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

  Logistics effectiveness in supply chains = Meeting demand
- Are supply chains effective?

Vi lever for å levere
We live to deliver

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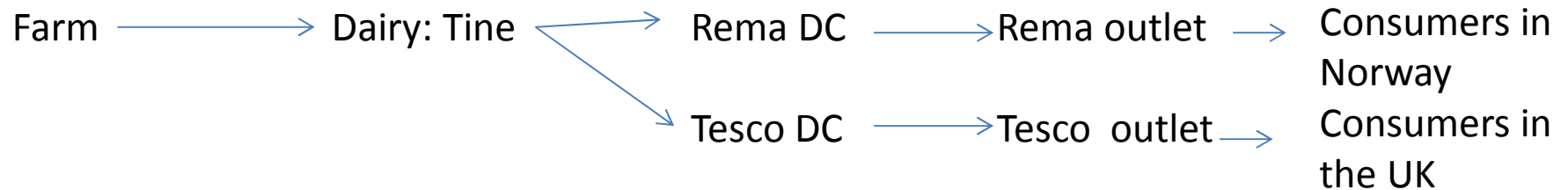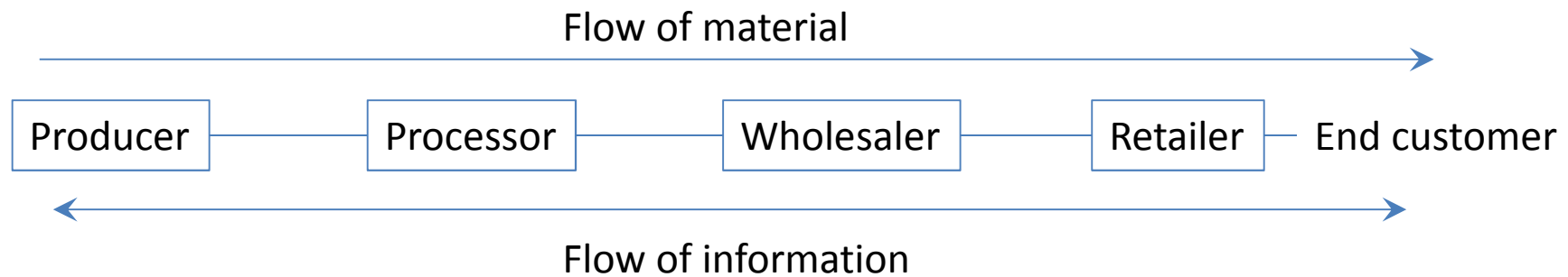
Effectiveness problems

- 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

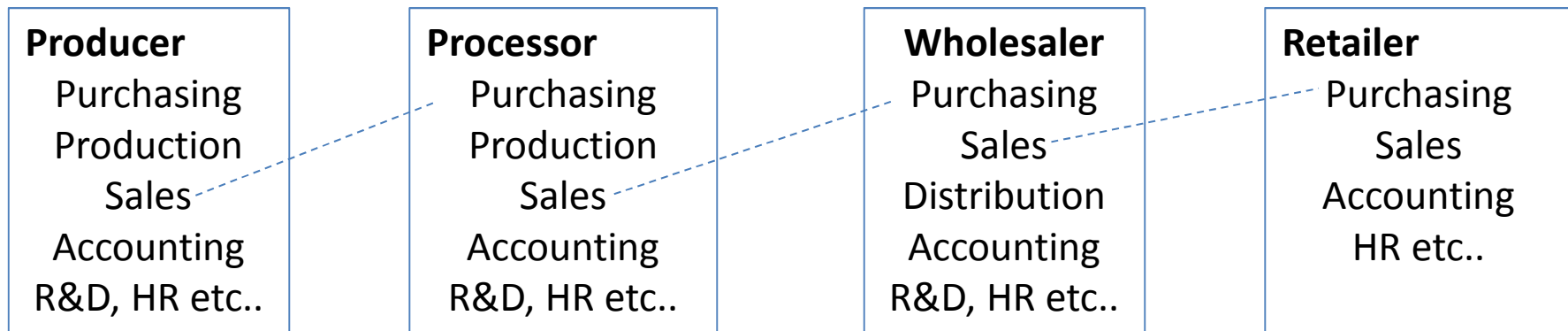# Inventory

- 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 → Consumers in Norway

Dairy: Tine → Tesco DC → Tesco outlet → Consumers in the UK

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

Producer
Purchasing
Production
Sales
Accounting
R&D, HR etc..

Processor
Purchasing
Production
Sales
Accounting
R&D, HR etc..

Wholesaler
Purchasing
Sales
Distribution
Accounting
R&D, HR etc..

Retailer
Purchasing
Sales
Accounting
HR etc..

Effectiveness challenges in international supply chains

- Long transportation distances
- Delays when crossing borders
- More actors, more steps

  Long lead time
  Variability
  Vulnerability

- National differences
  - Currency, sizes, voltage, connectors
  - Culture, Language, Fashion, Taste
  - Climate
  - Laws, rules, regulations

  Increasing product variety
  Different demand patterns
  Interpretation problems
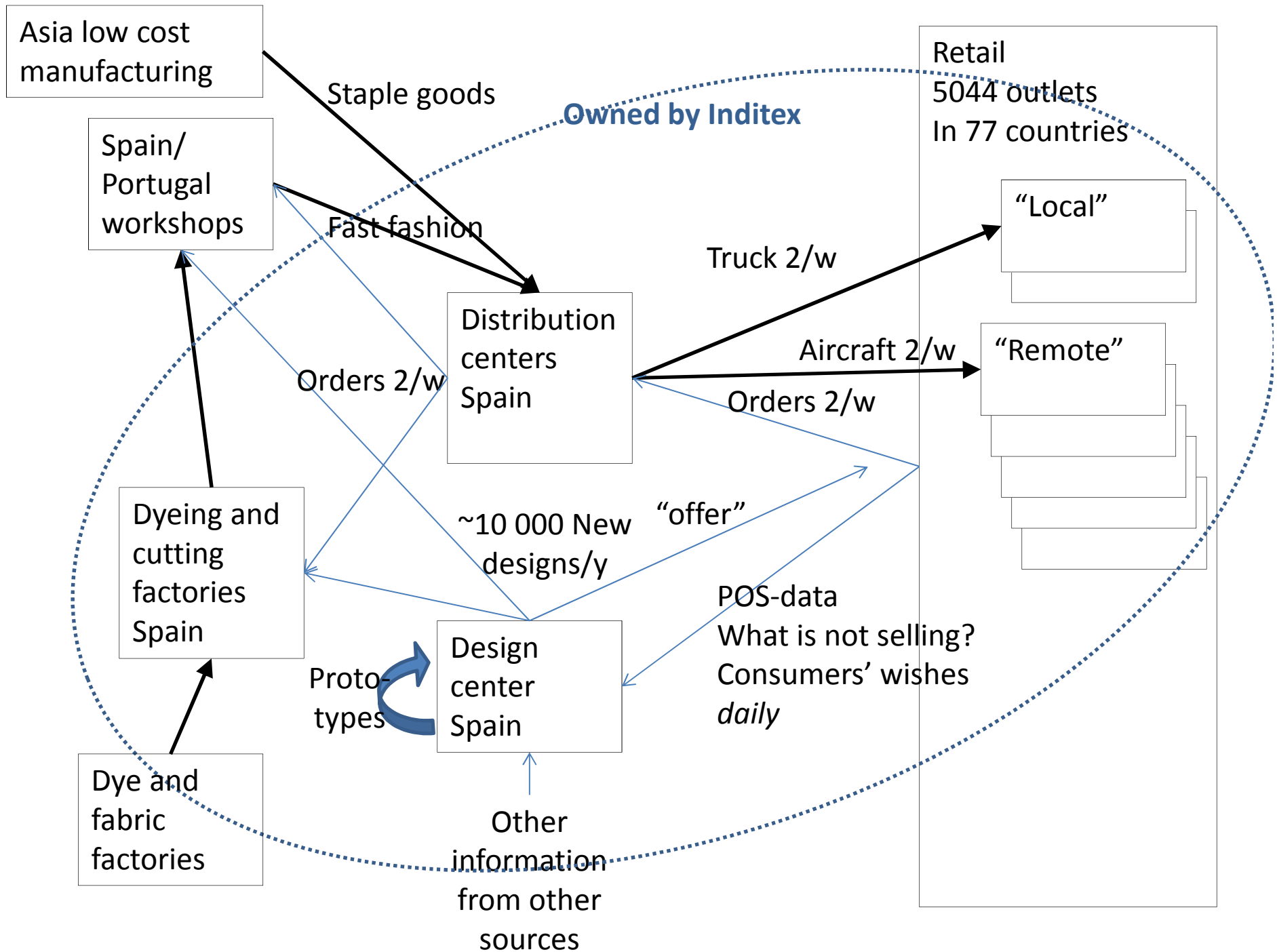 Compliance

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

	Gap	Inditex
Revenue	$14.7 billion	$18.2 billion
Net Income	$1.2 billion	$2.5 billion
Number of Stores	3,246	5,044
Number of Countries	31	77
Biggest Brand	Gap	Zara

Source: Gallaugher 2011

Asia low cost manufacturing

Spain/ Portugal workshops

Staple goods

Owned by Inditex

Fast fashion

Retail
5044 outlets
In 77 countries

Distribution centers Spain

Truck 2/w

"Local"

Orders 2/w

Aircraft 2/w

"Remote"

Orders 2/w

Dyeing and cutting factories Spain

~10 000 New designs/y

"offer"

POS-data
What is not selling?
Consumers' wishes
daily

Proto-types

Design center Spain

Dye and fabric factories

Other information from other sources

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 co-ordinating 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
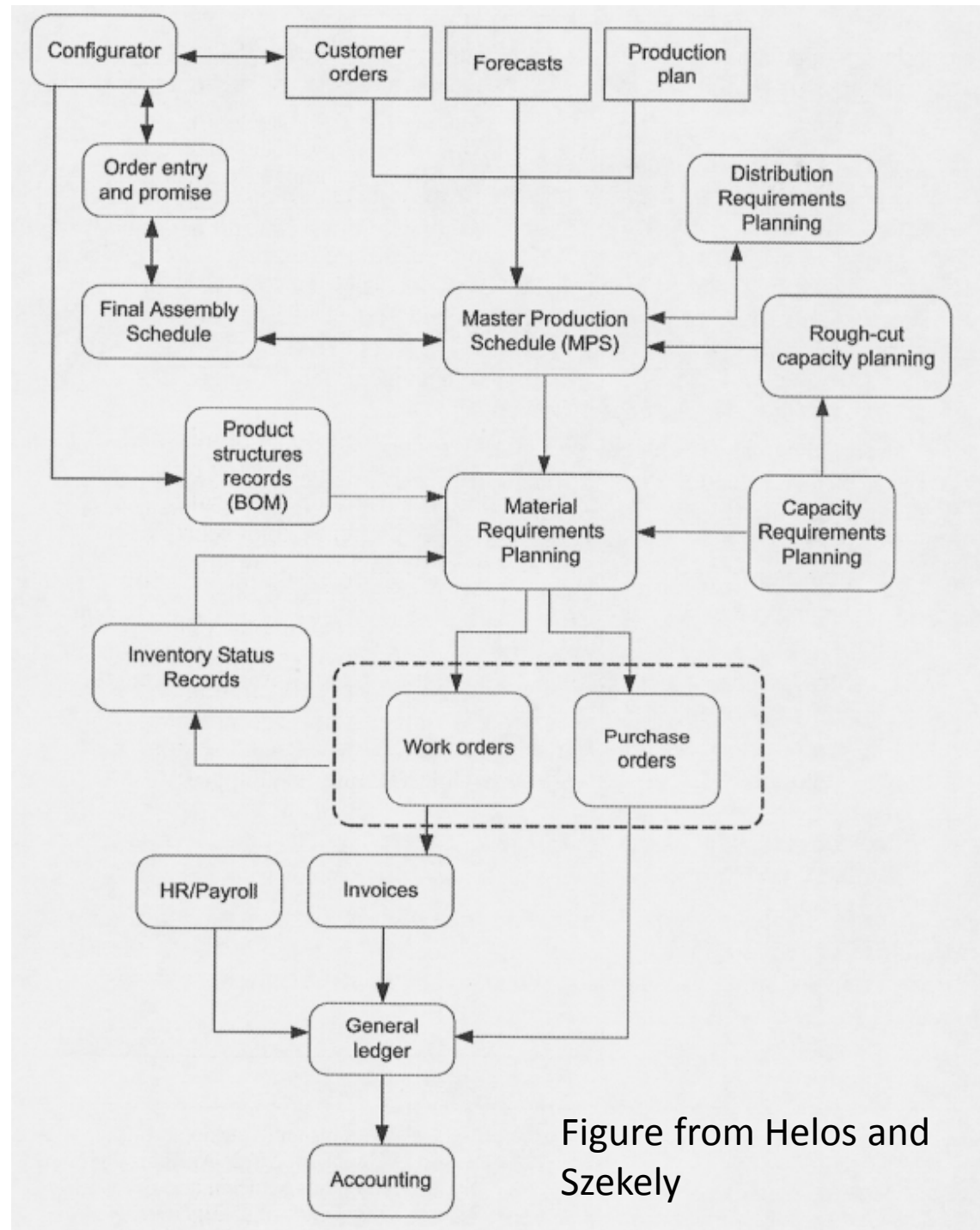- But where is the supply chain integration?

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