Implementation and application of Logistics Information Systems in international supply chains – challenges and effectiveness gains

Trial lecture
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Logistics

• Logistics is the task of coordinating material flow and information flow across the supply chain (Harrison & van Hoek 2008)

• *Effectiveness* is about reaching goals

• The goal of logistics is to deliver
  – The right product
  – At the right place
  – At the right time

• Are supply chains effective?

Logistics effectiveness in supply chains = Meeting demand
We live to deliver
Effectiveness problems

• Demand is typically not fully met
  – Typically 8 % stock-out in US grocery shops (Sloot et al. 2005)
• Demand and supply are variable
• Supply chain instability
  – Fluctuations in demand is amplified by demand distortion
  – Periods of over- and undersupply
• Typical measure to improve service: inventory
Inventory

• Inventory is expensive (waste?):
  – 25 % p.a. as a rule of thumb
  – Handling, storage, obsolescence, deterioration
• Much academic work within the area of logistics aims at calculating the “right” level of inventory
• Information systems are typically used to manage inventory
  – The ISs data about demand and current inventory often has low quality (Wagner 2002, Sloot et al. 2005)
Supply chain from raw material to the end customer/consumer

Flow of material:
- Producer
- Processor
- Wholesaler
- Retailer
- End customer

Flow of information:
- Farm → Dairy: Tine → Rema DC → Rema outlet
- Farm → Dairy: Tine → Tesco DC → Tesco outlet
- Consumers in Norway → Rema outlet
- Consumers in the UK → Tesco outlet

Demand distortion increases for each actor
Each actor stockpiles inventory
Internal organization of actors can give further fragmentation and further delays and distortion of demand information.
Effectiveness challenges in international supply chains

• Long transportation distances
• Delays when crossing borders
• More actors, more steps
• National differences
  – Currency, sizes, voltage, connectors
  – Culture, Language, Fashion, Taste
  – Climate
  – Laws, rules, regulations

Long lead time
Variability
Vulnerability

Increasing product variety
Different demand patterns
Interpretation problems
Compliance
Integration of the supply chain using IS

• Information systems could give better information about the demand and supply
  – Transfer real time information about the demand and supply to all actors electronically
• => Electronic integration of the supply chain processes between actors
• >Let’s look at an example from an industry where effectiveness is a hard challenge: fashion
Example Inditex/Zara

<table>
<thead>
<tr>
<th></th>
<th>Gap</th>
<th>Inditex</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue</td>
<td>$14.7 billion</td>
<td>$18.2 billion</td>
</tr>
<tr>
<td>Net Income</td>
<td>$1.2 billion</td>
<td>$2.5 billion</td>
</tr>
<tr>
<td>Number of Stores</td>
<td>3,246</td>
<td>5,044</td>
</tr>
<tr>
<td>Number of Countries</td>
<td>31</td>
<td>77</td>
</tr>
<tr>
<td>Biggest Brand</td>
<td>Gap</td>
<td>Zara</td>
</tr>
</tbody>
</table>

Source: Gallaugher 2011
Retail
5044 outlets
In 77 countries

Owned by Inditex

Asia low cost manufacturing

Spain/Portugal workshops

Dyeing and cutting factories Spain

Dye and fabric factories

Distribution centers Spain

Design center Spain

~10,000 New designs/y

Orders 2/w

Orders 2/w

“Local”

“Remote”

Truck 2/w

Aircraft 2/w

“offer”

POS-data

What is not selling?

Consumers’ wishes daily

Other information from other sources

Other information from other sources

Fast fashion

Staple goods

Proto-types

“Local”

“Remote”

Owned by Inditex
Reflecting over Zara

• Effective supply chain delivering new designs in short time
• Design center driven by high quality demand information
• Information quality from human participation
  – Orders placed by shop manager based on manual inventory position
  – Manual Business Intelligence
  – Incentives to provide high quality information
  – “Shared awareness”
  – Relatively low IT sophistication and cost (25 % of industry avg.)
• The role of vertical integration
More general about benefits and integration

• Several results indicate that a higher degree of IS based supply chain integration corresponds to better performance e.g. (Mukhopadhyay et al., 1995; Mukhopadhyay and Kekre, 2002, Frohlich 2002, Frohlich and Westbrook 2001)

• Still supply chain integration is patchy in most real supply chains (Storey et al. 2006)

• A paradox
Logistics Information System

• Definition: ”SCM IS are information systems (IS) used to coordinate information among the various customers, suppliers, and distributors in a supply chain” (McLaren and Vuong)

• ”A global logistics information system is necessary to achieve local service needs while seeking global cost optimization” (Christopher 2011)

• Relatively small literature
  – Most systems studied have internal focus
Logistics Information Systems

• Can be classified as (Closs et al. )
  – logistics operating systems (LOS), which include transactional applications such as order entry, order processing, warehousing, and transportation;
  – logistics planning systems (LPS) which include coordinating applications such as forecasting, inventory management, and distribution requirements planning.
• LOS and LIS converge into Enterprize Resource Planning Systems ERPs (Helos and Szekely)
• But where is the supply chain integration?
ERP

- A modular configurable business support system covering the entire international enterprise
- Gives instant access to all company information in a common database for all business functions
- Solves the internal fragmentation
- But where is the supply chain integration?

Figure from Helos and Szekely
Logistics information systems and implementation challenges

- Logistics information systems are to a large degree already implemented.
- The challenge is turning a fragmented supply chain into a whole using ISs for integration.
- Fragmentation at different levels:
  - Between companies: the supply chain level
  - Between functional departments: the company level
  - Between systems within the same function or company
IS integration challenges

• Not a technological challenge anymore
• Reduced cost challenge
  – Standardization of information still a problem
• Remaining hard challenges to reap benefits:
  – Actors must be willing to share information
  – Actors must also be willing to change current processes and organization to provide and to use high quality information
  – Both requirements are probably harder to fulfill in international supply chains – trust –interpretation