Stakeholders Perceptions to Sustainable Urban Freight Policies in Emerging Markets

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Acknowledgement

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Outline

- Background
- Methodology
  - Modeling Approach
  - Case Study and Sample
  - Policies Studied
- Modeling Results
  - All Observations
  - By City
  - By Stakeholder
- Implications for Decision Makers
Background

- Freight is the motor of the economy but its movement generates negative externalities
- Urban areas are more congested due to:
  - More people living in the cities: locals and foreigners
  - More consumption due to higher income
- Stakeholders perceptions do not always align
  - Each one has own point of view
  - Citizens perceptions are usually excluded
- Urban freight policy needs to identify and assess tradeoffs done by impacted stakeholders
Methodology

• Survey Design
  • Experimental design
    • Initiatives identification → 8 initiatives
    • Focus groups → 19 policies
    • Pilot → 2 pilots
    • Policies → 9 final policies
  • Data Collection: Rank policies - Luce Model
    • Converts rank data into implicit choices
    • Ranking process can be decomposed into a sequence of independent stages
Study Area - Cartagena

- Data Collection
  - San Diego, La Matuna, and Getsemaní
  - Carriers (50)
  - Receivers (52)
  - Citizens (49)
Study Area - Barranquilla

- Data Collection
  - Barranquillita, Downtown
  - Carriers (46)
  - Receivers (52)
  - Citizens (50)
Policies

• On-street Parking and Loading Areas (P1)
• Off-street Parking and Loading Areas (P2)
• Single Logistics Operator (P3): A single platform centralizes orders and shipments, with all agents able to access it
• Road Pricing with Incentive to Low Emission Vehicles (P4): Electronic toll to enter the area, with residents, low emission (or low noise) vehicles, and establishment owners exempted from the toll
• Vehicle Access Restrictions (P5)
• Relocation of Freight Generators outside City Center (P6)
• UCC with Low Emission Vehicles (P7)
• Receiver-Led Consolidation Program (P8)
• Off-Hour Deliveries (P9)
Most Beneficial Policies (Top 5)

- P1. On-Street Parking
- P2. Off-Street Parking
- P3. Single Logistics Operator
- P4. Road Pricing with Incentives
- P5. Vehicle Access Restrictions
- P6. Relocation of Freight Generators
- P7. UCC with LEV
- P8. Receiver-Led Consolidation
- P9. Off-Hour Deliveries
MODELING
Modeling Approach: Luce Model

- Converts rank data into implicit choices
- Ranking process can be decomposed into a sequence of independent stages
- Assumes the probability an individual will rank a given alternative first is greater than the probability of other alternatives being ranked first

\[
Prob(r_1, \ldots, r_s) = Prob\left(\frac{r_1}{S}\right) \cdot Prob\left(\frac{r_2}{S - \{r_1\}}\right) \cdots \cdot Prob\left(\frac{r_{s-1}}{S - \{r_1, \ldots, r_{s-2}\}}\right)
\]
## Results – Ranking All Observations

<table>
<thead>
<tr>
<th>Policy</th>
<th>Estimate</th>
<th>Pi</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1. On-Street Parking</td>
<td>2.410</td>
<td>28.66%</td>
<td>1</td>
</tr>
<tr>
<td>P2. Off-Street Parking</td>
<td>2.200</td>
<td>23.23%</td>
<td>2</td>
</tr>
<tr>
<td>P3. Single Logistics Operator</td>
<td>0.934</td>
<td>6.55%</td>
<td>6</td>
</tr>
<tr>
<td>P4. Road Pricing with Incentives</td>
<td>0.000</td>
<td>2.57%</td>
<td>9</td>
</tr>
<tr>
<td>P5. Vehicle Access Restrictions</td>
<td>0.998</td>
<td>6.98%</td>
<td>5</td>
</tr>
<tr>
<td>P6. Relocation of Freight Generators</td>
<td>0.772</td>
<td>5.57%</td>
<td>8</td>
</tr>
<tr>
<td>P7. UCC with LEV</td>
<td>1.290</td>
<td>9.35%</td>
<td>4</td>
</tr>
<tr>
<td>P8. Receiver-Led Consolidation</td>
<td>1.430</td>
<td>10.76%</td>
<td>3</td>
</tr>
<tr>
<td>P9. Off-Hour Deliveries</td>
<td>0.899</td>
<td>6.32%</td>
<td>7</td>
</tr>
</tbody>
</table>
Results - Ranking by City

Barranquilla

- On-street parking
- Off-street parking
- Receiver-led consolidation

Cartagena

- Off-street parking*
- On-street parking*
- UCC with LEVs
Results – Ranking by Stakeholder

Carriers
- On-street parking
- Off-street parking
- Receiver-led consolidation

Receivers
- On-street parking
- Off-street parking
- UCCs with LEVs

Citizens
- Off-street parking
- On-street parking
- OHDS
Results – By City and Carriers

Barranquilla

Receiver-led consolidation
Single Logistics Operator

Cartagena

Receiver-led consolidation
UCC with LEVs
Results – By City and Receivers

Barranquilla

Receiver-led consolidation
Vehicle Access Restrictions

Cartagena

UCC with LEVs
Receiver-led consolidation
Results – By City and Citizens

- Barranquilla
  - Vehicle Access Restrictions
  - OHD

- Cartagena
  - OHD
  - UCC with LEVs

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Implications for Decision Makers

- Stakeholders recognize freight is important and space is needed for loading/unloading operations.
- Local context plays a role even between cities in the same region.
- Stakeholders prefer:
  - see other supply chain agents playing active roles
  - sustainable policies being implemented
  - to be away from financial and restrictive policies
- Engagement is needed in planning stages
  - Include perceptions and preferences of those impacted
  - Identify and assess tradeoffs before implementation
Thanks!!
Questions?

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