

Summary

Getting Started with Operations and Supply Chain

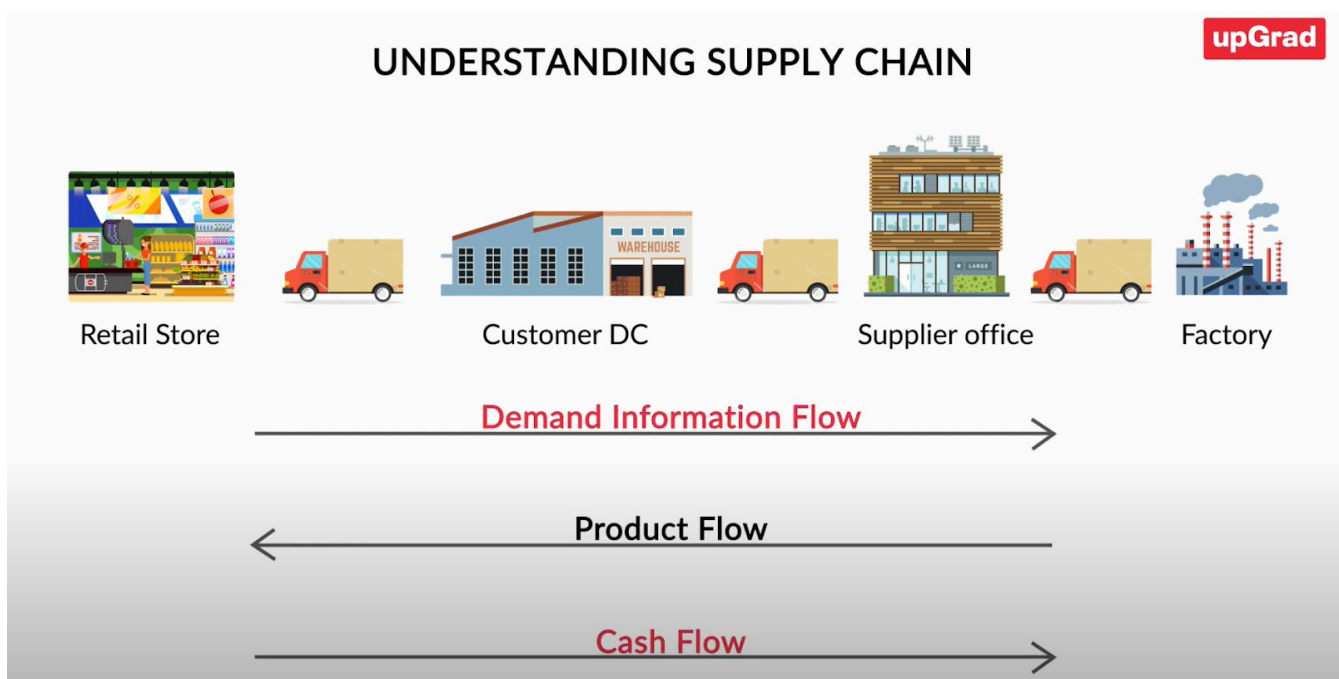
What is a Supply Chain?

A supply chain is a mechanism through which raw materials from the suppliers are first converted and then placed in the hands of the customers in the form of finished goods.

There are two distinct types of flows within a supply chain, which are as follows:

1. **Product flow:** From manufacturer to customer
2. **Demand flow:** From customer to manufacturer

The below picture depicts how demand information, product and cash flow across different elements in a supply chain:



A typical supply chain involves a variety of stakeholders. Supply chain includes all or some of the following stakeholders depending on the type of industry the organisation operates in:

- Customers
- Retailers
- Wholesalers/Distributors
- Storage locations

- Manufacturers
- Vendors or suppliers

The Best Supply Chain in The World

When it comes to the supply chain, Apple has consistently been ranked as No. 1 in the world by Gartner and other similar sources.

Supply chain can be broken down into the following smaller elements:

1. Making and delivering the right product
2. In the right condition and quantity
3. At the right time
4. To the right customer
5. At the lowest optimal cost with consistency



Achieving Goals and Value Through Supply Chain

Supply chain is necessary to achieve certain organisational goals, which are as follows:

1. To understand demand of the products
2. To plan the supply and availability of the products
3. To deliver customer service

Supply chain planning process is divided into smaller activities. These activities are carried out to have an effective and efficient supply chain. These activities are as follows:

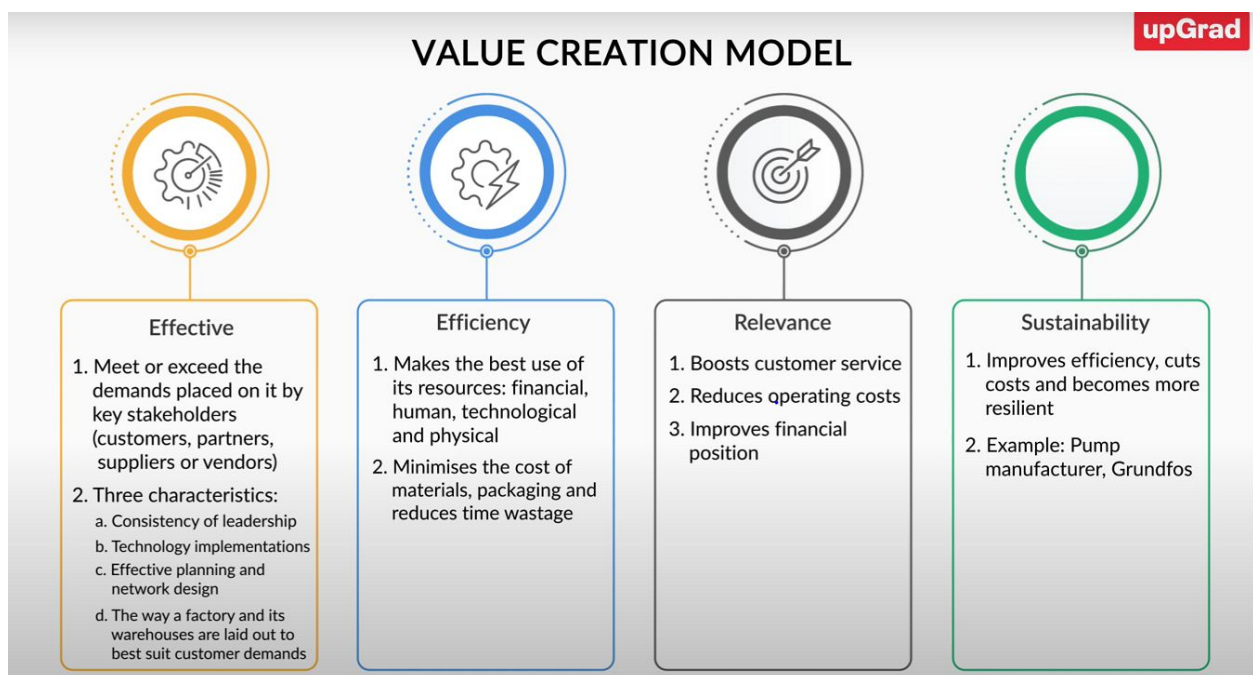
1. **Demand planning:** It refers to the process of forecasting or predicting the demand for products to ensure that they can be delivered to satisfy customer needs.

2. **Supply planning:** It refers to the entire planning process including distribution, manufacturing and procurement operations according to demand forecasts, considering capacity constraints and material availability.

There are four pillars of value creation within a supply chain, these are as follows:

- Effectiveness
- Efficiency
- Relevancy
- Sustainability

The below picture depicts the value creation process in a supply chain through the four pillars mentioned above:



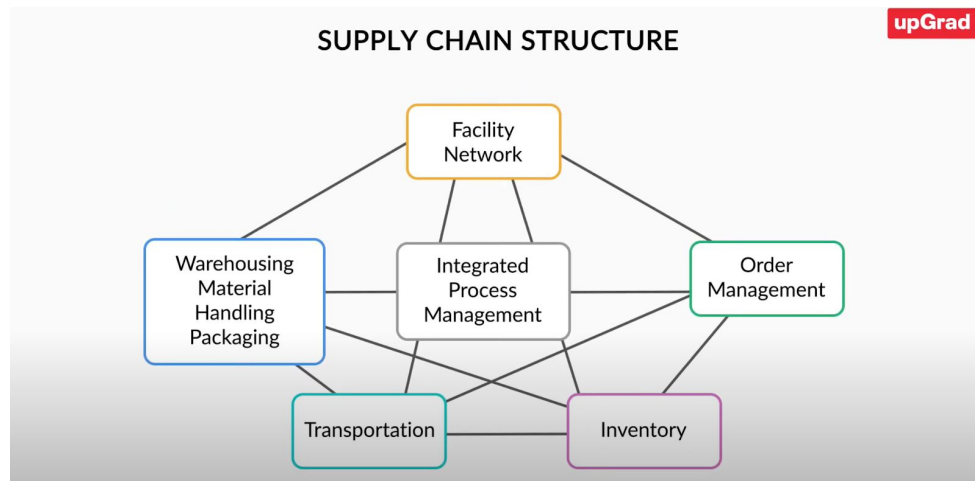
What Does a Supply Chain Include?

The supply chain mechanism related to product and demand information flow is possible only because of the inclusion of a set of specific business processes. These business processes are integrated in with each other.

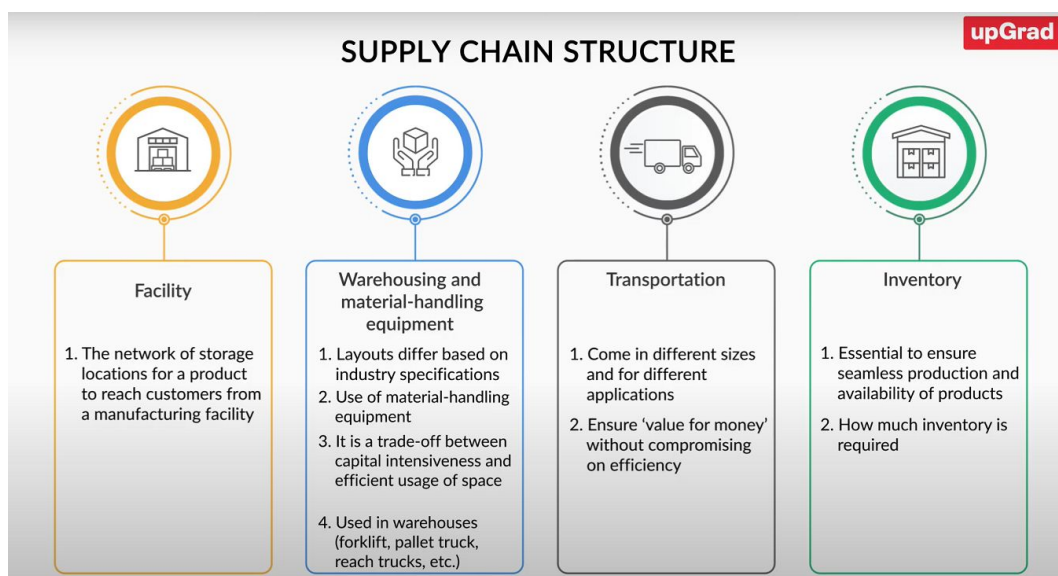
The different business processes of a typical and effective supply chain are always integrated. This integration occurs through the following set of interdependent processes:

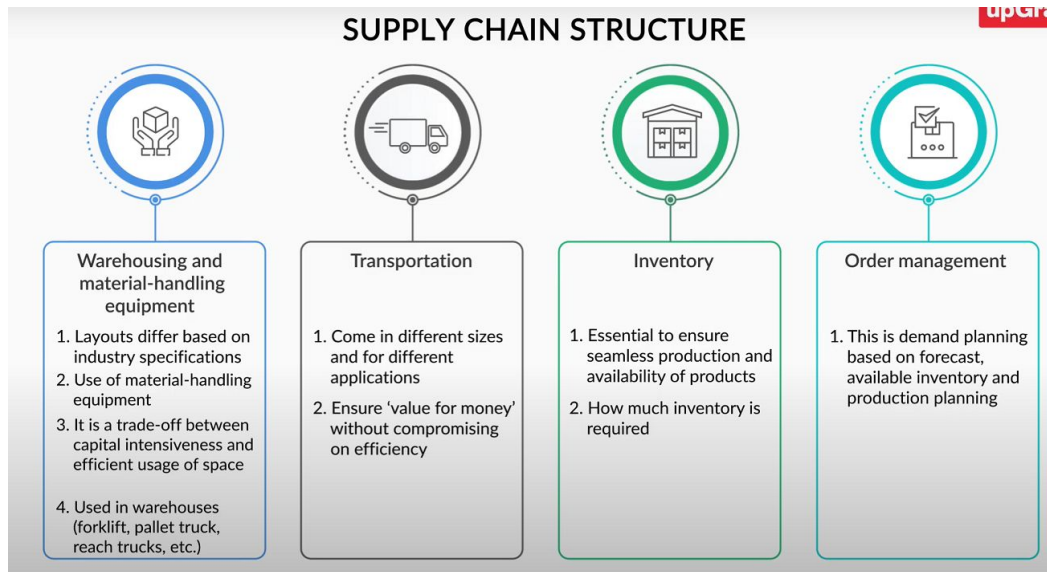
1. Facility network
2. Material handling equipment (MHE)
3. Transportation
4. Inventory
5. Order management

The below picture depicts how these activities are integrated with each other:



The below pictures depicts in detail each of these activities:



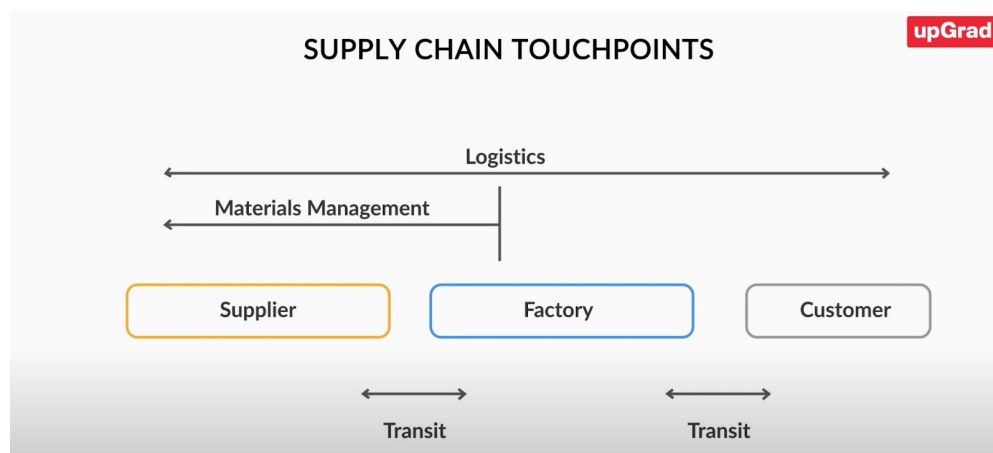


The single biggest advantage of the integration of these processes is the continuous interaction between each activity, not necessarily sequentially, but based on its importance, which ensures that the integrated supply chain manages all performance parameters.

A typical supply chain consists of certain touchpoints, which are as follows:

1. Supplier
2. Factory
3. Customer

The below picture depicts the arrangement of these touchpoints within a supply chain:



Each of these touchpoints have different sub-segments associated with them. These sub-segments are depicted in the picture below:



Why is Supply Chain Strategy Needed?

The bottomline for any business is profit. Profit is one of the most valuable objectives for any organisation to be achieved. Supply chains also work with this very objective in mind, however, sometimes organisations succeed in achieving this objective while other times they fail.

Organisations need to have a supply chain strategy that suits the kind of business and industry that they are operating in.

This simple mantra helps organisations in achieving the right strategic fit.

Supply chain is a business aspect that functions with the singular objective of creating value for your business. The value created through a supply chain is known as **supply chain surplus**.

02

Supply chain surplus = Customer value – Supply chain cost

The supply chain cost refers to the cost of transportation, distribution and storage of products.

The two different types of strategies developed by organisations are as follows:

1. Competitive strategy
2. Supply chain strategy

An organisation is said to achieve strategic fit only when the goals of these two strategies are aligned with each other.

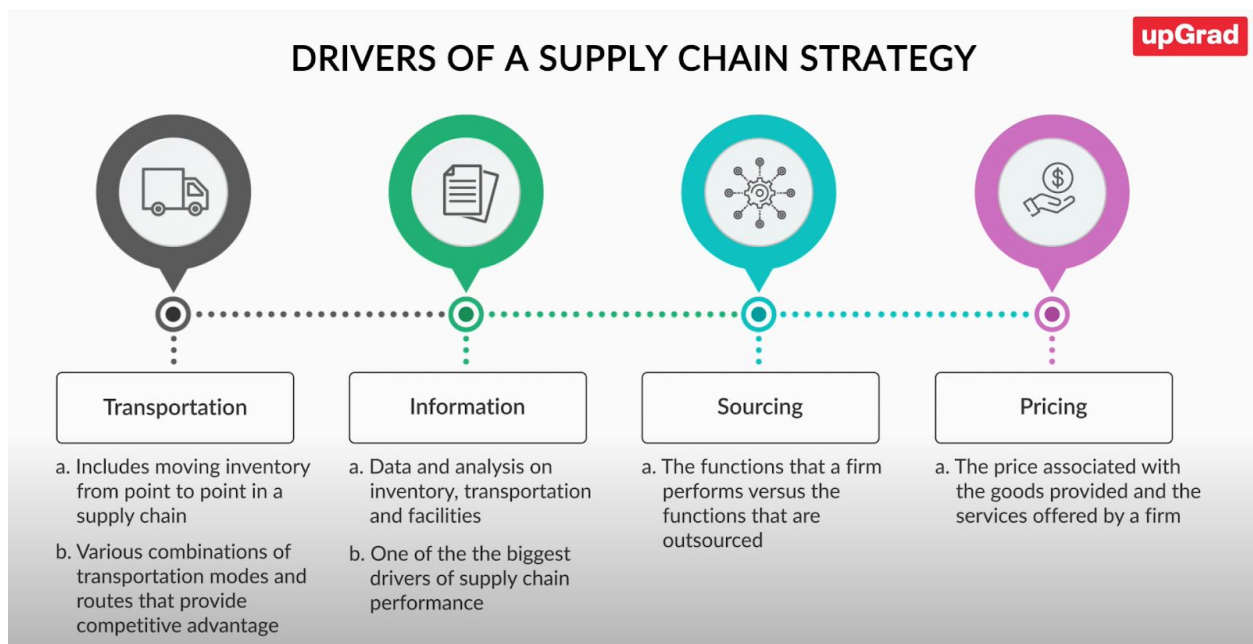
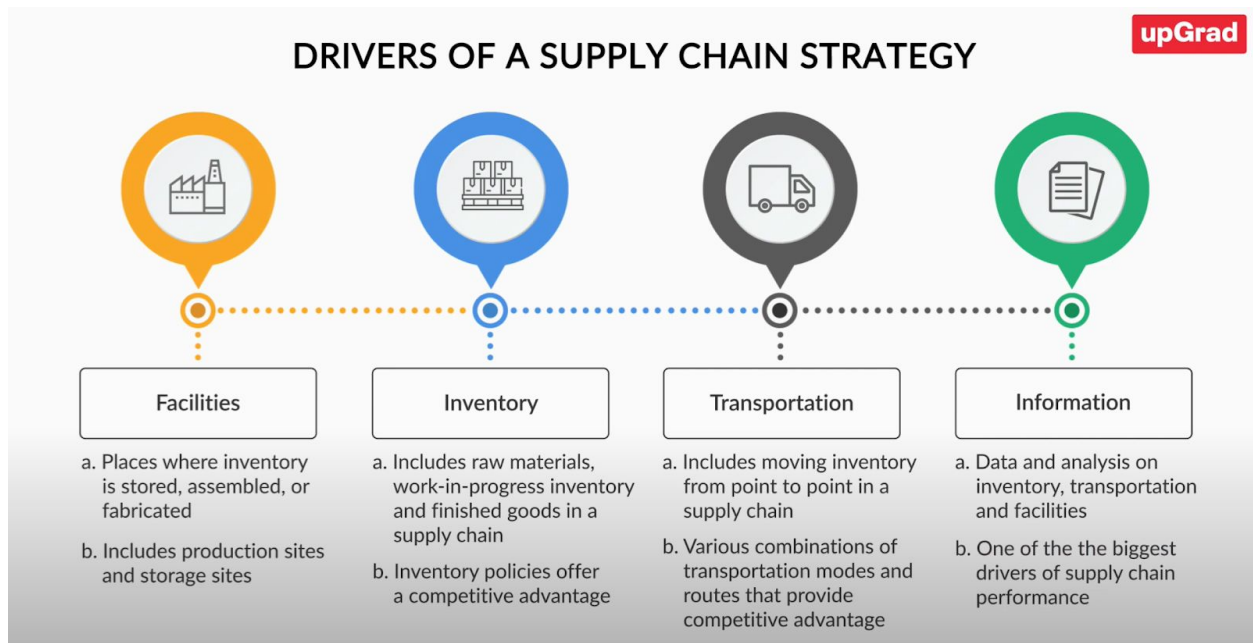
The stepwise framework used by organisations for achieving the best strategic fit consists of the following steps:



Based on the strategic fit framework, the two types of supply chain strategies that can be achieved by an organisation are as follows:

1. **Efficient supply chain strategy:** This strategy ensures that cost is kept at the minimum. It mostly suits products with low demand uncertainty.
2. **Responsive supply chain strategy:** This strategy ensures that the product is available to the customers at the earliest. It mostly suits innovative products with high demand uncertainty

There are certain drivers of a supply chain that play an important role in implementing the supply chain strategy in the most optimal manner. The below pictures depict these drivers.



Achieving Success Through Supply Chain

Companies differentiate themselves based on their supply chain strategy alone.
 Supply chain can also be utilised in creating a differentiating factor for an organisation.
 Example:

- A. **Zara** has a product lead time of about one week, whereas competitors have a lead time of close to six months. Some key points to remember about Zara's supply chain are as follows:
1. Zara adopted a strategy to keep all of the production in-house, which helped it reduce the product lead time. Zara also developed a robust ecosystem of having all its suppliers in its vicinity.
 2. Zara's strategy is to produce in small lot sizes and maintain a limited inventory of one product type. The benefits of this strategy are two-fold:
 - i. It does not have to block its working capital in the form of inventory.
 - ii. The chances of inventory getting redundant with the launch of a new product are reduced.

B. **Mumbai Dabbawalas**

There have been instances where an organisation has to implement both aspects of a supply chain strategy, i.e. cost-efficiency as well as responsiveness, to cater to different business verticals within the organisation.

Example:

- A. Amazon uses a cost-efficient supply chain in its normal course of business. It has to incorporate responsive supply chain strategy in some parts of its business to cater to the same-day delivery audiences.

Role of a Supply Chain Manager

Successful supply chain managers have to be proficient in their subject of expertise.

In addition, the supply chain manager should be able to build and maintain key relationships. To summarise, a supply chain manager is expected to:

1. Plan and implement the overall supply chain strategy
2. Collaborate with Sales, Operations and Customer Service teams
3. Determine key performance indicators (KPIs) within the supply chain
4. Suggest solutions for improving the supply chain process
5. Identify process bottlenecks and implement solutions in a timely manner
6. Ensure continuous training of supply chain personnel
7. Work with Finance, Sales and Manufacturing teams to determine the best vendors and distributors to partner with
8. Build and maintain a good relationship with the vendors

Disclaimer: All content and material on the UpGrad website is copyrighted material, either belonging to UpGrad or its bonafide contributors and is purely for the dissemination of education. You are permitted to access print and download extracts from this site purely for your own education only and on the following basis:

- You can download this document from the website for self-use only.
- Any copies of this document, in part or full, saved to disc or to any other storage medium may only be used for subsequent, self-viewing purposes or to print an individual extract or copy for non-commercial personal use only.
- Any further dissemination, distribution, reproduction, copying of the content of the document herein or the uploading thereof on other websites or use of content for any other commercial/unauthorized purposes in any way which could infringe the intellectual property rights of UpGrad or its contributors, is strictly prohibited.
- No graphics, images or photographs from any accompanying text in this document will be used separately for unauthorised purposes.
- No material in this document will be modified, adapted or altered in any way.
- No part of this document or UpGrad content may be reproduced or stored in any other web site or included in any public or private electronic retrieval system or service without UpGrad's prior written permission.
- Any rights not expressly granted in these terms are reserved.

Summary

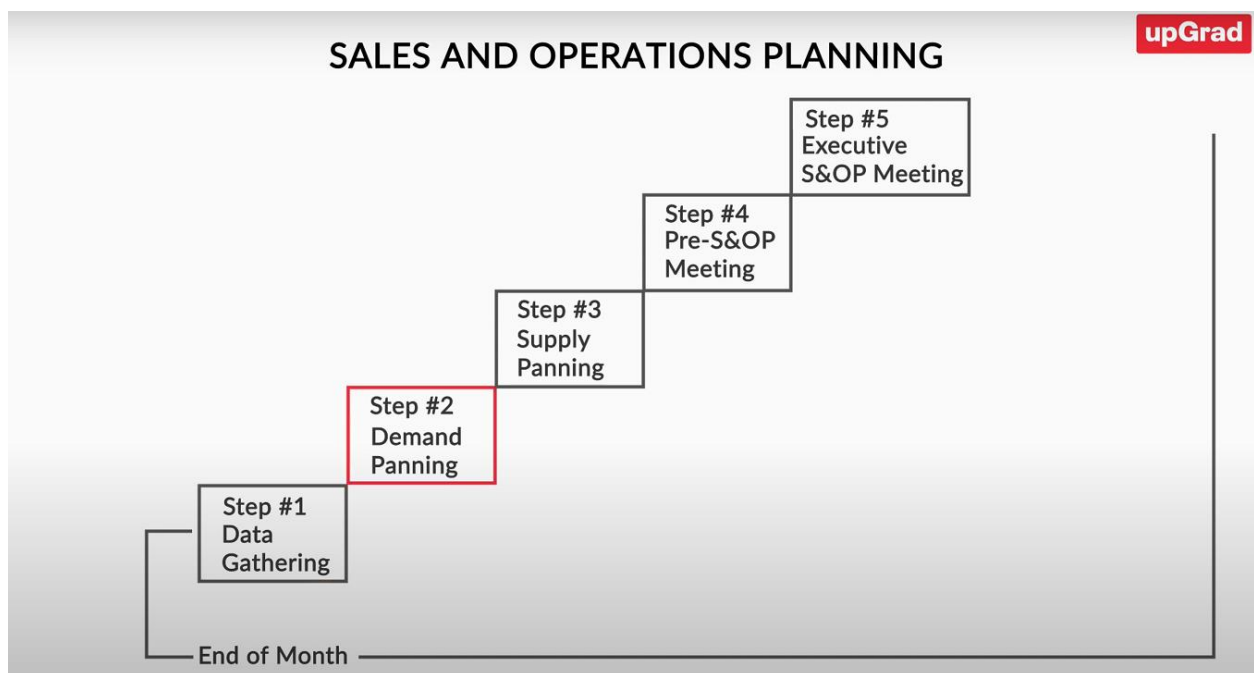
Demand Planning in Supply Chain

Sales and Demand

The entire supply chain planning process can be broken down into smaller planning activities that are carried out in a stepwise manner. The output of each planning activity is fed as an input to the next planning activity. Planning activities are carried out as part of the big, all-encompassing supply chain planning process. These planning activities are carried out in the following order:

1. Data gathering
2. Demand planning
3. Supply planning
4. Pre-sales and operations planning (Pre-S&OP) meeting
5. Executive sales and operation planning meeting

The following picture depicts these planning activities in a sequential manner:



Sales is different from demand. The difference between the two can be summarised as follows:

Sales: When you buy a product or service, sales is generated for that product or service. In simple terms, sales are the process by which people pay money to acquire something they demand.

Demand: Demand is the number of goods that the customers are willing to buy at several prices during a given time frame.

For the sales and demand to be equal to each other, the organisation must have the production capacity, technology and sales infrastructure to deliver what people want. All of these elements fall under the purview of supply chain management.

Determinants of Demand

The following elements determine the demand for a product or service, and are as follows:

1. **Price of the given product or service:** As the price of product or service increases, the quantity demanded decreases due to the decrease in the satisfaction level of the consumers.
2. **Price of related goods or services:** Every product or service has two types of products and services related to them, which are as follows:
 - a. **Substitute products or services:** These are the products or services that can be used in place of one another to satisfy a particular want or desire (tea and coffee).
An increase in the price of the substitute product leads to an increase in the demand for the given commodity and vice versa.
 - b. **Complementary products or services:** These are the products or services that are used together to satisfy a particular want or desire (tea and sugar).
An increase in the price of complementary goods leads to a decrease in the demand for the given commodity and vice versa.
3. **Income of the consumer:** The effect of change in income on demand depends on the nature of the commodity under consideration.
 - a. If the given commodity is a normal good, then an increase in income leads to an increase in the demand for it, while a decrease in income decreases the demand for the commodity.
 - b. If the given commodity is an inferior good, then an increase in income decreases the demand for it, while a decrease in income leads to an increase in the demand for the commodity.
4. **Tastes and preferences:** If a commodity is in fashion or is preferred by consumers, then the demand for such a commodity increases and vice versa.
5. **Expectation of change in price in the future:** If the price of a certain commodity is expected to increase in the near future, then people will buy more of that commodity than what they would normally buy.

Demand Planning

Demand forecasting simply means predicting the future demand for a product or service. This prediction can be made for one week, one month or even one year in the future. **Demand forecasting forms the basis of all supply chain planning.**

Demand planning refers to the process of creating reliable forecasts, so products or services can be produced and delivered more efficiently and to the satisfaction of the customers.

Certain factors can be used to predict the future demand for a product or service (and hence are useful in the demand planning process). These factors are as follows:

1. **Past demand** of the product or service
2. **Lead time** of product replenishment: This refers to the time it takes for a product to become available for sales again after the previous stock-out.
3. Planned **advertisements and marketing efforts.**
4. Planned **price discounts:** As you learnt earlier, the demand for a product or service is inversely proportional to its price. Thus, when a discount is provided for a product or service, its demand increases.
5. **Competitors' actions:** The demand for your product or service largely depends on how your competitors are responding to the changing market conditions.

6. **State of economy:** If the economy of a country is doing good and is expected to perform better in the future, the overall demand for products and services is likely to increase in future.

Demand Forecasting

Demand forecasting is done for **unconstrained demand**.

An unconstrained demand is a demand that does not consider the industrial and logistical constraints that might be plaguing an organisation or the entire industry.

The reasons for forecasting demand are as follows:

To satisfy the actual demand for a product or service that will arise in the future

To produce only the amount of finished goods required by the customers, neither more nor less

To reduce the volume of stock

Sales plan is a demand plan that is corrected using constraints such as the organisation's industrial and logistical needs.

In order to successfully forecast demand, it is vital to analyse the historical unconstrained demand for the product, and then incorporate the data on the following factors to arrive at the final numbers:

1. Data from marketing and sales campaigns
2. Shortages (voluntary or involuntary)
3. Logistical failures
4. Competitor's campaigns
5. Exceptional events

The following characteristics are common to any demand forecast:

1. Demand forecasting is always wrong.
2. Long-term demand forecasts are less accurate.
3. Aggregate demand forecasts are more accurate.

Planning Horizons in Demand Forecasting

Before undertaking the forecasting activity, an organisation should ask the following questions:

1. **What is the horizon for the business decision?**
Forecasting can be done for one week, one month or even one year into the future. The organisation should decide beforehand how ahead in the future it wants to forecast the demand for its products.
2. **What is the financial impact of this business issue?**
Forecasting is a capital-intensive activity. An organisation should identify in advance what will be the financial impact of undertaking this activity.
3. **What is the availability and cost of data required to generate a forecast?**
As mentioned in the previous segment, while constructing a forecast, you should not only have information on unconstrained demand figures but also cross-functional data from marketing and other verticals. Hence, the organisation should have the required data available with it before undertaking the forecasting activity.
4. **What is the frequency of a forecasting activity? Do you need to forecast demand on a weekly, monthly or quarterly basis?**

This depends on a lot of factors such as the current position of your product in the product life cycle, competitors' actions, market conditions, etc.

5. **Should forecasting be done at an item level or at an aggregate level?**

This also depends on a lot of external factors such as past sales performance of the product or the product category.

Considering the decision of setting up the horizon for demand forecasting, the time horizon for a demand forecast varies from long-term forecast (3-5 years) to short-term forecast (1-2 months or even less).

The following time horizons are considered in demand forecasting:

1. **Strategic horizon (long-term):**
Strategic horizon includes detailed annual and bi-annual forecasts.
2. **Tactical horizon (mid-term):**
Tactical horizon includes detailed monthly forecasts.
3. **Operational horizon (short-term):**
Operational horizon includes detailed weekly and daily forecasts.

The following picture depicts in detail each of these horizons:



Qualitative Forecasting

There are two approaches used for demand forecasting: qualitative and quantitative.

The methods under both these approaches are as follows:

Methods of qualitative forecasting:

1. Market research
2. Panel or group consensus
3. Historical analogy
4. Delphi method

Methods of quantitative forecasting:

1. Time series analysis (also known as intrinsic analysis)
2. Extrinsic analysis (also known as causal analysis)
3. Simulation

Further going into the details of methods for qualitative forecasting:

1. **Market research:** Anyone who has participated in a taste test at a supermarket has been a part of market research. Companies use this approach when they contemplate the introduction of a new beverage or flow.
2. **Panel consensus:** In a panel consensus, a panel of experts discusses an issue to make a decision. Examples of this method include a panel of experts developing an election forecast.
3. **Historical analogy:** In the historical analogy technique, the product goes through a cycle, and decisions are made based on the past experience of similar products. The demand for IoT will follow the same path as was followed by the demand for software. Thus, IoT demand can be predicted based on the demand graph which was created by software.
4. **Delphi method:** In the Delphi method, a panel of experts answer a sequence of questions where responses to one lead to the next question. This sequence of events continues through a number of rounds. The difference between the Delphi method and the panel consensus method is that the identity of experts is not revealed in the former.

Quantitative Forecasting

Quantitative forecasting techniques rely on the statistical analysis of data to generate a future forecast. These techniques are effective when historical data is readily available and the forecast horizon is short to mid-range.

The two methods of quantitative forecasting are as follows:

1. Time series forecasting:

- a. Time series forecasting is a method used for predicting activities through a chronological order.
- b. This technique forecasts future developments by evaluating previous patterns.
- c. This technique is best suited for product categories with low customer uncertainties.
- d. Time series forecasting can be done through the following ways:
 - i. Simple moving average
 - ii. Simple exponential smoothing
 - iii. ARIMA model

2. Causal forecasting:

- a. Causal forecasting is a forecasting strategy in which the predictive variable is believed to have a cause-and-effect relationship with one or more independent variables.
- b. In causal forecasting, demand forecast is assumed to be highly correlated to the environmental factors.
- c. Causal forecasting can be done through the following ways:
 - i. Regression modelling
 - ii. Econometric modelling
 - iii. Leading indicator modelling

Most companies use a mix of qualitative and quantitative approaches to arrive at a demand forecast.

Disclaimer: All content and material on the UpGrad website is copyrighted material, either belonging to UpGrad or its bonafide contributors and is purely for the dissemination of education. You are permitted to access print and download extracts from this site purely for your own education only and on the following basis:

- You can download this document from the website for self-use only.
- Any copies of this document, in part or full, saved to disc or to any other storage medium may only be used for subsequent, self-viewing purposes or to print an individual extract or copy for non-commercial personal use only.
- Any further dissemination, distribution, reproduction, copying of the content of the document herein or the uploading thereof on other websites or use of content for any other commercial/unauthorized purposes in any way which could infringe the intellectual property rights of UpGrad or its contributors, is strictly prohibited.
- No graphics, images or photographs from any accompanying text in this document will be used separately for unauthorised purposes.
- No material in this document will be modified, adapted or altered in any way.
- No part of this document or UpGrad content may be reproduced or stored in any other web site or included in any public or private electronic retrieval system or service without UpGrad's prior written permission.
- Any rights not expressly granted in these terms are reserved.

Summary

Supply Planning in Supply Chain

Supply Planning and Strategic Fit

Supply planning is the third step in the big picture of sales and operations planning (S&OP) process.

Supply planning is the entire planning process and it includes procurement, manufacturing and distribution operations according to demand forecasts, considering capacity constraints and material availability.

Supply planning broadly consist of the following three major components:

1. Procurement
2. Manufacturing
3. Distribution

An organisation faces the following obstacles that in achieving the strategic fit:

1. Increasing product variety
2. Rise in customers that are more demanding
3. Conflicts arising between different stakeholders within an organisation in taking up supply chain ownership
4. Globalisation within an organisation
5. Changing business environment
6. Difficulties faced while executing new strategies

Decision Making under Demand Uncertainty

Demand uncertainty reflects the uncertainty of the customer's demand for a product.

Implied demand uncertainty is the resulting uncertainty for only that portion of the demand that the supply chain plans to satisfy based on the customer needs.

This facet of demand uncertainty is managed through proper distribution by the organisation.

Distribution refers to the steps taken to move and store products from the supplier stage to the customer stage in the supply chain. Distribution happens from:

1. **Supplier to manufacturer:** Here, raw materials are moved.
2. **Manufacturer to consumer:** Here, finished goods are moved.

Distribution affects both the supply chain cost and the customer experience. Thus, it is imperative to design a distribution network that performs flawlessly.

Decision Making under Demand Variability

The demand for a product or a service does not remain constant throughout the year and fluctuates due to a number of factors, both internal and external. This phenomenon is known as **demand variability**.

There are four major causes of demand variability:

1. Volatility
2. Uncertainty
3. Complexity
4. Ambiguity

When the market signals a sharp increase in demand, especially in times of global crisis, supply chain leaders' profitability depends on being informed and agile enough to forecast and fulfil inventory in the right places, at the right speed and at the right time.

Five major actions that can be taken to plan for demand variability are as follows:

1. Maintain transparent, proactive relations with suppliers
2. Activate alternative sources of supply
3. Reduce lead time
4. Update inventory policy and planning
5. Align supply and demand management

Aggregate Planning

Once demand is forecasted and supply is planned, the next step in line is to plan for the production to cater to the supply. The planning done for this production process falls under the purview of **aggregate planning**.

An organisation finalises its business plans on the basis of demand forecast. This business plan is broken down to individual material requirements for a defined finite period. The process of working out these requirements for a medium range (between 2–3 months and 12–15 months) is called aggregate planning.

Advantage of conducting aggregate planning by an organisation are as follows:

- Aggregate planning helps organisations in dealing with the production facilities in a lean manner.
- It helps to develop effective strategic plans as well as relationships with distributors and suppliers.
- It helps in the optimisation of inventory.
- It serves as a useful tool for making viable forecasts.
- It helps organisations to identify the best options so that they can meet the demand easily.
- It assists in knowing about the inefficiencies that exist within the organisation.
- It also helps to determine resources within the organisation that are required in the manufacturing process.

Aggregate planning strategies are of the following three type:

1. **Level strategy**
 - a. A level strategy maintains a steady production rate as well as the level of the workforce by continuing consistent human resources and production in the organisation.
2. **Chase strategy**
 - a. A chase strategy keeps pace with demand fluctuations by varying either the actual level of output or the workforce number.
3. **Hybrid strategy**
 - a. A hybrid strategy maintains a sufficient balance between the stock level, recruiting, termination and production rate.

Supply Planning Case Study

In this segment, you have gone through a case study about a cement manufacturer who initiated a project to meet demand better, but after careful investigation changed their supply strategy.

The case study deals with understanding the implications of different ways of fulfilling demand.

Any manner of demand fulfilment has implications for the following:

1. **Customer satisfaction**, as the demand has to be met on-time and in-full
2. **Overall costs**, that includes tangible and intangible costs
 1. **Tangible costs** include the total logistics cost. It is also known as the total landed cost or total delivered cost and includes the following costs.
 - a. **Total manufacturing cost:** This is the total cost of production.
 - b. **Non-manufacturing expenses:** These are the administrative and developmental costs associated with the purchase of materials, engineering design, etc.
 - c. **Finished product logistics costs:** These are the logistics costs incurred for transporting the finished goods to the next entity in the supply chain, be it a distributor, a depot or a customer.
 2. **Intangible or hidden costs** include the following costs:
 - a. **Demurrage and wharfage charges:** These charges are faced by an organisation that uses Indian Railways to fulfil its demand. These charges are penalty charges that an organisation has to bear for using wharfs for extended periods of time and for temporary storage.
 - b. **Inventory holding costs:** As each railway rake can transport only 2600 tons, there are huge stockpiles of excess inventory. The inability to sell the excess stock to customers results in product obsolescence or the fine grains in the cement would become lumpy.

The objective of the project was twofold:

1. To ensure that all customer **demands are met on time and in full**
2. To ensure that the overall **costs are always under control**

The organisation had two centres in Tamil Nadu that produced cement, which had to be transported to all 14 districts of Kerala. As some of these districts and subdistricts had access to railheads and some did not, the mode of demand fulfilment was a combination of rail and road.

The table given below summarises and compares the available means of demand fulfilment.

Mode of Transport	Road Transport	Rail Transport
Partners	12 transporters	Only one: Indian Railways
Destination	Dispatched directly to depots in sub-districts, based on demand	Dispatched to goods sheds in districts. Further handling and

		transportation as per demand
Capacity (tons)	24 tons per truck	2,600 tons per rake
Lead time (days)	2 days	4 days

The situation was analysed from both the supplier's point of view and the receiver's point of view:

1. The supplier was indifferent to the mode of dispatch; they only wanted a quicker mode of evacuating their factories in order to achieve higher capacities of manufacturing and storage.
2. Prima facie, the receiver faced a higher landed cost when the material was transported by road. But using rail as a means of transport resulted in excess supplies, due to which the supply spiked suddenly and depleted after a long period of time.

Also, in using rail transport, the receiver was also burdened with the hidden costs of demurrage, wharfage, inventory holding, redistribution and transportation.

To check if the entire demand could be fulfilled via road, the organisation compared both modes of transport across all locations in Kerala. When all the costs were accounted for, the results were evident. Although the landed costs were higher for road transport, it accounted for a lower overall cost across all locations in Kerala.

By shifting their demand fulfilment mode to road transport, the organisation:

1. Reduced their lead time,
2. Reduced their delivered cost,
3. Improved customer satisfaction, and
4. Facilitated easier material handling.

Sales and Operations Planning (S&OP) and Its Need

S&OP is an aspect of supply chain planning whose goal is to create a unified, consensus-based business plan. This consensus is achieved through the cross-functional collaboration between the following departments:

- Sales
- Marketing
- Manufacturing
- Distribution
- Finance
- Human resources

There are certain limitations to statistical forecasting, as it relies heavily on models and historical data to produce estimates. However, other data, such as revenue and profit projections and marketing events, are often not a part of statistical forecasting.

This major drawback leads to the development of the sales and operation planning (S&OP) process.

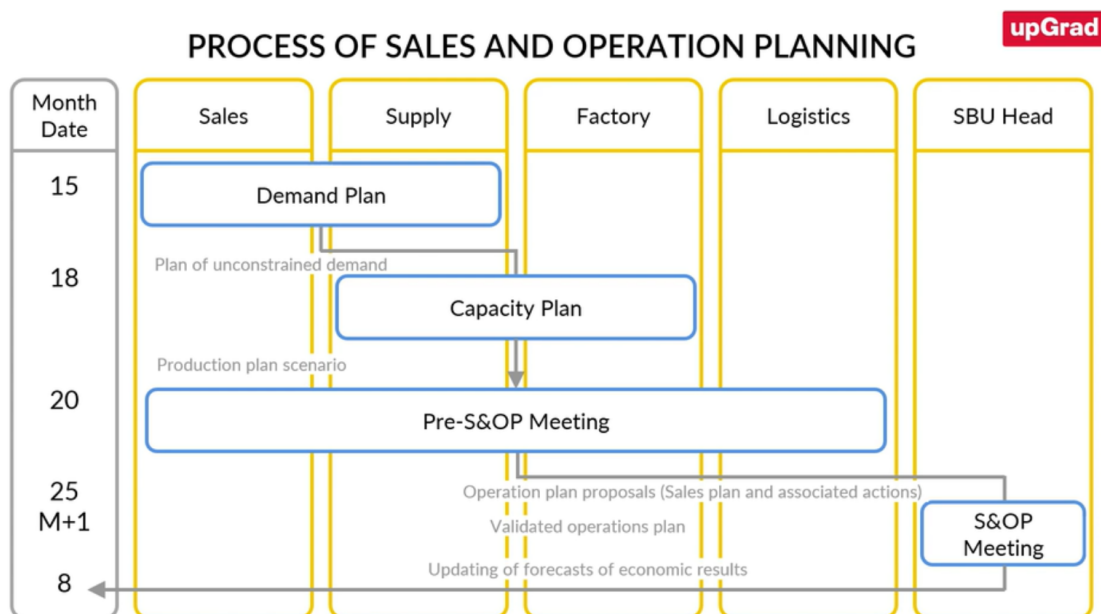
The aim of S&OP is to gain a holistic view of the planning process by extending the forecasting process to other functions and departments.

Incorporation of S&OP in an organisation

To incorporate S&OP within an organisation, it has to invest a lot in terms of time and other resources. The following points should be kept in mind to understand the incorporation of S&OP:

1. S&OP is an extremely important step in the entire supply chain planning process, and hence, it is typically led by senior management and executed on a monthly basis.
2. In this iterative process, the results from one planning cycle are compared with those of the next planning cycle to provide the management with information on trends from across the business.
3. Participants of the S&OP meeting evaluate the projections for supply and demand to ensure that the tactical plans for all business functions, across geographies, are aligned and support the organisation's broader strategy.

The following picture depicts the sequencing of activities in a sales and operations planning:



S&OP Horizons

A sales and operations planning process is defined in terms of objectives over short-, medium- and long-term periods. The different time horizons in S&OP are as follows:

1. Strategic horizon (long-term):

Strategic horizon involves making decisions for the next three to five years. This horizon includes planning for the following types of decisions:

1. Expansion of plant
2. Making changes in off-take policy or offtake agreement: It is an agreement between a producer and a buyer to purchase or sell a specified quantity of the producer's future production. Such an agreement is usually negotiated prior to the construction of a production facility.
3. Launching of new innovative products

2. Tactical horizon (mid-term):

1. Modification of the supply chain process
2. Making changes in recruitment and operations policy

3. Operational horizon (short-term):

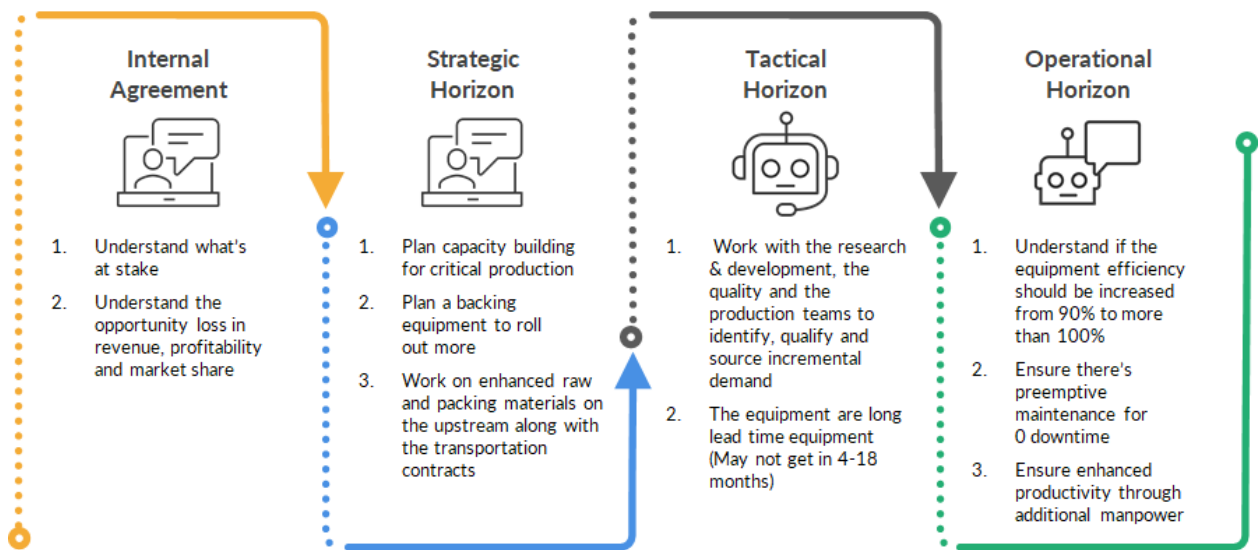
Operational horizon involves making decisions for the next four months. This horizon includes planning for the following types of decision:

1. Plans for anticipated and prepared flexibility
2. Deciding on number of teams
3. Hiring temporary workforce
4. Shift operations

S&OP in Real Life

In this segment you have learnt about a ready-to-eat food manufacturer that operates on a B2B model. This food manufacturer exports 60% of the goods produced and sells the remaining 40% in the domestic market. Its manufacturing plants run at 90% utilisation. The manufacturer is facing a supply shortage in both domestic and export markets. The image below summarises the key decisions that the manufacturer needs to make within the strategic, tactical and operational horizons.

PROBABLE APPROACH



Disclaimer: All content and material on the UpGrad website is copyrighted material, either belonging to UpGrad or its bonafide contributors and is purely for the dissemination of education. You are permitted to access print and download extracts from this site purely for your own education only and on the following basis:

- You can download this document from the website for self-use only.
- Any copies of this document, in part or full, saved to disc or to any other storage medium may only be used for subsequent, self-viewing purposes or to print an individual extract or copy for non-commercial personal use only.
- Any further dissemination, distribution, reproduction, copying of the content of the document herein or the uploading thereof on other websites or use of content for any other commercial/unauthorized purposes in any way which could infringe the intellectual property rights of UpGrad or its contributors, is strictly prohibited.
- No graphics, images or photographs from any accompanying text in this document will be used separately for unauthorised purposes.
- No material in this document will be modified, adapted or altered in any way.
- No part of this document or UpGrad content may be reproduced or stored in any other web site or included in any public or private electronic retrieval system or service without UpGrad's prior written permission.
- Any rights not expressly granted in these terms are reserved.

Session Summary

Key Sourcing Considerations

It is important for organisations to adopt effective sourcing strategies to maximise their performance and efficiency to gain a competitive advantage over their peers. In this module, you understood the importance of adopting the right sourcing strategy.

In this session, you learnt:

- The role of sourcing within the scope of the business value chain
- How to distinguish between direct and indirect sourcing
- The key aspects of sourcing, such as the level of processing required for certain products
- How sourcing decisions are made within various industries
- The role of 'make vs buy' decisions by understanding the reasons for outsourcing and the extent to which firms choose to control its ecosystem
- The difference between adopting a single- and a multiple-sourcing philosophy
- Apple's decision process when choosing to adopt a single- or a multiple-sourcing strategy

Introduction to Sourcing

In this segment, you learnt that the business value chain consists of the following cycle:

Source – Make – Move – Sell

With the help of the soft drink example, you identified the following steps in post planning, which make for a world-class supply chain:

- 1) Source – The raw materials to make the drink as well as the packaging materials so the drink reaches the customer in the right form and shape are sourced. Secondary materials, such as cartons and shrink wrap, also enable safe transit.
- 2) Make – Beverage made in the right quantity and of the right quality is stored in stock-keeping units.
- 3) Move – The product is transported to the end consumer through various channels, which include distributors, retailers and e-commerce partners.
- 4) Sell – The product is finally sold to the end consumer.

Direct vs Indirect Materials

In this segment, you learnt how to distinguish between direct and indirect sourcing.

Direct sourcing refers to the sourcing of a material that is directly involved in the making of a product. Examples include raw materials and packaging materials.

Indirect sourcing refers to the sourcing of a material that is not involved directly in the making of a product, but enables the organisation to produce it. An example is office supplies.

Next, you learnt about the factors that differentiate between direct and indirect materials. The table below summarises these differentiating factors.

	Direct Materials	Indirect Materials
Usage	Production	Maintenance, repair, and support operations
Accounting	Cost of goods sold	Selling, general, and administrative expenses
Impact on production	Any delay will delay production	Has a lower direct impact
Processing cost relative to value of transaction	Low	High
Number of transactions	Low	High

Product Form Considerations

In this segment, you learnt about the importance of sourcing strategies with the help of a few examples, which are given below.

1. An FMCG company, such as Amul, adopts the following strategies when sourcing for an agri-product, such as milk:
 - a. A village cooperative collects the milk.
 - b. The chiller plants store this milk, as required.
 - c. The dairy plant receives and checks the milk.
 2. For mobile phone and automobile manufacturers, sourcing the right parts and components is critical.
- A key takeaway from this example is that *with an increase in product complexity, the bill of materials and the number of vendors, too, increase.*
3. In e-commerce companies, the focus is more on ensuring that shipments are not damaged and the right courier partners are onboarded.
 4. Finally, for service-based organisations, such as Infosys, the right software needs to be sourced to deliver projects on a large scale.

Industry-Based Sourcing

In this segment, you learnt about the two key aspects of sourcing, that is:

- 1) A material can be used in its as-is form.
- 2) Material requires a certain level of processing before it can be used.

Through the example of a soft drink manufacturer, you understood that:

- 1) The materials that can be sourced and used in their as-is forms are raw materials, for example, sugar and water.
- 2) On the other hand, PET bottles require a certain level of processing before being used.

Outsourcing

In this segment, you learnt that outsourcing is a supply chain function, wherein a firm decides that a particular business activity will be performed by a third party.

A firm decides to outsource in order to increase its supply chain surplus.

The following factors affect the growth of supply chain surplus:

1. Scale – If the scale is already large, then it is less likely that outsourcing can achieve further economies of scale.
2. Uncertainty – If requirements are highly variable over a period of time, then choosing to outsource may increase the surplus through aggregation.
3. Specificity of assets – If assets are highly firm-specific, then outsourcing may be less suitable.

Single vs Multiple Sourcing

In this segment, you learnt about the differences between a single- and a multiple-sourcing strategy, which include the following:

1. Single sourcing strategy – This is a situation in which a firm decides to procure raw materials from a single supplier.
2. Multiple sourcing strategy – This is a situation in which a firm decides to procure raw materials from multiple suppliers.

Through the example of Erikson and Nokia, you gained an understanding of the impact of the choice of the correct sourcing strategy on a firm.

In the year 2000, a fire broke out at a Phillips plant, which resulted in significant losses as the production at the plant was hit. At the time of the incident, Phillips was a microchip supplier for both Erikson and Nokia. Here is how both of these companies were affected, as a result of the plant closure.

Eriksson

- It had adopted a single-sourcing policy.

- As there was no other source for microchips, it resulted in a disruption for months together.
- The loss amounted to more than \$400 million.

Nokia

- It had adopted a multiple-sourcing policy.
- It began switching its chip orders to other Phillips plants and using alternative suppliers.
- There was little impact on production despite the plant closure.

Apple-Samsung Battle

The world's leading smartphone rivals, Apple and Samsung, have been in a business relationship since the year 2008.

However, this relationship turned sour in 2011. Samsung has been a key supplier of display panels for Apple products. One of the most eye-catching features of the iPhone, the OLED screen, is manufactured by Samsung. In 2011, Apple accused Samsung of infringing on Apple's patents. This led to an almost decade-long legal battle between the two tech giants.

As a result, Apple was at a crossroads about how to continue its supplier relationship with Samsung. At the time, Apple had adopted a single-sourcing strategy, as OLED screens were sourced primarily from Samsung.

The following options were available to Apple:

Option 1

Continue its single-sourcing policy

Option 2

Switch from single sourcing to multiple sourcing

Option 3

Create its own supplier base

It is noted that Apple has continued its relationship with Samsung for having a single-sourcing policy.

Disclaimer: All content and material on the upGrad website is copyrighted, either belonging to upGrad or its bonafide contributors and is purely for the dissemination of education. You are permitted to access, print and download extracts from this site purely for your own education only and on the following basis:

- You can download this document from the website for self-use only.
- Any copies of this document, in part or full, saved to disk or to any other storage medium, may only be used for subsequent, self-viewing purposes or to print an individual extract or copy for non-commercial personal use only.
- Any further dissemination, distribution, reproduction, copying of the content of the document herein or the uploading thereof on other websites, or use of the content for any other

commercial/unauthorised purposes in any way which could infringe the intellectual property rights of upGrad or its contributors, is strictly prohibited.

- *No graphics, images or photographs from any accompanying text in this document will be used separately for unauthorised purposes.*
- *No material in this document will be modified, adapted or altered in any way.*
- *No part of this document or upGrad content may be reproduced or stored in any other website or included in any public or private electronic retrieval system or service without upGrad's prior written permission.*
- *Any right not expressly granted in these terms is reserved.*

Session Summary

Purchasing Cycle and Vendor Management

In this session, you:

- Identified the seven steps of the purchasing cycle,
- Understood the sourcing decisions made by companies using the 7-step framework of the purchasing cycle,
- Understood the qualitative aspects to consider while choosing an appropriate supplier,
- Learnt how to use the weighted average method to select suppliers,
- Understood the key performance metrics to measure sourcing,
- Identified the key sourcing challenges faced by a company,
- Analysed Apple's purchasing cycle using the 7-step framework, and
- Learnt about the sourcing challenges faced by Apple.

Purchasing Cycle

In this segment, you learnt about the following seven steps of the purchasing cycle, and through the example of a soft drink, you understood how they are applied to a real-world product.

Step 1: Receiving and analysing purchase requisitions

Purchase requests are received from internal planning functions within an organisation. For the soft drink example, these requests will include all specifications of inputs, such as raw material and packaging material. All inventory based on the lead time is shared with the procurement team.

Step 2: Selecting suppliers

Searching for potential suppliers involves issuing 'requests for quotations' to these potential suppliers, receiving and analysing those quotations, and, finally, selecting the correct supplier. The goal is to find the correct set of vendors who can provide the required material.

Step 3: Determining the correct price

Negotiate the correct price for the desired specifications. In the soft drink example, all specifications will be drawn up, such as the width of the cap and the strength of the bottles, and all vendors must be made aware of these specifications before negotiating for the price.

Step 4: Issuing purchase orders

After selecting the supplier, the company has to issue a purchase order to the supplier. This is a formal process

of issuing written contracts with the desired specification of the product and the terms of service.

Step 5: Following up to ensure that delivery dates are met

The inventory and frequency of the delivery of each product are determined depending on the lead time. In the soft drink example, a perishable product such as sugar will be ordered more frequently than bottle labels, which can easily be stored.

Step 6: Receiving and accepting goods

The purchase does not end after a purchase order has been issued. The next important step is to receive the goods by checking their quality. If a product is rejected, the company needs to ensure that it is replaced by the supplier.

Ensuring that the quality metrics are met and continuous feedback is provided to suppliers is the prime responsibility involved in the sourcing function.

Step 7: Approving suppliers' invoice for payment

The purchase cycle ends at the final stage, that is, paying the supplier. It has to generate the goods received note, after which the payment is processed.

This is a transactional step, but it is critical for ensuring a smooth relationship between clients and vendors. A correct reconciliation process needs to be maintained.

Purchasing Cycle - Big Bazaar

In this segment, you learnt that because large retail stores have a wide assortment of products, generally, each category (for example, breakfast, soft drinks or toys) has a **dedicated buying team** who works closely with suppliers to ensure that the relevant products are available for consumers.

Using the 7-step purchasing cycle framework, you understood how sourcing decisions are made in a large-format retail store such as Big Bazaar.

These steps are as follows:

Step 1: Receiving and analysing purchase requisitions

The dedicated buying team anticipates the overall demand for each category.

Next, they determine the brand-specific demand, which is influenced by consumer preferences that may vary based on geography.

Finally, they determine the correct Stock Keeping Unit (SKU) mix for each category.

Step 2: Selecting suppliers

It is essential to determine the existing players in the market.

One needs to understand the players that hold a greater brand pull for the set of consumers that are targeted.

Step 3: Determining the correct price

It is necessary to understand all the discounts and promotional offers provided by a particular brand. Customers buy more from the categories in which margins are high and stores can push/promote the products enough.

Joint business plans are made to collaborate for volumes, discounts, co-branding and promotions.

Step 4: Issuing purchase orders

A formal note for all brands with relevant specifications and quantities is issued. This purchase order must be time-bound.

Step 5: Following up to ensure that delivery dates are met

This manual step is extremely relevant in the Indian context. Purchase order success is measured by the following metric: 'On time and in full' (OTIF). This means that the order needs to be received on the specified date as agreed upon, and there should not be anything missing that makes the orders partially fulfilled.

Step 6: Receiving and accepting goods

Certain quality standards and the remaining shelf life of the products are to be maintained. For example, soft drinks that have a shelf life of less than 60% are not accepted. This is done to ensure that fresh stock is present on the shelves and stock-outs are avoided.

Step 7: Approving suppliers' invoice for payment

In this step, the agreed-upon payment and credit terms between vendors and retail chains are fulfilled.

Vendor Selection

In this segment, you learnt about the various factors that influence vendor selection. These are as follows:

1. Technical ability

Understanding the product and investing in R&D is essential for a vendor, and this factor becomes more relevant when dealing with high-tech specification products.

2. Manufacturing capability

For this factor, it is important to investigate whether the vendor has the capacity in terms of machinery and manpower to deliver the required goods.

3. Reliability

Having a reliable output with a low rejection percentage is desired.

To ensure that this factor is considered, most companies have a quality certification program that helps to monitor vendor processes.

4. After-sales services

A supplier's role does not end once the product is delivered. An important consideration is focusing on maintaining good after-sales services. Long-term associations happen with vendors when they exceed expectations. This plays an important role in ensuring the longevity of relationships with customers.

5. Supplier location

A facility near the production plant is desirable; however, the key takeaway here is that proximity to your vendor base depends on your most critical factor.

For example, Maruti in Gurgaon chose to be near their large vendor base so that they could have easier access to their parts suppliers instead of being near a port, which may have resulted in its transportation and logistics costs being lower.

Each company needs to consider its most 'critical factor' and base its decisions on it.

6. Just-in-time capability

This means that the material is moved 'just in time' or just before it is needed in the manufacturing process. The technique reduces the need to store excessive quantities of material in a warehouse, and hence, a vendor with this capability reduces the inventory carrying costs incurred by the company.

7. Price

This is an important factor, as it is the goal of all companies to reduce overhead costs and increase the bottom line. The key takeaway is that the price should not be the only factor that is considered, and decisions regarding vendor selection should be made on a more holistic basis.

Supplier Performance

In this segment, you learnt about the key metrics to measure sourcing performance.

They are as follows:

1. Adherence to specification
2. Cost

When considering commodity buying within FMCG products, a specific sourcing strategy needs to be considered.

For instance, longer lead times may be more appropriate for packaging products than agri products that have a shorter shelf life and, hence, could have a longer term forward, buying contracts to hedge risk. A strategy of continuously monitoring the price and buying on dips may also be chosen for certain high availability material but would be more difficult for agri products, which may require a continuous flow to be maintained.

Finally, you learnt about the performance metrics for a third-party or logistic service provider. These metrics are as follows:

1. Cost per box shipped

This is the per-unit cost of the product.

2. Inventory mismatch

The system inventory and physical stock should be well matched.

3. Manpower productivity

This refers to the number of boxes shipped per manpower.

4. Local authority issues

Be aware of the local authority rules and regulations and understand the impact these have on your company.

Sourcing Challenges

In this segment, you learnt about the following key sourcing challenges to keep in mind:

1. Non-adherence to quality standards

Ensuring that quality standards are met is essential; however, globalisation poses a risk, as each country has different specifications for the same material.

Understanding local specifications is important and requires a specific skill set.

2. Long-range logistics

Managing a well-oiled logistic system is necessary because if raw material and packaging material do not reach the desired factory location, they are worthless. Vendors who are integrated well with logistic service providers have an edge in today's times.

3. Delays in supplies

This has a negative impact with respect to the following:

- Loss in sales
- Loss in shelf space
- Dent in customer experience

4. Compliance issues

Understanding local statutory compliance laws is critical. All local laws must be abided by, and with the globalisation of supply chains, this becomes more relevant.

5. Geopolitical risk

Any geopolitical disruption leads to issues with respect to the supply and demand sides.

Apple Sourcing Process and Challenges

In this segment, we discussed the seven steps of the purchasing process, and you learnt how this relates to the development of iPhones. The seven steps are mentioned below.

1. Receiving and analysing purchase requisitions

Apple required a high level of coordination between stakeholders, as the product life cycle was short.

2. Selecting suppliers

Apple wanted control over its suppliers and was, hence, involved in every step in building iPhones.

3. Determining the correct price

Apple invested large capital in its suppliers in exchange for full control of the production and management of the iPhone manufacturing process. The large investment in R&D is built into the cost of the iPhone.

4. Issuing purchase order

Apple evaluated its supply base and issued purchase orders based on the capacity and low cost of production.

5. Following up to ensure that delivery dates are met

Suppliers met Apple's every demand owing to the large capital investment.

6. Receiving and accepting goods

Apple conducted strict quality checks to protect its brand reputation.

7. Approving suppliers' invoices for payment

The cost of keeping the inventory was borne by the supplier. Apple used to extend payables to as long as 90 days after the parts were used.

Disclaimer: All content and material on the upGrad website is copyrighted, either belonging to upGrad or its bonafide contributors and is purely for the dissemination of education. You are permitted to access, print and download extracts from this site purely for your own education only and on the following basis:

- You can download this document from the website for self-use only.
- Any copies of this document, in part or full, saved to disk or to any other storage medium, may only be used for subsequent, self-viewing purposes or to print an individual extract or copy for non-commercial personal use only.
- Any further dissemination, distribution, reproduction, copying of the content of the document herein or the uploading thereof on other websites, or use of the content for any other commercial/unauthorised purposes in any way which could infringe the intellectual property rights of upGrad or its contributors, is strictly prohibited.
- No graphics, images or photographs from any accompanying text in this document will be used separately for unauthorised purposes.
- No material in this document will be modified, adapted or altered in any way.

- *No part of this document or upGrad content may be reproduced or stored in any other website or included in any public or private electronic retrieval system or service without upGrad's prior written permission.*
- *Any right not expressly granted in these terms is reserved.*

Summary

Transportation and Inventory Management

What is Logistics?

Logistics is the process of getting the correct product to the customer in the correct condition at the correct time to the correct place and at the lowest or most optimal cost.

Managing logistics means managing two important elements in an organisation, inventory (along with its corresponding warehousing) and distribution (including transportation).

1. **Inventory:** Inventory is an idle stock of physical goods that has an economic value associated with it. It is visible throughout numerous points in an organisation's production. Inventory could be for a variety of goods such as:
 - a. A stockpile of raw or packing material
 - b. Supplies
 - c. Work in progress
 - d. Finished goods
2. **Transportation:** Transportation refers to the movement and modes of movement of goods and persons from one place to another. These places are referred to as nodes in a supply chain. The different modes of transport that are available are as follows:
 - a. Air
 - b. Water
 - c. Land or surface

Logistics is the process of moving and positioning inventory to meet customer requirements while ensuring the following:

1. Optimum time and place for positioning goods
2. Minimum total landed cost
3. Minimal assets

Distribution channels include retailers, wholesalers, direct mail and field sales. Depending on the type of business and products that you are selling, you have to incorporate any of these distribution channels within your logistics network.

Over the past few years, Indian government has taken some steps to build the logistics infrastructure in the country. These steps are as follows:

1. With the implementation of the **Goods and Services Tax (GST)**, India has witnessed **consolidation in warehouse** infrastructure that has led to a 30% reduction in inventory levels and **40% increment in inventory turnover**.
2. India has also implemented the concept of **multimodal logistics parks (MMLPs)**. The advantages of MMLPs are as follows:
 - a. Reduction in overall freight and warehousing costs
 - b. Reduction in pollution levels and traffic congestion

How to Manage Inventory?

An organisation has multiple motives for carrying an inventory. These motives are classified into the following three categories:

1. **Transactional motive:** This type of motive includes the following:
 - a. An enterprise maintains inventories to avoid bottlenecks in its production and sales activities.
 - b. By maintaining inventories, businesses ensure that production is not interrupted owing to the shortage of raw material and sales are not affected on account of non-availability of finished goods.
2. **Precautionary motive:** These types of motives include the following:
 - a. An enterprise holds inventories to reduce the risk during an unpredicted event such as a natural calamity or a pandemic.
 - b. Under such exceptional circumstances:
 - i. There can be a sudden and unexpected spurt in the demand for finished goods.
 - ii. There can be an unforeseen slump in the supply of raw material.
 - c. Under both these cases, a prudent business would surely prefer having some cushion to guard against the risk of such unpredictable changes.
3. **Speculative motive:** These types of motives include the following:
 - a. Enterprises hold inventories to take advantage of price fluctuations:
 - i. If the prices of raw material are expected to increase steeply in the near future, the enterprise is likely to hold more inventories than required at lower prices.

Along with meeting all the motives that are stated above, there are other benefits of holding inventory. These benefits are as follows:

1. It reduces the ordering cost that is incurred every time an organisation purchases raw material.
2. It also helps an organisation in achieving efficient production run.

If an organisation decides to hold a huge inventory, then this inventory also has some costs associated with it. These costs are as follows:

1. **Material costs:** These are also known as **ordering costs**.
 - a. It includes costs associated with placing orders to purchase:
 - i. Raw material and components
 - ii. Clerical and administrative salaries
 - iii. Postage, telegrams, bills, stationery, etc.
 - b. Higher the number of orders, higher will be the ordering costs and vice versa.
2. **Carrying costs:**
 - a. It includes costs involved in **holding or carrying inventories** such as the following:
 - i. Insurance charges for covering risks
 - ii. Rent for the floor space occupied
 - iii. Wages paid to labourers
 - iv. Wastages, obsolescence or deterioration, thefts and pilferage
 - b. It also includes **opportunity costs**.

- i. If the money that is blocked in inventories is invested elsewhere in the business, it would have earned a certain return. The loss of such returns is considered to be an opportunity cost.

In order to achieve the motives and benefits of having inventory without increasing the cost associated with it, organisations follow certain industry practices within inventory management. They classify their inventories into the following two types:

1. **Make to stock (MTS):**

- a. This includes fast-moving inventory whose demand is highly predictable.
- b. Example: Pizza Hut has stocks of cold drinks and cookies, as they are commonly used in each customer order.

2. **Make to order (MTO):**

- a. This includes slow-moving inventory whose demand is not predictable.
- b. Example: Special types of pizzas that are not ordered frequently in a Pizza Hut outlet
- c. In order to quicken the process of delivery to the customer, organisations use the concept of **delayed differentiation**.
- d. Using delayed differentiation, Pizza Hut maintains a stock of pizza bases and toppings such as cheese, mushrooms and baby corn so that as soon as the order is placed, the company will customise the pizza using the base and toppings and deliver it to the customer at the earliest.

Organisations also follow certain industry practices to replenish their inventory to avoid stock-out. A couple of the replenishment models used are as follows:

1. **Traditional method:**

- a. An example of this method includes the FMCG sales representatives visiting retailers to discuss their future orders.
- b. This method is suitable only when the number of items/stock-keeping units (SKUs) is low in number.

2. **Vendor-managed inventory (VMI):**

- a. This type of method is highly suitable when an organisation is dealing with a large number of SKUs.
- b. For every SKU, there is a predefined inventory level, and when the inventory goes below that level, the order is automatically triggered to replenish that SKU from the concerned supplier who then supplies the SKU from its warehouse or distribution centre.
- c. Ikea uses VMI as a mode of inventory replenishment.

What is the Need for Transportation?

Supply chain visibility is a key criterion in avoiding a mismatch between supply and demand. **Transportation is one of the important links that enhance supply chain visibility.**

There are different modes of transportation that are used by organisations to transport their products. These modes are as follows:

1. **Surface transport:** Surface transport can be segmented into the following modes:

- a. **Road transport:**

- i. Road transport uses a combination of **trailers** in the form of **flatbeds** or **containers**.
- ii. Road transport also uses **trucks** of various sizes such as **tempos**, heavy commercial vehicles (**HCV**), medium commercial vehicles (**MCV**) and light commercial vehicles (**LCV**).

iii. Road transport also uses **bullets** and **bunkers**.

b. Rail transport:

i. Rail transport uses **wagons**, **rakes** (a combination of close to 40 rakes) and **bullets**.

2. **Water transport:** Water transport uses two modes, which are **ships with containers** and **barges** (used between ports within a country or in inland waterways).
3. **Air transport:** Air transport uses **cargo flights** and **special flights** (used by major courier companies).
4. **E-commerce transport:** E-commerce transport uses a combination of surface transport modes, along with **courier** services for last-mile delivery.

Over the past few years, Indian government has taken some steps to build the transportation infrastructure in the country. These steps are as follows:

1. **Seaport development** for movement of cargo. This is achieved through public-private partnerships (PPP) such as the following:
 - a. The Jawaharlal Nehru Port Trust in Nhava Sheva
 - b. The Krishnapatnam Port Trust in Andhra Pradesh
2. **Inland container depot development:** Close to 50 such depots are already developed in India in locations such as Tughlakabad and Sanathnagar.
3. **Hub development for air traffic:** Twenty-four air cargo hubs have been developed in India up till 2020 in locations such as Nagpur.
4. Development of **special economic zones (SEZ)**, **export-oriented units** and **road transport hubs** in locations such as Ichchapuram, near Visakhapatnam, and Delhi (Sanjay Gandhi National Hub).

Disclaimer: All content and material on the UpGrad website is copyrighted material, either belonging to UpGrad or its bonafide contributors and is purely for the dissemination of education. You are permitted to access print and download extracts from this site purely for your own education only and on the following basis:

- You can download this document from the website for self-use only.
- Any copies of this document, in part or full, saved to disc or to any other storage medium may only be used for subsequent, self-viewing purposes or to print an individual extract or copy for non-commercial personal use only.
- Any further dissemination, distribution, reproduction, copying of the content of the document herein or the uploading thereof on other websites or use of content for any other commercial/unauthorized purposes in any way which could infringe the intellectual property rights of UpGrad or its contributors, is strictly prohibited.
- No graphics, images or photographs from any accompanying text in this document will be used separately for unauthorised purposes.
- No material in this document will be modified, adapted or altered in any way.
- No part of this document or UpGrad content may be reproduced or stored in any other web site or included in any public or private electronic retrieval system or service without UpGrad's prior written permission.
- Any rights not expressly granted in these terms are reserved.

Summary

Distribution Network Management

How to Distribute Your Products?

There are certain principles of logistics or distribution systems that must always be adhered to. These are as follows:

1. **Working backwards from the endpoints** to meet customer requirements
2. **Utilising assets to the maximum extent possible**, whether they are machines, vehicles or even floor space
3. **Avoiding double handling**; for example, deciding between a one-step and a two-step distribution process
4. Ensuring that the **logistics system is always reliable**, be it with regard to the equipment or the data being used in the system
5. Ensuring that **information is valid, correct, transparent and the same** for all the entities in the supply chain, as it may be critical in reducing costs and increasing customer satisfaction
6. Deciding between **owning and purchasing** logistics services
7. **Providing incentives** to achieve internal and external efficiency

Some of the major practical considerations of a distribution system include understanding the required results, estimating the total system impact of a design and being realistic about the analysis being performed. The design of distribution systems has far-flung effects, as it can affect product margins, profits, marketing budgets, the final retail price of a product, and consequently, sales management practices.

There are specific distribution strategies that are used by organisations for the distribution of their products. These strategies are as follows:

1. **Cross-docking**: In cross-docking, any storage areas hardly exist between the factory and the customer. The stock is almost always on wheels and is transferred from inbound to outbound modes of transport. In cross-docking, the products are received from an inbound transportation dock and then are transferred to an outbound transportation dock. This entire process happens at a place known as **distribution docking terminal**.
2. **Milk run**: Milk run is a delivery method in which a truck either collects the product from a single supplier and delivers it to multiple retailers or collects products from multiple suppliers and delivers them to a single retailer.
3. **Direct shipping**: As the name suggests, direct shipping involves the direct movement of goods from suppliers to customers, or vice versa. The simplest mode requires only two decision points: the quantity required to ship and the number of trucks to be used.
4. **Hub-and-spoke model**: A hub holds the inventory for a large region, with each spoke leading to a smaller location based on the region's requirement. The main driver for the hub-and-spoke model is the proximity to customers.

Considerations in Designing Distribution Network

A distribution network needs to consider a lot of variables in its designing phase. These variables are categorised into separate factors as given below.

1. Strategic factors
2. Technological factors
3. Macroeconomic factors
4. Political factors
5. Infrastructure factors
6. Competitive factors

1. **Strategic factors:** A distribution network includes parameters related to the **location and role of an organisation's facilities**. These parameters are as follows:
 - a. Firms that **focus on reducing their cost tend to find lowest-cost locations** even if they are far away from their customers.
 - i. Example: Apparel manufacturers shifted their production facilities from the US to Asian markets even though their majority sales were coming from the US.
 - b. Firms that **focus on being responsive to their customer needs tend to locate their facilities closer to their customers**.
 - i. Example: Zara has its manufacturing facilities in high-cost locations of Spain and Portugal in order to quickly adapt to European fashion trends.
 - c. Organisations that work on a global scale tend to **assign different roles to different facilities based on their geographical location**.
 - i. Example: Nike has production facilities in China and Indonesia that focus on cost and produce mass-market-priced shoes. While Nike's production facilities in Taiwan and South Korea focus on responsiveness and produce highly-priced new-designed shoes.
 - d. The types of roles that an organisational facility can play are as follows:
 - i. **Offshore facilities:** These are low-cost facilities aimed for export-oriented productions.
 - ii. **Source facilities:** These are low-cost facilities aimed for global productions. Good offshore facilities overtime migrate to become source facilities.
 - iii. **Server facilities:** These are regional production facilities that are typically used to either take advantage of a location's tax incentives or overcome trade barriers and logistics costs.
 - iv. **Contributor facilities:** These are regional production facilities that serve only the market where they are located.
 - v. **Outpost facilities:** These are regional production facilities that are built to gain local skills.
 - vi. **Lead facilities:** These are facilities that lead in research and development and production technologies. They create new products, processes and technologies for the entire network that they serve.
2. **Technological factors:** If the production technology displays significant economies of scale, then limited but high-capacity locations are better for the distribution network. Whereas if facilities have lower fixed costs, then many local facilities are preferred, as this helps in lowering the transportation costs.

3. **Macroeconomic factors:** These refer to taxes, tariffs, exchange rates and other similar factors.
4. **Political factors:** Companies prefer locations that have political stability, no unrest and where rules of commerce and ownership are well-defined with an unbiased judicial system.
5. **Infrastructure factors:** This includes the availability of good infrastructure, sites and labour and proximity to transportation terminals such as rails and roads. These factors play an important role in deciding the location of organisational facilities.
6. **Competitive factors:** Companies must take into account their competitor's strategy. Positive externalities between companies happen when they locate in closer proximity, and by doing so, they not only increase the combined demand of a specific product but also ensure that the customer has to come to one location to get what they desire. Example: Gas stations, petrol pumps and shops in a mall are all clustered together.

How to Design a Distribution Network?

While designing a distribution network, an organisation needs to ask two fundamental questions to itself. These questions are as follows:

1. How will the product be delivered to the customer?
2. Will the product flow use any intermediate storage locations?

Based on the responses to the questions given above, an organisation can implement the following types of distribution network designs:

1. **Manufacturing storage with direct shipping to customer:** Within this type of network design, the product is shipped directly from the manufacturer to the customer, bypassing distributors, retailers and depots.
2. **Manufacturing storage with direct shipping and in-transit storage:** Within this type of network design, the product is shipped from the manufacturer to the customer using intermediate storage or a cross-dock facility. Such a type of distribution network is used when an organisation is selling bundled products such as a Dell PC with a Sony monitor.
3. **Distributor storage with package carrier delivery:** Within this type of network design, the inventory is held by the distributor with a warehouse who ships to the customers. Such a type of distribution network is used by e-commerce companies such as Amazon and Flipkart that are selling products from multiple sellers.
4. **Distributor storage with last-mile delivery:** Within this type of network design, the inventory is held by the distributor with a warehouse who ships and delivers it to the customers. Such a type of distribution network is used by online grocery companies such as BigBasket and Grofers.
5. **Manufacturer/Distributor storage with customer pickup:** Within this type of network design, the product is stored by the manufacturer or the distributor, but the transport for product pickup is managed by the customer.
6. **Retail storage with customer pickup:** Within this type of network design, the inventory is stored at the retail outlets, and customers visit and purchase the product from the retail outlet. Such a type of distribution network is used by retail chains such as Big Bazaar.

A correct set of network designs is shortlisted by understanding the characteristics of the product that an organisation is selling and then ranking the performance of each of the six distribution network designs on these characteristics. The characteristics are as follows:

1. Response time
2. Product variety

3. Product availability
4. Customer experience
5. Time to market
6. Order visibility
7. Returnability
8. Inventory cost
9. Transportation cost
10. Facility and handling costs
11. Cost of information flow between supply chain stakeholders
12. Product demand

Based on the importance that an organisation gives to each of these characteristics combined with the performance of each of the six distribution network designs on those characteristics, the organisation finalises on the set of distribution network designs that it can use to carry out the distribution of its products.

Performance of a Distribution Network

An organisation should analyse the performance of its distribution network on two parameters. These parameters are as follows:

1. **Meeting customer needs**
2. **Cost of meeting the customer needs**

The analysis of the first parameter (**meeting customer needs**) is done by evaluating the performance of the distribution network on the same set of product characteristics that were used at the time of selecting the network. These characteristics are as follows:

1. **Response time:** Response time is the amount of time it takes for a customer to receive an order.
2. **Product variety:** Product variety is the number of different configurations that are offered by the distribution network.
3. **Product availability:** Product availability is the probability of having a product in stock when a customer order arrives.
4. **Customer experience:** Customer experience is the ease with which customers can place and receive orders.
5. **Time to market:** Time to market is the time it takes to bring a new product to the market.
6. **Returnability:** Returnability is the ease with which a customer can return unsatisfactory products.

The analysis of the second parameter (**cost of meeting the customer needs**) is done by evaluating the supply chain costs incurred by the distribution network. These costs are as follows:

1. Inventory cost
2. Transportation cost
3. Facility and handling costs
4. Cost of information flow between supply chain stakeholders

Changing the distribution network design of an organisation not only has an impact on all of the above-mentioned product characteristics and supply chain costs but also affects the following organisational strategies:

1. Sourcing strategy
2. Pricing strategy

Disclaimer: All content and material on the UpGrad website is copyrighted material, either belonging to UpGrad or its bonafide contributors and is purely for the dissemination of education. You are permitted to access print and download extracts from this site purely for your own education only and on the following basis:

- You can download this document from the website for self-use only.
- Any copies of this document, in part or full, saved to disc or to any other storage medium may only be used for subsequent, self-viewing purposes or to print an individual extract or copy for non-commercial personal use only.
- Any further dissemination, distribution, reproduction, copying of the content of the document herein or the uploading thereof on other websites or use of content for any other commercial/unauthorized purposes in any way which could infringe the intellectual property rights of UpGrad or its contributors, is strictly prohibited.
- No graphics, images or photographs from any accompanying text in this document will be used separately for unauthorised purposes.
- No material in this document will be modified, adapted or altered in any way.
- No part of this document or UpGrad content may be reproduced or stored in any other web site or included in any public or private electronic retrieval system or service without UpGrad's prior written permission.
- Any rights not expressly granted in these terms are reserved.

Summary

Warehouse Management and Supply Chain Coordination

How to Manage the Warehouses?

The inventories are stored within an organisation's **warehouses and distribution centres (DCs)**.

To manage its warehouses, an organisation asks two key questions to itself. These questions are as follows:

1. **How many distribution centres (DCs) are required** to adequately serve the customers?
2. **How to minimise the cost** of warehousing?

An organisation's response to the two questions given above helps it to measure the cost impact of undertaking this activity. The following are the costs that are affected:

1. Storage cost
2. Inventory holding cost
3. Transportation cost
4. Customer delivery or last-mile cost to serve
5. Warehouse management system (WMS) cost

In order to streamline the service levels, some rules can be formed for deliveries based on the distance to be covered from each warehouse. Although generic rules can be formed/followed, an optimum rule must be put in place.

Defining such an optimum rule requires us to:

1. **Follow common sense**
2. **Use optimisation tools:** These tools take into account the following parameters:
 - a. Warehouses that are needed to **serve the customer markets**
 - b. Warehouses that are needed to be **closer to the transport markets**
 - c. Warehouses that are required to **establish a hub-and-spoke model**
 - d. Warehouses that are to be **used as distribution centres (DCs) or regional distribution centres (RDCs)**

A typical model used commonly by organisations in deciding the number of warehouses that it needs to have is the cost-to-serve model:

1. In this model, the supply chain team begins with the **consideration of the expected service levels**. The service levels expected by customers help you in determining the optimum number of storage points required.
2. Additionally, **considering the cost and the time required to meet these service levels** will help in designing the 'first cut' of the warehouse network.
3. From the first cut, an iterative approach can be followed to develop the optimum warehouse network.

Over the past years, some of the major Innovations have been happening in the field of logistics. These innovations are as follows:

1. **Relay model:** A truck driver drives a maximum stretch of 200–300 kilometres after which the truck is handed over to another truck driver, thereby forming a relay structure.
 - a. As a result of this model, the driver is able to come back to his base location after every one or two days, thereby improving their work-life balance.
2. **Use of big data:** Companies use built-in sensors in their transportation vehicles.
 - a. This improves the visibility of every vehicle, as it moves from one node to another in a supply chain.
3. **Use of data analytics:** The company can use big data and analyse it to find truck drivers that are more reliable than the others.
 - a. It can then use these reliable truck drivers to handle fragile shipments in the future.

How to Coordinate Within a Supply Chain?

Supply chain coordination is an important pillar for managing the entire supply chain. Every stage in a supply chain has its own set of actions. These actions need to be aligned with each other in order to increase the value that is generated from the supply chain.

This coordination is achieved by the following:

1. Information needs to be constantly shared among different stakeholders.
2. Every stakeholder needs to take into account the effects of their actions on other stakeholders.

Coordination is affected when the objectives of different stakeholders are not aligned with each other or when the information flowing across the stakeholders is delayed or distorted.

Some techniques that are used to improve coordination in a supply chain are as follows:

1. Pricing strategy
2. Improving operational performance: Operational performance can be improved by reducing the replenishment lead time. The replenishment lead time can be reduced in the following ways:
 - a. Electronic data interchange-based ordering
 - b. Reducing lot size
 - c. Rationing based on past sales
3. Improving information visibility and accuracy in the supply chain. This can be achieved in the following two ways:
 - a. Continuous replenishment program (CRP):
 - i. CRP is a base that is used to support the entire efficient consumer response (ECR) strategy.
 - ii. CRP is used to replenish products in real-time.
 - iii. In CRP, products are replenished only as per the quantity sold and as needed in real-time. Since all the activities take place in real-time, there is no optimal order point, i.e., no specific time to order for replenishments.
 - b. Vendor-managed inventory (VMI):
 - i. The buyer of a product provides information to a vendor of that product.
 - ii. The vendor takes full responsibility for maintaining an agreed-upon inventory of the material, which is usually at the buyer's consumption location.

Bullwhip Effect

A phenomenon that is caused when coordination and efficiency are not maintained in a supply chain is called the **bullwhip effect**.

1. The bullwhip effect is a distribution channel phenomenon in which demand forecasts yield supply chain inefficiencies.
2. It refers to increasing fluctuations in inventory owing to shifts in consumer demand.
3. The bullwhip effect on the supply chain occurs when the changes in consumer demand cause the stakeholders in a supply chain to order more goods to meet the new demand.
4. The bullwhip effect usually flows up the supply chain, starting with the retailer, followed by the wholesaler, the distributor, the manufacturer and, finally, the raw material supplier.

The following are the causes of the bullwhip effect:

1. Sudden updates made to the demand forecast
2. Order batching
3. Price fluctuations
4. Demand information
5. Lack of communication
6. Free return policies

The following are the ways to minimise the bullwhip effect:

1. Through better information in terms of improved communication along the supply chain and better forecasts
2. By eliminating delays in the supply chain
3. By reducing order size and providing good customer service

Case Study - Tyre Industry

The case talked about a global tyre manufacturer Michelin, which tied up with India's local tyre manufacturer Apollo Tyres to use their distribution network within the country. While Apollo Tyres has multiple manufacturing units, Michelin imports and sells products using its joint venture network.

Unfortunately, the joint venture did not last for more than 18 months. The shelving of the joint venture meant that in 30 days, Michelin had to determine the following:

1. How to move out all stocks from the 70+ Apollo Tyres' depots and six RDCs?
2. How to establish self-sufficiency in logistics and distribution?
3. How to ensure zero disruption in serving customers?
4. How to set up an organisation to deliver and sustain logistics, distribution and customer service?

Michelin created detailed plans with stakeholders (majorly sales teams) on how to carry out each activity.

Some of the major factors that affected the strategy included the following:

1. The cost that Michelin was willing to spend (the cost as a percentage of net sales)

2. The service levels to which the sales team was willing to stretch
3. The number of depots that were strategically located to cater to the service levels

Three major factors that were considered while adopting a distribution strategy are as follows:

1. **Distribution:** Compared with Apollo Tyres (local), Michelin (all imports) had to align its business with the supply points as the focus.
2. **Costs:** Michelin worked backwards to ensure that its logistics cost did not exceed 10% of the net sales.
3. **Service provider:** Michelin chose to work with a third-party logistics provider.

Michelin agreed on a distribution strategy and service levels with the sales team and worked with a third-party logistics provider (3PL) for services in logistics, warehouses and credit management at an agreed price.

Disclaimer: All content and material on the UpGrad website is copyrighted material, either belonging to UpGrad or its bonafide contributors and is purely for the dissemination of education. You are permitted to access print and download extracts from this site purely for your own education only and on the following basis:

- You can download this document from the website for self-use only.
- Any copies of this document, in part or full, saved to disc or to any other storage medium may only be used for subsequent, self-viewing purposes or to print an individual extract or copy for non-commercial personal use only.
- Any further dissemination, distribution, reproduction, copying of the content of the document herein or the uploading thereof on other websites or use of content for any other commercial/unauthorized purposes in any way which could infringe the intellectual property rights of UpGrad or its contributors, is strictly prohibited.
- No graphics, images or photographs from any accompanying text in this document will be used separately for unauthorised purposes.
- No material in this document will be modified, adapted or altered in any way.
- No part of this document or UpGrad content may be reproduced or stored in any other web site or included in any public or private electronic retrieval system or service without UpGrad's prior written permission.
- Any rights not expressly granted in these terms are reserved.