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Developing Sustainable Transport System in Asian Megacities Challenges and Prospects

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Background

All cities facing range of transport problems

- Increasing motorization
 - Traffic congestion
 - Pollution; accident

Degrading condition of public transport

- Declining mode share
- Increasing subsidy burden
- Decreasing coverage

The list goes on....

But problem patterns varies by cities
 Need to examine cities' characteristics

pecial characteristics of Asian megacities

Economic growth, urbanization, urban form

- Higher economic growth rate and urbanization
- Rapid urbanization and growth of megacities
- Over-concentration in capital cities
- Higher level income disparity
- Mono-centric urban form with high density
- Weak land-use control and regulation

Urban Transport system

- Inadequate infrastructure: roads and railways
- Public transport mode share high but declining
- Rapid motorization (including motorcycle)
- Lack of financial resource

hallenges from special features of Asian megacities



Background: STREAM Study-objectives

- Sustainable Transport in East Asian Megacities" (STREAM) Study (2005-2007), objectives
 - Examine characteristics of EA megacities
 - Formulate a strategic policy framework
 - Suggest practical policy measures

nternational collaborative research team representing:

okyo (ITPS), Seoul (KOTI), Hong Kong (HP Univ), Taipei (NCT Jniv), Bangkok (AIT), Metro Manila (Univ Ph), Shanghai (Tongi Jniv), Jakarta (ITS), Hochiminh City (ALMEC)

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Need to understand Urban Transport Dynamics



elements of New Perspective

1. Importance of appropriate system structure

- Physical structure: infrastructure, land-use
 - More relevant for developing stage



Institution: "soft" aspects

2. Importance of timing (stage) with respect to

• Effectiveness and efficiency of policy measures

miny. Example



Similar patterns also for other objectives and policy measures



iming of transit inv<u>estment and ridership trend</u>



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opulation trend in Metropolitan core and sub-urban areas



Trend of suburbanization? of what kind?



opulation Decentralization: possible spatial patterns



Car-oriented sprawl

→ Undesirable !

Low density dispersion

Mono-centric

 Public-transport oriented poly-centric form

 \rightarrow Desirable!

Or Transit corridor with weak centers

(1)

Poly-centric decentralization

Policy makers have realized he need of transit oriented Irban form- formulated plans

Key Strategic Issues

- How to achieve such urban form in the face of weak land-use control?
- How to ensure housingjob balance in the subcenters?

Sub-center plan: **Bangkok**



Sub-center plan: Jabotabek



Figure 4.2 Integration of Transportation System with Land Use



Experiences and policy suggestions

Control-oriented approach:

- Difficult to implement
- No guarantee for desirable outcomes (green-belt in Seoul)
- Coordination of planning, development and market: more successful
 - Investment for urban rail, public housing and TOD in Tokyo (with dominant role of private sector)
 - Planned development of new urban centers in Metro-Manila (private sector's role)
- Useful instruments to guide the market
 - Pro-active MRT investment, promotion of TOD
 - FAR incentives; land readjustment; value capture
 - Incentives for decentralizing the jobs

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Available Road space 2004

	Area	Pop.	Road Area	
	(Km2)	Density Per/ha	Km2	% (city area)
City of Paris	105	202	27	25.8
New York City	678	112	210	25.2
Inner London (12 boroughs)	589	72	96	16.4
Inner Tokyo (8 wards)	110	121	24	21.7
Tokyo 23-wards	621	131	114	18.1
Seoul City	605	168	80	13.3
Taipei City Inner Core	134	197	20	14.9
Shanghai City Inner Core	108	378	13	12.0
Bangkok City Core	225	96	16	7.2
Jakarta City	656	133	48	7.3

Data source: STREAM Study compilation

Asian megacities:

- In adequate road
- Inefficient road hierarchy







Some cities have developed Toll ways rapidly...





ike per capita vs car ownersnip rate:

lected metropolitan areas (2002~04)



In general, income growth increases car ownership rate



ike per capita vs car ownersnip rate:

elected metropolitan areas (2002~04)



RP per capita Vs urbanized density



Key Strategic challenges

- How to de-link economic prosperity and car ownership? High density city structure?
- Inadequate road space in Asian megacities calls for more road investment: How to expand road space without promoting motorization?



Suggested policy approach

- 1. Strategic objectives of road investment by stages
 - Early stage:
 - Overall network building, right-of-way acquisition
 - Appropriate type: missing links, secondary roads
 - Consider network performance and freight transport
 - Middle stage: Road space allocation, bus lane etc
 - Later stage:
 - Bottle-neck improvement; Expressways
 - Address peak-hour congestion
- 2. Use of economic instruments: pricing, fee and taxes
 - Targeting both car ownership and use
 - Use of parking policies to control car use
- 3. Improving service quality of public transport



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Role of Public Transport

- Transport service that is..
- Accessible and Efficient (Economically efficient)
- Clean and healthy (Environmentally sound)
- Safe, Affordable, Inclusive (Socially acceptable)



Modal split $(1998 \sim 2004)$

Taipei Tokyo Seoul Shanghai Bangkok Jakarta M. Manila **HCMC**

出所:

Compilation by STREAM Study (2006)



60%

80%

100%

eveloping cities : Bus & Para-transit main modes for Public Trag

40%

I rends of public transport mode share



Note: Walking & bicycle not included

In general, public Transport mode share on declining trend

ey Challenge: Attracting <u>choice riders</u> public transport



eveloping Asian megacities:

- Public transport only for captive users
- > Not attractive for Choice riders



Shifts in public transport strategy needed...





olicy experience: Bus reform

Bus reform in Seoul and Taipei:

Common features



- Comprehensive reform: modernization, Median bus-lane, IC-ticketing, fare and service integration with MRT, farediscount for transfer (distance-based fare)
- Improvement in service and ridership,

Differences	
Taipei	Seoul
Reform through gradual process	Reform through major intervention
Ownership and operation largely by private sector; regulation by public sector	Public-private partnership in management and operation, significant role of public sector
No direct subsidy (indirect cross- subsidy from MRT for fare discount)	Significant financial burden on public sector (direct subsidy)

Bus reform...



For longer-term sustainability

\rightarrow Need to consider the financial cost of reform

Without MRT as backbone system, bus reform alone may not be successful to compete with private mode...

Need to develop MRT...also contribute to achieve desirable urban form





Need of high canacity system



Peak hour crowdedness in Tokyo due to higher demand





Timing of MRT development:

to maintain the high share of public transport mode



Multiple timing indicators

ndicators	Right timing when
-----------	-------------------

- ncome high enough for charging reasonable fare
- ar ownership **not too high** to ensure good patronage
- opulation high enough for threshold demand volume

Irban density Not too low for required passenger density

Timing should be decided considering the state of all indicators !



Timing of subway opening: Income stage

Opening year of the first subway and income per capita



Timing of subway opening: City population

City population and opening year of the first subway





Timing of Subway introduction

- 46 cities with subway: country income level (PPP\$ 1990) and population at the time of subway opening
- The average income level (PPP\$ 1990): 6202
- Average population: 2,838 thousand



IPN index by cities (Timing of subway opening)

Cities	Year of subway opening	Income per capita PPP\$ ¹	City Pop (000)	IPN Index	
Tokyo (Ginza)	1927	1870	3100	0.57	Far
Paris	1900	2876	2714	0.67	
London	1863	2881	2803	0.68	J
Toronto	1954	7699	1365	0.77	Ab
Tokyo (Marunouchi)	1954	2582	6700	0.99	pro
Cairo	1987	2465	8326	1.08	pri i
Seoul	1974	3015	6808	1.08	ate
Shanghai	1995	2653	9545	1.20	J
Taipei	1997	14598	2629	1.48	lat
Singapore	1987	11827	2800	1.37	
Bangkok	2004	7100	6604	1.63	

Country per capita GDP (1990 constant PPP\$)



Cities without Subway:

IPN Index if Subway in 2005?

City	Year	Income PPP\$/cap ¹	Pop Mil.	IPN Index	Remarks
Jakarta	2005	2805	8700	1.18	Late
НСМС	2005	2242	6200	0.89	Right time now
Metro Manila	2005	3750	10900	1.52	Late
Metro Manila	1984 ¹	2981	6800	1.07	Why LRT?

1. The Year when Metro Manila introduced LRT System



Urban railways,

- Important !
- Identify right timing !

....even bigger challenge is sustainable operation !



Operational characteristics of selected subway systems 2005

	Tokyo		Seoul ¹		Tai	Lon	New	
	Tokyo Metro	Toei	Seoul Metro	SMRT	pei	don	York	
Route (km)	183.2	109	134.9	152.2	67	408	371	
Passengers (mil/year)	2110	761	1440	819	361	971	1449	
Pass/km/day (000 person)	32	19	29	15	15	7	11	
Operation Revenue	357,312	121,774	772,200	426,600	9,204	1,402	2,908	
Cost	277,203	114,335	1041,200	780,600	8,571	2,362	5,673	
Revenue/cost	1.29	1.07	0.74	0.55	1.07	0.59	0.51	
Fare (US\$)	1.3 ~ 2.5	1.4 ~ 3.5	0.8 ~	· 1.1	0.6 ~ 1.9	3.0 ~ 8.0	2.0 ~	

1. data year 2003, 2. revenue/cost includes also of bus

2. Data source: Seoul (Sung 2007), rest from homepage of respective agencies



ublic transport: summary

- Key challenge:
 - Making public transport attractive for "choice riders"
- Possible suggestions:
 - Reform of bus and para-transits: find innovative model?
 - Investment for MRT: right timing !
 - Planning for hierarchical system; transfer facilities



lierarchy of Urban Railway Network (Tokyo)

Railway Type	St. Spacing	Operating Speed *
Shinkansen Railway (Bullet Train)	30 – 50 km	120 -130 km / hi
Inter-city Train (Japan Railways)	5 – 6 km	50 - 60 km / hi
Ordinary Train (Private Railways)	1 – 2 km	40 - 45 km / hi
Subway	0.5 – 1 km	30 - 35 km / hi
Monorail / AGT (BRT?)	0.5 – 1 km	20 - 30 km / hi
Number o Passengers Capacity Distance Far end of urban rail	owntown Area	Inter-city Train Express Train Shinkansen Railway Ordinary Train
line Me	tropolitan Area	Total 2.308 km 🙆

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lodal-coordination: infrastructure supply





are coordination among different modes

Early stage: Bus Vs private mode: (subsidy for bus appropriate) Middle Stage: (Bus Vs Rail) Vs Private mode (subsidy for bus hurt rail) Later stage: (Rail+Bus) vs Bus vs Private mode Private mode

Remove bus subsidy? Impact on affordability of poor

Needs market segmentation:

- Subsidy for economy mode (Jeepney, Non-AC bus)
- Deregulated fare for higher-service mode

Ex in Metro Manila

Comparison of Taxi and MRT Fares (US\$) in 2007

Taxi	MRT	Fare Ratio	Remarks
0.42	0.37	1.14	Lower taxi fare to discourage car?
0.75	0.26	2.92	Both taxi and MRT low?
1.10	0.44	2.50	Taxi fare lower? Good PT coverage!
1.45	0.40	3.63	Balanced?
1.63	0.45	3.59	Balanced?
1.92	0.51	3.74	Balanced?
2.00	0.95	2.11	Lower Taxi fare (good MRT coverage)
2.12	0.61	3.50	Balanced?
2.50	2.00	1.25	Unbalanced? Taxi lower or MRT higher?
2.70	2.25	1.20	Unbalanced? Taxi lower or MRT higher?
3.15	1.36	2.31	Taxi lower?
4.37	3.03	1.44	Unbalanced? Taxi lower or MRT higher?
5.78	1.40	4.13	Taxi higher? (may be ok, good MRT covrge)
7.02	1.91	3.68	Taxi higher? (may be ok, good MRT covrge)
	Taxi 0.42 0.75 1.10 1.45 1.63 1.92 2.00 2.12 2.00 2.12 2.50 2.70 3.15 4.37 5.78 5.78	TaxiMRT0.420.370.750.261.100.441.450.401.630.451.920.512.000.952.120.612.702.253.151.364.373.035.781.407.021.91	TaxiMRTFare Ratio0.420.371.140.750.262.921.100.442.501.450.403.631.450.403.631.630.453.741.920.513.742.000.952.112.120.613.502.502.001.252.702.251.203.151.362.314.373.031.445.781.404.137.021.913.68



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ransport investment demand and funding gap





Alternative funding/financing for urban transport in developing Asia

Funding/financing instruments	Degree of application in Asia		
Government fiscal borrowing (deficit budget)	Medium: concept of "balance budget" a barrier		
Public corporation borrowing (corporate bonds etc)	Low: lower credit worthiness due to lack of fiscal discipline		
Property tax, special tax	Low: windfall gain to property owners		
Fuel and vehicle tax (special account)	Low: external costs of vehicle use not internalize- inefficiency!		
Value capture & impact fee	Low: unfair burden sharing		
User's fee	Medium: due to priority to affordability		
Public subsidy	Low: Due budgetary pressure		
BOT (private sector finance)	Medium: How successful?		
Key challenge: How to apply broad range of instruments to ensure sustainable funding/financing?			

Conclusion-1

- Special nature of urban transport issues in Asian megacities demands special treatment
- **Timing consideration** offers useful framework to set priority for simultaneously arising diverse policy needs
- Asian megacities facing critical challenges
 - Achieving transit oriented urban in the face of weaker land use control
 - Expanding road space without encouraging motorization
 - Attract choice riders to public transport
 - Coordinating modal competition at different stages
 - Innovating alternative funding/financing?



Conclusion-2

- Good prospects? Specialties of Asian megacties offers many opportunities to face such challenges
- Urban transport system still evolving → policy measures can bring significant changes
- Large population with high-density and mixed use → possibility for competitive public transport
- New trends: large domestic saving; private sector participation; decentralization etc may bring innovations in funding, financing

.....the Workshop discussion may contribute in exploring practical policy options to respond these issues..



Thank you !

Comments and suggestions are welcomed ! surya@jterc.or.jp

