed.
  - Mud-pressurizing shield construction method by Japanese company will be used, and Japanese vehicles and signal system will be introduced
  - Aiming for completion and service in June 2025

Urban Transport Project in Jakarta Metropolitan Area (MRT, LRT, toll highways), IDI Report 2017.3 (No.859)

Ex-ante Evaluation Report Based on ODA Policy Evaluation Method, MOFA, October 24, 2018

JICA news release, [https://www.jica.go.jp/press/2018/20181024\\_01.html](https://www.jica.go.jp/press/2018/20181024_01.html)

Source: YouTube



# Toward Responding to Urban Transport Issues

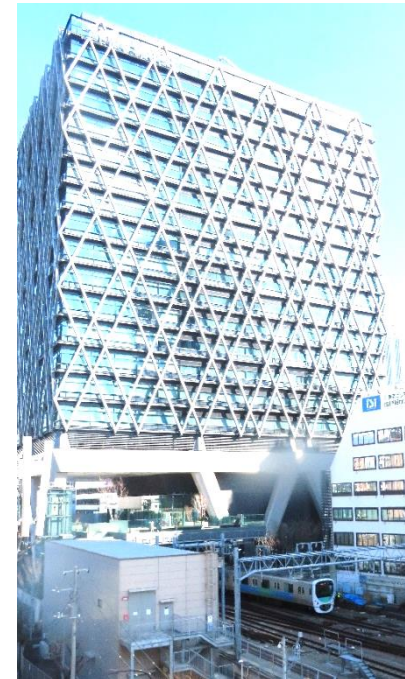
for Jakarta



## Limited land for TOD in Jakarta

- Vertical development above rail infrastructure should be considered

- ← As bus terminal (Shinjuku Bus Terminal)
- ↙ As office (Seibu Holdings Head Office)
- ↘ As green space, park (Odakyu Depot)



# JTTRI Future Prospect (DRAFT)

## JTTRI

**[The Morichi Committee "Research Group on Railway and Area Development"]**

Research and development support for strategies and business schemes

Academic experts, MLIT, JICA, UR, JRJT, Railway Companies, etc.

### ASEAN Transport Policies

#### A Support for the development of urban railways in ASEAN

Manila/Bangkok/Jakarta/Hanoi/Others

#### Consideration of policy support measurements

MLIT, MOFA, METI, embassy of various countries, etc.

#### Consideration of public financial support measures

JICA, JOIN, JBIC, JRJT, NEXI, etc.

Support and cooperation

Support and cooperation

### **JTTRI ASEAN Office**

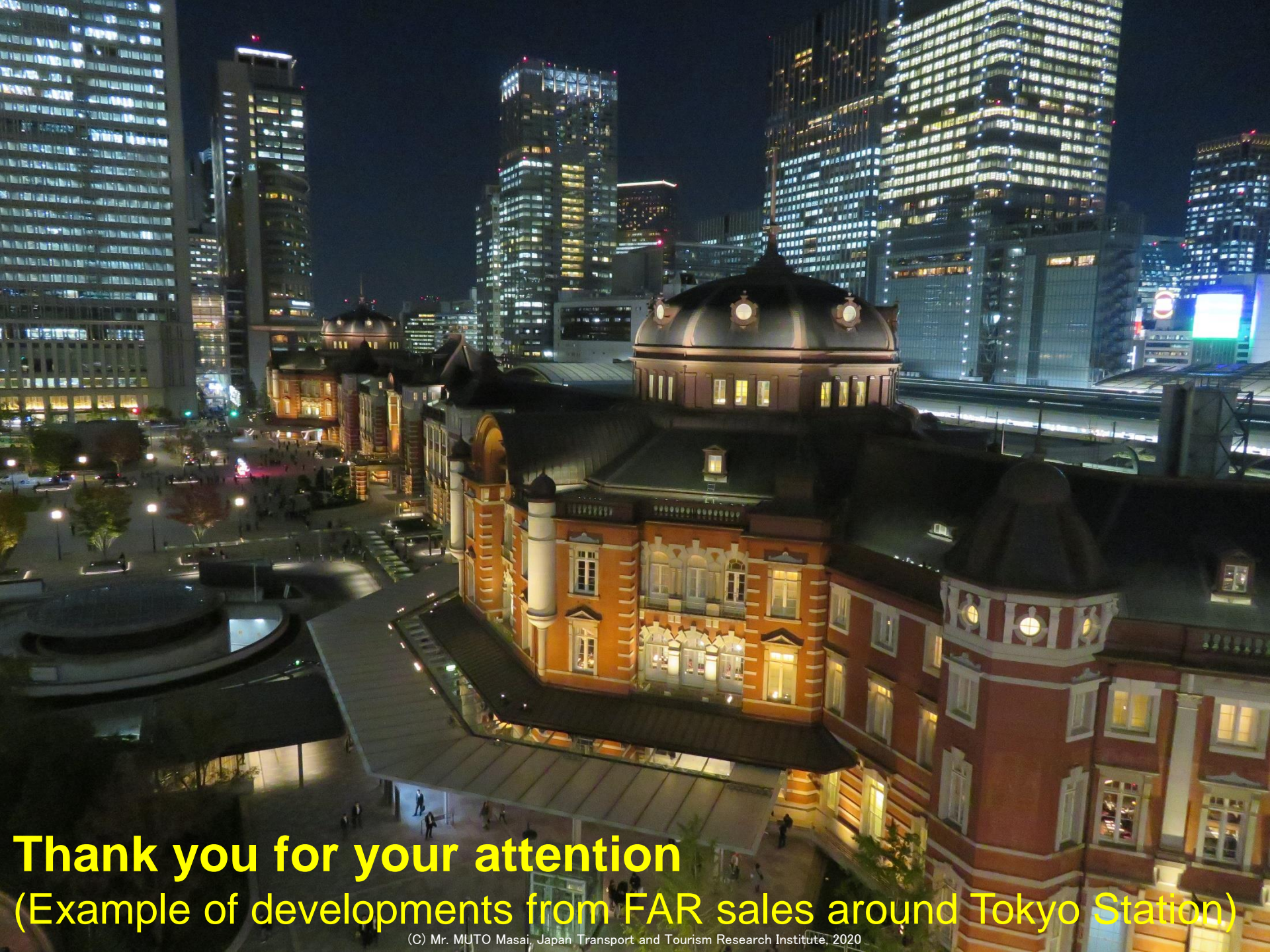
Coordination with ASEAN countries through inter-governmental agreement, and support for the development of urban railway projects

Urban Railway Development and Related Companies

Trading companies, railway operators, consultants, construction company, etc.

## **Support for Urban Railway Development Projects in ASEAN**





**Thank you for your attention**  
**(Example of developments from FAR sales around Tokyo Station)**