

# Knowledge Co-Creation Program (KCCP)

on

## Urban Railways Management

Organized by

JICA

Venue: JICA Tokyo Center, Japan

Duration: 06 November 2023 to 02 December 2023

### Presented by

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*Dhaka Mass Transit Company Limited*

*11 September 2024*



ঢাকা ম্যাস ট্রানজিট কোম্পানি লিমিটেড (ডিএমটিসিএল)

(শতভাগ সরকারি মালিকানাধীন কোম্পানি)



# Course Summary

- Participants: 17 No. from 10 Countries (Bangladesh, India, Vietnam, Philippines, Kenya, Tanzania, Panama, Tunisia, Egypt and Indonesia)
- Duration: 06 November 2023 to 02 December 2023
- Organizer: JICA Tokyo Center, Japan
- Training Implemented by: Japan International Consultants for Transportation Co., Ltd.
- Class Room Training: Lectures on various topics, Presentation on Country Report, Presentation on KISS RAIL 2.0 (Keys to implement successfully sustainable urban railways) and Presentation on Action Plan.
- Outside Visit



# Course Objectives

- To understand issue related to the operation of urban railways
- To get an overview of urban railways management strategies in Japan
- Sharing experiences of various countries on railways management
- Understanding various modes of urban railways
- To propose an improvement plan for urban railway management suitable to respective countries considering the current situation



# JICA's Assistance on Urban Transport Sector

- Challenges around the world (Rapid Urbanization: Increase of vehicle while insufficient roads and increase of pollution)
- JICA's roles and goals (Modal Shift to public transport)
- JICA's support (Technical Cooperation, "ODA: Official Development Assistance" Loans, Grants etc.)
- The way for future (Future Cooperation with emerging countries and support with digital solutions like AI)



# JICA's Assistance on Urban Transport Sector

“Improve connectivity”

Smooth and safe mobility of people and goods helps economic growth in developing countries.

“Modal shift to public transport”

Reducing emissions from automobiles, which account for 40% of the sources, is inevitable for effective action for climate change

Issue

Block the economic growth due to lack of infrastructure

Increase in the number of traffic accidents and casualties

Increase CO<sub>2</sub> emissions from transport sector

SDGs



9.1  
Infrastructure



11.2  
Accessibility



3.6  
Traffic safety



13  
Climate Change



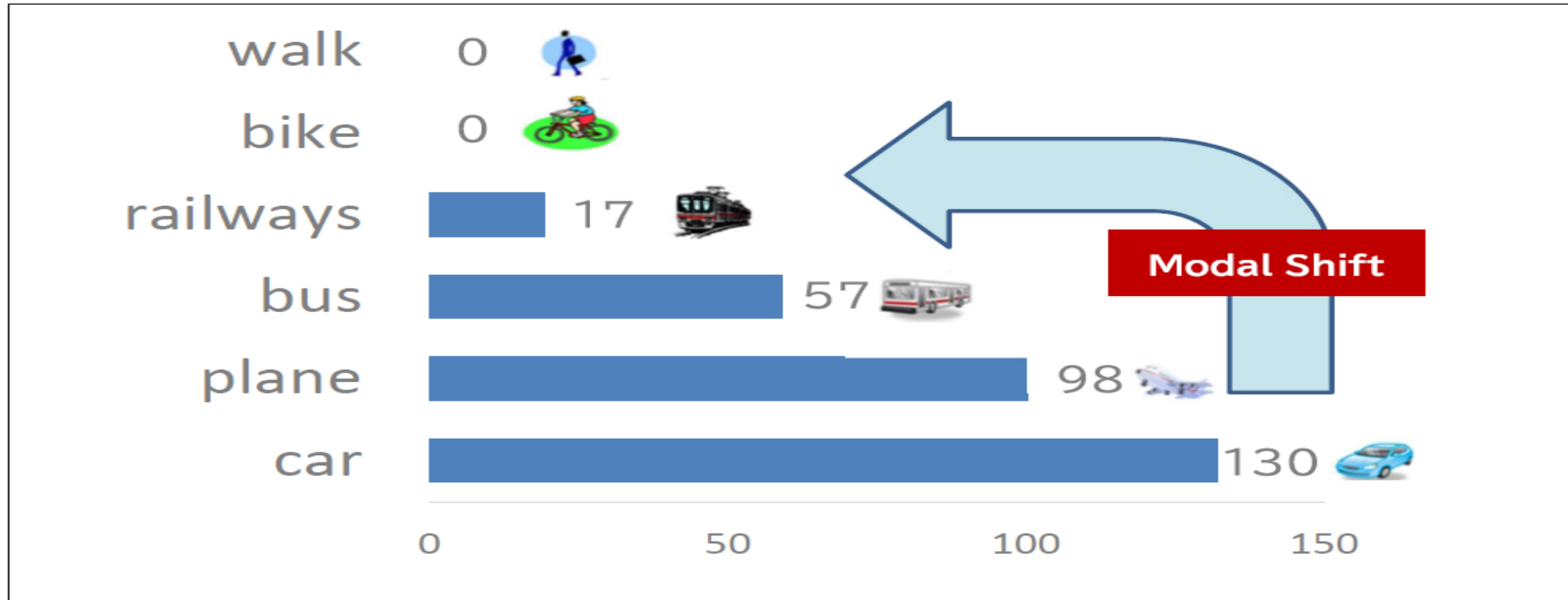
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# What can be done in transportation sector?

Amount of CO2 emitted to carry one person for one kilometer in Japan (2019)  
[g-CO2 / man·km]



Source :Created based on MLIT's data

→ In order to restrain the use of automobiles, to develop reliable, safe and environmentally friendly public transportation and to promote modal shift are essential approach.

9

6



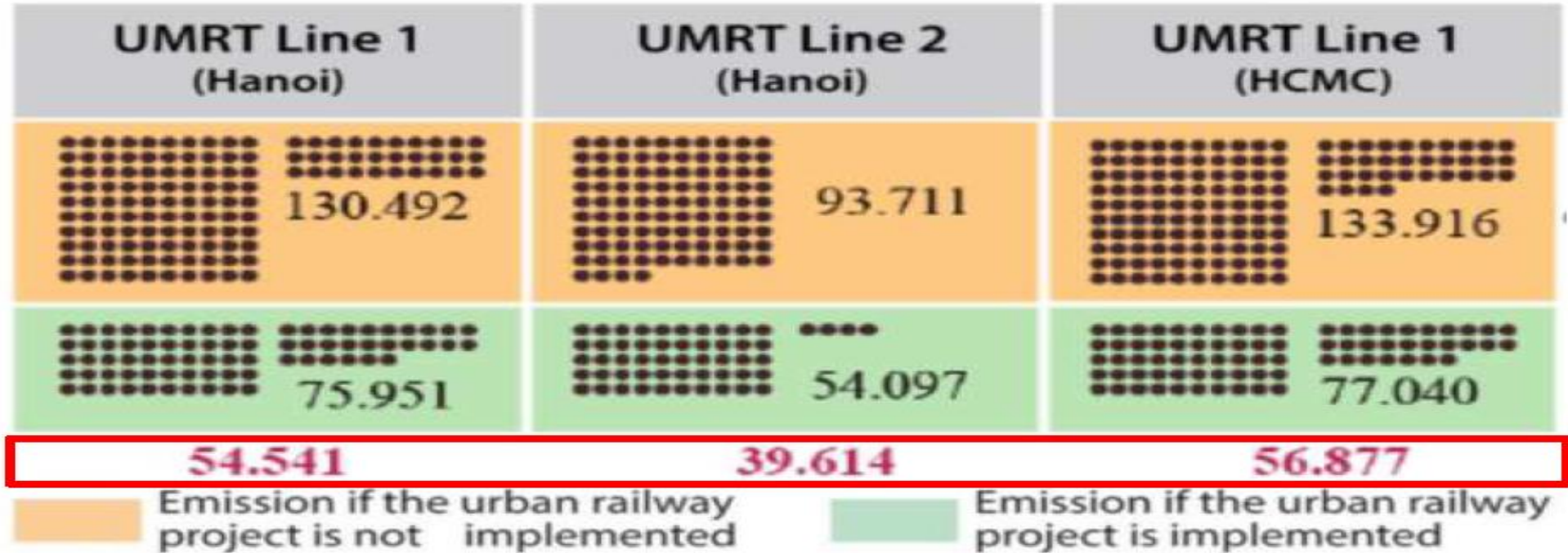
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# Urban railway as a measure against climate change

**Expected CO2 reduction effect by construction** of Hanoi Line 1, Hanoi Line 2 and Ho Chi Minh Line 1 (tons COs / year)



(Source) Data collection survey on development of measurement, report and verification (MRV) system in urban railway sector in Vietnam



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# JICA's Assistance Schemes

## Technical Cooperation



**Human Resource Development in Philippines**  
Training is provided to the staff of DOTR Philippines at Tokyo Metro General Training and Training Center.

## Official Development Assistance Loans



**Urban railway construction project in India**  
Provided ODA loan for urban railway construction projects in Delhi and Chennai.

## Official Development Assistance Grants



**Providing Operating Control Center for Myanmar Railways**  
At Yangon Central Station, the system and device for train and track monitoring etc. are installed.

## Public-Private Partnerships



**Study for Improvement of bus operation in Vietnam**  
Japanese bus operator conducts survey to the business including improvement current bus operation in Hanoi.



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# Infrastructure Development & Operation in Japan Railway

Originally

Railways were managed by a vertically integrated operating entity

facilities

rolling stock and

personnel

Recently

A vertical separation scheme has been adopted

A public sector owns the infrastructure

A railway operating entity holding rolling stock and personnel operates the railway



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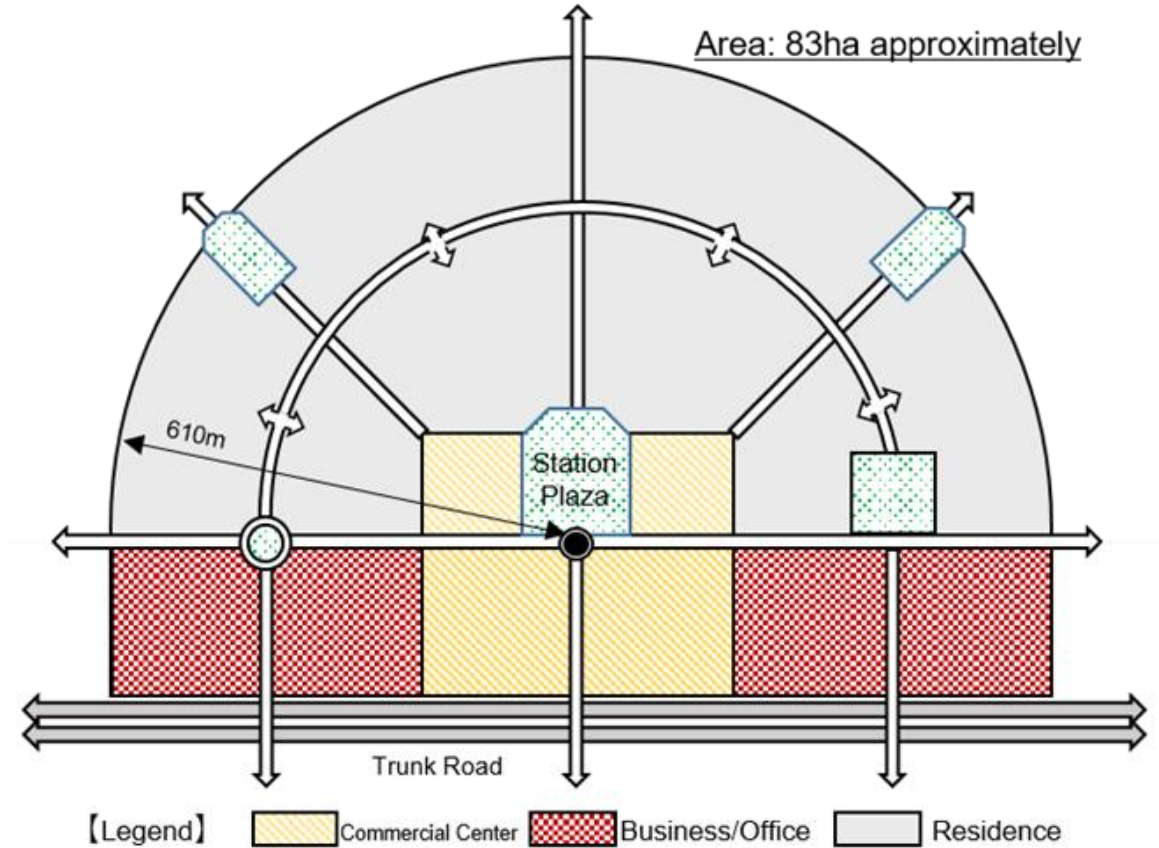
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# Transit Oriented Development (TOD)

❑ In 1993, Peter Calthorpe proposed Transport-oriented Development (TOD) as a new type of station development in suburban areas

❑ Later, it was also applied to existing stations in built-up areas, and now the concept is spreading worldwide.



# Definition of TOD

- ❑ Integrate land use and transportation around transportation hubs and a variety of **medium- to high-density land uses**, including residential areas
- ❑ promotes a **walkable built environment** and strengthens the linkage between MRT and other transportation modes
- ❑ urban revitalization and suburban area regeneration, **reduced reliance on automobiles**, and improved overall quality of life



Shinjuku Station, Shinjuku Bus Terminal & Other Commercial Facilities



# JICA's 3-6-3 Method

- **3 Triggers** to commence a TOD project
- **6 Keys** for successful TOD
- **3 Goals** for achieving metropolitan-wide issues



# 3 Triggers to Commence a TOD Project

**Timeliness:** All aspects are ready to implement TOD, especially related to Key 1 and 2 of TOD success

**Land:** Land is secured to implement TOD. Establishing an organization to manage unused public land should be considered (e.g. Japanese National Railways Settlement Corporation)

**Teamwork:** Stakeholders are united to implement TOD. Especially related to Key 3 of TOD success



# 6 Keys for successful TOD

- Key 1: Legal and Business **Support Systems**
- Key 2: Variety of **Financing** Schemes
- Key 3: Organizational **Capability**
- Key 4: Smooth **Transfer** with Urban Transport Modes
- Key 5: Significance of **Non-Fare** Revenue
- Key 6: Understanding **Station Area and Site levels** well



# Key-1: Legal and Business Support Systems

- ❖ National government: to enhance legal regulations and institutions from the metropolitan area level to the site level
- ❖ Local government: to introduce or revise ordinances that establish procedures for the smooth implementation of TOD at both the corridor and site level.



# Key-2: Variety of Financing Schemes

In addition to the usual financing schemes, the following ones need to be considered:

## Land value Capture:

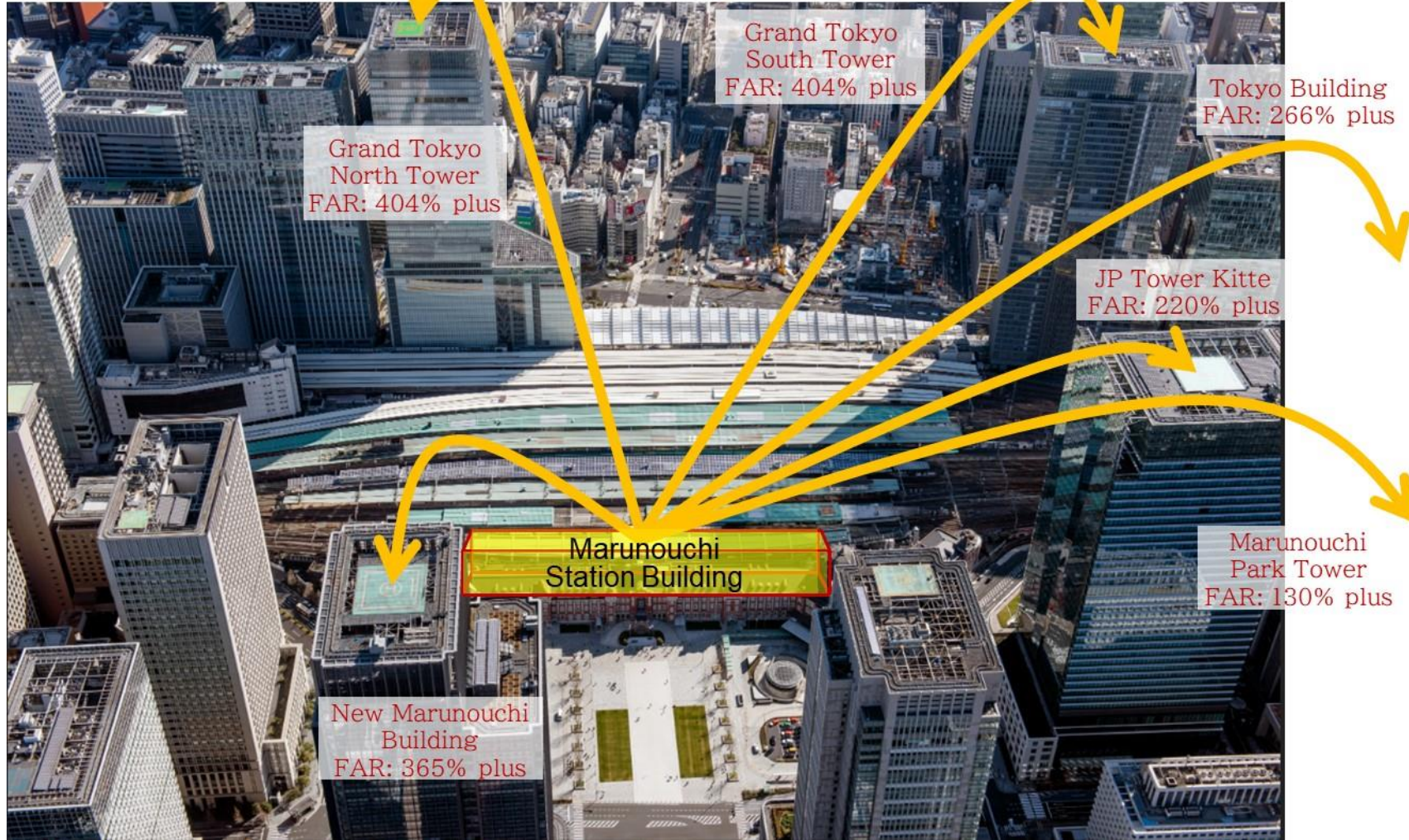
- **Pre-project**: contributions collected from specific regions or entities
- **During project**: land readjustment/consolidation, urban redevelopment, or TPS/LAP (in India) schemes; specific tax/contributions from specific sites
- **Post-project**: collected by the ordinal government tax system

## **Floor Area Ratio:**

- **Trades/Addition**: ex.: Tokyo station area, many station areas under the Act on Special Measures Concerning Urban Reconstruction of Japan; Semanggi intersection and Jakarta Tower Bldg., CSW Skybridge of Indonesia
- **Artificial floor above the railway track**: ex.: Shinjuku station area, creating FAR newly from zero (0)



# Key-2: Variety of Financing Schemes



JR Tokyo Station Area





## JR Shinjuku Station Area

Step 1: the artificial floor was constructed above the railway track for Basta-Shinjuku, the vertical public transport facility.

Step 2: excess 612% FAR of Basta-Shinjuku was used in Miraina-tower in the same land plot.



# Key 3: Organizational Capability

Organizational capacity and human resources are essential for both the government and the private sector to successfully implement TOD.

Specifically, the following policies are important:

- TOD **One-stop-service**
- **Incentives** for Rail Operators, such as MRTJ
- **Innovative policies** to help rail operators and private developers improve sustainable profitability



# Key 4: Smooth Transfer with Urban Transport Modes

Smooth transfer to other modes of transportation at the station is essential for the responsible entities to develop their transport operation (fare) business and non-fare business. It is necessary to develop adequate station plazas, access roads, and pedestrian accesses.



Station	Station Area (ha)	Daily passengers trips		
		Rail & Subway (number of lines operated)	other urban modes *	Total
Tokyo	117	2,218,171 (24)	1,021,000 31.5%	3,239,171
Shibuya	139	3,320,383 (8)	1,730,000 34.3%	5,050,383
Shinjuku	—	3,594,710 (11)	970,000 21.2%	4,564,710

\* long-distance and intracity buses, taxi, private cars, etc. (estimated)

Marunouchi Station Plaza, JR Tokyo Station

Photo: S. Akimura



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# Key 5: Significance of Non-Fare Revenue

In general, the transportation business does not make a profit, excluding the case with the railways in Japan's major cities.

It is essential to consider the non-fare business in large stations. Once on track, non-farebox revenue can be a significant source of income.

(2019 fiscal year)

(billion JPY, %)

Corporation	Segment	Transport Operations	Non-fare Box (Retail & Services, Real estate, Hotels, etc.)	Total
JR East Group	Operating revenues	2,038	964	3,002
	(share)	(68%)	(32%)	(100%)
JR West Group	Operating revenues	954	575	1,529
	(share)	(62%)	(38%)	(100%)
Tokyo Metro	Operating revenues	384	51	435
	(share)	(88%)	(12%)	(100%)
Tokyu Group	Operating revenues	212	946	1,157
	(share)	(18%)	(82%)	(100%)
Hankyu-Hanshin HD	Operating revenues	234	558	791
	(share)	(30%)	(70%)	(100%)



# Non-fare Business inside the Train



Three (3) Extra LSD (LCD saloon Display) for advertisement content just above the fixed window



Advertisement content hanged over the passengers from the middle of coach



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# Key 6: Understanding Station Area and Site levels well

- At the station area and site levels, it is necessary to understand relationship between station users and urban development



TOD around Shinjuku Station

# Tokyo Metro Comprehensive Learning & Training Center

## ➤ Facilities

- ✓ Various types of turnout, track and continuous welded rail (CWR)
- ✓ Overhead Contact lines with catenary suspension (Elevated-1500V), overhead rigid conductor equipment (Underground- 1500 V) and Third rail system
- ✓ Various types of signalling and safety equipment
- ✓ Mock-Up Station platform (two 3-car platforms and one 10-car platform)
- ✓ 180m long underground tunnel
- ✓ Elevator and escalator
- ✓ Train Simulator and rolling stock teaching materials room
- ✓ Station control room
- ✓ Ticket vending machine
- ✓ Sprinkler System Instruction Room



# Tokyo Metro Comprehensive Learning & Training Center (con..)

## ➤ Training Programs

Staff Level	Initial Training	Continuous Training
Train Operator/Station Controller	<ul style="list-style-type: none"><li>Academic Studies 3.5 Months</li><li>On Job Training 4.5 Months</li></ul>	<ul style="list-style-type: none"><li>Follow-up Training (One year later, 3 years later)</li><li>Driving Skills</li></ul>
Station Staffs	<ul style="list-style-type: none"><li>Academic Studies 2 Months</li><li>On Job Training 2 Months</li></ul>	<ul style="list-style-type: none"><li>4th year follow-up training (employee's with 3 years of experience after entering the company)</li><li>Complain handling skills training</li></ul>
Technical Staffs	<ul style="list-style-type: none"><li>Academic Studies &amp; Skill Training 4 Months</li><li>On –the -job Training 9 Months</li></ul>	<ul style="list-style-type: none"><li>Follow-up Training</li><li>Various Technical &amp; skills Training for each field</li><li>Skills competition</li></ul>

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# Takanawa Gateway Station Initiatives

## ➤ Environmental Initiatives (to achieve SDG's)



Improvement of thermal environment and reduction in energy consumption for lighting through the adoption of roof membrane



Installation of solar panel in the roof

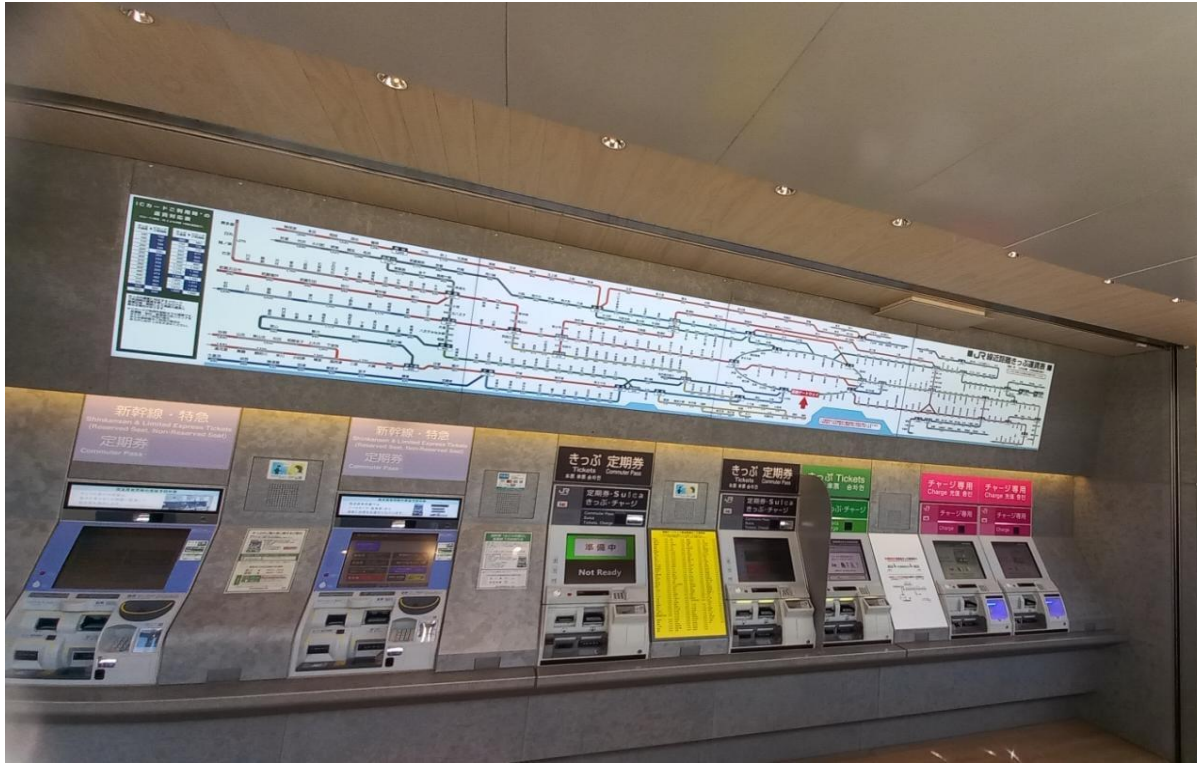


Installation of small wind turbine power generators



# Takanawa Gateway Station Initiatives

## ➤ Station Service Equipment



**LCD Digital Fare Map**



**AI Based Passenger Signage-**  
provide spoken guidance for passenger  
and real time information of Train  
Operation



# Wakabada Workshop of Keio Corporation



## ➤ Car Body Workshop

- ✓ Car lifting by using crane (30 ton) for bogie removing
- ✓ Scope of natural light due to glass walls
- ✓ Floor Painting and section wise (Bogie, brake, Electrical.....) equipment placement in dedicated area
- ✓ Separation of walkway and work zone for cautious movement
- ✓ Making rough surface for the possible slippery floor area

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# Wakabada Workshop of Keio Corporation



Car Body Workshop



Enter and Exit Tracks



Main Electric Machinery Workshop



Wheel and Axle Workshop



Basic Parts Workshop



Underframe Workshop



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# Wakabadai Workshop of Keio Corporation

- Use of 2<sup>nd</sup> floor of Workshop (almost 30 to 35% of workshop area)
  - for critical parts maintenance
  - for storing light weight spare parts



Electromagnetic Valve Automatic Test Equipment



Air Control Valve Automatic Test Equipment



Whistle Test Equipment



# Wakabada Workshop of Keio Corporation

- Use of 2<sup>nd</sup> floor of Workshop (almost 30 to 35% of workshop area)
  - for critical parts maintenance
  - for storing light weight spare parts



Oil Damper Test Equipment



Voltage/Current Relay Test Equipment



# Suica : JR EAST'S IC CARD

Suica = Super Urban Intelligent CArd



## THREE MAIN FUNCTIONS

### 1 TRANSPORTATION FARE



### 2 E-MONEY



### 3 AUTHENTICATION



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# YOU CAN USE YOUR Suica AT JR EAST STATIONS, BUT ALSO FOR RETAIL AND OTHER TRANSPORTATION SYSTEMS THROUGHOUT JAPAN.

As of March 31, 2023:

More than **9.5 million** Suica cards issued

More than **2.0 million** Mobile Suica issued

## TRANSPORTATION

### JR East area:

Suica can be used at **842\*** stations, which includes **657** stations in the Tokyo metropolitan area.

(\*:44 stations were added this May, and **44** more are to be added by the end of FY2026.)

The usage rate of IC cards for transportation in the Tokyo metropolitan area is **95%**.

### Japan:

Suica can be used at **5,000** stations and for **50,000** buses nationwide.

## E-MONEY

Suica can be used as E-money at **1.63 million** stores. (March 2022)

The largest number of transactions per month to date has been **262.97 million**. (July 2022)



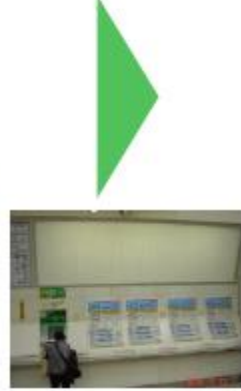
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# REDUCED NUMBER OF TICKET VENDING MACHINES

## Ueno Station



Suica card user rate increases



Fewer passengers purchasing tickets from ticket vending machines



Less need for ticket vending machines



Ticket vending machines removed and new space used for commercial or other purposes.

Case study: Ticket vending machines removed and vacant space used for gift shop.

## Other stations



Coffee stand



Currency exchange



ATM



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# Investigation into the causes of Railway Accidents and Prevention of their Recurrence



**Aviation**



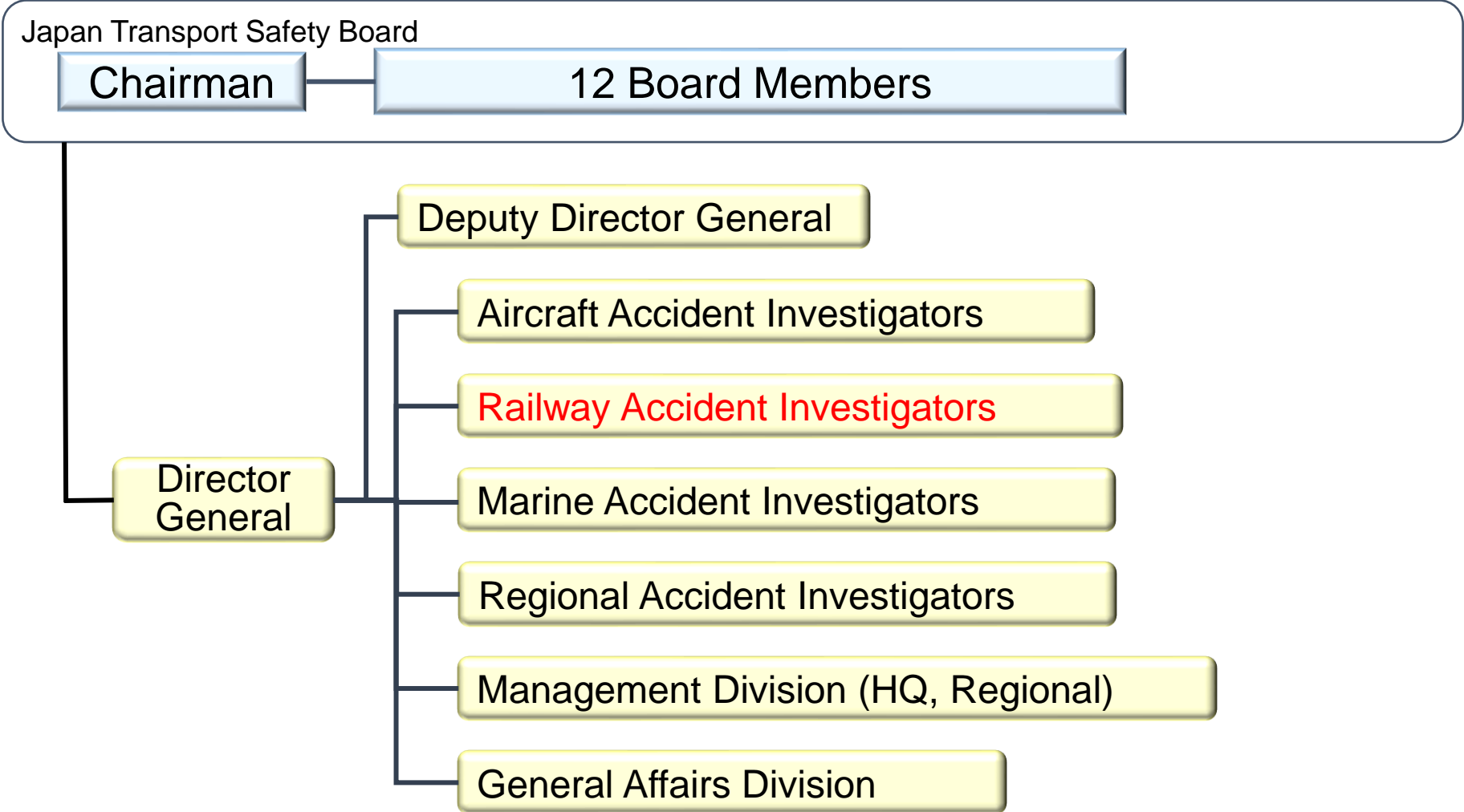
**Railway**



**Marine**

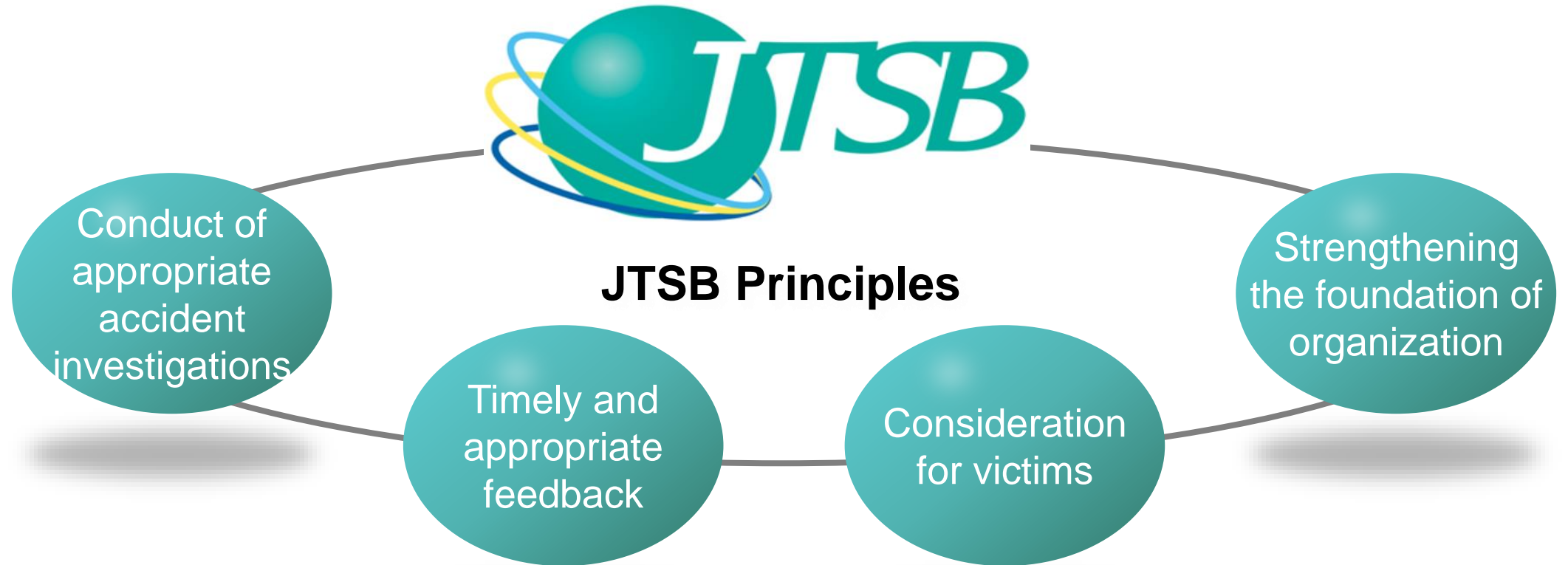
Japan Transport Safety Board (JTSB) under the Ministry of Land,  
Infrastructure, Transport and Tourism (MLIT)

# Organizational Structure of the Japan Transport Safety Board

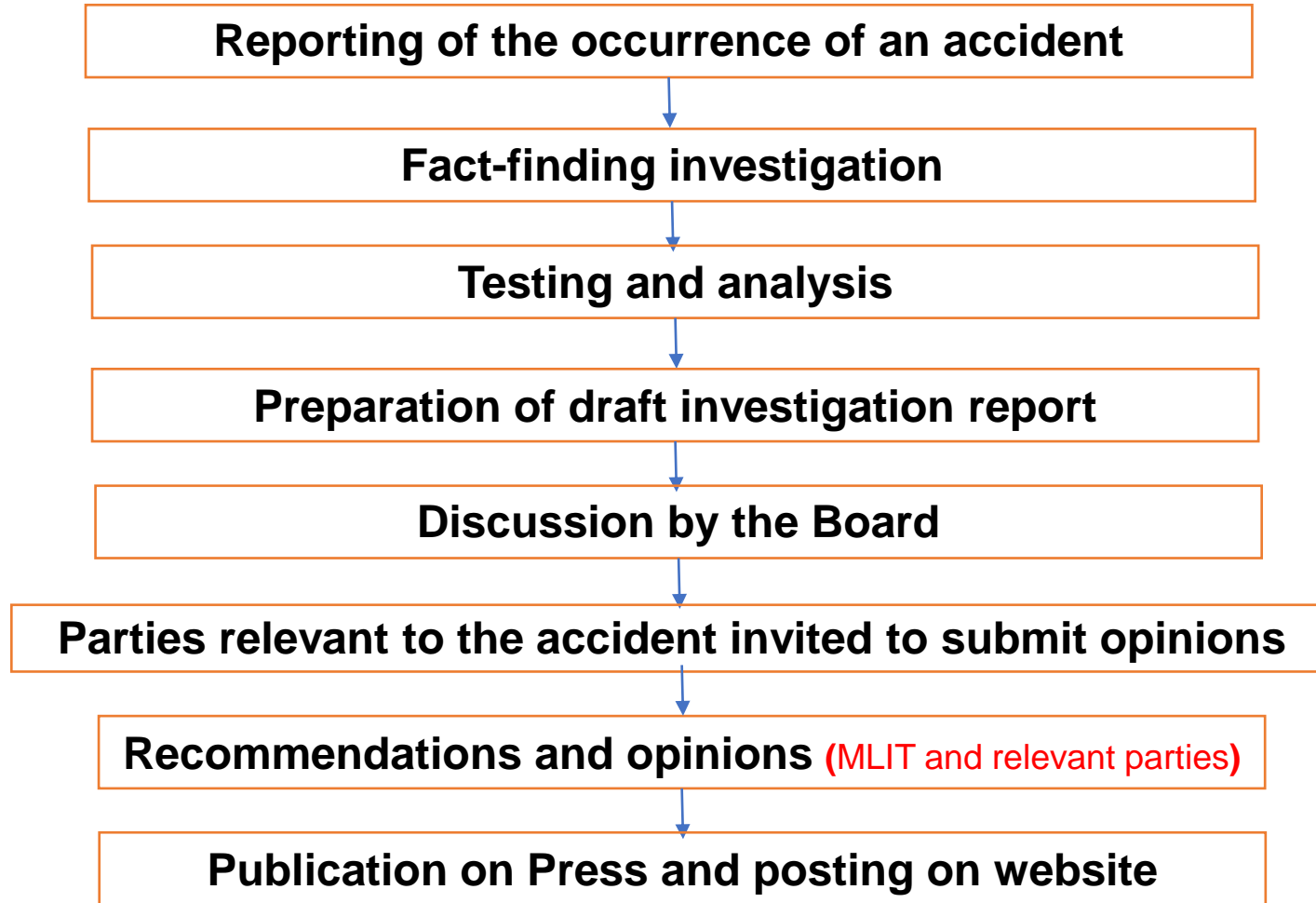


## ➤ Japan Transport Safety Board (JTTSB)

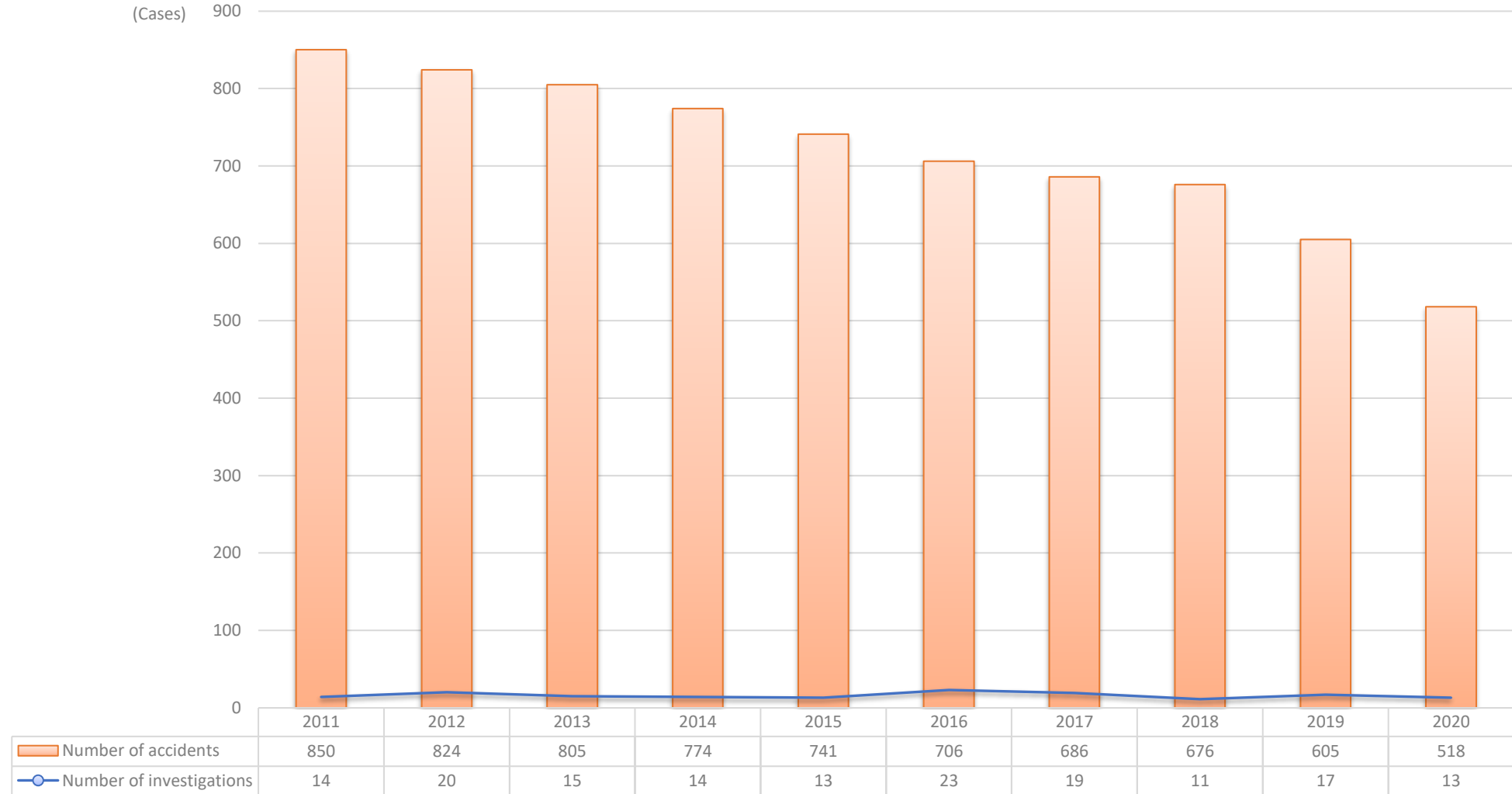
- ✓ An **independent** professional investigation agency
- ✓ Main purpose is to conduct scientific investigation from **impartial and neutral standpoint**



# Accident Investigation Procedures of JTSB



# Changes in the Number of Accidents and Investigations



# Initiatives for Disaster Prevention and Anti-Terrorism

## ➤ Initiatives Against Earthquakes




- Earthquakes detection device (seismograph) installation
- Strengthening pillars, emergency generators etc.
- Being prepared in case of major power outage
- Providing information to customers
- Measures to be prepared for stranded passengers such as water, emergency toilet kit, first aid etc.
- Improving emergency response skills



# Initiatives for Disaster Prevention and Anti-Terrorism

## ➤ Measures against flooding

- Preparing Flood Hazard Map
- Installation of Major flood prevention measures and equipment
- Analysis the Case of flooding in the past

Flooding channels		Case of flooding in the past	
Station entrances	Flood stop boards		Flood prevention door
Tunnel outlets	Flood prevention gate		
	Water prevention wall		
Inside tunnels	Flood prevention gate		



# Initiatives for Disaster Prevention and Anti-Terrorism

## ➤ Measures against terrorism

- Formulation of regulations, etc.
- Installation of Equipment and facilities such as CCTV camera in train and station, raised the wall height in depot etc.
- Vigilance and security measures
- Acquisition of a first aid certificate for all employees
- Customers cooperation



The height of walls have been raised.



Security camera



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# Scope of Improvement

## ➤ Expansion of non-fare business

### ✓ Planning and Developing TOD

- TOD will help to decentralize the crowd, urban revitalization and suburban area regeneration
- will increase the ridership
- will help in land value capture and in proper utilization of land (**higher FAR**)
- promotes a **walkable built environment**, space for social gathering
- improving overall quality of life

### ✓ Implementation of **multifunctional** (Transportation fare, E-money) IC card



Social Gathering Place near Shinjuku Station



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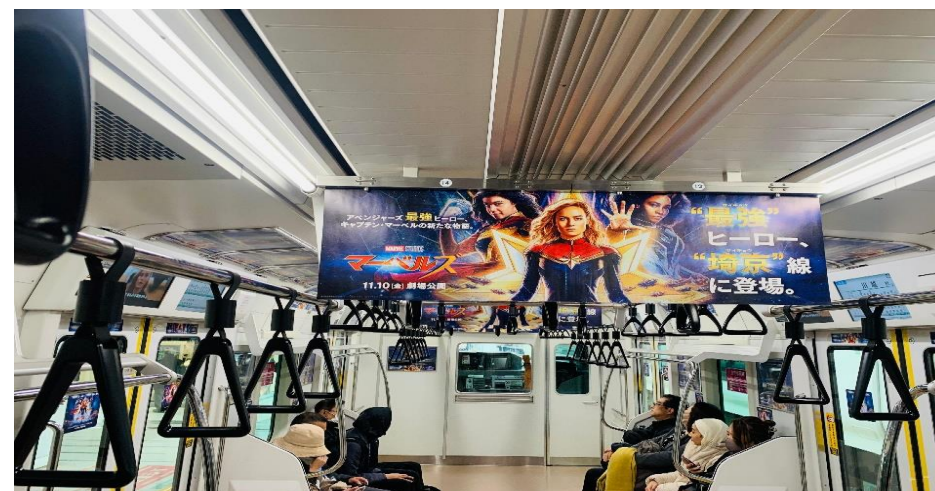


# Scope of Improvement (cont.)

## ➤ Expansion of non-fare business inside metro coach

✓ Design proposal for upcoming MRT Line's to add-

- **Extra LSD (LCD saloon Display)** for advertisement content **just above the free space of fixed window**
- **Fixture to hang** advertisement content over the passengers from the middle of metro coach



# Scope of Improvement (cont.)

## ➤ Expansion of non-fare business in Concourse Level

- ✓ LCD display can be hanged besides stair/escalator for advertisement content



# Scope of Improvement (cont.)

## ➤ DMTCL Training Center

- ✓ Establishment of Training Policy
- ✓ Simulation facilities for each subsystem (Door, Propulsion, APS, motor.....) of Rolling Stock
- ✓ Training Room establishment for P-way having sample of various types of turnout, track and points machine
- ✓ Having built in ticketing systems like TVM, AFC to train CRA, TOM and Securities



# Scope of Improvement (cont.)



# Scope of Improvement (cont.)

- **Luggage Rack** to keep passengers baggage's (or dedicated coach, specially for MRT Line-1)
- Installation of **solar panel** in roof of Stabling line, workshop, station or other area **having sufficient amount of sun light**
- Number of AFC gate for Exit of passenger should be more than the number of AFC gate of entry
- **Signage to encourage the passengers** to wait in line during boarding on train



# Scope of Improvement



Luggage Rack to keep passengers baggage's



Signage to encourage the passengers to wait in line during boarding

# Thank You Everyone

