Transport Planning & TOD for Compact, Livable and Productive Cities

Gerald Ollivier
Transport Cluster Leader
World Bank Hub Singapore
TOD COMPARED WITH COMPACT CITIES

TOD
A planning and design strategy to ensure compact, mixed-use, pedestrian and two-wheeler friendly, and suitably dense urban development organized around transit stations. It embraces the idea that locating amenities, employment, retail shops and housing around transit hubs promotes transit usage and non-motorized travel. Well-planned TOD is inclusive in nature and integrates considerations of resilience to natural hazards.

Compact City
The compact city or city of short distances is an urban planning and urban design concept, which promotes relatively high residential density with mixed land uses. It is based on an efficient public transport system and has an urban layout, which encourages walking and cycling, low energy consumption and reduced pollution. A large resident population provides opportunities for social interaction as well as a feeling of safety in numbers and 'eyes on the street'.
| 1 | Align Human/Economic Densities, Mass Transit Capacity and Network Characteristics for Greater Accessibility |
| 2 | Create Compact Regions with Short Commutes |
| 3 | Ensure Resilience of Areas Connected by Mass Transit |
| 4 | Plan and Zone for Mixed Use and Mixed Income Neighborhoods at Corridor Level |
| 5 | Create Vibrant, People-Centric Public Spaces Around Stations |
| 6 | Develop Neighborhoods that Promote Walking and Biking |
| 7 | Develop Good Quality, Accessible and Integrated Public Transit |
| 8 | Manage Private Vehicle Demand |

*Source: World Bank TOD COP*
City
- Access to advanced jobs, specialized services, recreation, shopping
- Mass transit as the backbone
  Bus transport as arteries

Corridor
- High job concentration at core hubs; diversity of use along the corridor
- Integrated active transport and public transport
  Balanced flows

Diverse Neighborhoods
- Access to local jobs, regularly used services, shops, recreation
- High quality space for cycling & walking
  Local bus to corridors
Overview

• Decoupling
• Planning for sustainable accessibility
• Articulating Densities
• Mass Transit + NMT approach (Tianjin)
• Planning at neighborhood level
Decoupling
INTEGRATION OF LAND USE AND TRANSIT: GREEN GROWTH IN COPENHAGEN

Source: LSE Cities. © LSE Cities
HONG KONG: DECOUPLING ECONOMIC GROWTH AND RESOURCE USE BY SHAPING A HIGH DENSITY URBAN FORM SUPPORTED BY TRANSIT

Source: LSE Cities. © LSE Cities
Planning for Sustainable Accessibility
SETTING A VISION WITH CLEAR TARGETS

By 2030 in Singapore

8 in 10 households living within a 10 minute walk from a train station

85% of public transport journeys (less than 20 km) completed within 60 minutes

75% of all journeys in peak hours undertaken on public transport

Source: Alain Bertaud

Land Transport Master Plan 2013
ACCESSIBILITY TO TRANSIT OUTCOMES OF ALIGNING HUMAN AND ECONOMIC DENSITIES WITH TRANSIT LINES

Pedestrian accessibility to rail and metro stations

NY & London: More than half people and more than 2/3 jobs located less than 1 km to mass transit stations

HK: 3/4 of people and 83% of jobs located less than 1 km to mass transit stations

Source: LSE Cities
ZHENGZHOU-URBAN RAIL

City of 6.4 million over 1010 km² and 438 km² of built up area

25km underground metro line 3, US$3 billion/US$250 m WB loan

Two special features

Understanding Accessibility/TOD Opportunities within the city

Ensuring integration across transport modes
MEASURING JOB ACCESSIBILITY

The 3V Framework (World Bank)
OPEN TRANSIT INDICATORS TOOL
OUTPUT: TRANSIT SYSTEM INDICATORS

- Average headway/frequency
- Number of service hours
- On-time performance

- Number of modes
- Total length of transit routes

- Number of stops
- Average distance between stops

- Coverage of stops for certain radius

- Percent of population living within certain radius of a transit stop

- Percentage of jobs can be accessed from certain area within certain time by transit, weighted by the population

- Number of stops
- Average distance between stops

- Coverage of stops for certain radius
To leverage the Tianjin metro system and to promote walking and biking in the urban core (in Heping and Nankai) in order to make transport greener and safer in Tianjin and draw lessons for other large cities.

Component 1: Green Transportation Improvement in Heping & Nankai Districts
Component 2: Metro Access Improvement
Component 3: Public Bike Sharing System Pilot
Component 4: Bus Terminal Development
Component 5: Technical Assistance
Articulating Densities

Source: Serge Salat

Source: Erik Fischer
THE SPIKY URBAN ECONOMY OF GLOBAL CITIES

London
Peak 141,600 jobs/km²

New York
Peak 151,600 jobs/km²

Hong Kong
Peak 120,200 jobs/km²
London’s Jobs hierarchy exponent minus 1, (minus 0.7 for population like in systems of cities in economic geography); one third of jobs, 1.5 million jobs, in 16 km² in London

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Source: Urban Morphology Institute.
Subway networks converge towards a characteristic structure with a dense and interconnected core and with spokes.

Degree centrality describes how connective a station is, that-is how many lines it connects (major interchanges have high degree centrality values).

Closeness centrality describes how close a station is from all the other stations in the network (closeness centrality is a measure of accessibility to a station within the network).

Betweenness centrality describes how many routes go through a given station (the more routes through the network pass through a station, the more “in between” this station is).

Source: QuantUrb, CASA
The stations along Crossrail route where property prices have outperformed compared to the market are the ones located in Central London where both jobs and connectivity are highly concentrated.

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ZHENGZHOU - ARTICULATING DENSITIES

Densities are not uniform

Source: The 3V Framework (World Bank)/Urban Morphology Institute

Need to articulate densities around network

Betweenness centrality of stations
3 VALUE FRAMEWORK

- Increase number of hubs and number of lines/modes they connect to
- Interlink neighboring stations into clusters
- Increase accessibility within the network for all
- Increase compactness (proximity to existing urban activity and short travel time to main destinations)
- Increase diversity of uses
- Increase concentration of commercial, cultural and education amenities
- Design neighborhood that promote walking and biking
- Create a vibrant public realm
- Increase residential density
- Increase job density
- Increase human density
- Increase diversity of land parcels to create a vibrant land market
- Increase social diversity
- Allow for vertical separation of development rights
- Increase FARs

Source: The 3V Framework (World Bank)
PLACE VALUE, NODE VALUE AND MARKET POTENTIAL VALUE

**Node Value**: importance of a station in the public transport network derived from its passenger traffic volume, inter-modality and centrality within a network. It is measured through a composite index.

**Place Value**: urban quality of a place and its attractiveness to residents in terms of amenities, schools and healthcare, type of urban development, local accessibility to daily needs by walking or biking, quality of the urban fabric around a station, size of blocks, network of streets and pattern of land use. It is measured through a composite index.

**Market Potential Value**: unrealized market value of station areas derived through the practice of real estate market analysis. Measured by a composited index considering major drivers of demand including current and future human densities, number of jobs accessible within 30 minutes of transit and major driver of supply (developable land, FAR, market vibrancy).
RESULTS FOR ZHENGZHOU LINE 3

Source: The 3V Framework (World Bank)
Planning at Neighborhood Level

Source: F. Labbe

Source: Hudson Yards website
STRATEGY FOR SUSTAINABLE NEIGHBORHOODS

- Local accessibility based on small blocks and on dense and connected street patterns with at least between 80 to 100 street intersections/km².
- Adequate space for streets. Street network occupies at least 30 per cent of the land and with at least 18 km of street length per km².
- High quality public space.
- Good quality pedestrian connections (sidewalks, street crossings).
- Traffic calming, traffic and parking management.

- Density levels over 800-meter area within walking distance of station depend on magnitude of transit investment.
- Densities of at least 15,000 per km² for sustainable neighborhoods.
Component 1: Green Transportation Improvement in Heping & Nankai Districts

This Component will finance the redevelopment of the streetscape in certain parts of Heping and Nankai Districts, including the creation of an integrated pedestrian and bike network with infrastructure investments in, *inter alia*, street pavement updates, drainage improvements, street facilities, and landscape improvements.

*Source: FSR for Urban Transport Improvement Project (Tianjin PMO)*
Community of Practice on Transit Oriented Development

**Goal:** Developing a critical mass of expertise and resources across sectors and regions to support the implementation of TOD principles in cities.

### City Scale
- Land Use Policy and Strategy
- Legal and Regulatory Framework
- Integrated Land Use and Transport
- Modeling of TOD
- Leveraging Private Sector
- Improving Accessibility around Stations
- Capacity Building

### Corridor Scale
- Understanding Transformation Potential
- Integrated urban/transport development
- Legal and Regulatory Framework
- Design and Planning Guidelines
- Feasibility Study
- Operational guide
- Accessibility Plan and Integrated Transport
- Financing Scheme/LVC
- Citizen Engagement
- Capacity Building
- Evaluation
- Social housing

### Station Scale
- Feasibility Study for PPP and TOD/structuring
- Conceptual Design
- Accessibility planning
- Case Studies
- Public space at local scale

[Graph showing the distribution of various topics across different cities and scales.]
Transit Oriented Development
Community of Practice Website
now OPEN to External Members by Registration

https://collaboration.worldbank.org/groups/tod-cop

For more gollivier@worldbank.org