

Supply Chain Management: An Overview

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Procurement and Supply Chain
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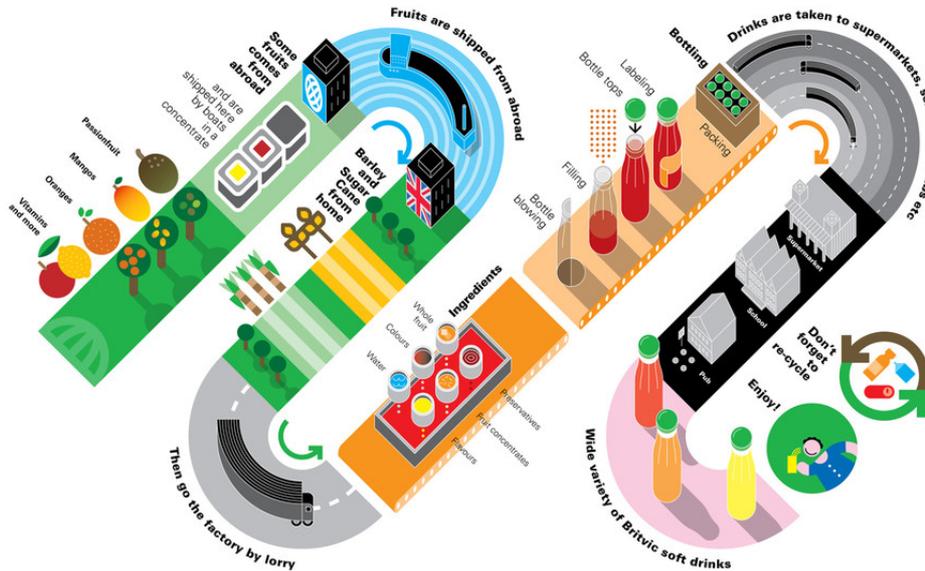


Agenda

- Supply Chain Management Definition
- Supply Chain Strategic Fit
- Triple A Supply Chain

Supply chain definition

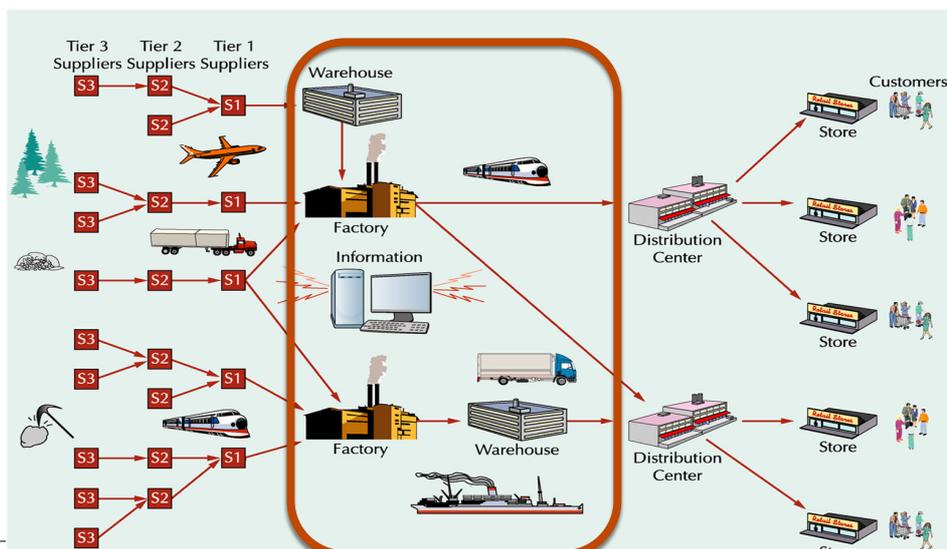
“A network of **connected and interdependent** organisations **mutually and co-operatively** working together to control , manage and improve the **flow of materials and information**”



Internal supply chain

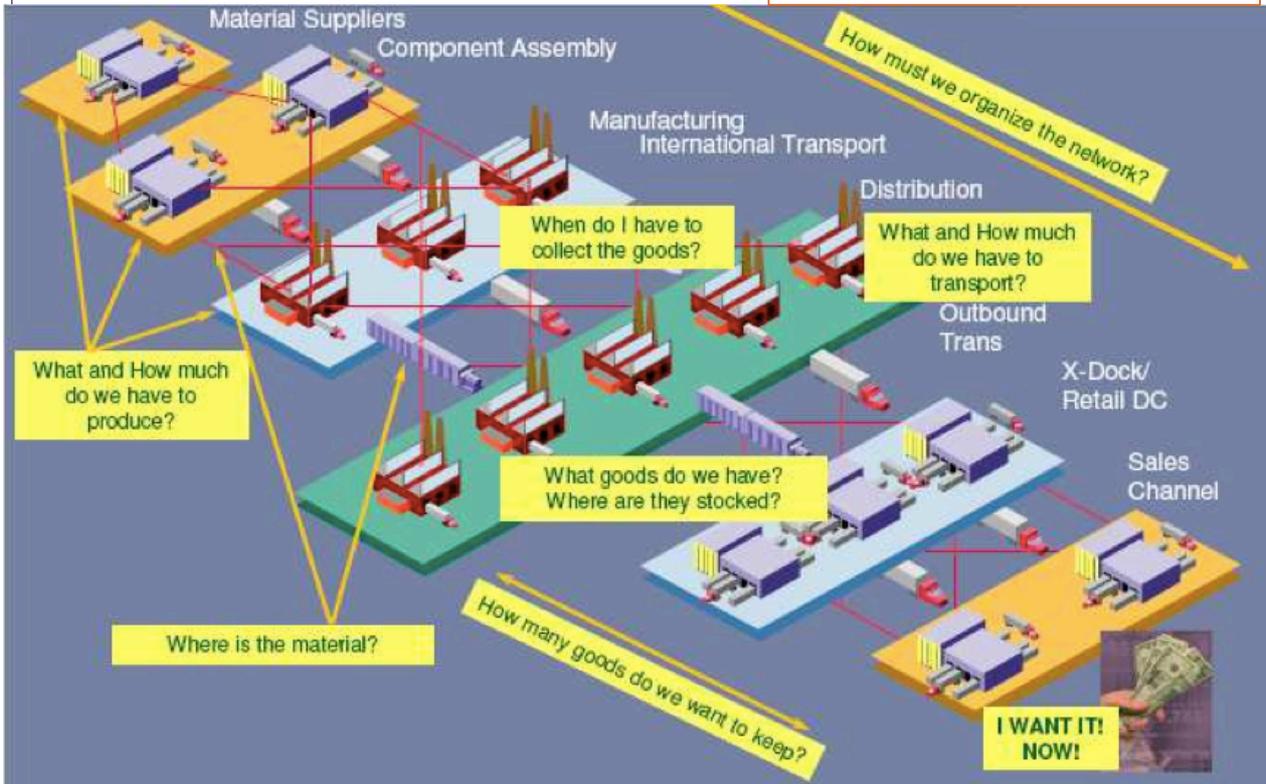
Internal supply chain deals with flows of information, goods and cash:

- **Upstream:** Procurement and inbound logistics
- **Within:** Planning and internal logistics
- **Downstream:** Warehouse mgmt, outbound logistics and distribution



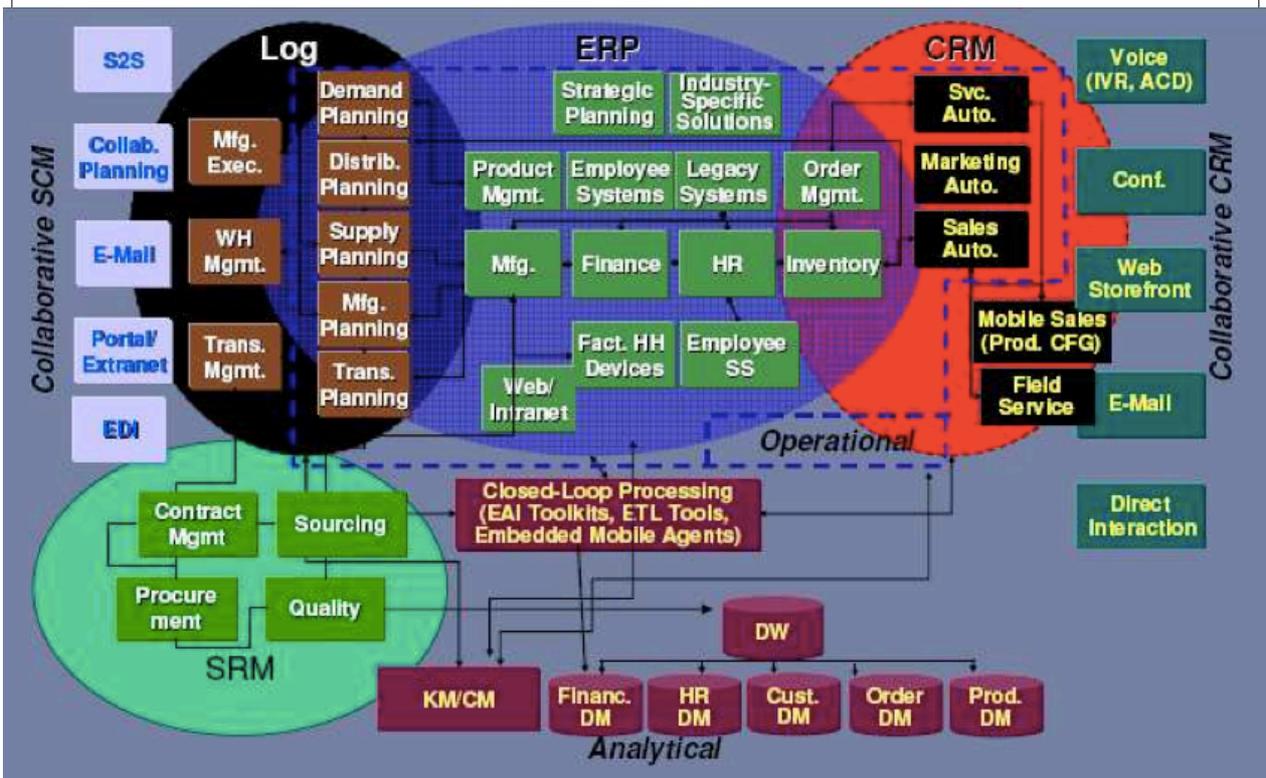
Operational perspective

Source: M. Ginap – Supply Chain Council



IT perspective

Source: M. Ginap – Supply Chain Council



Business perspective

Source: M. Ginap – Supply Chain Council

Decision View

- ▶ ROI
- ▶ Business impact
- ▶ Price/performance
- ▶ Risk/opportunity ...

Management View

- ▶ Costs/budget
- ▶ Schedule/effort/delay
- ▶ Utilization and loading
- ▶ Resource availability ...

Operational View

- ▶ Process/activities
- ▶ Products/specs
- ▶ Policy/procedures
- ▶ Constraints/guides ...

Metaphors of the Supply Chain

The Chain



The Network or the Web



The Stream



The Pipeline



The objective of a Supply Chain

- Maximize overall value created
- Supply chain value (or *supply chain surplus*): difference between what the final product is worth to the customer and the effort the supply chain expends in filling the customer's request
- Value is correlated to *supply chain profitability* (difference between revenue generated from the customer and the overall cost across the supply chain)

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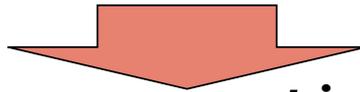
The objective of a Supply Chain

- Example: Dell receives €2000 from a customer for a computer (revenue)
- Supply chain incurs costs (information, storage, transportation, components, assembly, etc.)
- Difference between €2000 and the sum of all of these costs is the *supply chain profit*
- Supply chain profitability is total profit to be shared across all stages of the supply chain
- Supply chain success should be measured by total supply chain profitability, not profits at an individual stage

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The objective of a Supply Chain

- Sources of supply chain revenue: the customer
- Sources of supply chain cost: flows of information, products, or funds between stages of the supply chain



- ***Supply chain management is the management of flows between and among supply chain stages to maximize total supply chain profitability***

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Supply Chain Management

- A set of approaches used to efficiently integrate
 - Suppliers
 - Manufacturers
 - Warehouses
 - Distribution centers
- So that the product is produced and distributed
 - In the right quantities
 - To the right locations
 - And at the right time
- System-wide costs are minimized and
- Service level requirements are satisfied

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Why is SCM difficult?

- Uncertainty is inherent to every supply chain
 - Travel times
 - Breakdowns of machines and vehicles
 - Weather, natural catastrophe, war
 - Local politics, labor conditions, border issues
- The complexity of the problem to globally optimize a supply chain is significant
 - Minimize internal costs
 - Minimize uncertainty
 - Deal with remaining uncertainty

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The importance of SCM

- Shorter product life cycles of high-technology products
 - Less opportunity to accumulate historical data on customer demand
 - Wide choice of competing products makes it difficult to predict demand
- The growth of technologies such as the Internet enable greater collaboration between supply chain trading partners
 - If you don't do it, your competitor will
 - Major buyers such as Wal-Mart demand a level of "supply chain maturity" of its suppliers
- Availability of SCM technologies on the market
 - Firms have access to multiple products (e.g., SAP, Baan, Oracle, JD Edwards) with which to integrate internal processes

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Fundamentals of Supply Chain Management

- It views the supply chain as a single entity
- It calls for strategic decision making
- It provides a different perspective on inventories using them as a last, not first, resort
- It requires a new approach to systems; integration not simply interface

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Competitive and Supply Chain Strategies

- Competitive strategy: defines the set of customer needs a firm seeks to satisfy through its products and services
- Product development strategy: specifies the portfolio of new products that the company will try to develop
- Marketing and sales strategy: specifies how the market will be segmented and product positioned, priced, and promoted
- Supply chain strategy: determines the nature of material procurement, transportation of materials, manufacture of product or creation of service, distribution of product

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Achieving Strategic Fit

- Strategic fit:
 - Consistency between customer priorities of competitive strategy and supply chain capabilities specified by the supply chain strategy
 - Competitive and supply chain strategies have the same goals
- A company may fail because of a lack of strategic fit or because its processes and resources do not provide the capabilities to execute the desired strategy
- To achieve strategic fit, a firm must ensure that its supply chain capabilities support its ability to satisfy the targeted customer segments.

Refer to:

Fisher, What is the right supply chain for your product, HBR March-April 1997

How is Strategic Fit Achieved?

- Step 1: Understanding the customer and supply chain uncertainty
- Step 2: Understanding the supply chain and its response capabilities
- Step 3: Achieving strategic fit

Step 1: Understanding the Customer and Supply Chain Uncertainty

- Identify the needs of the customer segment being served
- Quantity of product needed in each lot
- Response time customers will tolerate
- Variety of products needed
- Service level required
- Price of the product
- Desired rate of innovation in the product

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Step 1: Understanding the Customer and Supply Chain Uncertainty

- Overall attribute of customer demand
- Demand uncertainty: uncertainty of customer demand for a product
- Implied demand uncertainty: resulting uncertainty for the supply chain given the portion of the demand the supply chain must handle and attributes the customer desires
- Ex: a firm supplying only emergency orders for a product will face a higher implied demand uncertainty than a firm that supplies the same product with a long lead time, as the second firm has an opportunity to fulfill the orders evenly over the long lead time.
- Ex: raising the service level of a supply increases the implied demand uncertainty even though the product's demand uncertainty does not change.

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Step 1: Understanding the Customer and Supply Chain Uncertainty

- Understanding the Customer:

- Lot size
- Response time
- Service level
- Product variety
- Price
- Innovation



***Implied
Demand
Uncertainty***

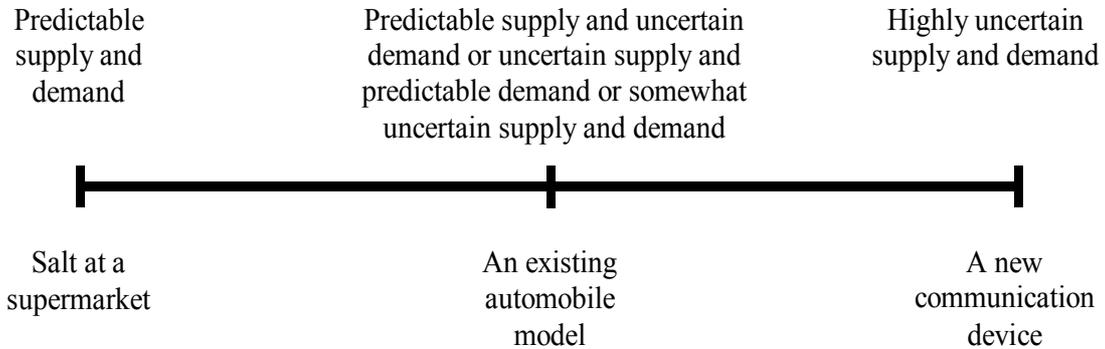
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Customer needs and Implied Demand Uncertainty

| • Customer need | Causes Implied Demand Uncertainty to |
|--|--|
| Range of quantity required increases | Increase because a wider range of the quantity required implies greater variance in demand |
| Lead time decreases (time pressure) | Increase because there is less time in which to react to orders |
| Variety of products required increases | Increase because demand per product becomes more disaggregate |
| Number of channels through which product may be acquired increases | Increase because the total customer demand is now disaggregated over more channels |
| Rate of innovation increases | Increase because new products tend to have more uncertain demand |
| Required service level increases | Increase because the firm now has to handle unusual surges in demand |

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Levels of Implied Demand Uncertainty



The Implied Uncertainty (Demand and Supply)

Implied Demand Uncertainty and other attributed

| Correlation between Implied Demand Uncertainty and other attributes | | |
|---|-------------------------|--------------------------|
| | Low Implied Uncertainty | High Implied Uncertainty |
| Product margin | Low | High |
| Average forecast error | 10% | 40% to 100% |
| Average stockout rate | 1% to 2% | 10% to 40% |
| Average forced season-end markdown | 0% | 10% to 25% |

Source: Adapted from Fisher (1997)

Step 2: Understanding the Supply Chain and its response capabilities

- How does the firm best meet demand? Creating strategic fit is all about creating a supply chain strategy that best meets the demand a company has targeted given the uncertainty it faces.
- Dimension describing the supply chain is supply chain responsiveness
- Supply chain responsiveness → ability to:
 - respond to wide ranges of quantities demanded
 - meet short lead times
 - handle a large variety of products
 - build highly innovative products
 - meet a very high service level

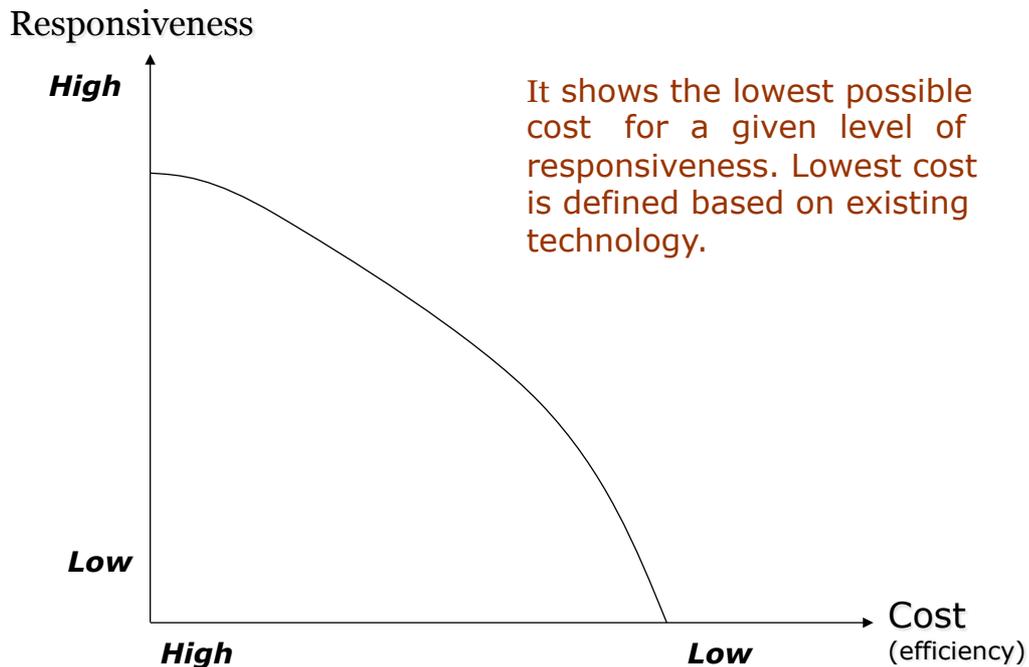
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Step 2: Understanding the Supply Chain and its response capabilities

- The most critical choice is the decision about the desired supply chain degree of efficiency and responsiveness
- There is a cost to achieving responsiveness!
- Supply chain efficiency: is the inverse of the cost of making and delivering the product to the customer
- Increasing responsiveness results in higher costs that lower efficiency → Cost-Responsiveness Efficient Frontier

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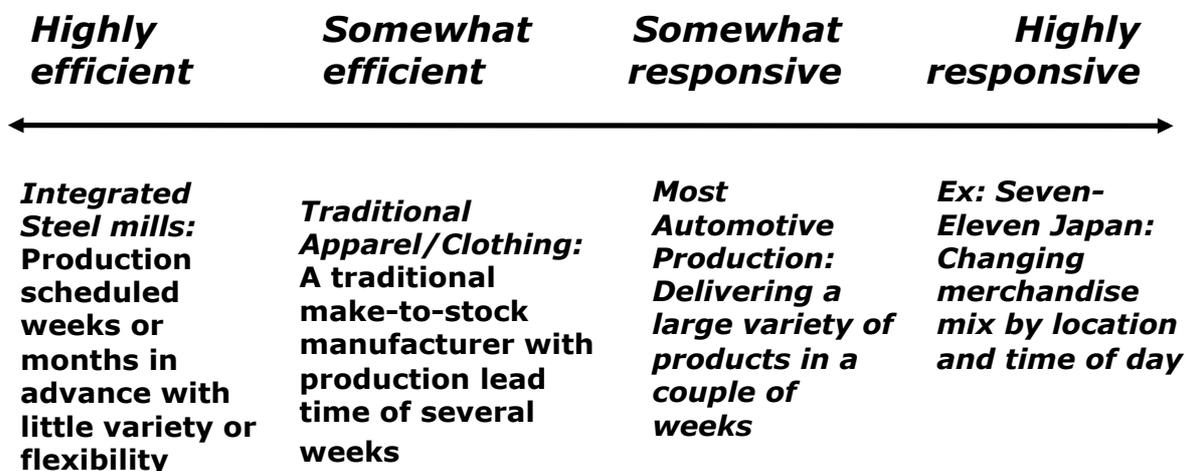
Cost-Responsiveness Efficient Frontier



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Efficiency/Responsiveness Spectrum

Supply chains range from those that focus solely on being responsive to those that focus on a goal of producing and supplying at the lowest possible cost.



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Step 3: Achieving Strategic Fit

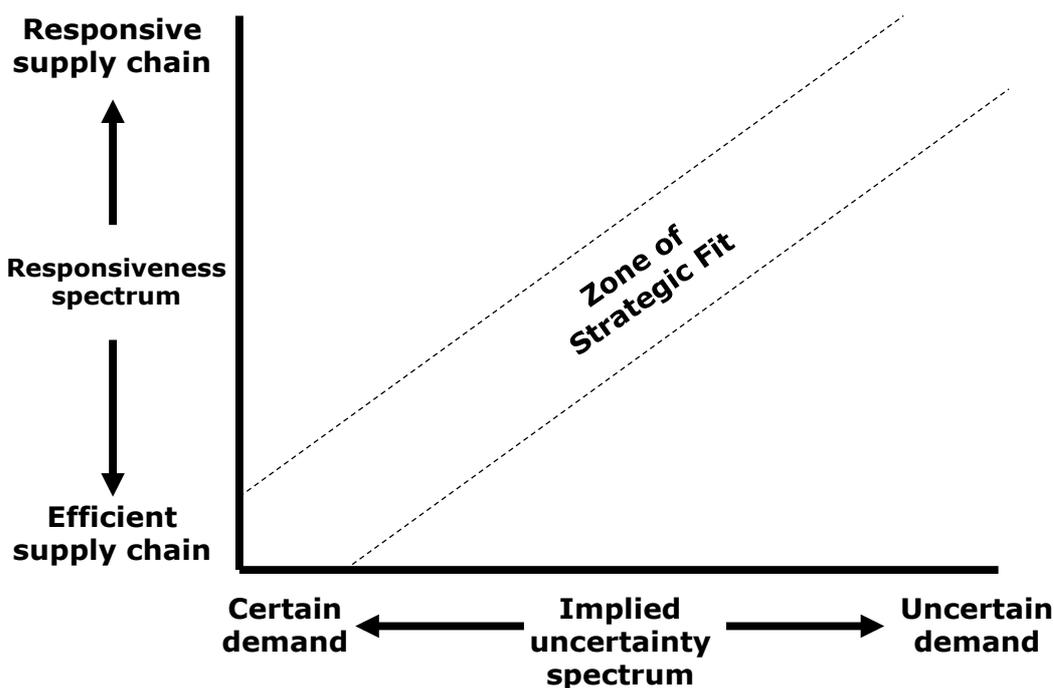
- Step is to ensure that what the supply chain does well is consistent with target customer's needs.
- The goal is to target high responsiveness for a supply chain facing high implied uncertainty, and efficiency for a supply chain facing low implied uncertainty.



Zone of strategic fit

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Step 3: Achieving Strategic Fit



Source: Fisher (1997)

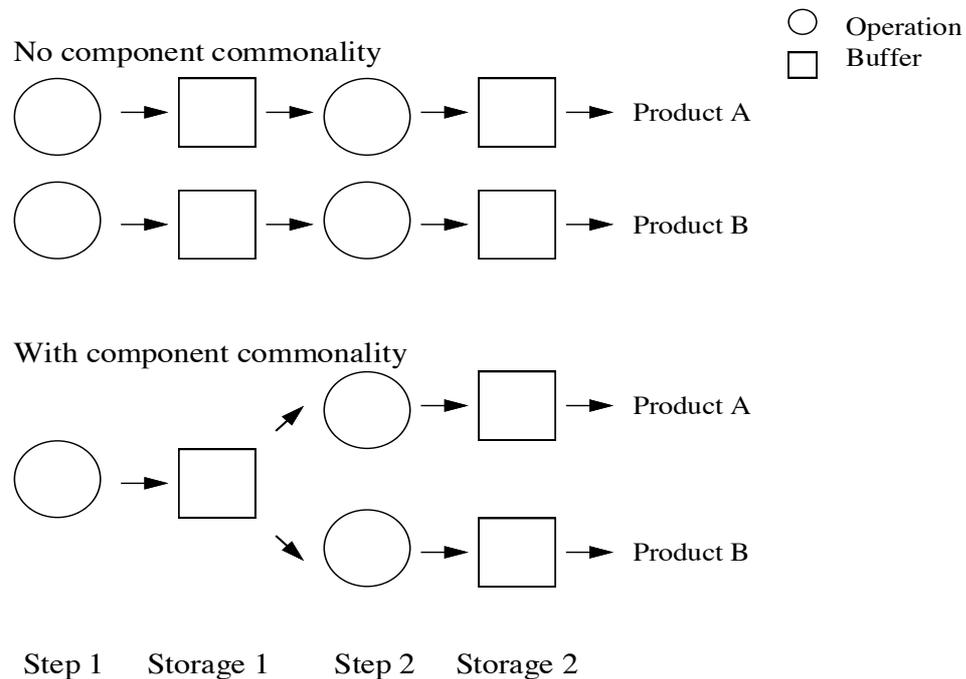
Comparison of Efficient and Responsive Supply Chains

| | Efficient | Responsive |
|-----------------------------|---|--|
| Primary goal | Lowest cost | Many products, quicker response possible, innovation/differentiation |
| Pricing strategy | Lower margins | Higher margins |
| Mfg strategy | High utilization | Capacity flexibility |
| Inventory strategy | Minimize inventory | Buffer inventory |
| Lead time strategy | Reduce but not at expense of greater cost | Aggressively reduce even if costs are significant |
| Supplier selection strategy | Cost and low quality | Speed, flexibility, quality |
| Transportation strategy | Greater reliance on low cost modes | Greater reliance on responsive (fast) modes |

Postponement

- Postponement is the organization of the production and distribution of products in such a way that the customization of the products is made as close to the point when the demand is known as possible
- Demand preconditions:
 - Fluctuation (e.g., seasonal hikes in demand for ski equipment)
 - Unpredictability (e.g., demand for high-tech products with short product life)
 - Urgency-operating on short required order lead-times relative to the production cycle (e.g., Benetton would not be able to run its full regular production cycle after finding out which sweater color sell best in the season)
 - Differentiation associated with different customer segment that leads to products having different performance characteristics (e.g., technological or legal requirement on the same product in different countries)
 - High product value: product with high unit value have high inventory holding cost and high cost of oversupply
 - High component commonality/modularity: high degree of shared components across the product lines

Component commonality/ modularity



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Postponement in Hewlett Packard

- HP uses postponement to customize their printers close to the local markets where they are actually being sold
- They are postponing commitment of a printer to a certain geographic market by producing universal printers and then applying power supplies and labels (the parts that differentiate printers for local markets) at the last stage, once demand is more certain
- HP manages a centralized plant that sends generic printers to the regional DCs (e.g., in Europe, Asia, etc.). The DCs carries some assembly functions to customize the printers for the specific local markets as soon as the customer order arrives
- This allows HP to take advantage of inventory pooling at the DC level which dramatically cut inventory costs as well as reducing the production cycle time

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Triple A supply chain

- Supply Chains should not target only efficiency, they need to be embrace:
 - Agility: Respond to short-term changes in demand or supply quickly; handle external disruptions smoothly.
 - Adaptability: Adjust supply chain's design to meet structural shifts in markets; modify supply network to strategies, products and technologies.
 - Alignment: Create incentives for better performance.
- Moreover, each company should be aware that it has to manage several supply chains often with different competitive priorities Therefore a "one fits all" approach often will not work

Refer to: Lee H.L – The Triple-A supply chain, HBR October 2004

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Agility

Objectives:

Respond to short-term changes in demand or supply quickly; handle external disruptions smoothly.

Methods:

- Promote flow of information with suppliers and customers.
- Develop collaborative relationships with suppliers.
- Design for postponement.
- Build inventory buffers by maintaining a stockpile of inexpensive but key components.
- Have a dependable logistics system or partner.
- Draw up contingency plans and develop crisis management teams.

Refer to: Lee H.L – The Triple-A supply chain, HBR October 2004

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Adaptability

Objectives:

Adjust supply chain's design to meet structural shifts in markets; modify supply network to strategies, products and technologies.

Methods:

- Monitor economies all over the world to spot new supply bases and markets.
- Use intermediaries to develop fresh suppliers and logistics infrastructure.
- Evaluate needs of ultimate consumers – not just immediate customers.
- Create flexible product designs.
- Determine where companies' products stand in terms of technology cycles and product life cycles.

Refer to: Lee H.L – The Triple-A supply chain, HBR October 2004

Alignment

Objectives:

Create incentives for better performance.

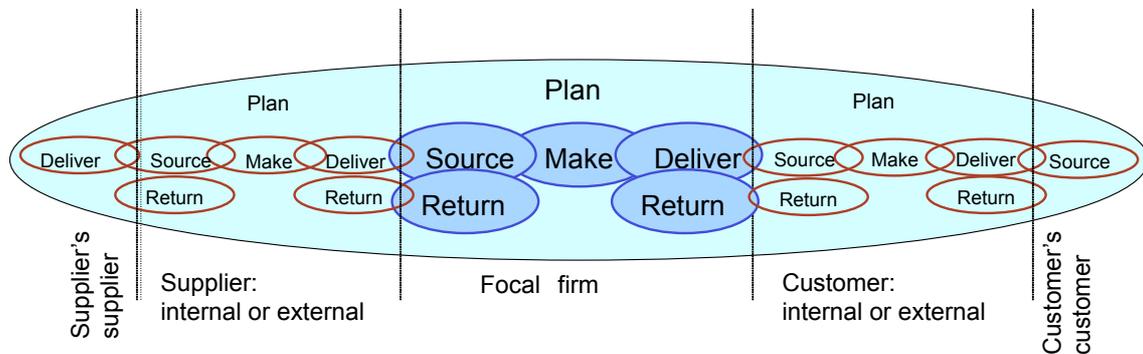
Methods:

- Exchange information and knowledge freely with vendors and customers.
- Lay down roles, tasks and responsibilities clearly for suppliers and customers.
- Equitably share risks, costs and gains of improvement initiatives.

Refer to: Lee H.L – The Triple-A supply chain, HBR October 2004

SCOR model

Supply Chain Operations Reference model as proposed by the Supply Chain Council



Source: <http://www.apics.org/apics-for-business/frameworks/scor>

SCOR overall process framework

- + **Process frameworks deliver the well-known concepts of business process reengineering, benchmarking, and best practices into a cross-functional framework**
 - + Standard processes:
Plan, Source, Make, Deliver, Return, Enable
 - + Standard metrics:
Perfect Delivery, Cash Cycle Time, Supply-Chain Cost, etc
 - + Standard practices
EDI, CPFR, Cross-Training, etc
- + **Pre-defined relationships between processes, metrics and practices**

Source: M. Ginap – Supply Chain Council

SCOR key processes

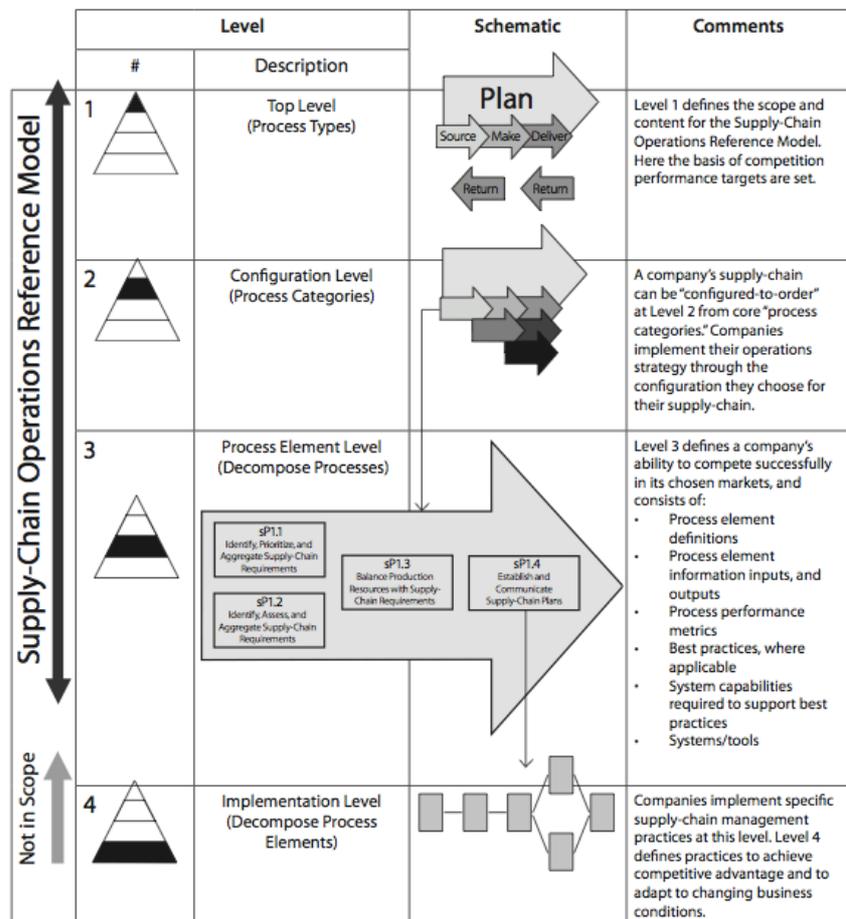
Supply Chain Operational Reference model

| SCOR Process | Definitions |
|----------------|---|
| Plan | Processes that balance aggregate demand and supply to develop a course of action which best meets sourcing, production and delivery requirements |
| Source | Processes that procure goods and services to meet planned or actual demand |
| Make | Processes that transform product to a finished state to meet planned or actual demand |
| Deliver | Processes that provide finished goods and services to meet planned or actual demand, typically including order management, transportation management, and distribution management |
| Return | Processes associated with returning or receiving returned products for any reason. These processes extend into post-delivery customer support |

Source: Supply Chain Council www.supply-chain.org

SCOR standard processes

Source: Supply Chain Council www.supply-chain.org



SCOR standard metrics

Source:
Supply Chain Council
www.supply-chain.org

| Performance Attribute | Performance Attribute Definition | Level 1 Strategic Metric |
|-------------------------------|--|--|
| Supply Chain Reliability | The performance of the supply chain in delivering: the correct product, to the correct place, at the correct time, in the correct condition and packaging, in the correct quantity, with the correct documentation, to the correct customer. | Perfect Order Fulfillment (RL.1.1) |
| Supply Chain Responsiveness | The speed at which a supply chain provides products to the customer. | Order Fulfillment Cycle Time (RS.1.1) |
| Supply Chain Agility | The agility of a supply chain in responding to marketplace changes to gain or maintain competitive advantage. | Upside Supply Chain Flexibility (AG.1.1) |
| | | Upside Supply Chain Adaptability (AG.1.2) |
| | | Downside Supply Chain Adaptability (AG.1.3) |
| | | Overall Value At Risk (AG.1.4) |
| Supply Chain Costs | The costs associated with operating the supply chain. | Supply Chain Management Cost (CO.1.1) |
| | | Cost of Goods Sold (CO.1.2) |
| Supply Chain Asset Management | The effectiveness of an organization in managing assets to support demand satisfaction. This includes the management of all assets: fixed and working capital. | Cash-to-Cash Cycle Time (AM.1.1) |
| | | Return on Supply Chain Fixed Assets (AM.1.2) |
| | | Return on Working Capital (AM.1.3) |

SCOR standard practices

The Practices section consists of best practices organized by original objective:

- SCOR; Improving overall supply chain operational performance. These best practices focus on the Reliability, Responsiveness, Agility, Cost and/or Asset Management Efficiency performance attributes.
- GreenSCOR; Improving the environmental footprint of the supply chain.
- Risk Management; Improving (mitigating) the risks of an undesired event taking place, limiting the impact of such an event and improving the ability to recover from the event.

Best practices are best described as unique ways to configure a set of processes (Configuration), unique ways to automate a set of processes (Technology) and/or unique ways to perform a set of processes (Knowledge) that result in significant better results.

No codification exists for Best Practices at this time.

Source: Supply Chain Council www.supply-chain.org

SCOR standard practices

1. **Available-to-Promise (ATP)**
2. **Carrier Agreements**
3. **CPFR**
4. **Co-located Procurement Reps**
5. **SCOR/Six Sigma/Lean Convergence**
6. **Cross-Docking**
7. **Drum-Buffer-Rope Scheduling**
8. **Lean Methodology**
9. **Merge – in – Transit**
10. **Postponement**
11. **Sales & Operations Planning (S&OP)**
12. **Six Sigma**
13. **Statistical Test Count**
14. **Supplier Performance Assessment System**
15. **Vendor Managed Inventory (VMI)**
16. **Wave Picking**

Source: Supply Chain Council www.supply-chain.org