Fundamentals of Logistics / Supply Chain Management
- Namibia University of Science & Technology-

05.08.2019, Marc Stumpf
Introduction

**Background**

- 03/2015: Master degree in industrial engineering (major: supply chain management)
- 07/2015 – 08/2017: Management Start Up Trainee in Global Supply Chain Management at Roche Diagnostics
- 09/2017 – 10/2018: Global Planner and Project Manager
- Since 11/2018: Senior Process Implementation Manager

**Experience**

- 2013: Intern for project leader BMW i8 (Germany)
- 2014: Intern in supply chain planning BMW x-series (USA)
- Since 2015: Project manager for international supply chain projects with increasing responsibility
  Focus: Change and launch projects for product portfolios
Introduction
Lecture Goal

You will get a basic understanding of forecasting and data analysis

1. Get a basic understanding of logistics concepts and the importance of supply chain management
2. Identify and describe the main elements/roles of a supply chain
3. Understand the challenges and big trends in supply chain management
1. Basics & Definitions
2. Supply Chain Overview
3. Supply Chain Processes
4. Roles in Supply Chain Management
Basics
Definitions

Supply chain management encompasses the planning and management of all activities involved in sourcing and procurement, conversion, and all logistics management activities.

Logistics management is that part of supply chain management that plans, implements, and controls the efficient, effective forward and reverses flow and storage of goods, services and related information between the point of origin and the point of consumption in order to meet customers’ requirements.

Supply Chain Planning (SCP) is the forward-looking process of coordinating assets to optimize the delivery of goods, services and information from supplier to customer, balancing supply and demand.

Source: Supply Chain Management, Terms & Glossary, CDCMP – Council of Supply Chain Management Professionals
Basics

Principles

- 7 r of logistics:
  1. right object/product/part
  2. right quantity
  3. right time
  4. right quality
  5. right place/location
  6. right costs
  7. right information

7R+ of logistics

* includes 8th R: right packaging
Basics

Functions & Objects

• Logistics as *service function*:
  • Execution of T-H-W processes (transport – handling – warehousing)
  • Controlling/monitoring the usage of material and information flow technologies

• Logistics as a *line function*:
  • Planning, deciding and designing systems for physical/temporal product transformation
  • Development of strategies
  • Logistical conception within a company or with partners

• *Objects*:
  • Physical goods (products, material)
  • Information
  • People
Evolution of logistics

1. Logistics as a material flow oriented service function
2. Logistics as a flow oriented coordinative function
3. Logistics as a supply chain in a company
4. Logistics as an inter-company supply chain

Missing of a sophisticated logistics
Evolution of logistics

1. Logistics as a materialflow oriented service function

- Establishment of marketing perspective
- Increasing number of variants (products)
- Total cost thinking
- Increasing sensitivity for customer service

Traditional logistics
Evolution of logistics

2. Logistics as a flow oriented coordinative function

- Oil crises, stagnation, inflation
- Increasing ecological thinking
- Increasing automation
- Crosslinking of information

Logistics as a coordinative function
Basics

Evolution of logistics

3. Logistics as a supply chain in a company

- Increasing competitive thinking
- Shortened innovation cycles
- Increasing number of individual customer requests
- Processflow orientation

Logistics to supply chain
Evolution of logistics

4. Logistics as an inter-company supply chain

- Globalization
- Increasing focus on effectivity and efficiency
- Integration of companies into global supply chains

Logistics to supply chain management
Basics

Classification of logistics systems

a) Scope
- Macro logistics systems (society)
- Micro logistics systems (company)
- Meta logistics systems (mixture)

b) Process phase
- Supply Logistics
  - Procurement/inbound logistics
  - Production logistics
  - Distribution logistics
- Waste logistics

c) Industry
- Commerce logistics
- Courier
- Transport logistics
- Public transport
- Hospital logistics
- Waste logistics

d) Special tasks
- Textile industry logistics
- Food logistics
- Health care logistics
Basics

Classification of logistics systems

- Logistics
  - Macro logistics
    - Hospital logistics
  - Micro logistics
    - Military logistics
  - Company logistics
    - Industry logistics
      - Within the company
      - Between companies
    - Commercial logistics
    - Service logistics
  - Meta logistics
    - Cooperations between different producing companies
    - Cooperation between different transport companies
    - Cooperations between producing and transport company
1. Basics & Definitions
2. Supply Chain Overview
3. Supply Chain Processes
4. Roles in Supply Chain Management
Supply Chain
Overview

Supplier / Procurement

Production

Distribution

Whole-saler

Customer

Reverse flow
Supply Chain

*Example – Beer Brewery*
Supply Chain

Supply logistics

- What is supply logistics?
  - Transfer of goods from procurement market (supplier) through production until distribution to customer
Goals

Overview

• Goals:
  • Support and improve the competitive position of the company through best possible logistics performance with minimal costs
  • Elements of logistics performance: delivery time/reliability/flexibility/quality/information
  • Goals:
    • Increase quality
    • Minimize costs
    • Improve flexibility
    • Reliable delivery
  • Conflict examples:
    • High quality → long duration and high costs
    • Low costs → low quality
## Goals

### Costs and Profitability

<table>
<thead>
<tr>
<th>Logistics costs</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Costs of physical handling</td>
<td>Picking &amp; Packing, transport, handling of goods</td>
</tr>
<tr>
<td>Costs of information flow</td>
<td>Planning, execution, monitoring with tools</td>
</tr>
<tr>
<td>Management costs</td>
<td>R&amp;D, overhead costs, training</td>
</tr>
<tr>
<td>Costs of stocking/storing</td>
<td>Warehouse costs, costs of working capital, write offs</td>
</tr>
<tr>
<td>Costs of process security</td>
<td>Penalty costs, delivery costs, downtimes</td>
</tr>
</tbody>
</table>

**Profitability** = \[ \frac{\text{Profit per period}}{\text{Investment (bonded capital)}} \]

*The goal is to maximize profitability*
Supply Chain
Supply logistics

• **Procurement/inbound logistics:**
  - Planning, implementing, handling and monitoring of material flow from supplier until availability at production including the information flow

• **Scope:**
  - Supplier selection – based on e.g. Quality, Price, Reliability, Flexibility, Image, Just-in-time options, geographical location
  - Material flow – Reduction of touch points, close collaboration, short lead times, supply safety, available delivery concepts
  - Information flow – administrative (e.g. order confirmation), strategic (e.g. change of concept to Just-in-time)
  - Structure – e.g. geographical location of the supplier

• **Tasks:**
  - administrative: material requirement planning, order quantity planning, quality monitoring
  - strategic: supplier assessment and selection, decision on supply concept, make-or-buy
Supply Chain

Supply logistics

- **Production logistics:**
  - All activities that have to do with material and information flows from raw material supply through the different production processes

- **Production planning:**
  1. Production program planning – What should be produced (finished good)?
  2. Quantity planning – How much need to be produced?
  3. Scheduling – When and in which order does it need to be produced?
  4. Capacity planning – What is the needed capacity and is enough capacity available?
  5. Production order release and monitoring – Are pre-steps successful? Can the production order be released?

- **Tasks:**
  - administrative: Order release, monitoring of material and information flows, operative production program planning
  - strategic: selection of production system setup, selection of warehouse setup, strategic production program planning
Supply Chain
Supply logistics

- **Distribution logistics:**
  - All activities that enable the physical availability of products for the customer including all necessary information
  - Make-to-order: Production is executed based on an actual customer order
  - Make-to-stock: Production is executed for anonymous market

- **Distribution structure:**
  - Vertical structure – Number of storage steps along the supply chain
  - Horizontal structure – Number of warehouses per step
Supply Chain

Supply logistics

• Distribution logistics:
  - Warehousing: Balancing supply and demand; important for balancing quantity, time and product portfolio
  - Distribution/forwarding: Spatial transport of goods with the help of means of transport
  - Spare part logistics: Important for customer satisfaction in after sales phase

• Tasks:
  - administrative: Transport of goods, planning of trips, order handling
  - strategic: Design of distribution structure, planning of site location, own fleet vs. forwarder
Supply Chain Overview

Supplier / Procurement  Production  Distribution  Wholesaler  Customer

Reverse flow
Supply Chain

Waste logistics

• What is waste logistics?
  • Transfer flow of goods in the opposite way of supply logistics
  • Planning, implementation and monitoring of reverse flows of product waste

• Why?
  • Increasing environmental consciousness of customers
  • Country regulation
  • Increasing costs of disposal of waste
  • Shortage of primary resources

• Tasks:
  • administrative: Re-distribution, rework and further use
  • strategic: Design of recycling network, collaboration in development processes, establishment of competitive advantage
Supply Chain
Waste logistics

1. Re-distribution logistics
   • Collection, sorting and separation of product remainders

2. Rework logistics
   • Planning, implementation and monitoring of process and information flows in rework facilities

3. Further use logistics
   • Optimization of physical and information flows in order to be able to use reworked resources again

If recycling is completely feasible, supply and waste logistics build a closed cycle
Supply Chain

Example – Beer Brewery
Supply Chain
Megatrends

- **Globalization** of supply chains
  - Increasing transport distances, new need of integration and information, increasing competitive intensity
- Increasing **customer orientation**
  - Focus of individual customer requirements, decreasing customer loyalty
- Decreasing **product and technology lifecycles**
  - Time-to-market as well as time-to-customer decreases, competition is time based, increasing requirements for spare parts
- Focus on **core competencies**
  - Increasing outsourcing share, creation of strategic partnerships
- Increasing **sensitivity for environment**
  - Increasing importance of recycling processes, shortage of primary resources
- **E-commerce**
  - Increasing range of service offers, decomposition of established supplier-customer-relationships
1. Basics & Definitions
2. Supply Chain Overview
3. Supply Chain Processes
4. Roles in Supply Chain Management
Supply Chain
Overview

Supplier Management / Procurement  Production  Distribution  Wholesaler  Customer

Supply Chain
Reasons for Supply Chain Networks:

- **Quality**: Concentration on core competencies
- **Costs**: Not all processes are cost optimal
- **Delivery**: Processes are not fast enough
- **Flexibility**: Balancing of capacities
Processes

Procurement - Marketing

- **Procurement Marketing** is divided into:
  - Preparation: Set framework for design of procurement system (market research)
  - Design: Marketing process during design phase including product categorization, strategic positioning, supplier assessment and selection
  - Continuous: Continuous analysis of supplier market, supplier relationship management
Processes
Procurement - Logistics

• **Procurement Logistics:**
  • Tasks:
    • strategic: Design of procurement/supply system
    • administrative: Execution of physical procurement, monitoring of supply processes until production
Processes

Procurement – Design of supply systems

• **Design of supply systems:**

  • *General conditions* – Are there any governmental conditions (e.g. laws, regulations)?
  
  • *General principles* – How shall the supply process look like?
  
  • *Strategy* – What is the desired supply process (e.g. JIT, JIS)
  
  • *Supplier selection* – Who can support the desired process?
  
  • *Supplier integration* – How can the supplier be integrated?
  
  • *Supplier relationship management* – How shall the relationship be maintained (bonus/malus)?
**Processes**

**Procurement - Strategy**

**Selection of procurement strategy:**

1. Classification of products to be supplied (strategic article, bottleneck articles, lever article, non-critical article)
2. Analysis of procurement market (supplier vs. buyer market)
3. Strategic positioning
4. Action plan
### Selection of procurement structure:

<table>
<thead>
<tr>
<th>Supplier</th>
<th>Sole (monopoly)</th>
<th>Single</th>
<th>Dual</th>
<th>Multiple</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply product</td>
<td>Unit</td>
<td>Modular</td>
<td>System</td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>Stock</td>
<td>Demand Tailored</td>
<td>Just-in-time</td>
<td></td>
</tr>
<tr>
<td>Technology</td>
<td>Manual</td>
<td>Electronic (e-procurement)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supply area</td>
<td>Local</td>
<td>Global</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Location</td>
<td>External</td>
<td>Internal</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Processes

Procurement - Clustering

- Bottleneck article
  - Global Sourcing

- Non-critical article
  - Multiple/global sourcing

- Strategic article
  - Single/local sourcing

- Lever article
  - Multiple/global sourcing
Processes

Procurement – Supplier Relationship Management

A process for providing the structure for how relationships with suppliers will be developed and maintained

- Supplier performance need to be continuously assessed
  - Bonus/Penalty (defined in contract)
  - Measures/actions to be defined with supplier

Carters 10 C’s of supplier selection:
1. Competency
2. Capacity
3. Consistency
4. Control of process
5. Cost/Price
6. Commitment to Quality
7. Cash/Finances
8. Clean
9. Culture & Relationships
10. Communication

Source: [http://www.raycarter.co.uk/about.php](http://www.raycarter.co.uk/about.php)
“Reinheitsgebot” sometimes called the "German Beer Purity Law" in English, is a series of regulations limiting the ingredients in beer to:

- water
- barley
- hops
- yeast
Processes

Production

• a process of combining various material inputs and immaterial inputs (plans, know-how) in order to make something for consumption (output)
Processes
Production

Just in sequence production:
Processes

Production – Example Brewery
Supply Chain Overview

Supplier Management / Procurement  
Production  
Distribution  
Wholesaler  
Customer
# Processes

## Distribution – Stock types

| **Location**     | - Central  
|                 | - Decentral  
|                 | - Close to production  
|                 | - Close to customer  |
| **Size**        | - To be determined depending on volume  
|                 | - Future growth  
|                 | - Expandability  |
| **Products**    | - Consistence (Gas, fluid, solid)  
|                 | - Volume  
|                 | - Size  
|                 | - Weight  |
| **Temperature** | - Ambient  
|                 | - Cool  
|                 | - Frozen  |
| **Construction**| - Free warehouse  
|                 | - Closed warehouse  |
| **Operator**    | - Internal staff  
|                 | - Warehouse provider  |
| **Technology**  | - Without support devices  
|                 | - With support devices (conveyors, cranes, forklift)  |
| **Facilities**  | - Bay warehouse (e.g. high bay rack, flow rack)  
|                 | - Closet storage  |
Processes

Distribution – Inventory management

FIFO (First-In-First-Out)

LIFO (Last-In-First-Out)
Processes

Distribution – Order processing

Source: https://www.datexcorp.com/inventory-management-tips-optimizing-your-warehouse/
Processes

Distribution – Pick & Pack

- Pick by list - Printed picking list
- Pick by light - Shelf shows product and quantity
- Pick by voice - Voice direction and speech recognition
- Pick by vision - Picking with data glasses
- Pick by RFID - Recognition with RFID scanner
Processes

*Distribution – Example Brewery*

- Cooled
- Closed
- With support devices
Processes

Distribution - Handover

• Packed boxes (orders) will be sorted and bundled to one shipment
• Shipment will be loaded and handed over to carrier
• **Shipping documents** record the handover
Transport planning is defined as planning required in the operation, provision and management of facilities and services for the modes of transport to achieve safer, faster, economical and environment-friendly movement of people and goods.

| **Transport good** | • Consistence (Gas, fluid, solid)  
| • Volume  
| • Size  
| • Weight |
| **Volume/Frequency** | • One time shipment  
| • Regular shipments  
| • Future growth |
| **Temperature** | • Ambient  
| • Cool  
| • Frozen |
| **Destination** | • National  
| • International |
| **Mode** | • Truck  
| • Air  
| • Sea |
| **Provider** | • Internal  
| • External (Service provider) |
Processes

Distribution – Shipment Planning

Service providers:

1. First Party Logistics Service Provider (1PL) – Own transport (mostly national), no additional service provider
2. Second Party Logistics Service Provider (2PL) - Service providers that handle transportation, handling or storage services for other companies
3. Third Party Logistics Service Provider (3PL) – Service providers that organize the flow of goods and information for their customers, take care of all their logistics and sometimes offer financial and information services
4. Fourth Party Logistics Service Provider (4PL) - System integrators who stand between their customers and other logistics service providers to ensure the coordination and organization of all business processes along the value chain
5. Fifth Party Logistics Service Provider (5PL) – Providers that are involved in supply chain management and provide system-specific consulting services and value chain management to their customers
Processes

Distribution – Shipment Planning

Bidding process:

1. Bid preparation
2. Request for information (RFI)
3. Request for Proposal (RFP)
4. Request for Quote (RFQ)
5. Evaluation
6. Selection and post-bid activities
Processes

Distribution – Shipment Management

Pick & Pack
Loading
Transport
Customs
Transport
Customer

Packing list
Export documents
Customs documents
Customer documents
Processes

Distribution – Shipment Management

- **Import** = An import is a good brought across a national border, from an external source.
- Party bringing in the good is called an importer
- Country has demand for an import when the price of the good (or service) on the world market is less than the price on the domestic market
- Trade deficit $\rightarrow$ import is larger than export

Every Country’s
BIGGEST IMPORT

Data sourced from the Observatory of Economic Complexity. Full data can be found via bit.ly/import and exports.
Processes

Distribution – Shipment Management

- **Export** = is a good or service produced in one country that is bought by someone in another country
- Seller of such goods and services is an exporter; the foreign buyer is an importer
- Export of goods often requires involvement of customs authorities (responsible for customs law, duties and taxes)
- Tariff is a tax for a specific good or set of goods exported from or imported to a country, creating an economic barrier to trade
- Free Trade Agreements (FTA) is a multinational agreement according to international law to form a free-trade area between the cooperating states.
  - determine the tariffs and duties that countries impose on imports and exports
  - goal of reducing/eliminating trade barriers

Processes

Distribution – Shipment Management

- **Incoterms** = **International Commercial Terms** are a series of pre-defined commercial terms published by the International Chamber of Commerce (ICC) relating to international commercial law.

<table>
<thead>
<tr>
<th>Incoterm</th>
<th>Description</th>
<th>Freight/Risk</th>
<th>More Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXW</td>
<td>Ex Works</td>
<td>Seller’s premises</td>
<td>Seller responsible for making the goods available at the seller’s premises. Buyer bears the full risk from there to destination.</td>
</tr>
<tr>
<td>FCA</td>
<td>Free Carrier</td>
<td>Seller’s premises</td>
<td>Seller responsible for delivery to the custody of carrier, identified by the buyer. Risk is transferred when loading has taken place.</td>
</tr>
<tr>
<td>CPT</td>
<td>Carriage Paid To</td>
<td>Seller’s premises</td>
<td>Seller delivers goods to the carrier at a named place of delivery and pays transport to the named destination. Risk is transferred at place of delivery whereas seller pays for transport to the destination.</td>
</tr>
<tr>
<td>CIP</td>
<td>Carriage and Insurance Paid To</td>
<td>Seller’s premises</td>
<td>Seller delivers goods to the carrier at a named place of delivery and pays transport and insurance to the named destination. Risk transfers at place of delivery whereas seller pays for transport to and from the destination.</td>
</tr>
<tr>
<td>DAT</td>
<td>Delivered at Terminal</td>
<td>Seller’s premises</td>
<td>Seller delivers goods unloaded at a specific place inside a terminal. Risk is transferred as soon as goods have been unloaded.</td>
</tr>
<tr>
<td>DAP</td>
<td>Delivered at Place</td>
<td>Seller’s premises</td>
<td>Seller delivers goods to the means of transport at agreed destination. Risk is transferred as soon as goods are moved to the means of transport.</td>
</tr>
<tr>
<td>DDP</td>
<td>Delivered Duty Paid</td>
<td>Seller’s premises</td>
<td>Seller delivers goods at the means of transport at agreed destination. Risk is transferred as soon as goods are moved to the means of transport.</td>
</tr>
<tr>
<td>FAS</td>
<td>Free alongside</td>
<td>Ship</td>
<td>Seller responsible for loading the goods on the vessel. Risk is transferred as soon as goods are over the ship’s rail.</td>
</tr>
<tr>
<td>FOB</td>
<td>Free on Board</td>
<td>Vessel</td>
<td>Seller is responsible for delivery of goods on the ship. Risk is transferred as soon as goods have been set down inside ship.</td>
</tr>
<tr>
<td>CFR</td>
<td>Cost and Freight</td>
<td>Vessel</td>
<td>Seller covers cost and freight, duty unpaid, to named port of destination. Risk is transferred as soon as the goods have been set down inside ship.</td>
</tr>
<tr>
<td>CIF</td>
<td>Cost, Insurance, Freight</td>
<td>Vessel</td>
<td>Seller covers cost, insurance and freight, duty paid, to named port of destination. Risk is transferred at named port of destination.</td>
</tr>
</tbody>
</table>
Processes

*Distribution – Freight Accounting*

- Freight accounting based on volume and transport mode
- Rates are negotiated on an annual basis

<table>
<thead>
<tr>
<th>Avg. Costs/kg chargeable weight in € (2015)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Road freight</td>
</tr>
<tr>
<td>Sea freight</td>
</tr>
<tr>
<td>Air freight</td>
</tr>
<tr>
<td>Courier</td>
</tr>
</tbody>
</table>
Processes

Distribution – Example Brewery
Supply Chain

Overview

Supplier Management / Procurement

Production

Distribution

Wholesaler

Customer
Processes

Distribution – Example Brewery
Agenda

1. Basics & Definitions
2. Supply Chain Overview
3. Supply Chain Processes
4. Roles in Supply Chain Management
**Role Players**

**Supplier**

<table>
<thead>
<tr>
<th>Supplier</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Role:</strong></td>
</tr>
<tr>
<td>• provide high-quality products from a manufacturer at a good price to a distributor or retailer for resale</td>
</tr>
<tr>
<td><strong>Goal:</strong></td>
</tr>
<tr>
<td>• Long term relationship with customer</td>
</tr>
<tr>
<td><strong>Interfaces:</strong></td>
</tr>
<tr>
<td>• Other suppliers</td>
</tr>
<tr>
<td>• Procurement organization</td>
</tr>
<tr>
<td>• Customer</td>
</tr>
</tbody>
</table>
Role Players

Procurement

Procurement Organization

- **Role:**
  - obtain goods and services in response to internal needs

- **Goal:**
  - Support organizational requirements, manage procurement and supply process, best possible price, manage relationships with interfaces

- **Interfaces:**
  - Suppliers
  - Internal stakeholders (e.g. manufacturing, logistics)
Role Players

Warehousing

Warehouse Provider

- **Role:**
  - logistics provider specialized on integrated operations of warehousing

- **Goal:**
  - Increase efficiency, improve customer service, increase sales, improve relationship

- **Interfaces:**
  - Manufacturing
  - Order Management
  - Forwarder
Role Players

Transportation

Transportation Provider

- **Role:**
  - logistics provider specialized on integrated operations of transportation

- **Goal:**
  - Transportation speed, transportation safety, shipping quality, volume utilization, competitive rate structure

- **Interfaces:**
  - Warehouse
  - Customer
  - Forwarder
Order Management/Customer Service

- **Role:**
  - face to the customer and responsible to answer customer requests

- **Goal:**
  - Increase customer satisfaction, decrease number of complaints, increase automation rate

- **Interfaces:**
  - Customer
  - Warehouse
  - Forwarder
Role Players

Quality

Logistics Quality

- **Role:**
  - define and facilitate logistics quality standards

- **Goal:**
  - Monitor quality KPI (Key Performance Indicator), resolve case investigation, decrease number of quality issues

- **Interfaces:**
  - Manufacturing/Supplier
  - Warehouse/Forwarder
  - Customer
Doing now what patients need next