Transit-Oriented Development in Lima
A TOD strategy and design for mass transit nodes of
Metro Line 1
Stephanie van Doorn  |  P5 presentation  |  MSc Urbanism - Studio ExploreLab  |  January 23, 2014
Contents

Subject introduction
- Problem definition
- Aim and purpose
- Research questions
- Methodology
- Theoretical dimension

Evaluations and conclusions

Regional context analysis

Vision and design proposals

Concepts and opportunities

TOD area

Metro corridor analysis

Definition TOD area
Subject introduction

Problem definition

Location

Lima

Randstad, The Netherlands

(www.skyscrapercity.com)
Subject introduction

Problem definition

Horizontally expanded city
Subject introduction

Problem definition

Inefficient transit network

- Chaotic and dangerous
- Low capacity vehicles
- Too many vehicles
- Not integrated peripheries

http://blog.pucp.edu.pe/
Subject introduction

Problem definition

Lack of integration of Metro Line 1 (opened in 2012)

- to transit network
- to its adjacent urban space
Subject introduction

Aim and purpose

Aim
Create a **strategy based on TOD** to intensify **multimodal transit** use and develop an **integrated and efficient transit network**.

Purpose
Propose an approach that **deals with TOD in the context of Lima** to find the role of the metro corridor in the city and explore ways to enhance its function and influence.
Subject introduction

Research questions

Main research question

‘To what extend can Transit-Oriented Development be used to improve Lima’s urban transit and urban space strengthening the efficiency of Metro Line 1 with an integrating and recovering approach?’
Research questions

Research sub question

[Historical dimension]
‘How has Lima’s public transport system developed in the twentieth century?’

[Socioeconomic dimension]
‘How are the features of the current public transport system in Lima answering the demands of the different income groups in the city?’

[Spatial dimension]
‘How is and what defines the current urban structure of Lima?’

[Political and planning dimension]
‘What are the spatial planning challenges and strategic interventions needed to activate urban transit and spatial developments?’

[Theoretical dimension]
‘Which aspects of Transit-Oriented Development are specifically applicable to low-income cities like Lima?’
**Methodology**

**Analytical dimension**

1. **Analysis** - metropolitan: opportunities regional network
   - Historical dimension
   - Socioeconomic dimension
   - Spatial dimension
   - Political and planning dimension

2. **Definition TOD area**

3. **Analysis** - station areas of Metro Line 1
   - Comparison of stations areas and concept creation through method
     - Characteristics
     - Position

4. **Establishing concepts, principles and strategies** at different scales and for different stations

5. **Developing TOD vision** for Metro Line 1

6. **Developing TOD station area designs**

**Theoretical dimension**

- Analysis approaches
- Concepts and Theories
- Design approaches

**Evaluation integration TOD**

**Historical dimension**

**Socioeconomic dimension**

**Spatial dimension**

**Political and planning dimension**

**Subject definition**

- aim and purpose
- research questions

**Subject definition**

- problem definition

**Subject definition**

**Problem definition**

**Aim and purpose**

**Research questions**
Subject introduction

Theoretical dimension

Transit-Oriented Development (Bernick and Cervero, 1997)

‘A compact, mixed-use community, centered around a transit station that, by design, invites residents, workers, and shoppers to drive their cars less and ride mass transit more. The transit station is what connects village residents to the rest of the region... The surrounding public space serves the important function of being a community gathering spot, a site for special events, and a place for celebrations - a modern-day version of the Greek agora.’ (p. 5)
Subject introduction

Theoretical dimension

From TOD analysis to design principles through theory

1. identify opportunities
2. define local and regional TOD area
3. analyse station area
4. establish general concepts and opportunities
5. create TOD design
6. evaluate TOD design
Analysis

1. identify opportunities
2. define local and regional TOD area
3. analyse station area
4. establish general concepts and opportunities
5. create TOD design
6. evaluate TOD design

historical dimension
spatial dimension
socioeconomic dimension
political and planning dimension
Regional context analysis

Historical dimension

Horizontally expanded

In the twentieth century Lima has been affected by:

- migrations from the hinterland
- informal settlements ‘barriadas’ in peripheries
- public transport transformation
- economic crisis and political change, which has led to informal public transport: unorganized, cheap, many routes, congestions, traffic chaos, accidents, environmental pollution
Regional context analysis

Spatial dimension

Urban patterns
- coastal location
- historical urban growth

Recent mass public transport
- recent aspirations to change the current informal public transport system

Modal split of motorized transport

Historical city centre
Modern centre
Informal peripheries
Metro Line 1
BRT
BRT feeder buses
Metro Line 1

Car
Motor-taxi
Taxi/collective taxi
Combi
Microbus
Bus
BRT/metro
Other

20%
8%
6%
23%
33%
7%
2%
1%
Regional context analysis

Socioeconomic dimension

- main activities located in the centre
- poor households in the peripheries make long distances
- informal public transport is cheap and the routes cover the whole city
- almost all households of different income groups use informal public transport
- an important amount of formal and informal jobs is generated by the informal public transport system
- informal public transport is an important social solution for the lower class
Regional context analysis

Political and planning dimension

Governmental entities

Lima region and provinces

Actors in transport planning

- lack of collaborative management between national, metropolitan and district governments
- insufficient cooperation and coordination on urban development and transport planning
- integrated urban planning and transport planning is required
TOD area for **activity corridor** and **transport corridor** analysis
1,200 metre radius along corridor

TOD area for **activity centre / local station area** urban design intervention
300-400 metre radius around station
Metro corridor analysis

Transit corridor

Metro use per hour

![Bar chart showing Metro use per hour across different hours of the day.](image)

Metro use per station

![Line chart showing Metro use per station across different hours of the day.](image)

Source: (AATE, 2013)
Metro corridor analysis

Activity corridor and activity centres

Some general characteristics

Socioeconomic class

Inhabitant density

Land-use

Source: INEI, 2009

Source: www.inei.gob.pe

Source: (INEI, 2009)
Metro corridor analysis

Theoretical background

From TOD analysis to design principles through theory

III Analysis station areas
Station positioning, analysis of relations between spatial conditions and networks

(Balz et al., 2009; Atelier Zuidvleugel, 2006):
- degree of access by public transport (APT)
- degree of access by car (AC)
- local densities of inhabitants and jobs (DIJ)
- degree of mixed-use (DMU)

IV Establish general objectives and opportunities
For activity centres or local station areas (Balz et al., 2009; Atelier Zuidvleugel, 2006):

Cities of the future
Regional crossroads
Regional hubs
City centres
Business sites
Outskirts of cities

Developing sub-centres
Metropolitan crossroads
Metropolitan hubs
City centres
Residential sites
Peripheries of cities
Metro corridor analysis

Activity corridor and activity centres

Positioning of stations

- Miguel Grau
- Gamarra
- Arriola
- La Cultura
- San Borja Sur
- Angamos
- Caballo
- Ayacucho
- Jorge Chávez
- Accorino
- San Juan
- María Auxiliadora
- Villa María
- Pumacahua
- Parque Industrial
- Villa El Salvador

Car-oriented

Connected to mass public transit

High inhabitant and employment density

High mixed-use degree

Amenities 400 m around station
Concepts and opportunities

Metro corridor

Positioning of station concepts

LIMA

RANDSTAD

- Rural areas
- Small towns
- Peripheries of cities
- Outskirts of cities
- Developing sub-centres
- Cities of the future
- Metropolitan hubs
- Regional hubs
- Metropolitan crossroads
- Creative cities
- Residential sites
- City centres
- Regional crossroads
- Outskirts of cities
- Business sites

Source: (Atelier Zuidvleugel, 2006)
Analysis and concepts

Conclusions metro corridor

Three station types

**MIGUEL GRAU**

**Metropolitan Crossroad**

is highly accessible by car

Why: not extremely high commerce and location along primary road

**CABITOS**

**Metropolitan Hub**

is car oriented and high degree of mixed-use

Why: its future connection to another metro line

**VILLA EL SALVADOR**

**Developing sub-centre**

has a high mixed-use degree and density

Why: location at the end of the corridor and close to the industrial park
Analysis and concepts

Concepts and principles for selected station areas

Main design principles

Opportunities

Metropolitan Crossroad
- An intensively used employment area with business, local industry and new connections to public transport

Metropolitan Hub
- New employment and mixed-use area with regional and interregional services

Developing sub-centre
- Urban area with own identity, mixed-use area with offices, small business and local services

Transit network

Clarify road hierarchies

Reorganize infrastructure

Create infrastructure

Land-use

Enhance diversity of functions

Stimulate functions of higher scale of influence

Enhance scale of influence of the industrial park

Urban structure

Densification around the station

Densification at the commercial area

Densification along primary and secondary roads

Public space

Create public space

Recover public space

Add quality to public space
Design and conclusions

1. Identify opportunities
2. Define local and regional TOD area
3. Analyse station area
4. Establish general concepts and opportunities
5. Create TOD design
6. Evaluate TOD design

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Vision and design proposals

Vision metro corridor

Phases

1. Connect with mass public transport - feeder buses

2. Redevelop stations with higher potential: Metropolitan hubs: Gamarra, La Cultura, Angamos and Cabitos

3. Consolidate Peripheries of cities within its urban space

4. Expand Residential sites with some offices and local commerce
Vision and design proposals

Design interventions

Station Miguel Grau - *The plaza as a gate to the city centre*

**Metropolitan Crossroad**
- An intensively used employment area with offices and local industry
- Mass public transport is added
- Public spaces are created

![Google Street View](http://conunclickactividadeconomica.blogspot.nl)
![www.facebook.com/LibertyBellPopupPlaza/](http://conunclickactividadeconomica.blogspot.nl)
Vision and design proposals

Design interventions

Station Miguel Grau - *The plaza as a gate to the city centre*
Vision and design proposals

Design interventions

Station Miguel Grau - *The plaza as a gate to the city centre*

Alternative: Station on the squares
**Vision and design proposals**

**Design interventions**

Station Cabitos - *Plaza between two metro stations*

**Metropolitan Hub**

- An employment and mixed-use area with metropolitan and inter-district services, commerce, offices and housing
- Metro Line 3 and mass public transport buses are added.
- Public spaces are recovered
Vision and design proposals

Design interventions

Station Cabitos - *Plaza between two metro stations*
Vision and design proposals

Design interventions

Station Cabitos - *Plaza between two metro stations*

Alternative: Super plaza
Vision and design proposals

Design interventions

Station Villa El Salvador - *The industrial mixed-use park*

**Developing sub-centre**

- A mixed-use area with offices, small business and local services
- Identified by the industrial park
- Connected to mass public transport system and road network
- Quality is added to public space

Transit network

Land-use

New public space

irrigation

billboard
Vision and design proposals

Design interventions

Station Villa El Salvador - *The industrial mixed-use park*
Vision and design proposals

Design interventions

Station Villa El Salvador - *The industrial mixed-use park*

Alternative: The industrial park extension
Vision and design proposals

Design interventions

Materials used

- **Red brick tiles**
  - at the plazas and boulevards

- **Gravel pavement**
  - at the plazas and boulevards
  - in the park of Villa El Salvador

- **Poured concrete with marks every 1 metre**
  - at not (yet) developed areas
  - at strategic places

(www.skyscrapercity.com)
(www.grungetexturefor.me)
(www.morguefile.com)
(www.morguefile.com)
Vision and design proposals

Design interventions

Materials used

- Tree pits with grass
  - at the plazas, boulevards and residential areas

- Concrete tree gates
  - along principle roads

- along principle / secondary roads
- at the plazas and boulevards
Evaluations and conclusions

Research question

‘To what extend can Transit-Oriented Development be used to improve Lima’s urban transit and urban space strengthening the efficiency of Metro Line 1 with an integrating and recovering approach?’

Enhancing the efficiency of Metro Line 1:

Obtained concepts and opportunities optimize the station area developments and use of the metro line

An integrating and recovering approach of urban transit and public space:

- Connection with mass public transport
- Creating efficient multi modal nodes with transfer stops close to stations
- Recovering and increasing qualitative public space at stations
- Integrating appropriate functions and densities at stations

Given the context, obtained concepts and opportunities are different than expected in theory.
Thank you!