Unit I

SUPPLY CHAIN MANAGEMENT

Role of Logistics and Supply chain Management: Scope and Importance- Evolution of Supply Chain - Decision Phases in Supply Chain - Competitive and Supply chain Strategies – Drivers of Supply Chain Performance and Obstacles.

Role of Logistics and Supply chain Management

Supply Chain Management : <u>is Management of the flow of goods and services that fulfils a customer need</u>.

Supply Chain Management is the integration of all activities associated with the flow and transformation of goods from raw materials through to end user product's consumption.

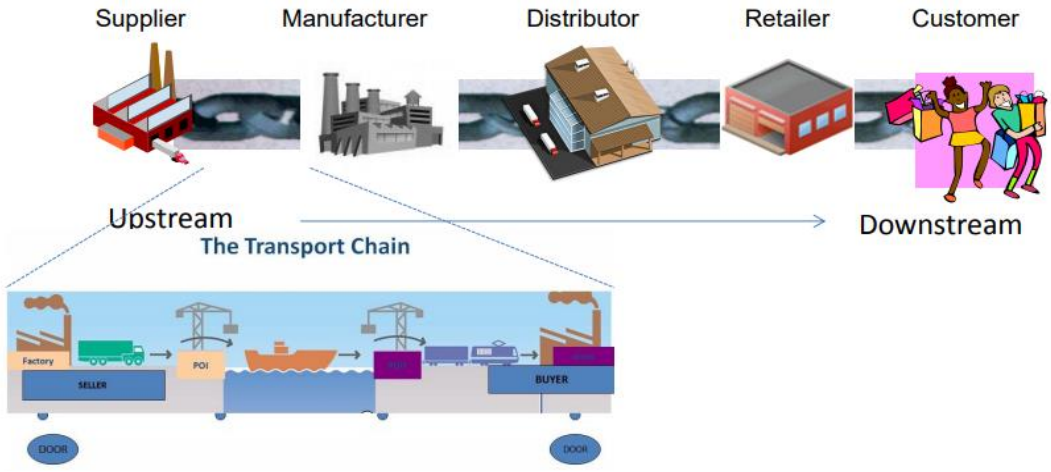


Fig 1.1 Supply Chain Management

Logistics: is the process of **integrating the movement and maintenance of goods in and out the organization**.

The resources managed in logistics can include

- physical items such as food, materials, animals, equipment, and liquids
- as well as abstract items, such as time and information.

The logistics of physical items usually involves the integration of information flow, material handling, production, packaging, inventory, transportation, and warehousing.

Difference between Logistics and supply chain management

Basis for Comparison	**Logistics Management**	**Supply Chain Management**
Meaning	The process of integrating the movement and maintenance of goods in and out the organization.	The coordination and management of the supply chain activities from raw material to end user.
Objective	Customer satisfaction	Competitive advantage
Evolution	Evolved earlier	Modern concept
No of organization involved	Single	Multiple
Technology	Transportation Management System (TRM), Warehouse Management System (WMS).	Customer Relationship management (CRM), Enterprise Resource Planning (ERP).

Stages of SCM: A typical supply chain may involve a variety of stages. The supply chain stages include

- Customers
- Retailers
- Wholesalers/distributors
- Manufacturers
- Component/raw material suppliers

Fig 1.2a Stages of SCM

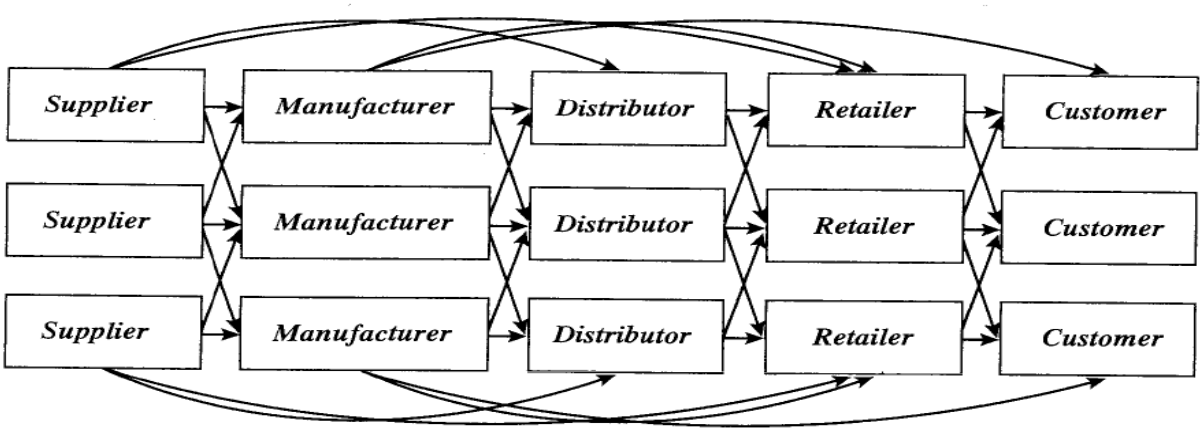


Fig 1.2 b Stages of SCM

Supply chain is basically concerned with movements of 3 Flows

- Product and Services (Product moves from supplier to Customer in forward direction)
- Cost (Flows in Backward direction from Customer to Supplier)
- Information (Flows in both the directions)

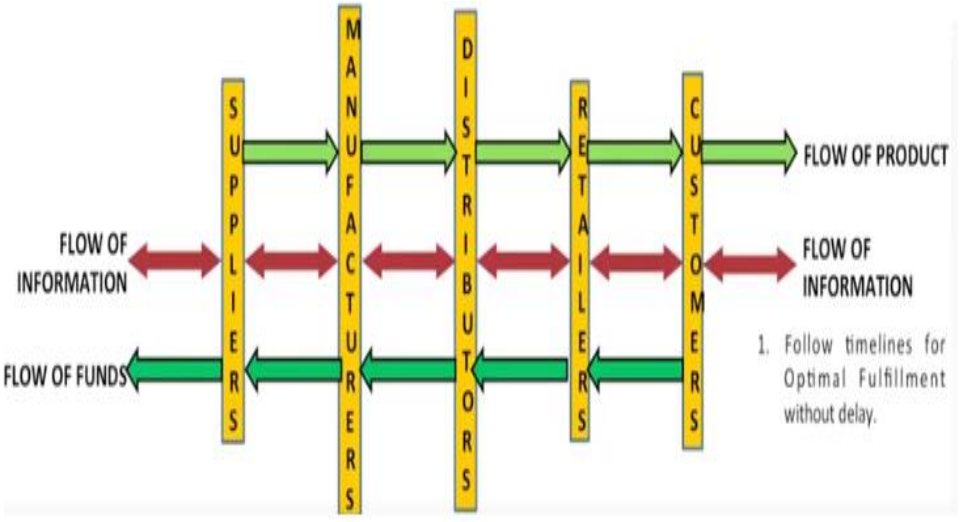


Fig 1.2c Flow of information in SCM

Scope and Importance

Scope: Monitoring and controlling the activities right from demand end (customer) to supply end (Suppliers).

Scope of SCM focuses on the following are areas

- **Minimizes Operating Cost :** Supply chain management focuses on reducing the overall operating cost of the organization. It aims at bringing efficiency and raising the profitability of organizations.
- **Boost Customer Service:** helps in providing better service to customers. Right product available to right cost provide better satisfaction to customers.
- **Enhance Financial Position**: Management of supply chain has an effective role on the financial position of business. It improves the efficiency of the organization, cut down the excessive cost and avoids any shortage. It ensures that optimum funds are always available which helps in improvingfinancial position.
- **Manages Distribution:** Distribution of products at the right time and the right location is a complex task for every organization. Supply chain managers ensure that all products get delivered at the right location within the time limit
- **Coordination Among Partners:** Proper coordination among all partners of business increase productivity and profitability. It develops a proper channel through which employees, supplier and customers can easily interact with business.
- **Inventory Management**: Maintaining an optimum inventory is a must for uninterrupted operation of every business. It keeps record of all inventories that is raw materials, spare parts and finished goods. Supply chain managers ensure that the proper amount of inventory is always maintained within the organization.
- **Supplier Management:** Supply chain management works on strengthening the relationships between business and suppliers. It tracks and records every interactions or transaction with the suppliers.

Objective of SCM:

- The objective of every supply chain is to maximize the **overall value generated**

- To monitor and relate production, distribution, and shipment of products and services.
- **To statisfy the customer requirements as efficient as possible.**

  - Low price
  - Variety of options
  - Good quality
  - Product availability - can provide customer satisfaction.

The overall Value generated by supply chain in represented as Surplus.

Supply Chain Surplus = Customer value – supply chain cost.

Importance: Supply Chain Management is a process of linking raw material transformation to the ultimate product to be consumed by the consumer. It contributes in adding value to it with support of various functions in making it.

Example:

- A Customer purchases a Kg of apple from big Bazaar for Rs 100.
- Farmer Supplies the apple 50 Rs per Kg.
- Therefor A supply chain Cost (including information + storage + transportation + manufacuring components etc+ Raw Meterial) = Rs (50 + 20)

The overall Value generated by supply chain in represented as Surplus.

Supply Chain Surplus = Customer value – supply chain cost.

= (Cost of apple Customer Buy) – (Former rate i.e Raw materials cost +Transportation Cost)

= 100 – (50+20) = 30 RS.

Evolution of Supply Chain

The History of Supply Chain Management can be studied under different eras.

Fig: Evolution of Supply Chain

Creation Era: The term "supply chain management" was first coined by Keith Oliver in 1982. But the concept of SCM was of great importance in the early 20th century.

The characteristics of this era of SCM include

- Assembly line Concept
- Up Scaling, (large-scale)
- Re-engineering,
- Down -Sizing for Cost Control.

Integration Era: This era of SCM was developed through 1990s by the introduction of enterprise resource planning (ERP) systems. This era has continued to develop into the 21st century with the expansion of Internet-based collaborative systems.

This era of supply chain evolution is characterized by

- Enterprise Resource Planning (ERP)
- Electronic Data Interchange (EDI)
- Cost reductions Techniques through integration.

Globalization Era: The third movement of SCM development, the globalization era.

This era can be characterized by

- The attention given to global systems of supplier relationships. (Expansion of supply chains beyond national boundaries and into other continents)
- Value addition
- Cost reduction

Specialization Era 1: This specialization model creates manufacturing and distribution networks composed of several individual supply chain specific to producer to end consumer. SCM works as a service.

This era can be characterized by

- Focus Core Competence
- Non Core Entities – Contract Manufacturing

Specialization Era 2: This specialization model creates many functions. Transportation Management, Storage and Inventory Management, Planning Development Management, Performance Management.

This era can be characterized by

- Logistics Services
- Warehouse Services

SCM 2.0: SCM 2.0 is a trend in the use of the WWW, that means to increase creativity, information sharing and collaboration among users (End Users). SCM 2.0 designed to rapidly deliver results with the quickly manage the future change for continuous flexibility, value and success.

This era can be characterized by

- Multi Suppliers – Customers

- Automated business transactions. Ex: Flipcart, Amazon
- Global Competitiveness

Decision Phases in a Supply Chain

Successful supply chain management has **3 main categories** depending on the frequency of each decision and the time frame over which a decision has an impact.

1. **Supply chain strategy or design** (Long term Planning)
2. **Supply chain planning (**Mid Term Planning**)**
3. **Supply chain operation (**Short Term Planning and Control)

1. **Supply chain strategy or design:** Decides how to structure the supply chain over the next several years. It decides what the chain's configuration will be, how resources will be allocated, and what processes each stage will perform.

Decisions include

- Location and capacities of production and warehousing facilities
- The method of transportation to be made available along different shipping legs
- The type of information system to be utilized.

2. **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
- 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 optimize performance. Companies define a set of operating policies that govern short-term operations

3. **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
- Place replenishment order.
- Achieve the reduction in uncertainty and optimize 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 are **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 (Customer – Retailer)
- Replenishment cycle (Retailer – Distributor)
- Manufacturing cycle (Distributor – Manufacture)
- Procurement cycle (Manufacture – Supplier)

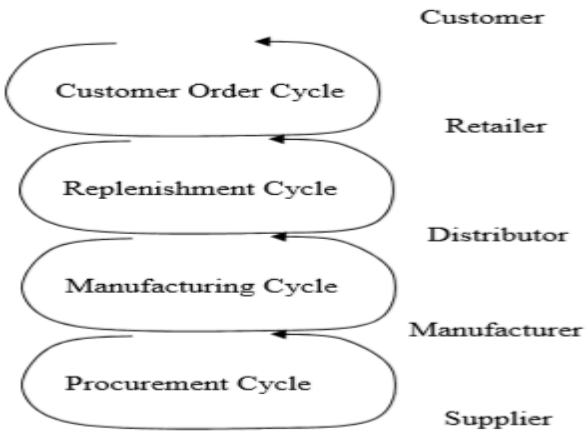


Fig 1.3 SCM Process Cycle

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.

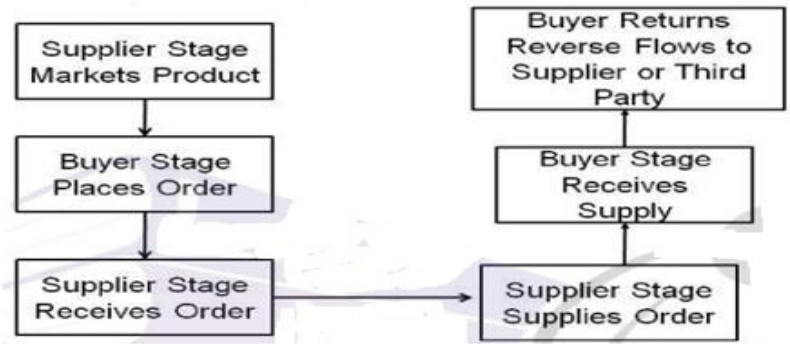


Fig 1.4 Subprocess in Supply chain process cycle

Push/Pull View: Push/Pull strategies is based on the end customer demand.

Push View: Push strategies are implemented based on the assumption that **demand is predictable**. As a result of that predictability, product could be manufactured and moved up the supply chain in preparation for the predicted demand.

Pull View: In case of push process, a process demand is not known. Pull strategies are focused on keeping stocks low and reacting quickly to demand fluctuations.

Pull process is reactive process, Push process is speculative process. Push/pull boundary in a supply chain separates push process from pull process. It is 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.

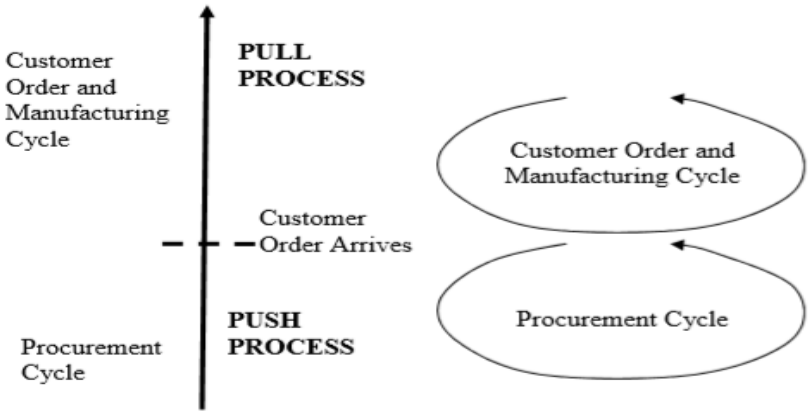


Fig 1.5 Push/Pull Processes of Dell Supply Chain

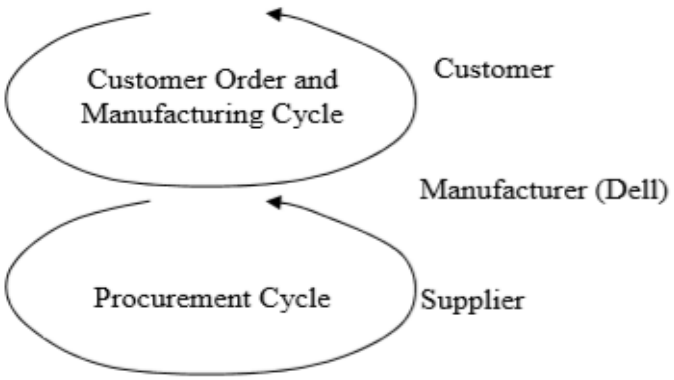


Fig 1.6 Dell Supply Chain

Which Strategy to Select ?

Classification of the supply chain macro processes in a firm

All supply chain processes can be classified into three macro processes based on whether they are at the customer or supplier interface or are internal to the firm.

1. Customer Relationship Management (CRM): All processes that focus on the interface between the firm and its customers. Its work to generate, receive, and track customer orders.

2. Internal supply chain management (ISCM): All processes that are internal to the firm. Its work to plan for and fulfill customer.

3. Supplier Relationship Management (SRM): All processes that focus on the interface between the firm and its suppliers. It works to evaluate and select suppliers and then source goods and services from them.

Competitive 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. It is defined based on how customer prioritizes 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 based on

- High availability of a variety of reasonable quality products at low prices. Eg: Wal-Mart.
- Better customer convenience, availability and responsiveness. Eg: McMaster Carr sells maintenance, repair and operations (MRO) products - over 400,000 items through catalog and web site.
- Better customization, 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 traditionally strategy like

- Supplier strategy: Supplier development is a business strategy that involves working with your diverse suppliers to boost their performance and drive continued business growth.
- Operations strategy: A plan specifying how an organization will allocate resources in order to support infrastructure and production.
- Logistics strategy: A logistics strategy is the means of finding the most efficient manner of distributing goods and maintaining a high level of service

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.

Basic steps to achieve strategic fit

1. Understanding the customer, and supply chain uncertainty

2. Understanding the supply chain capabilities

3. Achieving strategic fit

Drivers of Supply Chain Performance and Obstacles

The six drivers determine the supply chain performance in terms of responsiveness and efficiency and also whether strategic fit is achieved along the supply chain.

1. Facilities: are the actual physical locations in the supply chain network where product is stored, assembled, or fabricated. The two major types of facilities are production sites and storage sites. Decisions regarding location, capacity and flexibilities of facility have a significant impact on SC performance.

2. Inventory: It consists of all raw material, work in process, and finished goods within a supply chain. Changes in inventory policies can dramatically alter the efficiency and responsiveness of a SC

3.Transportation: It involves moving inventory from one point in the supply chain to another point. combinations of transportation modes and routes can affect the performance of SC.

4. Information: It consists of data and results of analysis regarding inventory, transportation, facilities, customer orders, customers, and funds. Potentially the biggest driver of supply chain performance. This driver allows the management with the better opportunity to make the SC more responsive and efficient

5. Sourcing: Distinguish the functions a firm performs and functions that are outsourced

6. Pricing: Price associated with goods and services provided by a firm to the supply chain

A Framework for Structuring Drivers

The combined impact of these drivers determines responsiveness and efficiency of the entire Supply Chain. SC strategy determines how the supply chain should perform with respect to efficiency and responsiveness. SC then use the supply chain drivers to reach the performance level the SC strategy dictates.

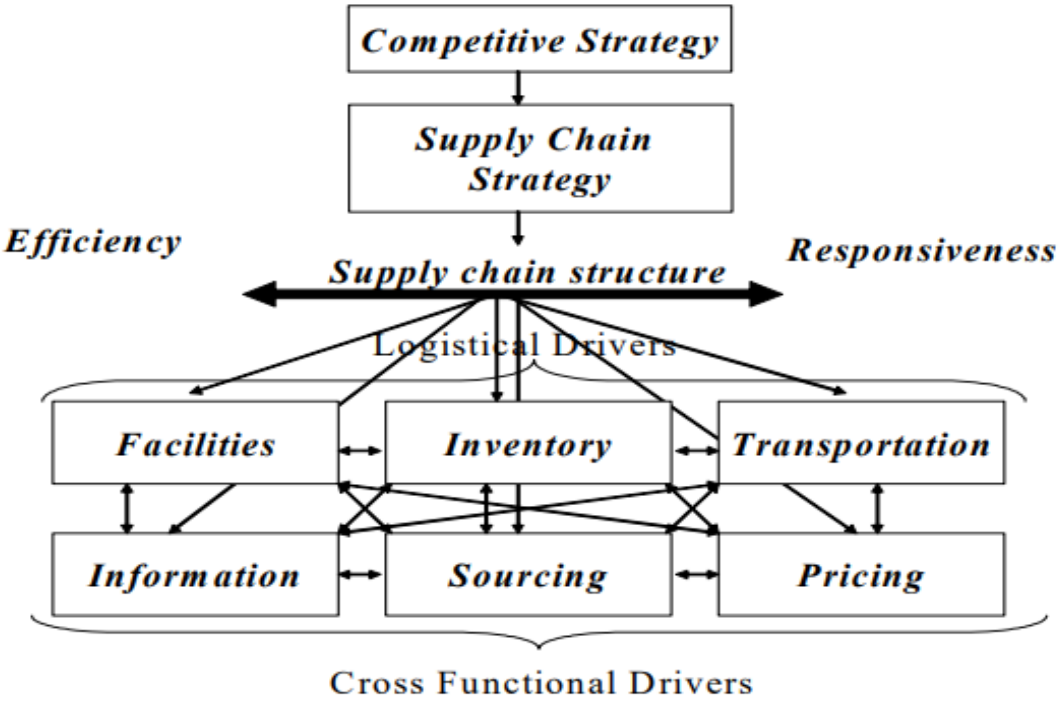


Fig 1.7 Supply Chain Decision Making Framework

1. Facilities: Within a facility, inventory is either transformed into another state or stored.

Role in the competitive strategy

- economies of scale (efficiency priority)
- larger number of smaller facilities (responsiveness priority)

Components of facilities decisions

- Location: centralization (efficiency) vs. decentralization (responsiveness). other factors to consider (e.g., availability of quality workers, infrastructure, proximity to customers)
- Capacity (flexibility versus efficiency)
- Manufacturing methodology (product focused versus process focused)
- Warehousing methodology (SKU storage, job lot storage, cross-docking)
- Overall trade-off: Responsiveness versus efficiency

2. Inventory

Inventory Role in the Supply Chain: Inventory is maintained in the supply chain because of mismatches between supply and demand.

I = RT (Little's Law)

where I = inventory; R = throughput; T = flow time.

Material flow time: time elapsed between when material enters the supply chain to when it exits the supply chain

Throughput: rate at which sales to end consumers occur

Inventory Role in Competitive Strategy: If responsiveness is a strategic competitive priority, a firm can locate larger amounts of inventory closer to customers. If cost is more important, inventory can be reduced to make the firm more efficient.

Components of Inventory Decisions: different types of inventory are **Cycle inventory:** This results due to producing or buying larger lots to minimize acquisition costs related to processing each purchase order or production order.

Safety Inventory: It is held to counter against uncertainty or variability of demand.

Seasonal Inventory: It is inventory maintained to satisfy higher demands in a period compared to production capacity. It arises due to the decision to service predicted variability in demand through extra production during slack period or low demand periods.

Inventory Overall trade-off:

Increasing inventory gives higher responsiveness but results in higher inventory carrying cost. less inventory: lower cost but lower responsiveness

3. Transportation

Transportation: Role in the Supply Chain: Moves the product between stages in the supply chain. Impact on responsiveness and efficiency. Faster transportation allows greater responsiveness but lower efficiency. Also affects inventory and facilities Transportation.

Transportation Role in the Competitive Strategy: If responsiveness is a strategic competitive priority, then faster transportation modes can provide greater responsiveness to customers who are willing to pay for it. Can also use slower transportation modes for customers whose priority is price (cost)

Transportation Components of Transportation Decisions:
Mode of transportation are

- air, truck, rail, ship, pipeline, electronic transportation
- vary in cost, speed, size of shipment, flexibility

Route and network selection

- Route: Route is a specific selection of facilities or destinations through which goods move
- Network: Network is a set of facilities or destinations which can be used for transportation of goods

In-house or outsource Transport

Transportation Overall trade-off: Using fast modes of transport raises responsiveness and transportation cost but lowers the inventory holding cost.

4. Information

Information Role in the Supply Chain: Information is the connection between various stages in a supply chain and allows them to coordinate actions and increase the maximum supply chain profitability. It is also essential in daily operations. The stocks available in warehouses must have visibility so that when a customer wants an item, it can be delivered to him.

Information Role in the Competitive Strategy: Allows supply chain to become more efficient and more responsive at the same time (reduces the need for a trade-off).

Example: The Home Depot stores - Andersen Windows: called "Window of Knowledge," allows distributors and customers to design windows to custom-fit their needs. Users can select from a library of over 50,000 components that can be combined in any number of ways. The system immediately gives the customer price quotes and automatically sends the order to the factory if the customer decides to buy.

Example: Del: Dell takes orders directly from consumers over the phone and via the Internet. Building this direct channel required an investment because of the added functions Dell must perform. A large part of that cost can be attributed to information. With the direct channel model, however, Dell is able to view the actual consumer demand much sooner than most PC manufacturers.

Components of Information Decisions: The key components are

- Push (MRP) versus pull (demand information transmitted quickly throughout the supply chain.

- Coordination and information sharing.
- Forecasting and aggregate planning
- Enabling technologies
    - Electronic data interchange (EDI)
    - Internet communication
    - Enterprise resource planning (ERP) systems
    - Supply Chain Management software

Information Overall trade-off: Accurate information can help a firm improve efficiency by decreasing inventory and transportation costs. Accurate information can improve responsiveness by helping a supply chain better match supply and demand.

5. Sourcing

Sourcing Role in the Supply Chain: Set of business processes required to purchase goods and services in a supply chain. Supplier selection, single vs. multiple suppliers, contract negotiation.

Sourcing Role in the Competitive Strategy: Sourcing decisions are crucial because they affect the level of efficiency and responsiveness in a supply chain. In-house vs. outsource decisions improve efficiency and responsiveness.

Components of Sourcing Decisions:

In-house versus outsource decisions: The most significant sourcing decision for a firm is whether to perform a task in-house or outsource it to a third party.

Supplier evaluation and selection: Managers must decide on the number of suppliers they will have for a particular activity.

Procurement process: Procurement is the process in which the supplier sends product in response to customer orders. Managers must decide on the structure of procurement of direct as well as indirect materials, and strategic as well as general materials.

Overall trade-off: Increase the supply chain profits

6. Pricing

Pricing Role in the Supply Chain: Pricing determines the amount to charge customers in a supply chain. Pricing strategies can be used to match demand and supply Pricing.

Role in the Competitive Strategy: Firms can utilize optimal pricing strategies to improve efficiency and responsiveness. Low price and low product availability. vary prices by response times.

Components of Pricing Decisions:

- **Pricing and economies of scale:** commonly used approach is to offer quantity discounts.
- **Everyday low pricing versus high-low pricing:** Everyday low pricing is Charges a continuously low price for a product over a long-time horizon. On the other hand, keeping prices steady over time then lower the price. Most supermarkets practice high-low pricing and offer steep discounts on a subset of their product every week.
- **Fixed price versus menu pricing:** A firm must decide whether it will charge a fixed price for its supply chain activities or have a menu with prices that vary with some other attribute, such as the response time or location of delivery.

Overall trade-off: Increase the firm profits

Obstacles to Achieving Strategic Fit

A company's ability to find a balance between responsiveness and efficiency that best meet the needs of the targeted customer is the key to achieving strategic fit. Companies face many obstacles in deciding where this balance is to be located on the responsiveness spectrum.

Obstacles:

- **Increasing variety of products:** In the era of mass customization production variety is increasing.

- **Decreasing product life cycles:** This makes the job of achieving strategic fit more difficult as supply chain must constantly adapt to manufacture and deliver new product in addition to coping with these product's demand uncertainty.

- **Increasingly demanding customers:** Today's customers are demanding faster fulfillment, better quality and better performing products for the same price they paid years ago means that the supply chain must provide more just to maintain its business

- **Fragmentation of supply chain ownership:** Now-a-days most firms have become less vertically integrated. More members in supply chain for providing goods. Many owners with its own policies and interests, the chain (network) more complicated to coordinate

- **Globalization:** Supply chains are more global. Global supply chains create many benefits such as ability to source from a global base of suppliers who may offer better or cheaper goods than were available in a company's home nation. Suppliers are apart making coordination is much more difficult.

- **Difficulty executing new strategies:** Creating successful strategy is not easy. Skillful execution of strategy is as important as creating successful strategies. Many companies understand Toyota Production System now, but still find it difficult to implement and operate.

Additional Topics for Unit 1:

Question:WALMART has been able to achieve respectable leadership in retail industry because of its focus on supply chain management. Draw the stages in Supply Chain Management adopted by WALMART and explain. Also draw the stages in Supply Chain Management adopted by Dell and Ford and state which model is best and justify your answer.

Walmart began with the goal to provide customers with the goods they wanted, whenever and wherever they wanted them. The company then focused on developing cost structures that allowed it to offer everyday low pricing. In the 1980s, Walmart began working directly with manufacturers to cut costs and more efficiently manage the supply chain.

Cross-docking is a logistics practice that is the centrepiece of Walmart's strategy to replenish inventory efficiently. It means the direct transfer of products from inbound or outbound truck trailers without the need for extra storage, by unloading items from an incoming semi-trailer truck or railroad car and loading these materials directly into outbound trucks, trailers, or rail cars (and vice versa), with no storage in between.

Suppliers have been delivering products to Walmart's distribution centers where the product is cross-docked and then delivered to Walmart stores. Cross-docking keeps inventory and transportation costs down, reduces transportation time, and eliminates inefficiencies.

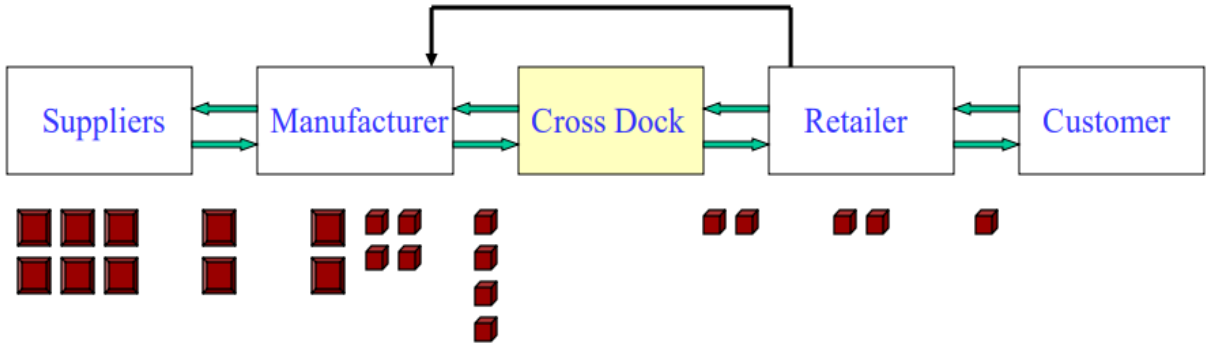


Fig: WALMART Supply Chain Stages

Dell Computer & Ford Supply Chain

Dell follows Direct Distribution Model of SCM that sells PCs directly to the consumers.

Ford is considering Dell's model as an example to reach high levels of productivity and low cost. It follows Supplier – manufacturer – dealers - customers.

Justification: Dell model of selling directly without retail stores always less expensive than a supply chain with retail stores like Ford.

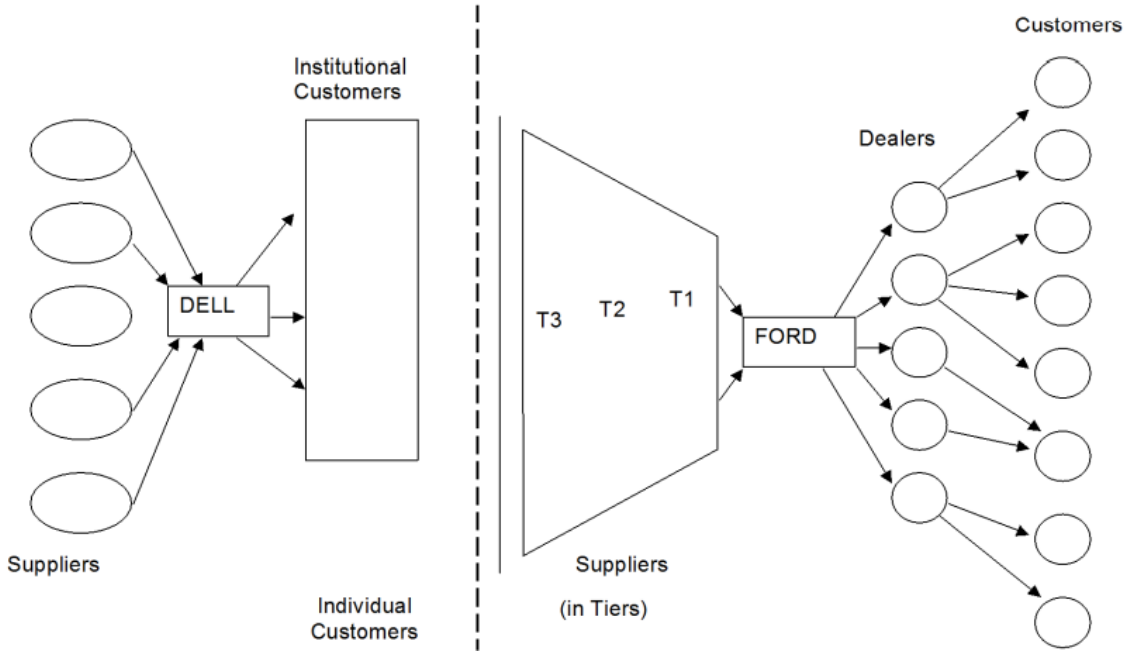


Fig: Dell Computer & Ford Supply Chain stages

Question: Consider the supply chain involved when a customer purchases a book at a bookstore. Identify the cycles in this supply chain and the location of the push/pull boundary. (15M) BTL3

When a customer purchases a book from the bookstore, a complete supply chain cycle which involves procurement, manufacturing, distribution, replenishment and customer delivery takes place.

The different supply chain cycles are quite separated in this case because each cycle occurs at the interface between two successive stages of the supply chain. The five supply chain stages reflect the work and involvement of five individual parties however the bookstore accounts for only the retailer stage because it serves no other functions within the supply chain. Pull processes mean a process is initiated in response to a customer order. Push processes, on the other hand, mean process is initiated in anticipation of customer orders.

The push/pull boundary in any supply chain separates push processes from pull processes. The push/pull boundary for the bookstore occurs between the customer order cycle and the procurement, manufacturing, and replenishment cycles. The customer order cycle is a pull process because all processes the customer order cycle are executed only after the customer

arrives. The remaining processes all take place prior to the customer arriving so that all products are already in inventory built up in anticipation of customer orders.

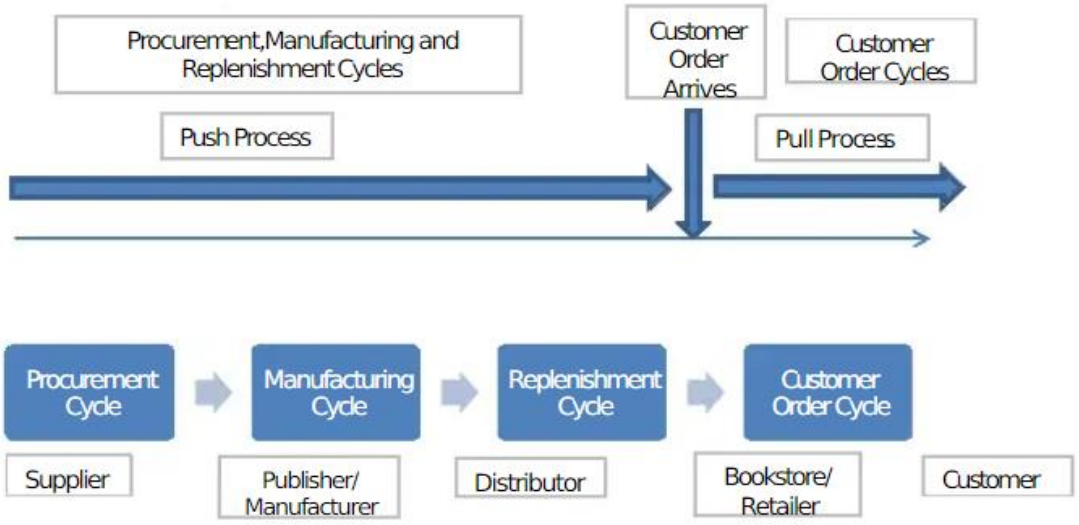
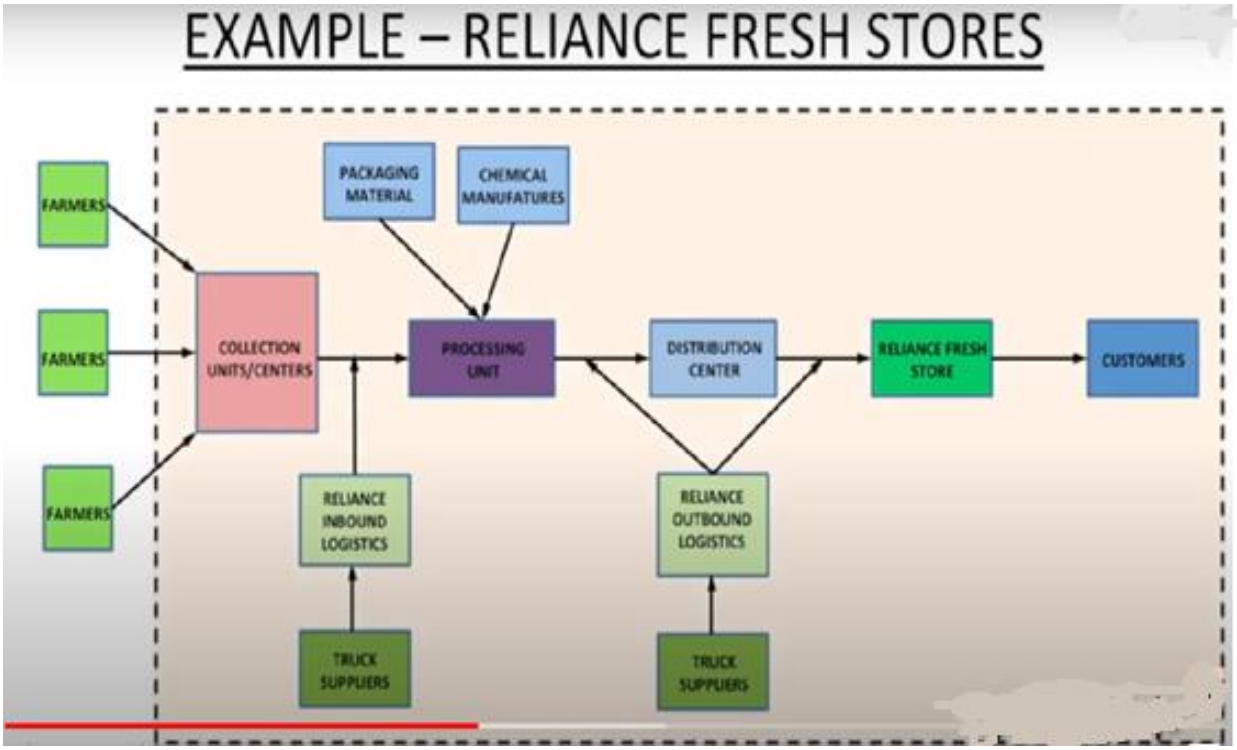
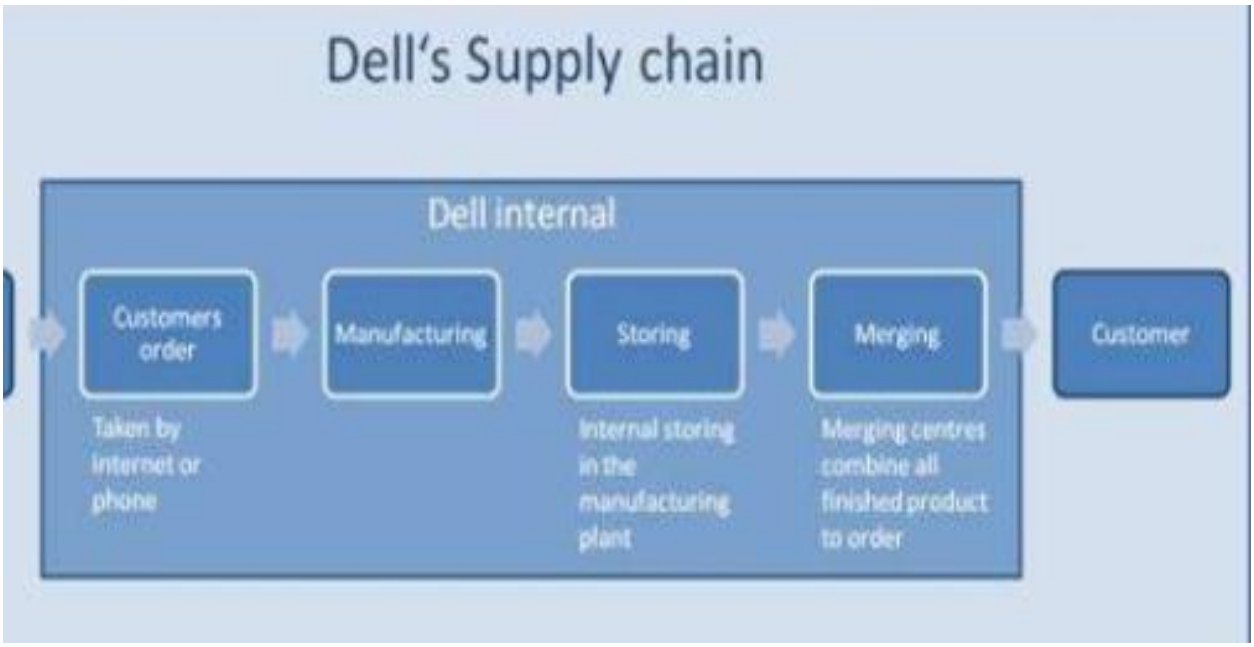


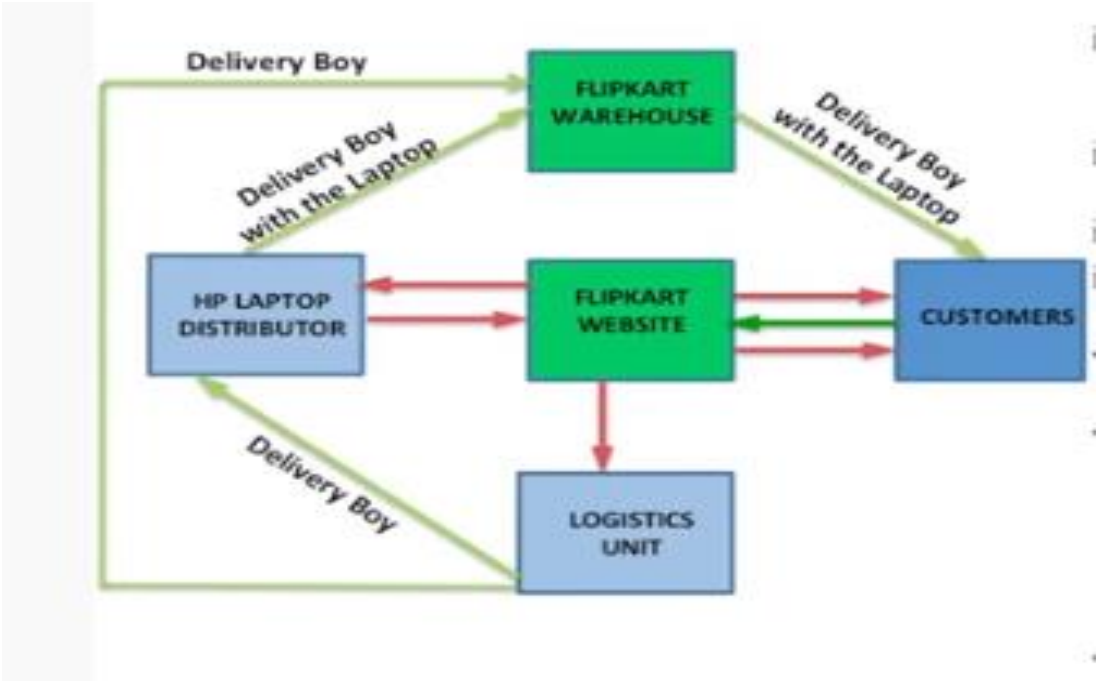
Fig: Supply chain for purchasing a book at bookstore and Push and Pull Boundary

Supply chain Models of Varoius Firm

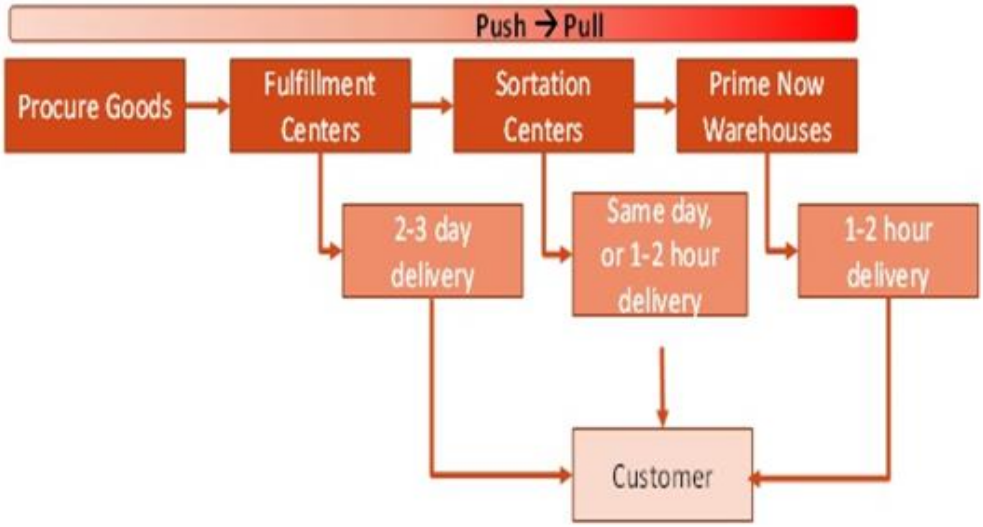


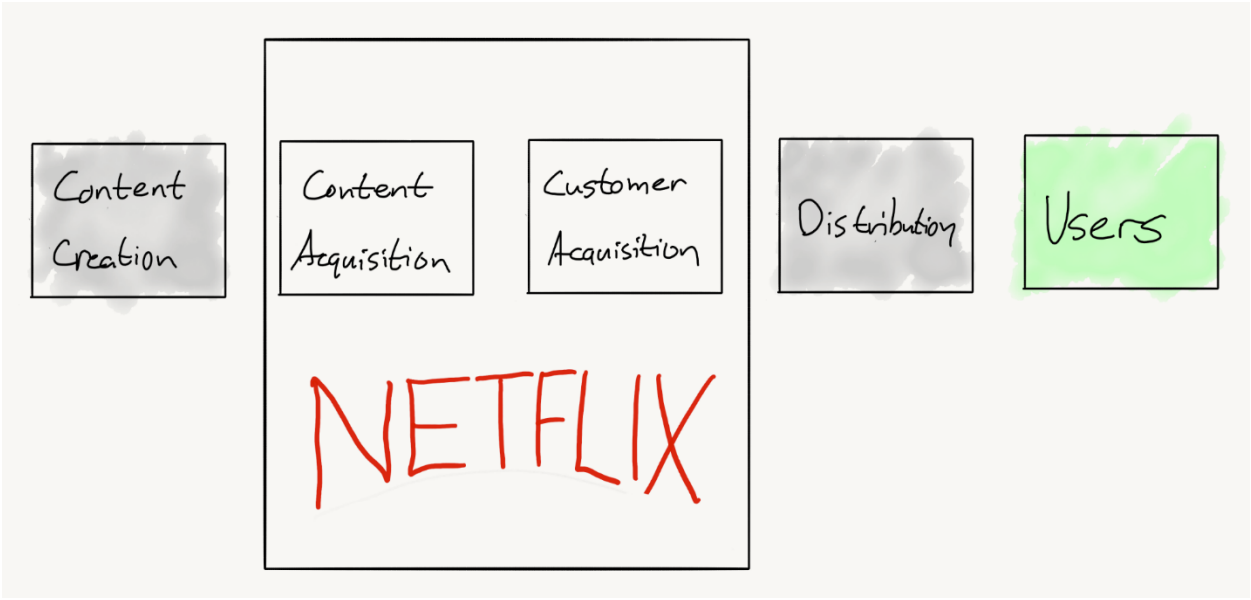


HP Supply Chain



Amazon


Push → Pull
Procure Goods
Fulfillment Centers
Sortation Centers
Prime Now Warehouses
2-3 day delivery
Same day, or 1-2 hour delivery
1-2 hour delivery
Customer


Content Creation
Content Acquisition
Customer Acquisition
Distribution
Users
NETFLIX