The “Developing” World?

Urban Passenger Mobility

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1.201

Objective and Content

- Provide a brief, somewhat anecdotal, “survey” of developing country urban mobility reality

1. Trends and Forces
2. ***A*** Developing World?
3. Developing Country Challenges and Opportunities: 5 Key Areas
   - Motorization, motorized 2-wheelers, public transportation, land management, institutions

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"Developing" World Urban Transportation: Trends in Perspective

By 2030

~2 billion new residents

X

~3,000 vkm/person/year

=

~6 trillion additional vehicle kms/yr

=

~600 billion additional liters of gasoline/yr

or **~1.9 billion tonnes of GHG yearly**

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Some Relevant Forces

- Income growth…
- Accessibility is a "superior good"
- Urban decentralization (i.e., suburbanization)
- Increasing labor force participation
- Declining household size

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In other words…

Urbanization
(Urban population growth)
+
Decentralization
(Urban outgrowth, “sprawl”)
+
Income Growth
=
More **people making** ***more*** **trips over** ***greater*** **distances**

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What do we mean by “developing” world?

- Can (should) we generalize?
- What is different?
- What is the same?
- Sources of variation?

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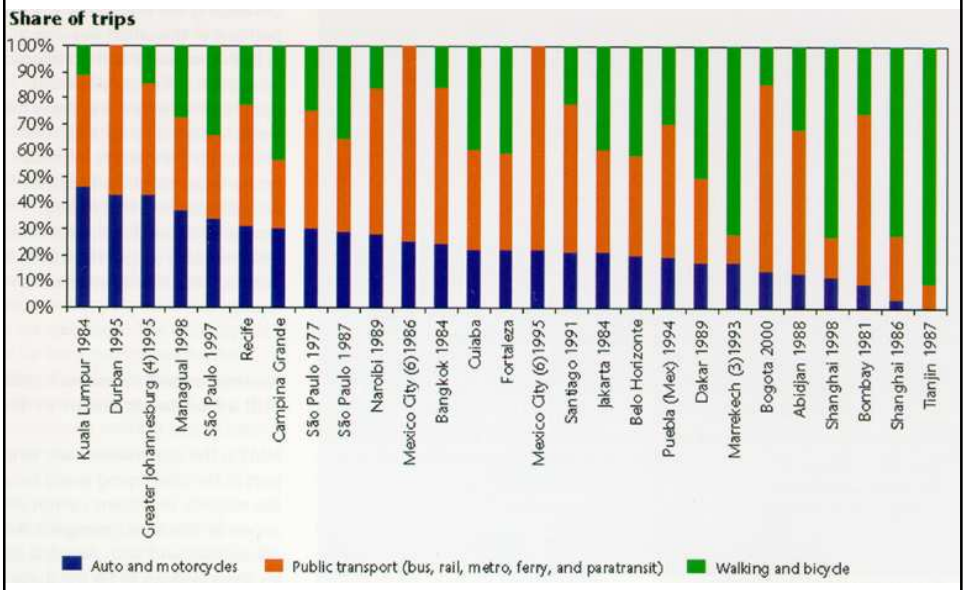
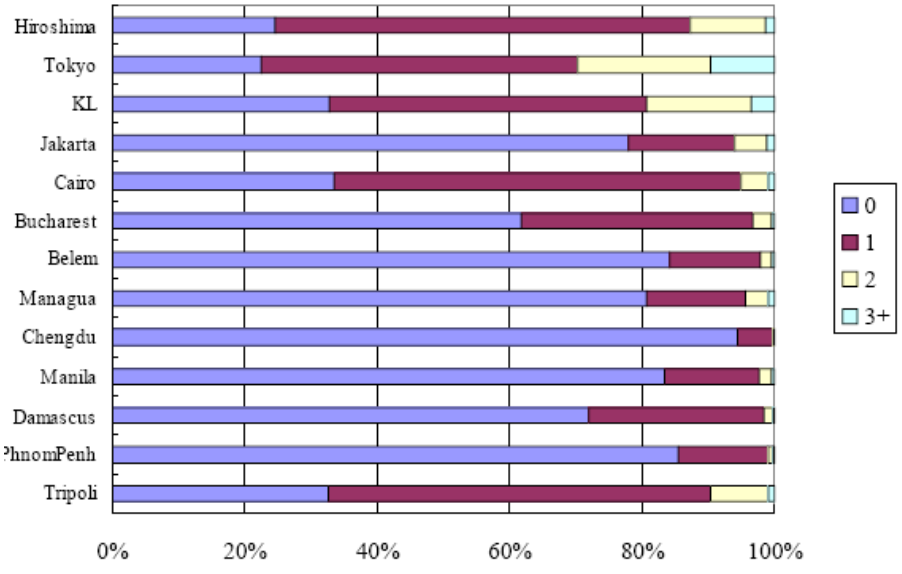
Range of "Developing World" Cities

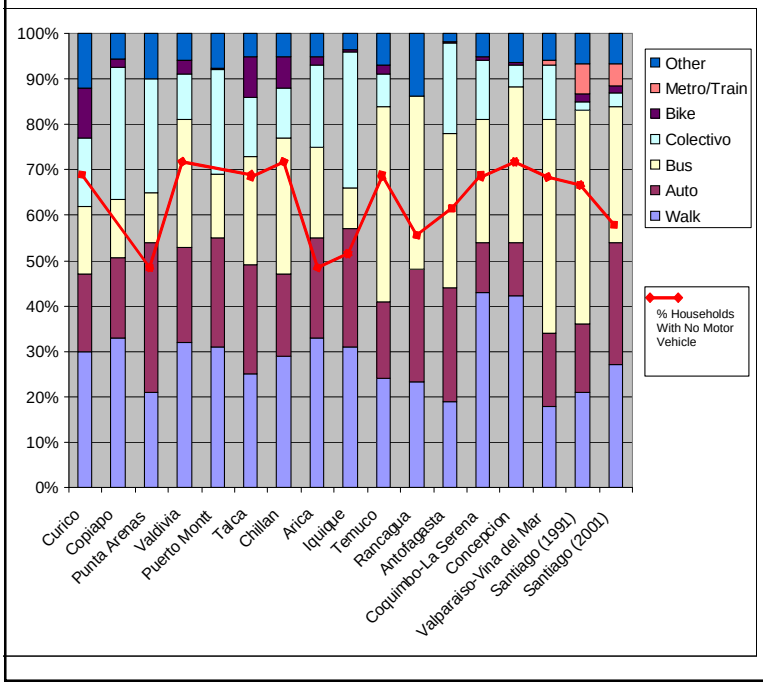


Source: Various, see WBCSD, Table A-1.

Household Car Ownership



Hyodo et al, 2005.



Chilean Cities:

Vehicle Ownership & Mode Shares

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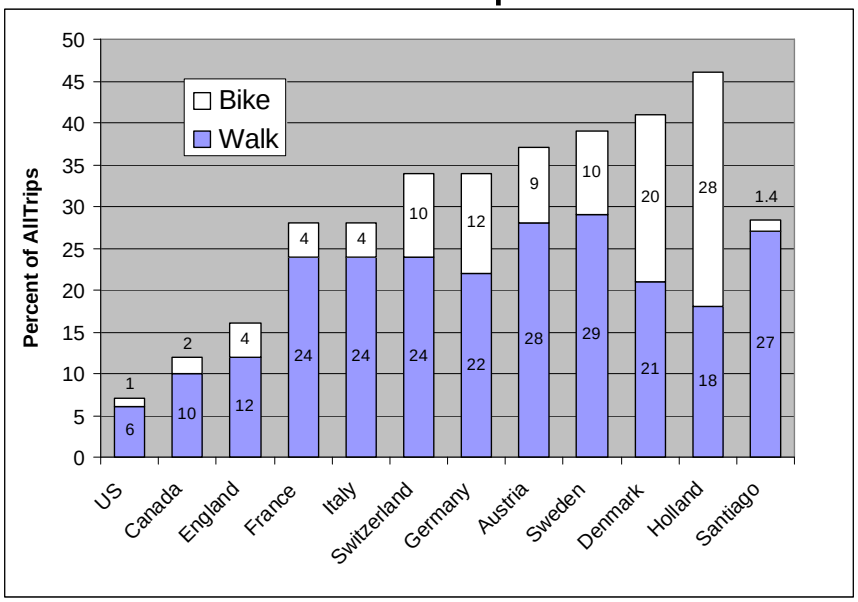
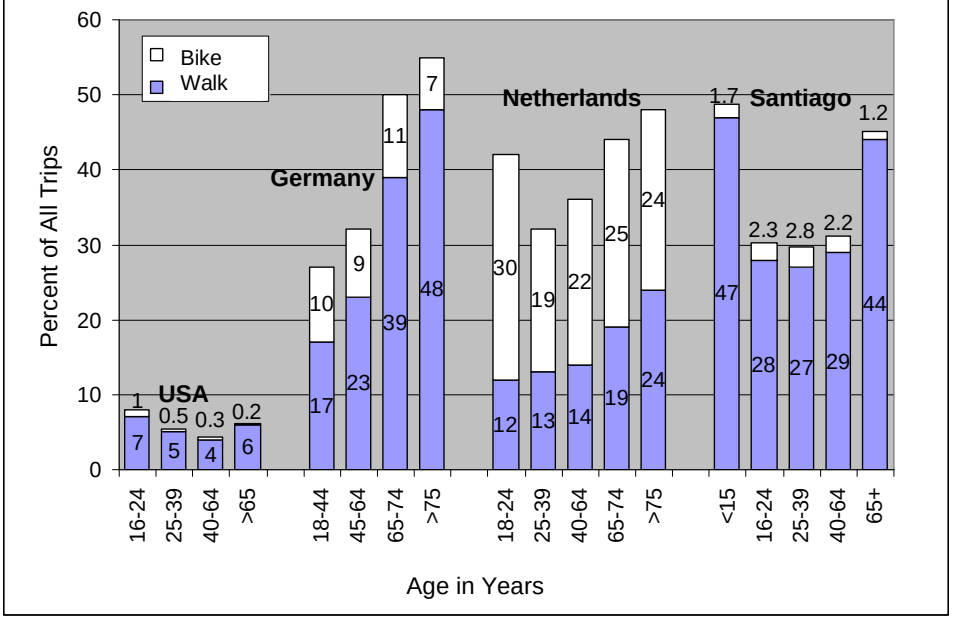
Non-motorized transport “cultures”?



Pucher & Dijkstra, 2003; Santiago derived from SECTRA, 2002.

Non-Motorized Urban Trips by Age Category



Pucher & Dijkstra, 2003; Santiago derived from SECTRA, 2002.

Gender

- Again, significant variation by culture…
- Generally, women have less access to private vehicles (*all else equal*)
- Women's travel habits – more often than men's related to household maintenance – not conducive to convenient public transport itineraries.
  - Further suffer possible dangers on public transport.
- In developing countries, female trip generation rate tends to be higher than males in most cities
  - Exceptions in places like Cairo and Kuala Lumpur
  - Likely religious and cultural influence (e.g. Hyodo et al, 2005).

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A few accurate generalizations

Poverty

- By definition, developing world is poorer
  - Accessibility poor
  - Time poor
  - Safety poor
  - Energy poor
- Distribution of income: tends to be worse
  - Gini coefficients
- Interacting effects: poor on periphery, isolated, poor transport, long trips

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Accurate generalizations

Dynamism

- E.g., land market changes in China and Vietnam
- Political and institutional decentralization
- Rates of population growth
- Demographic
  - Women in work force participation

Densities

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Can we “buy (and/or learn) away” some of the effects?

- Kuznets curve
- But, will this come in time?
- E.g.: traffic accident rates in India will not start declining until 2042…(Kopitz and Cropper, 2003)
- Paths of development will depend, in part, on time, speed, sequence of technological adaptation
- Impacts and implications will vary across contexts

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Developing country challenges and opportunities: Five key areas

- Motorization – does a foreseeable ceiling exist?
- Motorized two-wheelers – friend or foe?
- Public transportation – what future?
- Land development – any possibility for management for mobility?
- Institutions – capable of responding?

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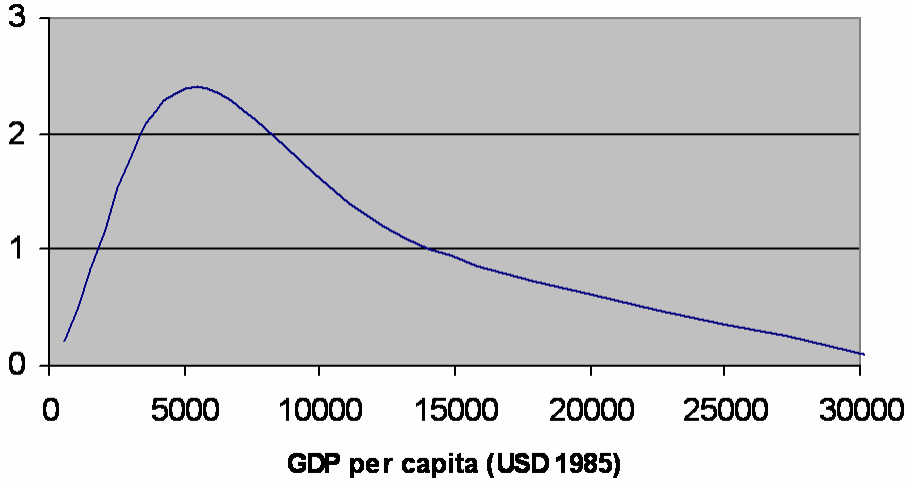
Motorization

In theory, a saturation point exists…

ALL of developing world is well-below saturation

The "vicious cycle…"

Motorization (cars/capita) Income Elasticity



Dargay, J. and D. Gately (1999); Income's effect on car and vehicle ownership, worldwide: 1960-2015; *Transportation Research A*, Vol. 33, No. 2.

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Motorization: Influencing Factors

- Income distribution
- Local industry and trade policy
  - Brazil, Malaysia,China
  - Trade liberalization and used vehicles
    - Peru, Senegal
  - Local tax policies: Shanghai until recently
- Other policies, with potentially perverse effects
  - “Hoy no circula”
- Will any country take a Singaporean approach to long-term management of S-curve?

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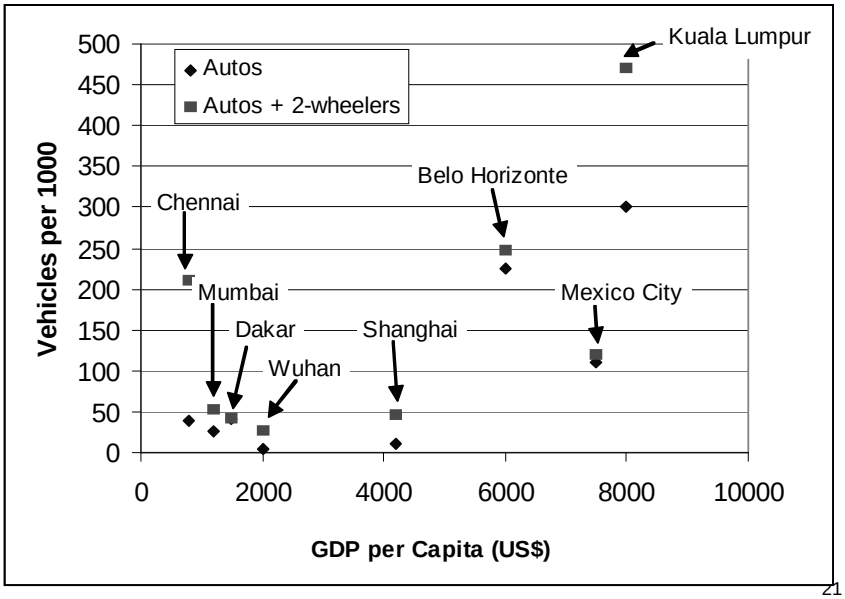
Motorization and Motorized Two-Wheelers

The “ladder of mobility”?

Where does the 2-wheeler culture come from?

Motorization and 2-wheelers



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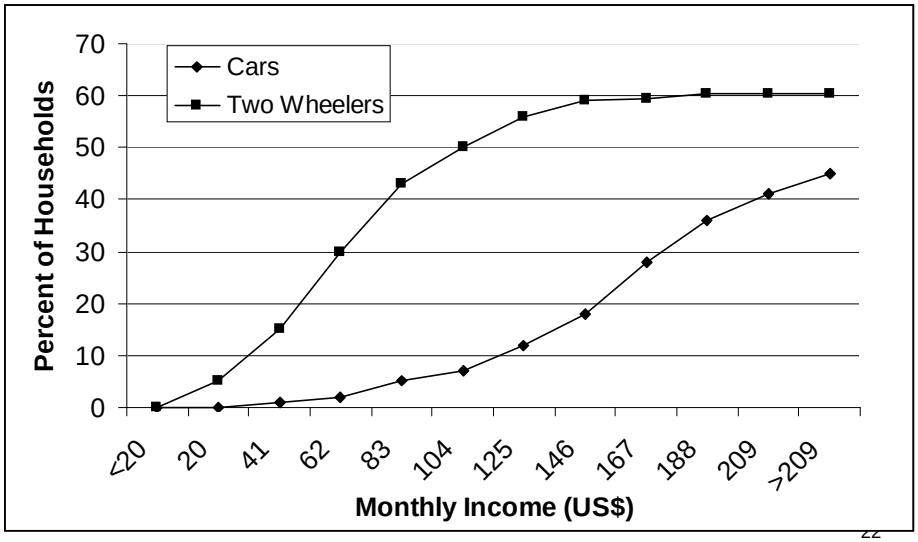
Chennai, 1993



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Rites, 1995.

2-wheelers

- The “worst of both worlds”? (Barter, 2004)?
  - Traffic saturation and undercutting public transport
- High levels of air and noise pollution
- Dangerous driving habits
- Difficult traffic management conditions
- Likely the “most challenging” transport problem that Asia will face in the next decade (Gwilliam, 2003)

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Public Transportation

Developing cities mobility backbone

Public Transportation

☑Ubiquitous service
☑Entrepreneurial spirit
☑Large potential demand…

☒Severe financial conditions
☒Inadequate capacity
☒Little network integration
☒Slow speeds
☒Deteriorating capital

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Public Transportation: Obstacles

- Poverty
  - Allport and Thomson (1990): with 1 dollar fare, Metros in LDCs "break even" (operationally)
- "Guerra del centavo"
- Potentially "counter-productive" competition

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Public Transportation: Competition

- *Car rapides* (Dakar)
- *Matutus* (Nairobi)
- Two-wheelers (Chennai)
- *Colectivos* (Mexico City)
- Auto industry… (KL, Brazil, Mexico, etc.)

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The Power of "Informality"

The *Matutu* minibus in Nairobi

	Bus	Matutu	Matutu Advantage
Average wait time (min)	24	14	44%
Average trip time (min)	65	38	42%
Average travel time (min)	90	52	42%
Average fare ($/km)	0.03	0.02	28%
Average trip speed (km/hr)	13	18	42%
Average travel speed (km/hr)	9	13	41%

Source: Koster and Hop (2000).

Note: Overall average based on AM/PM Peak and Off Peak.

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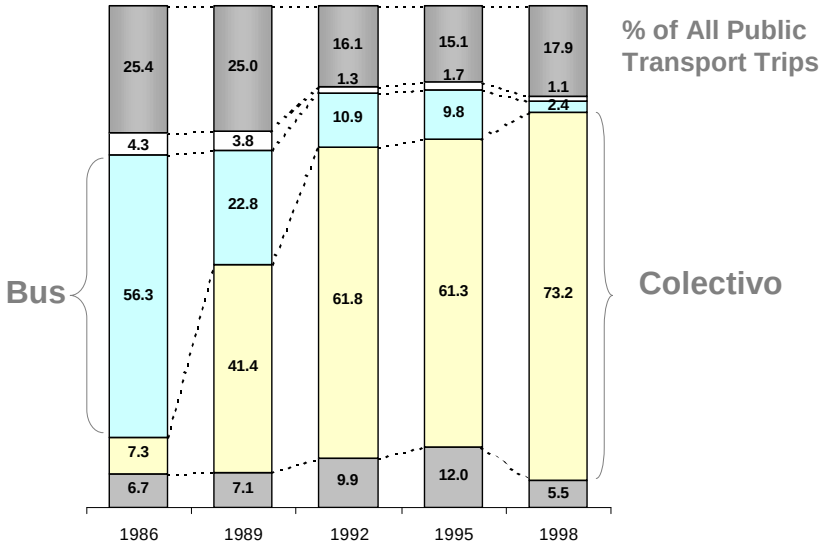
Rise of the Informal Sector: Mexico City



Mexico City's Colectivos

Images removed due to copyright restrictions.

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Public Transportation:
Institutional Challenges

Managing private industry in the public interest

- Private operators: strong political leverage
- Fare: conspicuous component of cost of living
- Ambivalence about "informality"
- Inter-jurisdictional coordination
  - E.g., Mexico City
- Innovation in isolation
  - Metrobus, KL's rail, TransMilenio

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Public Transportation:
A Range of Outcomes

- Mexico City Metro
  - US$400 mn/year of operating subsidies
- Kuala Lumpur
  - massive rail investment; bankrupts "companies", little mode share effect
- BRT "Revolution"?
  - Curitiba, *Transmilenio*, MetroBus, *Transantiago*, etc.

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Land Management

What hope for managing outcomes?

Urban Decentralization

	pop/sq km (1960)	pop/sq km (1990)	% chg. (1960-1990)
Tokyo	8,565	7,097	-17%
New York	2,878	2,086	-28%
Paris	6,860	4,614	-33%
London	6,539	4,232	-35%
Detroit	1,970	1,275	-35%
San Francisco-Oakland	1,640	1,602	-2%
Washington	2,046	1,373	-33%
Melbourne	2,028	1,491	-26%
Hamburg	6,827	3,982	-42%
Vienna	9,141	6,830	-25%
Brisbane	2,095	978	-53%
Copenhagen	4,952	3,467	-30%
Amsterdam	9,973	5,591	-44%
Zurich	5,998	4,708	-22%
Frankfurt	8,722	4,661	-47%

Will the developing world follow suit?

Source: Demographia, 2001

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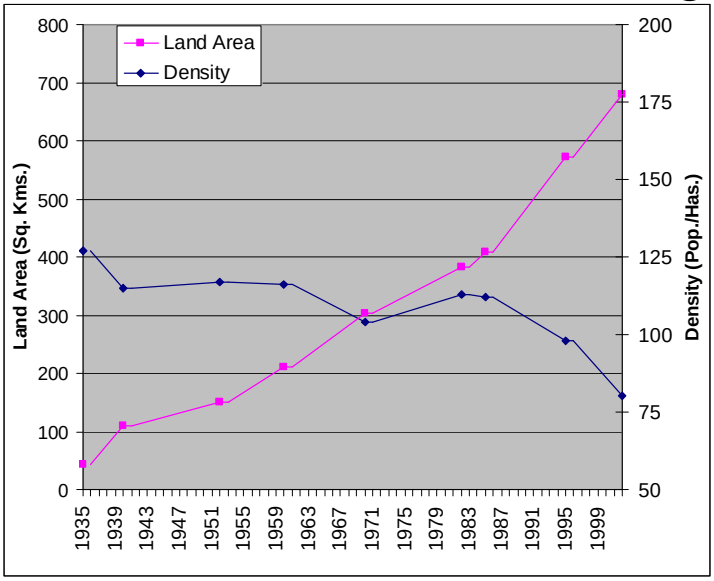
Decentralization in Santiago



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Land Patterns: Generalizations

- Developing world still *much* denser than industrialized
- Wuhan: 160 (persons/ha)
- Mumbai: 120 (persons/ha)
- Belo Horizonte: 63 (persons/ha)
- Santiago: 60-70(persons/ha)
- Shanghai at NY Metro Area density would be 16 x current size…

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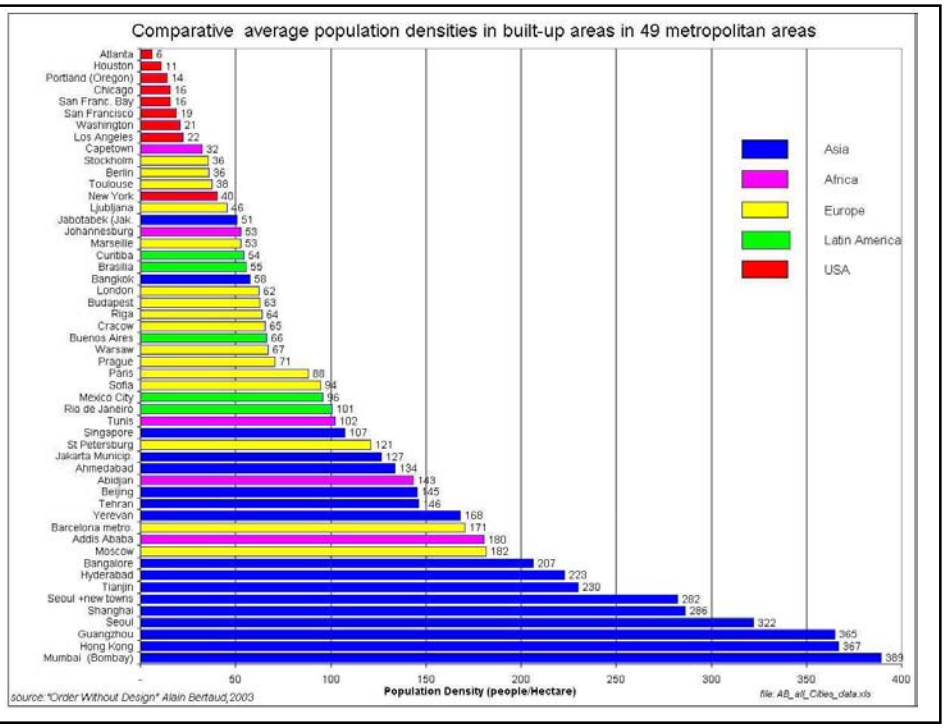

Land Development: Changes

- Massive Mega-Developments
  - Nave Mumbai (Mumbai)
  - Pudong (Shanghai)
  - Sante Fe (Mexico City)
  - Chacabuco (Santiago)
  - Kuala Lumpur City Centre Project
  - Etc.
  - Represent influence the “modernizing” forces (globalization, motorization, infrastructure expansion, etc.)

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Land Development: Challenges

Poverty, informality, spatial segregation

- Mexico City
  - 49% of residents live in “irregular” settlements
- Navi Mumbai
  - 39% in “informal” settlements
- China
  - Land reform and government land conversion incentives…
- Forces: continuous in-migration, low purchasing power, segregation, etc.

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Socio-Economic Spatial Segregation

Santiago **Mexico City**

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Urban Decentralization: The Rich & Poor

"Irregular" Settlements in Mexico City

Images removed due to copyright restrictions.

Upper Income "Sprawl" in Santiago de Chile

Images removed due to copyright restrictions.

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Institutions

The ultimate challenge?

Institutions

- Dynamism of change
  - Decentralization, democratization
  - Income growth, motorization, etc.
- Outstrips
  - Data relevance
  - Institutional capability (jurisdictional, technical, etc.)

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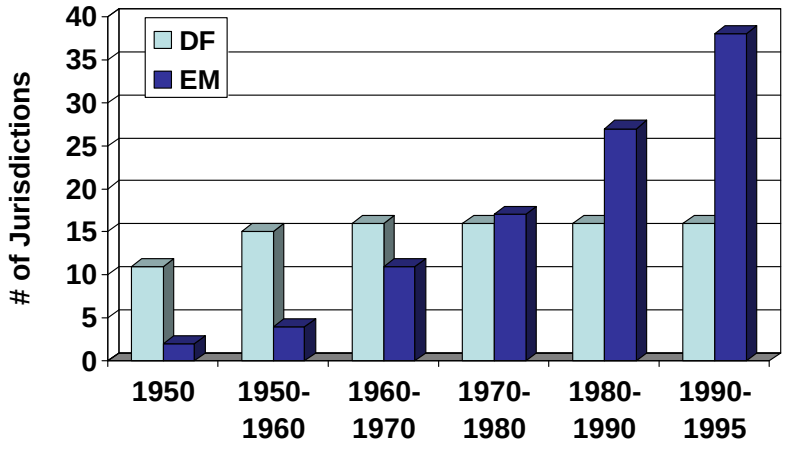
Mexico City Metro Area: Number of Local Jurisdictions



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Institutions

- Developing country context makes things worse
  - Conditions for bureaucracy, civil service
  - Information is scarcer, thus “more valuable”
  - Greater asymmetries between public and private sector
- Yet, interesting examples exist
  - In part, perhaps, due to institutional ambiguities

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Institutions, Politics and Planning…

- The allure of “Ribbon cutting” (e.g., highways, Metros) transcends parties
  - Politics trumps planning (almost always?)
- Motorization and the vested interests
  - Not just motor vehicle manufacturers…
- Urban expansion, speculators, real estate developers and the invasion of ‘big box’
- Citizens Organizations can be co-opted
  - But increasing in technical and political sophistication

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Politics, Planning and Ribbon-cutting:
Costanera Norte Highway in Santiago

Images removed due to copyright restrictions.

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Politics, Planning and Ribbon-cutting:
“Los Segundos Pisos” in Mexico City

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Politics, Planning and Ribbons:
"Los Segundos Pisos" en Mexico City

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Institutions, Politics and Planning:
Theory vs. Reality…
Development of Project Alternatives

Theory

- Concept and Scope well-defined
- Clearly respond to a need
- Consider *all reasonable* options
- Provide a *range* of options, illustrating trade-offs
- All alternatives should be *competitive* as possible
- Process should be open, well-documented, etc.
- Include "do nothing"

Practice
("the Genetics" of a Project)

- Personal Relationships
- Financial Sources
- Public Opinion
- Technical Analysis

(Juan Tapia G., 2005)

Source: Meyer & Miller, 2001

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Conclusions

- Urban developing world is mobility poor
- Still in early stages of motorization
  - Unclear where saturation might lie
- Two-wheelers are a mobility “equalizer” and possibly motorization “enhancer”
- Public transport faces street capacity constraints, low management power/capability, low purchasing power
  - Continued focus on high profile, costly “solutions”
  - Unclear whether BRT-as-panacea will be productive
- Urban physical growth may be largest long-term opportunity and challenge
- All of this (and more) poses massive challenge to under-capacitated institutions

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1.201J / 11.545J / ESD.210J Transportation Systems Analysis: Demand and Economics
Fall 2008