The Challenges in Transport Development and Connectivity in Developing Countries

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My research interests

Research topics: Interdisciplinary

- Sustainable Regional and Urban Development: 42%
- Life-oriented Approach for Regional and Urban Planning: 43%
- Integrated Regional and Urban Models: 15%
My views on transport

Time

Space

- human
- things
- information
- capitals

mobilities

transportation

My views on transport

Development of life-oriented approach for regional/urban/transport policies

My views on transport systems

My views on transport systems

Integration of regional/urban/transport developments with diverse sustainabilities

Background of Transportation Development in Asia

- **Urbanization**: rapid growth in general, but decline in Japan
- **A continuing car-dependent trend**: still very strong
- **Problematic development issues**: unbalanced within-country development in Asia is serious; urban development is often done in an unplanned manner; transport-based social exclusion issues
- **Disexternalities of transportation development**: traffic congestion, accidents, air pollution, social exclusion,
- **Major issues of transportation infrastructure and services**: lack of (better, integrated) planning, rapid growth of travel demand, slow development of transportation networks, bad travel management, …
- **Emerging threats and opportunities**
  - Threats: Climate change impacts (extreme weather, sea level rise, flooding, storm surge,…), selective migration due to globalization, …
  - Opportunities: regional integration/cooperation, IoT, AI, shared economy…

Cross-border connectivity

Cross-border transport in Asia

Asian Highway
Trans-Asia Railway Network
Great Mekong Region
Asian Highway (AH) Network

The idea of developing regional road and rail networks in Asia was initiated in the 1950s by the United Nations Economic Commission for Asia and the Far East (ECAFE), the forerunner of the present United Nations Economic and Social Commission for Asia and the Pacific (ESCAP).

Transport Systems in Asia

Trans-Asian Railway (TAR) Network

Criteria for including specific links into AH and TAR networks
- Capital-to-capital links
- Connections to main industrial and agricultural centres
- Connections to major sea and river ports
- Connections to major container terminals and depots

Linking the AH and TAR Networks

- Recognizing the value of developing an Asian integrated intermodal transport system with AH and TAR networks as its two important building blocks, ESCAP took an initiative in 2010 to develop an intergovernmental agreement on dry ports.

Missing: Cross-border waterways
→ e.g., Mekong River

Zhang J & Feng C-M (2017)
Introduction: Transport in Asia.
In: Zhang J & Feng C-M (eds), Routledge Handbook of Transport in Asia, Chapter 1.
China’s Belt and Road Initiative


Trade/Logistics/Tourism/…
Intermodal connectivity
Density does matter!
First, density does matter!
Density does matter!
To reduce transfer!

Figure 2. Some examples of mutual direct operation lines across companies

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To connect stations/stops!

Omachi Station

JR Sanyo Main Line

Hiroshima St.
Nishi-Hiroshima St.
Yokogawa St.
Hakushima New St.
To connect stations/stops!

JR Sanyo Main Line

Hakushima New St.

Astramline
To connect stations/stops!
To connect stations/stops!
Relocation of Tram Terminal from Middle of Road to Station Forecourt

To connect stations/stops!
To connect walk to Skyrail – Railway
Mutual use of transport IC cards in Japan

Source: https://ja.wikipedia.org/wiki/%E4%B9%97%E8%BB%8A%E3%82%AB%E3%83%BC%E3%83%89
To connect everyone with streets

WHAT ARE COMPLETE STREETS?

Complete Streets are streets for everyone. They are designed and operated to enable safe access for all users, including pedestrians, bicyclists, motorists and transit riders of all ages and abilities. Complete Streets make it easy to cross the street, walk to shops, and bicycle to work. They allow buses to run on time and make it safe for people to walk to and from train stations.
Intermodal Connectivity: Logistics

https://www.google.co.jp/search?q=connectivity+in+transport&tbm=isch&tbo=rimg:CbIXGjathSCV1jWdLHBy55w85AwUbmGwpGSpCpAcVmgzQqPi3jeuBhb7Yv0a-BHVvms2tLM2xG1hsvVY5VMLeIoRw030bcF_1mblBeWcQpOnmIC5nqKb3kdADQcGy3CKLYlRYfV4uzevR211gEgmmMkXk8xWdHEWLCWxM69RaaSc2dcoX2/Pd764E5SWVEC0P2ceNhJZuF1O_1Sj4EcRjH1g2SSFW0gEg3Hc2zUFeFD9H-CV_jSwFNd0y5SCWVYx1UI1wQsEFeMgHL/YC&tbo=u&sa=X&ved=0ahUKEwihQGifW7rvAhW9zTgKHeH9Dz0Q8BAoB

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Data issues about the connectivity

- Surveyed area: Companies of logistics services in Haiphong city
- Time: September 21st to October 20th, 2013
- Sample size: 160 shipments from 60 companies
## Data issues about the connectivity

### Section 2: Time use of commodity flow

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### Table 2:

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#### Activities:
1. Reserved booking
2. Storage
3. Loading
4. Transport
5. Unloading
6. Packaging
7. Labing
8. Sorting
9. Others

#### Facilities:
1. Industrial Park
2. Truck terminal
3. Inland Container
4. Railway station
5. Airport
6. Port/berths
7. Warehouse
8. Other
Data issues about the connectivity

Total Time use efficiency

0
0.2
0.4
0.6
0.8
1.0
1.2

1 6 11 16 21 26 31 36 41 46 51 56 61 66 71 76 81 86 91 96 101 106 111 116 121 126 131 136 141 146 151 156
High-speed Connectivity

High-speed railway
To connect regions with high-speed railways

High-speed railways in the mainland of China
To connect regions with high-speed railways

High-speed railways in Taiwan, China and South Korea
To connect regions with high-speed railways

High-speed railways in Japan

新幹線路線図

秋田新幹線（秋田～東京）
山形新幹線（山形～東京）
上越新幹線（新潟～東京）
北陸新幹線（金沢～東京）
北海道新幹線（札幌～東京）
東北新幹線（新青森～東京）
東海道新幹線（新大阪～東京）
九州新幹線（博多～鹿児島中央）
山陽新幹線（新大阪～員弁）
Impacts of Climate Change on transportation networks
Vulnerable Transport under Natural Disasters
Vulnerable Transport under Natural Disasters in Asia

The Great East Japan Earthquake (GEJE) of March 11, 2011
Vulnerable Transport under Natural Disasters

Vulnerability due to Natural Disasters

Legend
- — International boundary
- —— District boundary

- Rivers
- Normal Flood
- Flash Flood
- Severe drought prone area
- Surge Height above 1 meter
- Surge Height less than 1 meter
- 1 ppt salinity Isoline
Vulnerable Transport under Natural Disasters

- For 2050, 38-year return level with 95% confidence interval: 1.80 meters.
- For 2080, 68-year return level with 95% confidence interval: 2.0 meters.
Connectivity: A bigger picture

To connect transport with …
To connect transport with life

Life-oriented (Behavioral) Approach

Leisure/Recreation

Residence

Family Life

Health

Education

Expenditure

Job

Neighborhood

Leisure/Recreation

Residence

Family Life

Health

Education

Expenditure

Job

Neighborhood
To connect transport with land use: EK in Japan

**Before Phase I (～1920)**
Outside from Yamanote.Line: Basic rail network were built
Inside from Yamanote.Line: Tram network
Purpose: Freight, Pilgrimage (Narita Mountain, etc.)

**During Phase I (1923～1945)**
Rail: basic network completed (both central and suburban)
Road: limited improvement

**During Phase II (1955～1970)**
Overlapped with rapid motorization.
Change from tram to subway inside from Yamanote.Line
Rail: Rail Improvement ≈ capacity expansion → shorten headway, double tracking, separation of freight / pax train tracks, increasing number of cars per train, etc.
Road: began extensive network construction,

Overlapped with rapid motorization
To connect transport with health

To connect transport with energy

Activity-based consumption

- Time
- In-home activity
- Eating-out
- Work
- Meeting
- Trip
- Shopping
- Factory
- Office
- Space
- Home
- Restaurant

Wife
Husband
Home
Restaurant
Office
Factory
Eating-out
Meeting
Work
Trip
Shopping
Factory
Office
Space
Home
Restaurant

HIROSHIMA UNIVERSITY
Better transport governance: To connect stakeholders

Figure 20.3 DPSIR+C framework: An example of air quality management

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Q & A
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