Transforming the Urban Space through Transit Oriented Development

The 3V Approach

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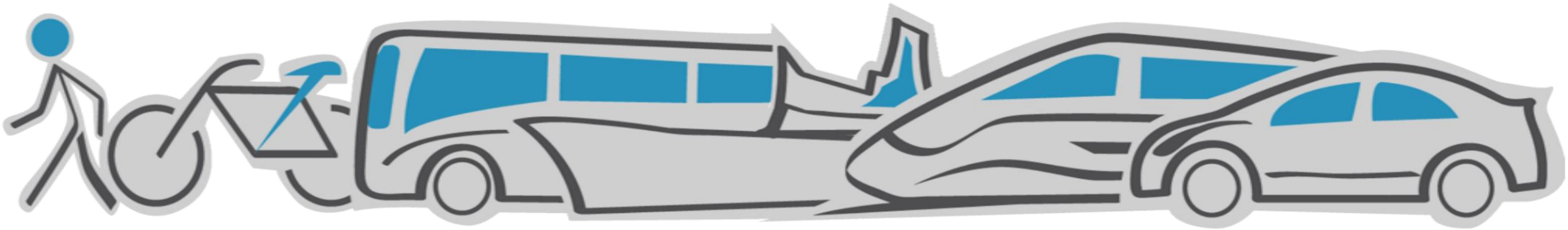
World Bank Hub Singapore

MDTF on Sustainable Urbanization
The China-World Bank Trust Fund



LAND USE AND TRANSPORT INTEGRATION: A HEALTHY CONVERSATION

Land use planning

Transit planning

Here is a land-use vision, conveying a sense of where population, jobs, and other key elements of urban structure will be in 20 years.

Thank you! Here is a sketch of a frequent transit network, including both rapid and local elements, which will serve that land use pattern.

This network creates certain opportunities for land use, and also has inefficiencies that you can eliminate by adjusting the land use. Here are some stations that need to be provided for.

Thanks! Given that, here is a revised land-use plan that would take better advantage of your draft frequent transit network, perhaps by putting more density around the stops.

Also, a couple of years have passed, so here is an updated plan to take us 20 years into the future.

Thank you! Here's an updated transit network plan, reflecting the changes you've made to the land use vision and also extending further into the future.

Notice in our network these new opportunities, challenges, and needs.

The conversation gets updated continually in this way.

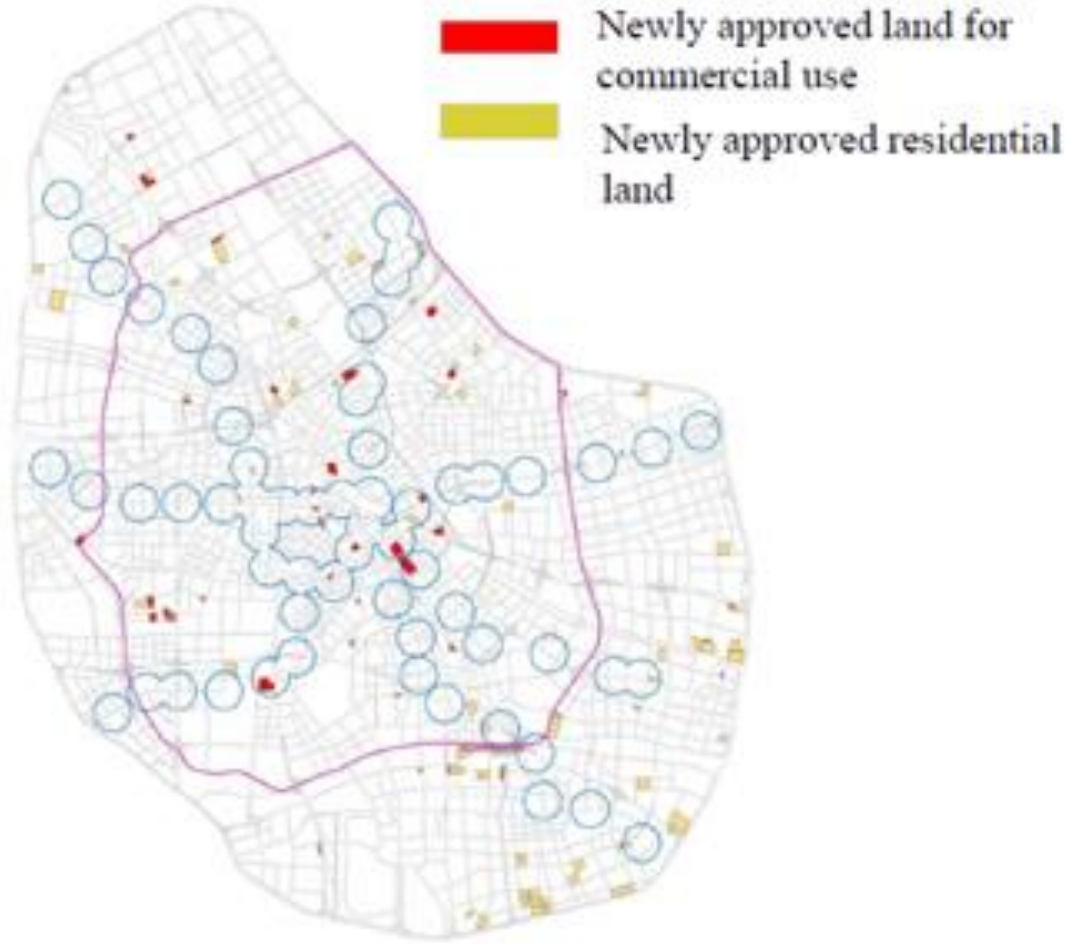
Source: Walker 2002. Adapted with permission from Island Press, Washington DC.

LAND DEVELOPMENT AND ACCESSIBILITY

Only 15% of new development in the access range of metro stations in 2015

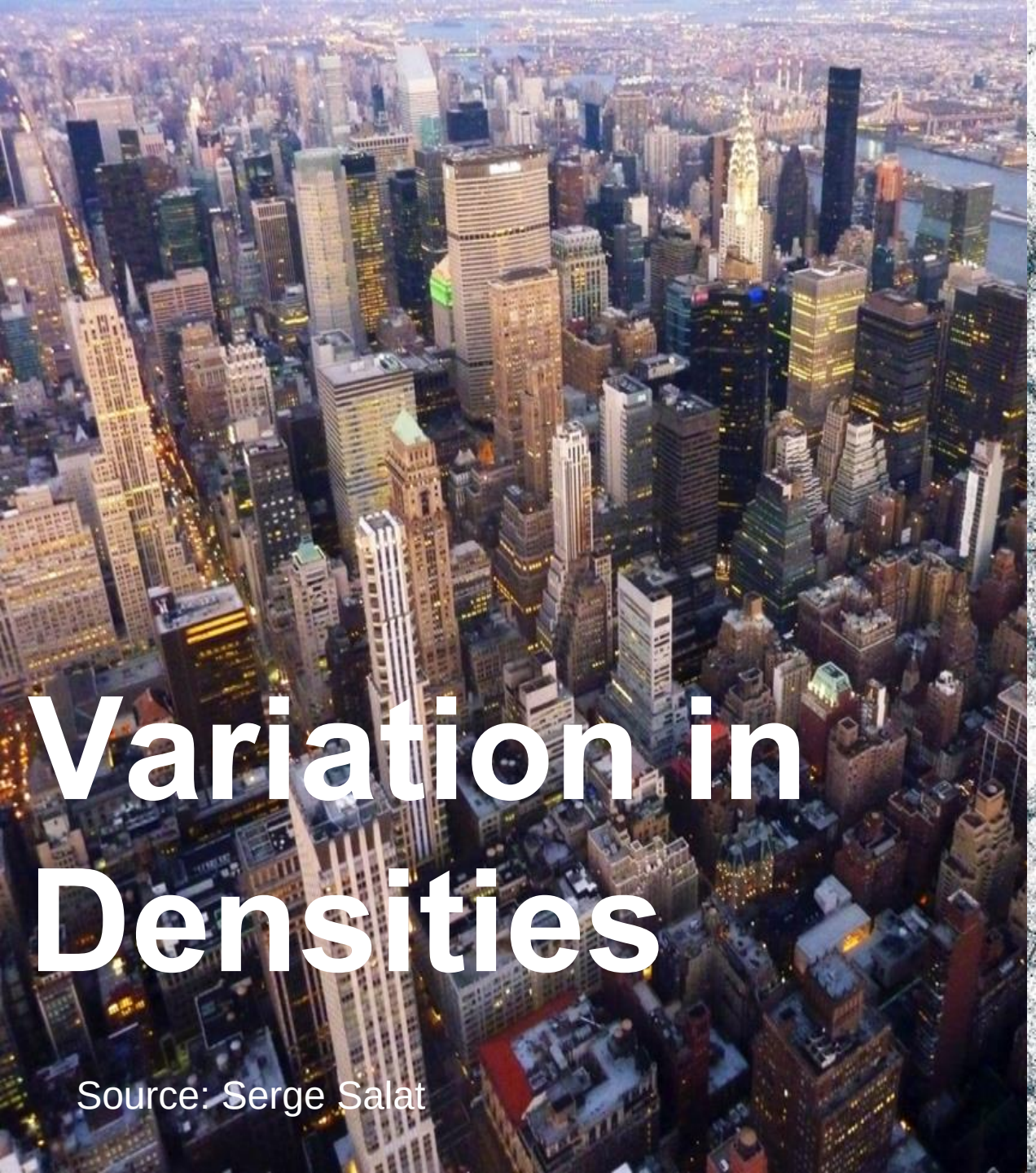
Scope	Scale of construction plots within the coverage (hectares)	Scale of construction plots outside the coverage (hectares)
Residential	2.61	148.87
Public infrastructure	25.29	4.37
Total	27.9	153.2

Guaranteed future congestion

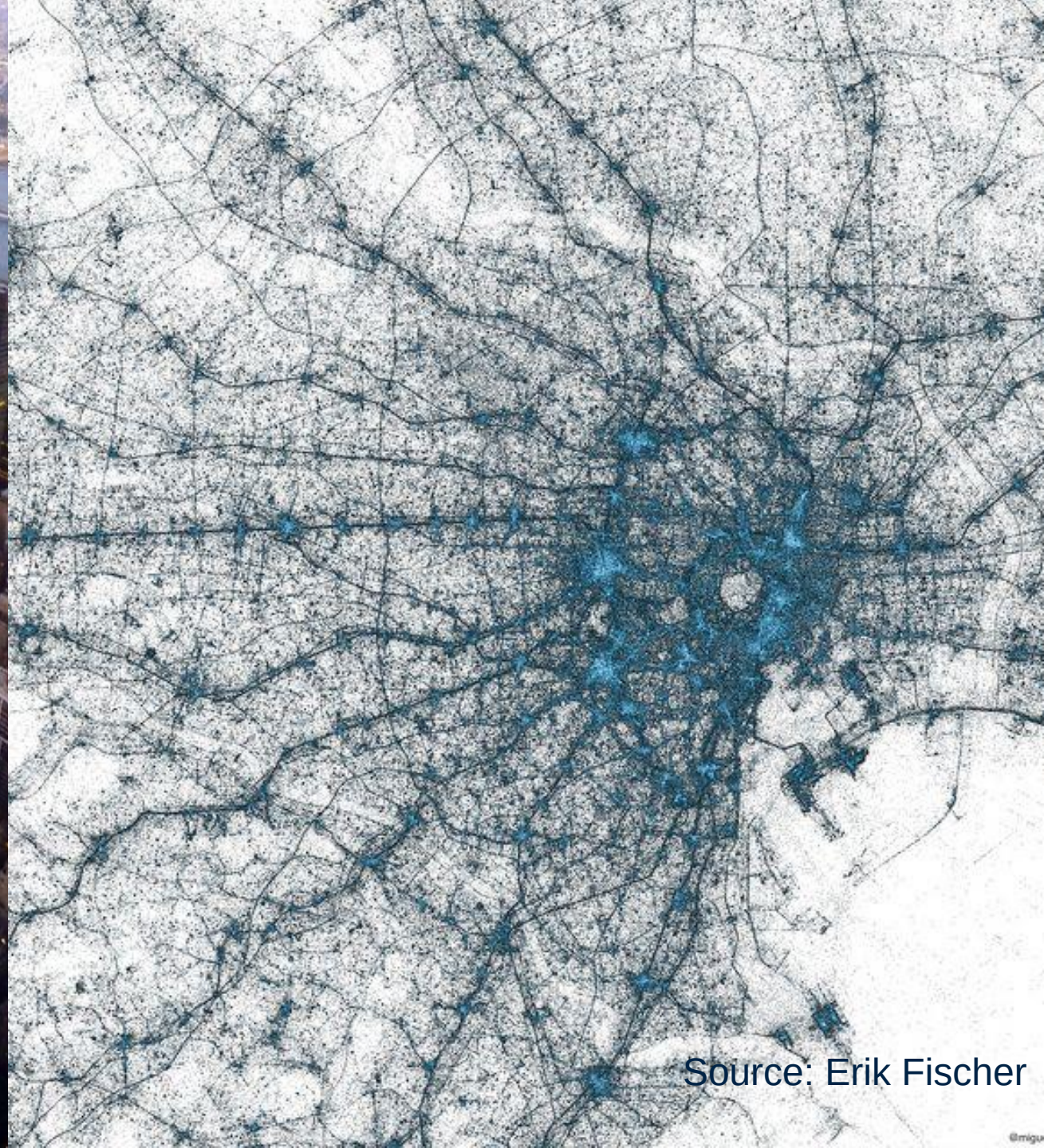


Rail traffic lines relation graph of approved construction plots and status-quo in 2015

Variation in Densities

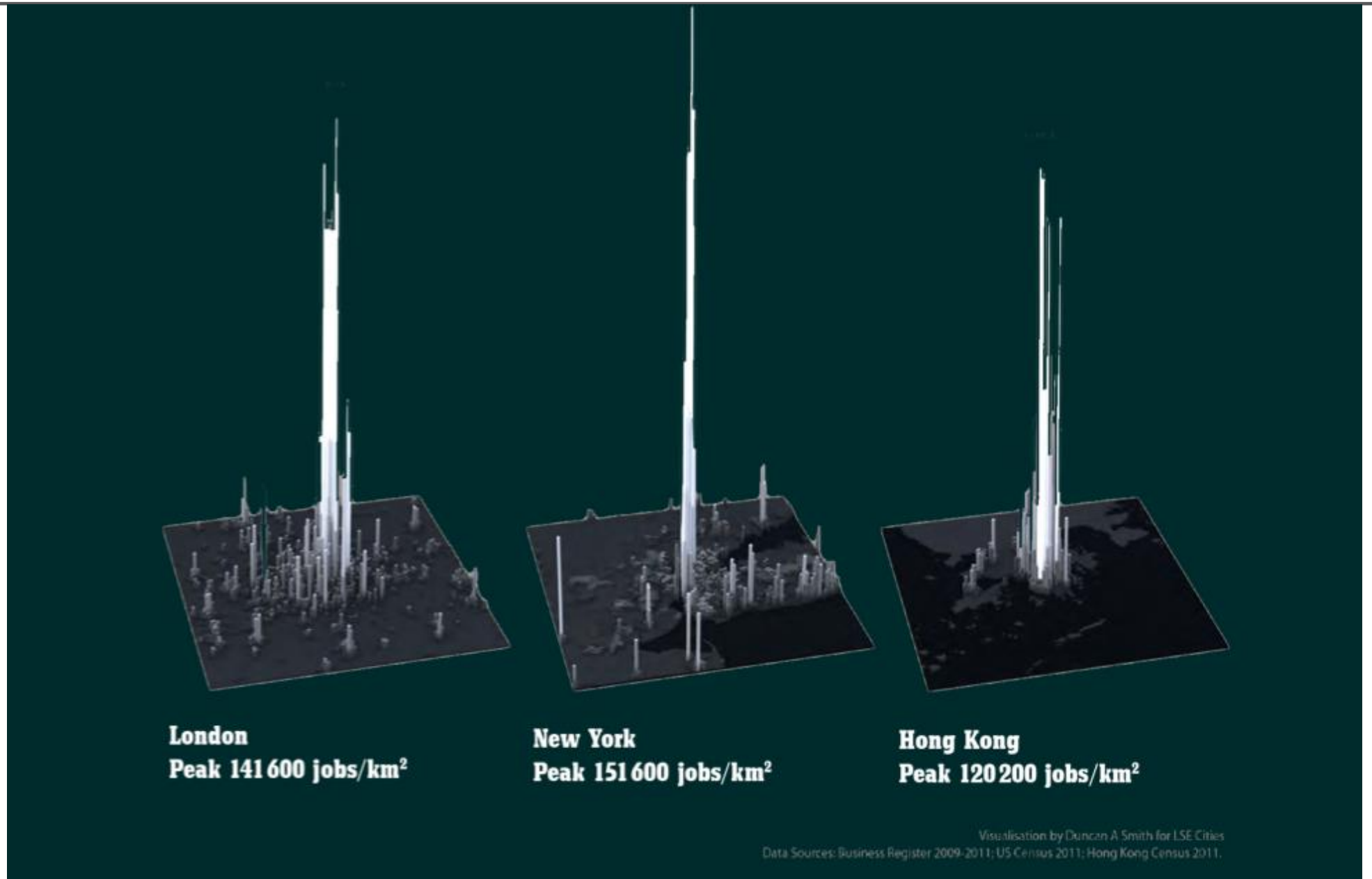


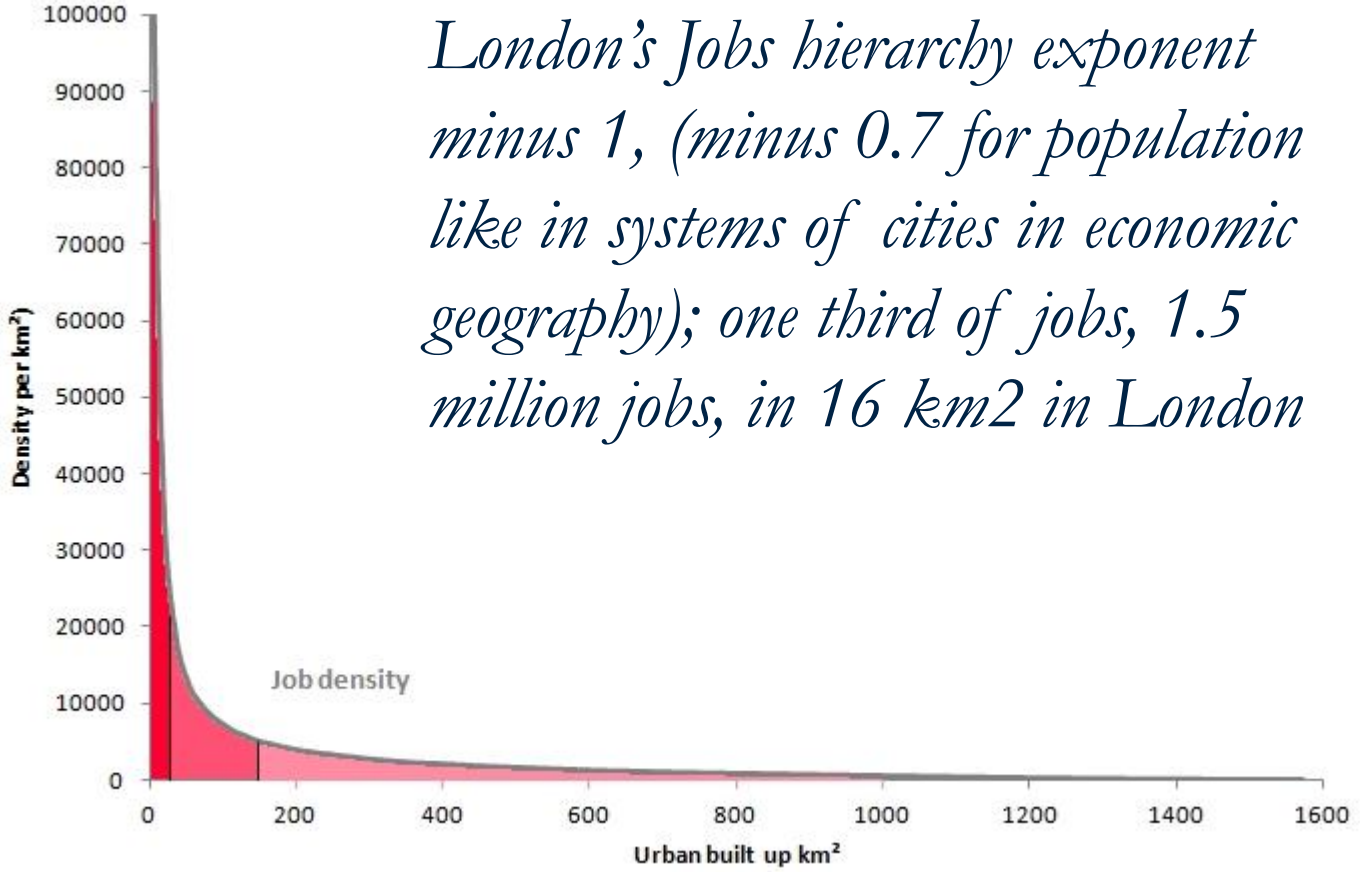
Source: Serge Salat



Source: Erik Fischer

THE SPIKY URBAN ECONOMY OF GLOBAL CITIES



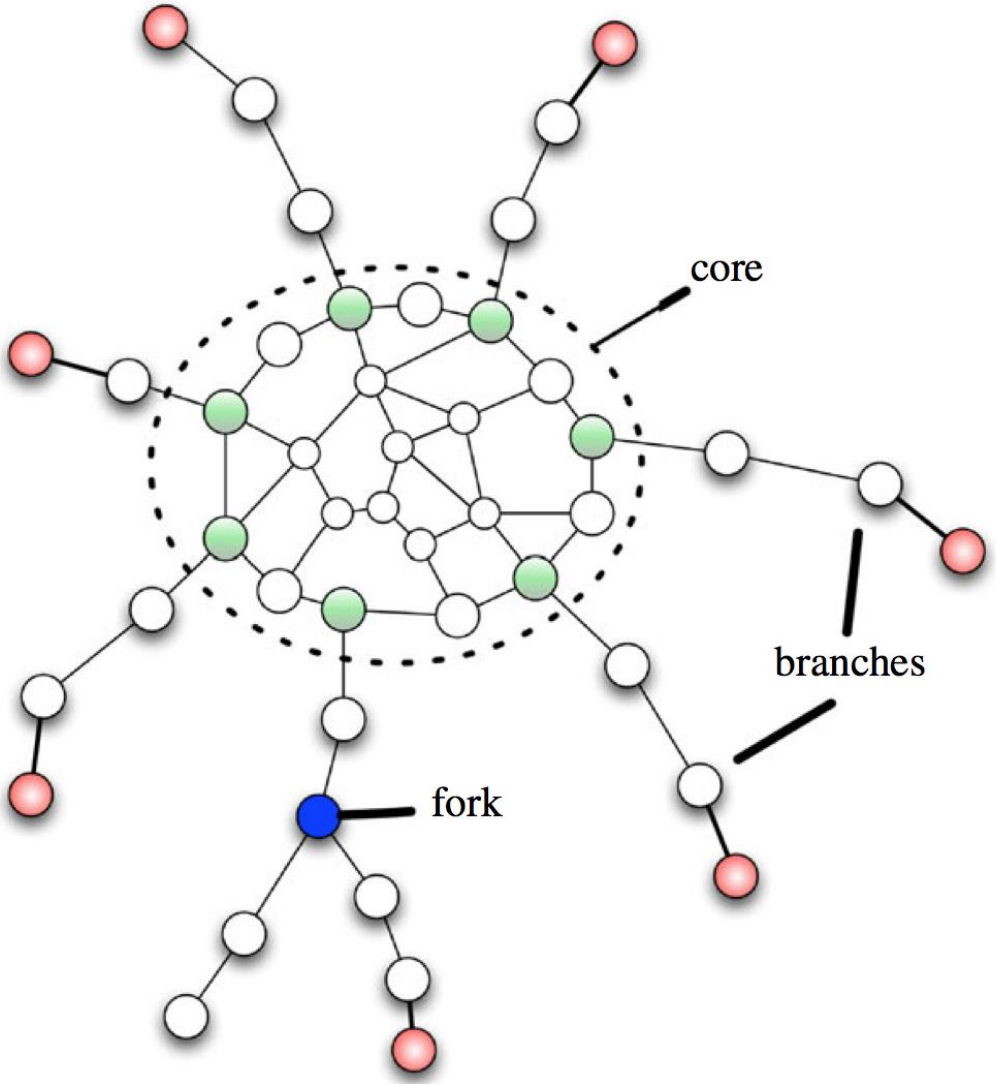


London's Jobs hierarchy exponent minus 1, (minus 0.7 for population like in systems of cities in economic geography); one third of jobs, 1.5 million jobs, in 16 km2 in London

Share	Pop	Area pop	Job	area jobs
33%	2,724,646	145	1,500,160	16
33-66%	2,724,646	285	1,500,160	150
66-100%	2,724,646	1144	1,500,160	1408

Source: Urban Morphology Institute.

SUBWAY NETWORKS CONVERGE TOWARDS A CHARACTERISTIC STRUCTURE WITH A DENSE AND INTERCONNECTED CORE WITH BRANCHES



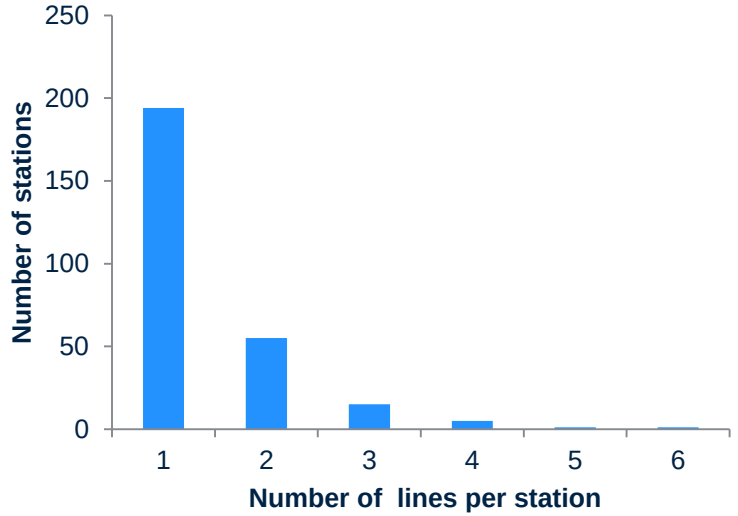
Source: QuantUrb, CASA

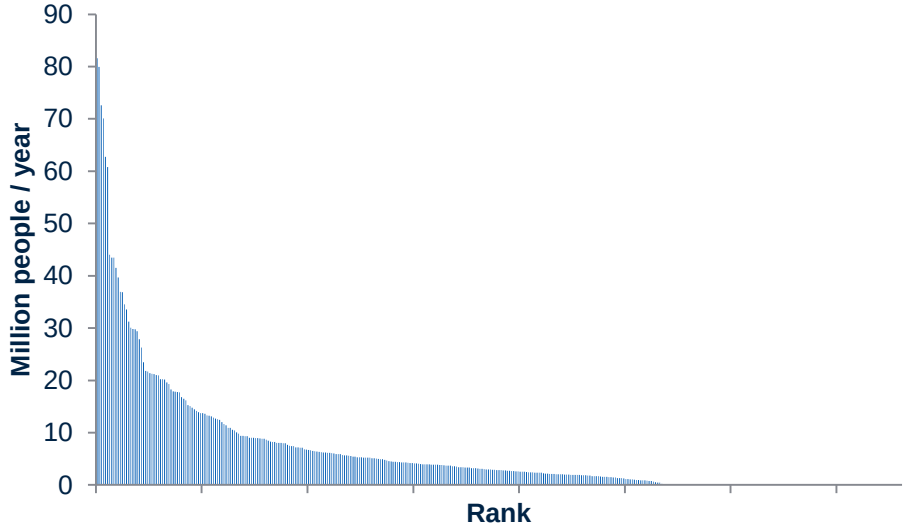
Degree centrality describes how connective a station is, that-is how many lines it connects (major interchanges have high degree centrality values)

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)

NODE VALUE (LONDON TUBE)





Hub, Interchange, Single station

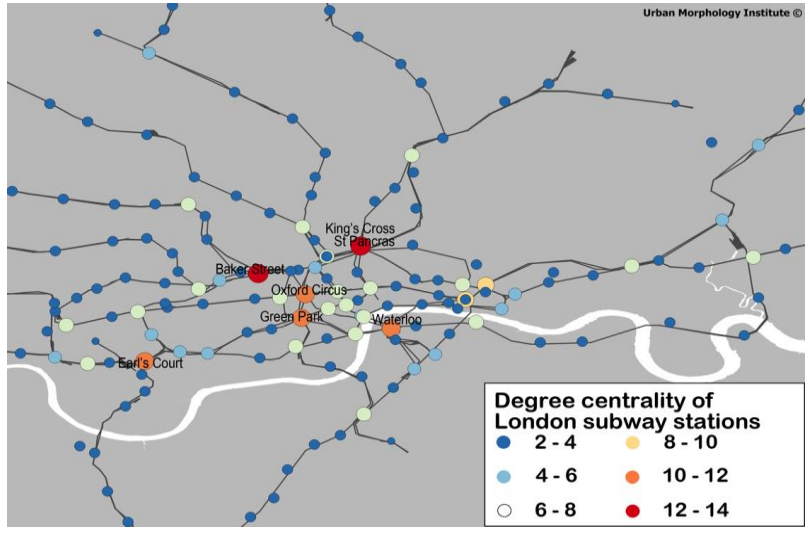
Diversity of connectivity

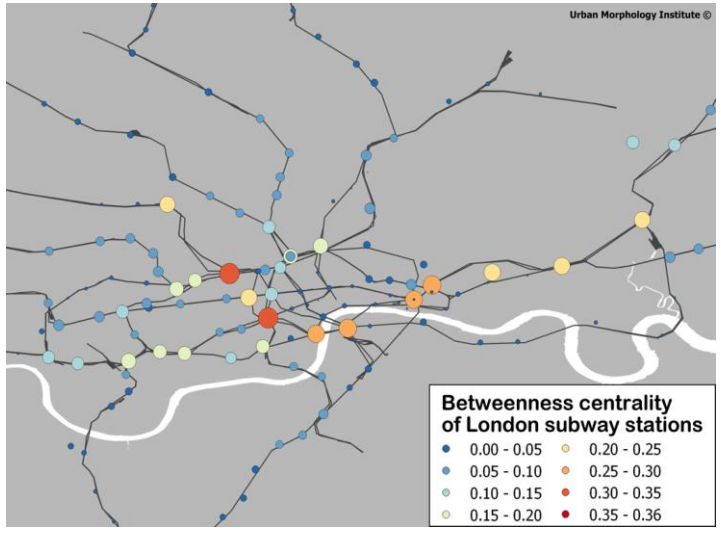
Node Accessibility/Centrality

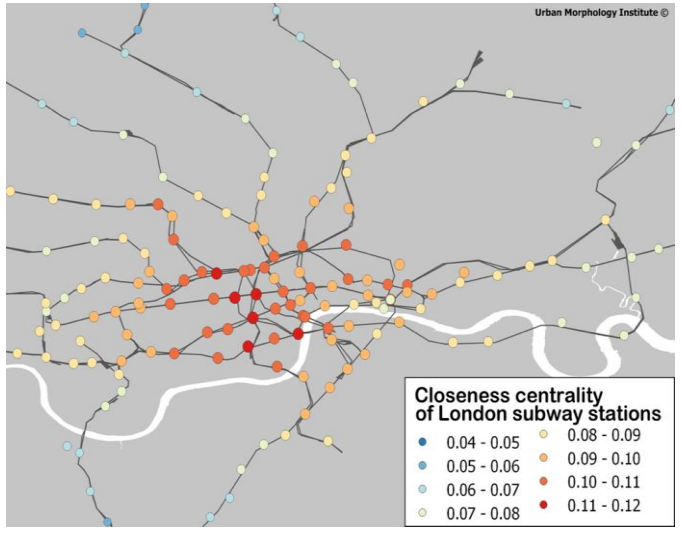
Intensity of node activity

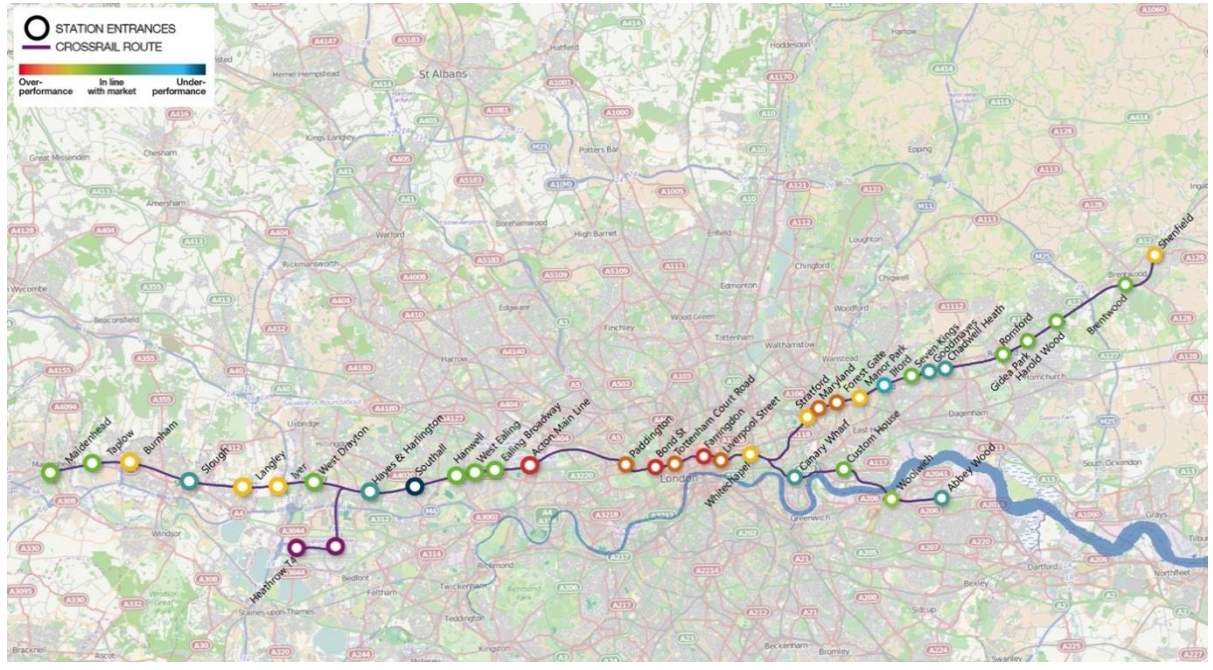
Source: Urban Morphology Institute

NETWORK CENTRALITIES IN LONDON









Centrality Source: Urban Morphology Institute

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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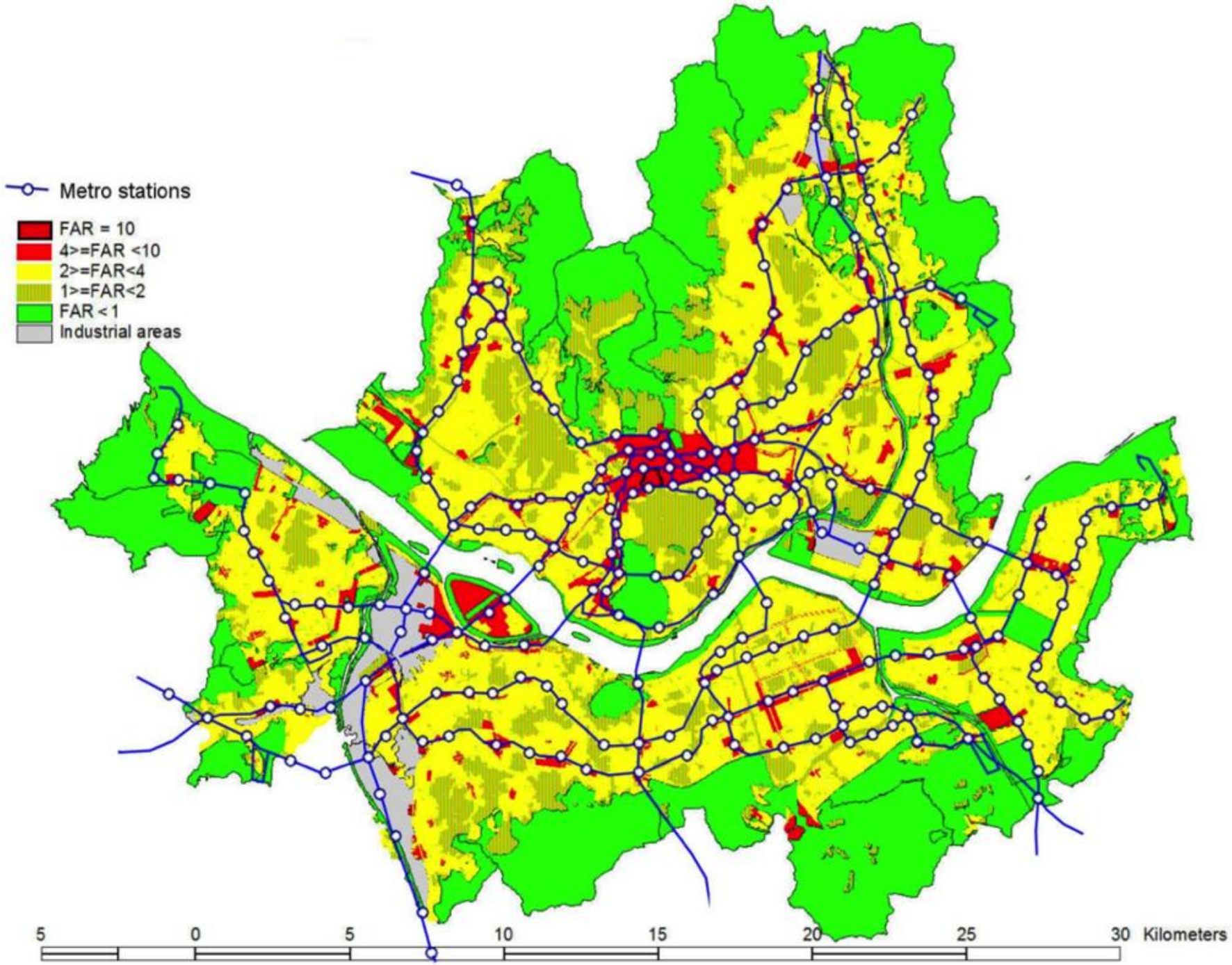


Applying the 3V Framework

3V FRAMEWORK

THERE IS NO ‘ONE SIZE FITS ALL SOLUTION: UNDERSTANDING WHERE, WHEN AND HOW ECONOMIC VALUE CAN BE CREATED REQUIRES A TYPOLOGY

THE 3V FRAMEWORK SERVES THE FOLLOWING PURPOSES

- ✓ Provides a quantified basis for understanding development opportunities around mass transit stations
- ✓ Facilitates interagency dialogue to identify misalignment and imbalances between connectivity, accessibility, place quality and market potential values and create an aspirational vision of future land use based TOD
- ✓ Achieves shared development vision with citizens, private developers, and other stakeholders

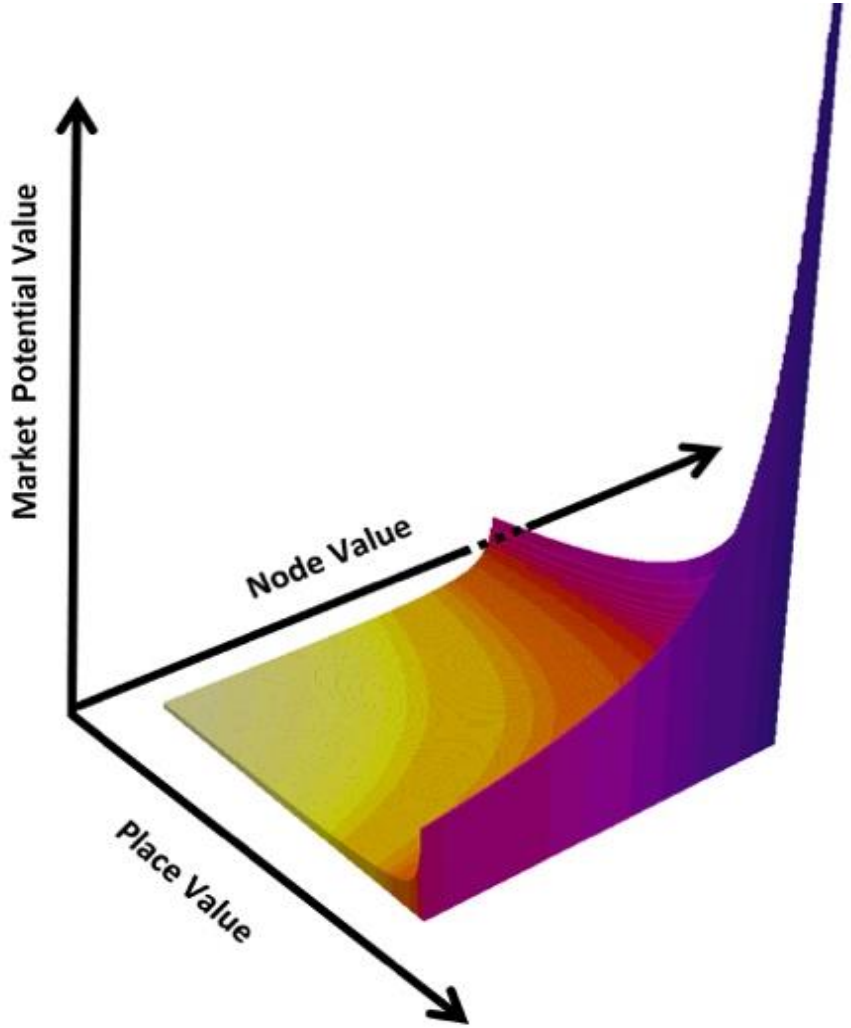
PLACE VALUE, NODE VALUE AND MARKET POTENTIAL VALUE

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.

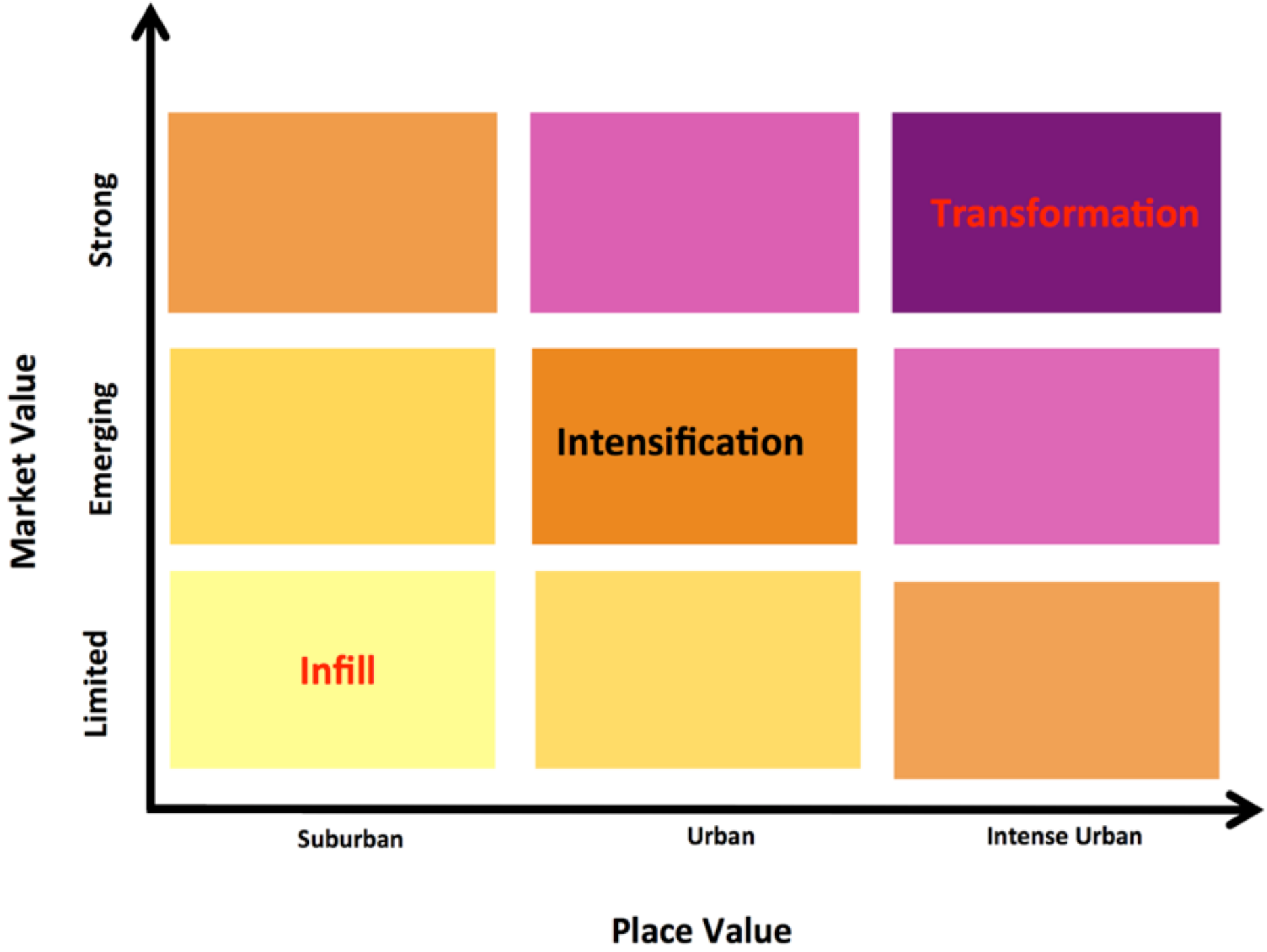
Market Potential Value: unrealized market value of station areas derived through the practice of real estate market analysis. Measured by a composited index considering major drivers of demand including current and future human densities, number of jobs accessible within 30 minutes of transit and major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

INCREASING THE THREE VALUES



Node Value	Place Value	Market Potential Value
• 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 • Increase Floor Area Ratios
Address Imbalances		

Source: The 3V Framework (World Bank)


Market Value
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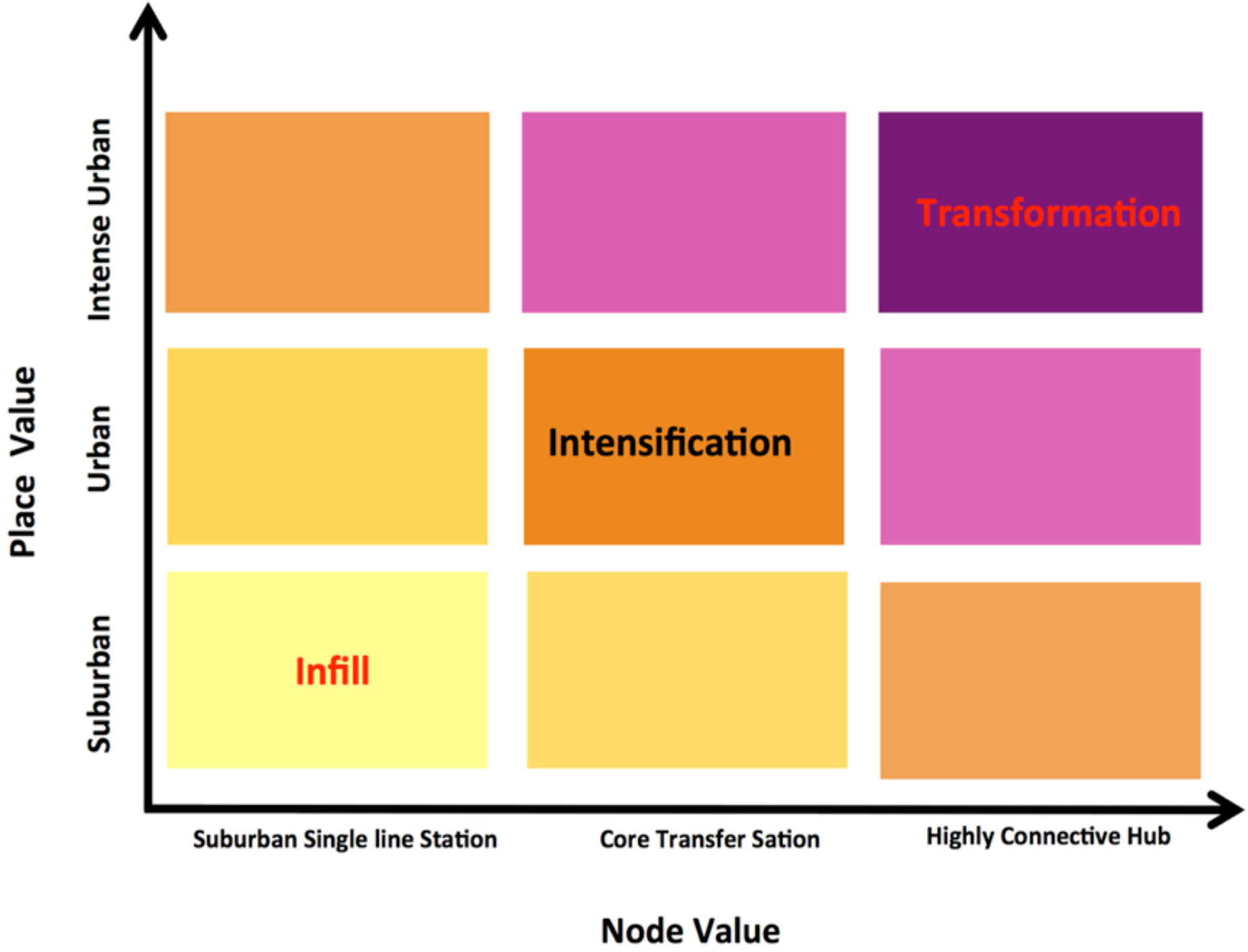
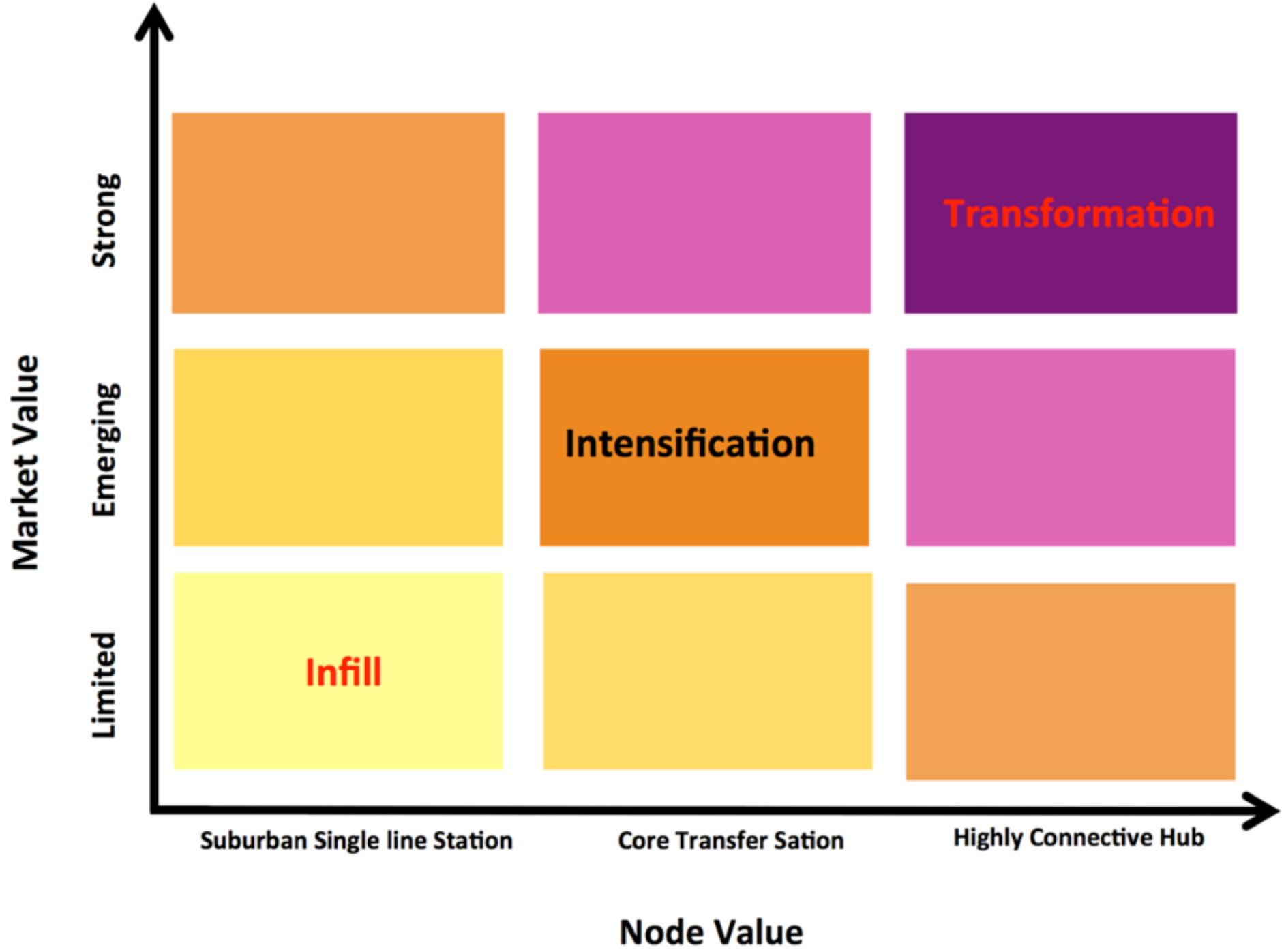
Emerging
Limited
Transformation
Intensification
Infill
Suburban
Urban
Intense Urban
Place Value


Place Value
Intense Urban
Urban
Suburban
Transformation
Intensification
Infill
Suburban Single line Station
Core Transfer Sation
Highly Connective Hub
Node Value


Market Value
Strong
Emerging
Limited
Transformation
Intensification
Infill
Suburban Single line Station
Core Transfer Sation
Highly Connective Hub
Node Value

OVERALL STRATEGIES

Infill is mainly for dependent nodes in suburban neighborhoods with single transit lines and low value market. The strategy there is to:

- Promote long term planning
- Increase activity levels and transit service through increased densities
- Plan and fund multimodal transportation system
- Plan for maintaining equity in vulnerable or challenged communities

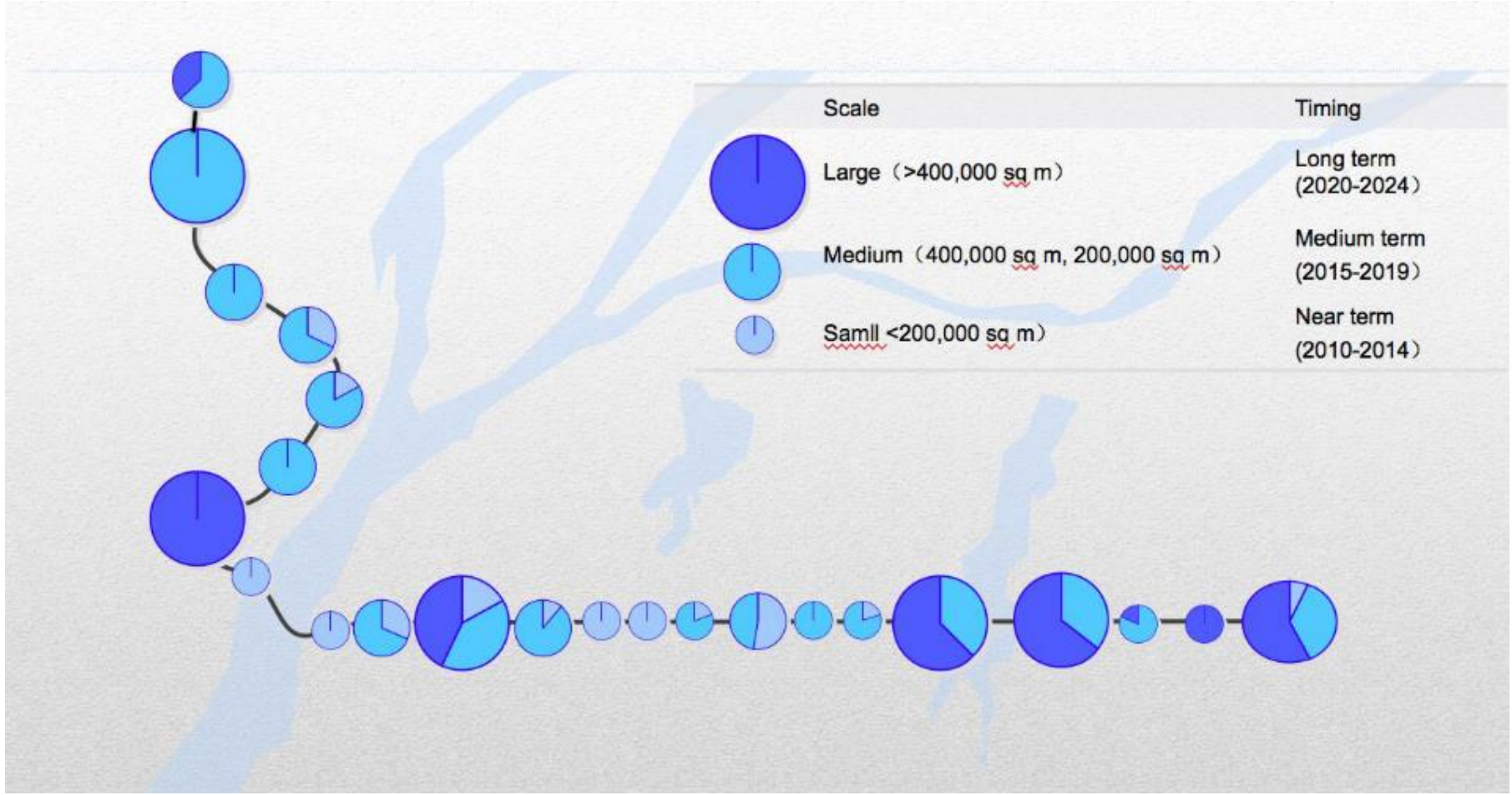
Intensification is for emerging station areas in urban neighborhoods with interchanges and emerging markets. The strategy there is to:

- Invest in catalytic TOD projects to prime and push the market
- Promote development oriented planning
- Evaluate and address missing multimodal connections and accessibility
- Prime areas for affordable housing

Transformation is the strategy to be applied in major hubs where creating a high level of place value through job concentration and good urban design with major investments in public spaces can create high peaks of land and real estate value.

- Invest in aggressive TOD projects to push the market
- Significantly higher densities and lower parking ratios
- Innovative building types and advancements in urban design & living, employment uses and destination
- Encourage some affordable or work force housing
- Foster increased transit service, capacity and amenities to support intensity of uses

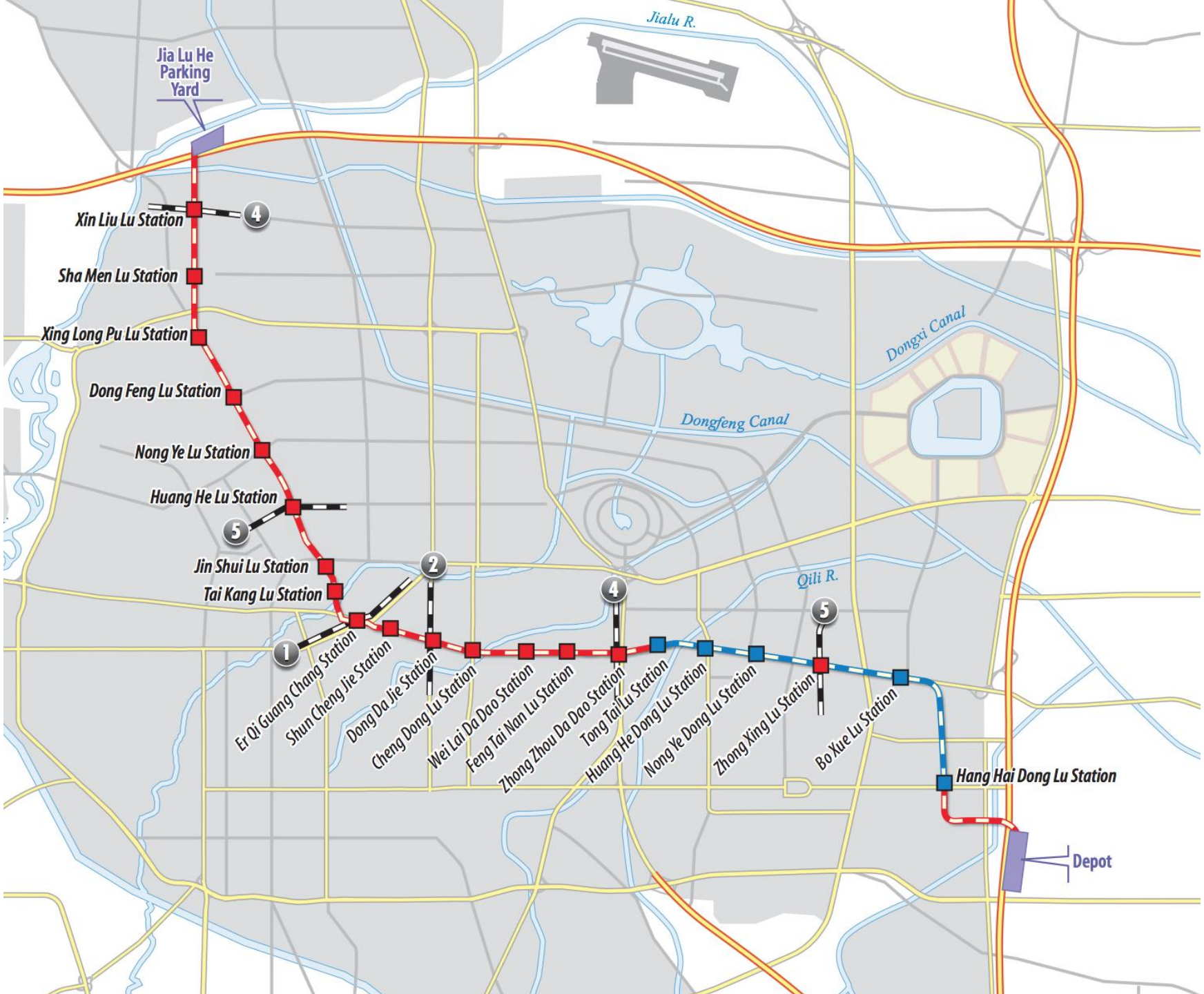
NANCHANG: SCALE AND SEQUENCE OF TOD



Metro Group adopted phased strategy for TOD along Line #1, starting from stations in downtown and move on to the suburbs.

As of 2016, estimated profits from TOD will cover 15-20% of the total construction costs of Line #1 and #2.

Applying the 3V on a corridor: Zhengzhou Line 3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Xin Liu Lu Station
Sha Men Lu Station
Xing Long Pu Lu Station
Dong Feng Lu Station
Nong Ye Lu Station
Huang He Lu Station
Jin Shui Lu Station
Tai Kang Lu Station
Dongxi Canal
Dongfeng Canal
Qili R.
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Er Qi Guang Chang Station
Shun Cheng Jie Station
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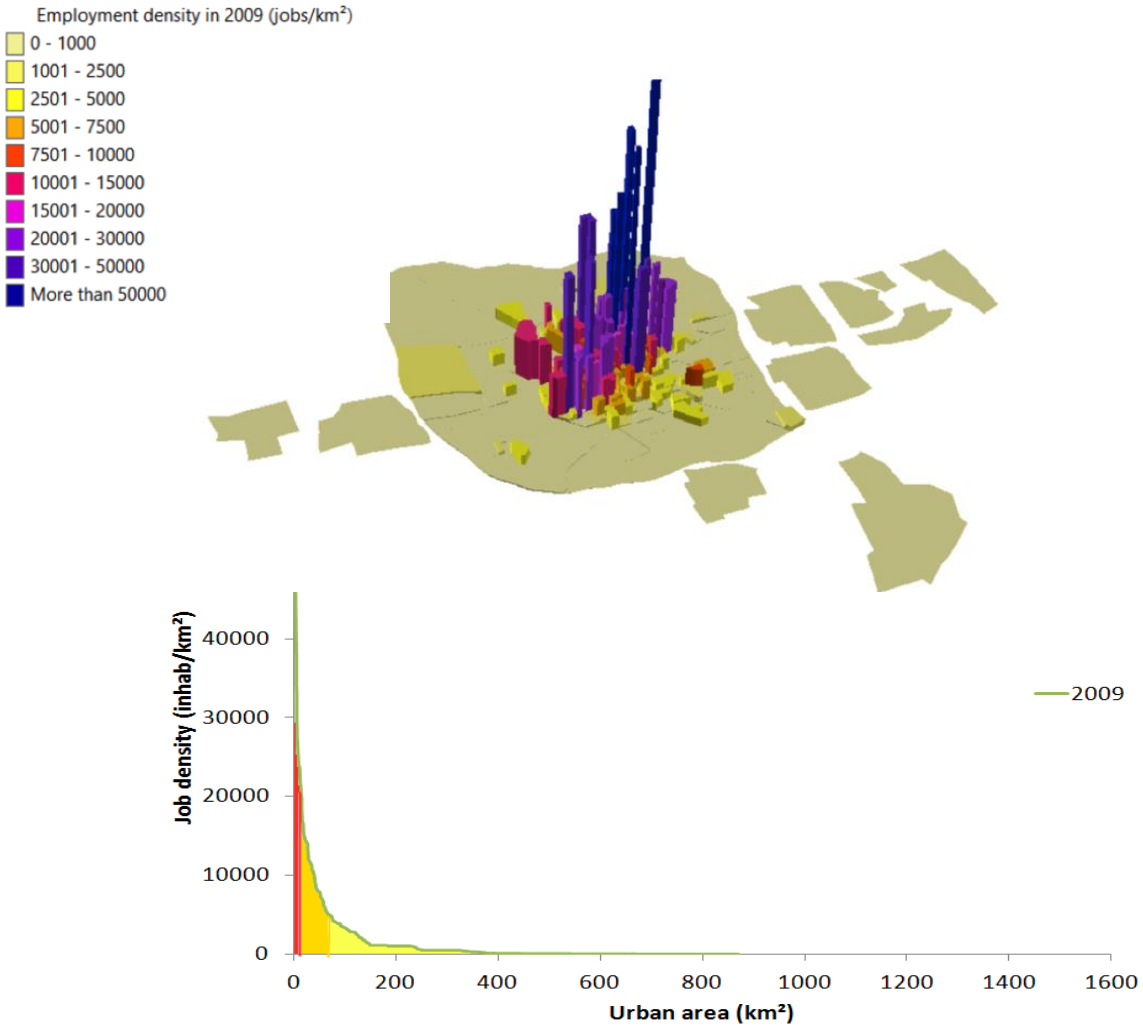
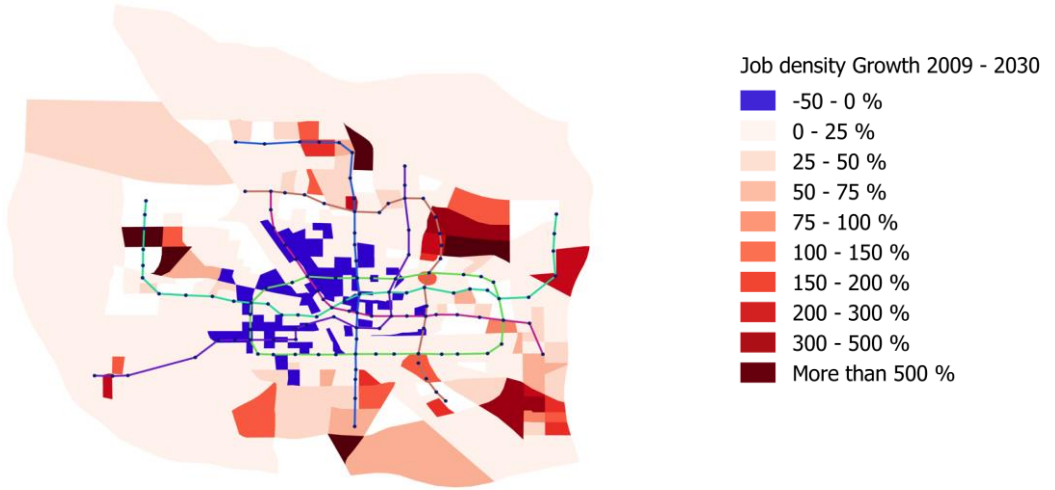
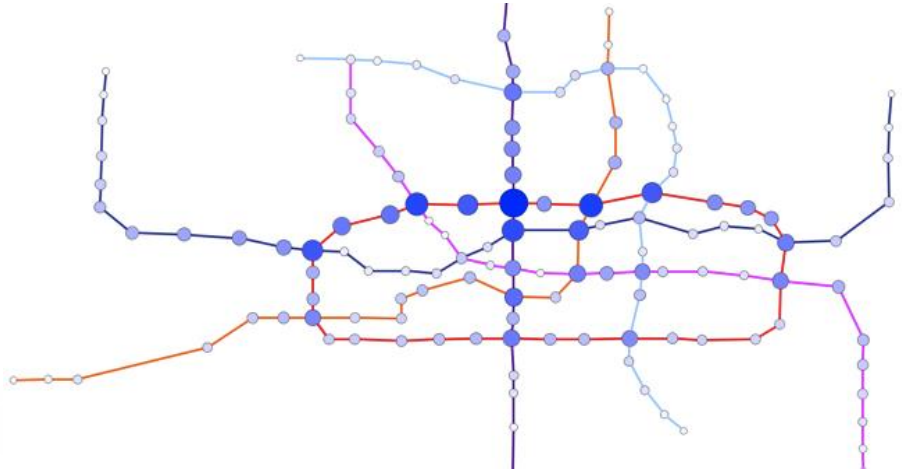
Bo Xue Lu Station
Hang Hai Dong Lu Station
Depot

ZHENGZHOU-ARTICULATING DENSITIES





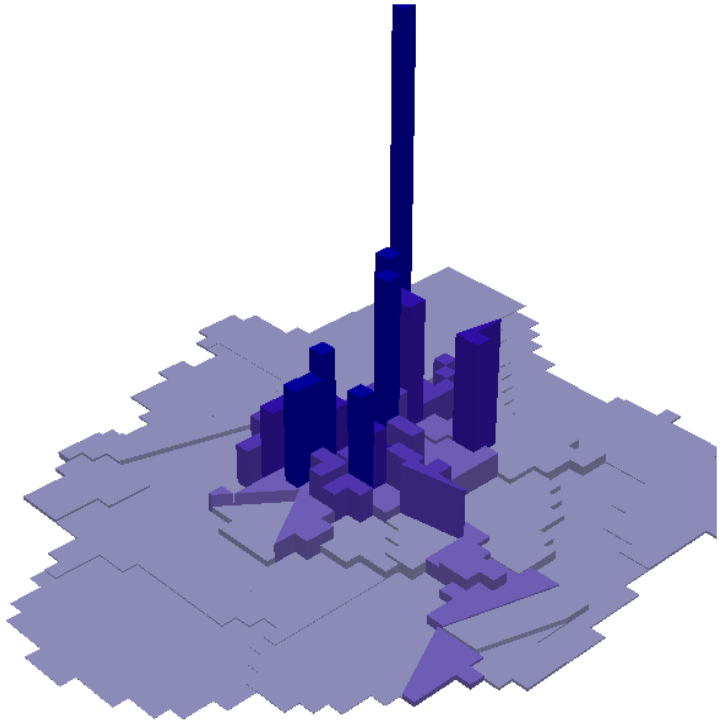


Betweenness centrality of stations

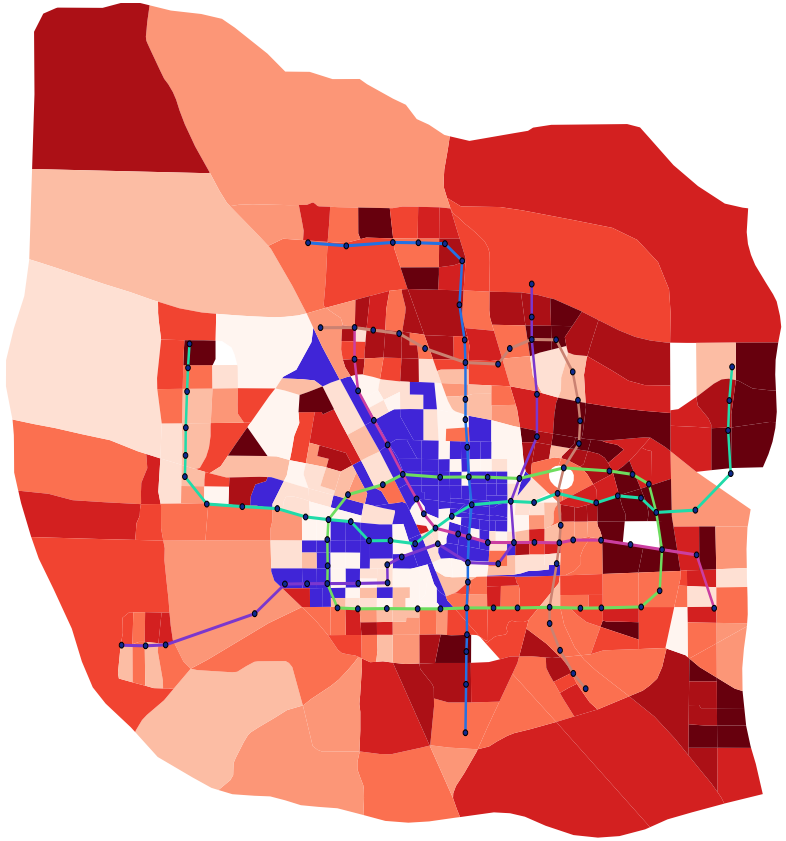
Densities are **not uniform**

Need to **articulate densities around network**

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



GDP per km² (100 million RMB per km²)
- Less than 2.00
- 2.01 - 5.00
- 5.01 - 10.00
- 10.01 - 20.00
- More than 20.00

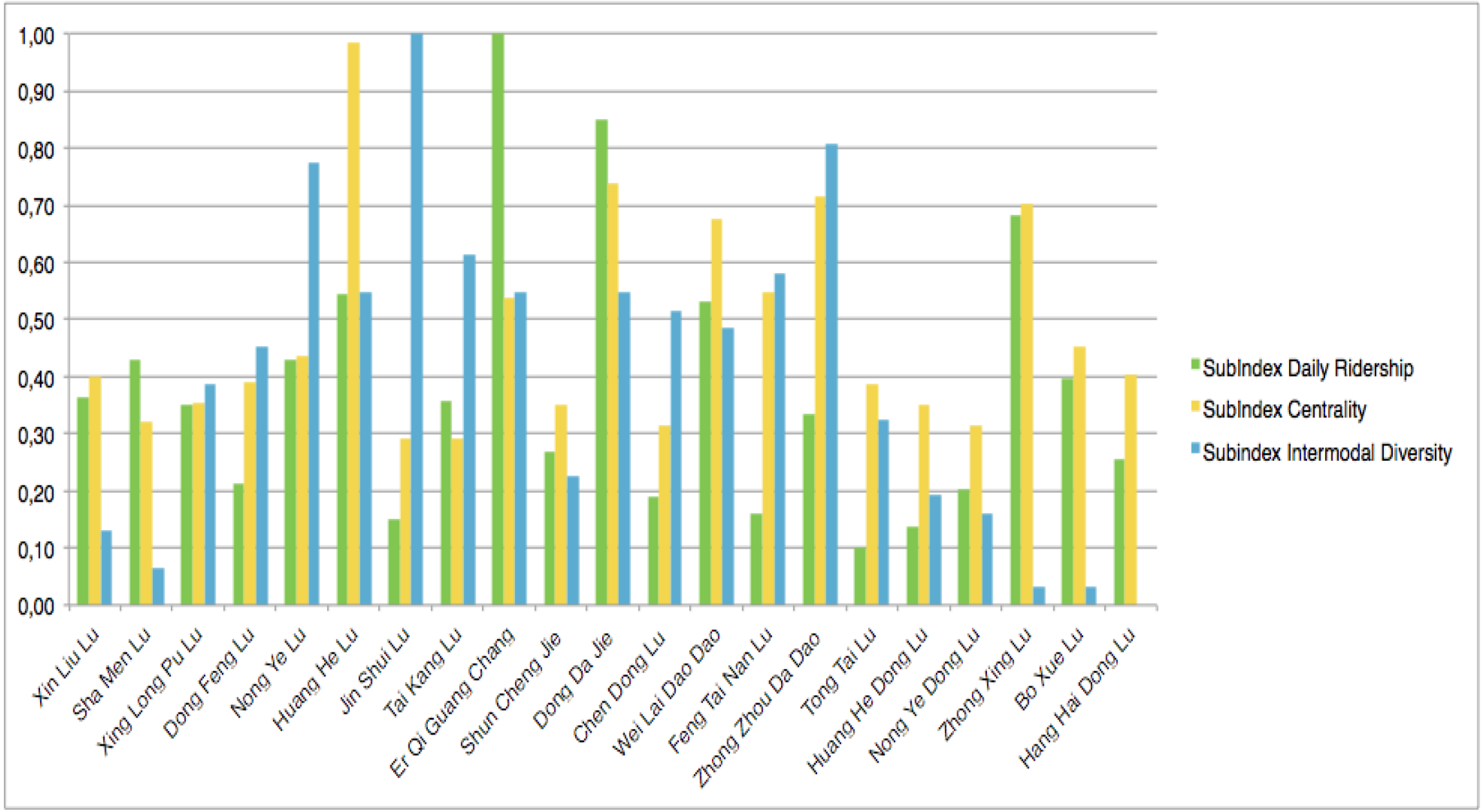


Human density Growth 2009 - 2030
- -50 - 0 %
- 0 - 25 %
- 25 - 50 %
- 50 - 75 %
- 75 - 100 %
- 100 - 150 %
- 150 - 200 %
- 200 - 300 %
- 300 - 500 %
- More than 500 %

Source: Urban Morphology Institute/World Bank 3V Framework

Application to Zhengzhou, China

NODE VALUE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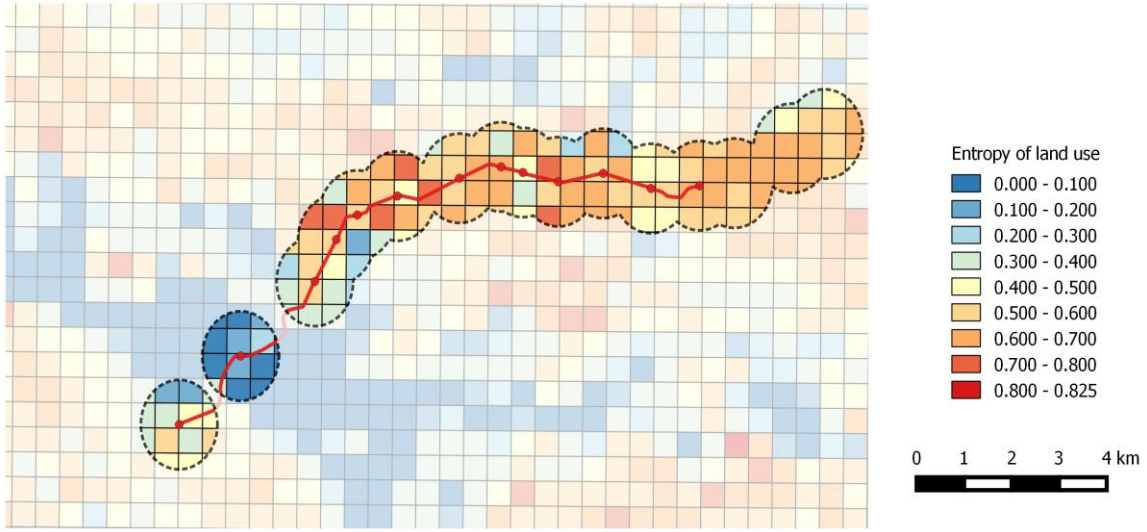
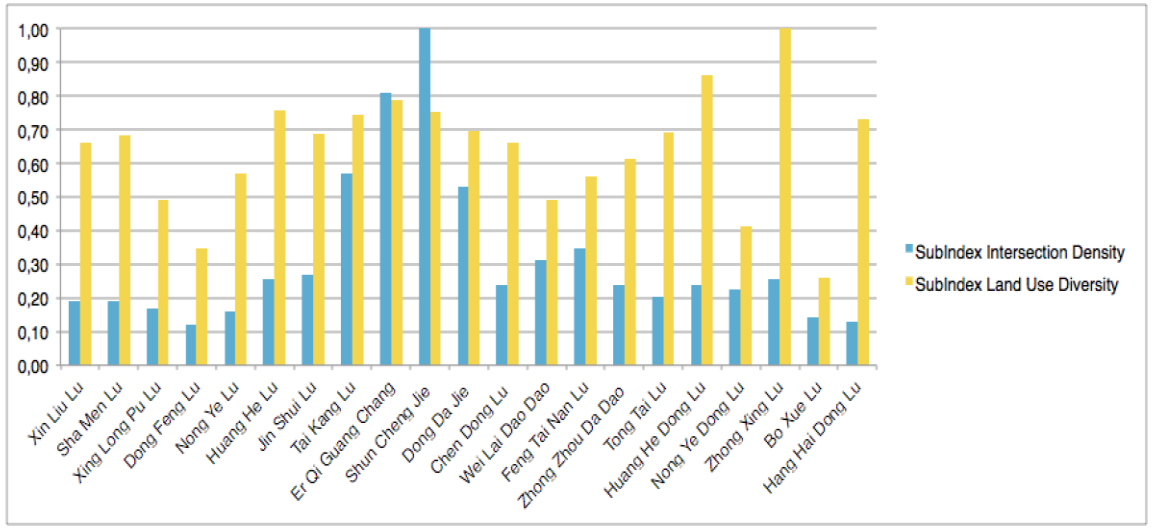
SubIndex Daily Ridership
SubIndex Centrality
Subindex Intermodal Diversity

PLACE VALUE

- Mix of land uses
- Density of social infrastructure
- Compactness
- Physical form and street patterns
- Walkability and bikability



Source: Urban Morphology Institute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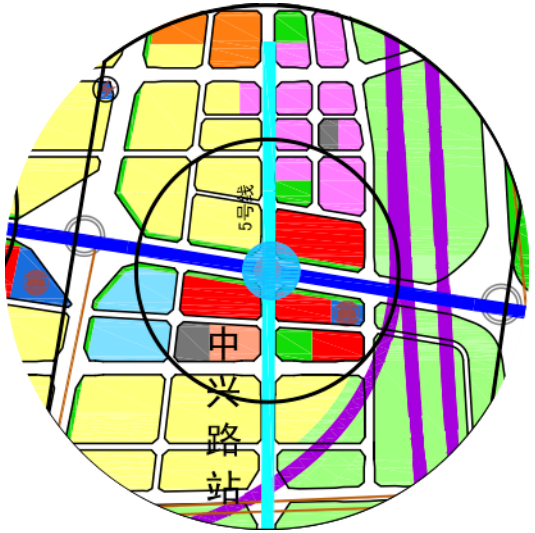
SubIndex Intersection Density
SubIndex Land Use Diversity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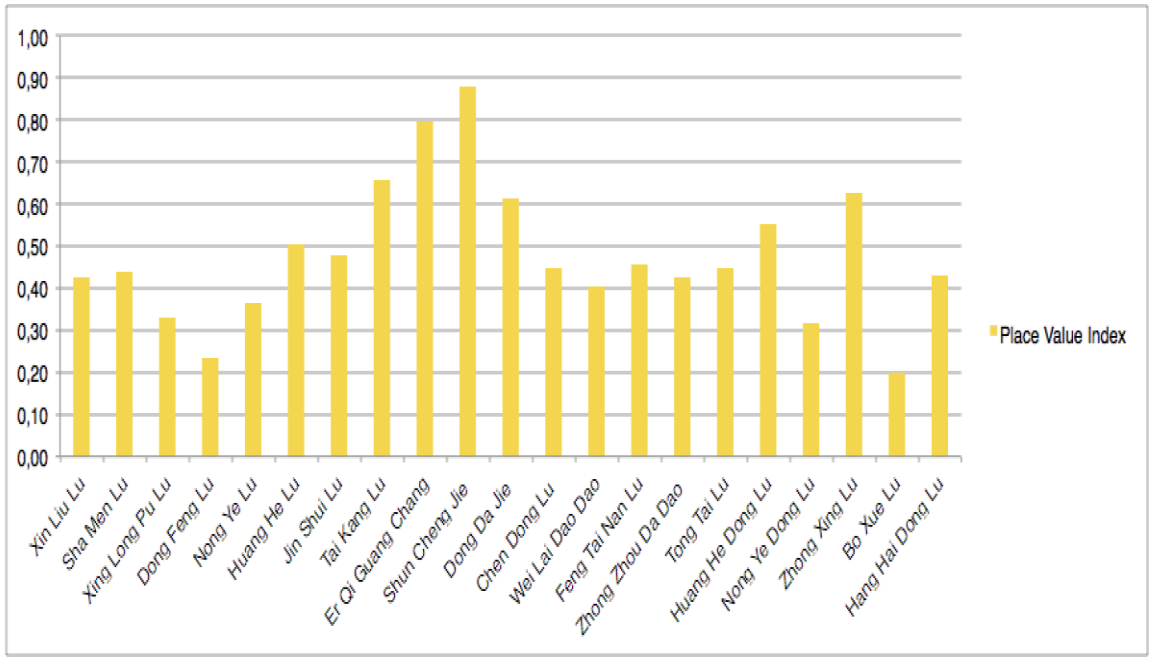
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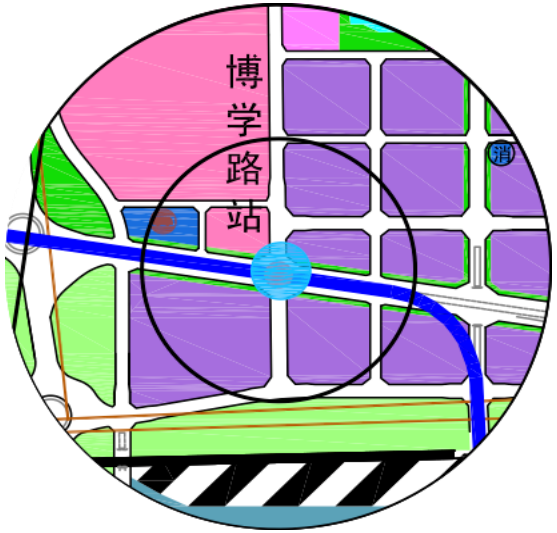
Place Value Index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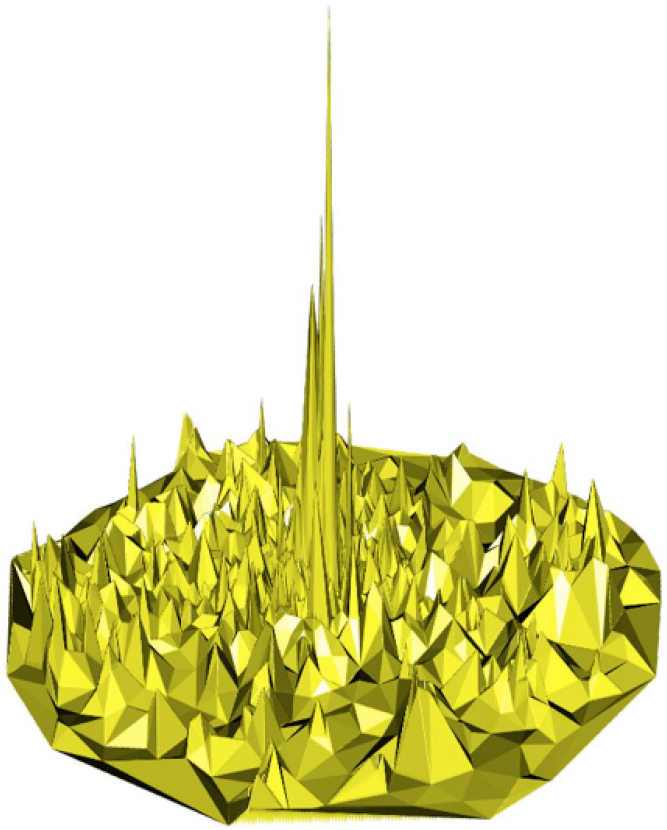
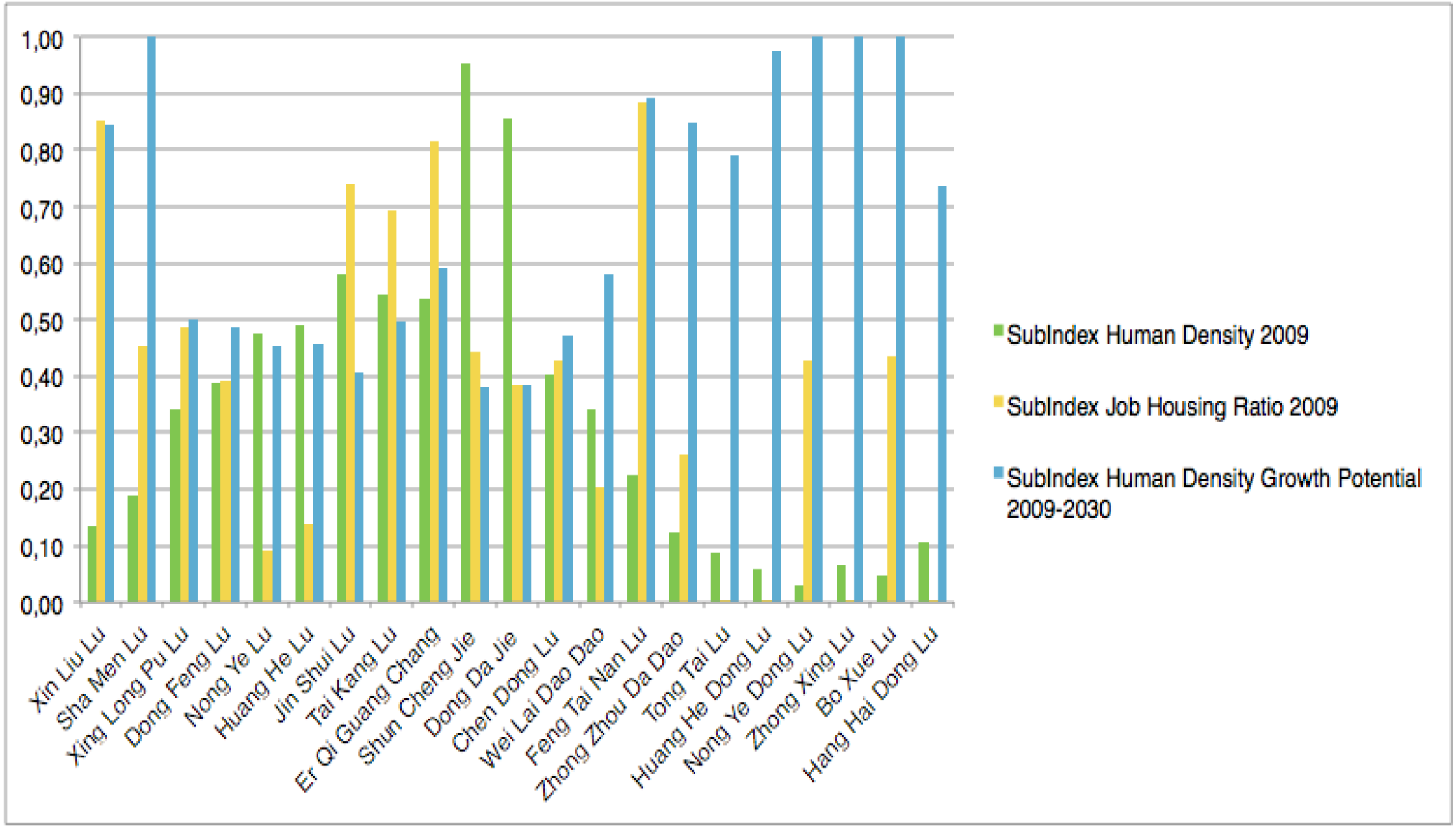
MARKET VALUE



- Economic attractiveness for developers (job densities/accessibility; People density)
- Land and real estate opportunities (FAR/unbuilt land)
- Market prices and activity
- Land shortage at city level

Source: World Bank; Serge Salat and Gerald Ollivier, 3V Framework (2016)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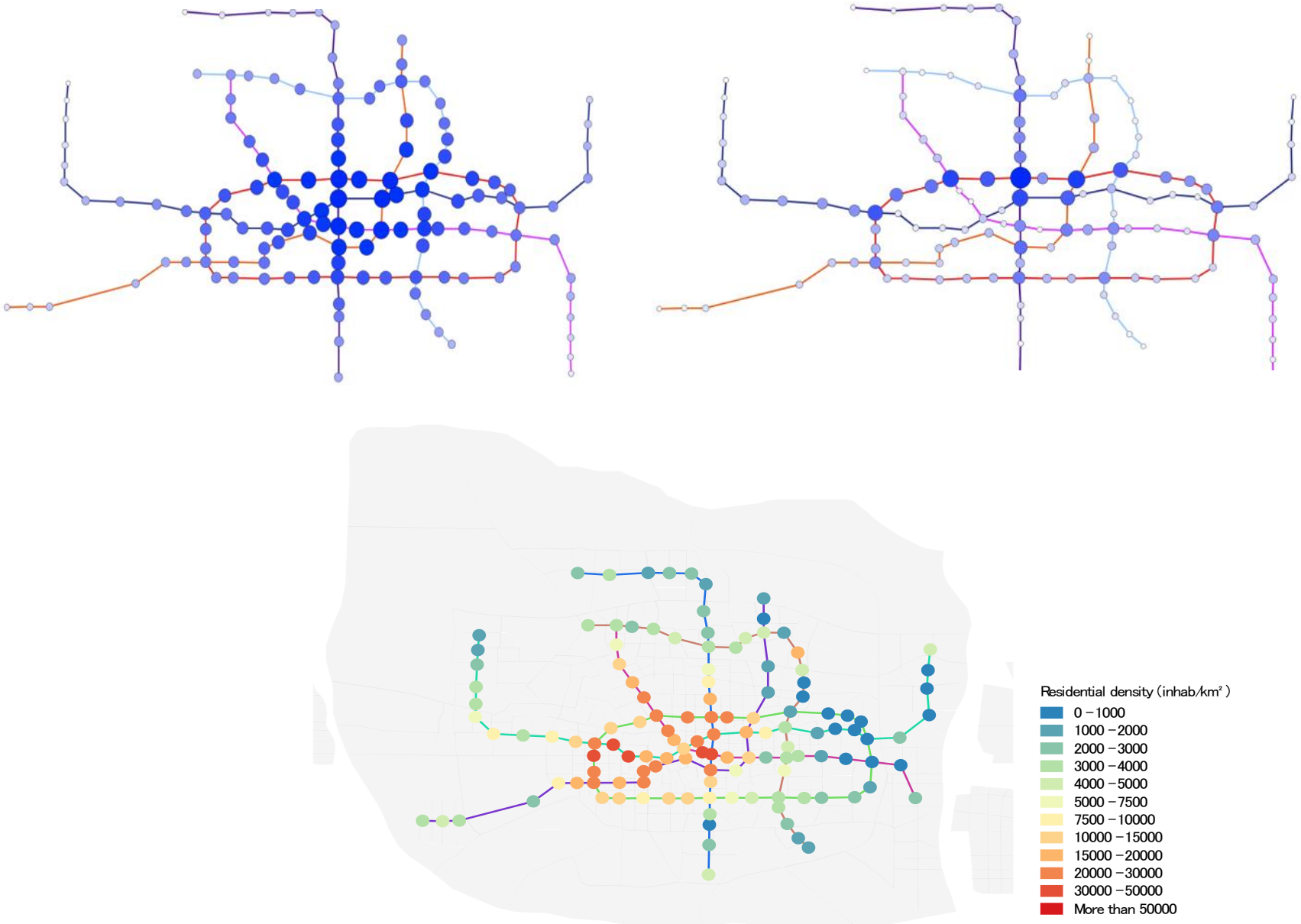
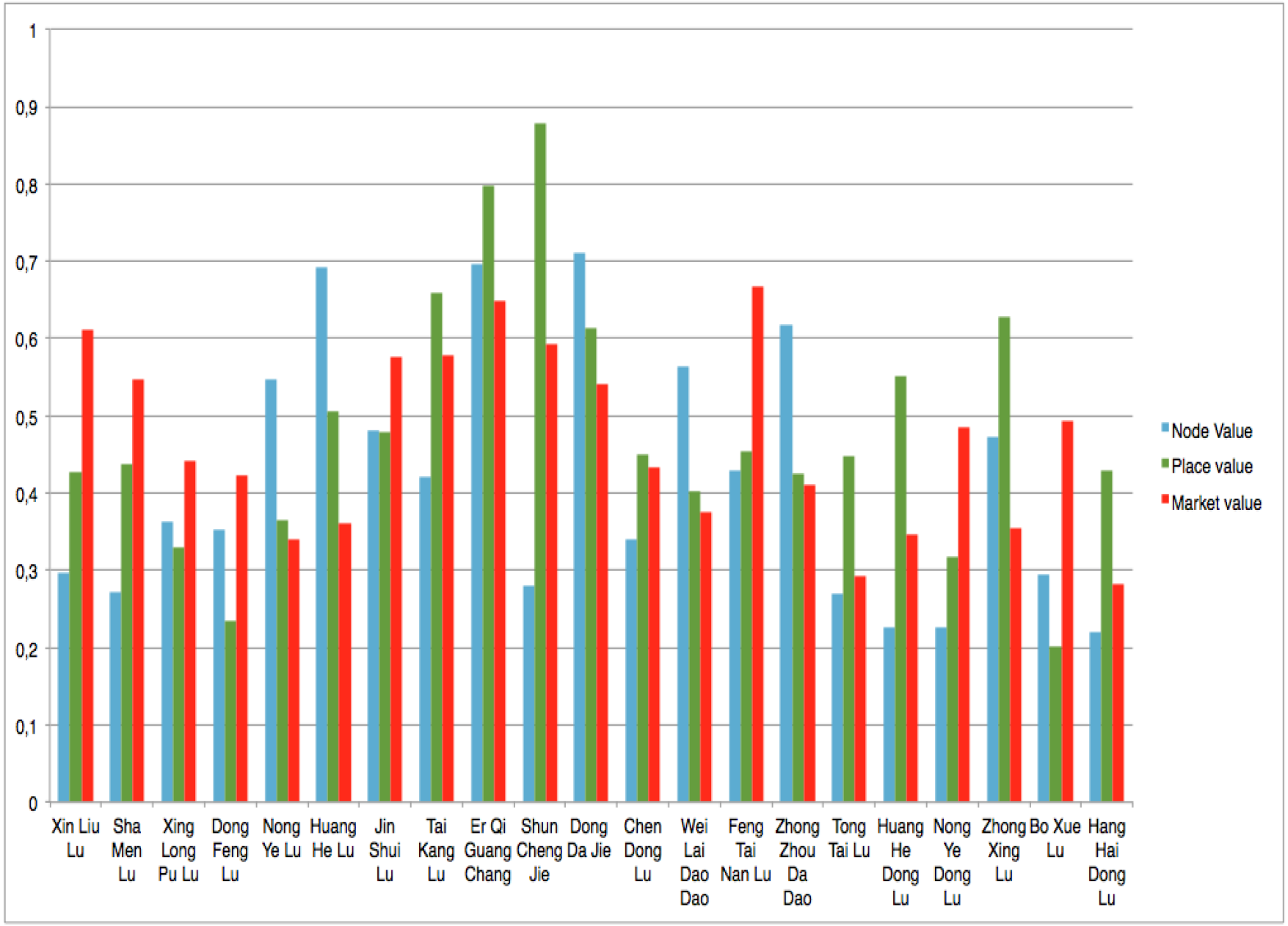
SubIndex Human Density 2009
SubIndex Job Housing Ratio 2009
SubIndex Human Density Growth Potential 2009-2030



Source: Urban Morphology Institute/World Bank 3V Framework Application to Zhengzhou, China.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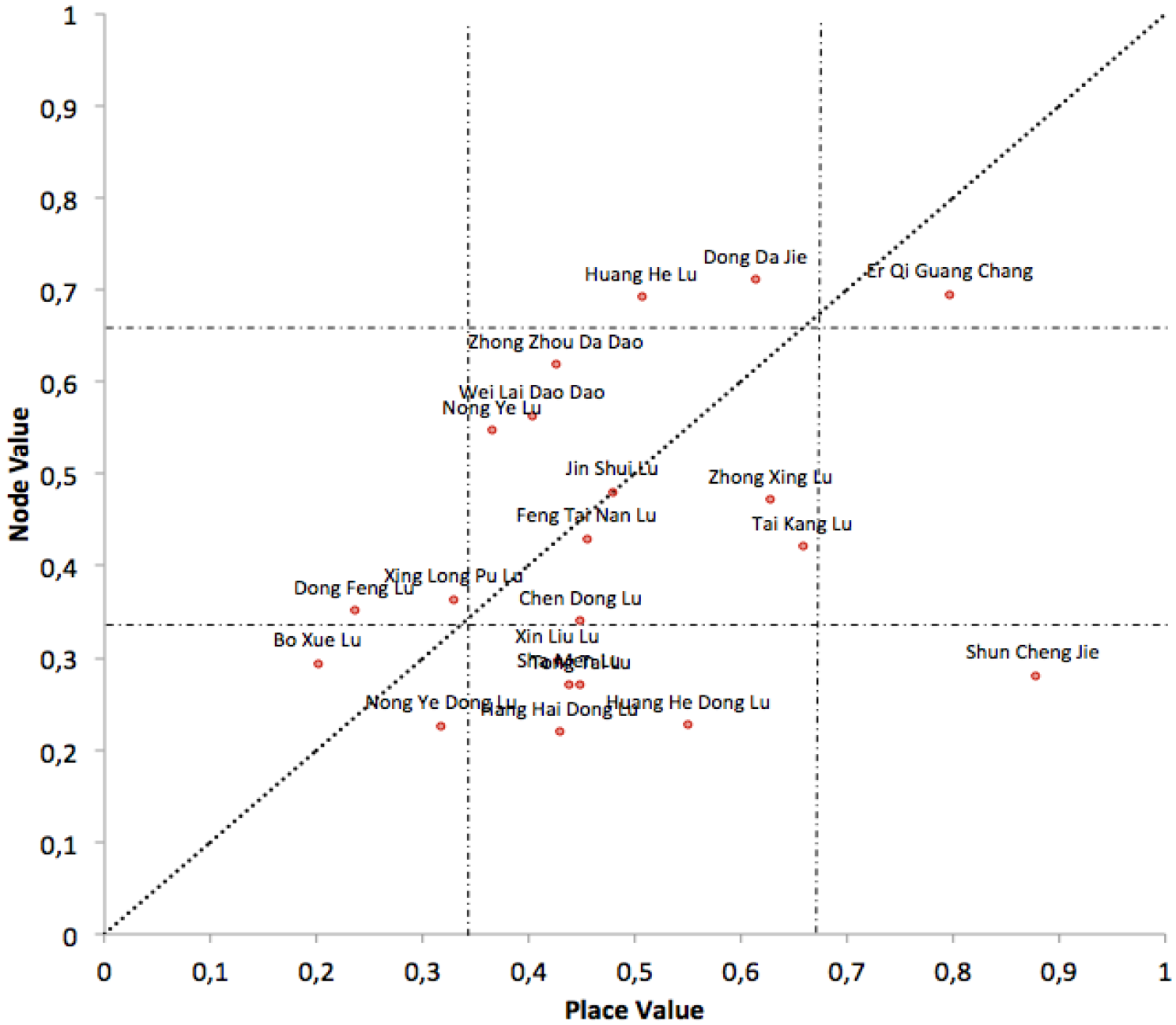
Bo Xue Lu
Hang Hai Dong Lu
Node Value
Place value
Market value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Wei Lai Dao Dao
Nong Ye Lu
Jin Shui Lu
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Feng Tai Nan Lu
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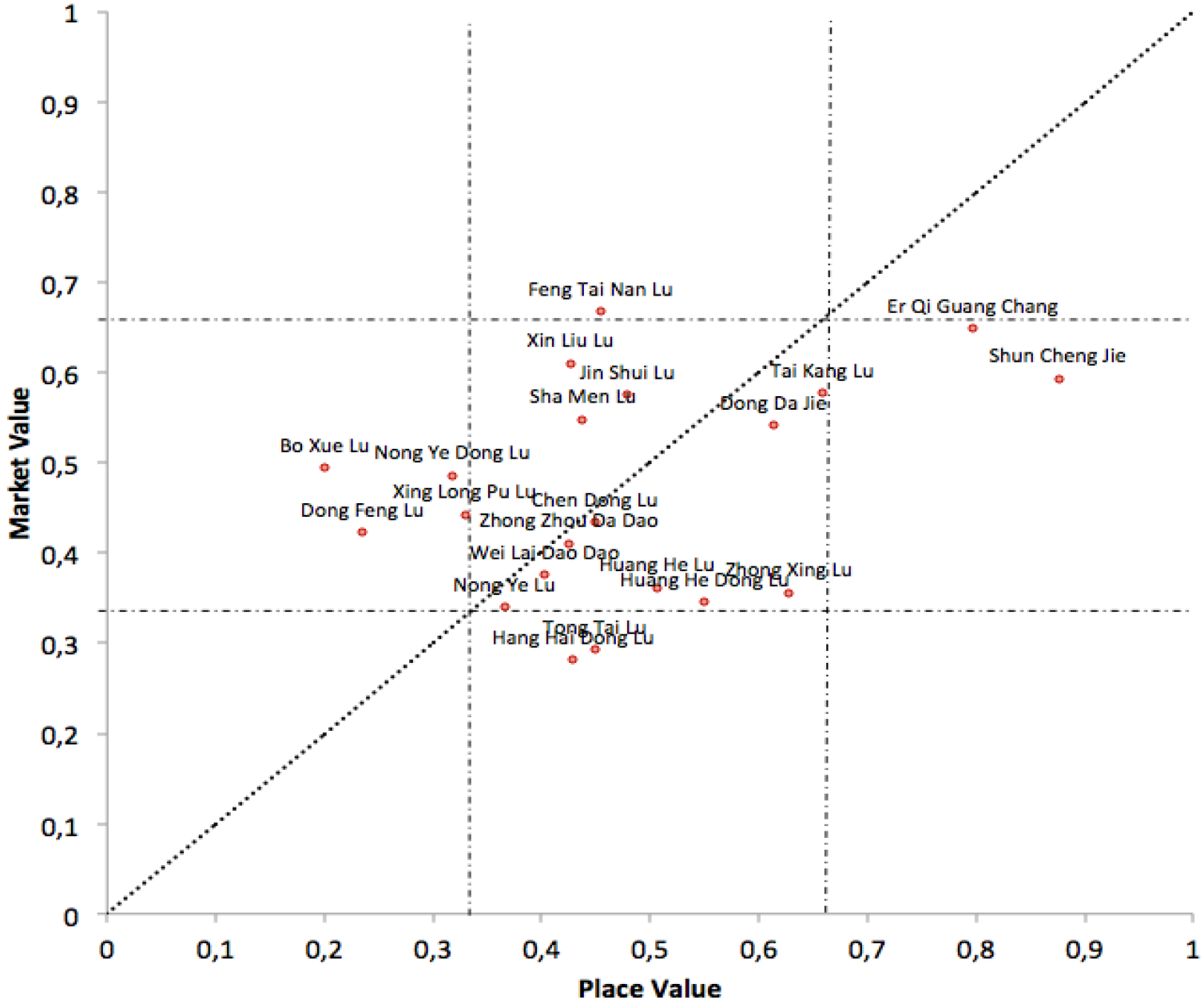
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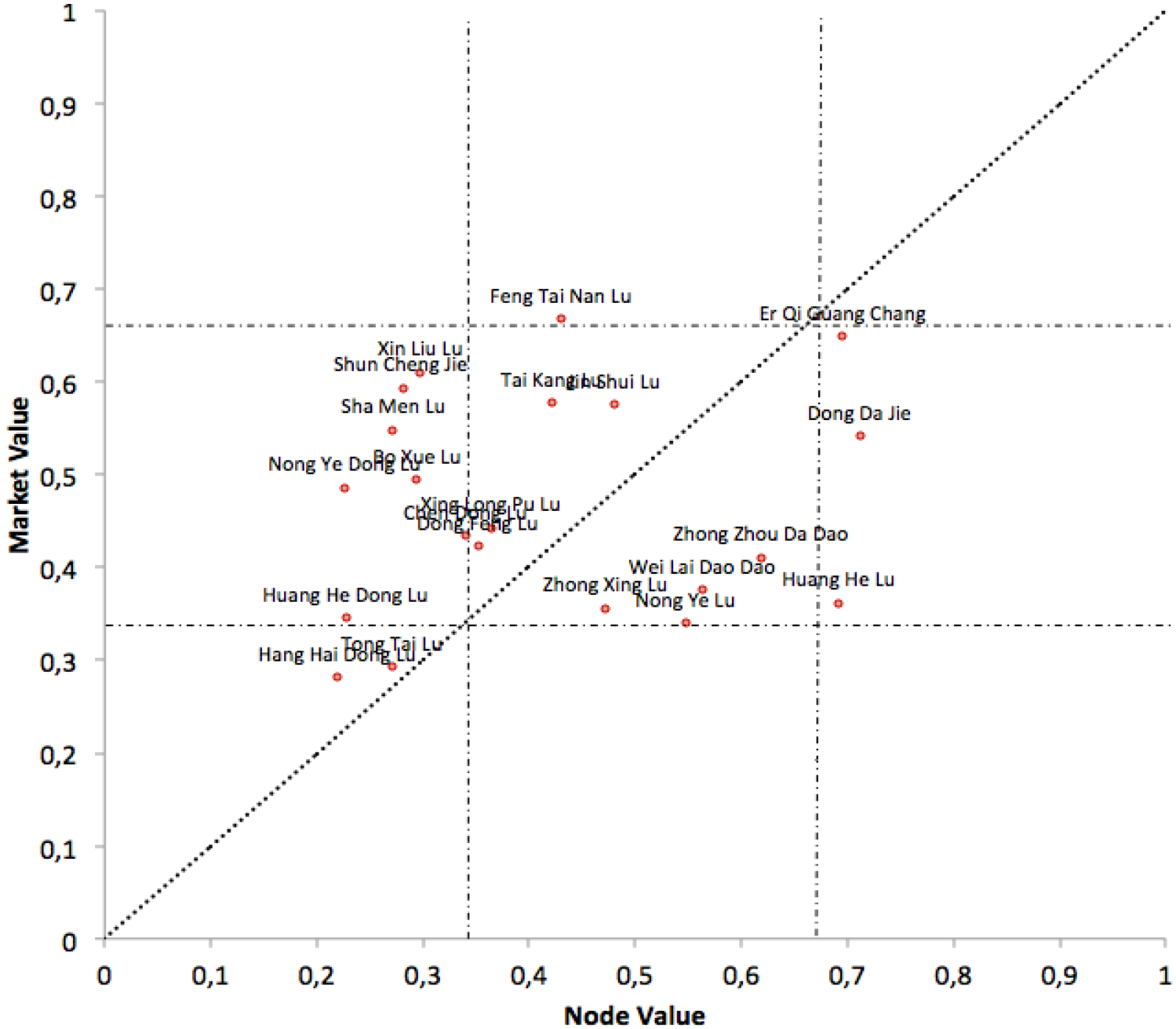
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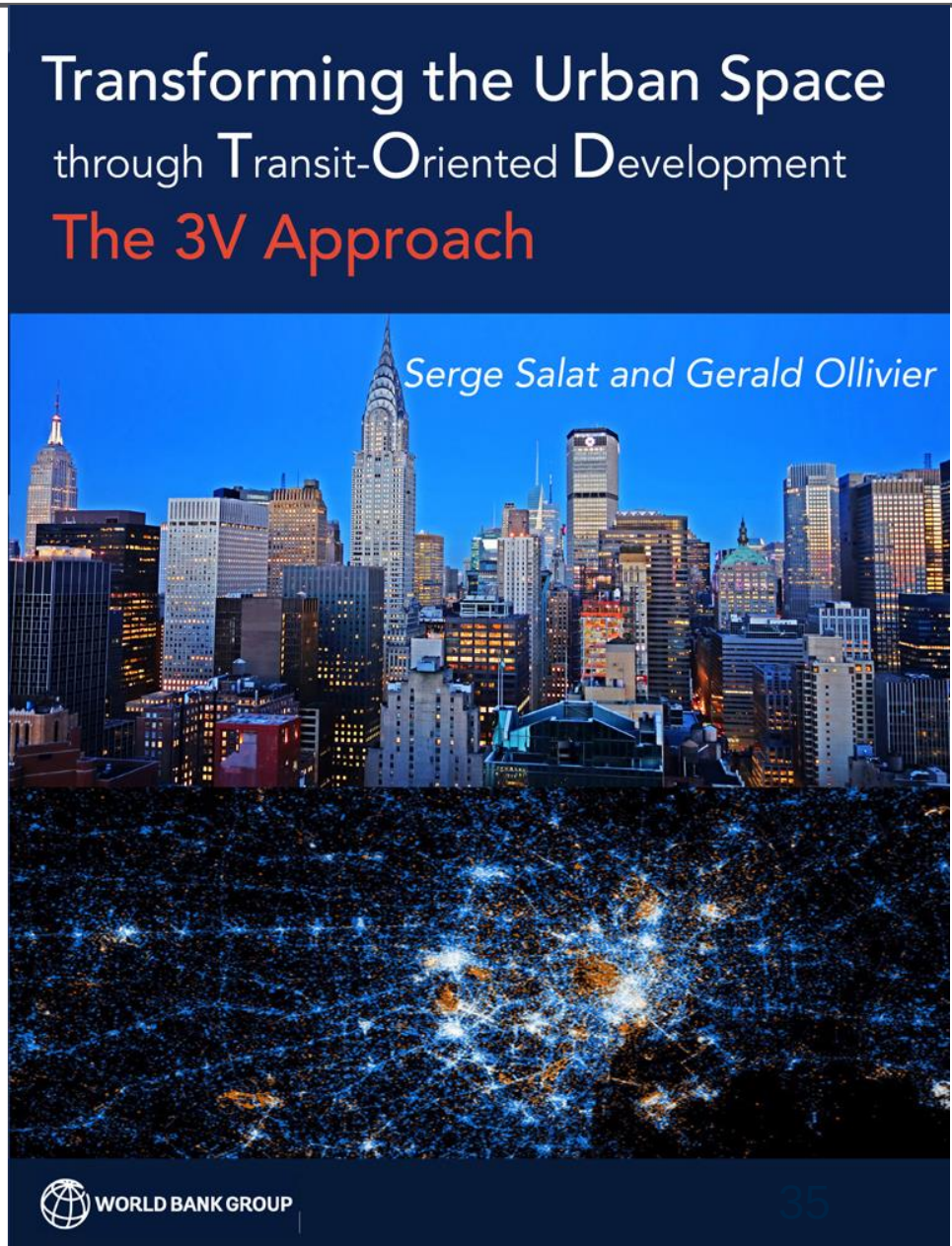
Huang He Lu
Zhong Xing Lu
Nong Ye Lu
Huang He Dong Lu
Tong Tai Lu

TRANSFORMING THE URBAN SPACE WITH TOD: THE 3V APPROACH

	Key messages
Overview	Adopt TOD for more sustainable city development.
Metropolitan scale	Maximize citywide accessibility to jobs through a hierarchically integrated transit system. Embrace nonuniform densities, concentrating jobs where accessibility is highest. Ensure local accessibility to health, education, and amenities.
Network scale	Align network centrality characteristics and intensity of land use.
Station scale	Create accessible, diverse, dense, mixed-use, vibrant communities based on station characteristics and good design.
3V[a] Framework	Cluster stations based on node, place, and market potential value. Identify imbalances between values to stimulate interagency dialogue and understand opportunities.
Developing solutions	Understand the drivers of and interplay between values. Apply infill, intensification, and transformation strategies based on the 3V typology.
Station examples	Hammarby, Bo01, Marina Bay, Hudson Yards, King's Cross
Corridor examples	Crossrail, Line 3 (Zhengzhou)
City examples	London, Zhengzhou

Available at http://hdl.handle.net/10986/26405



Next - the 3V : Methodology and Case Studies