

## Microeconomics

### Theory of production and costs - Demand elasticity

The demand curve provides the demanded quantity when price varies. It is a negative slope function, the higher the price the lower the quantity. Company that wants to sell, lower the price and this relation is stable.

Key issue: which is the % decreases in demand when a % increase in price occurs?

**Demand elasticity:** relative variation of quantity ( $q$ ) (or variation in %)/ relative variation of price ( $p$ ) (or the variation in %).

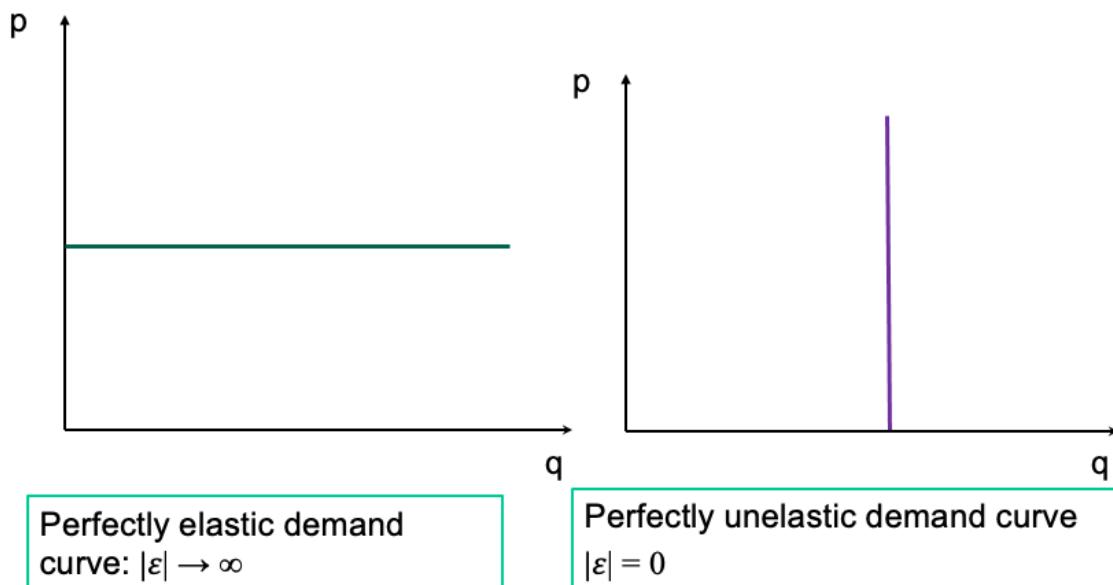
$$\varepsilon = \frac{\frac{\Delta q}{q}}{\frac{\Delta p}{p}} \Rightarrow \frac{\Delta q}{\Delta p} \cdot \frac{p}{q} \Rightarrow \frac{\partial q}{\partial p} \cdot \frac{p}{q}$$

1. Unelastic (rigid) demand:  $|\varepsilon| < 1$

- Low demand elasticity: an increase in price causes a limited reduction of demand.  
In this case the best strategy is to try to increase the price as much as possible, so to reduce the quantity in a small variation.
- Steep demand curve.
- The demand is more rigid when there are no substitutes.

2. Elastic demand:  $|\varepsilon| > 1$

- High demand elasticity: an increase in price causes a remarkable reduction of demand.  
In this case we are in trouble, any change in price can vary the quantity a lot.
- Flat demand curve



### Product differentiation

It will be important to reduce elasticity, because if there's no differentiation, there's no strategy. If they are completely substitutable there is no strategy, they sell products at the price decided by the market and not their self. (price-taker, they take the price from the market)

If they increase the price they may lose all customers, if they reduce it they may lead other to do that too and also they cannot satisfy all the market.

Firms aim to reduce the demand elasticity of their products so as increases in prices lead to increases in revenues.

It is possible to reduce the demand elasticity of a product by differentiating it from other products (of competitors and/or of the firm).

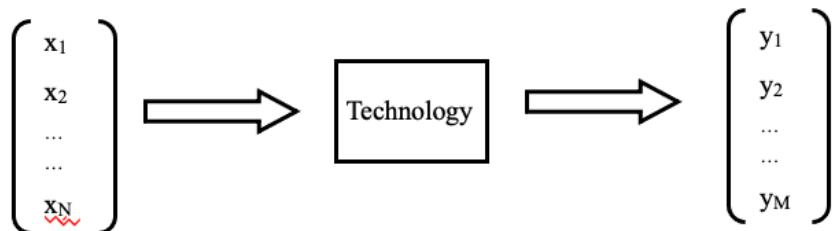
Product differentiation is:

- Conducive to market power: it allows setting high prices without losing customers
- A widespread competitive strategy
  - Real differentiation: by changing the real characteristics of the product, for instance through innovation
  - Perceived differentiation: by changing consumers' perception of the characteristics of the product, for instance through advertising

## Technology

The other side of the problem is the technology, which gives also other constraints.

Technology: the set of processes that a firm can use to turn a vector X of N inputs into a vector Y of M outputs



We can see it in a simplified way in such a way that the input are just two, typically capital (equipment, machinery, ...) and labour (the personal) and the output is just one.

- **Production set:** the set of all combinations of inputs and outputs that comprise a technologically feasible way to produce.
- **Production function:** the maximum possible output from a given vector of inputs. It is the boundary of the production set. We cannot produce more than the production function; this is the maximum. If we produce less we are not dealing with it efficiently.  
Software is the only technology in which this may not fit.  
With 2 inputs,  $x_1$  and  $x_2$ , and 1 output  $y$ , the production function is  $y=f(x_1, x_2)$
- **Isoquant:** set of all input bundles that produce the same output  $y$ . It represents all the combination between two input that generates a specific level of output ( $y$ ).

## Relevant Production Functions

### 1) Cobb-Douglas Function

$$y = f(x_1, x_2) = Ax_1^a x_2^b$$

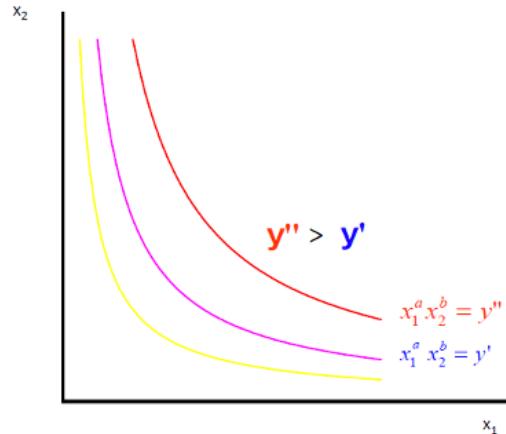
where  $x_1$  will be the capital and  $x_2$  the labor, for example.

- $A$  measures the **scale of production**, i.e., the output obtained by using 1 unit of each input
- $a$  and  $b$  measure how the output responds to changes in inputs

We have a multiplicative function. If one is 0 it all will be 0. This means we need both capital and labor.

The assumption is that the marginal product is greater than 0, otherwise we have that more work gives less production.

Isoquants are hyperbolic, asymptotic to the two axes.



If we use more workers and capital, we go outside from the origin, the more we produce. The inclination is the **marginal rate of substitution** (transformation), it tells us that we can substitute labor and capital to maintain the same level of production.

## 2) Leontief Function

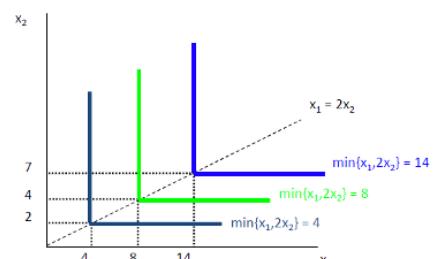
$$y = f(x_1, x_2) = \min\{x_1, x_2\}$$

To produce the output  $y$ , inputs must be used in fixed proportions. There's no substitutability between inputs.

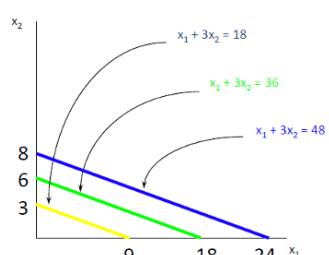
The more we increase the input the more we increase the output in cobb-douglas, here if we increase one of the input and not the other input, the increase of production is not present.

The isoquants are with a  $90^\circ$  angle, if we move just one input we move horizontally or vertically but we do not increase production.

We have inefficiency with Leontief, if we increase just one input we have waste. We need to find the perfect combination of them.



## 3) Substitute Inputs



$$y = f(x_1, x_2) = ax_1 + bx_2$$

Isoquants are L-shaped

One input can **replace** the other one **in a constant proportion**. They are perfectly substitutable. In the simplest case:  $a=b=1$

All isoquants are linear and parallel  
(angular coefficient:  $-a/b$ )

## Some Properties of Well-Behaved Technologies

The Cobb-Douglas is preferable because of two properties:

**Monotonicity:** the more you add input, the more you produce.

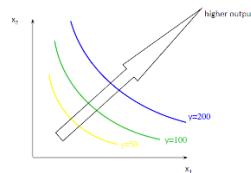
We want a monotonic function, but we also want a situation in which the transformation of substitution is not constant but variable, like the hyperbolic functions.

When we combine input of production we always end up in a situation of **decreasing returns**, we increase production at a lower rate, the more we add inputs the more the delta of production becomes smaller. we may reach a congestion of machines, each worker we add combines with a lower reliability of the machine, they can add more but not a lot more. There are physical constraints that cannot allow us to have machines that produces infinitely.

Then we have **convexity**.

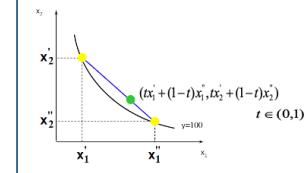
### Monotonicity

Production increases if one input increases, while the other input remains constant



### Convexity

If two bundles of inputs,  $(x_1^*, x_2^*)$  and  $(x_1^{**}, x_2^{**})$  produce  $y$  units of output, then their weighted average produces at least  $y$  units of output



## Marginal Product (short term concept)

The **marginal product** (MP) of an input is the output variation due to the variation of 1 unit of this input, holding all other inputs constant (is a partial derivative).

In case of a two-input technology

- The marginal product of input 1 is

$$MP_1 = \lim_{\Delta x_1 \rightarrow 0} \frac{f(x_1 + \Delta x_1, x_2) - f(x_1, x_2)}{\Delta x_1} = \frac{\partial f(x_1, x_2)}{\partial x_1}$$

- The marginal product of input 2 is

$$MP_2 = \lim_{\Delta x_2 \rightarrow 0} \frac{f(x_1, x_2 + \Delta x_2) - f(x_1, x_2)}{\Delta x_2} = \frac{\partial f(x_1, x_2)}{\partial x_2}$$

- MPs are positive because of the monotonicity, if we have negative marginal product the more we produce the less we obtain.
- **Law of diminishing marginal product** (common feature of many production processes): the marginal product of an input decreases as the level of the input increases, holding other inputs constant. In general

$$\frac{\partial MP_i}{\partial x_i} = \frac{\partial^2 f(x_i, x_j)}{\partial x_i^2} < 0$$

The congestion of a fixed input is inevitable, the more we add, the less the increase in production we obtain.

In cobb-douglas, if we have a coefficient smaller than one, we obtain this situation, positive first derivative and negative second derivative.

## Technical Rate of Substitution (TRS)

TRS measures the **trade-off between the two inputs**.

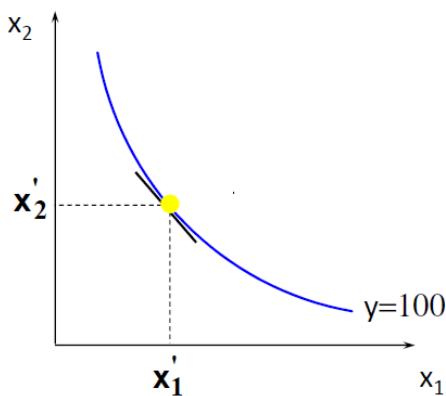
It tells us how we can substitute capital and labor so that we can obtain a production constant., it is the inclination or derivative of the isoquant.

- It is the rate at which input 2 can be substituted with input 1 to keep the output level constant.
- Graphically, it is the **slope** of the isoquant.
- Assume a small change ( $dx_1, dx_2$ ) in the input bundle that keeps output constant

$$\begin{aligned} dy &= \frac{\partial y}{\partial x_1} dx_1 + \frac{\partial y}{\partial x_2} dx_2 \\ &= MP_1 dx_1 + MP_2 dx_2 = 0 \end{aligned} \Rightarrow \frac{dx_2}{dx_1} = |TRS(x_1, x_2)| = \left| \frac{MP_1}{MP_2} \right|$$

It is equal to the ratio of the two marginal products.

- Assumption of **diminishing TRS**: the slope of the isoquant decreases (in absolute value) when moving to the right along the isoquant



## Returns to scale (Long term concept)

Returns to scale describe how output changes as all inputs change in the same proportion (e.g., all inputs double, or halve) → It is a long run concept

If by scaling all inputs by the same amount  $t > 0$  (*the scalar*), and if we obtain:

1.  $f(tx_1, tx_2) = tf(x_1, x_2)$  we have **constant** returns to scale
2.  $f(tx_1, tx_2) > tf(x_1, x_2)$  we have **increasing** returns to scale -> **Economy of scale** -> the total cost of production divided by the number of productions goes down.
3.  $f(tx_1, tx_2) < tf(x_1, x_2)$  we have **decreasing** returns to scale -> **Diseconomy of scale** -> the total cost of production divided by the number of productions increases.

In the cobb-douglas this is reflected in the sum of exponents. If alpha + beta = 1, we're in constant returns to scale, we double labor and capacity and we double production, if greater than 1 we have economy of scale we increase them and we have an increase of production, otherwise we have diseconomy of scale. If smaller than 1 we have the opposite.

## Profit Maximization in the Short Run

Profit maximization, we try to enlarge as we can the difference among revenue and costs.

In the short run, input 2 is **constant**.

With  $p$  the output price and  $\omega_1$  and  $\omega_2$  the input prices, the **profit maximization problem** of the firm is:

$$\max_{x_1} pf(x_1, \bar{x}_2) - \omega_1 x_1 - \omega_2 \bar{x}_2$$

The firm maximizes profit by choosing the level of input 1 (and producing the level of output) at which the marginal product of input 1 equals its price.

$$pMP_1(x_1^*, \bar{x}_2) = \omega_1$$

## Profit Maximization in the Long Run

In the long run both input are variable ( $x_1$  and  $x_2$ ).

The **profit maximization problem** is

$$\max_{x_1, x_2} pf(x_1, x_2) - \omega_1 x_1 - \omega_2 x_2$$

Analogously to the short run case, the firm maximizes profits by choosing the level of inputs (and producing the level of output) at which

$$\begin{aligned} pMP_1(x_1^*, x_2^*) &= \omega_1 \\ pMP_2(x_1^*, x_2^*) &= \omega_2 \end{aligned}$$

## Cost Minimization in the long run

How to minimize the costs of producing a certain output  $y$ ?

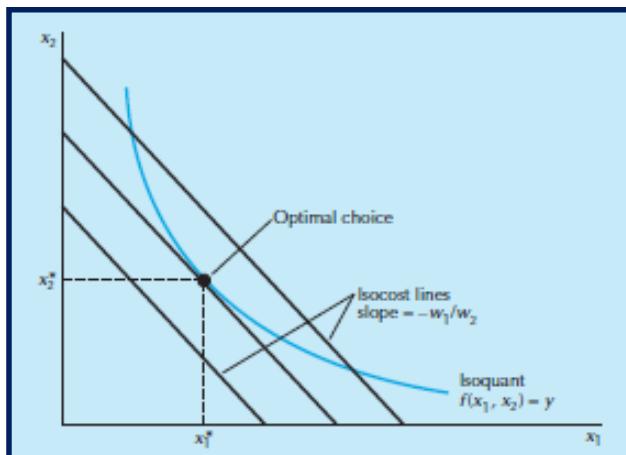
The **cost minimization problem** can be written as

$$\begin{aligned} \min_{x_1, x_2} & \omega_1 x_1 + \omega_2 x_2 \\ \text{such that } & f(x_1, x_2) = y \quad c(\omega_1, \omega_2, y) \end{aligned}$$

The solution gives the cost function: minimum cost of producing  $y$ , given input prices

We obtain the solution **graphically**, by considering **isoquants** and **isocosts**, i.e., set of all the input bundles having the same cost  $C$

The optimal situation is the farthest level of production from the origin.



$$|TRS(x_1^*, x_2^*)| = \frac{\omega_1}{\omega_2}$$

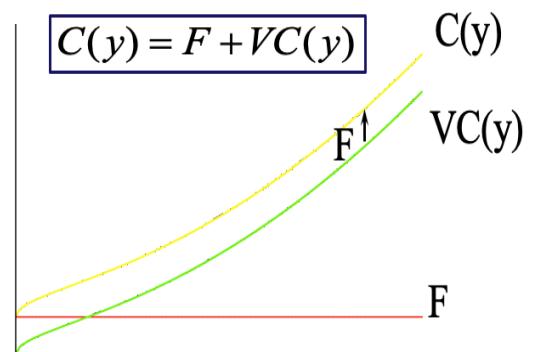
## Cost Functions: Taxonomy

In production function the variable is the quantity of production and  $x_1$  and  $x_2$  are measured in physical units.

With cost function we have the difference that the cost depends on the cost of input.

### 1) Short run: Total, variable, and fixed costs

- **Total cost function,  $C(y)$ :** is the minimum cost of all inputs (fixed and variable) when producing  $y$  units of output:  $C(y) = F + VC(y)$
- **Fixed cost function,  $F$ :** Costs that are independent from the level of production. Ex. the plant, we consider only a constant fraction of it.
- **Variable cost function,  $VC(y)$ :** is the cost of variable inputs when producing  $y$  units of output. It varies with the firm's output and depends on the level of the fixed input. Ex. energy, workers' salary, etc.
- **Average cost,  $AC(y)$ :** total cost of each unit of output, total cost divided by the quantity. (U-shaped)



- **Average variable cost function,  $AVC(y)$ :** It is the **variable cost of each unit of output**. If the **MP** is
  - **Increasing**,  $VC(y)$  increases at a decreasing rate as  $y$  increases:  **$AVC(y)$  is decreasing**
  - **Decreasing**,  $VC(y)$  increases at an increasing rate as  $y$  increases:  **$AVC(y)$  is increasing**
 Thus,  **$AVC(y)$  is U-shaped**.

When we start production we become more efficient and we get the minimum, but once we approach capacity the more we add people the less they will be efficient. (congestion).

- **Average fixed cost function,  $AFC(y)$ :** is the **fixed cost of each unit of output**. It **decreases** as output increases
- **Marginal cost function,  $MC(y)$ :** is the change in costs associate to a unitary change in output

$$MC(y) = \frac{\partial C(y)}{\partial y} = \frac{\partial VC(y)}{\partial y}$$

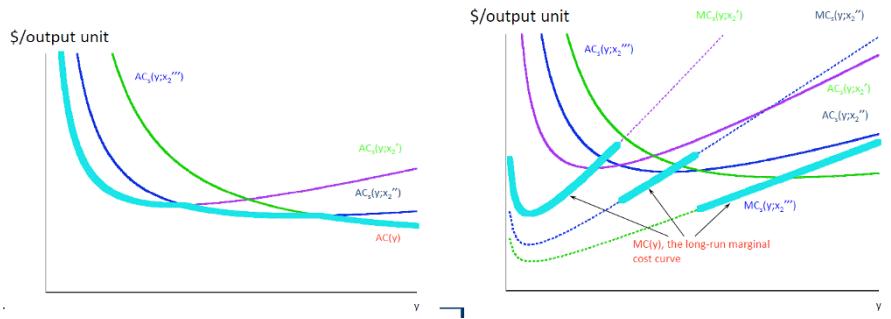
In other words,  $MC(y)$  is the derivative of variable and total cost. It gives the **slope** of the  $C(y)$  and  $VC(y)$  curves as output changes.

## 2) Long-Run: Total Cost Curves

We change both capacity and workers and what happens in average costs depends, in some industries we may have economy of scale and in some not.

For any output level  $y$ , the long-run total cost curve always gives the lowest possible total production cost

- The **long-run average total cost curve** must always give the lowest possible average total cost → The long-run average total cost curve is the lower envelope of all the short-run average total cost curves
- The **long-run marginal cost curve** must always give the lowest possible marginal cost → The long-run marginal cost curve is the lower envelope of all of the short-run marginal cost curves



## Basic of Market Structures

It is possible to define different market structures depending on

- Number of firms operating in the market
- The ways in which these firms interact when they make their pricing and output decisions

We can have:

### 1) Perfect competition

There are many (infinite) firms on the market,  $N \rightarrow \infty$ , where  $N$  is the number of firms, many producers. Firms produce a homogeneous good, having access to the same technology and thus having the same cost curves, perfectly substitutable goods.

Firms have no influence over the market price, there are free entry and exit, Information is perfect, everybody knows everything.

- If  $p' > p^e$ , the firm has no demand.
- At the equilibrium price  $p^e$ , market demand is equal to market supply.
- If  $p'' < p^e$ , the firm faces the entire market demand, but it cannot serve it due to its very limited productive capacity

**MR** = Marginal Revenue = Represents the additional revenue generated from selling one additional unit of output

**MC** = Marginal cost = Represents the additional cost incurred from producing one additional unit of output.

In order to **maximize profit** (in perfect competition), i.e. maximize the difference between the price of the product and the cost, the firm has to produce at the quantity where **MR equals MC**.

!! Producing more would result in **MR < MC**, indicating diminishing returns and higher costs, while producing less would result in **MR > MC**, indicating missed opportunities for additional revenue.

## 2) **Monopoly**

Monopoly refers to a market structure where a single entity or firm has exclusive control over the supply of a particular good or service, with no close substitutes available. In a monopoly, the firm faces no competition, allowing it to exert significant control over pricing and output decisions.

## 3) **Monopolistic competition**

Monopolistic competition refers to a market structure characterized by a large number of firms, each producing similar but slightly differentiated products. In this market structure, firms have some degree of control over their prices due to product differentiation, but they still face competition from other firms offering similar products.

## 4) **Oligopoly**

Oligopoly refers to a market structure characterized by a small number of large firms ( $\leq 10$ ) that dominate the industry. In this case we have interdependence, any player in oligopoly influences all other players with all its decisions, if one introduces a new product, all the others must react. We have strategic interdependence.

### **Shut down**

The shut down price is the minimum price a firm needs in order to justify remaining in the market in the short run. If the price exceeds the average cost of production (which includes both variable and fixed costs), the firm can cover its costs and continue production, even if it may be experiencing losses. The expectation is that prices may rise in the future, making it profitable again. There is a region in which a company may experience losses but still chooses to operate rather than shutting down. This region exists when the price is below the average cost but above the variable cost. Although the firm is not covering all its costs, it might continue production in the short run, hoping for better market conditions or higher prices.

- Short run survivability:  $P \geq AVC(y)$
- Long run survivability:  $P \geq AC(y)$

### **Total quantity supplied**

The total quantity supplied in the industry at a given market price is the sum of the quantities supplied at that price by each individual firm. It represents the aggregate supply in the market, combining the output of all firms.

- **Short-run industry supply** is derived from the individual supply functions of each firm in the market. It shows the relationship between the price and the quantity produced by the entire industry in the short run.

$$S(p) = \sum_{i=1}^N S_i(p)$$

Dove: N = number of firms,  $S_i(P)$  = i-esima firm's supply function

At the point of minimum average cost, the firm's marginal cost (the additional cost of producing one more unit) and marginal revenue (the additional revenue from selling one more unit) are equal. This equilibrium condition helps determine the firm's profit-maximizing quantity of production.

The relationship between price and quantity depends on the slope (or inclination) of the supply curve. If the supply curve is more vertical, a small increase in quantity leads to a large increase in price. In the short run, with fixed production capacity, an increase in demand results in a higher price. Similarly, firms may produce more if the price increases, and vice versa.

Increasing the price generally leads to a decrease in demand. Firms need to find the equilibrium point where price and quantity balance to ensure their survival and maximize profit. Increasing the price above the equilibrium level may result in a decrease in demand, negatively impacting the firm's sales and overall profitability.

### Short run: economic profits and losses

In the short run, firms in perfect competition can make economic profits or report losses.

Firms are price-takers and have no control over the market price:

- If a firm earns economic profits (revenue exceeds average costs), other firms will enter the market, increasing supply and driving down prices. -> Riduzione profitti
- if a firm incurs losses (revenue is less than average costs), it may exit the market, reducing supply and causing prices to rise. If a firm is experiencing losses in the short run, this rise in price helps the firm minimize its losses by allowing it to sell its output at a higher price and potentially cover a larger portion of its costs.

### Monopoly

There is one firm in the industry, which faces the market demand as its unique constraint.

The monopolist wants to maximize its economic profit

$$\max_y \Pi(y) = r(y) - C(y) = p(y)y - C(y)$$

To do so, it determines the optimal quantity of output ( $y^*$ ) at which marginal revenue (MR) equals marginal cost (MC)

It produces the output  $y^*$ , at which marginal revenue equals marginal cost

$$MR(y^*) = MC(y^*)$$

Under monopoly there's always a profit and prices are much higher than the price in the competition, and quantity much lower, because monopolies can choose the level of price, quantity and maximizes its profit.

Monopoly profits are social loss, lost by society and this is the difference with the case of perfect competition. The monopoly keeps the price high and people consumes less.

### OSSERVAZIONE:

- 1)  $Px_1^* = MP_1 \rightarrow$  profit maximization usata per capire come produrre, cioè come usare efficacemente le risorse in input  
 $Px_2^* = MP_2$
- 2)  $MR = MC \rightarrow$  profit maximization usata per capire quanto produrre  
 $. MR > MC : \text{Non sto maximizzando il profitto perché vendendo un'unità guadagno più di quanto spendo}$

$MR < MC$  : Non sto maximizzando il profitto perché vendendo un'unità perdo guadagno essendo il costo maggiore del revenue.

## Strategic Management

A **strategy** is a set of goal-directed actions a firm takes to gain and sustain superior performance relative to competitors.

**Competitive Advantage** is superior performance relative to other competitors in the same industry or the industry average.

- **Sustainable competitive advantage** for a firm that is able to outperform its competitors or the industry average over a prolonged period.
- **Competitive advantage is relative**, not absolute, you must compare yourself with someone else.
- A competitive advantage can be **gained** providing goods or services that:
  - Consumers value more highly than those of its competitors, or
  - Are similar to the competitors' at a lower price.

**Strategic Positioning** allow us to have a unique position within an industry that allows the firm to provide value to customers, while controlling costs.

## Value Creation

Value creation occurs because companies with a good strategy are able to provide products or services to consumers at a price point that they can afford while keeping their costs in check, thus making a profit at the same time.

**Shareholders** are people that has given money to the company at the beginning or later on.

**Stakeholders** are organizations, groups, and individuals:

- Can affect or can be affected by a firm's actions.
- Have an interest in the performance or survival of the firm.

For example stockholders, employees (including executives, managers, and workers), and board members.

## Stakeholder Impact Analysis

Stakeholder impact analyses refer to the use of analytical tools and techniques to analyze the effect of business decisions on stakeholders.



To identify the step 4 responsibilities more effectively, we use the framework called **corporate social responsibility (CSR)**.

The following is the Pyramid of Corporate Social Responsibility.

**Exhibit 1.3**

Adapted from Carroll, A. B. (1991, July—August), "The pyramid of corporate social responsibility: Toward the moral management of organizational stakeholders," *Business Horizons*: 42.



**CSR** has four components:

■ **Economic responsibilities.**

Investors expect an adequate return for their risk capital. Creditors expect the firm to repay its debts. Consumers expect safe products and services at appropriate prices and quality. Suppliers expect to be paid in full and on time.

■ **Legal responsibilities**

■ **Ethical responsibilities:** Strategic leaders are called upon to do what society deems just and fair.

■ **Philanthropic responsibilities**

### **AFI framework**

The strategy process is the result of:

- 1) **Analysis (A)** = Internal and External environment analysis, how to gain competitive advantage
- 2) **Formulation (F)** = How and where should the firm compete?
- 3) **Implementation (I)** = How should the firm organize to turn the formulated strategy into action? How should I implement the formulated strategies?

This framework:

- Explains and predicts differences in firm performance.
- Helps leaders formulate and implement a strategy that can result in superior performance.

### **External Analysis**

To make good decision is important to understand the external environment. External factors impact a firm. External factors in the firm's general environment are ones that strategic leaders have little direct influence over, such as macroeconomic factors (e.g., interest or currency exchange rates).

In contrast, internal factors in the firm's task environment are ones that strategic leaders do have some influence over, such as the composition of their strategic groups (a set of close rivals) or the structure of the industry.

### **PESTEL Model**

A PESTEL analysis is an acronym for a tool used to identify the external forces facing an organization.

The letters stand for Political, Economic, Social, Technological, Environmental and Legal.

This model is a straightforward way to scan, monitor, and evaluate external factors.

Environmental factors are grouped into six segments:

**1. Political.**

Political factors result from the processes and actions of government bodies that can influence the decisions and behavior of firms. Political and legal forces are closely related. Political pressure often results in changes in legislation.

**2. Economic.**

Economic factors in a firm's external environment are largely macroeconomic. Some macroeconomic factors that can affect firm strategy are:

- Growth rates
- Levels of employment.
- Interest rates
- Price stability
- Currency exchange rates.

**3. Sociocultural.**

Sociocultural factors capture a society's cultures, norms, and values

**4. Technological.**

Technological factors capture the application of knowledge to create new processes and products.

**5. Ecological.**

Ecological factors involve broad environmental issues such as the natural environment, global warming, and sustainable economic growth.

**6. Legal.**

Legal factors include the official outcomes of political processes as manifested in laws, mandates, regulations, and court decisions—all of which can have a direct bearing on a firm's profit potential.

### Firm Performances

Firm performance is determined primarily by two factors: industry and firm effects.

**Industry effects** They attribute firm performance to the industry in which the firm competes. The structure of an industry is determined by elements common to all industries, such as entry and exit barriers, number and size of companies, and types of products and services offered.

**Firm effects** attribute firm performance directly to the actions taken by the manager. It is typically more important than industry effects.

### Industry effects

An industry is a group of incumbent firms facing more or less the same set of suppliers and buyers. Firms competing in the same industry tend to offer similar products or services.

### Five Forces Model

Porter's Five Forces Model is a model that identifies and analyzes five competitive forces that shape every industry and helps determine an industry's weaknesses and strengths.

The Five Forces Model helps strategic leaders understand:

- The profit potential of different industries.
- How they can position their firms to gain and sustain competitive advantage.

The stronger the five forces, the lower the industry's profit potential.

## **Force 1 - Threat of Entry**

The risk that potential competitors will enter an industry:

- Potentially lowers industry profit.
- Increases spending to react against the new entries.

New entrants in an industry bring new capacity and the desire to gain market share.

The higher the entry barriers are, the smaller the threat for existing players. Examples of barriers to entry are the need for economies of scale, high customer loyalty for existing brands, large capital requirements.

## **Force 2 - Threat of Substitutes (Product or Services)**

The existence of products outside of the realm of the common product boundaries increases the propensity of customers to switch to alternatives.

These are products that meet the same basic customer need:

- In a different way.
- Available from outside the given industry.

Examples: Software vs. professional services, Energy drinks vs. coffee, etc.

## **Force 3 - Power of Buyers (Customer)**

The bargaining power of customers is the ability of customers to put the firm under pressure, which also affects the customer's sensitivity to price changes.

One thing to do to face it, is using brands. If a company is branded, then differentiated, and also advertised, the price can be higher.

## **Force 4 - Power of suppliers**

Pressures that industry suppliers can exert on an industry's profit potential.

Suppliers of raw materials, components, labor, and services (such as expertise) to the firm can be a source of power over the firm when there are few substitutes.

## **Force 5 - Rivalry among competitors**

This last force of the Porter's Five Forces examines how intense the current competition is in the marketplace, which is determined by the number of existing competitors and what each competitor can do.

Rivalry is high when there are a lot of competitors (perfect competition).

The intensity of rivalry among existing competitors is determined largely by the following factors:

### **■ Competitive industry structure**

Refers to elements and features common to all industries.

It is captured by:

- Number and size of competitors.
- Firm's degree of pricing power.
- Type of product or service (commodity or differentiated product).
- Height of entry barriers.

### **■ Industry growth**

Industry growth directly affects the intensity of rivalry among competitors.

- In periods of high growth, consumer demand rises, and price competition among firms frequently decreases. Because the pie is expanding, rivals are focused on capturing part

of that larger pie rather than taking market share and profitability away from one another.

- In contrast, rivalry among competitors becomes fierce during slow or even negative industry growth. Competition is fierce because rivals can gain only at the expense of others; therefore, companies are focused on taking business away from one another.

## ■ Strategic commitments

Given the structure of the industry, the companies define strategies and make commitments, which are investments, in the long-term.

If firms make strategic commitments to compete in an industry, rivalry among competitors is likely to be more intense, because they are costly, long-term oriented, and difficult to reverse.

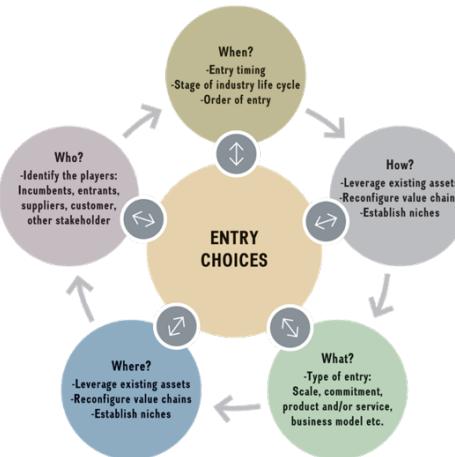
## ■ Exit barriers

These are obstacles that determine how easily a firm can leave that industry. An industry with low exit barriers is more attractive because it allows underperforming firms to exit more easily. In contrast, an industry with high exit barriers reduces its profit potential because excess capacity still remains.

## Changes over Time: Entry Choices and Industry Dynamics

Although the five forces plus complements model is useful in understanding an industry's profit potential, it provides only a point-in-time snapshot of a moving target. Threat of entries is the only similar-dynamic concept.

- 1) **Entry choices:** It's a model that constitute a strategic process over time.



- 2) **Industry dynamics,** consider the ratio between the entry and the existing companies and also between the exit and existing companies.

There are industries in which these ratios are quite low, others in which they're quite large. If this is close 0, nobody enters or exists; We are in a stable industry.

It provides insight about:

- Changing speed of an industry.
- Rate of innovation.
- Help capture structural changes in the industry.

- 3) **Industry convergence**, a process whereby formerly unrelated industries begin to satisfy the same customer need. This is typically caused by technological advances.

## Strategic groups

Strategic groups are a set of companies that pursue a similar strategy in the same industry.

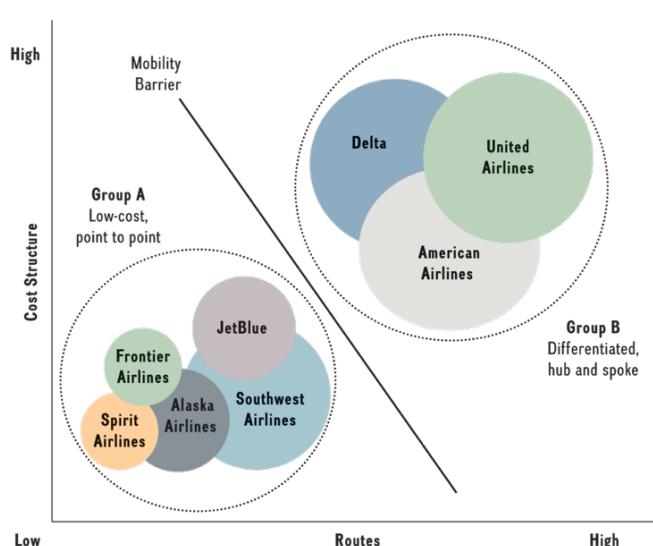
The **strategic group model** (framework) clusters different firms into groups. It is based on key strategic dimensions.

Firm performance is determined not only by the industry to which the firm belongs, but also by its strategic group membership.

To map the industry competitors into strategic groups, we perform the following steps:

- Identifying the most important strategic dimensions such as expenditures on research and development, technology, product differentiation, product and service offerings, etc.
- Choosing two key dimensions for the horizontal and vertical axes, which expose important differences among the competitors.
- Graphing the firms in the strategic group, indicating each firm's market share by the size of the bubble with which it is represented

The mobility barriers are actions costly and not easily reversed that restrict the movements between group (they are industry-specific factors)



## Firm Effects

The firm effects attribute firm performance directly to the actions taken by the manager. It is typically more important than industry effects.

The firm effects are obtained using a business strategy, i.e., the goal-directed actions managers take in their quest for competitive advantage when competing in an industry.

The possible ideas are increasing the value of the product or diminishing the cost with respect to the competitors.

This combination leads to different strategy, which are **cost leadership**, **differentiation** and **blue ocean**. -> Called also generic business strategies because works in any company.

## Strategic Positioning

A firm's ability to create value for customers (V) while containing costs (C).

The goal is to generate a large gap between the value (V) and the costs (C) =  $V - C$

The greater the economic value created ( $V - C$ ), the greater is a firm's potential for competitive advantage. We can do both, increasing the value and reducing the cost, but are typically separated (**strategic trade-offs**).

We talk about **Focused Business Strategies** happens when we do this in a narrow way, we produce few products, focusing on a small area.

The focused versions of the two business strategies—focused cost-leadership strategy and focused differentiation strategy—are essentially the same as the broad generic strategies except that the competitive scope is narrower.

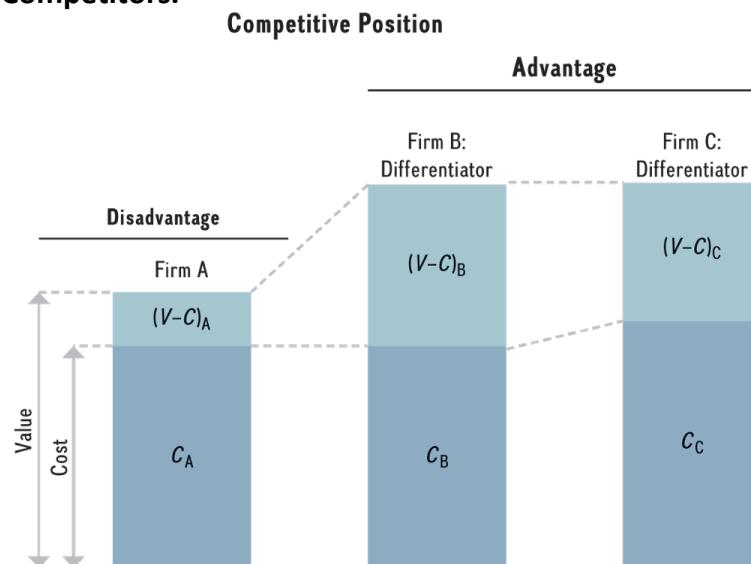
## Strategy 1 - Differentiation Strategy

A differentiation strategy is the approach businesses use to attract and keep customers by giving them a unique product or service, to get a competitive advantage.

It involves unique features that increase value, so that consumers pay a higher price.

**Competitive advantage achieved when:**

- **Value – Cost > Competitors.**



**Three drivers increase perceived value:**

- **Product features.**
- **Customer service.**
- **Complements:** Add value to a product or service giving something included with it.

## Strategy 2 - Cost leadership

The goal of a cost-leadership strategy is to reduce the firm's cost below that of its competitors while offering adequate value.

Competitive advantage achieved, as before, when: **Value – Cost > Competitors**

Drivers that keep cost low are:

- **Cost of input factors:** Lower-cost of the inputs (materials, capital, labor ...)
- **Economies of scale**

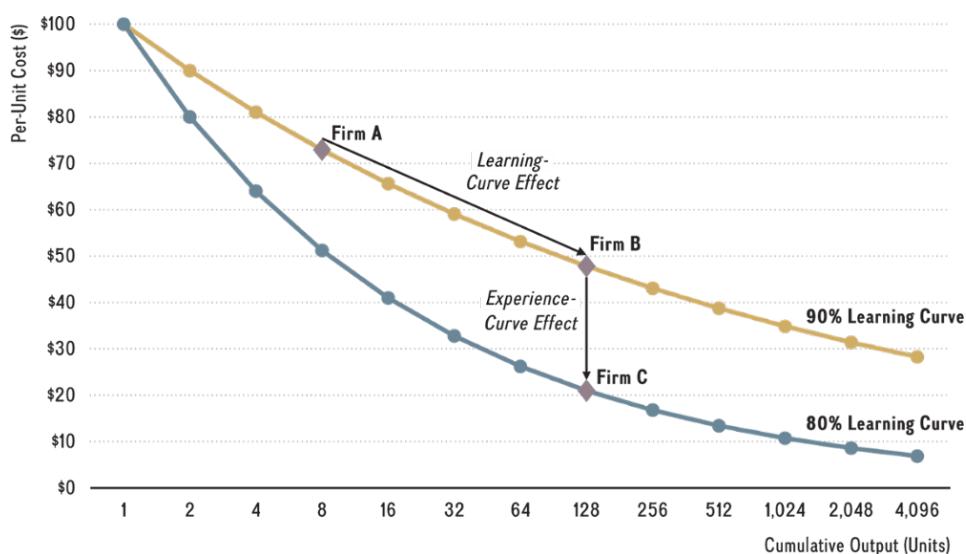
As output increases, the average cost per unit of production decreases. This happens because fixed costs, such as machinery or infrastructure, are spread over a larger number of units.

**Attenzione:** If the firms get too big, the complexity of managing and coordinating the production process raises the cost, negating any benefits to scale (Diseconomies of scale). -> Reduce complexity dividing the firm in subgroups.

- **Learning-curve effect:**

Workers or a firm gain experience in producing a particular product or service, they become more efficient and effective. With each repetition or experience, they learn how to improve their skills, optimize processes, and reduce waste or errors. This leads to an increase in productivity and a decrease in the time required to produce each unit.

- **Experience-curve effects:** These effects can include improvements in technology, better utilization of resources, process innovations, and increased knowledge of customer preferences.



### Strategy 3 - Blue Ocean Strategy

In cost leadership and differentiation we focus on existing customers.

**Blue Ocean** is a strategy that combines both differentiation and cost-leadership activities.

They use the metaphor of an ocean to denote market spaces. Blue oceans represent untapped market space, the creation of additional demand, and the resulting opportunities for highly profitable growth. In contrast, red oceans are the known market space in which rivalry among existing firms is cut-throat.

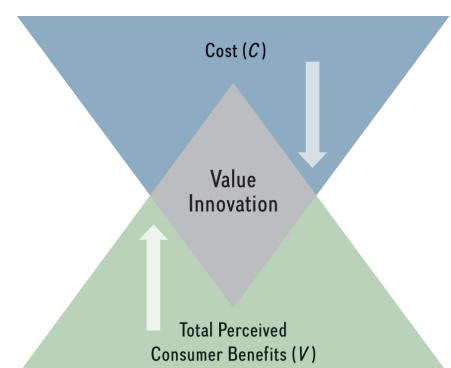
For a blue ocean strategy to succeed, managers must resolve trade-offs between the two generic strategic positions—low cost and differentiation. This is done through **value innovation**.

Value innovation is accomplished through simultaneously pursuing differentiation ( $V \uparrow$ ) and low cost ( $C \downarrow$ ).

Lowering a firm's costs is primarily achieved by eliminating and reducing the taken-for-granted factors that the firm's industry rivals compete on.

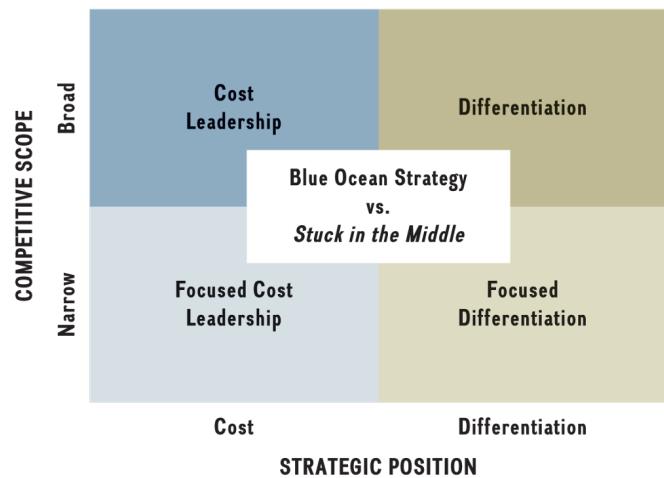
**Lower costs:**

- **Eliminate:** Which of the factors should be eliminated?
- **Reduce:** Which of the factors should be reduced?



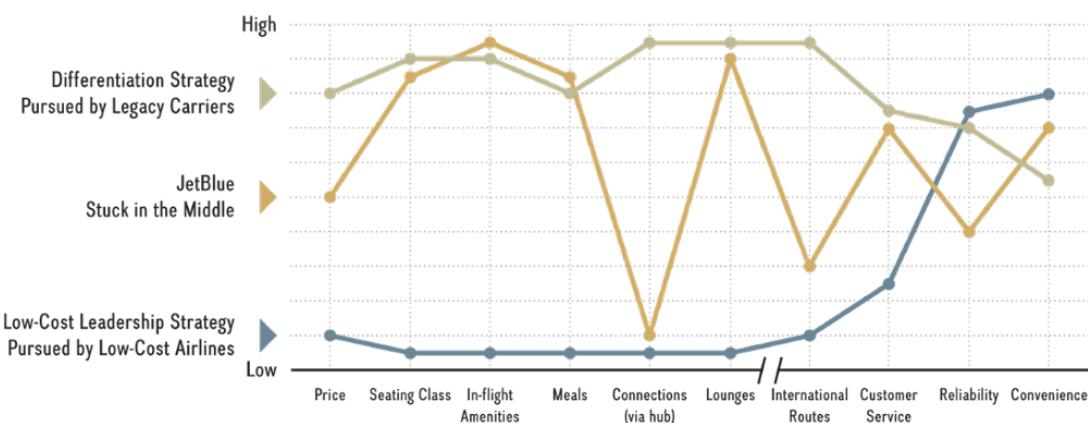
### Increase perceived consumer benefits:

- **Raise:** Which of the factors should be raised?
- **Create:** Which factors should be created?



### Strategy Canvas

The value curve is the basic component of the strategy canvas. The value curve, is simply a graphic representation of a firm's relative performance across different competitive factors in an industry.



Assets | Liabilities



Stato patrimoniale = situazione progressiva di una società nel corso degli anni

T: riporti all'inizio dell'anno saldo stato patrim. precedente (nel mazzino)  
Nel bilancio riporti solo il saldo finale (saldo iniziale +/- registrazioni tutto anno)

Profitti e Perdite = situazione annuale (parte da 0 e ci sono incrementi e decrementi annuali)

Differenze tra costi e ricavi;

Se c'è un perdita la segui negli assets (Fixed assets)

Se c'è un utile lo segui nelle liabilities (Fa parte patrimonio netto, della

↓  
 Costo | Ricavi  
 Quando faccio un'operazione a sx nel costo/ricavi:  $\Rightarrow$  Azione a destra  
 nello stato  
 patrimoniale  
 Vale anche al contrario  
 Finance

The **life cycle of the company** is made of:

### 1. Startup phase

It is composed by:

- **Business idea:** A business idea typically involves identifying a product, service, or solution that addresses a need or fulfills a demand in the market. It is based on the idea of that the resources used and consumed in the realization of the enterprise will be lower than the revenues obtained. (Total costs < Total Revenues).  
The compare of costs and revenues is typically done year by year.
- **Business plan:** A business plan is a written document that outlines the goals, strategies, and operations of a business. It serves as a roadmap for the future direction of the company. It also includes a basic balance sheet (foglio di bilancio) detailing how the initial funds will be used and how revenue and expenses are expected to flow in the early stages of the business.

In the startup phase we typically try to get the fundings from investors or banks. We have not revenues, so we have only cash outflows.

**FUNDINGS:** "Fondi" o "Investimenti", soldi o alle risorse finanziarie fornite a un'azienda o a un progetto per sostenere le sue operazioni, la crescita o iniziative specifiche.

### 2. Investment phase

During the investment phase, a business typically invests capital into acquiring various assets necessary for its operations. These assets can include physical assets like equipment, machinery, property, or inventory, as well as intangible assets like intellectual property, software, or branding.

We start our investment but we have the problem of cash absorption (we have cash outflow but no cash inflow).

During this time, it is important for entrepreneurs to carefully manage their cash flow and ensure that they have sufficient funding to cover their expenses and investments until they start generating revenue.

### 3. Operational phase

- Start production
- Cash generation

When we start production, we go to this phase in which we sell products and generate cash.

## Fundings

We may have two main sources of funding:

- **Owner capital (equity):** This is capital provided by the entrepreneur or other individuals, such as partners or shareholders. They own a share (azione) of the company and have an unlimited responsibility for the company's debts.
- **Debt capital:** This is capital provided by banks in the form of a loan (prestito), which can be short-term or long-term. The loan is repaid with the principal amount and interest over a specified period. The bank has a right to interest payments even if the company is unprofitable.

## Main differences

- 1) **Duration:** Equity capital has no expiration date and is held for the life of the company, while debt capital has a specific term and must be repaid within that period.
- 2) **Remuneration:** Equity shareholders can receive dividends and benefit from the increasing value of their shares, while lenders receive interest payments.
- 3) **Risk:** Shareholders have the risk of losing their capital if the company performs poorly, while lenders face the risk of insolvency or default but are only at risk of losing the loan amount.
- 4) **Allocation rules:** Shareholders in a limited company have limited liability, meaning creditors can only access the allocated capital in case of non-repayment. In different types of companies, such as SPAs and SRLs, there may be restrictions or authorization requirements for selling shares.

## Shareholders' rights and responsibilities

- 1) **Dividends:** Shareholders have the right to receive a portion of the company's profits as dividends, which are subject to taxation and distributed based on the shares they hold.
- 2) **Increasing value of shares:** Shareholders can benefit from the appreciation in the value of their shares over time.
- 3) **Approval of balance sheet:** Shareholders approve the company's financial statements, including decisions on the distribution of profits and the allocation of funds for further investments.
- 4) **Return on investment:** Shareholders do not have a legal right to a specific return on their investment. If the company does not generate profits, shareholders can push for management changes or sell their shares, but there is no obligation for the company to produce profits.

## Assets and Liabilities document (Stato Patrimoniale)

FA Fixed assets	OF Owners' funds
CA Current assets	LTL Long term loans
	CL Current liabilities

## Assets

Assets are resources that a company owns or controls, which have economic value and are expected to provide future benefits.

- **Fixed Assets**

Fixed assets are long-term assets with a useful life of more than one year. They are used in the production or operation of the business and are not intended for sale. (Brands, software, machinery, buildings, **long-term investments ...**)

- **Current assets:** Current assets are assets that are expected to be converted into cash or used up within one year or the normal operating cycle of the business.
  - **Inventory:** Goods held for sale or raw materials used in production.
  - **Accounts receivable:** Money that the company needs to receive from customers (that has already received the product/service)
  - **Cash:** Soldi liquidi o short-term investments

## Liabilities

Liabilities are obligations or debts that a company owes to external parties.

- **Owners' Funds** (shareholders equity): Owners' funds indicate the portion of the company's total assets that is attributable to its owners or shareholders. It is given by total assets – liabilities.
  - **Capitale Sociale:** Represents the amount of capital that shareholders have contributed to the company by purchasing common shares. It reflects the initial investments made by shareholders to acquire ownership in the company.
  - **Capital Reserves:** Are created from profits that have not been distributed to shareholders as dividends.
  - **Revenue Reserves:** Revenue reserves are created by retaining a portion of the company's profits for future use.
- **Long-Term Liabilities:** Long-term liabilities are obligations that are due for repayment beyond one year. They typically represent debt or financial obligations with a longer maturity period. (Long-term Loans)
- **Current Liabilities:** Current liabilities are short-term obligations that are expected to be settled within one year or the normal operating cycle of the business.
  - **Accounts Payable:** Money that the company has to pay to suppliers or vendors for goods or services received but not yet paid.
  - **Short-term Loans:** Loans or borrowings that are due for repayment within a year.

Osservazioni:

- 1) Short term liabilities should be covered by current assets.
- 2) Fixed assets must be covered by owner capital and long-term loans -> Because it is important for a company to ensure that these fixed assets are adequately financed to cover their costs.

There must be balance in the assets and liabilities. It ensures that the company's assets are properly financed, and the claims of creditors and owners are appropriately accounted for. By maintaining this balance, the company can demonstrate its solvency, financial stability, and the ability to meet its obligations.

## Long term loans (LTL)

A long-term loan refers to a financial arrangement where a company borrows a sum of money from a bank, typically used for significant investments or projects.

The loan structure consists of the following elements:

- **Nominal value:** The initial borrowed amount that forms the basis of the loan.

- **Duration:** A fixed timeline for loan repayment, with the possibility of extension upon bank approval.
- **Rate of interest:** The percentage of the loan amount that must be paid as interest annually.

Interest payments are considered costs, reflecting the expense of borrowing funds, while repayment of the borrowed amount is not a cost but a reduction in debt (una riduzione del debito).

### **Accounts payable (fatture)**

Represents the amount of money that the company needs to pay to the suppliers for good or services received.

They consists in the following elements:

- Nominal value defined by a formal document (invoice, fattura)
- Date of payment and penalties for late payment

Invoices create a debt for the company, and the remaining debt at the end of the year forms the account payable.

By calculating the ratio between the accounts payable and the total raw material cost, one can gauge the average delay in payment. This ratio gives an idea of how long it takes for the company to settle its debts with suppliers.

### **Short term loans**

Short-term loans are commonly utilized by businesses to address temporary financial needs or capitalize on opportunities that require immediate funding. However, it is crucial to carefully assess the appropriateness and risks associated with obtaining multiple short-term loans.

Overreliance on short-term loans can increase the company's financial risk, especially if the loans are not managed or calculated appropriately.

### **Intangibles**

Fixed assets that do not have a physical presence but hold significant value for a company (brand, copyright, Research and Development ...).

Intangibles result from costly investments made by the company, through acquiring external resources (such as licensing a patent).

They are recorded as assets on the balance sheet when certain conditions are met, such as having a determinable value and an identifiable future economic benefit.

### **Net fixed accounts**

Fixed accounts represent the accounting measure of fixed assets. To assign the cost of fixed assets to specific accounting periods, companies use the concept of depreciation.

The net fixed assets is given by **fixed asset – depreciation** (This is the value that is considered as fixed asset).

To assign the cost to just one year we take the acquisition cost and divide by a depreciation value, that depends on the amount of time we used the asset.

The depreciation is specified by the Ministry of Finance. The more we charge depreciation the more we have costs that reduce profits.

There are two methods of accounting:

#### **1) Net fixed accounts**

Net fixed method consists in charge, each year, a portion of the asset's cost as depreciation.

With this technique we represent in the same section of the Assets & Liabilities document both the nominal value of the assets and their depreciation

Buildings	Euro 100,000
(-) Depreciation of buildings	Euro 20,000
Net buildings	Euro 80,000
Equipment	Euro 300,000
(-) Depreciation of equipment	Euro 100,000
Net equipment	Euro 200,000

## 2) Depreciation fund

Depreciation fund method involves placing the entire value of the fixed asset on the asset side and creating a separate section in the liabilities called the "Depreciation Fund."

The overall impact is the same, but this technique emphasize that depreciation can be considered a source of funding.

Assets	Liabilities
Buildings Euro 100,000	Depreciation fund of buildings Euro 20,000
Equipment Euro 300,000	Depreciation fund of equipment Euro 100,000

## Long term investment

Long-term investments refer to financial assets that represent investments made for an extended period and can include:

- **Shares (azioni)** of others companies
- **Corporate bonds**: Sono prestiti che facciamo ad altre aziende che poi ci restituiscono con gli interessi
- **Sovereign bonds**: Sono prestiti che facciamo a livello governativo che poi ci restituiscono con gli interessi

They're not depreciated, while machines diminish their technical capabilities this does not happen for financial assets.

## Inventories (stock)

Inventories refer to the goods and materials that a company holds for production, manufacturing, or sale (raw materials, work-in-progress, finished products ...).

Initially, all inventory items are recorded based on their cost of acquisition. This cost represents the amount of money spent to purchase or produce the inventory items.

Inventory items are current assets, that means that stays in the company for less than one year. This creates problems in accounting the inventories, since the stock may be formed by items that entered at different dates and with different prices.

To address the measurement challenge, companies commonly use the following inventory valuation methods:

- 1) **FIFO**: First items to enter the inventory are the first ones to be sold or used. This means that the cost of the earliest acquired items is matched with the revenues first.
- 2) **LIFO**: Most recent items added to the inventory are the first ones to be sold or used. This means that the cost of the most recently acquired items is matched with the revenues first.
- 3) **Individual Item Tracking**: Some companies have systems in place to automatically track and value each individual item in the inventory. This allows for a more precise valuation by assigning specific costs to each item based on its acquisition or production cost.

## Accounts (receivable)

They are the result of commercial transactions in which the firm has sold products to clients but has not yet received the cash payment.

- They represent credits of the firm with respect to clients. The more we give time to customers to pay us, the more we will have credits.
- Receivable accounts have a date of expiration and may include clauses for penalties in case of late payment.
- If there is some risk of insolvency, receivable accounts should be cut by a percentage share representing the probability of not receiving the cash. (Viene rimossa una percentuale dal totale che indica la probabilità che il cliente non paghi, quello che rimane è l'account receivable netto che l'azienda si aspetta di ricevere).
- When customers are going to pay, the accounts receivable balance decreases, and the amounts received are recorded as cash inflows. (Liquidity of the firm)

It's important to balance the two assets, credits and debts, paying suppliers and receiving payments with a financial equilibrium.

## Cash

Cash refers to the liquid money available to a company, which can take the form of physical currency, such as coins and banknotes, or funds held in bank accounts.

Liquid assets can be readily converted into goods or services without significant time delay.

Careful cash management is crucial in the early life of a company because

- funds available are totally invested into assets
- operations absorb cash instead of generating cash, because revenues are low (e.g. the new product must be known by customers) and costs are high

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## Weighted Average Cost of Capital (WACC)

WACC is a financial metric that indicates the minimum return that the company's investments and activities should generate in order to meet the expectations of both debt holders and equity shareholder.

$$WACC (\%) = r_D \frac{D}{D+E} + r_E \frac{E}{D+E}$$

Where:

- $r_D$  (return to debt) = rate of interest payed to banks (%)
- $r_E$  (return to equity) = remuneration of shareholders (%) = (dividend + capital gain)/initial investment of shareholder
- $D$  = total debt
- $E$  = owner funds
- $D+E$  = total liabilities = total assets

*% debt over  
+ investments      Quanto vorrebbe fosse gli investitori*

*quanto vorrebbe fosse  
la banca*

*% equity over investment*

It means that if the company must repay the bank and the shareholders 10%, it means that the activity of transformation of this cash into investments must generate more than 10%, otherwise activity made with money generates less, it's better to shutdown the company.

Generally, the interest rate paid to the banks is lower than the return on equity capital, as equity holders bear higher risks (Banks are paid before holders, so they risk to gain nothing).

The **WACC** is used by companies to assess the feasibility of investment projects or potential acquisitions. If the WACC exceeds the expected return on an investment, it suggests that the investment may not be profitable enough to cover the required cost of capital, and the company may consider alternative options.

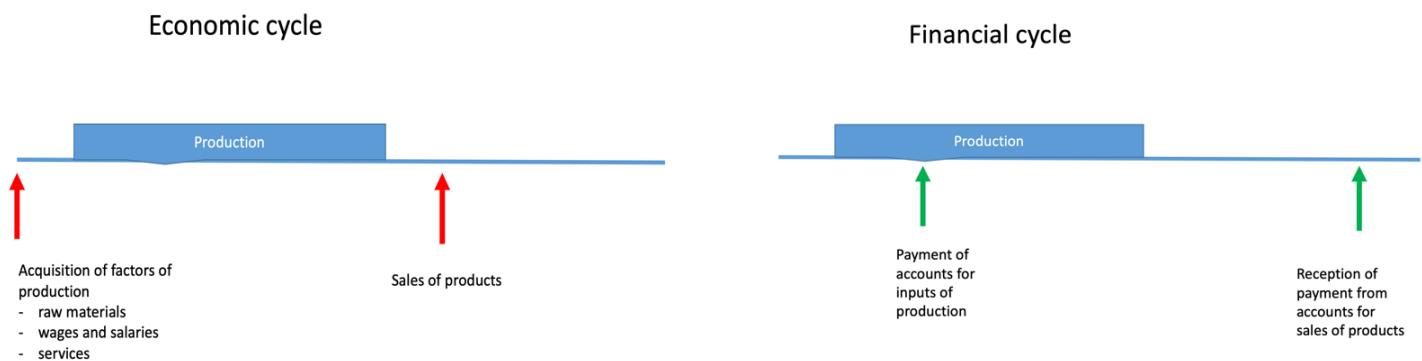
## Operational phase

After the startup phase we have the operation phase, in which we start production. In this phase we have revenues but also costs.

- **Revenues:** Revenues are generated through the sales of products and services. The monetary value of revenues depends on the volume and price combination. Revenues can be in the form of immediate cash or delayed payment through credit. If the revenue does not result in cash inflow, such as in the case of a customer going bankrupt, it leads to a loss (to be signed on the balance sheet), which is different from costs.
- **Costs:** Costs represent the consumption of resources needed in the production process. Costs can be monetary (immediate cash or delayed debit) or non-monetary, such as depreciation or cost reserves for future risks or expenses. Depreciation is a non-monetary cost as the cash outflow occurs at the beginning, and it does not generate immediate cash outflow. Cost reserves for future risks or expenses allow companies to allocate funds in advance for expected future costs, subject to legal regulations.

The operational phase is a combination of activities that generate two different cycles (not synchronized), economic and financial cycles.

- 1) **Economic cycle:** The economic cycle starts with the acquisition of production's factors and ends with the sales of the products
- 2) **Financial cycle:** The financial cycle starts with the payment for the costs needed to produce and ends with the reception of payment from sales.



One of the major difficulties in general management, and particularly in the startup phase, is the smooth coordination between the economic and the financial cycles.

We need to ensure the economic equilibrium, at the end of the year we need to have total revenues > total costs, but we also need to have sufficient cash to cope with requirements, which is financial equilibrium.

## Economic equilibrium

Economic equilibrium requires that total revenues exceed total costs, aiming for profitability. Temporary losses may occur, but sustained economic disequilibrium can lead to financial disruption, cash flow challenges, and potential insolvency.

## Financial equilibrium

Financial equilibrium involves ensuring that:

- 1) Fixed assets are adequately covered by owners' funds and long-term loans
- 2) Current liabilities are covered by current assets
- 3) Short-term cash needs are fully covered.

A company can be profitable but still face financial disequilibrium if there are high risks of insolvency or if payment terms for credits significantly exceed payment terms for debts. Conversely, a company can be in short-term financial equilibrium but unprofitable if it anticipates cash inflows at the expense of future profits or postpones necessary cash outflows, potentially leading to future financial crises.

### **Total revenues**

Total revenues represent the income generated by a company from various sources. These sources can be categorized into operational revenues, financial revenues, and extraordinary revenues.

- **Operational revenues:** Operational revenues are the primary source of income for a company and typically include sales of products and services. Also includes discount on purchases that reduce costs and increase revenue.
- **Financial revenues:** Financial revenues are generated through financial activities, such as interest earned on bonds and other financial assets, as well as capital gains from the sale of shares or other financial assets.
- **Extraordinary revenues (non recurrent):** Extraordinary revenues are non-recurring and can include capital gains from the sale of fixed assets, such as used equipment, as well as the cancellation of debts and any fiscal benefits obtained.

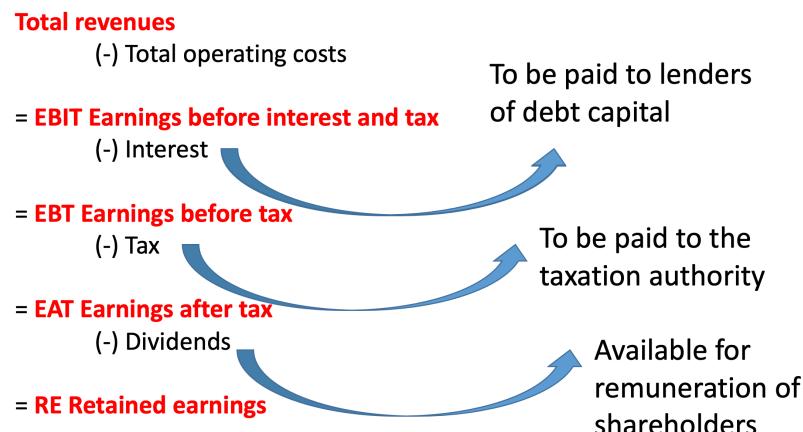
### **Total costs**

Total costs encompass the expenses incurred by a company in its operations and can be categorized into operational costs, financial costs, depreciation costs, and taxation costs.

- **Operational costs:** These costs are essential for the production and delivery of goods or services and need to be carefully managed to ensure profitability and efficiency.
- **Financial costs:** Financial costs include interest expenses on loans and debts, as well as administrative expenses related to bank fees and charges.
- **Depreciation costs:** Depreciation costs refer to the annual depreciation charge for buildings, equipment and machinery, vehicles, and capitalized R&D expenses.
- **Taxation costs:** Taxation costs encompass various taxes on income, non-income items, property, regulation, waste management, and other applicable taxes.

### **Profits**

The profitability of a company is measured through various indicators.



We remove operational costs and get an operational measure, we then cut off the bank, then we pay the taxation authority, and then we have the remuneration of shareholders, and this is why they're more subject to risks, they're paid after and they may get nothing.

We start from operational profitability, what we are good to, we detract operational costs and then we get financial measures.

### Financial ratios

Financial ratios provide insights into the financial health, performance, and risk profile of a company. They are derived from the structure of assets and liabilities, and they help analyze various aspects of a company's financial position.

FA Fixed assets	OF Owners' funds
CA Current assets	LTL Long term loans
	CL Current liabilities

The first column, representing the structure of investments, refers to the assets that the company holds, which are financed by the funding sources. The second column, representing funding, refers to the liabilities and owner's funds (equity) that provide the capital to finance the company's operations.

**Double-keeping property:** Every transaction or economic event has two aspects: a debit entry and a corresponding credit entry. These entries are recorded in different accounts, but the total value of debits must always equal the total value of credits. This ensures that the accounting equation (**Assets = Liabilities + Equity**) remains in balance. The difference between the total assets and total liabilities in the assets & liabilities statement represents the company's equity (owners fund), and this difference aligns with the profit generated by the company as reported in the profit & loss statement.

Ratios regarding assets & liabilities:

- **Capital employed (CE)** = FA + CA – CL = OF + LTL

It represents the investment in assets (fixed assets and current assets) minus current liabilities. It indicates the capital employed in the company, which consists of long-term funding sources.

- **Net worth (NW)** = Owners' Fund = OF (Patrimonio netto)

It is the value of the company calculated as total assets minus total debt. It represents the value of the company after subtracting the obligations.

- **Working capital (WC)** = CA – CL = OF + LTL – FA

It is calculated as current assets minus current liabilities. Working capital represents the funds available for day-to-day operations and indicates the liquidity position of the company.

## **Profitability Ratios** (We need a way to determine if a company is profitable or not):

- **Return on Assets (ROA) or Return on Total Assets (ROTA): EBIT/Total assets**

It measures the profitability of the company in relation to its total assets. It indicates how efficiently a company is utilizing its assets to generate profits. (Which is the ability of total assets to generate value?)

- **Return on investment (ROI): EBIT/Capital employed**

It assesses the profitability of the capital employed in the company (The ability of the company to generate value out of the capital employed). It measures the return generated from the total capital invested.

- **Return on equity (ROE): EAT/Owners' funds**

ROE measures the return generated for shareholders' equity. It indicates how effectively a company is utilizing shareholder funds to generate profits. ROE shows the percentage return on the shareholders' investment in the company.

It's a good ratio to compare different companies by the side of shareholder.

## **Liquidity Ratios** (Evaluate a company's ability to meet its short-term obligations and its overall liquidity position):

- **Current ratio (CR) = Current assets/Current liabilities**

We need to have this value  $> 1$ , because we imagine a situation in which all liabilities need to be transformed in cash immediately.

- **Quick ratio (QR) = Current liabilities/Cash**

It assesses the company's ability to meet its short-term obligations using only its quick assets, which are current assets excluding inventory.

## **Solvency ratios** (evaluate a company's ability to meet its long-term financial obligations and its overall financial stability):

- **Equity ratio (ER) = Owners' funds/ Total liabilities**

The equity ratio reflects the company's solvency and financial stability by indicating the proportion of assets that are financed by the owners.

- **Debt to equity ratio (DER) = Long term loan/ Owners' funds**

The ratio indicates the extent to which a company relies on debt financing compared to equity financing. A higher DER indicates a higher level of debt relative to owner's funds, which increase financial risks.

## **Capital market ratio**

- **Dividend yield (DY) = Dividend/ Market value of share**

A higher dividend yield indicates a higher return on investment through dividends. It suggests that the company is paying a larger portion of its profits to shareholders in the form of dividends.

It's important to note that a high dividend yield could also be a result of a decline in the company's stock price

### Cash flow ratio

The **Free cash flow (FCF)** financial ratio that represents the amount of cash generated by a company from its operations after subtracting capital expenditures (**CAPEX** - represent the cash outflows used for purchasing or maintaining fixed assets).

It provides insights into the company's ability to generate cash flow that can be used for various purposes such as investing in new projects, paying down debt, or distributing dividends to shareholders.

A positive free cash flow indicates that the company is generating more cash from its operations than it is spending on capital expenditures, so has "free money" to pay debt, pay dividends and so on.

OSS: **Free cash flow to equity (FCFE)** is a financial ratio that measures the amount of cash available to be distributed to the company's equity shareholders after accounting for capital expenditures.

capitale guad.  
mi ha fatto guad.  
↑ o perdere  
uno specifico prod.  
es: Se faccio guad e cappelli divido  
↑ in cash e ricavi  
relativi  
a quel  
prodotti

Profit center: Una suddivisione all'interno del bilancio per allocarlo nel singolo prodotto o linea di produzione

→ Per capire quanta parte utile / perdita va imputata al singolo prodotto / linea di produzione

**Financial accounting** is concerned with reporting financial information to external parties, such as stockholders, creditors, and regulators. The main document is the balance sheets.

**Managerial accounting** is concerned with internal decision-making, providing information to managers within an organization so that they can formulate plans, control operations, and make decisions. Here important are the budget and internal confidential documents.

### Management Accounting

We have discussed accounting as the technique to build up the balance sheet, building up the two documents: assets & liabilities and profit & loss (aggregating data on annual basis). -> Financial In management accounting, the focus shifts from annual aggregates to analyzing financial information on a more granular level. For example, instead of looking at overall costs and revenues for the entire year, management accountants seek to measure and analyze these figures per unit of product or service. This allows for a more detailed understanding of the cost structure and profitability at a product or service level.

We want to measure financial informations per unit of product.

### Cost accounting

Cost Accounting is a technique by which we can measure the cost not related to a year, but per unit of product, division, department. For many decisions, cost accounting is useful.

- **Direct cost:** Direct costs are costs that are physically connected to the production of a specific product. They include items such as raw materials, components, consumables, energy, and labor. These costs can be measured precisely in physical units or approximated on a yearly basis.
- **Indirect cost:** Indirect costs are costs that depend on the level of production in general but are not tied to any specific individual product. Examples include depreciation of equipment and factory services. Allocating indirect costs to individual products can be challenging and requires decision-making on how to distribute these costs.

One of the most used techniques is to allocate indirect costs as a linear proportion of the direct costs (%).

- **General cost:** General costs are costs at the company level that are not directly tied to the level of production but are associated with the overall activities of the firm. Examples include administration, legal and regulatory affairs, and corporate communication. Different companies may have different approaches to allocating these costs, depending on their specific circumstances.  
With general costs we use the **imputation** technique, i.e., rules for the breakdown of those elements of costs which are not directly connected to production. Depending on the decision we get different results.

### **Cost centers vs profit centers**

Cost centers and profit centers are concepts used in management accounting to allocate responsibility and measure performance within an organization.

- **Cost centers** are internal units or departments within the company that are primarily responsible for managing and controlling costs. Their main focus is on operational activities and reducing costs. Cost centers are not directly accountable for generating profits but rather for managing expenses efficiently (es: production departments, administrative units).
- **Profit centers** are units or departments that are responsible for both costs and profits. They not only manage costs but also actively work towards generating revenues and maximizing profitability. These units are responsible for generating revenues through their sales efforts and managing costs associated with their operations (es: sales department, marketing teams).

### **Cost allocation**

One of the principles we use is this.

The general principle is that each unit should be responsible for activities for which it has power and authority.

- **Cost center:** Are allocated direct costs, which are costs directly attributable to their specific activities, as well as indirect costs based on a proportionate basis relative to their direct costs. (Responsibility only for operational activities)
- **Profit center:** Are allocated all costs, including direct costs, indirect costs, and general costs. Profit centers are also responsible for overhead expenses, which are the costs associated with the overall administration and support functions of the organization.

By properly allocating costs, management can assess the performance of cost centers and profit centers, identify areas of improvement, and make informed decisions to optimize resource allocation and overall business performance.

### **Break even analysis**

Break-even analysis is a financial analysis tool used to determine the point at which a company's total revenue equals its total costs, resulting in zero profit or loss. Key points of break-even analysis include:

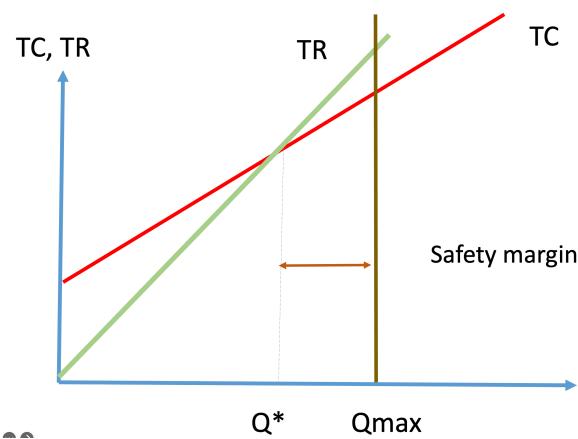
- **Fixed costs (FC):** These are costs that do not vary with the volume of production or sales. They must be covered by revenues to avoid losses.
- **Variable costs (VC):** These costs vary with the level of production or sales. They can have two regimes of variability: decreasing returns (U-shaped marginal cost function) or constant returns (constant marginal cost).

- **Unit Variable Cost ( $v$ ):** This represents the cost incurred for each unit of product or service sold. It is calculated by dividing the total variable costs by the number of units sold.
- **Product Price ( $p$ ):** This is the selling price per unit of the product or service.
- **Contribution margin ( $p - v$ ):** This is the difference between the selling price of a product or service and its variable cost. It represents the amount that contributes to covering fixed costs and generating profit.

The **break-even point (BEP)** is the quantity at which total revenue equals total costs, resulting in zero profit. It is calculated by dividing the fixed costs by the contribution margin per unit.

$$\text{BEP (Q*)} = \text{Fixed Costs} / (\text{Product Price} - \text{Unit Variable Cost})$$

The **safety margin** refers to the difference between the actual level of sales or production and the break-even point. A larger safety margin indicates a lower risk, as the company has more room to absorb fluctuations before experiencing losses.



### Manufacturing overhead

Manufacturing overhead includes all manufacturing costs except direct material and direct labor, so except the direct. These costs cannot be readily traced to finished products.

Includes indirect materials that cannot be easily or conveniently traced to specific units of product.

Includes indirect labor costs that cannot be easily or conveniently traced to specific units of product.

Only those indirect costs associated with operating the factory are included in manufacturing overhead (they include costs such as utilities, maintenance and repairs, depreciation of manufacturing equipment, factory supplies, and other indirect expenses incurred in the production facility).

$$\text{Conversion costs} = \text{Manufacturing overhead} + \text{part of the direct labor}$$

Considering **non-manufacturing costs**, we have the following taxonomy:

- **Selling costs:** Cost necessary to secure the order and deliver the product (either direct and indirect)
- **Administrative costs:** Executive, organizational and clerical costs (either direct and indirect)

## **Product costs**

Product costs are assigned to individual units of the product as they are acquired or manufactured and remain attached to each unit as long as it remains in inventory awaiting sale. This means that the costs are carried over from the acquisition or production phase and are accounted for until the product is sold.

For manufacturing companies, product costs include:

- **Raw materials:** includes any materials that go into the final product.
- **Work in process:** consists of units of product that are only partially complete and will require further work before they are ready for sale to the customer.
- **Finished goods costs:** consists of completed units of product that have not yet been sold to customers.

## **Transfer of Product Costs**

The transfer of product costs refers to the movement of costs incurred during the production process from one stage to another. In a manufacturing company, costs are initially assigned to raw materials and are gradually shifted to different stages of production until they become part of the finished goods.

### **Cost transfer process:**

- 1) **Raw materials:** The costs of direct materials are initially recorded in the Raw Materials account. When these materials are used in production, their costs are transferred from Raw Materials to the Work in Process (WIP) account. This transfer reflects the conversion of raw materials into products in progress.
- 2) **Direct labor and manufacturing overhead:** Direct labor costs, which include the wages or salaries of employees directly involved in production, along with manufacturing overhead costs (indirect production costs such as utilities, maintenance, or depreciation of manufacturing equipment), are added to the Work in Process account. This transfer recognizes the labor and overhead expenses incurred to convert the raw materials into partially completed products.
- 3) **Work in Process:** As the units of product progress through the production stages and are closer to completion, their accumulated costs are tracked in the Work in Process account. This account serves as an intermediary stage for accumulating the direct materials, direct labor, and manufacturing overhead costs associated with the production process.
- 4) **Finished goods:** Once the units of product are completed, their costs are transferred from the Work in Process account to the Finished Goods account. This transfer signifies that the products are now ready for sale and have reached their final stage of production.
- 5) **Cost of Goods Sold:** When the manufacturer sells the finished goods to customers, the costs associated with those goods are transferred from the Finished Goods account to the Cost of Goods Sold (COGS) account. This transfer reflects the recognition of costs related to products that have been sold and are no longer held in inventory.

**Period costs**, on the other hand, are expenses that are not directly associated with the production process but are incurred over a specific period, such as selling and administrative costs. These costs are recognized as expenses in the period in which they are incurred rather than being assigned to the product.

## Cost behavior

Cost behavior refers to how a cost will react to changes in the level of activity (higher productivity level).

The most common classifications are:

### 1) Variable costs

These costs vary in total in direct proportion to changes in the level of activity. However, the variable cost per unit remains constant. In other words, as the activity increases, the total cost increases, and as the activity decreases, the total cost decreases. Examples of variable costs include direct materials and direct labor. (cause-effect relation, doing something consumes resources and generate a cost).

### 2) Fixed costs

Fixed costs remain constant in total regardless of changes in the level of activity. However, on a per-unit basis, the average fixed cost per unit varies inversely with changes in activity. This means that as the activity level increases, the average fixed cost per unit decreases, and vice versa. Fixed costs include expenses such as rent, salaries of permanent staff, and insurance.

Cost	Behavior of the Cost (within the relevant range)	
	In Total	Per Unit
Variable cost	Total variable cost increases and decreases in proportion to changes in the activity level.	Variable cost per unit remains constant.
Fixed cost	Total fixed cost is not affected by changes in the activity level within the relevant range.	Fixed cost per unit decreases as the activity level rises and increases as the activity level falls.

### 3) Mixed costs

Mixed costs contain both variable and fixed elements. These costs have a fixed component that remains constant and a variable component that varies with the level of activity. An example of a mixed cost is utility expenses, where there is a fixed monthly charge along with a variable component based on usage.

The total mixed cost line can be expressed as an equation:  $Y = a + bX$

Where:  $Y$  = The total mixed cost.  
 $a$  = The total fixed cost (the vertical intercept of the line).  
 $b$  = The variable cost per unit of activity (the slope of the line).  
 $X$  = The level of activity.

## Decision-Making

The goal of making decisions is to identify those costs that are either **relevant** or **irrelevant** to the decision.

- 1) **Differential costs** (or incremental costs) are the difference in cost between any two alternatives. Those are always relevant to decision-making.

- 2) **Sunk costs** are costs that have already been incurred and cannot be changed, should be ignored when making decisions. (We just need to focus on future costs).
  - 3) **Opportunity cost** is the potential benefit that is given up when one alternative is selected over another. They must be explicitly considered in every decision.
- 

## Investment

Company investments refers to allocating funds to acquire fixed or current assets.

The different types of investments mentioned include investments in fixed assets (such as buildings, equipment, and computer networks), financial assets (shares, obligations, derivatives), and investments in human capital (education). Financial assets are more liquid, but we can encounter loss, e.g. selling a share.

## Formal structure of any investment

- 1) *Initial outflow of cash to acquire assets*  
Formally:  $-X_0$

- 2) *Subsequent inflow of cash generated through the utilization or sale of those assets.*  
Formally:  $+X_1 + X_2 + X_3 + X_4 + X_5 \dots$

Initially it is always  $-$ , but after a while  $+$ , we still may have costs, but we have a positive net cost, the sum.

## Preliminary assessment

Any investment in which the sum of cash inflows is larger than the initial outflow should be considered positively.

Formally  $(X_1 + X_2 + X_3 + X_4 + X_5 \dots) > X_0$

To verify the previous disequation we might build up a cumulative function of the form.

We obtain the Cumulative Cash Flow (CCF):

$$CCF_0 = -X_0$$

$$CCF_1 = -X_0 + X_1$$

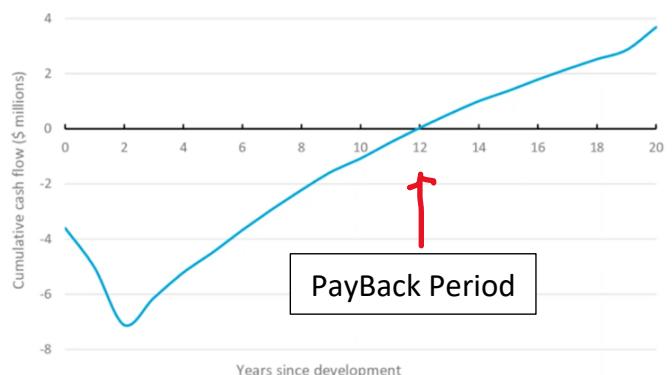
$$CCF_2 = -X_0 + X_1 + X_2$$

$$CCF_3 = -X_0 + X_1 + X_2 + X_3$$

$$CCF_4 = -X_0 + X_1 + X_2 + X_3 + X_4$$

$$CCF_5 = -X_0 + X_1 + X_2 + X_3 + X_4 + X_5$$

We are interested in the sequence.



The investment is acceptable if at the end of the the investment  $CCF > 0$ .

## Time value of money and discounting

People generally prefer to have money today rather than in the future, so cash flows in different time periods are not considered equal. Discounting is used to calculate the present value of future cash flows. The discount rate ( $r$ ) represents the rate of return required to make two sums at different dates indifferent to an individual.

We are looking for the real number such that  $X_1 = X_0 (1+r)$  with  $r > 0$ .

## Discounted Cash Flow

We can define the discounted cash flow as:

$$DCF = \sum X_t / (1+r)^t$$

- Each cash flow is discounted  $t$  times, where  $t$  represents the period. Sums of money that are distant in time are valued less as they are discounted more times.
- The value of the DCF depends on the choice of discount rate ( $r$ ) and the timing of cash flows.

The choice of discount rate depends on the type of investment:

- Public investments may use the official discount rate of the Central Bank
- For private investments, the Weighted Average Cost of Capital (WACC) is often used as the discount rate.

## Decision rule

The decision rule for investments is to proceed if the DCF is greater than zero ( $DCF > 0$ ). This indicates that the investment generates additional value, compensating for the initial outflow and providing a positive return. If the DCF is negative, the investment does not generate sufficient cash to cover the initial outflow.

## Internal rate of return (IRR)

IRR is the discount rate that makes the DCF equal to zero, i.e., the minimum rate of return ( $r$ ) to get a positive DCF.

To find the **IRR** we have to find the real number  $k$  such that:

$$DCF = \sum X_t / (1+k)^t = 0$$

## Internal rate of return vs DCF

IRR and DCF deliver the same results when applied to a single investment, if the **DCF > 0 then IRR > r**. (The investment generates value).

However, when comparing multiple investments, the two criteria can lead to different decisions. The **IRR** represents one of the roots of the polynomial equation formed by the DCF calculation. Different investments may have different IRRs, while the DCF criterion considers the overall value of the investment.

This implies that when two investments are compared, it is possible that the two criteria do not deliver the same decision.

The IRR divides the two regions, the one with **VAN** (value of the net present value)  $> 0$ , which means a positive return, and the one with **VAN**  $< 0$ , which means a negative return.

- 1) **DCF  $> 0$  or IRR  $>$  WACC:** The general acceptance criteria for an investment is to have a DCF greater than zero or an IRR higher than the weighted average cost of capital (WACC). If the investment meets either of these criteria, it is considered acceptable.
- 2) **IRR  $<$  WACC:** Accepting an investment with an IRR lower than the WACC would mean destroying value since the return is lower than the cost of capital

If we have more than one investment, it is possible to encounter situations where the DCF and IRR criteria deliver different outcomes. This difference arises due to the polynomial structure of the DCF calculation, which allows for multiple roots and different rates of return for each investment.

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## Marketing

Marketing refers to the activities and processes involved in promoting, selling, and distributing products or services to customers.

### Segmentation

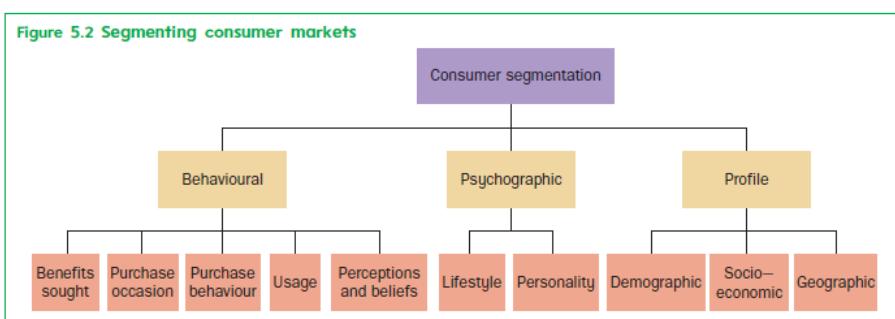
Marketing segmentation refers to the process of dividing a broader market into distinct groups or segments based on similar characteristics, needs, behaviors, or preferences of the target audience. B2C segmentation (Business-to-Customers): B2C are larger and implies a decentralized decision of individuals.

B2B (Business-to-Business): In B2B the decision-making process is more professional and more rational, less subject to emotions. The market is relatively small with respect to customers.

#### 1) Segmenting Consumer Markets (B2C)

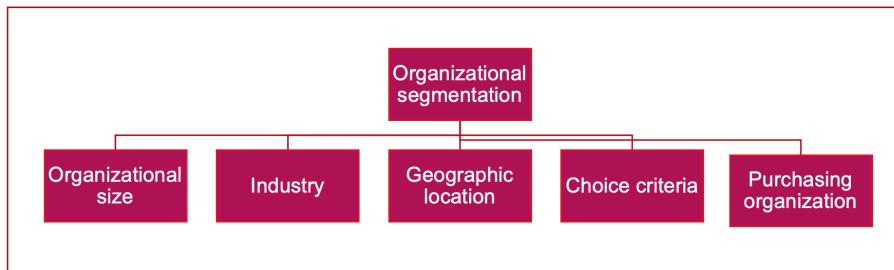
The consumers segmentation is done on three categories:

- a. **Profile segmentation:** Focuses on demographic and socio-economic factors of consumers. (age, gender, family size ...)
- b. **Behavioral segmentation:** Focuses on understanding how consumers interact with products or services. (product usage, brand loyalty ...)
- c. **Psychographic segmentation:** Aims to understand the underlying psychological factors that drive consumer behavior and preferences. (lifestyle, opinions, motivations ...)



## 2) Segmenting Business Markets (B2B)

- a. Organizational size
- b. Industry
- c. Geographic location
- d. Choice criteria: Criteria they use to make purchasing decisions (price, quality ...)
- e. Purchasing Organization: Structure and nature of their purchasing organization (Multiple decision-makers, centralized or decentralized purchasing)



We need to follow five criteria for successful segmentation:

- **Measurability:** A segment should be measurable in terms of its characteristics or attributes
- **Accessibility:** Ability to communicate specifically to the segment instead of the overall market
- **Actionable:** A market segment must have characteristics that provide useful data to support marketing strategies.
- **Effectiveness:** A segment should exhibit a favorable response to the marketing activities and messages directed towards them
- **Profitability:** A segment should have a favorable balance between costs and benefits



## Marketing Mix

The marketing mix consists of the four main elements that organizations use to influence consumer perceptions and meet customer needs. (4Ps of marketing):

- **Product:** Tangible or intangible product and services offered to it target market
- **Price:** Amount of money customers are willing to pay for a product or service
- **Promotion:** Involves communications activities used to inform, persuade, and influence customers about the company's products or services.
- **Place (Distribution):** Activities involved in getting the product or service to the target market. (Distribution channels, logistics ...)

## Target marketing

Target marketing is the strategic choice of specific segments to serve within a market.

- **Undifferentiated marketing:** Single marketing mix for the whole market.
- **Differentiated marketing:** Multiple mixing to address multiple segments.



- **Focused marketing:** Single marketing mix aimed at one target (niche) segment.
- **Customized marketing:** Multiple marketing mix addressed to one specific customer.

The more personalization we offer the more we adapt to individual customers, and the higher will be costs.

## Positioning

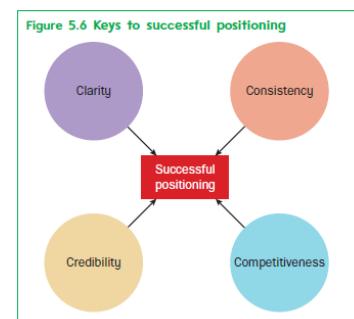
Strategic process of creating a distinct and meaningful position for a company's offering in the minds of target consumers. Design products/services that the customers are needing.

The goal is to occupy a unique and favorable position in the marketplace.

To determine the best position, three variables need to be considered: the customers, the competitors, and the company itself. Understanding what attributes matter to customers, identifying a differential advantage that sets the company apart from competitors, and leveraging unique sustainable attributes are all important factors in positioning.

The keys for successful positioning is made by these 4 Cs.

- **Clarity**, they have to understand why we are different
- **Consistency**, actions must be coherent with this positioning
- **Credibility**, we need to show that we are credible
- **Competitiveness**, we must be better than competitors



Perceptual maps are useful tools for visualizing and analyzing positioning. They involve reducing multiple dimensions to a two-dimensional map, allowing brands to be plotted based on important attributes and their scores in consumer research. This helps identify the relative positions of competing brands in the market.

## Repositioning

Repositioning involves making changes to the current position of a brand.

- 1) Image repositioning: Keep product and market changing the image of the product
- 2) Product repositioning: Change product and keep market
- 3) Intangible repositioning: Keep product and change market
- 4) Tangible repositioning: Change product and change market

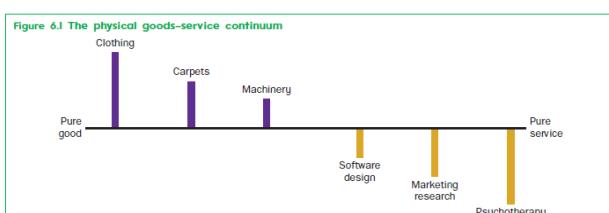
Figure 5.9 Alternative repositioning strategies

Target market	Product	
	Same	Different
Same	Image repositioning	Product repositioning
Different	Intangible repositioning	Tangible repositioning

## Product vs Service

The main difference between a product and a service is that:

- Product is obtained by engineering and physical transformation.
- Services are more related to the transformation of information.



**Digitalization** is transforming the distinction between goods and services. Companies are increasingly blending the two concepts by productizing services and servitizing products. The challenge with intangible services is how to appreciate their value. One approach is to make the service as tangible as possible, allowing customers to assess its quality based on tangible aspects.

### **Product policy**

Product policy in the context of goods focuses on creating value through products and brands. A product refers to anything that can satisfy customer needs.

To understand customer needs, we consider three perspectives: the core product, the actual product, and the augmented product.

- **Core product:** Represents the tangible element that is physically delivered and can be experienced materially.
- **Actual product:** Includes additional features that surround the core product and add value (functional/non-functional characteristics)
- **Augmented product:** Includes activities necessary to fully experience the product (service-based), for example installation, time delivery, brand value...

### **Branding**

Branding is the process of differentiating a company's product offerings from its competitors. It becomes more important as markets move away from perfect competition and towards differentiation. Branding allows companies to create associations with their products in the minds of consumers, making the purchase decision easier.

**Brands** have a significant impact on consumers' perceptions. Some products are more commonly known by their brand names than by their actual product names, showcasing the power of brands.

**Branding** brings several benefits to organizations, including increased company value and brand equity, consumer preference and loyalty, a barrier to competition, high profits, and a base for brand extensions. For consumers, brands communicate features and benefits, reduce the risk in purchasing, simplify the purchase decision, and hold symbolic value.

When it comes to **branding decisions**, organizations must consider the brand name (simple, positive associations, distinctive ...), brand development, and brand positioning in the marketplace. Brand names can be family names that cover multiple products (e.g., Ferrari), individual names (e.g., Panda), or a combination of both.

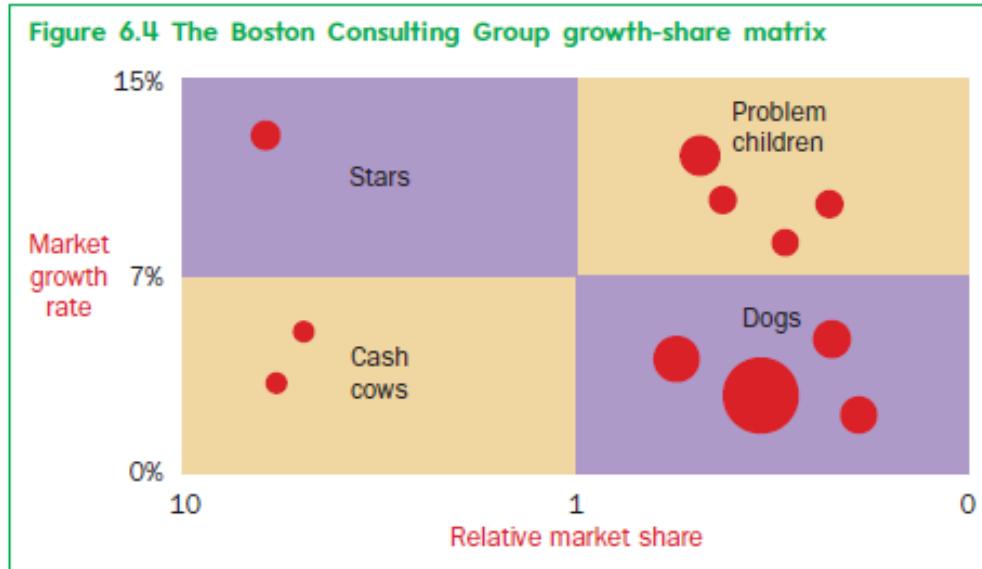
**Trademarks** provide legal protection for brand names, brand marks, or trade characters.

**Brand positioning** involves considering how the positioning is influenced by the brand. This includes the brand domain (where the brand competes with other brands), brand heritage (customer understanding from the past), brand assets (communication strategies), and brand personality (establishing a reference point).

Brand extension and brand stretching are strategies used to leverage brand equity to new products. In some cases, **new brands** are needed, such as Emporio Armani and Giorgio Armani. **Global branding** same brand across different markets. **Co-branding** multiple brands are used for different purposes.

Portfolio planning is a strategic approach to managing groups of brands and product lines. It involves classifying businesses or markets based on their market growth rate and relative market. The possible classifications are:

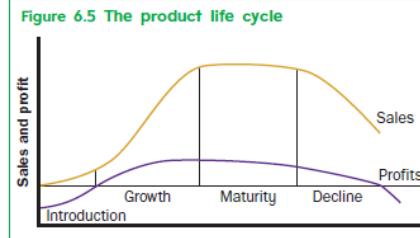
- **Stars:** Businesses or brands that have a high market share in rapidly growing markets. Stars have strong growth potential and can generate significant profits. Companies should invest resources in stars to maintain or increase their market leadership position. Strategies for stars often focus on growth and market expansion.
- **Cash Cows:** Cash cows are businesses or brands that have a high market share in low-growth markets. While their market growth may be limited, cash cows generate stable and substantial profits. Companies should aim to defend their market share and maximize the cash flow from these businesses. Strategies for cash cows often involve cost control and harvesting the profits generated.
- **Dogs:** Dogs are businesses or brands that have a low market share in low-growth markets. These businesses struggle to achieve significant profitability and may consume resources without generating substantial returns. Companies may choose to divest or discontinue these businesses if they do not show potential for improvement. Strategies for dogs may involve minimal investment and focusing on more promising opportunities.
- **Problem Children (Question Marks):** Problem children, also known as question marks, are businesses or brands that have a low market share in high-growth markets. While they operate in markets with growth potential, they have not yet achieved a significant market share. Companies face the decision of whether to invest in problem children to turn them into stars or divest and exit the market. Strategies for problem children may involve market research, product development, and marketing efforts to increase market share.



## The product lifecycle

The product lifecycle refers to the stages that a product goes through from its introduction to the market until its eventual decline. The classic product lifecycle consists of four stages:

- 1) **Introduction:** The product is newly introduced to the market. Sales are typically low as awareness and adoption are still building. Companies invest heavily in marketing and promotion during this stage to generate awareness and trial among consumers. Profits are usually negative due to the high expenses incurred in launching the product.
- 2) **Growth:** Sales begin to increase rapidly as more consumers adopt the product. Marketing efforts focus on expanding the customer base and gaining market share. Profits start to rise as sales volume increases and expenses are more effectively managed.
- 3) **Maturity:** The maturity stage is characterized by a plateau in sales. The product has reached its peak market penetration, and competition becomes more intense. Companies strive to maintain their market share and retain customers through marketing initiatives and product differentiation. Profits may remain stable but no longer experience significant growth.
- 4) **Decline:** Eventually, the product enters the decline stage, where sales start to decline due to factors such as market saturation, technological advancements, or changing consumer preferences. Companies may choose to manage the decline by reducing costs, targeting specific market segments, or introducing product enhancements. However, profits usually decrease during this stage until sales eventually reach zero.



Different strategies are required for each stage of the product lifecycle. In the introduction stage, companies focus on building awareness and trial. In the growth stage, efforts shift towards market expansion and increasing market share. In the maturity stage, companies aim to maintain market share and customer loyalty. In the decline stage, strategies focus on managing the decline and maximizing profitability.

## New Product Development

The introduction of new products is essential for companies to stay competitive and maintain growth. Waiting until sales decline is not a proactive strategy, so companies should continuously develop and launch new products to stay ahead of the market.

### Exists 4 categories of new products:

- **Product replacements** (45%): It includes making revisions and improvements to existing products. These modifications are often incremental and aim to enhance the features, performance, or design of the existing product.
- **Additions to existing lines** (25%): Companies introduce new products that complement or expand their existing product lines. These additions help capture additional market share, cater to different customer preferences, or address specific needs within the target market.
- **New product lines:** (20%) Companies venture into new markets or industries to diversify their offerings and reach a different customer base
- **New-to-the-world products:** (10%) These are highly innovative and groundbreaking products that create entirely new markets or industries.

New Product Development process:

1. **Idea generation:** This is the stage where ideas for new products are generated.
2. **Screening:** The generated ideas are carefully evaluated and screened.
3. **Concept Testing:** The selected ideas are further developed into product concepts, which are then presented to a sample group of target customers. Feedback is collected to assess their level of interest.
4. **Business Analysis:** Analysis to evaluate the financial viability of the product (is done now because before we hadn't sufficient data)
5. **Product development**
6. **Market testing:** Before a full-scale launch, the product is tested in a limited market or specific target segments. (Prototype)
7. **Commercialization:** If the market testing phase is successful, the product is ready for commercialization.

Figure 6.6 The seven-stage new product development process



The **diffusion of innovation** is a theory that explains how new products are adopted and spread among the target market.

Innovators and early adopters are typically the first to embrace and adopt new products, while the majority follows suit as the product gains more awareness and acceptance.

### Marketing - Value through Services, Relationships and Experiences

In the context of marketing, there is a growing trend towards **servitization**, where companies shift their business models from merely selling goods to providing services.

The main characteristics of services are:

1. **Intangibility:** Services are intangible, meaning they cannot be seen, touched, or physically experienced. To increase tangibility, service providers may use tangible cues or physical evidence to approximate the quality of the service.
2. **Inseparability:** Unlike goods, which can be produced and consumed separately, services are often simultaneously produced and consumed. The production and consumption of services occur in real-time and in the same space.
3. **Perishability:** Services are perishable, meaning they cannot be stored or inventoried for future use. Unlike goods that can be produced in advance and stored until they are needed, services must be consumed at the time of their production.
4. **Variability:** Standardization difficult; for goods we can standardize by engineering procedures, while we cannot do in services, it is produced during the delivery.

The **services marketing mix** is an extension of the 4P's which are present in products:

- Product;
- Price;
- Promotion;
- Place.

The additional elements of the mix are in services:

- **Physical evidence:** Physical evidence refers to the tangible cues or tangible aspects that customers use to evaluate the likely quality of a service. It includes elements such as the physical environment, decor, furnishings, lighting, and other visible elements that contribute to the overall service experience.
- **People:** The people component of the services marketing mix recognizes the importance of employees and their role in delivering the service experience. Since services involve simultaneous production and consumption, the interaction between service providers and customers becomes critical. The behavior, competence, and attitude of service personnel significantly impact customer satisfaction.
- **Process:** Process refers to the procedures, mechanisms, and flow of activities involved in service delivery. In the context of services, process often includes the use of technology, software, and standardized procedures to ensure efficiency and effectiveness.
- **Service Branding:** Branding in services is essential due to the intangible nature of services. Successful service brands possess distinctiveness, relevance, memorability, and flexibility. A distinctive brand differentiates the service provider from the competition, while relevance communicates the nature of the service and its benefits.

### **Relationship marketing**

Relationship marketing focuses on building and maintaining strong customer relationships. We have six benefits of Strong Customer Relationships:

1. **Increased purchases:** Strong customer relationships often lead to increased customer loyalty and repeat purchases.
2. **Lower costs:** Retaining existing customers is generally more cost-effective than acquiring new ones.
3. **Lifetime value:** Customers who have a positive relationship with a service provider are more likely to continue using their services, contributing to sustained revenue.
4. **Sustainable competitive advantage:** When customers have a positive experience and develop trust in a particular service provider, they are less likely to switch to competitors.
5. **Word of mouth promotion:** Satisfied customers who have strong relationships with a service provider are more likely to recommend the services to others.
6. **Decreased staff turnover:** Satisfied customers create a positive work environment, reducing staff turnover and contributing to overall employee satisfaction.

### **Meeting Customer Experience**

Meeting customer experience expectations is crucial in building and maintaining strong customer relationships. Customers evaluate their service experiences based on several factors:

1. **Reliability:** A reliable service is one that consistently meets or exceeds customer expectations.
2. **Assurance:** Service providers should demonstrate expertise, credibility, and reliability to instil trust in their customers.
3. **Responsiveness:** Timely and helpful customer support can significantly impact the overall customer experience.
4. **Empathy:** Acting in a friendly and polite manner and showing genuine concern for customer needs helps build a positive emotional connection.
5. **Tangibles:** Tangible elements, such as staff appearance, decor, and overall service environment, contribute to the customer's perception of service quality.

## **The Gaps Model**

The Gaps Model is a framework used in service marketing to analyze and improve service quality delivery. It identifies four main gaps that can cause service quality, and the goal is to close them.

### **Gap 1**

This is the gap between what customers expect from a service provider and what the senior management team in the service organization thinks that customers expect.

Solution: Effective research into customers' expectations can be used to close this gap.

### **Gap 2**

This is the gap between senior management perceptions and the service-level criteria that they set for the organization.

Solution: This gap can be closed by ensuring that customer service goals are an important part of the organization's targets.

### **Gap 3**

This is the gap between the service-level targets set by the organization and the actual level of service that is delivered by front-line staff. This is a human resource problem typically, we fail to deliver. This gap can arise due to there being inadequate resources committed to service delivery, or poor selection, training, and motivation of staff.

Solution: Proper investment in service resources to align employee behavior and actions with the desired service standards.

### **Gap 4**

Finally, this is the gap between promises made to customers and the actual experience they receive. Over-promising or setting unrealistic expectations can lead to dissatisfaction.

Solution: Manage service promises carefully and ensure that organizations deliver what they promise to avoid customer disappointment.

## **Service Recovery**

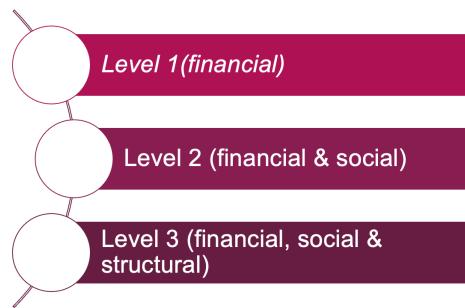
Service recovery refers to the strategies and actions taken by a company when a service failure occurs, typically in response to customer complaints or dissatisfaction. The aim of service recovery is not only to resolve the immediate problem but also to restore the customer's trust in the firm and improve the service system to prevent similar issues in the future.

1. **Tracking system:** Companies should have a mechanism in place to identify system failures and track service problems. Encouraging customers to report issues is essential, as customers who do not complain are less likely to continue their relationship with the company. By actively seeking feedback and addressing problems, companies can learn from their mistakes and make necessary improvements.
2. **Empower and train staff:** Employees should be trained and empowered to handle service complaints effectively. Research has shown that successfully resolving a complaint can actually improve a customer's perception of the firm compared to before the service failure.
3. **Encourage learning and improvement:** Companies should analyze the root causes of service failures, implement corrective actions, and strive to enhance their service delivery processes to prevent similar incidents in the future.

## Relationship Marketing

Relationship marketing emphasizes the management of long-term relationships with customers and the establishment of strong bonds (legami) with them.

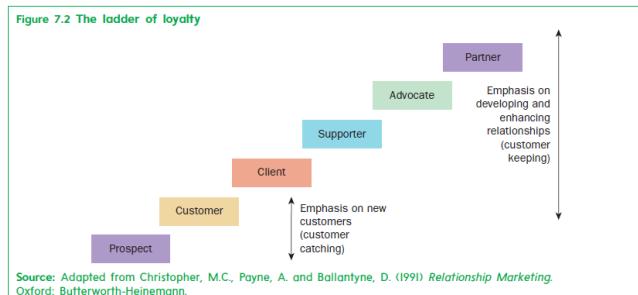
- Social bond: Social bonds refer to the emotional connections and interactions between the company and its customers, such as through recommendations, surveys, and personalized communication.
- Structural bond: Structural bonds relate to the involvement of customers in the company's community or network, fostering a sense of belonging and engagement.



## Ladder of loyalty

The ladder of loyalty concept illustrates the progression of customer relationships.

Customers -> Supporters -> Advocates -> Partners



## Experiential Marketing

Experiential marketing focuses on creating memorable and immersive experiences for customers that go beyond traditional marketing. It taps into customers' social identities, engages their senses and emotions, and encourages active participation and creativity. The goal is to foster a strong connection with the brand and leave a lasting positive impression.

## Non-profit marketing

Non-profit marketing refers to the application of marketing principles and strategies to organizations and initiatives that have non-economic goals, such as providing cultural enrichment, protecting the environment, or offering social services. Unlike for-profit businesses, the primary objective of non-profit marketing is not to generate financial profits but to achieve social or public welfare outcomes.

They rely on marketing strategies to raise awareness, attract donors, engage volunteers, and deliver their services effectively.

**Target marketing is important**, Donors evaluate different charities based on factors such as the organization's reputation, transparency in fund usage, and the perceived worthiness of the cause.

**Differentiation is also important**, Non-profit organizations must find unique ways to stand out and communicate their value proposition to stakeholders and the public.

## Social Marketing

Social Marketing is a specific form of non-profit marketing that focuses on encouraging positive social behaviors and societal change. It applies commercial marketing techniques, such as market research, audience segmentation, and the development of marketing mix strategies, to achieve social objectives.

## Distribution: Delivering Customer Value

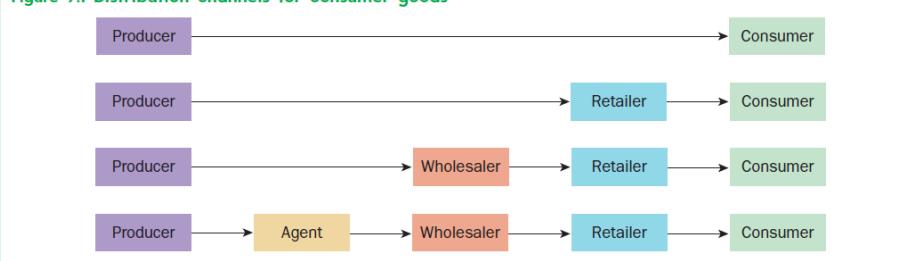
Distribution is a necessary element in marketing mix since products need to be available to customer in quantity, in locations close to the customer and in time needed by the customer.

It requires the involvement of intermediaries, known as **channel intermediaries**, who facilitate the distribution process and meet the needs of end customers.

### Types of distribution channels for consumers goods (B2C):

1. **Direct channel:** The producer sells products directly to customers without the involvement of intermediaries. (typically used in e-commerce and direct-to-customers distribution)
2. **Short channel:** Involves selling products to retailers, who then sell them to customers. Retailers take on the risk of unsold quantities and provide functions such as storing and selling the products, for which they receive a margin or economic reward.
3. **Long channel:** Includes the presence of wholesalers in addition to retailers. Wholesalers purchase products from producers and sell them in smaller quantities to retailers, who then sell to customers. This channel is suitable for large product ranges with standardized items and longer shelf life.
4. **Agent intermediaries:** These intermediaries, such as agents and representatives, facilitate the sales process without taking ownership of the products. Agents manage the sales process but lack the authority to conclude contracts, while representatives have the legal authority to conclude sales contracts on behalf of the producer. Agents can be active in both short and long channels, depending on the complexity of the product and the company's size.

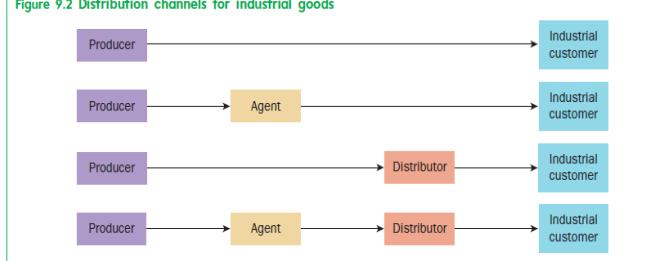
Figure 9.1 Distribution channels for consumer goods



### Types of distribution channels for business goods (B2B):

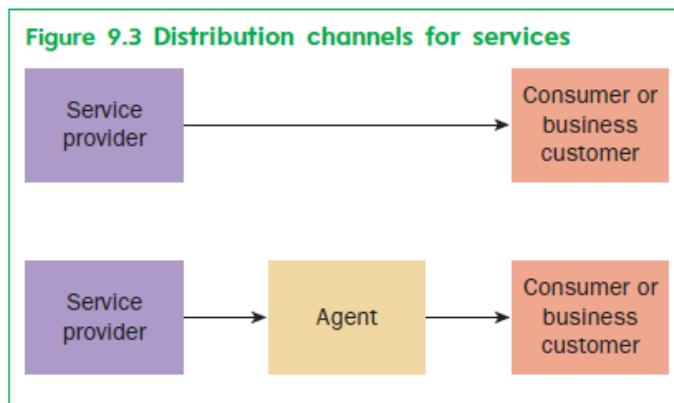
In B2B industrial goods distribution, companies must consider factors like specialized salespeople, long decision processes, relationship building, agent intermediaries for standardized products, distributors for multiple products, and dedicated sales efforts. The goal is to efficiently deliver industrial goods that meet the specific needs of business customers.

Figure 9.2 Distribution channels for industrial goods



## Types of distribution channels in services:

Distribution channels for services are usually short, either direct or via an agent:

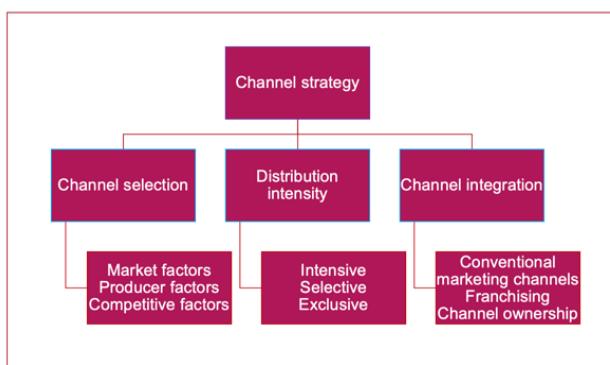


Unlike physical goods, services are characterized by the simultaneity of production and consumption. This means that the service is created and delivered to the customer in real-time or near real-time, without the need for an extensive supply chain.

## Distribution channel strategy

Distribution channel strategy involves three key decisions: channel selection, distribution intensity, and channel integration.

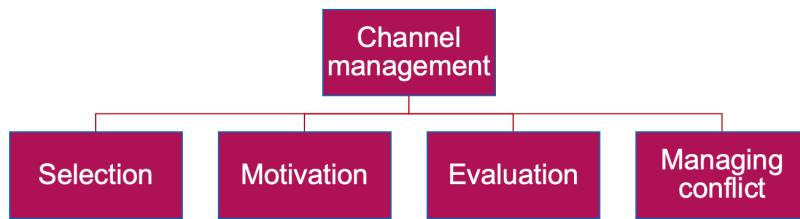
1. **Channel selection:** This decision involves choosing the most effective distribution channel for the product or service. Factors such as product characteristics, market factors, producer factors, and competitive factors influence the selection.
2. **Distribution intensity:** Distribution intensity refers to the level of market coverage achieved through the distribution channel. It involves determining the number of points of sale in a given geographic area.
  - **Intensive distribution** aims for saturation coverage of the market. In all places where customers buy that category of products we need to sell (Perfect comp.)
  - **Selective distribution** focuses on a limited number of outlets (Branding sell)
  - **Exclusive distribution** involves exclusive partnerships with a single distributor.
3. **Channel integration:** Level of control and ownership a producer has over the distribution channel. It can range from **conventional marketing channels**, where the producer has limited control over intermediaries, to **administered vertical marketing systems and franchising**.



## Channel management

It involves effectively managing the relationship with channel partners to ensure successful outcomes. Here are key aspects of channel management:

1. **Selection:** Choosing the right channel partners is crucial. This involves identifying partners that align with the company's goals, values, and target market
2. **Motivation:** Motivating channel partners to prioritize the company's products or services over competitors' offerings is essential.
3. **Evaluation:** Regularly evaluating the performance of channel partners is necessary to ensure they are meeting the company's expectations. (sales performances)
4. **Managing conflict:** Conflict management is crucial in handling any disagreements or conflicts that may arise between the company and its channel partners. (specially on price)



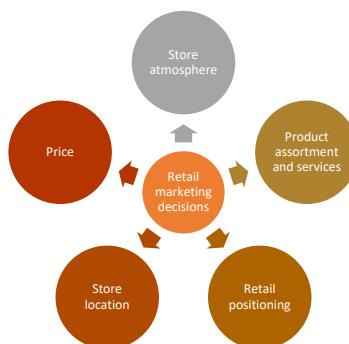
## Multi-channels management

In the era of e-commerce and digital transformation, industries have witnessed a shift in distribution channels. Coordinating these channels is vital to avoid destructive competition and conflicts, such as customers viewing products in physical stores but making purchases online.

## Retailing issues

The main issues in retailing can be categorized into five key areas:

1. **Physical distribution:** This involves managing the logistics aspects of distribution, including transportation, warehousing, and inventory control.
2. **Customer service:** Providing excellent after-sale service is essential for customer satisfaction and loyalty. Addressing customer inquiries, handling returns, and resolving issues promptly contribute to a positive customer experience.
3. **Order processing:** Efficiently processing orders, including receiving and confirming them, is crucial to ensure timely delivery and meet customer expectations.
4. **Inventory control:** Effective management of inventory levels, including forecasting demand, replenishment, and avoiding stockouts or overstocks, helps optimize supply chain operations and minimize costs.
5. **Warehousing:** Determining the appropriate physical location for inventory storage and managing warehouse operations efficiently is vital for smooth order fulfillment and timely delivery.



## Marketing vs Sales

Marketing and sales are distinct but interconnected functions.

**Marketing** is the strategic operation that precedes sales and involves activities such as market research, segmentation, product development, and pricing. (Marketing comes before sales)

**Sales**, on the other hand, focus on executing the sales process, building customer relationships, and closing deals.

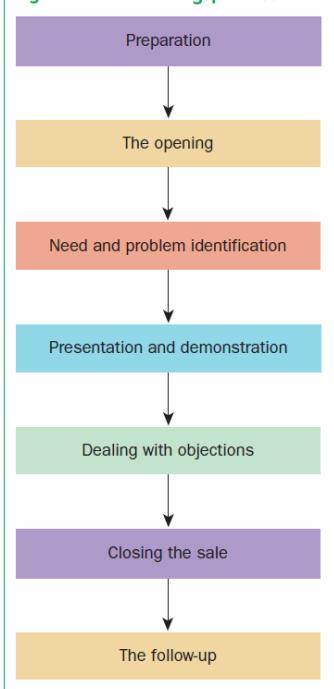
**SalesPeople** play a crucial role in the selling process. They are expected not only to sell but also to empathetically understand customer needs and identify problems.

**SalesManagers** have two main responsibilities: designing the sales force and managing its activities. This includes workload management, defining geographic and product structures, customer-based approaches, key account management, setting objectives, recruitment, training, motivation, compensation, and performance evaluation.

Maintaining customer relationships is vital, even after the sale is closed.

Regular communication and support ensure customer satisfaction and prevent them from switching to competitors.

Figure 9.4 The selling process



## Integrated Marketing Communications I: Mass Communications Techniques

How to communicate with customers?

**Promotional mix:** Offline communication techniques that can be used in combination to create a diverse and impactful communication strategy.

- Advertising: This involves paid messages through various media channels such as television, radio...
- Sales promotion: These are short-term incentives, discounts, or special offers designed to encourage immediate sales or customer action
- Publicity;
- Sponsorship;
- Direct marketing;

The choice of the promotional mix (combination of communication techniques) depends on:

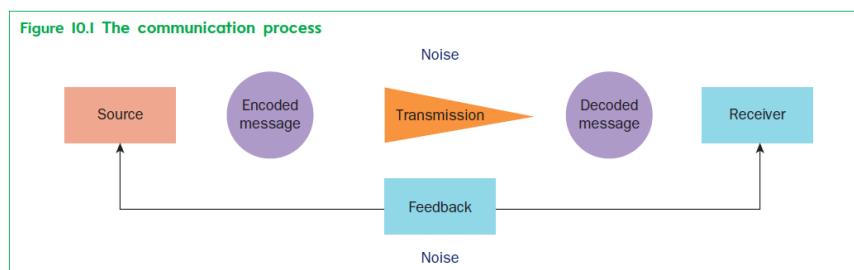
1. **Budget and resource availability:** The available budget and resources influence the selection and weightage given to different promotional tools.
2. **Market size and concentration:** The size and concentration of the target market impact the choice of promotional activities. In competitive markets, it becomes necessary to engage in advertising to maintain brand visibility and prevent memory loss.
3. **Customer information needs:** The amount of information customers require about the product or service influences the type and content of the communication strategy. Providing the necessary information to customers makes the product more visible and appealing.

4. **Product characteristics:** The nature and complexity of the product determine the emphasis on advertising. Simple products may focus more on demonstrating the need and usage, while complex products may require more technical explanations.
5. **Push versus pull strategies:** A push strategy involves encouraging retailers to promote and sell the products, while a pull strategy focuses on creating demand among customers who then request the product from retailers.

**Integrated Communications Campaign:** Refers to a strategic approach that combines various marketing communication channels and tactics to deliver a consistent and unified message to the target audience. It aims to deliver a clear, consistent, credible, and competitive message about the organization and its products. Consistency and clear positioning improve brand perception in the minds of consumers. Here are the stages involved in developing an integrated communications campaign:

- **Establish objectives:** Clear, credible, and competitive objectives are set. These objectives define what the campaign aims to achieve, such as increasing brand awareness, generating leads, or driving sales.
- **Identify constraints:** Constraints or limitations that need to be addressed are identified. This may include budget limitations, regulatory restrictions, or specific target audience considerations.
- **Work with an advertising agency:** An advertising agency is often engaged to collaborate on the campaign. The agency's creative team, equipped with expertise in human sciences, can provide valuable insights and develop effective advertising concepts and messages.
- **Select communication channels:** The appropriate communication channels are selected to reach the target audience effectively. Each channel has its own costs, reach (the number of people exposed to the message), and suitability for the campaign's objectives. Channels may include television, radio, print publications, online platforms, social media, or outdoor advertising.

**Feedback** is essential in the communication process to ensure understanding and effectiveness. Monitoring consumer response and adjusting communication strategies accordingly helps identify any noise or barriers to effective communication.



## Setting advertising budget

Setting advertising budgets can be done in different ways:

- **Percentage of Sales:** This approach involves allocating a certain percentage of the company's sales revenue as the advertising budget.
- **Objective and Task:** This approach involves the company to identify the desired outcomes and then estimates the costs associated with achieving those goals. This approach allows for more strategic and targeted budget allocation.

- Affordability: The budget is set based on what the company can afford to spend on advertising. It ensures that the advertising budget aligns with the overall financial health of the company.
- Competitive Parity: Companies may allocate their advertising budget based on maintaining parity with competitors. They analyze the advertising spending of their competitors and allocate a similar budget to remain competitive in the market. This approach is particularly relevant in industries with intense competition and where advertising plays a significant role.

## Advertising campaign development

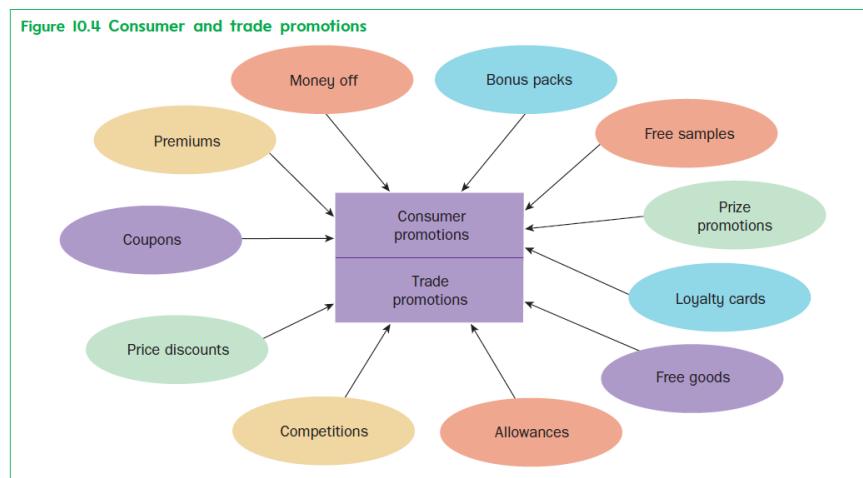
When organizing the advertising campaign development, companies have several options:

- **In-house:** Small companies or those with limited resources may handle advertising internally, either by collaborating with media professionals or establishing an in-house advertising department. (cost-saving)
- **Advertising Agency:** Many companies choose to work with advertising agencies that specialize in developing and executing advertising campaigns. Agencies can offer a range of services and handle the entire advertising process from strategy to execution.
- **Hybrid Approach:** Some companies opt for a combination of in-house resources and specialized agencies. They may have an in-house team for certain advertising functions, while outsourcing other tasks to specialized agencies. This approach allows for a balance between control, cost-effectiveness, and access to specialized expertise.

## Sales Promotion

Sales promotion refers to short-term tactics used by companies to stimulate immediate sales and accelerate the buying process. It is different from advertising, which focuses on long-term brand building and awareness. Sales promotion techniques are employed to increase sales in the short term by creating incentives and enticing customers to make a purchase.

Sales promotion strategies can include various techniques:



## Public relation and publicity

Public relations is a strategic communication practice that involves maintaining relationships with key decision-makers such as government, the public, investors, shareholders, and other stakeholders. Large companies often require continuous engagement with these entities to shape public perception, manage reputation, and address regulatory and financial concerns. **Publicity**, a subset

**of public relations**, involves generating media coverage to convey messages and create credibility for the organization. It has three important characteristics: high credibility, no direct media costs, and no control over publication.

### **Sponsorship**

Sponsorship is a business relationship between a provider of funds, resources, or services and an individual, event, or organization. In return for their support, sponsors receive rights and associations that can be utilized for commercial advantage. A crucial element of sponsorship is the association between the sponsor and the testimonial or the event.

The principal objectives of sponsorship are gaining publicity, creating entertainment opportunities, fostering favorable brand and company associations, improving community relations, and creating promotional opportunities.

### **Direct Marketing**

Direct marketing is the term that is used to describe the distribution of products, information, and promotional benefits to target consumers through interactive communication in a way that allows response to be measured.

Direct marketing encompasses various methods such as direct mail, telemarketing (both inbound and outbound), direct response advertising (such as coupon response or phone-based responses) and so on.

Direct marketing activities require regulation, especially concerning privacy violations, to avoid negative reactions from consumers.

### **Exhibitions**

Exhibitions are promotional events where buyers, sellers, and competitors come together in a commercial setting. They provide a unique opportunity for companies to showcase their products, interact directly with potential customers, and gather valuable market insights.

### **Product placement**

Product placement involves the intentional placement of products or logos in movies, television shows, songs, and video games, usually in exchange for a fee. It is a form of marketing that aims to create brand visibility and association with popular media content.

### **Ambient advertising**

Ambient advertising refers to advertising carried out on outdoor media. It involves unconventional and creative placements that capture attention and engage the audience in unexpected ways

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## **Integrated Marketing Communications II: Online Communications**

Online Communications refers to the study of how digital marketing has transformed the field of marketing. The traditional approach to the internet was to view it as a communication medium, similar to television. However, there has been significant growth in online communication in recent years, driven by advancements in technology and the rise of digital natives.

Internet opened to new possibilities for segmentation and targeting in marketing, based on the definition of:

- **Digital natives:** People born in the digital technology era.
- **Digital immigrants:** People who remember (and used) older forms of communication and media

To be successful, marketers need to understand and cater to the needs of both groups.

Recognizing the differences between them can help companies and professionals develop effective marketing campaigns, whether they are traditional or digital in nature.

One significant change in online communication is the shift in the role of the content supplier. In the traditional communication model, the supplier creates content and the receiver consumes it. With the rise of user-generated content and social media, the paradigm has shifted. Customers themselves can generate content, sharing their experiences and opinions about products and services.

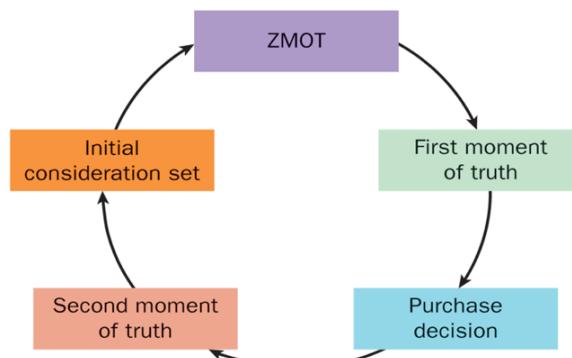
The **5S model** forms the basics of all digital activity:

1. **Sell:** Sell: Growing sales through wider distribution channels.
2. **Serve:** Add value to customers by providing extra benefits online. (es:customer support)
3. **Speak:** It involves engaging in conversations with customers through social media, online forums, and other interactive platforms to build relationships, gather feedback, and address customer concerns.
4. **Save:** By leveraging digital channels, companies can reduce costs associated with traditional marketing methods like printing, physical stores, and rentals.
5. **Sizzle:** The sizzle factor involves extending the brand online and enhancing the online experience through interactivity with customers.

## The Consumer Decision Journey

The Consumer Decision Journey refers to the process that consumers go through when making purchasing decisions.

1. It starts with the first moment of truth, which is when consumers enter the digital experience with little to no information about a product or service.
2. Companies aim to create a positive first moment of truth that leads consumers to make a purchase.
3. After the initial purchase, companies strive to maintain the customer relationship to generate repeat purchases and build loyalty.



## **Web designing principles**

Principles of good web design play a crucial role in creating effective online experiences. These principles focus on factors such as usability, visual appeal, intuitive navigation, clear messaging, responsive design for different devices, and accessibility for all users. By following these principles, companies can enhance the user experience, increase engagement, and drive desired actions from website visitors.

## **Search Engine Optimization (SEO)**

SEO is a key aspect of digital marketing that involves optimizing a website to achieve higher rankings in organic search engine results pages

The position of any page is determined by the algorithm of the search engine, which matches keywords entered by the user with keywords on the websites.

The key points to effective SEO are:

1. **Content** – it is the content of the page that influences a position on the search results page
2. **Keywords** – companies should use words (and all synonyms) associated with its product(s) throughout all elements of the website
3. **Links** – links to and from the website are important as they help the ‘spider’ to place it within the network of websites
4. **Images** and other **visual content** – if marketers are working with CMS, they should not ignore the ‘image description’ as ‘spiders’ can’t see through an image or a video

## **Content marketing**

It is a strategic marketing approach where we create the content thinking at the behavior of the user in front of it.

The goal is to drive profitable customer action by providing useful and engaging content that aligns with the audience's interests and needs.

## **Search Engine Campaigns**

Search engine campaigns involve various steps:

- **Identify the target audience:** Before launching a campaign, it's essential to define the target audience for the advertising.
- **Identify the objectives** of the campaign.
- **Identify the keywords:** The choice of keywords is important, and there is a distinction between short-tail (more generic) and long-tail (more specific) keywords.
- **Budgets:** Multiple search advertising campaigns may run simultaneously, targeting different keywords and audiences. Determining the overall budget size and allocating it across various campaigns is a crucial decision.
- **Advertising copy:** Search ads have limited character counts, typically 130 characters. Crafting clear and compelling ad copy within these constraints is important to attract clicks and drive traffic.
- **A/B testing:** We launch different version (A and B) of the campaign and we do statistically tests to individuate which is better of the two
- **Measuring effectiveness:** Tracking and analyzing campaign performance is crucial. Key metrics to consider include *click-through rate, cost per click, ad position, and conversion rate*.

## **Display Advertising**

1. **Banner advertising:** Graphical banners placed on websites to promote a product or service.
2. **Pop-up advertising:** Pop-up ads appear in separate windows or tabs, often interrupting the browsing experience. They are generally considered intrusive and less favored by users.
3. **Rich-media advertising:** This type of advertising involves interactive and engaging features such as videos, skippable videos, live information, or ads that require user input, like providing an email address.

## ***Social advertising***

Social advertising involves placing ads on social media platforms like Facebook.

These platforms offer attractive opportunities for advertisers due to their ability to target niche audiences effectively.

## **Principles of Social Media**

The main principles of **social media** are:

1. **Reach:** Social media enables reaching a global audience.
2. **Accessibility:** Social media is freely available to anyone with an electronic device and internet access.
3. **Usability:** Social media platforms are user-friendly.
4. **Immediacy:** Social media allows real-time communication and dialogue between users.
5. **Permanence:** Social media offers flexibility in editing or removing published content.

## **Social Media Metrics**

Social media metrics help measure the effectiveness of social media activities. They can be categorized into three main types:

1. **Activity metrics:** These metrics measure the company's input in terms of the number of posts, frequency, and types of posts.
2. **Interaction metrics:** These metrics reflect the audience's engagement with social media content, including metrics such as the number of fans, likes, followers, comments etc...
3. **Performance metrics:** These metrics focus on the outcomes of social media activity, such as financial results, customer satisfaction, or other defined goals.

## **Mobile Marketing**

Mobile marketing leverages smartphones to reach and engage with the target audience. It encompasses two forms:

1. **Proximity marketing:** This strategy involves using wireless devices to distribute marketing messages to specific locations, targeting users in proximity to deliver relevant promotions or information.
2. **Mobile Applications (Apps)**  
Software applications, or apps, are computer programs that allow a user to perform a single or several related tasks. Apart from social activity, apps are used for news, games, entertainment, and sporting information.

## **Email marketing**

Email marketing campaigns start with the development of mailing lists, consisting of individuals who have opted to receive communications. It follows the concept of permission marketing, where communication is limited to those who have given their consent. Metrics used to assess

email marketing effectiveness include bounce rate, open rate, click-through rate, conversion rate, and unsubscribe rate.

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### **Buyer personas and digital marketing**

Buyer personas are essential in understanding customers and shaping digital marketing strategies. Buyer personas represent unique individuals with realistic, field-based characteristics. These personas help marketers gain insight into the mindset of buyers and develop strategies tailored to their needs.

The art and science of asking probing questions and actively listening to customer responses are at the core of the buyer persona concept. Spending quality time with customers allows marketers to gain deep insights into their preferences and decision-making processes.

Segmenting customers based on the **type of purchase decision process** is important:

- **Low consideration purchases**, such as impulsive decisions or unconscious processes, are challenging to analyze and reconstruct. (Not interesting)
- **High consideration purchases**, like investment decisions, involve conscious and conscientious thinking. (Interesting)

In high consideration purchases, customers can retrospectively reconstruct their reasoning and discuss their journey, including the issues, questions, information sources, and criteria they considered during the decision-making process.

### **Buyer personas crucial points:**

- Long personal interviews with customers and recording their responses.
- Extracting relevant sentences from the interviews help in understanding the reasons behind customers' decisions.

### **Buyer personas interview**

The interview process for gathering buyer persona insights involves several steps:

1. **Authorization:** Seek internal authorization from the appropriate stakeholders to conduct the interviews.
2. **Construction of the interviewee list:** Collaborate with the sales team to identify individuals to interview. Sales representatives may be hesitant to share their personal contacts, so it's crucial to establish agreement and cooperation between marketing and sales.
3. **Identification of buyers:** Look beyond just the end-user and identify the various stakeholders involved in the buying decision.
4. **Establish the first contact:** Initiate contact through a phone call rather than email. Manage the call effectively to secure an appointment for the interview.

There are different types of buyers to consider during the interview process:

- A. **Current customers:** Generally easier to interview, but may only provide positive feedback.
- B. **Buyers who selected a competitor:** These buyers can provide valuable insights into why they chose a competitor's solution over yours. (**MOST INFORMATIVE**)
- C. **Status quo (non-buyers):** Individuals who considered your product but ultimately decided not to purchase. They may be reluctant to participate in interviews.

- D. **Buyers who never considered your product:** These individuals can offer insights into why they never engaged with your offerings.

During the interviews, ask interviewees to tell their story in a narrative way. Extract five key elements, or insights, from their stories, and document them in a table.

The **insights** to gather from the interviews include:

1. **Priority initiative** - The most compelling reasons that buyers decide to invest in a solution like yours and why others are content with the status quo. This insight helps understand what triggers the need for your product.
2. **Success factors** - The operational or personal results that buyers expect from purchasing a solution like yours. Explore the expected rewards and perceived risks associated with the solution.
3. **Perceived barriers** - Identify any internal resistances or negative perceptions of your company or product, as well as any negative prior experiences that may hinder the buying decision.
4. **Buyer's journey** - Gain insights into the behind-the-scenes evaluation process, including how the buyer evaluates options, eliminates contenders, and ultimately makes the final choice. Understand the role of influencers in the decision-making process.
5. **Decision criteria** - Identify the specific attributes of the product that buyers consider important, as well as the criteria used to compare alternative solutions and make the final decision.

By gathering these insights from the interviews, you can build robust buyer personas that accurately represent your target customers and inform your digital marketing strategies.

### **Why buyers persona approach is important?**

#### a. **From the marketing and sales perspective**

- Discover information that the customer will never disclose.
- Anticipate potential obstacles and objections that may arise during the sales process
- Avoid falling into the trap of price competition
- Visibility into who is involved in the decision-making process
- Identify the main criteria for evaluating the alternative options
- External influences that impact the customer's decision-making process

#### b. **From the Business development perspective**

- Help the buyer persona to strengthen her own position within the buying company

### **Permission marketing**

In permission marketing, there is a shift in perspective from traditional marketing that intrudes upon limited customer attention to digital communication that is based on customers giving permission to interact.

This approach is about delivering valuable content at the precise moment the audience needs it, without interrupting their activities. Permission marketing emphasizes authenticity, participation, and becoming a publisher of content in the relevant field.

**Traditional marketing has limitations** in understanding customer behavior and preferences.

Market research relies on self-reported opinions that may not be accurate. Sales representatives focus on individual accounts and enter the customer journey late. Buyer surveys confirm existing

knowledge but may lack in-depth insights. Focus groups can be influenced by groupthink. **The persona approach overcomes these limitations** by uncovering emotional factors, avoiding biases, and actively listening to customers. This leads to targeted marketing strategies and stronger customer connections.

### **Theory of the long tail (Chris Anderson)**

The theory of the long tail explains how the digital realm enables small producers and niche content to prosper (prosperare).

In traditional mass consumer markets, limited physical distribution space and heavy advertising favor products with the largest potential (blockbusters), leading to the disappearance of others. However, in the digital space, production, distribution, and search costs are reduced, allowing small producers to collectively rival the popularity of blockbusters. This phenomenon is known as the long tail.

### **The theory of cognitive surplus (Clay Shirky)**

The theory of cognitive surplus, put forth by Clay Shirky, suggests that people have a desire to share content when it is available to them. With the rise of digital platforms and social media, individuals can utilize their cognitive surplus by creating and sharing content with others. This sharing behavior contributes to the abundance of content in the digital landscape.

### **Web strategy (using buyer personas)**

To build an effective web strategy, it is important to define buyer personas in detail.

It's important that the web content should be able to resonate with the specific needs, preferences, and characteristics of each buyer persona. (Each person has to reflect herself on the content of the site).

When building buyer personas, a descriptive table can be used to capture key information about their characteristics, preferences, and behaviors.

WHO	BUYER PERSONA Description: who is this person?	
WHAT	Problems our company is addressing for this persona («why are they buying from us?») Actions we want to trigger in the buyer <ul style="list-style-type: none"> <li>- Purchase</li> <li>- Seek information</li> <li>- Connect</li> <li>- Download content</li> </ul>	
WHY	In which way is our company remarkable? Proof of our claim (testimonials, media coverage, guarantee, etc.)	
WHERE	Where are buyers? (Google, blog, Facebook, Twitter..) Whom do they trust?	
HOW	Which content shall we publish? List of keywords used by buyers in their Google search Media to utilize (blog, Twitter, YouTube, email, newsletter, e-book, Facebook, podcast, etc.)	
WHEN	Action plan (monthly, quarterly, annual) Piano di azione (mensile, trimestrale, annuale) Scorecard (goals vs results) <ul style="list-style-type: none"> <li>- Number of purchases</li> <li>- Number of information searches</li> <li>- Number of connections</li> <li>- Number of download</li> </ul>	

Key metrics in digital marketing can be categorized into seven types, including reach, engagement, conversion, retention, revenue, customer satisfaction, and advocacy. These metrics help measure the effectiveness of marketing efforts and provide insights for optimizing strategies.

## Marketing vs Sales

- **Marketing** focuses on generating attention and interest from a wide audience that encompasses the various buyer personas. It aims to create awareness and engage potential customers through strategic communication and targeted campaigns. Marketing activities occur earlier in the buyer's journey, before they are close to making a purchase decision.
- **Sales**, on the other hand, works on influencing and persuading individual buyers when they are in the later stages of the buying process. Salespeople interact directly with prospects, addressing their specific needs, providing product information, and guiding them towards making a purchase.

## Value through pricing

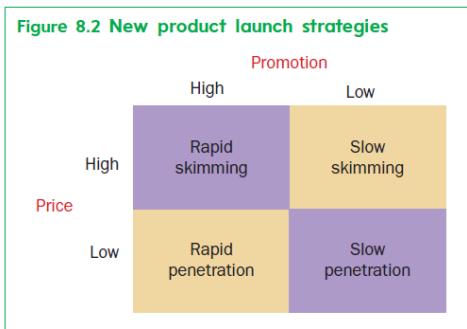
There are three different pricing methods:

1. **Cost-based pricing:** This method involves determining the price based on the full cost of production plus a markup. The cost per unit is calculated by adding direct costs, fixed costs, and the desired markup. Companies consider factors such as expected sales volume, fixed costs, and competition to determine the appropriate markup. The markup is influenced by factors such as product differentiation, elasticity of demand, and the company's pricing strategy.
2. **Competitor-oriented pricing:** This approach involves setting prices based on what competitors are charging. There are three forms of competitor-oriented pricing:
  - Following the prices charged by leading competitors
  - Adopting the going-rate price that is commonly used in the market
  - Participating in competitive bidding processes.Companies may use competitor pricing as an upper or lower bound when setting their own prices.
3. **Market-led pricing:** With this approach, the price is determined based on the perceived value of the product or solution to the customer. Companies aim to understand the maximum price the customer is willing to pay for the value they receive. Directly asking customers for their perceived value may result in lower prices, so there are techniques used to estimate it:
  - Trade-off analysis: This technique involves offering customers different product options with varying features, prices, or attributes. By observing customer choices and preferences among these options, companies can gather insights into how customers value different aspects of the product.
  - Experimentation: Experimentation involves setting different prices for a product or service and observing customer response. By varying the price and analyzing customer behavior, companies can determine the price range within which customers are willing to purchase the product.
  - Economic Value Estimation (EVC): EVC involves analyzing the costs and benefits associated with a product and comparing them to alternative solutions in the market. The more value a product gives compared to the competition, the higher the price that can be charged.

## New product launch strategy

In new product launch strategies, companies have two main approaches: rapid penetration and skimming.

- **Rapid Penetration Strategy:** This strategy involves entering the market with a low price to quickly capture a large market share. The focus is on gaining a significant customer base and generating high sales volume. By offering a lower price compared to competitors, the company aims to attract price-sensitive customers and create brand awareness. While this strategy may result in lower initial profits, it can lead to economies of scale, cost advantages, and market dominance in the long run.
- **Skimming Strategy:** Skimming involves launching a new product with a high initial price, targeting early adopters and innovators in the market. This strategy is effective when a product offers unique features or innovations that justify a premium price. Over time, as the market matures and competition increases, the company gradually lowers the price to attract more price-sensitive customers. Skimming allows the company to maximize profits during the early stages of the product life cycle and capitalize on the willingness of early adopters to pay a premium for innovation.



## Product line strategy

Companies need to consider how a new product fits into their existing product line when determining its price. This involves assessing the pricing relationship between the new product and other products in the line. When multiple market segments show potential, companies may design modified versions of the product to cater to different segments and price them based on the perceived value each segment places on the product.

## Channel management strategy

When products are sold through intermediaries like distributors or retailers, the pricing strategy must consider the margins required by these intermediaries. Understanding the needs of distributors and retailers is crucial in determining the list price to the end customer. E-commerce platforms often provide clearer pricing since they eliminate some intermediaries.

## International Marketing Strategy

Exporting products to different countries can lead to price escalation, where factors like inflation rates, exchange rates, and custom duties may require firms to increase their prices. To prevent parallel importing, where products meant for international markets are re-imported and sold at lower prices, firms need to implement measures to control distribution channels and unauthorized sales.

## Managing Price Changes

Price changes involves:

- Considering the circumstances that justify raising or lowering prices, such as adding new features to a product.
- Decide whether to implement price changes abruptly or gradually.
- Estimate competitors' reactions, as they may respond differently depending on the market conditions.

Reacting to competitors' price change is a theory of oligopoly. Firms have the option to follow, ignore, or counteract competitors' price changes. The strategic decision depends on the specific market dynamics and competitive landscape.

**Table 8.3 Reacting to competitors' price changes**

	Increases	Cuts
When to follow	Rising costs Excess demand Price-insensitive customers Price rise compatible with brand image Harvest or hold objective	Falling costs Excess supply Price-sensitive customers Price fall compatible with brand image Build or hold objective
When to ignore	Stable or falling costs Excess supply Price-sensitive customers Price rise incompatible with brand image Build objective	Rising costs Excess demand Price-insensitive customers Price fall incompatible with brand image Harvest objective
Tactics Quick response Slow response	Margin improvement urgent Gains to be made by being customers' friend	Offset competitive threat High customer loyalty

## Yield management and Dynamic Pricing

E-commerce has revolutionized pricing strategies with the introduction of yield management and dynamic pricing:

- **Yield management**, commonly used in service industries like travel and hotels, involves monitoring demand patterns and adjusting prices accordingly.
- **Dynamic pricing** refers to the continuous adjustment of prices based on real-time demand and market conditions.

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## Pretotyping

Pretotyping is a methodology used to test new product ideas at an early stage. The failure rate of new products is high, and even well-executed ideas can fail.

According to Savoia, traditional market research has limitations that can lead to failure in product development. When asking people about their preferences, it may not accurately reflect their true desires.

### Limitations of traditional market research:

- **Communication**, as the abstract nature of product concepts and their verbal description can result in unreliable translations. People need real-world experience to fully understand the features of a product beyond just looking at pictures.
- **Predictive power** is also limited, as people struggle to accurately predict their future wishes and behaviors. Their predictions are most reliable when based on repeated and routine consumption experiences.

- **Engagement** is crucial in obtaining reliable information. When people lack personal investment in a problem or are asked to evaluate a product without any engagement to pay for it, their judgment tends to be inaccurate and does not reflect their true preferences or willingness to buy.
- **Confirmation bias** is another challenge, where managers tend to seek confirmatory information that aligns with their preexisting opinions. This biased information processing can lead to the formation of information bubbles and echo chambers.

To overcome these limitations, Savoia suggested to make assumptions quantitative and conducting experiments as early as possible to test those assumptions (prototyping). This involves formulating hypotheses that are testable and transforming ideas into measurable numbers to develop tests.

### Pretotyping

Pretotyping suggests a different approach by making assumptions quantitative and conducting experiments early on to test these assumptions. The idea is to transform the idea into measurable numbers, create testable hypotheses, and conduct tests to gather real-world feedback. By stating assumptions in quantifiable terms, such as a specific percentage of people who would buy a product at a certain price, companies can conduct experiments to validate or refute these assumptions.

- **XYZ hypothesis format:** At least X% of Y will Z

Before XYZ hypothesis	After XYZ hypothesis
Some people	At least 10% of people
Very polluted cities	Cities with AQI index= 100
Interested	Buy
Reasonably priced	\$120

- **Hypozooming:** The concept of " hypozooming " is introduced, which involves taking the initial XYZ hypothesis and making it testable on a small scale. For instance, instead of testing the hypothesis in all cities with high air pollution, a specific city like Beijing can be chosen for testing.

By conducting tests on a smaller scale, the hypothesis becomes more reliable and allows for more accurate statistical analysis. As more data is collected and more assumptions are tested, the hypothesis can be refined and made more precise

### Pretotyping techniques:

1. **Mechanical turk** service, such as Amazon's, where people can be paid to perform specific tasks remotely, like testing products.
2. **Fake door** involves creating a facade or a preliminary test to gauge interest before fully investing in the idea. For example, opening a door with the name of a bookshop and we don't put books inside, we just write 'We are preparing' it, we fake the opening doing a preliminary test to approximate the idea.
3. **Facade pretotyping** involves having a real but partial activity behind the door.
4. **YouTube** can be utilized for prototyping by testing viewers' engagement with a video and assessing their response.
5. **Hidden prototyping**, where a new product is placed on a shelf without permission, and its interactions and sales are observed. (without the permission of IKEA for example)
6. **Relabeling products**, such putting a different cover on a book

## **Scoring system in prototyping**

The scoring system in prototyping involves assigning positive scores based on specific actions or milestones, such as acquiring a valid email address that agrees to receive information about the product.

This scoring system is aligned with the YODA principle, which stands for "Your Own Data." It emphasizes the importance of collecting and utilizing data that is generated during the prototyping process. By tracking and analyzing customer actions, such as providing an email address, companies can gather valuable insights about the potential demand and interest in their product.

## **Pretotyping steps**

The steps in pretotyping include:

1. Creating hypotheses (XYZ format)
  2. Testing those hypotheses (Pretotype techniques)
  3. Iterating based on the insights gathered.
- 

## **Network-based Industries**

Network industries (such as IT, social media, web services and so on) differ from traditional industries, due to different demand (customer behavior) and supply (cost structure) sides.

**Demand Side:** On the demand side, the network effect drives customer behavior. As more users join a network or platform, it becomes more valuable and attractive to other potential users. This positive feedback loop amplifies demand and can lead to rapid adoption and growth.

**Supply side:** On the supply side, the cost structure in network-based industries is influenced by the characteristics of digital goods and services. Digital products can often be replicated and distributed at minimal marginal costs, leading to economies of scale. This cost structure allows network-based companies to scale rapidly and potentially dominate their markets.

## **Network effect**

The network effect refers to the phenomenon where the value of a good or service is not solely determined by its inherent features but also by the number of users or adopters it has. The more people who use the good or service, the more valuable it becomes for both existing and future users.

Network effects do NOT depend on imitation behavior but rather by the increased value generated through the network of users.

This network effect modifies the equilibrium in the market and necessitates changes in strategies for companies operating within such networks.

Network effect influences market dynamics and the behavior of individuals within networks because people tend to base their actions on the behavior of others for two reasons:

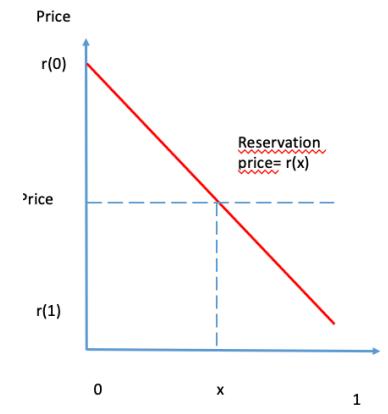
- They believe that others' behavior carries information value (imitation effect).
- There are direct benefits to joining a network (network effect)

Every product or service possesses its intrinsic value, but the network effect adds an additional dimension of value derived from the network itself.

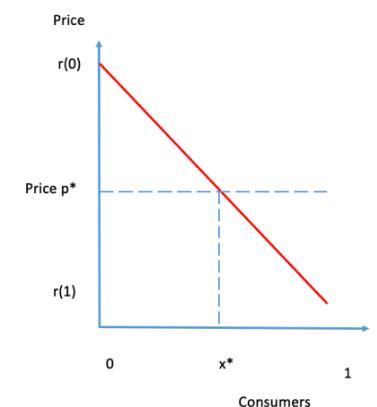
## Part 1. Demand effects

### Conventional Markets

In conventional markets, the reservation price, which represents the maximum amount each customer is willing to pay for one unit of the product, is represented by a negatively inclined function, denoted as  $r(x)$ , where  $x$  represents the proportion of consumers who are willing to buy the product. At a given price  $p^*$ , there will always be a certain proportion  $x^*$  of consumers who are willing to purchase the product, i.e.,  $r(x^*) = p^*$ .

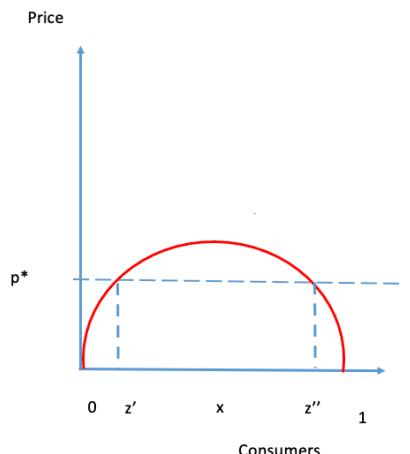


**Market equilibrium** occurs when the supply of the product matches the demand. Under typical conditions, there will be at least one company willing to supply the quantity  $x^*$  at the price  $p^*$  that satisfies the demand. This represents a unique equilibrium point in a well-functioning market. However, **market failure** can occur if no company is able to produce the product at a price below the reservation price at  $x = 0$  ( $r(0)$ ). In such cases, the market fails to materialize. On the other hand, if multiple companies are willing to supply the product at a price below  $r(0)$ , competition emerges, and the market will consist of multiple competing companies. In a scenario of perfect competition, all companies will supply the product at the price-taking level,  $p^*$ . Due to the negatively inclined nature of the reservation price curve, the equilibrium point will be reached, and a certain number of consumers will purchase the product. The competing companies will strive to attract customers in this market environment.



### Network markets (demand with network effect)

In this scenario, consumers' decision to buy a product depends on two factors: the value of the product (represented by their reservation price) and the number of other customers who have already adopted the product.



The demand in network industries is influenced by both the reservation function (negatively inclined) and the network function (positively inclined). The reservation function represents the value of the product based on its quantity, while the network function represents the value based on the number of other buyers. These functions are often expressed in a multiplicative form, such as  $r(x) * f(z)$ , where  $x$  represents the quantity and  $z$  represents the number of other buyers.

If we consider a parabolic shape for the network function ( $f(z) = z$ ) and a linear reservation function ( $r(x) = 1 - x$ ), the overall function  $r(x) * f(z)$  becomes  $z * (1 - z)$ . This function exhibits three equilibria: 0,  $z'$ , and  $z''$ . We have multiple equilibria (not only one) and each equilibrium represents a different level of market adoption and value.

Below the  $z'$  equilibrium, the market collapses as the value is not sufficient to justify the price. Between  $z'$  and  $z''$ , there is downward pressure as the value exceeds the price, leading to higher adoption. At the  $z''$  equilibrium, all customers prefer to buy the product, and the network value increases due to positive feedback.

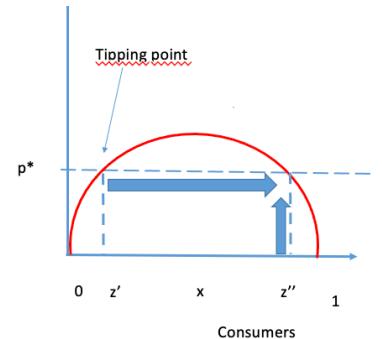
As a result:

- The **equilibrium 0** represents a situation where there are no buyers or network participants. While this equilibrium is stable in the sense that it will persist if it is reached, it is not preferable because it implies no market activity or value.
- The **equilibrium  $z'$**  represents a situation where there is some level of market adoption, but it is not stable. If the level of adoption falls below  $z'$ , it tends to decrease further towards 0. On the other hand, if the level of adoption exceeds  $z'$ , it tends to move towards the equilibrium  $z''$ .
- The **equilibrium  $z''$**  is a stable equilibrium. When the level of adoption is between  $z'$  and  $z''$ , there is a positive pressure for more customers to join and increase the adoption. This positive feedback loop drives the adoption towards the equilibrium  $z''$ . People who are between  $z'$  and  $z''$  see the increasing adoption and value, and they are motivated to join. Those who are already beyond  $z''$  may reconsider their decision and also come back to participate in the network.

### Characteristics of network effect

Strategically, there are several implications of these dynamics:

1. The  $z'$  equilibrium serves as a tipping point that separates market collapse from strong pressure towards adoption.
  - Companies need to understand the location of this tipping point
  - Higher prices make it harder to reach the tipping point, while lower prices facilitate achieving the desired level of adoption.
  - Reducing the price not only moves the tipping point to the left but also shifts the stable equilibrium to the right, attracting a larger proportion of customers.
2. Companies must aim to reach the tipping point as early as possible. Growing slowly can lead to failure. Having a good product alone is not enough; companies must influence customer expectations regarding adoption.
3. **Self-fulfilling expectation equilibrium:** When customers believe that many others will participate, they are more likely to join themselves, which leads to a larger network and higher adoption. This reinforces the expectation of a large network and creates a positive feedback loop. (The expectations of customers can be influenced by the strategy of the firm).



### Strategic implications of network effect

Companies need to understand the location of this tipping point and must aim to reach the tipping point as early as possible. Growing slowly can lead to failure. Having a good product alone is not enough; companies must influence customer expectations regarding adoption.

This can be achieved through various strategies, such as:

1. **Entering with a low price:** One approach is to introduce the product or service at a lower price point compared to competitors. If the price is lower, the tipping point will be easier to catch.
2. **Creating network effects with complementors:** Companies can collaborate with other businesses or developers to create complementary products or services that enhance the value of their own offering. By establishing partnerships or ecosystems, companies can generate network effects where the usage of one product drives the usage of another. This

mutually beneficial relationship can help accelerate adoption and increase the overall value of the network.

3. **Leveraging network properties to dominate sub-markets:** Companies can strategically target specific market niches or sub-markets to establish a strong presence. By focusing on a subset of customers or a particular segment, they can aim to reach the tipping point within that sub-market and dominate it. Once they have established a strong position, they can expand into other sub-markets, leveraging their network effects and reputation to attract new users.

If two companies compete with network-related products the winner will not be the one with the best product, but the one who has influenced better the expectations of customers.

### Network industry properties

Networks exhibit various properties that differentiate them from traditional systems. Here are some key properties of networks:

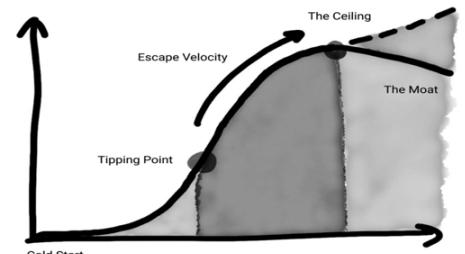
1. **Power Law Distribution:** There are a few company with a disproportionately high number of customers or connections, while the majority of company have relatively fewer customers or connections.
2. **Long Tail:** There are a lot of company selling to many small buyers in the long tail, but the sum of niches at the long tail might be larger than the sales of blockbusters. This is thanks to the digital technology as the markets are not anymore constrained by physical space (as it was in traditional markets).  
The long tail represents a wide range of products with relatively low sales individually but collectively account for a significant portion of overall demand.
3. **Rich-gets-Richer (Winner Takes All):** Networks often exhibit a "rich-get-richer" effect, where popular or successful entities attract more attention, resources, or connections, leading to a disproportionate advantage and further success. In a winner-takes-all scenario, a tipping point is reached, and one dominant player captures a significant market share, while competitors struggle to gain traction.
4. **Community Structure:** Networks tend to exhibit a community structure, where members with similar characteristics or interests form clusters or subgroups within the network. This phenomenon is known as degree assortativity, where nodes with similar degrees (number of connections) tend to connect with each other.

Additionally, in social networks, users can be classified as active or passive. While users may have a large number of friends or connections, their interactions and communication typically occur with only a subset of those connections. This indicates that users are more actively engaged with a smaller group of individuals within their network.

### Cold start problem

The cold start problem refers to the challenge of starting with zero users and reaching the critical mass necessary to activate network effects (reaching the tipping point).

It is still possible that the tipping point is never reached, if the population of users does not reach the threshold, the dynamics is reverted: customer abandon the company and sales collapse.



The **escape velocity** is the velocity needed after the tipping point to consolidate the network and scale.

### From 0 to the Escape velocity:

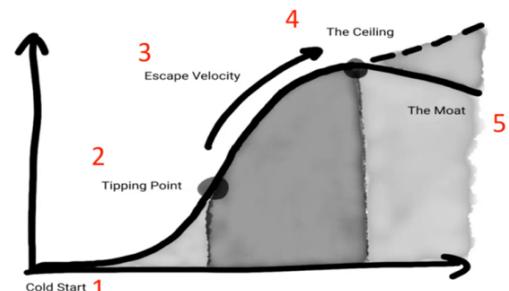
1. **Acquisition Effect:** This strategy focuses on leveraging the existing members of the network to acquire new users. The goal is to achieve viral growth by enabling users within the network to invite others from their personal networks. **Once the tipping point** is reached, the network effect kicks in, and existing members become the main actors in expanding the user base. This systematic effort to acquire new users can lead to rapid growth.
2. **Engagement Effect:** Once users are part of the network, this strategy aims to increase engagement by developing new services or features that are relevant and valuable to the existing user base. By enhancing the network and creating denser connections, new usage patterns can emerge. The goal is to keep users active and engaged within the network.
3. **Economic Effect:** This strategy focuses on monetization and cost optimization as the network expands. With a larger network, there are more opportunities to generate revenue and increase efficiency. The larger the network, the more revenue can be generated, and costs can be reduced through improved efficiency.

In some cases, a **tool-to-network strategy** can be employed, where users are initially attracted to a tool or service for its intrinsic value but stay for the size and benefits of the network. This strategy is particularly applicable to products centered around content creation, organization, and reference.

The **engagement effect** refers to the observation that within networks, people tend to concentrate their attention and engagement on a limited number of activities or apps. This behavior is evident in the usage patterns of mobile applications and Internet services, where individuals primarily focus on a small number of apps that they find most valuable or interesting. It is common for startups to experience a high churn rate, with a significant percentage of users leaving the app or service soon after initially trying it. For example, it is not uncommon to see retention rates of 60% leaving after day 1, 30% after day 7, and 15% after day 30.

The **economic effect** focuses on optimizing the utilization of underutilized capacities within digital companies. As the network expands, there is a greater ability to estimate and manage the probability of random events, leading to more efficient resource allocation.

The **ceiling effects**, can be driven by factors such as market saturation, user abandonment, spam, regulatory actions, or degraded product experiences. To counterbalance these ceiling effects, companies can pursue strategies that allow them to continue growing and expanding their revenue. One approach is to aim for a high valuation, such as becoming a billion-dollar company, which is often referred to as a "unicorn" in the business world. This high valuation not only attracts investor interest but also signifies the company's success and potential. However, it is important to be cautious of overexploitation or depletion of resources, as rapid growth can lead to **exhaustion** or a loss of quality if not managed carefully.



## Part 2. Cost structures

In digital industries, companies often have different cost structures compared to traditional manufacturing companies. This is due to the presence of the network effect and the unique characteristics of digital products.

**Fixed and Marginal Costs:** Digital companies typically have high fixed costs and low to zero marginal costs. Fixed costs include research, development, and software design, while the marginal cost of distributing a digital product (like software or a digital file) to additional users is nearly zero. In contrast, manufacturing companies usually have both substantial fixed costs (like machinery, plants, and infrastructure) and variable costs (raw materials, labor, etc.). They incur significant costs for each additional unit produced.

**Economies of Scale:** Due to the near-zero marginal costs, digital companies can achieve massive economies of scale. As the user base grows, the cost per user decreases significantly, leading to a scenario where large players can often provide services more cheaply than smaller competitors. On the other hand, manufacturing companies also benefit from economies of scale, but to a lesser degree, as they face physical limitations (raw material availability, production capacity of plants, etc.).

**Break-Even Point and Profitability:** Because of their high fixed costs and low variable costs, digital companies typically have a high break-even point. However, once they cross that threshold, each additional unit is extremely profitable. In contrast, manufacturing companies have a lower break-even point, but their per-unit profitability doesn't dramatically increase after reaching it due to continuous variable costs.

**Capacity and Growth:** Digital companies, especially those providing software-based products or services, have virtually unlimited capacity. They can serve millions or even billions of users without significant additional costs, allowing them to grow and potentially monopolize their market. Manufacturing companies, on the other hand, face physical limits on their capacity due to constraints on resources, labor, and equipment.

**Pricing Strategy:** With their unique cost structure, digital companies often employ innovative pricing strategies like freemium models (where basic services are free, and users pay for premium features) to rapidly grow their user base. Manufacturing companies generally have less flexibility in pricing due to the direct costs associated with producing each unit.

Formula used:

1.  $\text{Average\_costs} = \frac{\text{FC}}{Q} + \frac{\text{VC}}{Q}$  -> Essendo VC costante (Marginal cost costante), AC diminuisce con l'aumentare della produzione
2.  $\text{Break\_even\_point (Q)} = \frac{\text{FC}}{p-v}$  -> Breakeven point più alto del manufacturing perché fixed cost alti, ma una volta raggiunto, ottengo molti profitti perché Marginal cost vicino allo 0 (costo produzione unità in più)
3.  $\text{Security margin} = \frac{(\text{Qmax} - \text{QBPE})}{\text{Qmax}}$  -> Lower in digital industries perché VC bassi

## AI-based companies

These companies leverage AI technologies to drive their operations and business models. AI's ability to process and analyze vast quantities of data enables them to automate processes, improve decision-making, and create personalized user experiences. This has drastically changed the operating models of many industries, particularly digital ones, where AI can take over tasks traditionally performed by a combination of machines and labor.

The **business model of AI-based companies** revolves around value creation and value capture:

- Value creation refers to how these companies generate value for their customers through their unique value propositions (differentiation, cost leadership ...).
- Value capture, on the other hand, is the ability of these companies to appropriate a share of the value they create, typically through revenue generation.

However, the most drastic changes occur in the operating model (How to deliver the value promised by the business model) of AI-based companies. Traditionally, companies relied on a combination of machines and labor to perform various operational tasks. With the introduction of AI, many of these tasks can now be entirely automated by AI systems. This fundamentally changes how operations are conducted within these companies.

The **operating model of AI-based companies** has three key elements: **scaling, scope, and learning**.

- **Scaling** refers to the company's ability to increase its capacity without experiencing diseconomies of scale or inefficiencies. Unlike traditional companies, AI-driven companies do not suffer from diminishing returns as they scale. They can achieve scalability without significant constraints.
- **Scope** refers to the variety or range of products and services offered by the company. AI-based companies can diversify their offerings across different domains, expanding beyond their initial focus. For example, Amazon started as an e-commerce platform but has since expanded into cloud services, fresh food delivery, financial services, and more.
- **Learning** is the ability of companies to continuously innovate and adapt to changing market conditions. AI-based companies can rapidly develop and deploy new products and services, leveraging their AI capabilities. This allows them to stay at the forefront of innovation and respond quickly to customer needs.

AI-driven companies also benefit from the fact that they do not face traditional diseconomies of scale. Traditional companies encounter organizational challenges as they grow, such as increased communication needs, slower decision-making, bureaucracy, and deteriorating customer service. In contrast, AI-based companies can scale without experiencing these limitations. Their operating model enables them to achieve new levels of scalability, broader scope, and faster learning and adaptation.

## Cloud-based business model

The cloud-based business model is a delivery model that eliminates the need for capital expenditure (Capex) investments in hardware and infrastructure by providing services over the internet.

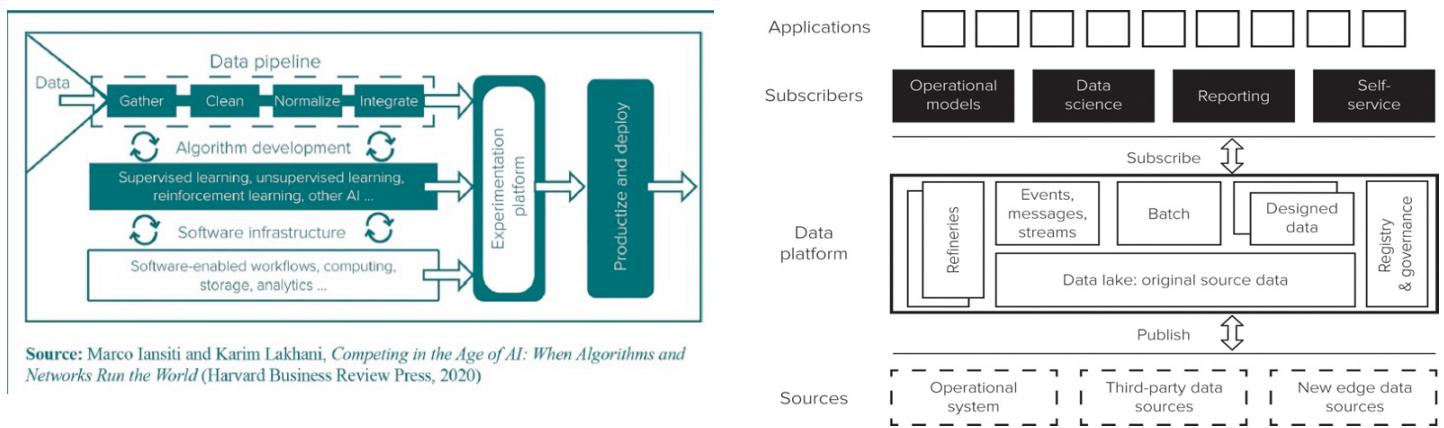
The architecture of a cloud-based business model typically consists of several components:

- **Data pipeline**, which refers to the systematic, sustainable, and scalable process of gathering, inputting, cleaning, integrating, processing, and safeguarding data.
- **Algorithm development**, which involves creating sets of rules that machines follow to make decisions, generate predictions, or solve specific problems. AI algorithms play a

crucial role in driving critical operating activities by generating predictions about future states or actions of the business. There are different types of AI models, including supervised learning (using labeled datasets), unsupervised learning (identifying patterns in data without previous modeling), and reinforcement learning (using performance feedback to improve decision-making).

- **The experimentation platform** is another important component of the cloud-based business model. It involves systematic testing of hypotheses regarding new prediction and decision algorithms to ensure that suggested changes have the desired effect. Companies use scientific approaches such as randomized control trials (RCT) or A/B testing to compare different versions and establish causality.

The software infrastructure of a cloud-based business model is designed to support the flow of data from sources to a data platform, then to subscribers, and finally to applications in a vertical manner. This infrastructure enables seamless access to cloud services and allows for scalability and flexibility in deploying applications and services.



## AI Factory

The AI Factory model is a new approach to data aggregation, processing, and application development that is radically different from traditional IT approaches. It involves the use of a publish-subscribe methodology for APIs, where data is aggregated, cleaned, refined, and processed, and then made available through consistent interfaces (APIs). These APIs can be subscribed to by developers to implement various applications.

One key aspect of the AI Factory model is the modularity of interfaces. APIs are designed with consistency in mind, allowing for easy integration, data security, and governance. This modularity enables the development of internal systems and the plug-in of third-party software, facilitating collaboration and innovation.

Compared to traditional IT approaches with siloed information systems, fragmented data, and expensive custom software development, the AI Factory model offers a more efficient and agile way of working. It eliminates the long delays typically associated with software development and enables organizations to leverage data and AI technologies effectively.

## Strategic management in the AI era:

1. **Value creation:** Value creation are influenced by network effects, learning effects, and clustering.
  - Network effects can be direct or indirect
    - o **Direct network effects:** Users value the presence of other users

- **Indirect network effects:** Users in one category value the presence of users from another category
- Learning effects (of AI models) are driven by the growth of the user network and the accumulation of data for AI applications. The larger the company, the better the learning. The more data used to train and optimize the algorithm, the more accurate the algorithm's output- hence the more complex the problem to be solved.
- Clustering refers to the distinction between global networks and local networks, which affects the competition and barriers to entry in different industries.
  - In global networks the value users receive comes from the presence of other users in the overall (world) network (like airbnb). These global networks often require significant investment at a global scale and may have high barriers to entry, resulting in limited competition.
  - Local networks derive their value from the presence of users within a specific sub-group or cluster of the overall network. These clusters can be based on geographic or urban areas, specific service types, or customer needs. (es: food delivery). In clustered networks, competition may be more intense as users prioritize the availability and quality of services within their specific cluster.

## 2. **Value capture:** The dynamics of value capture include concepts such as multihoming, disintermediation, and network bridging.

- **Multihoming** refers to the ability of customers to be part of multiple networks (Airbnb and Booking)
- **Disintermediation** involves the risk of users bypassing intermediaries in a network. In certain situations, nodes or participants within a network can directly interact with each other, eliminating the need for intermediaries or middlemen. To mitigate the risk of disintermediation, companies may implement strategies to retain customers and enhance the value they provide. This can include exclusive access to information or services, reducing transaction fees, or offering additional services that differentiate them from potential direct interactions.
- **Network Bridging** is a strategic approach where a company leverages the strength and properties of one network to build and sustain another network. This involves expanding the company's offerings and reach by utilizing existing network assets and capabilities. For example, a company may start with a successful e-commerce platform and then use the data and knowledge gained from that network to develop additional services, such as mobile payment solutions or delivery services. By bridging networks, companies can tap into their existing user base, leverage their brand reputation, and create synergies between different network offerings.

## Project Management

**Project management** is the application of knowledge, skills and tools necessary to achieve the project's requirements.

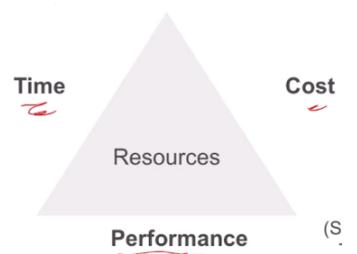
A **Project** is any series of activities and tasks that:

- Have a specific objective to be completed
- Have defined start and end dates
- Have specific requirements and budget constraints

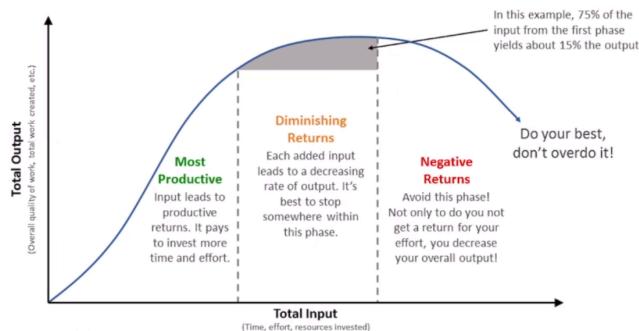
**Project deliverables:** A project produces deliverables which are the tangible or intangible outputs that are produced as a result of a project. The output of a project is not just a deliverable but we focus on the creation of sustainable business value.

**Project success:** Successful project management can be defined as achieving project objectives, considering time, cost and performances (triple constraint model).

The project has to be executed within time, costs and the right performance. We cannot have all three characteristics, we need to find a trade-off, we have to decide where to put the project in this triangle (also called spider chart).



**Law of diminishing returns:** It's a level of capacity where adding additional factor we don't have a proportional increase. (I'm starting to have congestion).



**Project failure:** When the final results are not what were expected, even though the original expectations may or may not have been reasonable.

### Accomplishment

- From "none" to "perfection"
- Actual accomplishment (AC)
- Planned accomplishment (PA)
- Achievable (A)

$$\text{Perceived failure} = \text{PA} - \text{AC}$$

$$\text{Actual failure} = \text{A} - \text{AC}$$

$$\text{Planning failure} = \text{A} - \text{PA}$$

- Unmeetable expectations = assured failure ! → Planning failure

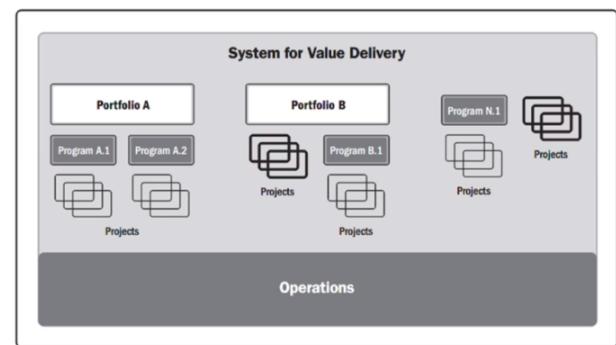
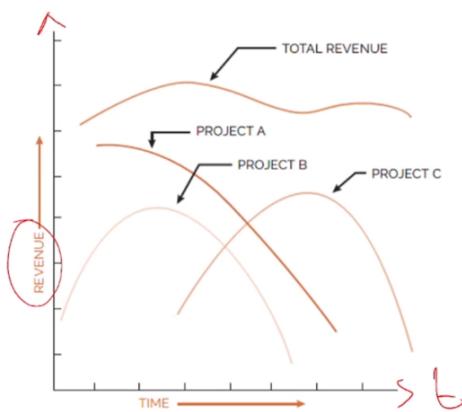
**Lesson learned:** Lessons can be learned from each and every project, even if the project is a failure. Lesson learned must be documented.

**Best practice:** Actions or activities undertaken by the company or individuals that lead to a sustained competitive advantage.

**Proven Practice:** Once this idea has been proven to be effective, we normally integrate the best practice into our processes so that it becomes a standard way of doing business.

**Post-implementation meeting:** It's a meeting done at the end of the project to determine what could have gone better, what did well and so on. We can get some learned lessons.

**Project portfolio management:** We may have multiple projects running at the same time and considering the time on the x axis and the profit at the y axis, these projects will generate revenues in time, with a certain distribution. For the company we will find then the total revenue profile. The project (executed by project managers) are part of programs that are grouped in portfolios.



**Information flow:** The information flow in project management encompasses two main directions: top-down and bottom-up.

- **Top-down flow:** Represents the direction of communication and decision-making from the management team to the portfolios, projects, and project managers. It starts with the management team developing the company's strategy, which is then translated into various portfolios. These portfolios are further broken down into individual projects, which are coordinated by project managers.
- **Bottom-up flow:** Represents the reverse direction of communication. It starts with the resources working on the projects, who communicate the progress, challenges, and resource needs to the project manager. The project manager then communicates this information to the portfolio manager, who integrates the results and communicates them back to the senior leadership or management team.

**Business case:** A business case is a document that provides the reasoning why a project should be initiated. It must be done before starting the project and typically includes:

- **Project Objectives:** Clearly defined goals and objectives that the project aims to achieve. Objects must be described in specific terms, measurable, action oriented, realistic and bounded by time (**SMART rule**)
- **Benefits and Value:** Assessment of benefits the project will deliver.
- **Cost Analysis:** An estimation of the project's budget (resources, equipment, software...)
- **Risk Assessment:** Identification and evaluation of potential risks and uncertainties associated with the project.

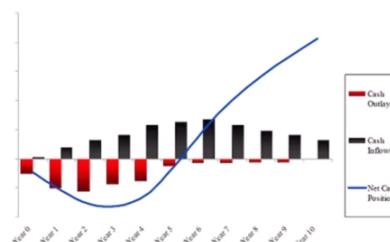
- **Stakeholder Analysis:** Identification of key stakeholders and an assessment of their interests, concerns, and potential impacts on the project.
- **Timeline and Deliverables:** A proposed timeline or schedule for project execution, including major milestones, deliverables, and dependencies
- **Financial Analysis:** An evaluation of the financial viability and return on investment (ROI) of the project. This includes assessing the payback period, net present value (NPV), internal rate of return (IRR), and other financial metrics to determine the project's profitability.

**Assumptions:** The expectations for the final results are based on the assumptions made and must be challenged to verify their validity. All the assumption must be documented.

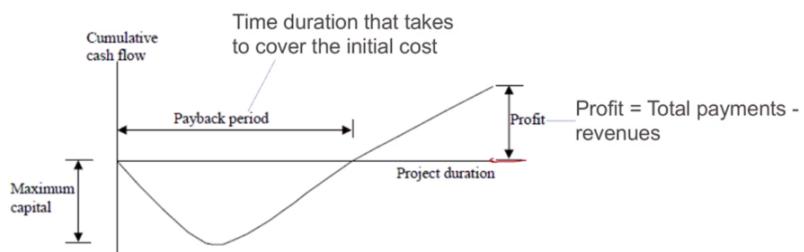
- **Explicit assumptions:** Assumption expressed without any ambiguity
- **Implicit assumptions:** Assumption hidden or undetected
- **Critical assumptions:** Assumptions that can cause significant dmg to the project.

**Metrics to measure financial business value:** Metrics to measure financial business value are crucial in evaluating the financial feasibility and performance of a project.

- **Project Cash Flow:** Project cash flow measures the inflow and outflow of cash over the project's lifespan.
  - If we sum the cash inflow and outflow in a cumulative basis, we get the cash flow curve (in blue), that will tell us for how much time we are going to be cash-negative.



- The minimum will tell us the maximum amount of cash required, maximum capital required. The net cash will be our profits. The payback period is the time that it takes to cover the initial cost. Break event is the point in the x-axis (time of project duration) where we will have the cash flow at 0.



- **Cost-Benefit Ratio:** The cost-benefit ratio compares the total benefits of a project to its total costs. It is calculated by dividing the project's total expected benefits by its total expected costs. A ratio greater than 1 indicates that the project's benefits outweigh its costs, suggesting a favorable financial outcome.
- **Return on Investment (ROI):** ROI measure is used to evaluate the efficiency of an investment or to compare the efficiency of a number of different investments. It is on way of considering profits in relation to capital invested.

$$\text{ROI} = (\text{Benefits} - \text{Costs}) / \text{Costs}$$

- **Net Present Value (NPV):** NPV is an indicator of how much value an investment or project adds to the firm. A positive NPV indicates that the project is expected to generate more value than the initial investment, suggesting financial viability.

$$NPV = \sum \frac{R_t}{(1 + i)^t}$$

- $t$  is the time of the cash flow
- $i$  is the discount rate (the rate of return that could be earned on an investment in the financial markets with similar risk; the opportunity cost of capital)
- $R_t$  is the net cash flow (i.e., cash inflow – cash outflow, at time  $t$ ).

Once got this NPV number we can decide to accept or declining the project (the higher the NPV is, the better it is).

NPV > 0	The project adds value to the business.	We should pursue the project.
NPV < 0	The project doesn't add value to the business.	We should reject the project.
NPV = 0	The business will neither gain nor lose value.	We would be indifferent in such a situation, at least from a monetary perspective. We need to consider other factors - the project may improve our brand, create more jobs, and others.

- **Payback Analysis / Payback Period:** The payback period measures the time required for a project to recover its initial investment. It calculates the time it takes for the project's cumulative cash flows to equal or exceed the initial investment. A shorter payback period is generally preferred as it indicates a quicker return on investment and reduced financial risk.
- **Internal Rate of Return (IRR):** IRR is the discount rate at which the NPV of the project becomes zero. It represents the project's expected rate of return, taking into account the present value of future cash flows. A higher IRR indicates a more attractive investment opportunity, as it reflects a higher expected return compared to the project's required rate of return.

**Discounted cash flow analysis (DCF):** A dollar earned today is worth more than a dollar earned one or more years from now. The formula is:

$$FV = PV * (1 + k)^n$$

FV = Future value, PV = Present value, k = investment rate, n = number of years

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## Project Manager

A project manager requires a combination of (Talent Triangle):

- Technical Project Management (Easy): Technical skills (depends on the project), PM methodology and framework.
- Strategic & Business Management (Medium): Project Managers need to have a strategic mindset and the ability to align the project objectives with the overall organizational goals.
- Leadership (Difficult): Team building, problem solving and so on. It is an art, not a science.



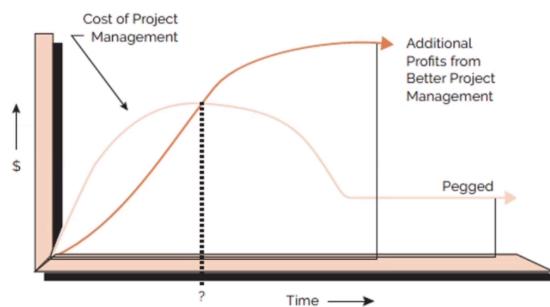
Other useful soft skills can be: Motivating, Decision Making, Critical Thinking and so on.

## PM as Change Agent (Integration)

The project manager (PM) often serves as a change agent within an organization. As a change agent, the PM is responsible for leading and facilitating the necessary changes required to implement and complete the project successfully. This involves influencing and guiding stakeholders through the change process, overcoming resistance, and promoting acceptance and adoption of new ways of working. The PM acts as a catalyst for change, helping the organization transition from current practices to the desired project outcomes. The changes has a PM cost.

## PM costs

The PM costs include the resources allocated to the project manager's role and the activities performed to plan, execute, and control the project.



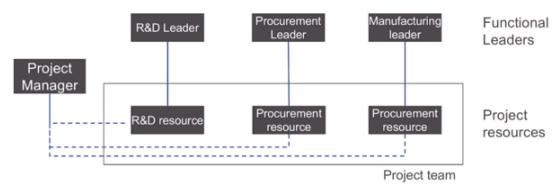
There is a learning curve associated with project management. Initially, when starting a project, the efficiency of project management may be lower as the team familiarizes themselves with the project requirements, processes, and dynamics. However, as the project progresses and the team gains experience and knowledge, the efficiency and effectiveness of project management should improve. Once the project management practices reach a certain point of proficiency, there can be additional profits or benefits for the business. This means that well-executed project management can contribute to achieving project objectives, meeting timelines, controlling costs, and delivering high-quality results. By effectively managing the project, the PM can create value for the business beyond what was initially outlined in the business case.

## Organizations functions

Usually, organizations are organized in functions which are the different departments or areas of specialization that exist within the company.

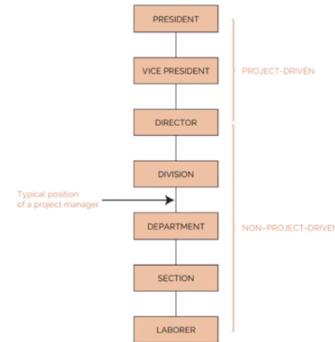
The project manager may have resources allocated from each function (guys working for you).

We have a direct reporting line (the straight one) and the indirect reporting line (the dotted one).



The **project sponsor**, on the other hand, is responsible for setting the project objectives, providing the necessary resources, and ensuring that the project receives the organizational support it needs.

While the project manager has the technical responsibility for managing the project and overseeing the work, the project sponsor focuses more on the strategic aspects of the project, such as aligning it with the organization's goals and ensuring that it receives the necessary support from the various functions.



### Project Management Office (PMO)

Project Management Office (PMO) is a centralized unit within an organization that is responsible for standardizing and improving project management practices. The primary role of a PMO is to establish and enforce a consistent project management methodology and provide support to project managers and teams.

The PMO is not directly involved in the execution of projects but rather focuses on creating a framework for project management excellence. It develops and maintains project management standards, processes, templates, and tools that are used across the organization. The PMO ensures that projects are planned, executed, and monitored in a consistent manner, following best practices and industry standards.

### Responsibility Matrix

Responsibility Matrix is a tool used to define and communicate the roles and responsibilities of individuals or teams involved in a project or process. It helps to clarify who is accountable, who should be consulted, who needs to be informed, and who is responsible for each task or decision. The responsibility matrix typically consists of a grid or table format with the activities or tasks listed vertically and the project team members or functional units listed horizontally. The intersection of each activity and team member represents their level of involvement or responsibility for that specific task.

In the columns we are going to have the team members, and in the rows, we have the tasks. The roles in the responsibility matrix can be assigned using different frameworks, for example RACI or DACI.

### RACI

In the RACI framework, the roles that can be assigned are the following:

- **Responsible (R):** The person or team who is primarily responsible for performing the task or activity. They are the individuals who have the authority and accountability for completing the work.
- **Accountable (A):** The person who is ultimately answerable for the successful completion of the task or activity. They are responsible for ensuring that the work is completed and meeting the required standards.
- **Consulted (C):** The individuals or teams who need to be consulted or provide input on the task or activity. They may have expertise or knowledge that is necessary for the successful completion of the work.
- **Informed (I):** The individuals or teams who need to be kept informed about the progress or outcome of the task or activity. They may not have direct involvement but still need to be aware of the status or results.

**Problem:** RACI assigns role to each individual, but it does not clarify what they are supposed to do.

## DACI

In the DACI framework, the roles that can be assigned are the following:

- **Driver** (D): The person or role responsible for initiating and driving the activity or decision. They take the lead and ensure that the work is completed.
- **Approver** (A): The person or role with the authority to approve or authorize the activity or decision. They have the final say and sign off on the work.
- **Contributor** (C): The person or role who provides input or contributes to the activity or decision. They offer their expertise, knowledge, or resources to support the work.
- **Informed** (I): The person or role who needs to be kept informed about the progress or outcome of the activity or decision. They are not directly involved in the work but should be kept up to date.

## Stakeholder management

We may have internal and external stakeholders and it's important to monitor them in a clear basis (identify who they are, understand their needs, analyze their needs, engage and monitor).

The stakeholder communication can be in two modes:

- **Push Communication**: Proactive dissemination of information from the project team or project manager to the stakeholders. Push communication is typically one-way, where the project team or manager shares information, updates, progress reports, or important announcements with the stakeholders.  
Problems: It inhibits immediate feedback or response from stakeholders, and it may not allow for a real-time assessment of stakeholder understanding or reactions.
- **Pull Communication**: This refers to the stakeholder seeking or pulling information from available sources or channels. In this mode, stakeholders actively search for information they need or are interested in. Pull communication enables stakeholders to independently gather information as per their requirements and convenience.

To analyze the stakeholders we can use this template (**STAKEHOLDER REGISTER**):

Stakeholder Names and Roles	How important? (Low – Med – High)	Current level of support? (Low – Med – High)	What do you want from stakeholders?	What is important to stakeholders?	How could stakeholders block your efforts?	What is your strategy for enhancing stakeholder support?
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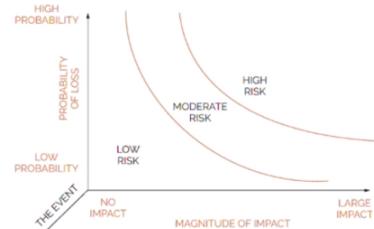
## Risk Management

**Risk** is an **uncertain event or condition that, if it occurs, has a positive or negative effect on one or more projects objectives**. They can be of two types:

- **Threats** = Negative risks (Represents the chance that cost or schedule will increase)
- **Opportunities** = Positive risks (They have the potential result to save money and time)

A risk can be represented as a function of two main variables, **Probability** and **Consequence**.

$$\text{Risk} = f(\text{probability}, \text{consequence})$$



Other characteristics of a risk can be:

- **Expected Timing**: When the risk might occur during the life of the project.
- **Frequency of the risk (event)**: How many times the risk might occur during the life of the project.

The **objective of risk management** is to prevent, avoid or mitigate a threat.

### Risk management process

This process is made of 6 different steps:

1. **Plan Risk Management** – Determine how risk management will be done on the project, who will be involved and the procedures to be used.
2. **Identify Risks** – stakeholders make a comprehensive list of risks (threats and opportunities)
3. **Perform qualitative risk analysis** — Prioritize the risks, obtaining a short list from the long list.
4. **Perform quantitative risk analysis** — Use statistical concepts to quantify the risks.
5. **Plan risk responses** — What can be done to reduce the overall risk.
6. **Monitor and control risk** — Implement risk response plan throughout the course of the project.

#### 1. Plan Risk Management

We will take as reference the PMI framework.

- **PRM inputs**: The inputs can be for example the stakeholder register, external factors...
- **PRM output**: The output will be a document (called Risk Management Plan) to detail the risk management approach in terms of process, methodology and so on. The key elements are: Risk strategy, Roles and responsibilities, Timing, Risk categories, costs and so on...



To effectively manage the wide range of risks that can arise, a **Risk Breakdown Structure** (RBS) is often utilized. The RBS breaks down risk categories into further subcategories or individual risks, allowing for a comprehensive examination of potential risks. This helps ensure that all relevant risks are identified and addressed.

- Types of risk:
  - Business risk: a risk of a gain or loss
  - Pure risk: only a risk of loss

## 2. Identify Risks

Identify risks consists in the process of identifying individual project risks as well as sources of those risks, and documenting their characteristics.

- Identify Risks input: Project management plan, Project documents, Agreements and so on.
- Identify Risks output: Risk register, which is a list of risk with additional informations

There are various tools and techniques that can be used to identify risks:

1. **Cause-risk-effect format:** This format establishes a logical flow between the cause of a risk, the risk itself (which is an uncertain event), and the effect or impact it may have on the project. The better is formulated, the more likely people will think at actions to mitigate the risks.

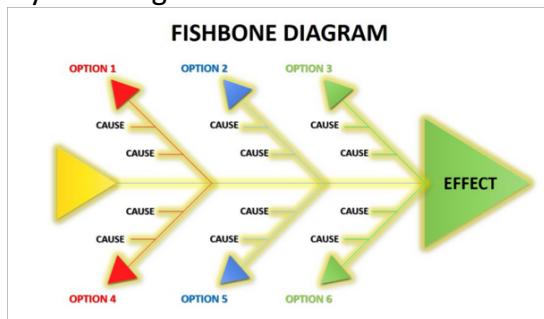
Cause	Risk	Effect
The market research function stopped focusing on the product while doing marketing research	thus missing a new trend in requirements	resulting in scope changes

- Not detailed

Cause	Risk	Effect
The number of inches apart the seats should be spaced will depend on market research, which, due to changing consumer needs, will not be done until late in the project. The market research department has many products it will be researching	which may mean that seat-spacing requirements could be ignored or come even later than planned	causing the need to eliminate one row of seats and redesign the locking mechanism if the research shows changes in needs

- Detailed

2. **Cause and effect diagram (Fishbone diagram):** This diagram helps identify the root causes of risks by working backward from the effect. It is a useful tool when conducting brainstorming sessions involving a large group of people. The diagram induces the participants to ask “why” starting from an effect to individuate the causes.



3. **Brainstorming:** Brainstorming sessions bring people together to generate a wide range of possible risks. However, it is important to be aware of the limitations, such as the possibility of groupthink or missing contributions from certain individuals.
4. **Pre-mortem:** The pre-mortem technique involves imagining the project has already failed and exploring potential reasons for that failure, which encourages out-of-the-box thinking.
5. **Affinity diagrams:** Group risks, in categories, that has been generated from other risk identify techniques and look for missing categories of risks.
6. **Expert interviews:** Get insights from experts in that specific project's areas.
7. **Nominal Group Technique:** Collect a list of risks from each group's member and ask each group member to rate each risk (1-10), tabulate the ratings to obtain the group opinion of the top risks.
8. **Delphi technique:** Determine list of expert but keep names anonymous, collect expert opinions and compile them into a list, try to reach consensus.
9. **FMEA:** FMEA process involves breaking down the system or process into its components and identifying potential failure modes for each component. Failure modes refer to specific ways in which a component can fail or deviate from its intended functionality. For each

failure mode, the FMEA team assesses the severity of the failure's impact, the likelihood of its occurrence, and the ability to detect the failure before it reaches the customer or causes harm.

The Risk Priority Number (RPN) is a numerical value assigned to each potential failure mode identified in the FMEA. The RPN is calculated by multiplying the severity, occurrence, and detection ratings assigned to the failure mode. [The severity rating represents the seriousness of the consequences if the failure occurs, the occurrence rating indicates the likelihood of the failure happening, and the detection rating reflects the ability to detect the failure before it affects the customer or the process.] By assigning RPN values, the FMEA helps prioritize the identified failure modes based on their potential risks. Higher RPN values indicate failure modes that pose a greater risk and require more attention in terms of mitigation measures.

It is recommended to use a combination of these techniques and methods to ensure comprehensive risk identification and we stop when we reach something stupid (ex: aliens are coming).

The goal is to gather a comprehensive list of risks in a risk register. The risk register serves as a document to record all identified risks, along with relevant information such as their description, potential impact, likelihood, assigned owner, and mitigation strategies. Regularly updating the risk register throughout the project helps maintain visibility and facilitates effective risk management.

### 3. Perform qualitative risk analysis

Perform qualitative risk analysis is the process of prioritizing project risks by assessing their probability of occurrence and impact, as well as other characteristics.

The objective is to determine which risk to consider, if they probability to occur or they impact is low, it doesn't make sense to plan responses to them.

- ① - A risk that could occur later in the project should be rated higher than one that could occur earlier in the project, because later the risk occur, the greater is the impact on the project.
- ② - A risk that could impact an important part of the project should be rated higher than one that could affect less important activities
- ③ - A risk that might occur more than once may need the same response several time or a unique response for each occurrence.

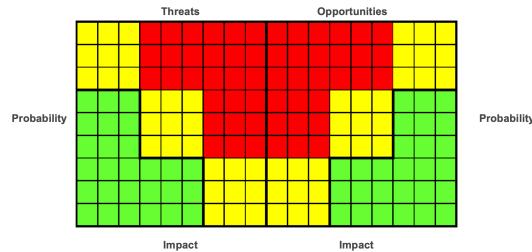
The qualitative risk analysis is conducted throughout the project life cycle, starting from the initial stages where information may be limited and response plans might not yet be developed. As the project progresses, more information becomes available, and the focus shifts towards evaluating options and actions to address the identified risks.

Data quality assessment is crucial during qualitative risk analysis to ensure that the data used for analysis is accurate and reliable. It is also important to consider factors such as cultural differences, as the interpretation of risk values or scales may vary among individuals.

The Probability and Impact Matrix is a tool used in risk management to assess and prioritize risks based on their probability of occurrence and impact on the project. The risk score is calculated by multiplying the probability and impact values assigned to each risk.

We can have two approach used:

1. **Categorizing risks based on their risk score.** Low-risk events are documented for future reference, medium-risk events require a decision-making process to determine the appropriate course of action, and high-risk events are moved to the next phase of risk management, which involves performing quantitative analysis and/or planning risk response.



2. **Sets a specific threshold (X) for the risk score.** Any risk with a score above this threshold is considered significant and requires further analysis and planning. These risks are also moved to the "Perform Quantitative Analysis and/or Plan Risk Response" phase.

Probability	Threats					Opportunities					Probability
	Very High 0.90	High 0.70	Medium 0.50	Low 0.30	Very Low 0.10	Very High 0.90	High 0.70	Medium 0.50	Low 0.30	Very Low 0.10	
	Very Low 0.05	Low 0.10	Moderate 0.20	High 0.40	Very High 0.80	Very Low 0.05	Low 0.10	Moderate 0.20	High 0.40	Very High 0.80	
Negative Impact	0.05	0.09	0.18	0.36	0.72	0.72	0.36	0.18	0.09	0.05	Very Low 0.05
Positive Impact	0.05	0.10	0.20	0.40	0.80	0.80	0.20	0.10	0.05	0.05	Very Low 0.05

With this technique we considered only the probability and the impact as dimension, but we can have higher complexity considering other dimensions like Urgency, Detectability and so on. With more than two dimension the problem becomes multi-dimensional.

#### 4. Perform quantitative risk analysis

It is about analyze numerically the risk and the uncertainty and quantify the project risk exposure. The tools that can be used in this stage are:

- The **expected monetary value** (EMV) is a basic technique used in quantitative risk analysis. It calculates the value of each risk by multiplying its probability of occurrence with the associated impact. This helps prioritize risks based on their potential financial impact. By considering risks with EMV values above a predefined threshold, project managers can focus on addressing the most significant risks.
  - $EVM = P * I$ 
    - P = probability
    - I = impact
  - Project EVM =  $\text{SUM} (P_i * I_i)$
- **Decision Tree Analysis:** Each path of the decision tree represents different decision or events (during the project), each associated with a cost and related risks. It involves mutual exclusivity, and the decision tree is evaluated by calculating the EMV for each branch.

**Probability distributions** are utilized to model risks more accurately, because for most risks the probability of occurrence is uncertain and is a continuous range of probabilities.

Some of the probability distribution that are used are:

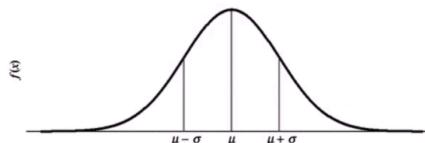
- **Triangular distribution:**

- o It is characterized by three values: Optimistic scenario, Pessimistic scenario, Most Likely scenario.
- o It has no tails so it usually underestimates the risk (if we have an event occurring somewhere outside the scenario defined).
- o It weights much more the likelihood for something pessimistic than optimistic, as we can see from the triangle dimension.



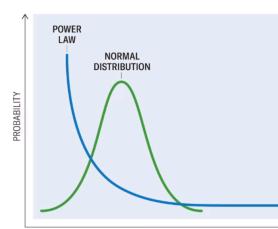
- **Gaussian distribution:**

- o Thin tails (allows limited amount of variation)
- o It does not capture the asymmetry observed in certain risks where events in the tail ends of the distribution are significant because the Gaussian distribution has no skew.



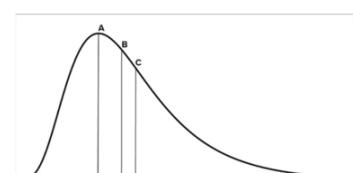
- **Pareto distribution:**

- o It is characterized by an heavy tail on the right side.
- o It is commonly used when there is a high probability of small events occurring, but also a small probability of large events occurring. This distribution is often used to model rare and extreme events, such as natural disasters or major failures.



- **LogNormal Distribution:**

- o It is a compromise between thin tails of Gaussian distrib. and heavy tails of Pareto distrib.
- o Skewed right (heavier tail right)
- o It is often used for variables such as project costs, durations, or resource consumption.
- o Models that there are more risks for costs overruns than opportunities for cost saving.



**Monte Carlo Simulation** is a simulation-based approach used when there is no suitable probability distribution available. It involves randomly selecting input values for each iteration and simulating the project's outcomes to assess potential costs, durations, or other variables. It provides a more comprehensive understanding of the range of possible project outcomes.

**Sensitivity analysis** is often performed alongside quantitative risk analysis. It involves assessing the impact of changing variables or assumptions on project outcomes. By analyzing the sensitivity of project completion dates or costs to different factors, project managers can identify critical areas of risk and uncertainty.

## 5. Plan risk responses

Plan risk responses involves determining the appropriate actions to be taken in response to identified risks.

- The inputs for this step include the risk register, which contains a comprehensive list of identified risks, and other techniques or tools used during the risk analysis phase.
- The output for this step is the risk management actions, what we are going to do with all the risks.

When planning risk responses, it is important to consider the trade-offs and potential consequences of each action. Sometimes, taking actions to mitigate one risk may inadvertently increase other risks or introduce new risks. For example, mitigating a schedule risk by allocating additional resources may increase the cost risk or introduce resource conflicts.

**Inertia:** It is a critical aspect of implementing risk responses. Initiating risk response actions may encounter resistance or require significant effort.

**Velocity:** Even after initiating risk response actions, it is important to continuously monitor and assess their effectiveness.

### Strategies for threats:

- **Avoid:** Eliminate the threat, or, protect the project from its impact.
- **Transfer:** Transfer the threat to a third party to manage the risk and take the impact if it occurs.
- **Mitigate:** Reduce probability of occurrence and/or impact of a threat. Early mitigation is more effective than trying to repair the damage done from the threat.
- **Accept:** Accept the existence of the threat but don't do actions.

### Strategies for opportunities:

- **Exploit:** Exploiting the opportunities to gain additional benefits.
- **Enhance:** Increase the probability of occurrence or impact of an opportunity
- **Accept:** Accept the existence of the opportunity but don't do actions.

The steps viewed until now (1 to 5) are part of the so said **baseline phase (starting point)**. We run the process once and we go towards the monitor and control risks phase which must be done continuously.

## 6. Monitor and control risks

This step focuses on actively tracking and evaluating identified risks throughout the project to ensure they are effectively managed.

The output of this step is a revised risk register, which captures any changes or updates to the risks identified.

When we deal with risks in this phase, we need to deal with complexity, i.e., complex systems and variables can impact the occurrence and impact of risks.

To manage complexity, we can use:

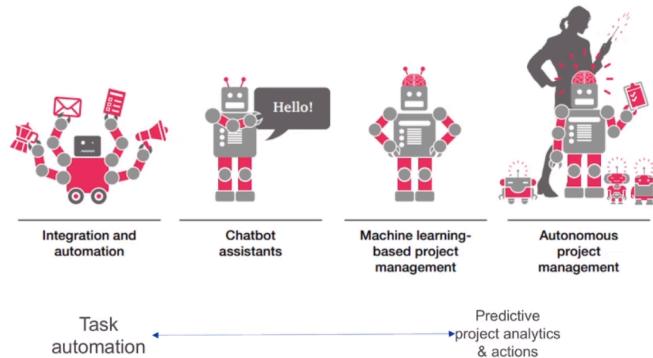
- **System-based approach:** This involves analyzing the overall ecosystem and identifying opportunities to simplify the system by decoupling interconnected parts and reducing the number of variables. Simulation approaches can be utilized to assess the potential effects of various risk scenarios.
- **Reframing approach:** It involves sharing risks with external entities such as customers, suppliers, and stakeholders, to get a different perspective. It also includes rebalancing data used in risk analysis and decision-making processes to ensure accuracy, relevance, and reliability. Regular data reviews and adjustments help maintain a robust risk management approach.
- **Process-based approaches:** It requires iterative processes where iteration allows for continuous improvement and adjustment of risk responses based on ongoing monitoring and evaluation. Engaging stakeholders ensures that their perspectives and expertise are considered in risk management decisions. Fail-safe measures, such as redundancy in data architecture, help mitigate the consequences of risks and minimize their potential impact.

During risk monitoring and control, it is essential to be aware of common types of biases that can affect decision-making and risk management.

- **Common Information Sampling Bias:** This bias involves spending more time and energy on information that is already known rather than seeking out new and potentially helpful information.
- **Confirmation Bias:** This bias occurs when we lean on existing beliefs and actively seek out information that confirms our preconceived notions.
- **Halo Effect:** The halo effect bias leads us to see someone favorably based on our overall positive impression of them, regardless of their actual actions or performance.
- **Status Quo Bias:** This bias manifests as a preference for maintaining the current state of affairs, even when alternative options may be more beneficial.
- **Hindsight Bias:** Hindsight bias involves believing, after an event has occurred, that we would have predicted its outcome accurately.
- **Plan - Continuation Bias:** This bias refers to the tendency to stick to a course of action even when circumstances change, overlooking the need for adaptability.
- **Ingroup Bias:** This bias leads us to favor individuals or groups that we perceive as being part of our own group.

## Project Management and AI

The integration of artificial intelligence (AI) into project management practices is becoming increasingly prevalent. The **PwC framework** provides a way to understand the different levels of AI complexity in project management.



### PCW framework complexities:

- **Integration and Automation:** At this level, AI is primarily used for digitalization and process automation. It involves integrating AI technologies into project management tools and systems to streamline processes and improve efficiency.
- **Chatbot Assistants:** The next level involves the use of AI-powered chatbot assistants. These assistants can provide project-related information, answer common questions, and assist with basic project management tasks. They utilize natural language processing and machine learning algorithms to understand user queries and provide relevant responses.
- **ML-based PMs:** Machine Learning (ML) plays a key role at this level. ML-based project managers focus on analyzing project data and making predictions. For example, they can forecast project timelines by comparing completion dates with expected ones, helping to identify potential delays or deviations.
- **Autonomous Project Management:** The highest level of AI in project management is autonomous project management, which can be compared to self-driving cars. This level involves AI systems that can make decisions and take actions autonomously based on project data, historical patterns, and predefined rules. These systems can adapt and optimize project plans in real-time.

There is a number of challenges for AI:

- AI require a certain degree of PM maturity.
- AI needs a large amount of quality data for training.
- Current AI system do not consider emotional and social dynamics, so they have difficulties to do the leadership task.
- AI is a Blackbox solution, it necessitate of Explainable AI (XAI)

## Project Schedule Management

Some key terms to be used in project scheduling are the following:

- **Milestone**: A milestone is a significant point or event in a project (represented with triangle).
- **Activity**: A unique and distinct scheduled portion of work with a duration greater than zero time periods, to be performed during the course of a project (represented with square)
- **Resource**: Resource assigned to an activity (for example materials, equipment and so on)
- **Logical relationship**: A dependency between two activities or between an activity and a milestone (Links)
- **Schedule model**: A representation of the plan for executing the project's activities including durations, dependencies, and other planning information, which is used to produce a project schedule along with other scheduling artifact

The lifecycle can be of three types:

- **Predictive**: Projects or products that are known and proven allowing the major planning to occur prior to project execution.
- **Iterative**: Allows feedback on partially completed or unfinished work to improve and modify that work.
- **Incremental**: Provides finished deliverables that the customer may be able to use immediately creating early value for the project
- **Adaptive**: At the end of each iteration (sometimes known as a sprint), the customer reviews a functional deliverable. Works well when the level of uncertainty is high.

The scheduling is composed by the following elements:

1. **Plan schedule management**.
2. **Define activities**.
3. **Sequence activities**.
4. **Estimate activity durations**.
5. **Develop schedule**.
6. **Control schedule**.

### 1. Plan Schedule Management

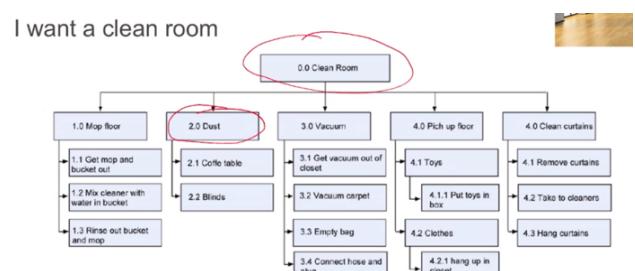
Process of establishing the policies, procedures and documentation for planning, developing, managing, executing and controlling the project schedule.

### 2. Define Activities

Define Activities involves identifying and documenting the specific actions or tasks that need to be performed to produce the project deliverables.

The WBS is commonly used to assist this process.

The Work Breakdown Structure (WBS) is a hierarchical structure that breaks down the overall scope of work into a list of activities. It represents a decomposition of the project into smaller, manageable components. The WBS should reflect the cost structure, meaning that each activity should have a budget assigned to it. It allows for understanding the duration, cost, and budget for each element of the project.



The WBS should capture the structure of the project and ensure that each task has a unique identifier. It follows the "100% rule," which states that the children (lower-level activities) must represent 100% of each parent (higher-level activity). The WBS helps in organizing and tracking activities individually, providing a basis for scheduling and cost control.

Deciding how many levels to include in the WBS is a common challenge. There is a standard recommendation to go down to level 6, but the level of decomposition depends on factors such as project complexity, control requirements, and practicality. While having more levels provides better control, it also increases complexity and interdependencies among activities.

A fundamental question is how many levels do we have? We have WBS decomposition problems.

Finding the right balance between control, effort, and practicality is known as the scheduler's dilemma. It requires considering trade-offs and ensuring that the schedule is understood and manageable by the project team. It is important to strike a balance between providing enough detail in the schedule without overwhelming team members

The Scope creep is a significant concern during the project. It refers to the additional scope and requirements that are introduced and force adjustments to the schedule and budget. Having a change control mechanism in place is essential to manage scope changes effectively. Changes from the customer may present opportunities for additional time or cost, but it is crucial to have a clear process for evaluating and accommodating these changes.

Rolling wave planning is an approach that provides visibility on short-term tasks while keeping medium-to-long-term activities at a higher level of detail. It involves starting with a detailed WBS and gradually exploring and breaking down tasks as more information becomes available. This approach acknowledges uncertainty in the project scope and allows for flexibility in adapting the schedule as the project progresses

### 3. Sequence activities

Sequence activities, which involves determining the order in which the activities should be performed.

The Precedence Diagramming Method (PDM) can be used to identify and document the relationships among activities. There are four types of dependencies that define the relationships between activities:

1. **Finish-to-Start (FS):** Activity A must be completed before Activity B can start. This is the most commonly used dependency, where the finish of one activity is linked to the start of the next.
2. **Start-to-Start (SS):** Activity B can start after Activity A has started. This dependency is less common.
3. **Finish-to-Finish (FF):** Activity B cannot finish until Activity A has finished. This dependency is also less common.
4. **Start-to-Finish (SF):** The start of Activity A is linked to the finish of Activity B. Activity B cannot complete until Activity A has started. This dependency is rarely used.

When defining activity attributes, certain **constraints** need to be considered.

- Each activity, except the first, must have at least one FS relationship, and each activity, except the last, must have at least one SF relationship.
- Middle activities should have both a predecessor and a successor to maintain a valid network. If activities are missing these relationships, the network is considered invalid.
- Open start or end activities, also known as dangling activities, are those without any predecessors or successors.

The **Dependencies** can be categorized as mandatory or discretionary and External or Internal:

- **Mandatory dependencies** are necessary for executing the work physically or may be imposed from external factors.
- **Discretionary dependencies**, on the other hand, provide flexibility and are based on preferred ways of executing tasks.
- **External dependencies** are outside the control of the project team
- **Internal dependencies** are within their control of the project team

**Leads and lags** are used to introduce constraints in the scheduling logic in order to delay activities for a certain reason.

- **Lead** is an acceleration that allows for overlapping a little bit between two activities.
- **Lag** is an amount of time to delay the start of the successor activity in relation to the predecessor.

Leads are associated with FS relationships, while lags are associated with SS relationships. It is important to use leads and lags judiciously, as excessive use can increase complexity and maintenance efforts, and reduce schedule explainability.

**Monitoring** the schedule's health is crucial to ensure its accuracy and effectiveness. Metrics such as the number of open ends (activities without successors or predecessors) can be used to assess the schedule's health.

- Tools like **Acumen Fuse** can help analyze and visualize schedule quality by scanning the network and providing a dashboard with relevant metrics.

#### 4. Estimating Activity Duration

Process of estimating activity duration (number of work periods) need to complete individual activities with the estimated resources.

To do this estimation, different techniques can be used:

1. **Analogous Estimating**: This approach involves using data and information from previous similar projects as a basis for estimating the duration of current activities. It relies on historical data and comparisons with similar activities to provide estimates. However, it is important to note that historical data may not always accurately reflect the current project's circumstances.
2. **Parametric Estimating**: This approach uses mathematical models and calculations based on historical data to estimate activity durations. It involves applying formulas and statistical techniques to analyze historical information and derive estimates for the current project. These models can be based on various factors such as size, complexity, resources, or other relevant parameters.

3. **Bottom-up estimating:** When an activity's duration cannot be estimated with a reasonable degree of confidence, it is broken down into smaller, more detailed tasks for the purpose of estimating their durations. Each individual task is estimated separately, and the estimates are then aggregated to determine the overall duration of the activity. This approach allows for a more granular estimation by considering the specific tasks involved.
4. **Three-Point Estimating:** This technique involves using a probabilistic approach to estimate activity durations. It takes into account three estimates: the most likely duration, an optimistic duration, and a pessimistic duration. These estimates are often represented using a triangular distribution, where the most likely estimate is at the peak of the triangle, and the optimistic and pessimistic estimates are at the other two ends. Formulas such as the PERT (Program Evaluation and Review Technique) can be used to calculate weighted averages and standard deviations based on these estimates.

## 5. Develop Schedule

The develop schedule involves creating a comprehensive timeline that outlines the sequence of activities and their durations.

The scheduling approaches that can be used to analyze and develop the project schedule are:

- **Rolling Wave Planning:** This approach involves developing the schedule in waves or iterations. Initially, the high-level activities are defined and scheduled, and as the project progresses and more information becomes available, the lower-level activities are added and scheduled. It provides flexibility and allows for adjustments and refinements as the project unfolds.
- **Critical Chain Method:** This method focuses on managing project uncertainties and constraints. It involves identifying critical activities that have the most impact on the project's duration and adding buffers to account for uncertainties and variations in activity durations. The buffers can be allocated within activities or at the end of the project. The critical chain method helps in managing project dependencies and prioritizing activities that are crucial for the project's success.

### Critical path approach (CPM)

The Critical Path Method is a scheduling technique used to determine the longest path of dependent activities and identify activities that are critical to the project's duration. The critical path represents the sequence of activities that, if delayed, will directly impact the project's completion date. By analyzing the critical path, project managers can prioritize their efforts and focus on activities that need close monitoring and attention. The CPM tells the earliest possible finish late, it is the longest path.

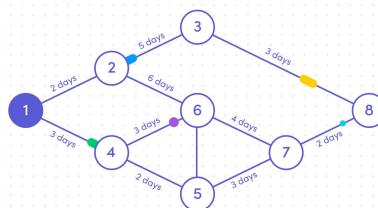
**Slack time** is the amount of time by which an activity or event can be delayed without affecting the project's end date. It is calculated as the difference between the latest allowable date (TL) and the earliest expected start date (TE) of an activity. If slack time is zero, the activity is on the critical path and any delay will impact the project's schedule. Positive slack time indicates flexibility in non-critical activities. Project managers use slack time to prioritize resources, make scheduling decisions, and address risks or delays.

$$TL - TE$$

## PERT

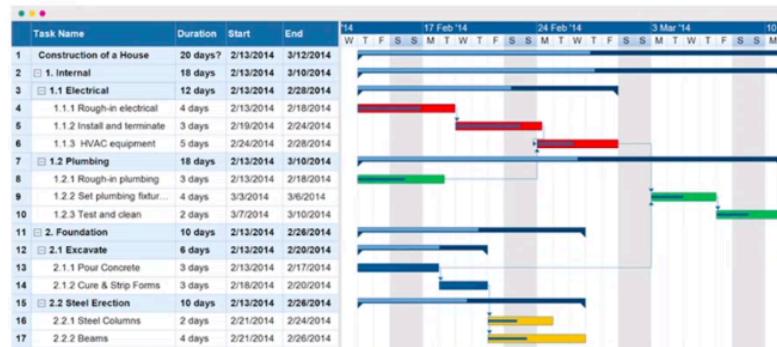
PERT is a network analysis technique that uses nodes and arrows to represent activities and their dependencies. It allows for the estimation of activity durations based on three estimates: optimistic, most likely, and pessimistic. By considering these estimates, weighted averages, and standard deviations, project managers can calculate the expected durations and assess the uncertainty associated with each activity. To perform PERT network analysis you can follow this list:

1. Prepare the list of activities
2. Define inter relationship among the activities
3. Estimate activity duration
4. Assemble the activities in the form of a flow diagram
5. Draw the network
6. Analyze the network (critical events, critical path etc)



## Gantt Chart

A Gantt chart is a visual representation of the project schedule. It displays the activities as horizontal bars on a timeline, indicating their start and end dates. Gantt charts provide a clear overview of the project schedule, dependencies, and critical activities. They are widely used for communication and tracking progress throughout the project.



Talking about critical path, from the business perspective, it tells the activities that are driving the project, we need to pay the attention to them, and if they will be delayed the project will be.

## Resource optimization

Developing the project schedule also involves considering resource availability and optimizing resource allocation. Project managers need to balance the demands of activities with the available resources, ensuring that resources are effectively assigned to tasks and that there are no resource overloads or bottlenecks.

- **Resource leveling:** Resource leveling is a technique used to balance the demand for resources with their availability over the course of the project. The goal is to avoid resource overloads or bottlenecks by adjusting the start and end dates of activities or tasks. The main objective of resource leveling is to achieve a more even distribution of resources throughout the project timeline.
- **Resource Smoothing:** Resource smoothing, is a technique used to manage resource conflicts and optimize resource utilization. The primary objective of resource smoothing is to achieve a consistent and balanced use of resources while maintaining a relatively constant resource allocation profile.

## Schedule compression

Schedule compression refers to the techniques used to shorten the project schedule when there is a need to accelerate the completion of the project or meet tight deadlines. It involves reducing the overall project duration by either compressing the time required for specific activities or by overlapping activities that were initially planned to be sequential.

There are two techniques of schedule compression:

- **Crashing:** Crashing involves allocating additional resources to critical activities to complete them in a shorter duration. However, crashing typically comes at an increased cost.
- **Fast Tracking:** Fast tracking involves overlapping sequential activities that were initially planned to be executed one after another. Instead of waiting for one activity to finish before starting the next, the activities are partially or fully overlapped, allowing them to be executed concurrently. However, can introduce additional risk caused by an higher chance of dependencies and coordination issues.

**Drift** refers to the delay in the project schedule that may occur due to various factors such as unexpected events, changes in requirements, resource constraints, or external influences. When drift occurs, the project schedule needs to be adjusted, and the target completion date may need to be moved accordingly. Project managers must monitor the project closely, identify drift, and take appropriate actions to mitigate its impact and bring the project back on track.

## 6. Control Schedule

Control Schedule is the process of monitoring and managing the project schedule to ensure it remains on track and aligned with the baseline schedule. It involves comparing the current version of the schedule with the original baseline, which serves as the reference for performance evaluation.

The Key Performance Indicators (KPI) are used by project managers to control the schedule, measuring and assessing the progress.

- **Leading Indicators:** Leading indicators are proactive measures that provide early insights into potential schedule deviations, allowing for timely corrective actions to be taken.
- **Lagging indicators:** Lagging indicators are reactive measures that assess past performance and help identify areas of improvement.

Regular and frequent measurement of project progress is crucial in control schedule. This enables project managers to track actual progress against planned milestones, identify variances, and take necessary corrective measures to bring the project back on track.

However, there are potential pitfalls to be cautious of during schedule control. Here are some important pitfalls to be aware of:

- **Hawthorne effect:** The act of measuring something can influence behavior, leading to skewed results.
- **Vanity metrics:** These are metrics that may look impressive but do not provide meaningful insights for decision-making. For instance, measuring pageviews on a website may not be as useful as measuring the number of new viewers, which indicates potential growth.
- **Confirmation bias:** People have a tendency to seek and interpret information that confirms their existing beliefs.

- **Correlation versus causation:** Mistaking correlation for causation is a common error in data analysis. Just because two variables are correlated does not mean one directly causes the other.
- 

## Project Cost Management

Project Cost Management is a crucial aspect of project management that involves planning, estimating, budgeting, and controlling costs throughout the project lifecycle. It helps ensure that the project is delivered within the allocated budget while meeting the desired objectives and delivering value to stakeholders. This phase is composed by 4 steps:

1. **Plan Cost Management:** This process involves developing a cost management plan that outlines how project costs will be estimated, budgeted, managed, monitored, and controlled.
2. **Estimate Costs:** In this process, the project team develops cost estimates by approximating the monetary resources required to complete project work.

### Techniques:

- **Analogous Estimating:** This technique uses values or attributes from previous similar projects as a basis for estimating costs for the current project.
- **Parametric Estimating:** It involves using statistical relationships between historical data and other variables to calculate cost estimates for project work.
- **Bottom-Up Estimating:** This technique involves estimating the cost of individual work packages or activities in detail and then aggregating them to higher levels for reporting and tracking purposes.
- **3-Point Estimating:** It uses a range of estimates to calculate a more realistic cost estimate. The most common methods are the Triangular Distribution (optimistic + most likely + pessimistic) divided by 3 and the Beta Distribution (optimistic + most likely + pessimistic) divided by 6.

### Analysis:

- **Alternatives analysis:** Involves evaluating different options for executing project work (such as make vs. buy decisions).
  - **Reserve analysis** to account for cost uncertainties, and considering the
  - **Cost of quality** in estimating project costs.
3. **Determine Budget:** The determine budget process involves aggregating the estimated costs of individual activities or work packages to establish an authorized cost baseline. It sets the approved budget for the project, including any contingency reserves or management reserves.
    - **Cost baseline:** The cost baseline represents the approved version of the budget and typically includes contingencies and reserves that are added on top of the estimated costs.
    - **Contingencies** are provisions set aside to address unforeseen events or risks that may impact the project's cost. They act as a buffer to cover potential cost overruns or scope changes.
    - **Management reserves** are additional funds that are set aside to address unknown risks or changes that may arise during the course of the project.
    - The ability to influence costs diminishes over time, meaning that it becomes more challenging to make significant cost reductions as the project progresses. Therefore,

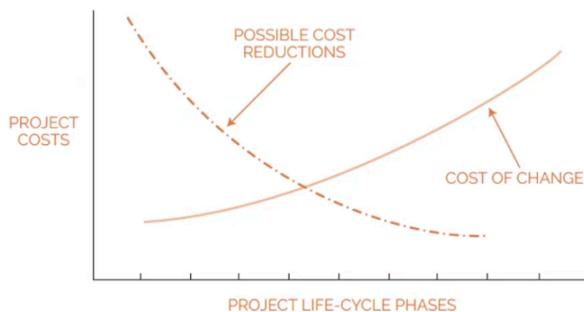
it is crucial to have contingency reserves in place early on, as they provide a greater ability to address issues and cover unexpected costs during the initial stages of the project.

4. **Control Costs:** The control costs process focuses on monitoring the status of the project to update the project costs and manage changes to the cost baseline. It involves tracking actual costs, comparing them to the baseline, and taking corrective actions if there are deviations or variances.

### Cost Control

Cost control is the process of monitoring and managing the project's costs against the approved budget. It involves tracking and analyzing project expenses to ensure they align with the planned budget and taking corrective actions if there are any deviations.

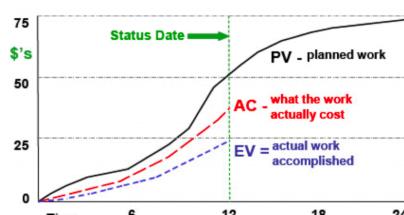
If we plot the project costs over time, the ability to reduce costs decrease while the cost of change increases in an opposite trend.



**Earned value analysis** provides a systematic approach to measuring and evaluating the progress of the project. It calculates the value of the work completed based on the planned budget and schedule. It allows project managers to assess the project's performance by comparing the earned value (EV) to the planned value (PV) and actual costs incurred (AC). By examining the variances between these values, project managers can determine if the project is on track, over budget, or behind schedule.

To perform earned value analysis, a baseline is established at the beginning of the project, which includes the approved budget, schedule, and scope. The planned value (PV) represents the authorized budget assigned to scheduled work, and it is typically distributed over time. The earned value (EV) is the estimated value of the work actually performed based on the completed tasks and milestones. The actual cost (AC) is the real cost incurred for completing the work. By comparing these values, project managers can calculate variances and indices that indicate the project's cost and schedule performance.

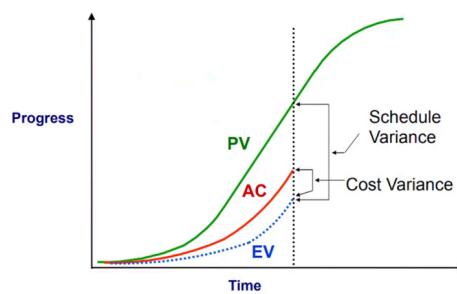
It's important to note that earned value analysis considers the cumulative progress of the project, rather than simply measuring time-based proportions. By focusing on the deliverables completed and the value earned at any given point, project managers can have a more accurate understanding of the project's status and make informed decisions regarding cost control.



## Cost and Schedule Variance

We can put all these things into a graph and if we can plot the curves we can understand where we are in the project and determine the cost variance and the schedule variance.

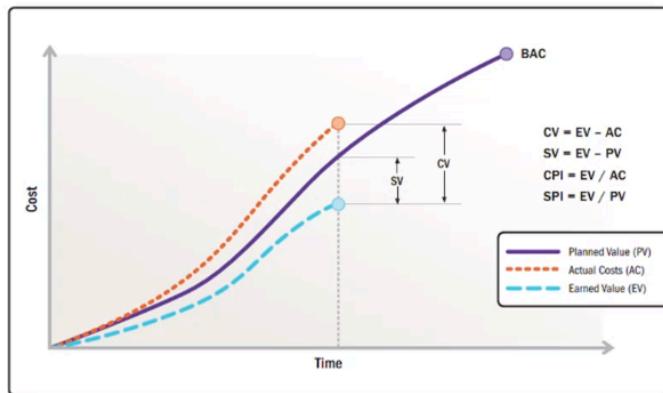
- The **cost variance** measures the difference between the earned value and the actual cost, providing insight into whether the project is over or under budget. ( $CV = EV - AC$ )
  - o  **$CV > 0$** : Physical progress was accomplished at a lower cost than what was predicted
  - o  **$CV < 0$** : Physical progress was accomplished at a greater cost than was forecasted; cost overrun!
  - o CV measures the efficiency with which physical progress was accomplished compared with the plan
- The **schedule variance** measures the difference between the earned value and the planned value, indicating whether the project is ahead or behind schedule.
  - o  **$SV > 0$** : Physical progress was accomplished at higher rate than planned
  - o  **$SV < 0$** : Physical progress was accomplished at slower rate than planned
  - o SV measures the speed with which physical progress was accomplished compared with the plan



We can also calculate indices:

- **Cost Performance Index (CPI)**: It is a ratio that compares the value of work performed (Earned Value, EV) to the actual cost incurred (Actual Cost, AC) up to a given point in the project. It is calculated using the formula:  $CPI = EV / AC$ 
  - o  **$CPI = 1$** : The project is exactly on budget, project is utilizing funds efficiently.
  - o  **$CPI > 1$** : The project is performing better than planned in terms of cost. More work has been completed for each unit of cost incurred, indicating good cost control.
  - o  **$CPI < 1$** : The project is over budget, and more cost has been incurred than the value of work completed. It suggests that cost control measures need to be implemented to bring the project back on track.
- **Schedule Performance Index (SPI)**: It is a ratio that compares the value of work performed (Earned Value, EV) to the planned value (Planned Value, PV) up to a given point in the project. It is calculated using the formula:  $SPI = EV / PV$ 
  - o  **$SPI = 1$** : The project is exactly on schedule, indicating that the work progress is in line with the planned schedule.
  - o  **$SPI > 1$** : The project is ahead of schedule, and more work has been completed than planned at a given point. It suggests efficient schedule management.
  - o  **$SPI < 1$** : The project is behind schedule, and less work has been completed than planned. It indicates that corrective actions may be needed to catch up on the schedule.

**SPI > 1** does not necessarily mean you are ahead of schedule! You can accomplish more work than planned by working on non-critical path Work Packages. You need to look at the critical path to determine whether you are ahead, on or behind schedule.



When calculating the **EV** (Earned Value), we need to strike a balance between accuracy and effort. The major challenge lies in measuring the progress of activities that are still in progress. For activities that are 100% completed, there is no difficulty in measurement. However, for ongoing activities, we need to determine the extent of progress achieved. There are different methods to measure progress, such as duration-based and tangibility-based approaches.

- In the duration-based approach, we split the project into milestones and assign a percentage of completion to each milestone as it is achieved. This method only recognizes progress once a milestone is reached, which may underestimate overall progress.
- In the discrete approach, activities are either considered 0% complete or 100% complete. If the work can be physically measured, physical measurements can be used as well. For example, if an activity is 50% complete, we recognize 50% of its cost. If an activity is fully completed, we consider its entire cost, and if it is partially completed, we consider a proportionate cost.

By calculating the schedule variance, we can assess the deviation between the planned schedule and the actual progress. This helps in understanding whether the project is ahead of or behind schedule.

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## Scrum

Scrum is a project management methodology based on Agile and Lean principles, primarily used in software development projects. It emphasizes a collaborative and iterative approach to project execution. Here are the lean principles:

- **3M's**
  - o **Load (muri)**: Do not overload your process.
  - o **Flow (mura)**: Keep the flow even.
  - o **Waste (muda)**: Remove nonvalue adding activities
- **Lean disciplines:**
  - o Eliminate waste.
  - o Create knowledge: Amplify learning.
  - o Defer commitment – Decide as late as possible.
  - o Deliver as fast as possible – Learn as fast as possible.
  - o Respect people – Empower the team.

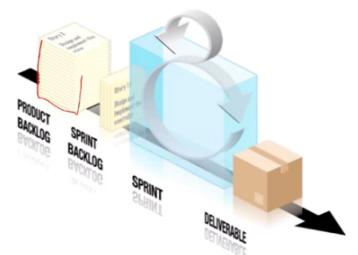
- Optimize the whole – Improve the entire system.

SCRUM's goal is to deliver as much quality software as possible within a series of short time-boxes called Sprints that typically last about a month.

SCRUM is not only an "iterative and incremental" development method but also an "adaptive" software development method.

What is a simplified overview of Scrum:

- **Building blocks:**
    - **Product vision:** The product owner defines the overall vision for the product.
    - **Product Backlog:** It is a prioritized list of items (e.g., user stories) based on business value. → Quello che c'è da fare
  - **Scrum Team:**
    - **Product Owner (PO):** Responsible for defining the product vision and creating the product backlog.
    - **Development Team (DT):** They deliver a potentially shippable product at the end of each sprint.
    - **Scrum Master (SM):** The SM owns the overall Scrum framework and process.
  - **Scrum Process:**
    - **Sprint Planning Meeting:** The team estimates the effort needed for each user story and decides which stories to commit to for the next sprint (Sprint Backlog).
    - **Sprint:** The development team works on the committed items from the Sprint Backlog to build the product increment.
    - **Sprint Review Meeting:** The team assesses the working software based on acceptance criteria and gathers feedback from stakeholders.
    - **Sprint Retrospective:** The team reflects on the sprint, identifies areas for improvement, and determines actions for the next sprint.
1. The **product vision** represents the **overall goal and purpose of the product**, and it is the responsibility of the Product Owner to define and communicate this vision. The **product backlog** is a prioritized list of items, such as user stories, that **represent the work to be done**.
  2. During each **sprint**, which is a **time-boxed iteration**, the Development Team (DT) works on a **set of items from the product backlog to create a shippable product increment**. The effort required for each item is estimated by the DT. The **item to work on (sprint backlog)** are **decided in the sprint planning meeting**, i.e., the Product Owner presents the items, and the DT estimates the effort required and **decides which items to include in the sprint backlog**. *→ on which features focus on*
  3. Throughout the sprint, the **DT works on developing the shippable products based on the sprint backlog**.
  4. At the end of the sprint, there is a **sprint review meeting** where the **working products are assessed and demonstrated to stakeholders for feedback and evaluation**. After the **sprint review**, there is a **sprint retrospective** where the team **reflects on the sprint and identifies improvements for the next sprint**. This retrospective helps the team learn from their experiences and adjust their process. The Scrum process repeats in subsequent sprints, with the Product Owner refining and updating the product backlog based on feedback and changing requirements.



The Scrum framework emphasizes collaboration, transparency, and continuous improvement to deliver value to the end product.

### **Product Owner**

The product owner is responsible to define the content and prioritize the value.

- Owns the Product Backlog (He has to maximize the ROI of the product)
- Decide Release date and content
- Discuss and agrees with stakeholders (what to do and why)
- Discuss and agree <sup>with</sup> DT on what needs to be done
- Accept/Rejects sprints based on the product requirements established (from him)

### **Development team**

The development team is a cross-functional team, i.e, every skill needed to create a potentially shippable product increment must be in the team.

- Owns the Sprint Backlog and uses it to deliver a shippable product in the end of the sprint
- Is responsible for Product Quality
- Defines how to implement the functionalities.
- Prepares Spring Review meeting.
- Perform Spring Retrospectives to improve efficiency.
- They are self-organized, more or less seven members

### **Scrum Master**

The Scrum Master is a role in Scrum responsible for ensuring the Scrum framework is understood and implemented effectively. The Scrum Master serves as a facilitator, coach, and servant-leader to the Scrum Team and the organization as a whole. Their primary focus is on promoting and supporting the adoption of Scrum principles and practices.

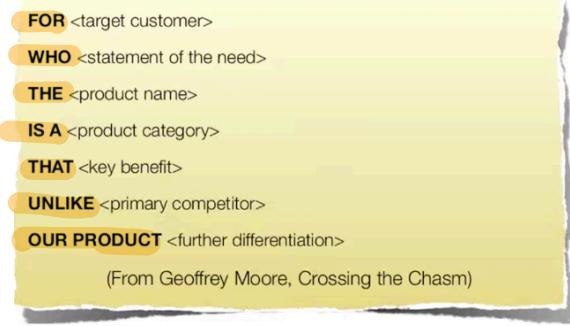
- Owns Scrum Framework and coaches every participant in the correct usage of Scrum.
- Helps PO in preparing the Spring Planning Meeting
- Helps DT in preparing review meeting
- Prepares and facilitate daily Scrums
- Protects DT from interferences during Spring, and coaches them to become more effective.
- The qualities of a Scrum Master can be: Listening, Empathy, Persuasion and so on.

### **Formulating the product vision**

The product vision is the first building block we discuss.

- Describes why the project is undertaken
- Describes which is the desired output
- The concept behind the product vision must be shared by the Team, Stakeholders, PO and end users.

One way to formulate a good product vision is using this framework:



## Product Backlog

When creating a Product Backlog in Scrum, it is important to specify the requirements of the product. User stories are commonly used to describe the functional solutions that the product should provide.

- **Requirements:** Represents a need, must answer the question "What?" and "Why". The requirements are transformed into multiple User Stories, where each User Story is a proposal to partially satisfy the Requirement.
- **User Stories:** Represent a description of a "solution" from a functional point of view, normally described from the User perspective.
  - o **Acceptance Criteria:** A User Story must contain an Acceptance Criteria that describes how the user of the story would accept the implemented functionality.

As a Returning Customer I want the system to remember my details so I can purchase goods more quickly.

### Acceptance criteria:

Scenario: Review Details Before Purchase  
Given I'm on the Amazon website  
And I'm logged in as a returning customer  
When I click the "1-Click" button  
Then I should see my order details

- o The User Stories features are the following (INVEST):
  - **Independent:** Each user story should be self-contained and not dependent on other user stories.
  - **Negotiable:** User stories are not set in stone and can be further refined and adjusted through collaboration with the stakeholders.
  - **Valuable:** User stories should provide value to the customer or end-user.
  - **Estimable:** It should be possible to estimate the effort required to implement a user story.
  - **Small:** User stories should be small enough to be completed within a single iteration.
  - **Testable:** There should be clear acceptance criteria to determine when a user story is considered complete.

## Sprint planning Meeting

The Sprint Planning meeting is a key event in Scrum that occurs at the beginning of every Sprint. Its purpose is to plan and prepare for the upcoming Sprint.

Here are the important details about the Sprint Planning meeting:

1. **Time-boxed:** The meeting is time-boxed to a specific duration, usually eight hours for a one-month Sprint. For shorter Sprints, the duration of the meeting is typically shorter.
2. **Preparation:** Some preparation occurs before the Sprint Planning meeting. The Product Owner prioritizes and refines the Product Backlog, which is the list of items to be worked on. The Product Owner may involve the team in this preparation process.
3. **Attendees:** The meeting is attended by the Product Owner, Scrum Master, and the development team members.
4. **Two Parts:** The Sprint Planning meeting consists of two parts: the "What?" part and the "How?" part.
  - a) **Part 1 - What:** In this part, the Product Owner explains the release goal, provides information about the backlog items, and their priorities. The Product Owner determines the priorities, but the development team has the autonomy to decide how much backlog they can commit to for the Sprint.
  - b) **Part 2 - How:** The development team decides how to turn the selected backlog items from Part 1 into a potentially shippable product increment. They identify the tasks required to complete the work. The output of this part is the Sprint Backlog, which includes the backlog items selected for the Sprint and the associated tasks.
5. **Involvement of the Product Owner:** The Product Owner is present during the second part of the Sprint Planning meeting to answer any questions that arise from the development team regarding the backlog items, clarify requirements, and provide additional information if needed.

## Spring Backlog

A Sprint in Scrum is a time-boxed period, typically lasting 1 to 4 weeks, during which the development team builds the Product Backlog items they committed to completing.

Here are the key points about Sprints:

- **Sprint Planning:** During the Sprint Planning meeting, the development team selects the Product Backlog items they will work on and groups them into a Sprint Backlog. The length of the Sprint, once selected, should not vary unless there is a valid reason.
- **No Changes Allowed:** Once a Sprint has started, no changes are allowed to the committed work, which includes the User Stories in the Sprint Backlog. Changes to team composition are also not allowed during the Sprint, except for unplanned tasks related to Sprint Backlog items that may emerge during the Sprint.
- **Fixed End Date:** The end of the Sprint is fixed and predetermined. The development team aims to deliver a potentially shippable increment of the product by the end of the Sprint. However, it is possible that some functionality may still be missing and require further development.
- **No Gaps Between Sprints:** Sprints follow one another without gaps. As one Sprint ends, the next one begins, allowing for continuous development and delivery of increments.

**Potentially Shippable Product Increment:** During each Sprint, the development team aims to deliver a portion of product functionality that is completely developed and tested. The concept of "Done" is determined by the conditions of satisfaction identified by the Product Owner and the Team. However, it's important to note that a potentially shippable product increment does not necessarily mean the product is ready for immediate release. There may still be missing features or aspects that need further development.

**Abnormal Sprint Termination:** In certain extreme circumstances, a Sprint may need to be terminated before its planned duration. This can occur if there are significant interruptions or

impediments preventing the team from achieving their Sprint goal, or if there are changes in business priorities. The decision to cancel a Sprint lies with the Product Owner, although input from stakeholders, the Team, or the Scrum Master may influence the decision.

- Sprint cancellation should be a rare occurrence.
- When a Sprint is cancelled, any completed and "done" Product Backlog items are reviewed. If they represent a potentially shippable product increment, they are presented to the Product Owner for acceptance.
- All other Product Backlog items that were not completed are put back on the Product Backlog with their initial estimates. Any work done on those items is assumed to be lost.

### Sprint Review Meeting

The Sprint Review Meeting is coordinated by the Scrum Master and:

- The team presents the working software they built to the PO and any other stakeholder
- The PO accepts or rejects work based on Acceptance Criteria that was agreed formerly in the Spring Planning Meeting

### Daily Scrum

The Daily Scrum, also known as the Daily Stand-Up, is a crucial event in Scrum that promotes daily coordination and collaboration within the development team.

Here are some key points to understand about the Daily Scrum:

- **Meeting Structure:**
  - o **Time-Boxed:** The Daily Scrum is limited to a maximum duration of 15 minutes to keep it concise and focused.
  - o **Attendance:** It is attended by the development team members, including the Scrum Master.
  - o **Stand-Up Format:** Participants stand during the meeting to encourage brevity and active engagement.
- **Three Questions:** During the Daily Scrum, each team member answers three questions:
  - o What did you complete since the last Daily Scrum?
  - o What impediments or obstacles did you encounter that hindered your progress?
  - o What are you planning to complete before the next Daily Scrum?The purpose of these questions is to provide a quick status update, identify any issues, and align everyone's tasks and goals.
- **Focus on Team Collaboration:**
  - o **Not a Status Meeting:** The Daily Scrum is not meant for detailed reporting to the Scrum Master. Its primary focus is on fostering communication and collaboration among team members.
  - o **No Problem Solving:** The Daily Scrum is not the forum for solving complex problems. If any issues require further discussion or resolution, they are noted in a "parking lot" and addressed after the meeting.
  - o **Everyone's Responsibility:** All team members are responsible for adhering to the agenda and time-box, and for pointing out any distractions or discussions that go beyond the meeting's intended scope.
  - o **Addressing Each Other:** During the meeting, team members address one another, sharing updates, asking clarifying questions, and providing support. The focus is on empowering the team and promoting self-organization.
- **Regularity and Punctuality:**
  - o **Consistent Timing:** The Daily Scrum is held at the same time every day, determined by the team's preference and availability.

- **Starting on Time:** It is important to begin the meeting promptly, respecting everyone's time and promoting a sense of discipline.

### **Sprint Retrospective**

The Sprint Retrospective is a dedicated event in Scrum that provides an opportunity for the **Scrum team** to **reflect on the previous Sprint and identify areas of improvement**.

- **Purpose:** Reflect on methods, teamwork, and address issues for continuous improvement.
- **Timing:** After Sprint Review.
- **Duration:** Typically around 3 hours for a one-month