

**Supply chain design
and production systems
Lesson 1: the supply chain**

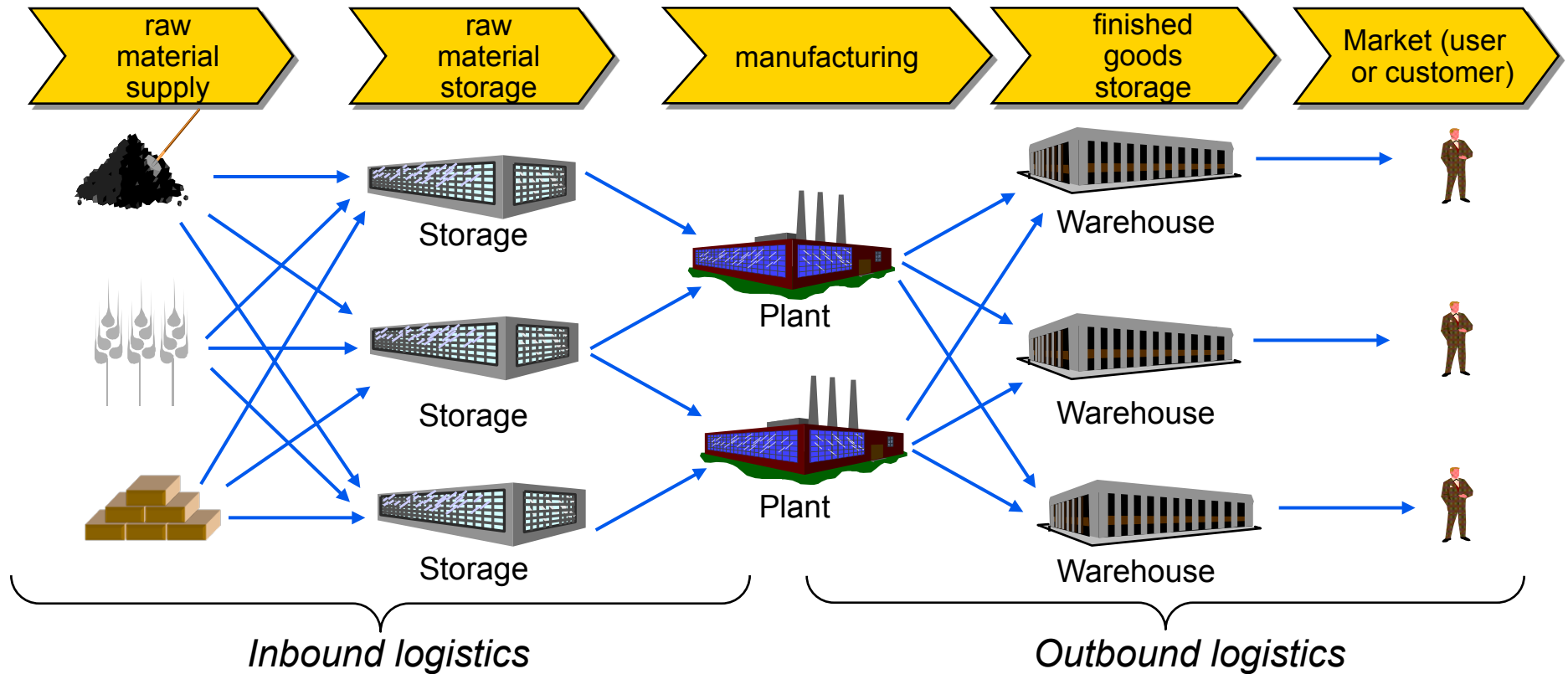
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Agenda

- Definition
- Why SC & SC management?
- The decisions – the problems
- Supply Chain strategies
- Supply Chain performances

The supply chain– 1/4

Definition: “All the different actors, infrastructures, resources, processes and activities (and the links between them) that attend from the sourcing of raw materials, to transformation in semi-finished products and finished products to distribution of finished products to clients”



Other definitions

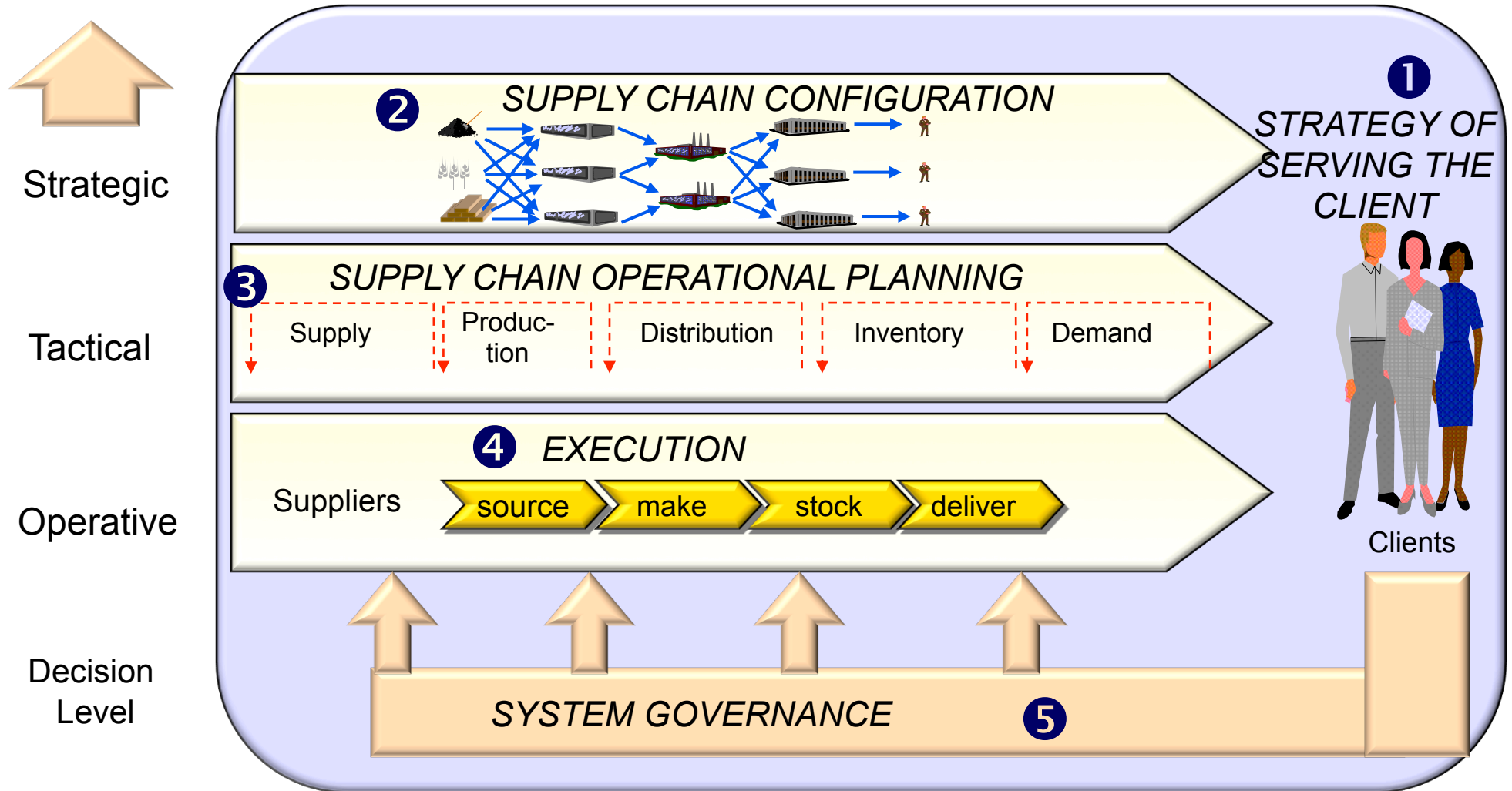
- A set of firms that **pass materials forward**. [...] raw material and component producers, product assemblers, wholesalers, retailer merchants and transportation companies are all members of a supply chain. (La Londe and Masters, 1994)
- The network of organizations that are involved, through upstream and downstream linkages, in the different processes and activities that **produce value** in the form of products and services delivered to the ultimate consumer (Christopher, 1992)
- A set of entities (organizations and individuals) directly involved in the upstream and downstream **flows** of products, services, finances, and/or information from a source to a customer (Mentzer et al., 2001)

Why SC & SC management?

- The firm is not a stand alone entity but it is part of a network of interconnected firms
- Optimizing internal processes is no longer enough
- Need to manage processes going beyond the boundaries of the company
- Shift on competition: from “**company vs company**” to “**SC vs SC**”
- Supply Chain has to be managed as a whole

The supply chain– 2/4

The decisions – the problems



SC strategies – 1/8

- *Mass products (standard)*
 - **Mass distribution (retail)**
 - **Stable demand**
 - **Long life cycle**
 - **Stability generates competition, that limits profit margins...**
 - **Turbulence induced by**
 - **Speculative purchasing**
 - *Sales promotion*

- *Innovative products*
 - **Short life cycle (few months)**
 - **Variable demand and high margins**
 - **Short time window (Time to Market role)**

SC strategies – 2/8

- *Stable processes*
 - **Mature processes and technologies**
 - **Wide and clear supply system**
 - **Automation**
 - **Medium-long term supply contracts**

- *Unstable processes*
 - **Technology and production processes evolution**
 - **Narrow and unstable supply system**
 - **Continuous operations fine-tuning, variable productivity**
 - **Spot supply contracts or frequent specifications changes**

SC strategies – 3/8

Demand variability

Process stability

	Low (standard products)	High (innovative products)
High	Lean Supply Chain	Responsive Supply Chain
Low	Risk hedging Supply Chain	Agile Supply Chain

SC strategies – 4/8

Demand variability

	Low (standard)	High (innovative)
High	Food, “Basic” clothing	Automotive Designer clothing, computer, pop music
Low	Oil and fuel Hydroelectric energy (black-out), agriculture products	TLC, professional computers, semiconductors

SC strategies (lean SC) – 5/8

Maximize efficiency in terms of total logistic cost

- **Non value adding activities elimination**
- **Economies of scale**
- **Stock control and centralized management**
- **Optimization techniques aim at distribution and production capacity maximization**
- **Client-supplier info sharing automation**

SC strategies (risk hedging SC) – 6/8

- Risk management orientation
 - **Structural**
 - **Abnormal: resilience**
- Backup strategies: stocks, backup suppliers
- Resource sharing inside supply chain, in order to share the risk of supply interruption
 - **Ex: co-ownership of raw materials and components stocks with other firms**
- ICT enables success
 - **Real time information on stocks and demand**
 - **Dynamic allocation of stocks and demand between partners who share the same warehouse stocks**

SC strategies (responsive SC) – 7/8

- Strategy based on reactivity and flexibility in order to cope with customers' needs variety and variability
- *Build-to-order* and *mass customization* approach, suitable to satisfy market specific demand
- Importance of Time-to-market
- Example National Bicycle (90s)
 - **Stable technology but variable demand**
 - **High quality product, strongly customized**
 - **Modular product, assembled and painted on client's order, customized frames: 2 millions combinations**
 - **Two weeks deliveries with 99% accuracy**

SC strategies (agile SC) – 8/8

- Capacity of response and flexibility to market needs plus “risk hedging” strategies
 - **Stock and other capacity resources shared between partners to face stockout and capacity interruption**
- Agile means that supply chain can face variable demand (outbound), minimizing at the same time the risk of supply interruption (inbound)

The supply chain – 3/4

The topic of **performance** measurement has received increasing attention in the management accounting literature as well as in the SCM one (Cousins et al., 2008). Supply chain performance can be classified in efficiency and effectiveness measures (Beamon, 1999).

Efficiency refers to the ability of a SC to maximize the use of internal resources, given the same output. Efficiency measures are therefore related to *costs* (basically **stock levels** and **production/transportation costs**) (Simchi-Levi et al., 2001).

Effectiveness refers to the ability of a SC to satisfy clients requirements. Effectiveness is measured against **service level** (Simchi-Levi et al., 2001).

Cousins, P., Lawson, B., Squire, B., (2008) Performance measurement in strategic buyer-supplier relationships: The mediating role of socialization mechanisms, *International Journal of Operations & Production Management*, Vol. 28, No. 3, pp. 238-258

Beamon, B.M., (1999) Measuring supply chain performances, *International journal of Operations and Production Management*, Vol. 19, No. 3, pp. 275-292

Simchi-Levi, D., Kaminsky, P., Simchi-Levi, E. (2001) *Designing and managing the supply chain*, McGraw-Hill, Fairfield, Connecticut

The supply chain – 4/4

- SERVICE LEVEL
 - Multidimensional concept: on time delivery, stock-outs, quality, price, etc.
- LOGISTICAL TOTAL COST
 - Cost to provide a certain service level
- A synthesis of the above reported measures could be given by:
 - Supply chain profitability