

Supply chain Management

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Lecture 4

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تسعى لتكون الكيان الأول الذي يتبنى مبدأ المجتمع التعليمي
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PMG 660

Designing Distribution Network



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Learning Objectives

After reading this chapter, you will be able to

- 1. Identify the key factors to be considered when designing a distribution network.**
- 2. Discuss the strengths and weaknesses of various distribution options.**
- 3. Understand how e-business has affected the design of distribution networks in different industries.**



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The role of distribution in the supply chain

Distribution refers to the steps taken to move and store a product from the supplier stage to a customer stage in the supply chain.

Distribution occurs between every pair of stages in the supply chain.

Raw materials and components are moved from suppliers to manufacturers, whereas finished products are moved from the manufacturer to the end consumer.

The role of distribution in the supply chain

The process of designing a distribution network has two broad phases.

- **In the first phase, the broad structure of the supply chain network is visualized. This phase decides the number of stages in the supply chain and the role of each stage.**
- **The second phase then takes the broad structure and converts it into specific locations and their capability, capacity, and demand allocation.**

FACTORS INFLUENCING DISTRIBUTION NETWORK DESIGN

At the highest level, performance of a distribution network should be evaluated along two dimensions:

- 1. Customer needs that are met**
- 2. Cost of meeting customer needs.**

Thus, a firm must evaluate the impact on customer service and cost as it compares different distribution network options. The customer needs that are met influence the company's revenues, which along with cost decide the profitability of the delivery network.

Factors influencing network design decisions

These includes:

- Response time
- Product variety
- Product availability
- Customer experience
- Time to market
- Order visibility
- Returnability

Continue:

- **Response time** is the amount of time it takes for a customer to receive an order.
- **Product variety** is the number of different products or configurations that are offered by the distribution network.
- **Product availability** is the probability of having a product in stock when a customer order arrives.
- **Customer experience** includes the ease with which customers can place and receive orders and the extent to which this experience is customized.

Continue:

- **Time to market** is the time it takes to bring a new product to the market.
- **Order visibility** is the ability of customers to track their orders from placement to delivery.
- **Returnability** is the ease with which a customer can return unsatisfactory merchandise and the ability of the network to handle such returns

Macroeconomic factors

- include taxes, tariffs, exchange rates, and other economic factors that are not internal to an individual firm.
- As global trade has increased, macroeconomic factors have had a significant influence on the success or failure of supply chain networks.

Thus, it is imperative that firms take these factors into account when making network design decisions.

Political factors

- **The political stability of the country under consideration plays a significant role in location choice.**
- **Companies prefer to locate facilities in politically stable countries where the rules of commerce and ownership are well defined.**
- **Countries with independent and clear legal systems allow firms to feel that they have recourse in the courts should they need it.**

Discuss the strengths and weaknesses of various distribution options

Managers must make two key decisions when designing a distribution network:

- 1. Will product be delivered to the customer location or picked up from a prearranged site?**
- 2. Will product flow through an intermediary (or intermediate location)?**

Based on the firm's industry and the answers to these two questions, one of six distinct distribution network designs may be used to move products from factory to customer.

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These designs are classified as follows:

- 1.Manufacturer storage with direct shipping**
- 2.Manufacturer storage with direct shipping and in-transit merge**
- 3.Distributor storage with carrier delivery**
- 4.Distributor storage with last-mile delivery**
- 5.Manufacturer/distributor storage with customer pickup**
- 6.Retail storage with customer pickup**

1- Manufacturer Storage with Direct Shipping

In this option, product is shipped directly from the manufacturer to the end customer, bypassing the retailer (who takes the order and initiates the delivery request).

This option is also referred to as drop-shipping. The retailer carries no inventory. Information flows from the customer, via the retailer, to the manufacturer, and product is shipped directly from the manufacturer to customers.

1- Manufacturer Storage with Direct Shipping

- The biggest advantage of drop-shipping is the ability to centralize inventories at the manufacturer, which can aggregate demand across all retailers that it supplies. As a result, the supply chain is able to provide a high level of product availability with lower levels of inventory.
- Benefit of aggregation is achieved only if the manufacturer can allocate at least a portion of the available inventory across retailers on an as-needed basis. The benefits from centralization are highest for high-value, low-demand items with unpredictable demand.

1- Manufacturer Storage with Direct Shipping



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- Drop-shipping also offers the manufacturer the opportunity to postpone customization until after a customer has placed an order.
- Drop-shipping provides a good customer experience in the form of delivery to the customer location. The experience, however, suffers when a single order containing products from several manufacturers is delivered in partial shipments.

1- Manufacturer Storage with Direct Shipping



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- Response times tend to be long when drop-shipping is used because the order must be transmitted from the retailer to the manufacturer and shipping distances are generally longer from the manufacturer's centralized site.
- Another issue is that the response time need not be identical for every manufacturer that is part of a customer order. Given an order containing products from several sources, the customer will receive multiple partial shipments over time, making receiving more complicated for the customer.

1- Manufacturer Storage with Direct Shipping

A manufacturer storage network is likely to have difficulty handling returns, hurting customer satisfaction.

- The handling of returns is more expensive under drop-shipping because each order may involve shipments from more than one manufacturer. **Returns can be handled in two ways:**
- One is for the customer to return the product directly to the manufacturer.
- The second approach is for the retailer to set up a separate facility (across all manufacturers) to handle returns. The first approach incurs high transportation and coordination costs, whereas the second approach requires investment in a facility to handle returns

2- Manufacturer storage with direct shipping and in-transit merge

- under which each product in the order is sent directly from its manufacturer to the end customer,
- in-transit merge combines pieces of the order coming from different locations so the customer gets a single delivery.
- As with drop-shipping, the ability to aggregate inventories and postpone product customization is a significant advantage of in-transit merge.
- The main advantages of in-transit merge over drop-shipping are lower transportation cost and improved customer experience.

Customer experience is likely to be better than with drop-shipping, because the customer receives only one delivery for an order instead of many partial shipments

3- Distributor storage with carrier delivery

Under this option, inventory is held not by manufacturers at the factories, but by distributors/ retailers in intermediate warehouses, and package carriers are used to transport products from the intermediate location to the final customer.

Amazon and industrial distributors such as McMaster-Carr have used this approach combined with drop-shipping from a manufacturer (or distributor)

3- Distributor storage with carrier delivery

- **Transportation costs** are somewhat lower for distributor storage because an economic mode of transportation (e.g., truckloads) can be employed for inbound shipments to the warehouse, which is closer to the customer.
- **facility costs** (of warehousing) are somewhat higher with distributor storage because of a loss of aggregation.
- **Processing and handling** costs are comparable to those of manufacturer storage unless the factory is able to ship to the end customer directly from the production line. In that case, distributor storage has higher processing costs.
- From a facility cost perspective, distributor storage is not appropriate for extremely slow-moving items

3- Distributor storage with carrier delivery



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- **Response time** under distributor storage is better because distributor warehouses are, on average, closer to customers
- **Customer convenience** is high with distributor storage because a single shipment reaches the customer in response to an order.
- **Time to market** under distributor storage is somewhat higher because of the need to stock another stage in the supply chain.

- **Returnability** is better than it is with manufacturer storage because all returns can be processed at the warehouse itself.
- **Order visibility** becomes easier than with manufacturer storage because there is a single shipment from the warehouse to the customer and only one stage of the supply chain is directly involved in filling the customer order

4. Distributor storage with last-mile delivery

Last-mile delivery refers to the distributor/retailer delivering the product to the customer's home instead of using a package carrier.

- **Amazon Fresh have used last-mile delivery in the grocery industry.**
- **The automotive spare parts industry is one in which distributor storage with last-mile delivery is the dominant model.**
- **Product variety is generally lower than for distributor storage with carrier delivery.**
- **The cost of providing product availability is higher than for every option other than retail stores**

4. Distributor storage with last-mile delivery



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- Distributor storage with last-mile delivery requires higher levels of inventory than the other options (except for retail stores) because it has a lower level of aggregation.
- The customer experience can be very good using this option
- Last-mile delivery may be somewhat less expensive in large,
- Facility and processing costs are very high using this option, given the large number of facilities required.
- Response times are faster than using package carriers

5. Manufacturer/distributor storage with customer pickup

In this approach, inventory is stored at the manufacturer or distributor warehouse but customers place their orders online or on the phone and then travel to designated pickup points to collect their merchandise.

- **Inventory costs** using this approach can be kept low, with either manufacturer or distributor storage to exploit aggregation.
- **Transportation cost** is lower than for any solution using package carriers because significant aggregation is possible when delivering orders to a pickup site.
- **Facility costs** are high if new pickup sites have to be built. A solution using existing sites can lower the additional facility costs

6. Retail storage with customer pickup

In this option, often viewed as the most traditional type of supply chain, inventory is stored locally at retail stores.

Customers walk into the retail store or place an order online or by phone and pick it up at the retail store.

- **Local storage increases inventory costs because of the lack of aggregation.**
- **Transportation cost is much lower than with other solutions because inexpensive modes of transport can be used to replenish product at the retail store.**
- **Product variety stored locally is lower than under other options**

E-BUSINESS AND THE DISTRIBUTION NETWORK

- In this section we see how the advent of e-business in the late 1990s affected the structure and performance of various distribution networks.
- The goal is to understand what drove the successful introduction of e-business in some networks and not others, and how these networks should evolve. Similar to our consideration with distribution networks, we build a scorecard based on how e-business affects a supply chain's ability to meet customer needs and the cost of meeting those needs.

IMPACT OF E-BUSINESS ON CUSTOMER SERVICE

- **Response Time to Customers** :When selling physical products that cannot be downloaded, customer requests take longer to fulfill through online sales than in a retail store because of the shipping time involved.
- **Product Variety** :A company e-business finds it easier to offer a larger selection of products than a bricks-and-mortar store. For example, Walmart.com offers a much larger selection of products than Walmart stores do.

IMPACT OF E-BUSINESS ON CUSTOMER SERVICE



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- **Customer Experience** :Online sales affect customer experience in terms of access, customization, and convenience. the Internet allows a customer to place an order at any convenient time
- **Faster Time to Market**: A firm can introduce a new product much more quickly online as compared with doing so via physical channels.

IMPACT OF E-BUSINESS ON CUSTOMER SERVICE

- **Product Availability:** By aggregating its inventory, a company selling online improves product availability.
- **Better information** on customer preferences also allows firms selling online to improve availability.
- **Order Visibility** :The Internet makes it possible to provide visibility of order status.
- **Return ability** : is harder with online orders,

IMPACT OF E-BUSINESS ON COST

- **Inventory Costs:** Compared with a supermarket chain, an online grocer has lower inventories by aggregating the inventory in a few large replenishment centers.
- **Facility Costs:** online sales allow it to lower facility costs because it needs only warehouse facilities and can save on the cost of retail outlets such as supermarkets.
- **Transportation:** An online grocer such as Peapod has significantly higher transportation costs than a supermarket.
- **Information Costs :** again, the IT infrastructure required for online sales increases costs.

Reference

Supply chain management

Strategy, Planning, and Operation

By: Sunil Chopra,

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