SUPPLY CHAIN MANAGEMENT

Objective

- Maximise the overall value generated – is the difference between what the final product is worth to the customer and the effort the supply chains expend in filling the request of the customer.

- Supply chain profitability is the difference between the revenue generated from the customer and the overall cost across the supply chain.

- It is the total profit to be shared across all supply chain stages.

- Supply chain success is measured in terms of supply chain profitability and not in terms of the profits at an individual stage.

- Revenue is from customer – positive cash flow.

- All other cash flows are simply fund exchanges that occur within the supply chain given that different stages have different owners.

- All flows of information, product or funds generates costs within the supply chain.

- Supply chain management involves the management of flows between and among stages in a supply chain to maximise total supply chain profitability.

Decision Phases

Three categories - Depending on the frequency of each decision and the time frame over which a decision has an impact,

- Supply chain strategy or design
- Supply chain planning
- Supply chain operation

Supply chain strategy

- Decides how to structure the supply chain over the next several years
  - chain configuration,
  - resource allocated and
  - process at each stage should perform

- Decisions include
  - location and capacities of production and warehousing facilities,
  - the products to be manufactured or stored at various locations,
  - the method of transportation to be made available along different shipping legs, and
  - the type of information system to be utilised.
Supply chain planning

- Under the given configuration decisions are made which has impact on a time frame of quarter to a year
- Starts with a forecast the coming year or a comparable time frame
- Planning decisions include
  - which market will be supplied from which locations,
  - the subcontracting for manufacturing,
  - the inventory policies to be followed, and
  - the timing and size of marketing promotions
- Companies in the planning phase try to incorporate any flexibility built into the supply chain in the design phase and exploit it to optimise performance
- Companies define a set of operating policies that govern short-term operations

Supply chain operation

- Decisions are taken regarding individual customer order and the time frame is week or days
- Configuration is fixed and policies are defined
- Objective is to handle incoming customer orders in the best possible manner
- Decisions related with
  - allocation of inventory or production to individual orders,
  - set a date that an order is to be filled,
  - generate pick lists at a warehouse,
  - allocate an order to a particular shipping mode and shipment,
  - set delivery schedules of trucks, and
  - place replenishment order
- Exploit the reduction in uncertainty and optimise performance

Process View of Supply Chain

- A supply chain is a sequence of processes and flows that take place within and between different stages and combine to fill a customer need for a product
- Two ways to view the processes performed in a supply chain
  Cycles view and
  Push/pull view

Cycle view

- Defines the processes involved and the owners of each process
- Process in a supply chain are divided into a series of cycles
• Cycles are performed at the interface between two successive stages of a supply chain
• Supply chain process can be broken down into four process cycles such as
  – Customer order cycle
  – Replenishment cycle
  – Manufacturing cycle
  – Procurement cycle
• Each cycle occurs at the interface between two successive stages of the supply chain
• A cycle view of the supply chain is very useful when considering operational decisions
• It clearly specifies the roles and responsibilities of each member of the supply chain
• It helps the designer to consider the infrastructure required to support the processes

Fig 1: Supply Chain Process Cycles
Fig. Customer Order Cycle

Fig 2: Replenishment Cycle

Fig 3: Manufacturing Cycle
Push/Pull View

- Categorises processes in a supply chain based on whether they are initiated in response to a customer order (pull) or in anticipation of a customer order (push)
- Categorisation is based on the timing of process execution relative to end customer demand
- At the time of execution of a pull process customer demand is known with certainty
- In case of push process at the time of execution of a process demand is not known and must be forecasted
- Pull process – reactive process
- Push process – speculative process
- Push/pull boundary in a supply chain separates push process from pull process
- Very useful when considering strategic decisions relating to supply chain
- Forces more global consideration of supply chain processes as they relate to a customer order
- More the pull process better the supply chain

Fig 4: Procurement Cycle
COMPETITIVENESS AND SUPPLY CHAIN STRATEGIES

- Competitive strategy of a company defines the set of customer needs that it seeks to satisfy through its products and services
- Defined based on how customer prioritises product cost, delivery time, variety and quality
- Targets one or more customer segments and aims to provide products and services that satisfy these customer’s needs
- Some company’s competitive strategies are defined around the following
  - High availability of a variety of reasonable quality products at low prices – eg: Wal-Mart
– Better customer convenience, availability and responsiveness – eg: McMaster Carr – MRO items - over 200,000 items through catalog and web site
– Better customisation, and variety at reasonable cost – eg: Dell

To execute a competitive strategy of a company, all the functions play a role and each must develop its own strategy

Supply chain strategy determines
– the nature of procurement of raw materials,
– transportation of materials to and from the company,
– manufacture of the product or operations to provide the service, and
– distribution of the product to the customer, along with any follow-up service

This strategy includes what many traditionally include
– Supplier strategy
– Operations strategy, and
– Logistics strategy

Decisions regarding inventory, operating facilities, transportation, and information flows in the supply chain are all part of supply chain strategy

Achieving Strategic Fit

Strategic fit means that both the competitive and supply chain strategies have the same goal

It refers to consistency between
– The customer priorities that the competitive strategy hopes to satisfy and
– The supply chain capabilities that the supply chain strategy aims to build

Major task of chief executive officer (CEO) is aligning all of the core strategies with the overall competitive strategy to achieve strategic fit

During the supply chain design a key consideration is the strategic fit

A company’s success or failure closely linked to the following
1. The competitive strategy and all functional strategies must fit together to form a coordinated overall strategy
2. Different functions in a company must appropriately structure their process and resources to be able to execute these strategies successfully

Basic steps to achieve strategic fit
1. Understanding the customer, and supply chain uncertainty
2. Understanding the supply chain capabilities
3. Achieving strategic fit

Understanding the Customer and Supply Chain Uncertainty
• To understand the customer, a company must identify the needs of the customer segment being served

• Customer demand from different segments may vary along several attributes:
  1. The quantity of the product needed in each lot
  2. The response time that customers are willing to tolerate
  3. The variety of products needed
  4. The service level required
  5. The price of the product
  6. The desired rate of innovation in the product

### Implied Demand Uncertainty

• Demand uncertainty reflects the uncertainty of customer demand for product

• Implied demand uncertainty is the uncertainty in meeting a portion of customer demand and it is the uncertainty the supply chain faces.

• It is mainly due to the attributes the customer desires

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**Illustration**

As a supply chain raises its service level, it must be able to meet a higher and higher percentage of actual demand, forcing it to prepare for rare surges in demand.

Thus raising the service level increases the implied demand uncertainty even though the product’s underlying demand uncertainty does not change.

• Product demand uncertainty and various customer needs that the supply chain tries to fill affect implied demand uncertainty

• The following customer needs increases implied demand uncertainty
  
  – Range quantity required increases
  – Lead time decreases
  – Variety of products required increases
  – Number of channels through which product may be acquired increases
  – Rate of innovation increases
  – Required service level increases

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**Correlation between implied demand uncertainty and other attributes**

<table>
<thead>
<tr>
<th></th>
<th>Low Implied Uncertainty</th>
<th>High Implied Uncertainty</th>
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<tbody>
<tr>
<td>Product margin</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Average forecast error</td>
<td>10%</td>
<td>40% to 100%</td>
</tr>
<tr>
<td>Average stockout rate</td>
<td>1% to 2%</td>
<td>10% to 40%</td>
</tr>
<tr>
<td>Average forced season</td>
<td>0%</td>
<td>10% to 25%</td>
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</table>

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• Following supply source capabilities increase the supply uncertainty and hence high implied demand uncertainty

  Frequent breakdown
Unpredictable and low yields
Poor quality
Limited supply capacity
Inflexible supply capacity
Evolving production process

• Implied uncertainty spectrum shows in one end predictable supply and demand, and in the other end highly uncertain supply and demand

Understanding the supply chain

• Important supply chain characteristics are responsiveness and efficiency

• Supply chain responsiveness includes a supply chain’s ability to do the following
  ▪ Respond to wide range of quantities demanded
  ▪ Meet short lead time
  ▪ Handle a large variety of products
  ▪ Build highly innovative products
  ▪ Meet a very high service level
  ▪ Handle supply uncertainty

• Supply chain efficiency is the cost of making and delivering a product to the customer

• Cost-responsiveness efficient frontier is the curve showing the lowest possible cost for a given level of responsiveness

• Shows the cost-responsiveness performance of the best supply chain

• Firms on the efficient frontier are also continuously improving their processes and changing technology to shift the efficient frontier itself

Fig 7: Cost – Responsiveness efficient frontier

• 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
Achieving Strategic Fit

- Strategic fit is achieved if what the supply chain does particularly well is consistent with the targeted customer’s needs and the uncertainty of the supply chain.

![Diagram showing the zone of strategic fit]

**Fig 8: Finding the zone of strategic fit**

- For high level of performance, companies should move their competitive strategy (and resulting implied uncertainty) and supply chain strategy (and resulting responsiveness) towards the zone of strategic fit.
- To achieve complete strategic fit, a firm must consider all functional strategic within the value chain.
Comparison of efficient and responsive supply chains

<table>
<thead>
<tr>
<th>Primary goal</th>
<th>lowest cost</th>
<th>Respond quickly</th>
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<tr>
<td>Product design strategy</td>
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<td>Modularity-postponement</td>
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<td>High margin</td>
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<td>Mfg. Strategy</td>
<td>Lower cost</td>
<td>Capacity flexibility</td>
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<tr>
<td>Inventory Strategy</td>
<td>Minimise</td>
<td>Buffer inventory</td>
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<tr>
<td>Lead time strategy</td>
<td>Reduce- not at the expense of cost</td>
<td>Aggressively reduce</td>
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<tr>
<td>Supplier strategy</td>
<td>Cost and quality</td>
<td>Speed, flexibility, reliability, quality</td>
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Other Issues Affecting Strategic Fit

- Multiple products and customer segments
- Product life cycle
- Competitive change over time

Multiple Products and Customer Segments

- Firms often sells multiple products and serves customer segments with very different needs
- Different products and segments have different implied demand uncertainty
- Key issue for company is to create a supply chain that balances efficiency and responsiveness given its portfolio of products, customer segments and supply sources
- Several possible routes a company can take
  - One route – set up independent supply chains for each different product or customer segment
    - Feasible if each segment is large enough to support a dedicated supply chain
  - Preferable strategy is to tailor the supply chain to best meet the needs of each product’s demand
    - Tailoring the supply chain requires some links in the supply chain with some products, while having separate operations for other links – considering efficiency and responsiveness

Product Life Cycle

- As product go through their life cycle, the demand characteristics and the needs of the customer segments being served change
• As product mature, the corresponding supply chain strategy should, in general, move from being responsive to being efficient

**Competitive Change Over Time**

• Competitor can change the landscape of the market
  
  ➢ Growth of mass customisation – competitors flood the marketplace with product variety, customers are becoming accustomed to having their individual needs satisfied
  
  ➢ Competitive focus today is on producing sufficient variety at a reasonable price

• As competitive landscape changes, a firm is forced to alter its competitive strategy – result in change in supply chain strategy

**Fig 9: Changes in supply chain strategy over a product life cycle**
EXPANDING STRATEGIC SCOPE

- Scope of strategic fit refers to the function and stages that devices an integrated strategy with a shared objective

- One extreme - operation within a function devices independent strategy

- Other extreme - all functional areas within all stages of the supply chain device strategy jointly with a common objective

Intracompany intraoperation scope: minimises local cost view
- Strategic fit is considered in one operation within a functional area within a company
- Resulting collection of strategies will most likely not come close to maximising supply chain profit – conflicting local objectives
- Practices during 1950s and 1960s

Intracompany intrafunctional scope: minimise functional cost view
- Given that many operations together form each function within a firm, managers recognised the weakness of the intracompany intraoperation scope
- With the intracompany intrafunction scope, the strategic fit is expanded to include all operations within a function
- The scope of strategic fit expands to an entire function within a stage of the supply chain

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An example of intracompany intraoperation scope of supply chain strategy at a distributor
Intracompany interfunctional scope: maximise company profit view

- Different functions may have conflicting objectives
- Functional strategies are developed to support both each other and the competitive strategy

Intercompany interfunctional scope: maximise supply chain surplus view

- Intracompany interfunctional scope leads to each stage of the supply chain trying to maximise its own profits, which does not necessarily result in the maximisation of supply chain surplus
- When company uses speed as their primary competitive advantage to succeed in the marketplace, intracompany interfunctional strategy performs badly
  - The impediment to create level of speed that customers are demanding lies to a degree within their own boundaries
  - Managing these interfaces becomes a key to providing speed to customers
- Intercompany scope forces every stage of the supply chain to look across the supply chain and evaluate the impact of its action on other stages as well as on the interfaces
- This means treating stages in the supply chain that a company does not own as belonging to the company

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An example of intracompany interfunctional scope of supply chain strategic fit at a distributor

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The intercompany interfunctional scope of strategic fit

Agile intercompany interfunctional scope

- Till now the discussion was on strategic fit under static context – players in supply chain and customers do not change over time
- Dynamics exits – product life cycle get shorter and companies try to satisfy the changing needs of individual customers
- In such situations, a company may have to partner with many different firms depending on the product being produced and the customer being served – strategic fit should have agile intercompany scope