Abstract

This Technical Note documents the core messages from the 2nd Technical Deep Dive on Transit-oriented Development (TOD TDD) held in Tokyo on May 29 – June 2, 2017 by World Bank TDLC in collaboration with Tod CoP and the Government of Japan. The 3V Framework was introduced to participants as a comprehensive and systematic tool to assess development potential for TOD projects. The framework aims to increase and align node value, place value, and market potential value in the public transportation network. A detailed session on TOD financing clarified how to further increase land value through densification, expansion of catchment area, and paying attention to quality aspects of public transit and TOD areas. Key takeaways from Japanese cases were: land readjustment and urban redevelopment as effective land development methods; cost sharing schemes between the national and local governments and private sector; the need for the public sector to display leadership by laying out plans and visions; and consensus building made easier by breaking down challenges and minimizing the number of counterparts to deal with at once.

Transit-oriented Development and Challenges

Transit-oriented Development (TOD) aims to develop a public transportation system with socio-economic activities concentrated around transit hubs. In addition to achieving improved urban mobility and economic agglomeration, well designed TOD enhances affordability by lowering transport and housing costs, creates lively communities around stations, and promotes resilience through better allocation of residents and urban structures. The fact that TOD can be partly self-financed through land value capture (LVC) is yet another important dimension.

Building on the 1st TOD TDD which laid out the basic concepts of TOD, the 2nd TOD TDD delved deeper into the implementation side and discussed how to make TOD happen in participating cities. Their challenges are summarized below.
Retrofitting TOD
Implementing TOD in a built-up area incurs more challenges than starting a new green-field project. Ensuring interoperability with existing transport modes is proving difficult for many cities, not to mention the physical integration with the existing city fabric. Furthermore, cities face challenges in guiding their citizens away from car-oriented mobility habits to transit-oriented behaviors. Sufficient ridership is essential for a TOD project to be sustainable. Cities including Chengdu (China), Suzhou (China), Harbin (China), Thessaloniki (Greece), Pakistan, Belgrade (Serbia), and Dar es Salaam (Tanzania) listed retrofitting TOD as a key challenge.

Sustainable Financing
Public transportation systems require large upfront investments and continuous operating expenses. Even if the initial barrier is overcome and the system is put in place, public transport operators typically rely on subsidies because fare-box revenues are often insufficient to cover operating expenses. Fortaleza (Brazil) and Belgrade suffer from significant fiscal gaps, and Guiyang raised the lack of private participation as one cause for this problem. These cities were interested in the self-financing dimension of TOD and were looking for successful LVC models.

Legal and Regulatory Frameworks
Many TOD projects start with land acquisition, and in many cases, this initial stage can be a severe bottleneck for project implementation. Strong legal frameworks for land acquisition can significantly speed up the process. Moving away from land acquisition and searching for alternative ways of securing land can also be effective, as is exhibited in Japanese cases.

Various value capture mechanisms such as floor area ratio (FAR) adjustment, land and land use lease, and property tax are effective only when combined with strong land administration systems and regulatory frameworks. These systems and regulations must be well designed and enforced. Once in place, these systems and regulations allow the public sector to provide pertinent incentives for the private sector to participate in the project and make social contributions.

Chengdu, Suzhou, Harbin, Pakistan, Cebu (Philippines), Belgrade, Dar es Salaam, and Danang (Vietnam) are cities that raised the lack of strong legal and regulatory frameworks as one of their challenges, with emphasis on land administration.

Inter-jurisdictional Coordination
TOD is not a linear process. Ideally, it should be a back-and-forth process between urban planners, transport planners, economic development officials, and real estate developers. Cities wanted insights on consensus building among different divisions and departments within a municipal government, task divisions and cost sharing between the national and municipal government, and how to bring the private sector on the the project. Guiyang is faced with coordination issues with existing planning, regulatory, and operating agencies. Danang needs national standards, laws, and procedures to enable TOD, not to mention a coordination mechanism between government agencies. Pakistan is facing national subsidy issues for its mass transit projects.
Setting the Ground

3V Framework

The 3V Framework focuses on three key dimensions, or values, to be considered in TOD planning and implementation: Node Value, Place Value, and Market Potential Value. The framework aims to assist planners in increasing, and more importantly, aligning the three values.

“Corridor development is about leveraging different land uses and a mix of people from different socio-economic backgrounds along the corridor. It is not just about transport.”
Gerald Ollivier
TOD CoP Lead, World Bank

NODE VALUE

The node value represents the importance of a station in the public transportation network derived from its passenger traffic volume, inter-modality, and centrality within the network. This value can be enhanced by increasing the number of connecting lines/modes, interlinking neighboring stations into clusters, and increasing accessibility within the network.

PLACE VALUE

The place value reflects the urban quality and diversity of a place and its attractiveness to residents in terms of amenities, facilities, and local accessibility to daily needs created by mixed land use patterns and urban design. This value can be increased by pursuing compactness, allowing different usages among floors, concentrating commercial, cultural, and educational amenities, designing neighborhoods that promote walking and biking, and creating a vibrant public realm.

MARKET POTENTIAL VALUE

The market potential value denotes unrealized market value of station areas considering major determinants of demand including densities of jobs and residents, accessibility via public transit, and land market dynamics. This value can be increased by achieving densification of jobs and residents, diversity of land parcels for a vibrant land market, social diversity, and higher floor area ratio (FAR).

No city has uniform densities, and understanding the city’s hierarchical densities around their public transportation network is a necessary first step in the application of the 3V Framework. In a project in Zhengzhou (China), for example, the node value was calculated based on ridership and connectivity to multiple lines and modes. An assessment of place values around stations revealed that the place value fluctuates greatly within the urban space. Finally, market potential value was assessed based on economic attractiveness, land/real estate opportunities, market prices, and other indicators. Once articulated, the three values and their respective densities can be plotted onto the public transportation network of the city. Planners can use this diagram to discuss specific measures to increase and align the three values. For more information, please refer to Salat and Ollivier, 2017.

“Structures and urban space are not flat.”
Serge Salat, President, Urban Morphology and Complex Systems Institute

Curitiba, Brazil

Density is high where it matters (articulated density) and shows the alignment of the three values.
TOD Financing through Land Value Capture

LVC allows TOD projects to be partly self-financed and is critical for sustainable urban development. However, value must be created before it can be captured. The existence of public transit by itself adds value to the city, but TOD can further increase land values by expanding influential or catchment areas and paying attention to quality aspects of public transit and TOD areas.

“Land value must be created before it can be captured.”

Belgrade, Serbia

VALUE CREATION 1: ENLARGED INFLUENTIAL AREA

The influential area of the TOD project can be enlarged vertically and horizontally. In other words, the quantity of valuable assets can be increased through densification and the expansion of catchment area.

Tools for densification include FAR increase, transfer of development right, land adjustment, and urban redevelopment. However, when discussing density, articulated density is more meaningful than average density. Curitiba is a good example where the city has a well-designed and functional TOD model with high densities in high-quality areas along transit corridors despite its low average population density in global standards.

Tools to expand catchment area include transit feeders, bus terminals, station plaza, and bicycle lanes. The definition of station accessibility should not be confined to walking distance alone since many cities, particularly those from Asia and Africa, are mega-cities with populations too large to fit into a small area of land determined by walking accessibility. It is possible to expand catchment area by enhancing mode connectivity at stations, as showcased by Japanese cities such as Tokyo and Toyama through their impressive combination of rail and bus connections.

VALUE CREATION 2: QUALITY ASPECTS OF PUBLIC TRANSIT AND TOD AREAS

Quality aspects of public transit and TOD areas such as efficiency, functionality, and comfort further increase land value in TOD areas. Several studies underlined that public transit with a high-quality, pedestrian-friendly design results in higher percentage of land value increase in surrounding areas compared to public transit with a low-quality, non-pedestrian-friendly design. (Cervero, 2004; Renne, 2014)

VALUE CAPTURE

While transit development can be partly funded by fare-box revenues and taxes, cities need to look at additional sources of funding for their TOD projects, as shown by the examples of Hong Kong, Delhi, Tokyo, and Singapore (Murakami, 2012) and their application of LVC.

LVC has two categories: tax/fee-based LVC and development-based LVC. Instruments for the former include property tax, land tax, tax incremental financing (TIF), and betterment levies and special assessments. However, tax/fee-based LVC has challenges such as the unpopularity of taxes, valuation methods, uncertainties, equity issues, and dysfunctional collection systems because of inadequate land registration system.

Development-based LVC aims to share development benefits with all stakeholders. First, the transit agency makes investments and the land value increases due to enhanced accessibility. Then, private developers come in to densify land and diversify land use, working
with agencies to provide suitable amenities to support such densities. The station area becomes a lively community, further increasing land value. The aggregate increase in land value is to be shared among the stakeholders mentioned above. Specific instruments for development-based LVC include land sale/lease, air rights sale, land readjustment, and urban redevelopment financing.

**GLOBAL BEST PRACTICES OF LVC**
The fare-box revenue of Tokyu, a private railway company in Tokyo, covers only 34% of the company’s revenue. The remaining 66% is raised through property developments, station commercial businesses, and rental and management businesses. (Suzuki et al., 2014) Tokyu uses the revenues to further acquire land, build railway corridors, and lead commercial and residential development around its stations.

**Tokyu’s Non-Railway Business**

Hyderabad (India) showcases an innovative Public-Private-Partnership (PPP) scheme where 45% of the project revenue came from real estate. The project was a Design-Build-Finance-Operate-Transfer (DBFOT) scheme, and the private concessionaire was contracted for a project period of 35 years with property development rights for 25 sites and 3 depots and a minimum gap fund (National Government’s subsidies). This PPP scheme was made possible by the government’s special vehicle for land acquisition, statutory clearances, 10% maximum gap funds, and a 300m TOD zone designation.

**Lessons from Japan**

**TOD in Japan**

Tokyo Metropolitan Area is largely reliant on public transit. The whole metropolitan area has around 50% of railway usage, and the number goes up to 80% in the central area. Tokyo’s very dense railway network is run by many different operators, and the area coverage is so high that a station is always within 10 minutes’ walking distance from anywhere inside the famous circular line “Yamanote Line”. Furthermore, land price is higher along railway corridors compared to other parts of Tokyo, implying success in terms of land value creation. The fact that railway development preceded road development and the wave of motorization and the private railway operators’ prominent business model of corridor development are two key backgrounds for Tokyo’s current situation.

**CASE STUDY: TOYAMA CITY**

The aging and shrinking demographic in Japan triggered Toyama’s TOD development. It began with a unique idea to reduce the city’s administrative costs by altering uncontrolled urban sprawl to compact development. Toyama’s TOD is centered around its Light Rail Transit (LRT) system. Construction costs are a tenth compared to subways, and its medium capacity is just the right size for a medium-sized city like Toyama. The circular LRT line has improved transport service levels, and the number of public transit users grew 2.1 times on weekdays and 4.7 on weekends. The increased ridership allowed for redevelopment of the central area by calling in private investments. The city also successfully reallocated citizens by providing subsidies for housings along the LRT corridor.

Source: Toyama City
Japan’s TOD can be categorized into corridor development in suburban areas and terminal station development in central areas. The corridor development model maintains profitability by increasing land value and thus securing sufficient ridership. Japanese cities have built commercial facilities, residential areas, and universities in the suburbs to create passengers flow in the opposite direction of commuting seven days a week. Corridor development was first implemented by Hankyu in 1910 and is now the dominant business model for private railway companies in Japan.

Today, Japan is putting more effort into terminal station development in central areas due to population decline, aging, and high per square unit prices. The basic concept is to aggregate urban structures and functions near terminal stations to maximize socio-economic value of limited strategic locations. In many cases, this type of TOD happens as an urban redevelopment project entailing densification. In Tokyo, base FAR for commercial zones is determined based on the type of land use and distance from transit hubs, thus giving the development projects a transit-oriented nature. Furthermore, FAR bonus is a key instrument for governments to control and guide private development by providing incentives.

Land Readjustment

Three commonly adopted project schemes are New Urban Residential Area Development Project, Land Readjustment Project, and Urban Redevelopment Project. Land readjustment, which converts land rights to partial building (i.e. floor) rights in redeveloped areas, is heavily used in Japan, often combined with urban redevelopment, which converts land ownership into shares. This method allows for the reorganization of fragmented land parcels and the development of public facilities through land contribution while at the same time firmly protecting land rights throughout the reploting process. Up to date, approximately 3,700 km² of land was developed or redeveloped by land readjustment, which accounts to 30% of the total urban area in the whole country. Many TOD projects, both corridor development and station development, was made possible with this land assemblage scheme. More information on land readjustment can be found in TDLC’s “Case Study on Land Readjustment in Japan”.

A DIFFERENT VIEW: DEVELOPMENT-ORIENTED TRANSIT?

Typically, public transportation networks are given as preconditions, and planners discuss how to develop the hub stations on corridors. However, in Japan, potential for TOD is often included in the criteria for the feasibility study. In other words, the alignment of transit may change considering TOD opportunities. This approach allows for flexible and large-scale interventions while requiring long-term planning, larger planning scope, and complete coordination among agencies. Perhaps this may be phrased as “Development-oriented Transit (DOT)”.

Source: Tokyo Development Learning Center, World Bank Group
Public Sector Leadership and Cost Sharing

In Japan’s TOD projects, the national government, local governments, and private entities all bear responsibilities and share costs. The national government promotes urban and transport development through laws and regulations, financial support to municipalities, and traffic surveys. Their key role is to create masterplans which draws the boundary of and determines the extent of development, considering national-level spatial priorities while at the same time reflecting regional/city plans. These detailed city plans are prepared by local governments within a one-month timeframe, and this is where the coordination between land use, transport infrastructure, and urban development takes place. Once the city plans are finalized, alterations to the shape and quality of land and construction of buildings are restricted. These plans and visions are the basis for collaborative actions with the private sector.

CASE STUDY: KITAKYUSHU CITY

Kitakyushu’s 8.8km monorail showcases a complex but functional cost sharing model between the national and local government. The corridor was a tram before the development of the monorail. Therefore, the infrastructure parts such as rails and pillars are regarded as roads and are operated by the city. Non-infrastructure parts such as carriages require maintenance costs, and the national government subsidizes a maximum of one third of these costs. When the monorail became earthquake resistant, nearly half of the costs were covered by the national government.

Consensus Building

A large-scale redevelopment project is currently ongoing at Shibuya station, which is one of the biggest hub stations in Japan and its surrounding areas. The project includes reconstruction of railway and non-railway infrastructure (road and storm drainage) as well as the redevelopment of the terminal building. Various stakeholders are involved: national government, metropolitan government, municipal government, local authorities, railway companies, other private companies, and citizens. This case provides valuable lessons on consensus building among a large number of stakeholders.

Shibuya’s project plan was formulated in four phases. In Phase 1, the governments worked with the railway companies to examine the rearrangement of public facilities and residential sites. In Phase 2, the governments and the railway companies together approached local authorities concerning roads, rivers, sewages, and traffic in order to examine the allocation and functions of public facilities. In Phase 3, the governments coordinated with the railway companies again to examine the draft urban plan for the land readjustment project. In Phase 4, the metropolitan and municipal governments released information to local residents and private companies and began procedures to make urban planning decisions for the land readjustment project.

Shibuya’s successful consensus building was made possible by breaking down complex challenges into individual elements (i.e. phases) and minimizing the number of stakeholders for each element. Another key point was that the public sector, either the central or local government, took initiative at every stage of the project. The public sector was always the one to set out a grand vision, and they made sure to back up the vision by explaining its economic rationale.

Within the broad vision set by the public sector, the railway companies and private developers join these redevelopment projects as financially viable investments. The Act on Special Measures concerning Urban Reconstruction allows private developers to
propose the FAR needed to ensure project viability. The final FAR is determined after negotiations between the public and private, and in the case of Shibuya, 13.7 was approved.

More information on Shibuya’s redevelopment project can be found in TDLC’s case study “Overview and Planning Process of Shibuya Redevelopment Project”.

### After Action Plans

On the last day of the TOD TDD, each client city created a detailed After Action Plan based on the key takeaways from the five-day experience. This section shows one detailed example to illustrate how clients contextualized the knowledge they gained.

**Dakar, Senegal**

In their land use plan for 2035, Dakar aims to transform from their present mono-polar urban structure into a multi-polar structure. They will introduce urban growth boundaries and promote development along transit corridors, differentiating each transit hub by assigning a unique function. Key takeaways for Dakar were that value needs to be created before it can be captured, planners must look at articulated densities and development potential instead of average figures, and creative land development tools such as land readjustment have yet to become mainstream. Furthermore, the two TOD approaches in Japan are each applicable to different parts of their city: corridor development to Diamniadio and central area redevelopment to Medina and Guediawaye.

The 3V Framework was directly applicable for Dakar as a comprehensive and systematic tool.

**Future Image of Shibuya Redevelopment Project**

![Image: Future Image of Shibuya Redevelopment Project](Source: Shibuya Station Guide, Japan Station Network)

**BRT Network in Dakar**

![Image: BRT Network in Dakar](Source: Dakar City)
to identify development potential. By utilizing a transport demand model, the city has already identified and mapped out potential hub stations based on the number of transfer passengers and the number of intersecting lines. They now understand that this is the assessment of node value, which is only the first step in the 3V Framework. To assess place value, Dakar will collect data on local pedestrian accessibility, urban amenities, and quality of urban space. For market value, they will analyze the real estate value of potential hub stations by analyzing existing data. After the three values are articulated, they will hold a visioning workshop to discuss initial corridor-level land use for specific station areas. Station area priorities and allocation of institutional responsibilities will be agreed upon in this workshop. From there, they will conduct targeted discussions on development concepts for prioritized stations.

Belgrade, Serbia

Belgrade originally considered it unrealistic to compare their city with booming Asian cities, but they realized that New Belgrade is being developed quite similarly to MM21. Their current Transport Master Plan includes the construction of a metro line, the demolishing of the existing main rail station in the city center, and the construction of two new rail stations on both sides of a river, which is one of the two rivers dividing the city into three areas. The bus and railway systems will be integrated at Node 1, which is the station on the east side, and shopping malls and office buildings will be constructed around Node 2, which is the station on the west side. The former rail station will become the center of a new densified Belgrade.

The biggest highlight for Belgrade was that real estate development can be supported or spurred by new transport facilities; the important question for Belgrade is whether to pursue TOD or DOT. They already had some of the development outcomes figured out and a vision consolidated. The next step for them was to discuss how to develop transit in line with their overall development vision.

In fact, some aspects of TOD such as integration of transport and urban planning were already incorporated in their planning system. Furthermore, as shown in the figure below, the locations of the two new nodes were planned so that they will be well connected to the bicycle path network. In other words, the two nodes were planned to enhance node value by increasing the number of available lines or modes. Building on the TDD experience, as their next step, the city will work more strategically to enhance place value by creating pedestrian-friendly public spaces around the nodes. Specifically, they will plan underground garages, reconstruct the city boulevards, and create the Belgrade Waterfront. General actions they will take to better implement TOD in their city are to build capacity for institutional coordination between transport and urban planners, to develop geospatial tools and data platforms for better decision making and impact assessment, and to prepare policies and guidelines enabling corridor-level development, station-level development, and LVC.
2ND TECHNICAL DEEP DIVE ON TRANSIT-ORIENTED DEVELOPMENT

The 2nd TOD TDD is part of a knowledge exchange series bringing together experts and practitioners to share good practices and experience on specific technical subjects. The program was developed and organized by Tokyo Development Learning Center (TDLC) in collaboration with TOD Community of Practice (CoP). The TDD also leveraged TDLC’s City Partnership Program (CPP) and welcomed Yokohama City, Toyama City, and Kitakyushu City as key resources. Other collaborators include the Ministry of Land, Infrastructure, Transport and Tourism (MLIT) from the Government of Japan, the Institute for Transportation and Development (ITDP), Japan Institute of Country-ology and Engineering (JICE), and Japan Railway Construction Transport and Technology Agency (JRTT). Around 30 clients gathered from Nairobi, Senegal, Tanzania, China, Philippines, Vietnam, Serbia, Greece, Brazil, Bangladesh, and Pakistan, accompanied by TTLs.

Learning materials and presentations from the 1st and 2nd TOD TDD are available internally at the TDLC Technical Deep Dive Group on the C4D platform. Other TOD-related materials are also available internally at the Transit-Oriented Development CoP Group on the C4D platform.

REFERENCES


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