better logistics for cities. better cities for logistics.

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Urbanization is here to stay

• Wave of urban growth (2011-2050)
  – From 7.0 to 9.3 billion
  – 78% to 86%, developed urban areas
  – 47% to 64%, less developed urban areas
• More citizens, more consumers
  – 30 to 50 tons of goods per capita
  – 300 to 400 truck trips per 1000 citizens per day
• Urban freight makes up 10%-15% of total miles traveled

Sources: UN(2011), Dablanc(2011), Giuliano et. al. (2013), mashable.com
Cities with population > 5M

1900s

(1)
London ~ 6.5M
Osaka(?), New York ~ 4M
Paris, Berlin ~ 3M
Tokyo ~ 1.5

1950s

(5)
Tokyo ~ 13M
New York ~ 12M
Osaka ~ 9M
London ~ 8M
Paris, Shanghai ~ 5M

2000s

(78)
Tokyo ~ 35M
Mumbai, Mexico City ~ 20M
São Paulo, New York ~ 19M
Shanghai ~ 17M
Kolkata, Delhi ~ 16M
Beijing, London ~ 15M
LA, Buenos Aires ~ 12M
Rio, Paris, Manila ~ 11M
Moscow, Istanbul ~ 10M
.... 45 more

Source: E.Blanco (MIT) - MGI, Forbes, University of Cologne
São Paulo ...

Source: Barbieri, USP, 2012
Shanghai ...
Tokyo …

Source: http://dailynewsdig.com/high-resolution-aerial-photos/
Mexico City ...

Source: http://dailynewsdig.com/high-resolution-aerial-photos/
Urban density to new levels

Population Density - people per sq.km.

Source: MIT Megacity Logistics Lab. Demographia.
Fonte: Paulo Saldiva from C. Cunha Barbieri, USP (2013)
The rise of the nanostore
The rise of the nanostore
In Summary ...

- More people, more boxes
- More income, more boxes per person
- More density, more boxes per km²
- More congestion, more nanostores
- More congestion, more home deliveries
- More logistics ... same infrastructure...
THE URBAN LOGISTICS POLICY DILEMMA

How to balance quality of life with consumer needs?
The Urban Freight Dilemma
Barrier 1: People vs. Boxes

Model for urban development “incompatible” with logistics efficiency

Good for People
Mixed economic activity, more public transport, less vehicles
More public transport, less roads
More pedestrian, less roads

Bad for Boxes
More people, more boxes
More consolidation of logistics activities
Bigger warehouses, bigger trucks of incoming products
Logistics sprawl
Smaller trucks in, with less roads

Sources: Giuliano et. al. (2013),
Findings Santiago Case Study
Location of minimum Loading/Unloading Spaces

1,801 establishments/km²

4,000 deliveries per km²
ecludes office supplies & home deliveries • projected at 7,000 for Centro Santiago area

1 loading/unloading area per block
The Urban Freight Dilemma
Barrier 2: Policy complexity

Complex urban freight policies

No “blanket” solutions

• Diversity of freight needs between economic sectors
  – Ice cream vs. Computers
  – Water vs. Cosmetics
• Diversity of urban areas

Jurisdictional Fragmentation

• Metropolitan areas, cities, neighborhoods
• Port authorities, cities

Image Sources: Pesquisa Origem-Destino 2007 RMSP – Relatório Síntese
Freight transportation CO₂ drivers

Load (Shippers) → Fuel Consumption & CO2

- Equipment (Carriers)
- Distance (Network)

- Engine Efficiency
- Driving Practices
- Fuel types
- Planning
- Product Profile

- Customer Expectations
- Congestion
- Infrastructure
The “carbon-efficiency” math

$$\$$ = D \times W \times \text{Rate}

$\text{CO}_2$ = D \times W \times \text{EF}

\downarrow \text{Rate} \approx \downarrow \text{EF}
The Urban Freight System

national/global economy

supply chains

urban economy

logistics system

distribution network

route

delivery or pick-up

driver/city/customer interactions (hours)

last-mile operations, vehicle fleets (days)

inventory management, facilities, channel management, demand management (months)

multi-company, markets, land-use, infrastructure management, policy (years)

strategy, competitiveness, development (decades)
national/global economy

supply chains

urban economy

logistics system

distribution network

route

driver/city/customer interactions (hours)

last-mile operations, vehicle fleets (days)

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multi-company, markets, land-use, infrastructure management, policy (years)

strategy, competitiveness, development (decades)

Fleet efficiency standards

Local planning policy

Regional/Port planning policy

Voluntary programs

Rail adaptation

LEZ

Road pricing

Off-hour deliveries

Port appointment & Pricing systems

Traffic & parking regulations

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**Findings: Mexico City Case Study**


- **Regulated Pollutant Emissions (g/h)**
  - CO2: -0.4% (3.9 mn)
  - PM: -15.8%
  - NOx: -15.7%
  - HC: -0.3%
  - CO: +3.3%

- **Fuel Consumption (l/h)**
  - Diesel: -14.9% (189)
  - Petrol: +2.1% (1,465)

- Distance and Time Travelled:
  - Distance: -1.5% (15,224)
  - Time: +3.4% (436)

- **Cluster analysis**

- **Ambiguous impact of tighter consolidation of commercial shipments on traffic and emissions**
- **Fewer replenishment cycles and dedicated loading zones yield significant improvements**
CLOSING THOUGHTS
better logistics for cities.

urban channel strategy
excellence in last-mile operations
high-resolution urban logistics design

better cities for logistics.
data-driven policy making
innovation in urban freight planning
better logistics for cities. better cities for logistics.

Thanks!

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