A CITY WITH AN ISOLATED BUS RAPID TRANSIT SYSTEM

formulating a design strategy to establish an integrated transit oriented development in Jakarta
How do you address the issue of integration between:

**Urban fabric**    **Bus Rapid Transit**

on a local scale

Methodology:

*Newman & Kenworthy: Sustainable and Cities*

*Van Nes, A. The Spatial Condition for a Vital Compact City*
City Profile

JAKARTA
City Profile

Population density

GDP per capita

main global connection to Indonesia

Source: Statistical Year Book of Indonesia
Jakarta's Problem

Motorway oriented planning

General people dependence on cars
In 2004, the BRT TransJakarta is introduced to the city. The new system quickly grows in popularity.

- **2004**
  - 16 million users
  - 39 billion rupiah income

- **2005**
  - 20 million users
  - 55 billion rupiah income

- **2006**
  - 39 million users
  - 130 billion rupiah income

- **2007**
  - 61 million users
  - 205 billion rupiah income
Jakarta’s BRT Problem

Despite of This . . .

“abandoned busway stop”

Complicated way to reach the bus station

Undesirable walking experience

Segregation by lanes
Jakarta needs more busways

City needs more busways, says the mayor who started it all

Adisti Sukma Sawitri, The Jakarta Post, Jakarta | Wednesday, April 25, 2007

The Colombian mayor who revolutionized Bogota’s public transportation system has said that Jakarta’s administration should focus on expanding the bus rapid transit (BRT) network instead of developing a subway or monorail.

Former Bogota mayor Enrique Peñalosa, who championed the BRT in his city, told a transportation seminar here that it would be cheaper for Jakarta to expand its busway system.

“A subway would cost three times its contract value, yet it would only cover several lines, (but) with the same amount of money you could reach all parts of the city with the (busway) network,” he said during a seminar on BRT best practices.

Jakarta should focus more on the improvement of the effectiveness and efficiency of the BRT.
Problem Statement

UNCONNECTED URBAN FABRIC & BRT
## Problem Statement

### Urban Problem
- Typology that doesn’t support a desirable open space.
- Ineffective distribution of function
- Lack of public space, too much “Private” space

### Infrastructure Problem
- Isolated and hardly accessible transit stop
- Threat: Bus lane would segregate the urban fabric

## Problem Conclusion (Urban + Infrastructure):

Low integration value between the urban fabric and the BRT line on the local scale
**Goal**

**ESTABLISHING A TRANSIT-ORIENTED DEVELOPMENT WITHIN THE EXISTING URBAN FABRIC**

Mixed-use function, compact development, linking cycle routes, public spaces.

**Effect:**

Connected neighborhoods, More green parks, compact city, reduced urban sprawl, pedestrian bicycle friendly city, etc.
Theoretical Background

TOD & Space Syntax
Four Strategies to implement a sustainable city:

1. Create strategy to revitalize inner city
   Traffic calming, street planting, sidewalk widening, etc.

2. Focus development along transit lines - TOD

3. Discourage future urban sprawl

4. Extend transit system to poorly served suburb
<table>
<thead>
<tr>
<th>City</th>
<th>Urban</th>
<th>Infrastructure</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Curitiba</td>
<td>TOD</td>
<td>Busways oriented</td>
<td>Public service and other activities is concentrated around transit stop</td>
</tr>
<tr>
<td>Bogota</td>
<td>TOD</td>
<td>Busways and Bicycle lanes</td>
<td>Car Free days</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><em>Pico y Placa</em> (restricts 40% private automobile use during peak hours)</td>
</tr>
<tr>
<td>Singapore</td>
<td>TOD</td>
<td>Heavy investment for MRT</td>
<td>Parking restriction and high parking charge</td>
</tr>
<tr>
<td></td>
<td>Pedestrians and cyclists oriented</td>
<td>Feeder bus.</td>
<td>High cost for car ownership</td>
</tr>
<tr>
<td>Perth</td>
<td>TOD</td>
<td>Heavy investment on electric rail.</td>
<td>Community code to encourage urban villages</td>
</tr>
<tr>
<td></td>
<td>Discourage the use of automobile through land use</td>
<td>Cycleways network</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pedestrian oriented</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Changing building use into a residential/mixed-use development</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Van Nes, *The Spatial Condition for a Vital Compact City*
Strategic Planning Approach

INTRODUCING TOD IN THE EXISTING URBAN FABRIC

to connect the urban fabric and the BRT
**GOAL**
Integrated urban fabric And BRT (TOD)

**PROBLEM**
Low integration value between urban fabric & BRT line

**STRATEGY**
Establishing a TOD within the existing urban fabric.

**METHOD:**
Space Syntax

**SUBGOAL**
Revitalize the Subjected Area
Sustainable BRT
Problem Conclusion (Urban+Infrastructure):

Low integration value between the urban fabric and BRT line on local scale

urban problem

low integration value
low visibility
low variety of functions
lack of public space

infrastructure problem

take too much time to reach the BRT station.
Station is isolated from the urban fabric.
lack of basic amenities that support station use.
STRATEGIC DESIGN: ESTABLISHING A TOD IN JAKARTA

URBAN & POLICY

URBAN VILLAGES
Residential is provided by ‘urban villages’, a compact and mixed-use residential area and retail.

PUBLIC SPACE
Public space is provided by the bicycle splines, existing park, and the station park.

INFRASRUCTURE

BRT LANE IMPROVEMENT
BRT lane must not separate the urban fabric and has to be integrated with the urban fabric.

BRT STOP IMPROVEMENT
Activities should be focused around the BRT stop by providing a variety of functions around a transit stop and transit park.

OTHER SUPPORTING AMENITIES
Car removal policy, collective parking ground, bicycle sheds, etc.

BASIC METHOD OF ANALYSIS: SPACE SYNTAX
**BASIC METHOD OF ANALYSIS: SPACE SYNTAX**

**Increase the Degree of Connectivity**

Do a space syntax analysis:

**Through three-step analysis >**

- 0 - 20 % > very bad connectivity
- 20-40 % > bad connectivity
- 40-60 % > average connectivity
- 60-80 % > good connectivity
- 80-100 % > very good connectivity

**Through Global integration map >**

Once a street has a good degree of connectivity, design intervention can be made.

50% of the area is connected
Increase the Degree of Connectivity

Do a space syntax analysis:
Through three-step analysis >
0 - 20 % > very bad connectivity
20-40 % > bad connectivity
40-60 % > average connectivity
60-80 % > good connectivity
80-100 % > very good connectivity

Through Global integration map >

Once a street has a good degree of connectivity, design intervention can be made.
URBAN STRATEGY: URBAN VILLAGE & PUBLIC SPACE

Compacting the Neighborhood
Introducing Public Space

Mixed Use Function

Reduce the Perception of Crime – Increase Visibility

Create street inter-accessibility on a local scale

Reference for high dense living:
- Dense living minimum 200 ⌀ / ha
- Denser living minimum 650 ⌀ / ha
- Densest living minimum 1500 ⌀ / ha

Open space by introducing the concept of bicycle spline

An ideal “branches”: ideally less than 100m.

Discourage tall fences or walls, replace with shorter hedge, green covering, etc. (improvement over the public – semiprivate - private realm)

Facade with lots of openings.

Establish direct street to / from the BRT stop could create a very vital shopping street on the subjected area.
INFRASTRUCTURE STRATEGY:
BRT STOP & LANE IMPROVEMENT

Accessible BRT Stop

Sustainable BRT lane

Upgrade scheme from bus to commuter tram

Other

Claim the Car Parks for People
Focus Activities around the Transit Stop
Applying the strategy in a phased sequence

1. Establish bicycle lane and enhance public space
2. Upgrade existing building's function.
3. Establish denser mixed-use residential
4. Other amenities (parking building, supporting facilities, etc.)
4. Technological upgrade and lane reorganization

URBAN INTERVENTION 2015 $...
INFRASTRUCTURAL INTERVENTION 2030 $$$
Design: Analysis

FOUR CASE STUDIES
Design: Analysis

Setiabudi BRT Stop
**Location**
The inner neighborhood area between BRT stop Setiabudi (Line 1) and BRT stop Kuningan Madya Aini (Line 6)

**Site area**
30.84 Ha

**Land use**
Residential: 70% (rentals)
Infrastructure: 8% (narrow streets and alleys)
Open spaces: 10% (mostly abandoned building sites)
Industrial 0%
The path toward the BRT station. First climb the pedestrian bridge then go down to the BRT station.
Large Headquarters / offices with ‘private’ building typology

Poorly planned pedestrian area (few street amenities)

Large open space allotted for car park

walkable radius

Design: Analysis

CBD area
Abandoned buildings, turned into temporary structure.

Narrow road for cars
size comparison
**Proximity to BRT stop**

The inner area is within the bikable radius of the two BRT stop (Setiabudi (left) and Kuningan Madya Aini (right)).
Functions

Headquarters and office buildings concentrated along the main road.

Few facilities in the inner neighborhood

The function percentage shows that there are less service-related facilities in the area and too much workplaces.

Entertainment areas is shown as 45%, but the truth is that most of the entertainment facilities are only located inside the buildings around the CBD area. There are no facilities in the inner area.
Public Transportation

Opportunity to connect the BRT stops
No other public transportation inside the neighborhood
Space Syntax

Total Depth Map analysis (r=10)

reveals a poorly integrated area in the inner neighborhood to the major route.

Agent Based Analysis

The inner area is not visually integrated with the major route.
Space Syntax

Global Integration Map $r=10$

Agent Based Analysis
**Strategy:**

Create New Street Connection based on space syntax that will increase connectivity and generate activity.
## Problem Statement – SWOT Analysis

<table>
<thead>
<tr>
<th>BRT STOP</th>
<th>Urban Village</th>
<th>Public Space</th>
<th>BRT Stop and Lane</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setiabudi</td>
<td><strong>S</strong> Buildings within 400m radius are of denser type</td>
<td><strong>W</strong> No Public space</td>
<td><strong>W</strong> Transit stop unconnected to the urban fabric.</td>
<td><strong>W</strong> Typology of land use where all open spaces are converted into parking lots.</td>
</tr>
<tr>
<td>BRT Stop</td>
<td><strong>O</strong> Inner neighborhood is abandoned, not feasible to be maintained. There is an opportunity to refurbish the area</td>
<td><strong>W</strong> Car-oriented planning, no pathway or public space (only motorways and parking space)</td>
<td><strong>O</strong> There is another BRT stop (from Line 6) close to the Setiabudi BRT Stop</td>
<td><strong>W</strong> No functions close to the Setiabudi BRT stop that supports its use.</td>
</tr>
<tr>
<td></td>
<td><strong>W</strong> Inner neighborhood is a low dense residential area with unclear land use and temporary buildings</td>
<td><strong>W</strong> Human activities happens in the building</td>
<td></td>
<td><strong>T</strong> Motorized transportation will took over the new street.</td>
</tr>
</tbody>
</table>
Design

Setiabudi TOD
Walkable Radius (400m)

- BRT station is segregated from the urban fabric
- No public space
- Parking buildings (each office buildings have their own parking space)
- Parking space
Claim the private space into a public space.
The land is still owned by the building, but the fences are lowered and merged with the pedestrian path. Street furniture and green is introduced.

Introduce a dense highrise of mixed-use building
Located inside the walkable radius, close to the station. This new highrise should support low income people too. Variety is important.

Collective Parking
Provide a collective parking building as a transit point around the BRT transit stop.

Connect the two BRT stops with a direct line for bicycle (bicycle spline)
Introduction of bicycle spline will create a new connection and new supporting functions for the inner neighborhood.

Opportunity, introduce a shuttle to connect the two BRT transit stop
Introduce a feeder loop that can transport passengers between the two transit stops.

Walkable Radius (400m)
Q
Most of the owner of the building sold or convert the buildings into rentals for migrants or for workers. Rentals are extremely cheap, but the condition is very bad.

W
Abandoned building and lots

W
Basically the area is unconnected to the BRT Stop

W
Disorganized land use and street width

Bikable Radius (700m)
Most of the owner of the building sold or convert the buildings into rentals for migrants or for workers. Rentals are extremely cheap, but the condition is very bad.

Abandoned building and lots

Basicall the area is unconnected to the BRT Stop

Disorganized land use and street width

Bikable Radius (700m)
Opportunity, introduce a shuttle to connect the two BRT transit stop introduce a feeder loop that can transport passenger between the two transit stops.

Additional facility as a magnet to the site business center, media center, etc.

Connect the two BRT stops with a direct line for bicycle (bicycle spline) Introduction of bicycle spline will create a new connection and new supporting functions for the inner neighborhood

Densify the inner neighborhood The unclear land use and poorly densified typology should be densified to accommodate the increasing interest of the land. Empty lots should be converted into more mixed-use building and not forgetting the provision of public space for people.

Bikable Radius (700m)
Design Intervention

intervention

refurbished

new building
Design Intervention

residential type

Bikable Radius: Duxton Road

dense living

<table>
<thead>
<tr>
<th>Area</th>
<th>3000 m²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Footprint</td>
<td>2000 m²</td>
</tr>
<tr>
<td>Gross Floor Area</td>
<td>8000 m²</td>
</tr>
</tbody>
</table>

GSI 0.66
FSI 2.66
OSR 0.12
L 4

GSI High Density
FSI High Compactness
OSR Low Open Space

Walkable Radius: Area Ex Boschi
denser living

<table>
<thead>
<tr>
<th>Area</th>
<th>17000 m²</th>
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<tbody>
<tr>
<td>Footprint</td>
<td>2000 m²</td>
</tr>
<tr>
<td>Gross Floor Area</td>
<td>30000 m²</td>
</tr>
</tbody>
</table>

GSI 0.11
FSI 1.76
OSR 0.5
L 15

GSI Low Density
FSI Medium Compactness
OSR High Open Space

walkable radius (400m)
bikable radius (700m)
Design Intervention

functions

existing plaza setiabudi

shopping street

transit park
Transit Point: The Gate to the Inner Neighborhood, BRT Transit Park and Retail Area

Walkable Radius (400m)
Transit Point: The Gate to the Inner Neighborhood

Walkable Radius (400m)
Bike Park and Ride, Collective parking area

Walkable Radius (400m)
Design Intervention

Denser mixed-use residential area

Walkable Radius (400m)
Design Intervention

Inner Neighborhood: shopping street

Bikable Radius (700m)
Inner neighborhood: transit park and mixed-use retail

Bikable Radius (700m)
Section: Walkable Radius (400m)
Design Intervention

Section: Walkable Radius (400m)
Section: Walkable Radius (400m)

before

after

proposed 28m height limit

summer solstice (s)  winter solstice (s)
Section: Walkable Radius (400m)
Section: Bikable Radius (700m)

**Before**
- Empty lot
- Mixed-use

**After**
- Proposed 12m height limit
- Mixed-use dense residential
- New mixed-use retail
- Refurbished mixed-use retail
- Suggested continuous weather protecting awning

The diagram illustrates the design intervention focusing on the bikable radius with a 700m radius. The transformation includes the introduction of mixed-use dense residential areas and new retail spaces, enhancing the urban bikable environment.
Design Intervention

Section: Bikable Radius (700m)

before

after

summer solstice (s)

winter solstice (s)

proposed 12m height limit

residence

residence

residence

retail

media center

3.00m 3.00m 3.00m

mixed-use dense residential

bicycle park+ride & park area

mixed-use dense residential

0 10m

refurbished mixed-use retail

suggested continuous weather protecting awning

ew mixed-use retail

bicycle park+ride
Section: Setiabudi BRT Stop

before
Section: Setiabudi BRT Stop

Design Intervention

after
Connecting the two BRT stops
Connecting the two BRT stops
Public

Ensuring the public interest is saved, ensuring that the objective is kept.

Private

Especially the office close to the BRT station will receive benefit from the BRT.

The BRT has to be maintained by the Private.

Citizen

Citizen will receive good improvement of the new neighborhood.

Several lots of rentals need to be claimed or bought; the owner will receive priority over the new property; and now he may be able to create his own shop.
Financial Strategy

TOD Improvement
- Short-Term Priority

Private Developer
- Public Transport Authority
  - revenues
  - expenses

BRT Maintenance
- General Maintenance

BRT Improvement
- Long-Term Priority

(Rupiah - Indonesian Currency)
Phasing

Urban Village
Inner Neighborhood Transformation
  Mixed-use Apartment
Retail Area
Building Demolition

Public Space
Inner Road Improvement
Transit Park
Other Park

Amenities
Carpark Facility
Media Center

Infrastructure
Busstop in the Inner Neighborhood
Reorganization of the BRT System
Upgrade to Tram
Steps of Implementation

**moderate**

- **2010-2015**: Bicycle spline
- **2015-2020**: Collective car park
  - Densifying existing land use
  - Denser mixed use development
- **2020-2030**: BRT line and stop improvement

**Surplus:**
Second phasing can be started earlier. Investment can be started for the third phase.

**deficit:**
BRT station relocation cannot be made, it is important that the inner neighborhood is well-connected to the BRT line. A well-planned shuttle bus has to be replanned.
Evaluation & Conclusion

EVALUATION
Space Syntax

Global Integration Map $r=10$

Agent Based Analysis

Mixed-use Residential Typology

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**BALANCE OF FUNCTION**

- 65% leisure
- 22% service
- 13% work

- belongs to the upper social class
- none
- offices

- distributed leisure with varied typology
- services for the residential e.g. nursery, etc.
- offices
CONCLUSION: SPACE SYNTAX AND THE ESTABLISHMENT OF TOD

• Jakarta is different from other city that implement TOD. Jakarta’s urban fabric is existing and has a “disorganized” street network quality. Different strategy has to be developed for Jakarta to establish a TOD.

• Main problem of Jakarta’s transit and the city is the low integration value on the micro scale between the two. Good accessibility has to be established

• To address this problem, the strategy is the creation of a balanced strategic framework on both urban and infrastructural aspect. To do this, a space syntax analysis has to be done to analyze the connection of a street. After this, intervention can be made on both urban and infrastructure aspect.

• On the urban aspect, the structure of the neighborhood (public space and building typology) needs to be reorganized.

• On the infrastructural scale, improvement on bus stop and bus lane must be made.
Calthorpe

- Mainly focuses on the Neighborhood level.

Newman & Kenworthy

- + Introduction of global scale.

Jakarta

- + Use of space syntax to analyze the degree of integration and inter-connectivity AND inter-visibility of a neighborhood.
FUTURE CHALLENGE

By consistently implementing this strategy (creation of TOD) in the BRT stops of Jakarta on a local scale, this strategy can refurbish the entire model of the urban fabric in Jakarta, making it more sustainable in terms of people’s mobility.
IF I HAD MORE TIME

• **Master plan of individual plot (samples):** Detailed Urban Design [samples of individual plot intervention for retail and housing].

• **Evaluation:** Design intervention in respect to the metropolitan scale.

• **Evaluation:** A New Method? Brief comparison with previous researches that is linked with using space syntax to measure a connectivity of a station

• Fine-polishing the report
THANK YOU