Factors driving the spatial layout of distribution channels

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Alexander Onstein, PhD student, Delft University of Technology, Amsterdam University of Applied Sciences

Mehrnaz Ektesaby, Delft University of Technology
Jafar Rezaei, Delft University of Technology
Lórant A. Tavasszy, Delft University of Technology
Dick A. van Damme, Amsterdam University of Applied Sciences

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Spatial layout of distribution channels – impacts

**Inditex to Build Distribution Hub in Lelystad**

Distribution hub in central Europe needed to complement Central Logistics Platforms in Spain

Inditex, one of the world's largest fashion retailers, is set to build a new distribution hub in Lelystad, the Netherlands. The new hub will complement the activities by the Inditex Central Logistics Platforms in Spain. Construction will require an initial investment of approx. €100 million. Inditex will initially purchase a 35-hectare plot at the Lelystad Airport Businesspark (LAB) currently under development. This plot borders on the airport which, in April 2019, will begin offering passenger flights as a twin airport to Schiphol.
Spatial layout of distribution channels – strategic decision problems

• Centralization degree
• DC locations

Chopra, 2003
Outline

Research Gap
• Hardly any descriptive research, no quantitative research on factors

Objectives
• List factors that drive spatial layout of distribution channels
• Determine the importance of these factors

Approach:
• Literature review
• Decision model
• Survey based estimation
Factors (1)

1. DEMAND
   - Demand level
   - Demand volatility
   - Demand dispersion

2. SERVICE LEVEL
   - Supplier lead time
   - Delivery time
   - Delivery reliability
   - Responsiveness
   - Returnability

3. PRODUCT CHARACTERISTICS
   - Product value density
   - Package density
   - Perishability

4. LOGISTICS COSTS FACTORS
   - Transport costs – Inbound
   - Transport costs - Outbound
   - Inventory costs
   - Warehousing costs

- Factor selection based on literature review and interviews with logistics experts
Factors (2)

5a. PROXIMITY-RELATED LOCATION FACTORS
- Distance DC to consumer markets
- Distance DC to production facilities
- Distance DC to suppliers

5b. ACCESSIBILITY-RELATED LOCATION FACTORS
- Available transport infrastructure
- Distance DC to motorway
- Distance DC to airport
- Distance DC to seaport
- Distance DC to inland port / terminal
- Distance DC to rail terminal
- Congestion

5c. RESOURCES-RELATED LOCATION FACTORS
- Labour market availability
- Labour costs per region
- Land availability for DC
- Land costs for DC

6. INSTITUTIONAL FACTORS
- Taxes
- Zoning
- Laws, regulations, customs
- Investment incentives

7. FIRM CHARACTERISTICS
- Company size
- Business strategy
Decision model

- **Objective** = to determine importance of factors

- Many choice modelling approaches or multi-criteria decision methods available

- Here: Best-Worst Method (Rezaei, 2015)
  - Simple approach: weighted sum of factors will reveal best structure
  - To identify weights: survey based identification of importance of factors
  - Estimation of overall weights

- **Advantages:**
  - Fewer comparisons needed
  - More consistent comparisons
Best-Worst Method (1)

• **Step 1:** Determine a set of decision factors $c_1, c_2, \ldots c_n$

• **Step 2:** Determine the best (i.e., most important) and worst (i.e., least important) factors

• **Step 3:** Comparison of the best factor with the other factors
  (1: equally important, 9: extremely more important)

<table>
<thead>
<tr>
<th>Factors</th>
<th>Demand</th>
<th>Service level</th>
<th>Product characteristics</th>
<th>Logistics costs</th>
<th>Location factors</th>
<th>Institutional factors</th>
<th>Firm characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most important: Demand</td>
<td>X</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>6</td>
<td>7</td>
<td>7</td>
</tr>
</tbody>
</table>
Best-Worst Method (2)

- **Step 4:** Comparison of the other factors with the worst factor
  (1: equally important, 9: extremely more important)

<table>
<thead>
<tr>
<th>Main factors</th>
<th>Least important factor: Institutional factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demand</td>
<td>7</td>
</tr>
<tr>
<td>Service level</td>
<td>7</td>
</tr>
<tr>
<td>Product characteristics</td>
<td>6</td>
</tr>
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<td>Logistics costs</td>
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<td>X</td>
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<tr>
<td>Firm characteristics</td>
<td>4</td>
</tr>
</tbody>
</table>

- **Step 5:** Finding the optimal factor weights $w_1$, $w_2$, ..., $w_n$
Data collection - online survey

- April – May 2017
- Survey opened 717 times, 75 respondents

<table>
<thead>
<tr>
<th>Organization type</th>
<th>share</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decision makers</td>
<td>22 (29%)</td>
</tr>
<tr>
<td>Experts</td>
<td>45 (60%)</td>
</tr>
<tr>
<td>Other</td>
<td>8 (11%)</td>
</tr>
<tr>
<td>Total</td>
<td>75 (100%)</td>
</tr>
</tbody>
</table>
Main factor weights – Results

N = 75

Demand factors | Service level factors | Logistics costs factors | Location factors | Institutional factors | Firm characteristics

DM's          | Experts

0.05          | 0.05
0.1           | 0.1
0.15          | 0.15
0.2           | 0.2
0.25          | 0.25
Sub factor weights – Results (1)

- Customers expect fast and reliable deliveries
- Returnability expected to become more important in e-commerce era (Hjort and Lantz, 2016)
Sub factor weights – Results (2)

- Decision makers value ‘transport costs’ more highly than experts.
- ‘Transport costs – inbound’ valued more highly than ‘Transport costs – outbound’
  - Inbound transport costs: more potential distribution costs savings.
Sub factor weights – Results (3)

- Decision makers accept large distances between DC and production facilities
- ‘Distance to suppliers’ relatively unimportant: scale economies on inbound transport
Sub factor weights – Results (4)

- Decision makers and experts show similar factor weights
- Rail scores low: large transport modes are seldom used for DC delivery or outbound transport
Conclusions

• ‘Logistics costs’, ‘Service level’ and ‘Demand level’ are the most important factors that drive decision making
• Decision makers value ‘transport costs’ more highly than experts
• ‘Distance to suppliers’ relatively unimportant: scale economies on inbound transport
• Some factors score low but could be very dynamic (e.g. ‘returnability’)

Next steps
• Framework to take into account relationships between factors
• More data collection
  – Representation of important sectors (e.g. e-commerce)
  – To test how respondents from non-Western countries value the importance of several factors