Transit-Oriented Development (TOD) is a combination of public transportation and urban development. In 1993, Peter Calthorpe proposed TOD as a new type of station development in suburban areas. TOD and similar developments began in the early 1900s in England (E. Howard’s Garden City) and Japan (Osaka, Umeda to Takarazuka, Tama Den-en-toshi), and have been used in the construction of new towns and the improvement of existing station areas around the world.

In most cases, the national government takes the lead in formulating CDM in the capital region of each country, while local governments take the lead in other metropolitan areas.

Transit-oriented development (TOD) integrates land use and transportation around transportation hubs and a variety of medium-to-high-density land uses, including residential areas. This promotes a walkable built environment and strengthens the linkage between mass transit and other transportation modes, which can result in urban revitalization and suburban area regeneration, reduced reliance on automobiles, and improved overall quality of life (QOL).
Three Metropolitan Visions and Six Keys to TOD Success

Key to TOD Success ① Legal and Business Support System

The national government is responsible for enhancing legal and business support systems from the metropolitan area level to the site level in order to solve issues. Following this, local governments need to enact ordinances that establish procedures for the smooth implementation of TOD.

- **Metropolitan Level:** “Multi-Polar Patterns National Land Formation Promotion Act” and “Act on Special Measures concerning Promotion of Supply of Houses and Housing Lands in Urban Districts” (Tokyo Metropolitan Area); Grand Paris Act (Paris Metropolitan Area).
- **Corridor Level:** “Act on Special Measures concerning Comprehensive Advancement of Housing Development and Railway Construction in Metropolitan Areas” (Tokyo Metropolitan Area); Crossrail Act (London Metropolitan Area).
- **Station Area and Site Level:** Utilization of Special Floor-Area Ratio (revision of the City Planning Act and the Building Standards Act), “Act on Special Measures concerning Urban Reconstruction” (Metropolitan Areas in Japan), Land readjustment; Urban redevelopment, Continuous grade separation, and other existing regulations.

Key to TOD Success ② Variety of Financing Schemes

One of the obstacles to promote TOD in developing countries is financing. A variety of financing scheme is recommended.

- Land Value Capture (Cross-subsidy from real estate developer to transit operator, tax levied to development beneficiary, tax on land value increase)
- Premium Floor-Area-Ratio (FAR), Revenue from FAR sale. (e.g., Tokyo Station)
- Cost sharing by merging construction with public works (e.g., Shinjuku Station)
- Reduce transit operator’s initial cost by separating infrastructure and operation (e.g., Japan Railway Construction, Transport and Technology Agency prepares and lends operational facilities)
- Loans from public institutions

Key to TOD Success ③ Organizational Capability

Cooperation of different stakeholders, including government agencies involved in urban planning, private land developers, and rail and feeder transit operators, is essential for TOD implementation. If there is a lack of know-how or human resources for implementation, it is vital to consider support from others.

- Cooperation between urban transportation and urban development department (creation of organization in charge of TOD; e.g., Himeji Station)
- Request for support from organizations with know-how and expertise (e.g., UR Agency’s support)
- Smooth licensing via TOD One-stop-shop Service
- Industry, academia, government collaboration and TOD promotion activities (e.g., public interest corporations in Japan)
Three Metropolitan Visions Achieved through TOD

[Metropolitan Structure that Solves Social and Environmental Issues]
- Efficient decentralized urban structure through the formation of subcenters that share the functions concentrated in the city centers
- Formation of sustainable compact urban areas that are not dependent on automobiles by improving pedestrian and public transport access

[Economic and Quality-of-Life (QOL) Improvement of Metropolitan Area]
- Stimulation of economic activity through the formation of business centers where is highly convenient, brisk and attractive
- Improvement of the residential environment and easy access to commercial facilities
- Improvement of public transportation convenience and safety, including improvement of the pedestrian environment and increased barrier-free access

[Comfortable Urban Space based on Local History and Culture]
- Station facades and urban spaces rooted in local history and culture and in harmony with the surrounding landscape

Key to TOD Success

4 Smooth Transfer with Urban Transit Modes

- Smooth, safe, and fast transfer between rail/BRT to city bus, taxi, paratransit, and other feeder modes are important to increase passengers’ convenience and overall usage.
- Adequate-sized station plaza, access road, and last-mile pedestrian flow (between station area and surrounding area).

5 Importance of Non-Rail Business

- In a station with large number of passengers, shopping, office, leisure and other non-rail business should be considered to improve business profitability.
- To raise profit, it is important for transit operators to establish non-rail business.
- It is important to make the distinction from regular shopping and office building development. Also important is to put effort in tenant leasing. (e.g., Gransta (JR East) and Eki Marché (JR West))
- When non-rail businesses are operating smoothly, it will create synergy with increased ridership and farebox revenue.

6 Understanding of Station Area and Site

- It is important to understand the condition of land use, urban development, and mobility at the station area and site level to formulate TOD that matches local characteristics.
- Importance of station building façade as a city’s gate that symbolizes its history, culture and future.
- Number of passengers and rail/BRT modal share in each station can be factors to help understand potential for success. In case of commercial- and business-oriented TOD, (i) more than 200,000 daily passengers can enable large-scale TOD deployment, and (ii) daily passengers between 30,000 and 200,000 can enable partial TOD deployment.
- An integrated regression model which correlates number of passenger with population and density, integrated with data in Japan, Europe, USA, Canada, and Australia, can be used as a Key Performance Indicator (KPI) of TOD from planning to implementation: \( \log_{10}(\text{passenger of a station}) = 0.93456 + 1.15969 \times \log_{10}(\text{population of a municipality}) - 0.66575 \times \log_{10}(\text{area of a municipality}); R^2 = 0.672 \)
4. Case Study of TOD in Japan

Key to TOD Success 1  Legal and Business Support Systems

[Tokyo Station] Special Floor-Area Ratio system and sale of unused air rights
Government did legal revision that allowed JR East to sell unused air rights to finance restoration of the historical station building.

(Source: JICA Study Team based on photo by JR East Design Corporation)

Key to TOD Success 2  Variety of Financing Schemes

[Shinjuku Station] Improvement of transit terminal and new station entrance
By merging construction and cost sharing with the road project, an artificial floor was constructed over the rail tracks; and bus and taxi terminals, station expansion, and commercial building development were integrated into the project. The construction of the artificial floor allows for increased FAR.

(Photo: JR East Design Corporation)

Key to TOD Success 3  Organizational Capability

[Osaka Station] Development of former freight yard
Osaka City commissioned the experienced Urban Renaissance Agency (UR) to develop the infrastructure and other aspects of the former JNR freight yard (Umekita District) in accordance with its development concept of enhancing international competitiveness. After its completion, an organization was established to operate and manage the asset.

5. Metropolitan Structure that Solves Social and Environmental Issues

Redevelopment of the aged east cemeteries to the suburbs, renovated and developed the East-West Passageway.

Along with the road project, the Himeji Castle was converted into a hotel on both sides.

The station platform and roads surrounded by hotel facilities was improved.
City, Saitama New Urban Center, Inato Mirai 21, and others were setting railways to decentralize and area.

Center, the Keiyo Line can reach built with the aim of separating it is a subcenter of Chiba city.

side of Sendai Station, relocated and expanded the station, and among other improvements.

with the improvement of Himeji Station track (continuous grade separation the “Otemae-dori” street connecting castle, a world heritage site, was into a transit mall* and the sidewalks were widened. Station building was also relocated to facilitate the reconstruction, and the view castle from the Shinkansen platform raised. In addition, the north and south piazzas were redeveloped, three ring surrounding the station were constructed, and other commercial/business were built.

Key to TOD Success

[Shibuya Station] Development of pedestrian network
Construction of a multilevel pedestrian network to seamlessly connect Shibuya station, which is located in a valley, with its surroundings.

(Key to TOD Success

[Shibuya Station] Development of pedestrian network
Construction of a multilevel pedestrian network to seamlessly connect Shibuya station, which is located in a valley, with its surroundings.

(Sakura Station) Development of station plaza
Even for a small-scale station, the station plaza is important for transfer between rail and urban transport modes.

(Key to TOD Success

[Shinagawa Station] Development of commercial/business facilities
Station interior is completely overhauled to make room for an in-station commercial facility (Ekinaka). New station was built in the adjacent stabilizing yard and commercial/business facilities are under construction. After the privatization of JNR, the ratio of each JR companies’ non-rail business revenues continues to rise.

(Key to TOD Success

[Shinagawa Station] Development of commercial/business facilities
Station interior is completely overhauled to make room for an in-station commercial facility (Ekinaka). New station was built in the adjacent stabilizing yard and commercial/business facilities are under construction. After the privatization of JNR, the ratio of each JR companies’ non-rail business revenues continues to rise.

(Key to TOD Success

[Shinagawa Station] Station facade that shows locality as a gateway to the city
The east and west facades of the station are contrasting. The east exit has historic streetscape with a giant gate to welcome tourists. The west exit is modern and is primarily a gateway for local residents with bus stops and parking area.

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(Key to TOD Success

[Shinagawa Station] Station facade that shows locality as a gateway to the city
The east and west facades of the station are contrasting. The east exit has historic streetscape with a giant gate to welcome tourists. The west exit is modern and is primarily a gateway for local residents with bus stops and parking area.
5. Case Study of TOD Implementation in Six Metropolitan Areas

The followings are case studies as a reference to the CDM initiator.

**Case 1**  
**Tokyo Metropolitan Area (from 1980s onwards)**

In the 1980s, the Tokyo Metropolitan Area was extremely congested due to its position as the major population and urban center of the region. In response, the Fourth National Capital Region Development plan was formulated to decentralize the Tokyo area and develop suburban cities to relieve the congestion. Additionally, related laws and regulations were introduced, and existing laws and regulations (e.g., the City Planning Act) were revised. TOD was also leveraged by Tsukuba Science City, Saitama New Urban Center, Makuhari New Urban Center, Minato Mirai 21, and others to facilitate the relocation of people and urban functions along new and expanded railway lines.

In the 1990s, the government shifted its policy to make Tokyo more competitive internationally. As a result, TOD policy now focuses on railway operators connecting central Tokyo and surrounding suburban cities.

<table>
<thead>
<tr>
<th>Policy Objective</th>
<th>Metropolitan Level</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Realize the multi-polar and decentralized land use by fixing the concentration of population and urban functions in Tokyo.</td>
<td>Strengthen access between Tokyo and suburban core cities and between suburban core cities by road, rail, and others.</td>
<td>Establish the Advisory Council for the Promotion of Urban Renewal (2000).</td>
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</table>

**Organization**  
Establish the National Land Agency (1974).

**Framework**  

**Policy Development**  
Promote the relocation of government research institutes (86 institutions), universities, and others to the Saitama New Urban Center, Makuhari New Urban Center, Minato Mirai 21, Chiba New Town, Tsukuba Science City, Tachikawa, Hachioji, and others.

<table>
<thead>
<tr>
<th>Policy Development</th>
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<tbody>
<tr>
<td>The Fourth National Capital Region Development Plan (1986); Develop suburban cities, strengthen cooperation, and promote the relocation of population and urban functions from Tokyo to the suburban areas.</td>
<td>Designate Chiba, Tokyo, Yurakuchô, Akhabara, Kanda, Shinkuji, Shingawara, Osato, Shibuya, Ikebukuro, Yokosuka, and Kanazawa Stakes as Special District for Urban Regeneration (1993-1998).</td>
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<th>Policy Plan</th>
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<tbody>
<tr>
<td>Following the &quot;Settlement Concept&quot; proposed in The Third Comprehensive National Development Plan (1977), the goal is to establish a stable land area and urban development within the city, while taking into account the role of the Tohoku region.</td>
<td>Promoting the relocation of population and urban functions from Tokyo to the suburban areas.</td>
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</table>

**Case 2**  
**Sendai Metropolitan Area (from 1970s onwards)**

In line with The Third National Comprehensive Development Plan, the Sendai Metropolitan area has been developed as the economic center of the Tohoku region. TOD components such as commercial and residential area development and the expansion of railway lines were implemented at Sendai Station, along the Airport Access Line, and others.

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<tbody>
<tr>
<td>Ensure its position as the largest economic center in the Tohoku region.</td>
<td>New construction and extension of rail lines and roads to accommodate the expansion of residential areas.</td>
<td>Implementation of urban development as the largest economic center in the Tohoku region. Re-development of the east side of the Sendai station following the post-war land readjustment of the station's west side.</td>
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<td>Following the &quot;Settlement Concept&quot; proposed in The Third Comprehensive National Development Plan (1977), the goal is to establish a stable land area and urban development within the city, while taking into account the role of the Tohoku region.</td>
<td>Promoting the relocation of population and urban functions from Tokyo to the suburban areas.</td>
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<td>Establish the National Land Agency (1974).</td>
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**Framework**  
Implementation of Three Northeast Development Laws (1957), The 3rd Comprehensive National Development Plan Act (1988), and others. Flexible application of Factory Location Law and University Establishment Guidelines, etc.

**Policy Development**  

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<tbody>
<tr>
<td>Development and extension of the Tohoku Shinkansen line (started in 1982 between Moroibara and Omiya). Development of Tohoku Expressway (opened in 1973). Development of the Sendai Station (opened in 1975). Development of the Sendai Station (opened in 1977).</td>
<td>Implementation of urban development as the largest economic center in the Tohoku region. Re-development of the east side of the Sendai station following the post-war land readjustment of the station's west side.</td>
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**Sendai Station**  
Sendai became an ordinance-designated city (1989).

**Sendai Station East District** (from 1983) and Sendai Station East District 2 (from 1988). Utilization of existing system (land readjustment, continuous multi-level crossing, etc.), designation of Sendai urban area as Special District for Urban Renewal (2020), etc.
**Case 3**  
**Paris Metropolitan Area** (from 2009 onwards)

The Grand Paris Act of 2010 started the Grand Paris Project, which involves construction of subway networks in the suburbs and redevelopment of the station areas. The aim is to promote sustainable economic growth and to fix the administrative inefficiencies of the separation of city of Paris and its surrounding municipalities.

<table>
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</thead>
<tbody>
<tr>
<td><strong>Policy Objective</strong></td>
<td>Reinforce the public transportation system that connects the entire Paris metropolitan area as an integrated region with the city of Paris at its core.</td>
<td>Promote urban (re)development linked to the metropolitan level and the corridor level policy.</td>
<td></td>
</tr>
<tr>
<td><strong>Policy Plan</strong></td>
<td>Establish a public corporation that will effectively lead the project as a higher-level organization of the local government and will also be in charge of redevelopment and subway construction.</td>
<td>Redevelopment along the subway line to improve the impact of Subway development.</td>
<td></td>
</tr>
<tr>
<td><strong>Organization</strong></td>
<td>Establish Société du Grand Paris (SGP).</td>
<td>Strengthen organizational capability of administration in each region.</td>
<td></td>
</tr>
<tr>
<td><strong>Framework</strong></td>
<td>Grand Paris Act (2010) and increased lodging and business taxes.</td>
<td></td>
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</tr>
<tr>
<td><strong>Policy Development</strong></td>
<td>Tax increase (120 million €/year) to be provided to SGP, the operator.</td>
<td>Subway construction by SGP. Construction below 4m below ground level, where no compensation for subway construction is required.</td>
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**Case 4**  
**London Metropolitan Area** (from 1999 onwards)


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</thead>
<tbody>
<tr>
<td><strong>Policy Objective</strong></td>
<td>Respond to economic and population growth, strengthen international competitiveness, and address climate change.</td>
<td>Strategic implementation of the objectives above based on The London Plan.</td>
<td></td>
</tr>
<tr>
<td><strong>Organization</strong></td>
<td>Establish Greater London (Greater London Authority, London Assembly, Mayor of London; 1999)</td>
<td></td>
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</tr>
<tr>
<td><strong>Framework</strong></td>
<td>Greater London Authority Act (1999)</td>
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</tr>
<tr>
<td><strong>Policy Development</strong></td>
<td>Expansion of the subway network, including improved access to airports and London Olympics facilities, etc.</td>
<td>Utilise existing systems to promote urban planning (e.g., mixed-use development), rail station-related (e.g., improvement of transportation connectivity), and bicycle/pedestrian-related (e.g., development of pedestrian networks).</td>
<td>Other than as stated above, there are station area developments at 5 Crossrail stations (development profits to be used for Crossrail construction).</td>
</tr>
</tbody>
</table>

**Case 5**  
**Jakarta Metropolitan Area** (from 2022 onwards)

While there has been rapid population movement from Jakarta to the surrounding areas, the road and rail network connecting both has been slow to develop. In the surrounding areas, residential development is progressing without connecting to the existing rail network. There is an urgent need for TOD that coordinates development within the metropolitan area and the public transportation network.

<table>
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</thead>
<tbody>
<tr>
<td><strong>Policy Objective</strong></td>
<td>Improve the quality of life and reduce road traffic congestion.</td>
<td>Various conditions need to be established to facilitate TOD implementation.</td>
<td></td>
</tr>
<tr>
<td><strong>Policy Plan</strong></td>
<td>Update of the Metropolitan Area Transportation Master Plan (Conversion to an effective plan) is an issue.</td>
<td>Strengthening local government’s ability to plan and implement TOD is an issue (integration of TOD systems of various ministries).</td>
<td></td>
</tr>
<tr>
<td><strong>Organization</strong></td>
<td>Improve cooperation between urban development and urban transportation.</td>
<td>Strengthening collaboration among ministries and departments in charge of TOD is an issue.</td>
<td></td>
</tr>
<tr>
<td><strong>Framework</strong></td>
<td>Need to establish a national-level model project to support coordinated planning and project development by urban development and urban transportation and a new system to support project financing.</td>
<td>Need to establish organizations to support TOD development</td>
<td></td>
</tr>
<tr>
<td><strong>Policy Development</strong></td>
<td>Collaborative organizations are key to TOD implementation. Need to strengthen cooperation between public and private sectors.</td>
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</tbody>
</table>
Population and urban functions are increasingly concentrated in Bangkok’s built-up area. The Bangkok Central Station in Hua Lamphong is congested all day, while slowly deteriorating and losing its functionality. In response, the Thai government has decided to promote the development of smart cities as well as industrial and technological innovation under its "Thailand 4.0" policy. As the first step, the Ministry of Transportation and the State Railways of Thailand built a new central station in the Bang Sue district with multiple train lines arriving and departing, and is currently developing the station area (372 ha).

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<tr>
<td>Solution to the population and urban functions concentration in the Bangkok’s built-up area.</td>
<td>Starting with the connection of the Blue Line (Hua Lamphong to Bang Sue) in 2004, several lines will be consolidated at Bang Sue, making it the new central station of Bangkok.</td>
<td>The station area will be developed as a smart city (372 ha), aiming to create a diverse city with business, shopping, residential, cultural and tourist facilities to become the hub of Bangkok as an international city.</td>
<td>Introduce advanced technology and ICT in smart cities to avoid concerns about future urban problems.</td>
<td></td>
</tr>
<tr>
<td>Policy Plan</td>
<td>Implement Thailand 4.0, which will accelerate the digitalization of the economy and society. Break out of the “middle-income trap” and become a developed country in 20 years.</td>
<td>National Digital Economy Commission (chaired by the Prime Minister; Members include experts)</td>
<td>Organizational development for smart city implementation in Bang Sue.</td>
<td></td>
</tr>
<tr>
<td>Organization</td>
<td>Smart Cities Commission (chaired by the Deputy Minister of Transportation).</td>
<td>Seven smart criteria were established. Working groups were established for each standard, with the Office of Transportation Policy and Planning (OTP) as the secretariat.</td>
<td>Because it is the first time, technical assistance from Japan’s JICA and URBAN are requested.</td>
<td></td>
</tr>
<tr>
<td>Framework</td>
<td>To avoid risks associated with operation and maintenance, the private sector, which is the contractor, assumes the risk. Fares are determined by the government’s upper and lower limits, and contractor operates within the limits.</td>
<td>Railway: Development and connection of BTS Line, Purple Line, Red Line, Yellow Line, and Airport Link line. Utilize Japanese government loans and others for the development.</td>
<td>The project is implemented in three phases of 5 years each: short, medium, and long term. The project is planned to be completed by 2032 and will be financed by Japanese government loans and others.</td>
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</tbody>
</table>

6. Steps to Achieve TOD

Step 1 Metropolitan level: Clarification of objectives/targets and issues

Step 2 Proposal for landuse and Corridor Masterplan (CDM) (Incl. Leader/Integrator for Metropolitan development, Legal and Business Support Systems and Financing)

Step 3 Planning and Implementation for Corridor

Step 4 Corridor Development Masterplan (Incl. Implementing body, Legal and Business Support Systems and Financing)

Step 5 Implementation of each TOD project

Step 6 Establishment of Corridor/Station area management body and carrying out of its sustainable activities

*This material is prepared based on the Study: "Information Collection & Confirmation Study on Planning & Implementation of TOD for Sustainable Cities around the World." Summary report is available through JICA Library Portal Site. (https://www.jica.go.jp/english/about/organization/library/index.html)

Japan International Cooperation Agency (JICA) is in charge of administering all Japanese ODA such as technical cooperation, Finance and Investment Cooperation and Grants in an integrated manner. JICA, works in over 150 countries and regions and has some 90 overseas offices.