Urban Logistics Hubs and Real Estate Economics: Evidence from Ecommerce

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A – The Digital Transformation of Retail
B – The Locational Dynamics of E-commerce
C – The Hierarchy of E-commerce Facilities

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A – The Digital Transformation of Retail

Distribution-based consumption resulting in the shift of the retail inventory from the store to the distribution center.
The Impacts of E-commerce on Freight Distribution

1. **DISTRIBUTION PATTERN**
   - Distributional consumption.
   - Growth in B2C deliveries.
   - Changes in last mile logistics.

2. **REAL ESTATE FOOTPRINT**
   - Shift of the real estate footprint from retail to distribution.
   - Changes in locational dynamics.

3. **LOGISTICAL FACILITIES**
   - New logistical facilities (E-fulfillment, Sortation center, Urban logistics depot).
   - Automation of fulfillment and inventory management.

4. **VERTICAL INTEGRATION**
   - Development of 3PL and 4PL services.
   - Dedicated carrier services (truck, air, non-vessel operating common carrier).

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**Welcome to the cardboard box era**

**The digitalization of retail**
Comparison Between Retail and E-commerce Cost Structures for a $150 Apparel Piece

Retail Cost Structure

- Profit: $24.00
- Marketing: $15.00
- Other retail costs: $12.00
- Rent: $22.50
- Distribution to stores: $4.50
- Store Payroll: $27.00
- Factory Cost: $45.00

E-commerce Cost Structure

- Profit: $45.00
- Marketing: $15.00
- Operating costs: $30.00
- Warehousing: $5.00
- Free shipping & Returns: $10.00
- Factory cost: $45.00
Mail Carried by USPS and Parcels Carried by Major Carriers, United States, 2004-2022 (in billion units)
The Retail Apocalypse: Reassessing the Retail Footprint

Retail Space per Capita, 2017 (in square foot)

- Germany
- South Korea
- China
- France
- Japan
- Sweden
- UK
- Australia
- Canada
- United States

Announced and Completed Retail Store Closures, USA

- 2012
- 2013
- 2014
- 2015
- 2016
- 2017
- 2018
- 2019
- 2020
- 2021
- 2022
B – The Locational Dynamics of E-commerce
## Location and Design Criteria for Distribution Centers

### Attribute Drivers

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Driver</th>
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</thead>
<tbody>
<tr>
<td>Cost</td>
<td>Price sensitivity</td>
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<tr>
<td>Footprint</td>
<td>Massification</td>
</tr>
<tr>
<td>Facility</td>
<td>Throughput</td>
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<tr>
<td>Connectivity</td>
<td>Co-location</td>
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<tr>
<td>Accessibility</td>
<td>Lead time</td>
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<tr>
<td>Technology</td>
<td>Automation</td>
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</tbody>
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- **Price per square foot; Operation costs (labor, utilities, taxes).**
- **Large surface; Parking space for trucks; Space for expansion.**
- **High clearance; Separate loading and unloading bays; Improved stacking density (from 20 to 80 feet); Potential for cross-docking.**
- **Continuous turnover (pick-up and deliveries often LTL); Access to corridors; Co-location with rail, air and port terminals.**
- **Market access; Shorter lead times; Less than 48 hours service window.**
- **Sort inventory; Control movements from receiving docks to shipping docks; Management systems controlling transactions.**
The Distributional Places of Amazon: Internalizing Parcel Deliveries through a Distributional Hierarchy
Annual Footprint added in Amazon Distribution Facilities

Five to seven years of e-commerce growth has been compressed into a single year.

1. Niche e-commerce
2. Diversification into an e-commerce platform
3. Vertical integration of e-commerce
4. Horizontal integration
5. Pandemic surge

- Delivery Station
- Sortation Center
- Air Hub
- Prime Now / Fresh
- Fulfillment Center
- Inbound Cross Dock
- Total Footprint

Five to seven years of e-commerce growth has been compressed into a single year.
Annual Footprint added in Amazon Distribution Facilities, 2020-2022
C – The Hierarchy of E-commerce Facilities: Distributional Places
Amazon Fulfillment Centers Network

331 Facilities
Nearest Neighbor Index: 0.23
z-score: -21.58
p-value: 0
Observed Mean Distance: (m) 24,521

Facility Size (sq. ft)
- Less than 150,000
- 150,000 to 300,000
- 300,000 to 600,000
- 600,000 to 900,000
- More than 900,000

Clustered Random
0.28
Amazon Sortation Centers Network

106 Facilities

Nearest Neighbor index: 0.65
z-score: -5.44
p-value: 0
Observed Mean Distance (m): 171,688

Facility Size (sq. ft)
- Less than 150,000
- 150,000 to 300,000
- 300,000 to 600,000
- 600,000 to 900,000
- More than 900,000
- Weighted Median Center

Clustered Random

0.65
Amazon Delivery Stations Network

633 Facilities
Nearest Neighbor Index: 0.28
z-score: -34.40
p-value: 0
Observed Mean Distance (m): 18,526

Facility Size
- Less than 150,000
- 150,000 to 300,000
- 300,000 to 600,000
- 600,000 to 900,000
- More than 900,000
- Weighted Median Center

Distribution of Square Feet
- Mean: 164,998
- StDev: 150,943

Clustered
Random
0.28
Location of Amazon’s E-Commerce Facilities in the Los Angeles and New York Metropolitan Areas

A: Fulfillment cluster; IDX & EFC (75 km from CBD)

B: Last-mile cluster; PH, AFP, DS

\[ B = 2.93 \times A \]

\[ B = 1.99 \times A \]
Parcel Delivery and Pickup Time, 2019

64.4% (10AM – 2PM)

42.7% (4PM – 8 PM)

N (delivery) = 27,398
N (pickup) = 26,021
Conclusion: Real Estate Economics of E-commerce

- **Logistical facilities (places)**
  - Emergence of a hierarchy of specialized facilities.
  - Distributional places fulfilling a role along the e-commerce supply chain:
    - Procurement & fulfillment.
    - Distribution.
    - Last mile.
  - Function related to size.
  - Functional specialization for e-fulfillment centers (e.g. sortable, non-sortable).

- **Horizontal and vertical integration**
  - Horizontal integration: using logistical facilities to expand market coverage and lead time.
  - Vertical integration: using logistical facilities to control flows and channels.
Thank you for your attention!

https://transportgeography.org/
https://porteconomicsmanagement.org/
https://globalcitylogistics.org/