

HOW TO DISTRIBUTE PRODUCTS? ON AN OPTIMAL AND SUSTAINABLE DISTRIBUTION STRATEGY

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Distribution within the framework of logistics processes encompasses a series of operations and procedures that enable the delivery of goods from the creation and manufacturing phase all the way to the end usage by the consumer. These processes include activities such as transportation, warehousing, inventory management, location analysis, and information processing. The central purpose of distribution logistics is to ensure that products arrive at the consumers flawlessly and efficiently. Here, transportation plays the role of transferring goods, meaning that the decision on the mode of transportation is an important segment of setting an appropriate distribution strategy. In addition, choices are influenced by factors such as the characteristics and type of goods, competitive factors, demands for the complexity of the distribution channels themselves, and the like. The main decisions thus include the length of the distribution channels, the use of direct or indirect forms of distribution, types and varieties of channels for offering and distributing goods to end consumers, and the extent of outsourcing. The key objectives of establishing distribution channels include ensuring the correct presence of products on the market, increasing sales opportunities with positioning strategies and promotions, and effective participation in determining influences on the operational distribution activities.

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1 What is distribution? Which parts of business does it cover?

Logistics—and distribution as a part of it—are two processes in supply chains. Several groups of actors can be identified based on the different stages of goods movement along the chain:

- Suppliers supply the chain with raw materials, components, semi-finished products, finished products, and other components and materials.
- Manufacturers are engaged in product development and production. In some cases, raw materials such as wood and coal move directly into the chain.
- Intermediaries:
 - Wholesale distributors are intermediaries between manufacturers and other intermediaries, providing products from the source.
 - Brokers facilitate buying and selling between suppliers and buyers, without taking ownership of inventory.
 - Retailers sell goods to end consumers or businesses.
- End consumers can be either business or individual consumers.

The way supply chain elements are combined leads to different distribution channels. The nature of demand, production processes, and the influence of the main channel determine both the scope and the number of channel members. According to Kajba et al. (2023), and in line with the concept of constant factors in supply chain systems—namely products, services, processes, and systems—each element within the supply chain is both influenced by and interdependent with others, leading to complex and interconnected relationships. This integration enables the optimization of material, information, and financial flows, but it also increases the complexity of management. As individual processes and systems continuously adapt to changes in supply demand, businesses must remain flexible and continuously monitor efficiency in order to maintain a competitive advantage and ensure smooth distribution flow.

In logistics, distribution refers to processes and activities that direct the flow of goods from their development and production to the end consumer. These activities include transportation, warehousing, inventory management, location analysis, and

information processing. The main goal of distribution logistics is to ensure the efficient and smooth delivery of finished products to consumers.

It is important to distinguish between a "distributor" and "distribution". A distributor is an intermediary in the distribution channel who does not manufacture its own products but purchases and resells or mediates them. Thus, distributors typically purchase goods in larger quantities and then distribute them to more consumers or buyers in smaller units. A distributor is therefore a key element in ensuring that products reach end consumers.

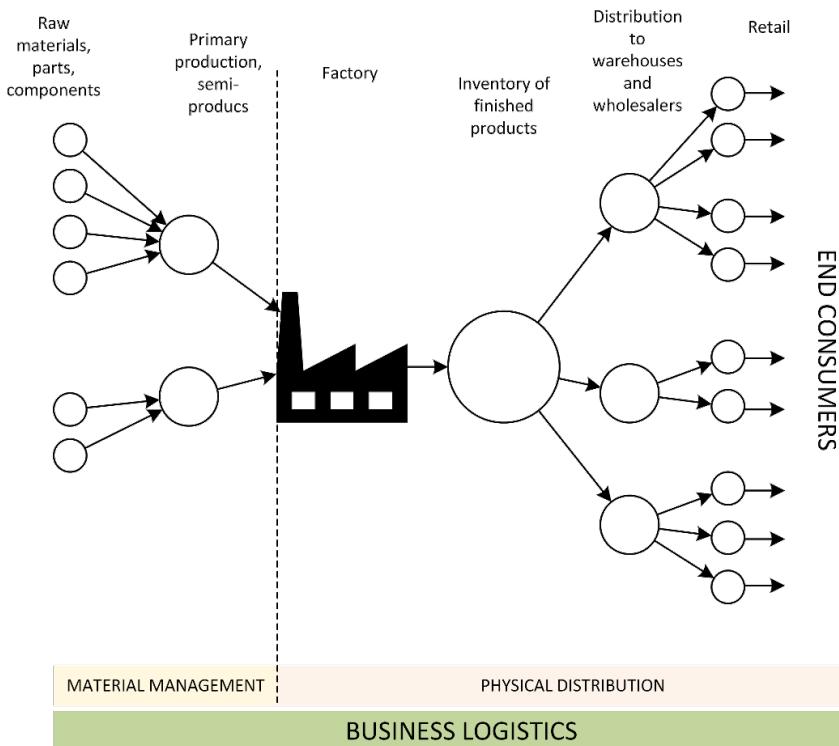


Figure 5.1: Distribution and Transport in Supply Chains

Source: adapted from (Murphy & Knemeyer, 2018)

On the other hand, "distribution" describes the entire process and not just one element in the channel. Distribution encompasses activities related to the movement of goods, including transportation, warehousing, order management, location

analysis, and similar activities. According to Ross (2015), distribution within the distribution system includes activities such as transportation, warehousing, inventory management, materials handling, order management, location analysis, industrial packaging, and data processing and communication networks. Overall, distribution is a key component of the logistics chain that ensures products and services reach consumers correctly and efficiently, whether they travel directly from the manufacturer or via a distributor.

The processes of distribution and transport in supply chains are illustrated in Figure 5.1. Here, circles symbolize facilities where inventories are stored, while lines with arrows represent movement or distribution processes managed by distributors. The supply chain continues both to the left and right of the displayed segment.

2 Modes of Transport and Distribution, their Environmental Impact and Costs

In distribution and logistics networks, transport functions as the "carrier" of goods through the supply chain. The transport network often coincides with the distribution network, focusing on the physical movement of goods. While we refer here to the movement of physical goods, transport may also represent the movement of, for instance, information, monetary flows, and so on. Planning these networks is closely tied to overall supply chain planning and its flow; consequently, transport management in distribution is also crucial for an efficient supply chain. Various modes of transport—rail, road, water, air, or pipelines—offer users numerous choices. Despite the wide array of options, selecting the right mode and service provider can be challenging. Key factors in selection are (Ballou, 2004):

- Cost, determined by basic transport expenses, possible additional costs, and relevant expenditures, such as fuel, labor, and depreciation.
- Average transit time, or the average duration of shipment travel from the origin to the destination.
- Transit time variability, meaning variations in delivery time caused by external factors such as weather or congestion.
- Loss and damage, referring to the carrier's ability to transport goods without damage or losses.

Therefore, the selection of a service is not focused solely on cost but also on the quality and reliability of the service. Some transport modes can be combined for greater efficiency in terms of intermodal or multimodal transport; for example, goods may be transported by rail and then delivered locally by truck. Nevertheless, the "door-to-door" approach is key for effective and timely delivery, and consequently for the efficient operation of distribution processes.

Road transport by trucks is often a key element in the distribution chain, especially for semi-finished and final products. Unlike rail, which transports larger quantities of raw materials and cargo, trucks offer a solution for smaller shipments, providing greater flexibility in distribution. One of the main advantages of road transport is the possibility of "door-to-door" delivery. This means there is less cargo handling between the origin and the final destination, reducing the need for additional loading or unloading, as is common in rail or air transport. Trucks also have an advantage in terms of availability and frequency of transport, as schedules can be quickly adjusted according to customer needs. The road transport market includes various types of carriers, including contract carriers who specialize in specific clients and offer customized services (without the client needing to own the vehicles). Of course, trucks cannot transport as many different types of cargo as railways, primarily due to road limitations such as dimensions and weight. Nevertheless, trucks provide fast and reliable delivery of bulk goods or goods on smaller intermodal units, such as pallets. The ability to quickly load a vehicle and immediately begin transport is a major advantage, especially for smaller quantity shipments, where trucks dominate the market compared to rail, which requires larger volumes for optimal efficiency. Road transport by trucks is therefore indispensable in the modern distribution chain due to its flexibility, speed, and efficiency.

Rail Transport is a key element of the physical distribution system, enabling long-distance freight transport. It is especially suitable for transporting raw materials such as coal, timber, and chemicals, as well as lower-value products like food, paper, and wood products. A distinctive feature of rail transport is that the majority of time (in some cases up to 80%) is spent on processes such as loading, unloading, terminal switching, and shunting, which results in relatively low operational speed and a shorter daily mileage per wagon. The railway transport system operates under two legal forms—public and private carriers. Public carriers provide services to the general public, while private carriers focus primarily on the needs of a specific owner.

Most rail traffic is conducted by public carriers. It is important to note that the basic unit of rail freight is the "lot", representing a specific quantity of goods, typically corresponding to the capacity of one railcar. To increase efficiency, multiples of lots are often used, especially for larger shipments. Modern railways offer various services tailored to market needs—from specialized wagons for specific cargo types to flexible services allowing route and destination changes during transport. In a distribution context, rail transport offers numerous advantages, such as greater transport capacity, flexibility, and cost-effectiveness, especially for large-volume, long-distance freight.

Despite its higher cost, *air transport* has become an essential part of the global distribution network, primarily due to its unmatched speed in crossing long distances. Commercial aircraft capable of high speeds allow rapid delivery, although additional time factors such as takeoff, landing, and airport delays must be considered. While air transport is sensitive to weather and other obstacles, its reliability is high. With continuous technological advancements and the emergence of larger aircraft, limitations in volume and payload are decreasing, potentially making air freight more affordable in the future. One added benefit of air transport is the reduced risk of loss or damage compared to ground transport. Packaging requirements for air transport are less stringent, and theft at airports is relatively rare. Modern air freight covers a wide range of services, from regular domestic to international carriers that connect global markets and facilitate international trade. All of this underscores the growing importance of air transport in modern distribution networks.

Water transport remains one of the classic modes of transport, still widely used due to its exceptional carrying capacity, despite certain limitations. Its operation is confined to specific geographic conditions, as inland waterway transport is viable mainly along continental routes, requiring specific locations for cargo originators. Compared to rail transport, water transport is slower, with average speeds up to 15 km/h. However, its capacity is impressive; barges—flat-bottomed vessels designed for river and coastal transport without their own propulsion—can carry up to 4,000 tons. Technological improvements such as satellite navigation enhance the efficiency and reliability of this mode. Water transport is also economically adaptable, as most goods travel under minimal economic regulation. Loss and damage are minimal, particularly for bulk low-value cargo. However, transporting more valuable goods

requires additional care and appropriate packaging. The energy efficiency of water transport is its key advantage, enabling the movement of large volumes over long distances with less fuel consumption than other modes. Comparisons show that barges consume less energy per ton-kilometer than other transport methods, highlighting their important role in the distribution chain.

Pipeline transport is a specialized method currently most efficient for transporting oil and refined petroleum products, although there are efforts to expand its use to other cargo types. A key feature of pipeline transport is its slowness, with speeds between 4.8 and 6.5 km/h. However, its continuous operation—24 hours a day, 7 days a week—ensures high efficiency and reliability. Pipelines offer high transmission capacity under full operation. In terms of reliability, pipelines are among the top, as their functioning is rarely disrupted by external factors like weather, and pumping equipment is extremely dependable. From a distribution standpoint, loss and damage are minimal, since liquids and gases are less susceptible to damage than other products. Potential hazards are limited, though responsibility exists for any losses or damages, and threats mainly stem from natural disasters or terrorism. Pipeline transport is thus a reliable and efficient system for distributing certain types of cargo. Most commonly, pipeline systems are used in their basic form for transporting water, domestic gas, etc., as part of end-user supply for households and businesses.

Maritime Transport is vital for globally connecting markets and transporting large quantities of goods across intercontinental distances at low per-ton costs. It enables efficient movement of raw materials like oil and grain, as well as containerized products. Ships are tailored to specific needs; oil tankers carry liquids, while container ships are designed for standardized intermodal transport units. As ship sizes have increased over the years, the relative transport costs have decreased. However, maritime transport faces challenges. Adverse weather such as storms can affect reliability and speed, while larger ships require deeper ports, leading to higher infrastructure investments. Problems also arise from major events that can paralyze maritime routes (e.g., the Suez Canal blockage in 2021 or the 2024 Red Sea traffic disruptions due to attacks), as well as port capacity limitations, particularly in net importing regions. Despite these challenges, maritime transport remains the backbone of global distribution, connecting the entire supply network and enabling intercontinental trade. For optimal functioning, integration with other modes such

as rail and road is necessary, ensuring smooth flow of goods from origin to final destination.

3 The Role of Distribution in Business Performance and Market Placement

Optimally and efficiently designed distribution channels help reduce complexity in other segments of the supply chain. According to Ross (2015), these channels may include the following functions:

- Assortment: Distributors group related or similar products into assortments to meet consumer preferences. For example, an auto parts distributor might assemble various components needed for brake repair into one package.
- Allocation: This function involves dividing large inventories of goods into smaller units or packages for sale. For example, a distributor dealing with construction materials might order large quantities of screws and then divide them into smaller packages.
- Sorting: This is the process of classifying various types of goods acquired from multiple suppliers into similar categories. For example, a fruit distributor might sort apples by quality and size.
- Accumulation: Here, the distributor gathers similar products into larger batches to offer them as a single unit. For instance, a distributor of electronics might bundle TVs of different brands into a common offer or group together products typically bought in combination, such as various computer components.

Distribution channels encompass essential services that are vital to the efficient functioning of the supply chain. Sales and promotion are crucial for manufacturers who often face challenges in market access due to limited sales outlets. To overcome these challenges, they often integrate distributors into their network. Additionally, distributors increasingly engage in converting semi-finished goods into final products through sorting, labeling, and simple assembly tasks. The transport of goods is essential to ensure that products arrive at the right place at the right time—failure to do so leads to lost sales and consumer distrust. Warehousing serves as a buffer between the uncertainties of supply and demand, ensuring sufficient inventory to meet consumer needs. Some distributors also perform sequencing,

sorting goods into specific configurations tailored to customer needs, or assembling kits for lean manufacturing.

Many companies use traditional accounting systems to track costs, but these are often too generic for detailed analysis. To measure performance effectively and understand distribution operations, more granular cost data is needed. According to Rushton, Croucher, and Baker (2017), distribution costs can be broken into:

- Storage and warehousing costs: These include construction, labor, and equipment costs. Factors such as location, building age, and loading systems affect cost ratios. The size of the distribution center impacts per-unit costs—larger centers typically have lower unit costs due to better space and equipment utilization.
- Transport costs: These can be divided into primary transport costs (moving goods) and delivery costs (transport to the end consumer). Requirements and costs vary with the number of distribution points. Primary transport generally involves bulk shipments, while final delivery, which serves individual consumers, may be handled by third parties (3PL).
- Inventory holding costs: These include inventory management expenses, such as financing inventory, service costs like administration and insurance, and risk costs arising from theft, spoilage, and obsolescence.
- Information system costs: These relate to the need for data and communication, ranging from order to fulfillment. Costs increase with the number of warehouses in the system, as more complex information systems are required for effective management.

4 Distribution Strategies and Distribution Channels

A distribution strategy defines how goods or services reach end consumers. Choosing an effective distribution strategy is crucial for maximizing profit and maintaining customer loyalty.

- Strategies typically focus on distribution channels, which include:
- Indirect distribution: Goods pass through multiple channels before reaching the consumer.

- Direct distribution: Companies deliver goods directly to the consumer.
- Intensive distribution: Aims to achieve the widest possible market share.
- Selective distribution: Limited to specific sales points, as seen with brands like Zara.
- Exclusive distribution: Specific distributors receive exclusive rights for certain areas, e.g., Ferrari in a specific region.

The choice of distribution strategy often depends on the type of product. Companies may use different strategies for different products. A distribution network consists of channels and hubs that facilitate the transfer of goods. A distribution channel refers to the methods and means of moving goods from the manufacturer to the end point. The end point is usually a retail store, but with the rise of online shopping, home delivery is becoming increasingly significant. For digital products such as music and movies, "physical" delivery can occur via the internet.

Figure 5.2 illustrates the main alternative distribution channels for consumer goods from production to retail stores.

There are also other channels, such as those from industrial suppliers to customers or direct channels to the final consumer. Distribution channels from the manufacturer to retail stores can include:

- The manufacturer delivers goods to the retailer's distribution center, which then sends them to the retail store.
- The manufacturer sells goods to a wholesaler, who then delivers them to the retail store.
- The manufacturer ships goods directly from its warehouse to the retail store.
- The manufacturer sells goods to an intermediary, who then delivers them to the store.
- The manufacturer uses small parcel carriers to deliver to retail stores.
- The manufacturer delivers goods via a cash-and-carry system for smaller retailers.
- The manufacturer uses third-party services (3PL) to distribute to retail stores.
- The manufacturer delivers goods directly from production to the retail store.

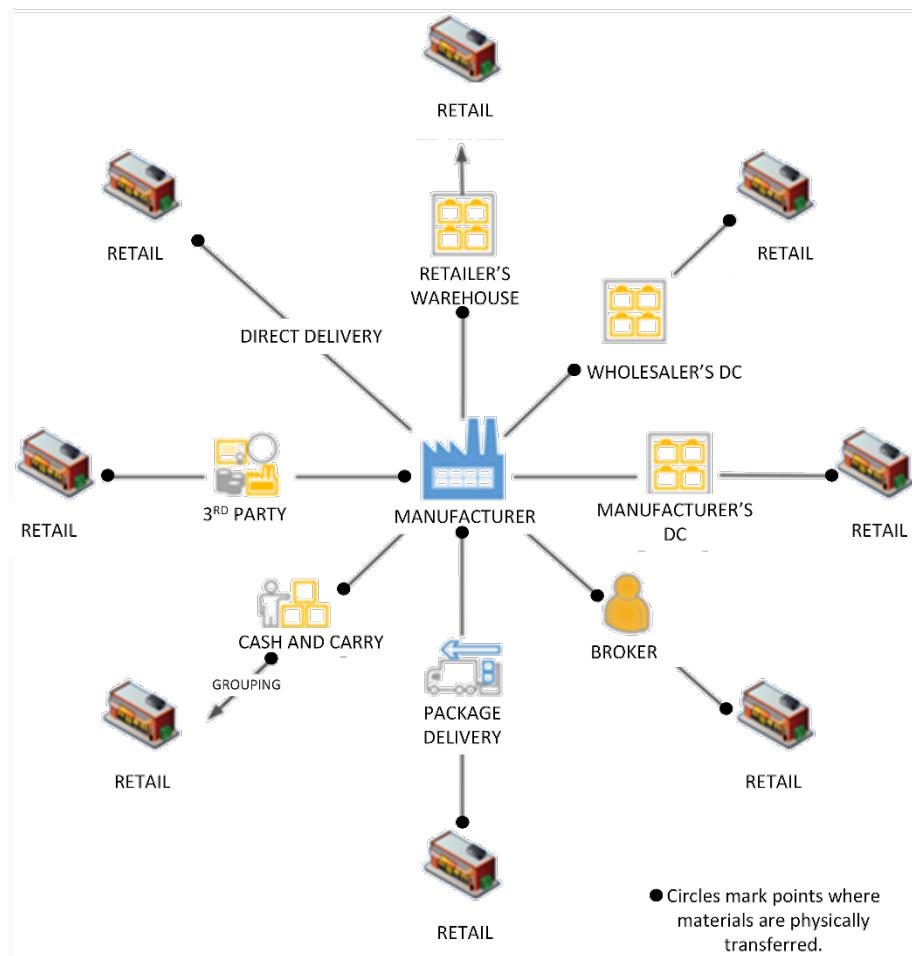


Figure 5.2: Alternative Channels for Distributing Consumer Goods to Retail Stores

Source: Adapted from Rushton, Croucher in Baker (2017)

In addition to the channels described above, there are also variants that do not involve retail stores, essentially representing flows referred to as B2C (Business-to-Consumer), where the manufacturer sells its products and services directly to the end consumer.

- Mail order is a popular method of purchase, where goods are ordered via a catalog and delivered directly to the consumer's home, bypassing the store.

- Direct delivery from the manufacturer to the consumer's home is rare, typically occurring after direct advertising sales or for custom-made products.
- Online shopping has become common, with additional specialized operations for home delivery, mostly carried out by 3PL companies, while some products are distributed directly online.
- The factory-to-factory or B2B channel is key for the distribution of industrial products, which include a variety of product types and sizes, and the transport may be handled by manufacturers or 3PL companies.

The structure of distribution channels varies significantly between companies. According to Rushton, Croucher, & Baker (2017, p. 56), basic variations include:

- The diversity of intermediaries or distributors,
- The number of stages in the distribution process, determining how many intermediaries are involved before the product reaches the consumer,
- The level of distribution intensity at each stage, determining whether multiple types of intermediaries are used at all levels, or only selective ones.

Some small and medium-sized enterprises (SMEs) often opt for simpler channel structures that allow for efficient and cost-effective distribution of their products. In contrast, large companies that offer a wide range of products and target diverse consumer segments typically have more complex distribution channels. In this context, it is worth mentioning that some companies follow a policy of disintermediation, attempting to eliminate certain intermediaries or middlemen to reduce costs and speed up market entry. For some companies, especially large ones, eliminating intermediaries becomes a crucial part of their supply chain strategy. However, due to the diverse needs and strategies of companies and the numerous variable factors, it is difficult to define a "typical" distribution channel.

5 **Choosing a Distribution Strategy Based on Network, Market, and Products**

When establishing distribution channels, several key objectives arise. The first goal is to ensure the correct market presence of products, meaning products must be made available to consumers at the right time and place. The second goal is to

increase sales opportunities, achieved through strategies such as product positioning in stores and special promotions. The third goal involves participating in the determination of distribution factors, such as minimum order sizes, transport unit loads, and delivery time windows. The fourth goal is to maintain service levels through contractually defined standards, which ensure high service quality for customers. The fifth goal is reducing logistics operations and distribution costs, including optimizing resources and eliminating unnecessary operations. The sixth goal is to ensure an efficient flow of information, including sales trends, inventory levels, costs, and other data from sales points, which enables better management of the distribution system.

When designing a distribution system, it is important to consider various channel characteristics, including market, production, and competitive factors. These features influence decisions in planning an effective channel for distributing goods to end consumers. For example, the size and dispersion of the market, as well as the competitive landscape, will influence the choice between "long" channels, involving more transfers and warehousing, and "short" channels, better suited for smaller markets with limited consumers. This ensures the distribution channel aligns with the needs of both the market and the product.

Looking at the final part of distribution channels—typically from distribution centers (of either the manufacturer or the distributor)—we generally identify three main types of channel structures, based on how consumers order, from where, and how delivery is executed. These channel forms, illustrated in Figure 1.3, include:

- Single-channel distribution involves selling and distributing products through only one channel, either digital (e.g., an online store) or physical (e.g., a street retail store). This approach helps reduce costs as it is easier to manage and can sometimes be operated without third-party providers. It also allows businesses to focus on improving performance within one channel, which is especially useful when resources are limited, and no large management team is needed. Distribution follows the sales system—for instance, online sales typically rely on parcel delivery services.
- Multi-channel distribution enables sales and communication (and subsequently, distribution) through various channels such as telephone, website, social media, mobile apps, and physical stores, which operate independently. This means the

company may not have insight into the customer's previous interactions across different channels, as they function independently. Benefits of multi-channel commerce include reaching customers in diverse ways, comparing the effectiveness of each channel, and increasing brand awareness. Separate distribution methods are established for each channel—for example, the same product may be distributed via parcel delivery for online orders and stocked in a physical store.

- Omnichannel distribution combines multi-channel retail with integration across all channels, enabling a centralized view of operations and customer data. For customers, this provides a seamless shopping experience. Benefits of omnichannel distribution include leveraging the advantages of multi-channel systems, smoother transitions for customers between channels (which can boost sales), and more informed marketing decisions based on unified data. From a distribution perspective, this means centralized inventory management, greater flexibility, and allowing consumers to choose the distribution method that suits them best.

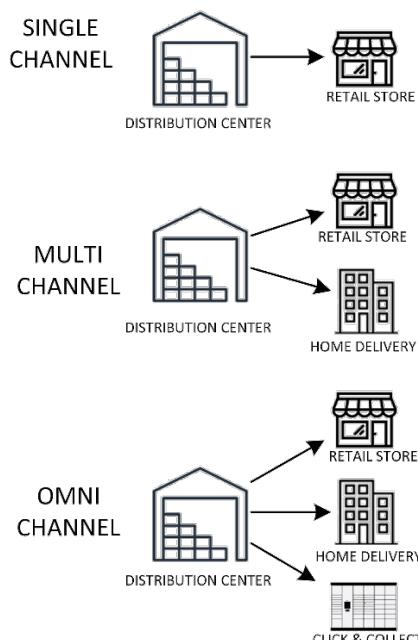


Figure 5.3: Types of Distribution Channels

Source: own source

When selecting a distribution channel, it is important to consider the nature of the product itself, as this can greatly influence the number and type of suitable channels (Rushton, Croucher, & Baker, 2017). For instance, high-value goods are more suitable for direct sales through short channels, as higher gross margins can more easily cover the increased sales and distribution costs typically associated with these channels. Furthermore, short channels are appealing due to enhanced security for high-value goods, as there is less risk of loss or theft. They also help reduce the need to hold large inventories of valuable goods, minimizing issues such as high working capital and obsolescence costs. On the other hand, complex goods, such as machinery, often require direct sales, since intermediaries may lack the expertise to adequately explain their function to potential consumers. New products are often best distributed through third-party channels, as final demand is difficult to forecast, and distribution channels must remain flexible to respond to varying demand levels. Time-sensitive goods, such as food, require faster or shorter distribution channels due to their limited shelf life. Goods with specific handling requirements—like frozen food, porcelain, glass, and hazardous chemicals—may require specialized physical distribution channels. Pharmaceuticals form a distinct category, requiring specialized channels and compliance with strict transport conditions.

Competitive characteristics relate to the activities of competitors selling similar goods. This includes decisions about whether to sell alongside competitors' products or use exclusive sales channels to avoid competition. In some cases, offering a wide range of products at the same retail locations is necessary if consumers demand it. It is also crucial to compare service levels with those of competitors and ensure equal or superior service, which can be a key competitive advantage—especially for goods where it is hard to differentiate based on quality and price.

The structure of goods distribution is generally either single-tier or multi-tier. The chosen structure depends on various factors such as the type of area (e.g., urban, suburban, rural), the size of the area (e.g., countries, continents), the type of goods being shipped, vehicle types used, and requirements for volume and time.

There are two main distribution methods: direct delivery—where goods are delivered from manufacturer to consumer without intermediaries or storage, giving the manufacturer greater control over branding and pricing, but incurring delivery costs to multiple locations—multi-tier delivery, where goods pass through a hierarchical

structure of distribution centers, warehouses, and retailers before reaching the consumer, enabling faster availability but resulting in higher operating costs (Ross, 2015, p. 47). Both methods are commonly used depending on a company's production strategy. A single-echelon distribution structure (direct delivery) does not involve any intermediaries between supply and demand sources and operates through direct shipments—either from one source to one consumer or from one source to multiple consumers, as in consolidation. Conversely, a multi-echelon network includes intermediate facilities like warehouses, consolidation centers, distribution centers, and cross-dock systems where goods move from source to destination.

It is also essential to consider the challenges of transportation and fleet management when designing distribution (Bektas, 2017).

Distribution systems can be centralized or decentralized. In a centralized system, decisions for the entire supply chain are made centrally, resulting in smaller warehouse networks, minimal safety stocks, lower overhead and transportation costs, and the ability to achieve economies of scale and service targets at lower total cost. Decentralized systems face increased costs due to local inventory and transportation needs, leading to higher total costs. The key difference lies in delivery: centralized systems have longer delivery times due to greater distances, whereas decentralized systems offer shorter delivery times and lower costs as warehouses are closer to consumers (Ross, 2015, p. 47). Another advantage of decentralized systems is resource dispersion, which is useful in the event of a system failure, as another element can quickly take over the role.

The basic decision-making process for choosing a distribution strategy follows the same logic as other logistics decisions. This process is shown in Figure 1.4:

- First, a thorough analysis of the current situation is required, including identifying objectives, business strategy, the current distribution status, and the broader logistics strategy.
- Next, potential distribution options are identified—strategies, providers, target markets, and suitable methods.

- Then, the identified options are analyzed and evaluated based on distribution requirements and predefined priorities. Ideally, a decision model is created to evaluate all variants using specific parameters.
- Finally, the selected strategy is implemented, continuously monitored, and evaluated for effectiveness—and adjusted as needed.

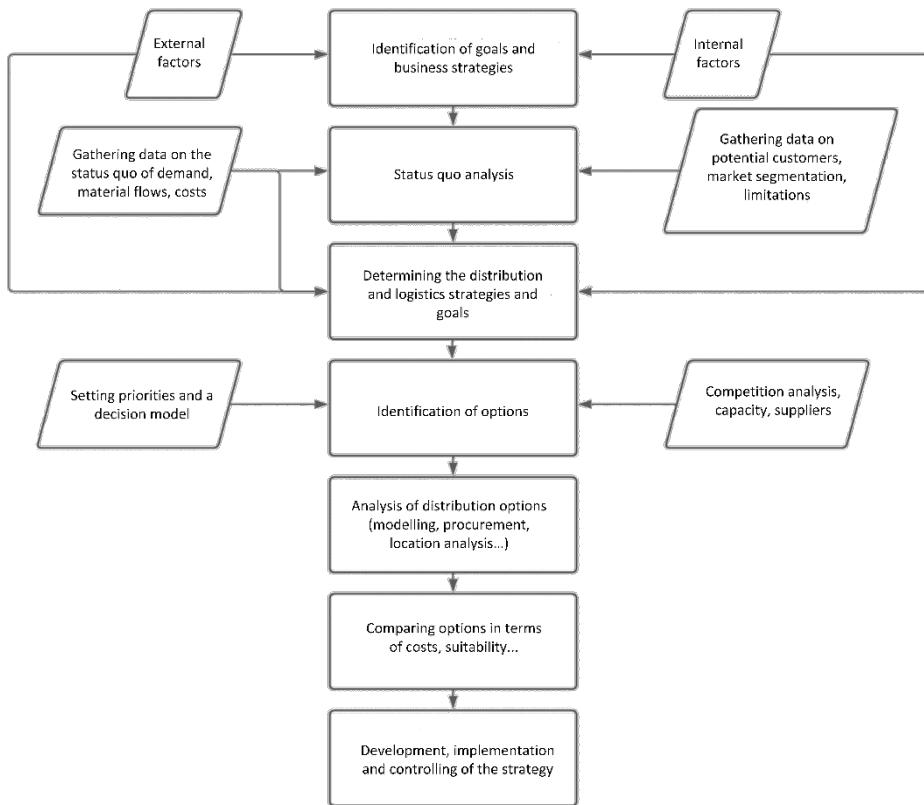


Figure 5.4: Decision-Making Process for Selecting a Distribution Strategy

Source: Adapted from (Rushton, Croucher, & Baker, 2017) and (Bektas, 2017)

Distribution is thus a crucial and at the same time challenging element of the supply chain, as it requires precise planning and strategic decision-making that directly affect a company's efficiency and competitiveness. The appropriate choice of a distribution strategy—tailored to the nature of the products, market conditions, and company goals—is essential for cost optimization, ensuring timely delivery, and achieving

customer satisfaction. The complexity of distribution channels, involving various intermediaries and levels, necessitates thorough analysis and regular adjustments to enable a company to effectively respond to changes in demand and technological developments. Therefore, the design of the distribution network must be carefully aligned with broader logistics strategies and the development of the supply chains in which the company operates, thereby enabling long-term market success.

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