

## Innovation, a definition

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# Innovation

The classic definitions of **innovation** include:

1. *the process of making improvements by introducing something new*
2. *the act of introducing something new: something newly introduced* ([The American Heritage Dictionary](#)).
3. *the introduction of something new.* ([Merriam-Webster](#) Online)
4. *a new idea, method or device.* (Merriam-Webster Online)
5. *the successful exploitation of new ideas* (Dept of Trade and Industry, UK).
6. *change that creates a new dimension of performance* [Peter Drucker](#) (Hesselbein, 2002)

In [economics](#), [business](#) and [government policy](#), - something new - must be substantially different, not an insignificant change. In economics the change must increase value, customer value, or producer value. Innovations are intended to make someone better off, and the succession of many innovations grows the whole economy.

The term innovation may refer to both radical and incremental changes to products, processes or services. The often unspoken goal of innovation is to solve a problem. Innovation is an important topic in the study of [economics](#), [business](#), [technology](#), [sociology](#), and [engineering](#). Since innovation is also considered a major driver of the economy, the factors that lead to innovation are also considered to be critical to [policy](#) makers.

In the organisational context, innovation may be linked to performance and growth through improvements in efficiency, productivity, quality, competitive positioning, market share, etc. All organisations can innovate, including for example hospitals, universities, and local governments.

While innovation typically adds value, innovation may also have a negative or destructive effect as new developments clear away or change old organisational forms and practices. Organisations that do not innovate effectively may be destroyed by those that do.

## Conceptualizing innovation

Innovation has been studied in a variety of contexts, including in relation to technology, commerce, social systems, economic development, and policy construction. There are, therefore, naturally a wide range of approaches to conceptualizing innovation in the scholarly literature.

Fortunately, however, a consistent theme may be identified: innovation is typically understood as the *introduction* of something *new* and *useful*, for example introducing new methods, techniques, or practices or new or altered products and services.

It is useful, when conceptualizing innovation, to consider whether other words suffice. Recent authors point out that invention - the creation of new tools or the novel compilation of existing tools - is often confused with innovation. Many product and service enhancements may fall more rigorously under the term improvement. Change and creativity are also words that may often be

substituted for innovation. What, then, is innovation that makes it necessary to have a different word from these others, or is it a catch-all word, a loose synonym? Much of the current business literature blurs the concept of innovation with value creation, value extraction and operational execution. In this view, an innovation is not an innovation until someone successfully implements and makes money on an idea. Extracting the essential concept of innovation from these other closely linked notions is no easy thing.

One emerging approach is to use these other notions as the constituent elements of innovation as an action: Innovation occurs when someone uses an invention - or uses existing tools in a new way - to change how the world works, how people organize themselves, and how they conduct their lives.

Note in this view inventions may be concepts, physical devices or any other set of things that facilitate an action. An innovation in this light occurs whether or not the act of innovating succeeds in generating value for its champions. Innovation is distinct from improvement in that it causes society to reorganize. It is distinct from problem solving and is perhaps more rigorously seen as new problem creation. And in this view, innovation applies whether the act generates positive or negative results.

## **Innovation in organizations**

A convenient definition of innovation from an organizational perspective is given by Luecke and Katz (2003), who wrote:

*"Innovation . . . is generally understood as the introduction of a new thing or method . . . Innovation is the embodiment, combination, or synthesis of knowledge in original, relevant, valued new products, processes, or services. (p. 2)"*

Innovation typically involves [creativity](#), but is not identical to it: innovation involves acting on the creative ideas to make some specific and tangible difference in the domain in which the innovation occurs. For example, Amabile et al (1996) propose:

*"All innovation begins with creative ideas . . . We define innovation as the successful implementation of creative ideas within an organization. In this view, creativity by individuals and teams is a starting point for innovation; the first is necessary but not sufficient condition for the second". (p. 1154-1155).*

For innovation to occur, something more than the generation of a creative idea or insight is required: the insight must be put into action to make a genuine difference, resulting for example in new or altered business processes within the organisation, or changes in the products and services provided.

A further characterization of innovation is as an organizational or management process. For example, Davila et al (2006), write:

*"Innovation, like many business functions, is a management process that requires specific tools, rules, and discipline." (p. xvii)*

From this point of view the emphasis is moved from the introduction of specific novel and useful ideas to the general organizational processes and procedures for generating, considering, and acting on such insights leading to significant organizational improvements in terms of improved or new business products, services, or internal processes.

Through these varieties of viewpoints, creativity is typically seen as the basis for innovation, and innovation as the successful implementation of creative ideas within an organization (c.f. Amabile et al 1996 p.1155). From this point of view, creativity may be displayed by individuals, but innovation occurs in the organizational context only.

It should be noted, however, that the term 'innovation' is used by many authors rather interchangeably with the term 'creativity' when discussing individual and organizational creative activity. As Davila et al (2006) comment,

*"Often, in common parlance, the words creativity and innovation are used interchangeably. They shouldn't be, because while creativity implies coming up with ideas, it's the "bringing ideas to life" . . . that makes innovation the distinct undertaking it is."*

The distinctions between creativity and innovation discussed above are by no means fixed or universal in the innovation literature. They are however observed by a considerable number of scholars in innovation studies.

## **Technological concepts of innovation**

The [OECD](#) defines Technological Innovation in the [Oslo Manual](#) (1995) as:

*Technological product and process (TPP) innovations comprise implemented technologically new products and processes and significant technological improvements in products and processes. A TPP innovation has been implemented if it has been introduced on the market (product innovation) or used within a production process (process innovation). TPP innovations involve a series of scientific, technological, organisational, financial and commercial activities. The TPP innovating firm is one that has implemented technologically new or significantly technologically improved products or processes during the period under review.*

A 2005/6 [MIT](#) survey of innovation in technology found a number of characteristics common to innovators working in that field.

- 1- They are not troubled by the idea of failure.
- 2- They realize that failure can be learned from and that the 'failed' technology can later be re-used for other purposes.
- 3- They know innovation requires that one works in advanced areas where failure is a real possibility.
- 4- Innovators are curious about what is happening in a myriad of disciplines, not only their own specialty.
- 5- Innovators are open to third-party experiments with their products.
- 6- They recognize that a useful innovation must be "robust", flexible and adaptable.
- 7- Innovators delight in spotting a need that we don't even know we harbor, and then fulfilling that need with a new innovation, and as such;
- 8- Innovators like to make products that are immediately useful to their first users.

## **Economic conceptions of innovation**

[Joseph Schumpeter](#) defined economic innovation in 1934:

1. The introduction of a new good —that is one with which consumers are not yet familiar—or of a new quality of a good.
2. The introduction of a new method of production, which need by no means be founded upon a discovery scientifically new, and can also exist in a new way of handling a commodity commercially.
3. The opening of a new market, into which the particular branch of manufacture of the country in question has not previously entered, whether or not this market has existed before.
4. The conquest of a new source of supply of raw materials or half-manufactured goods, again irrespective of whether this source already exists or whether it has first to be created.
5. The carrying out of the new organization of any industry, like the creation of a monopoly position (for example through “trustification”) or the breaking up of a monopoly position

Schumpeter's focus on innovation is reflected in Neo-Schumpeterian economics.

Innovation is also studied by economists in a variety of contexts, for example in theories of [entrepreneurship](#) or in [Paul Romer's](#) New Growth Theory.

## **Transaction cost and network theory perspectives**

According to Regis Cabral (1998, 2003):

*"Innovation is a new element introduced in the network which changes, even if momentarily, the costs of transactions between at least two actors, elements or nodes, in the network."*

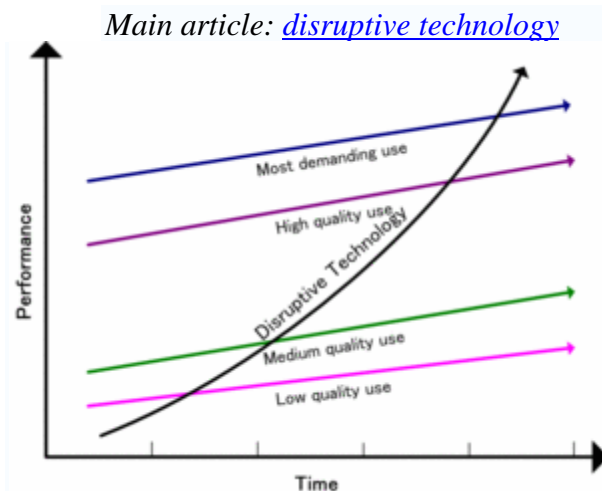
# Types of innovation

Scholars have identified a variety of types of innovation, including for example:

- **Business Model innovation** involves changing the way business is done in terms of capturing value e.g. [Compaq](#) vs. [Dell](#), [hub and spoke airlines](#) vs. [Southwest](#), and [Hertz/Avis](#) vs. [Enterprise](#).
- **Marketing innovation** is the development of new marketing methods with improvement in product design or packaging, product promotion or pricing.
- **Organizational innovation** involves the creation or alteration of business structures, practices, and models, and may therefore include process, marketing and business model innovation.
- **Process innovation** involves the implementation of a new or significantly improved production or delivery method.
- **Product innovation**, involves the introduction of a new good or service that is new or substantially improved. This might include improvements in functional characteristics, technical abilities, ease of use, or any other dimension.
- **Service innovation**, is similar to product innovation except that the innovation relates to services rather than to products
- **Supply chain innovation** where innovations occur in the sourcing of input products from suppliers and the delivery of output products to customers

For example, *financial innovation* occurs as new financial products and services are developed, combining basic financial attributes (risk-sharing, liquidity, credit) in innovative ways, as well as exploiting the weaknesses of tax law. To address problems or capitalize on opportunities, new financial products and services are developed, new business models emerge, and business processes are adapted and improved. Financial innovation, therefore, may be seen in general to involve most of the above mentioned types of innovation.

## Disruptive vs. sustaining innovation



How low-end disruption occurs over time.

In addition to dividing innovations into types, innovation is often characterized by its impact on existing markets or businesses. Sustaining innovations allows organizations to continue to approach markets the same way, such as the development of a faster or more fuel efficient car. Disruptive technology on the other hand, significantly changes a market or product category, such as the [invention](#) of a cheap, safe personal flying machine that could replace cars.

Prof. [Clayton M. Christensen](#) of the [Harvard Business School](#), maintained a database of innovative changes in the production and sale of hard-disks from 1975 to 1995. There were 116 new technologies introduced, 111 of them were sustaining in nature, and every established firm in the industry was able to copy or replicate those innovations with 100% success. (Sustaining innovations also tend to be evolutionary.) In contrast there were 5 disruptive innovations. None of the disruptive products involved any new technology, yet for the established firms in the industry the adoption rate in the disruptive technologies was zero. See "Leading for Innovation" Hesselbein, (2002), page 204.

For the leading firms, the new technologies offered their existing customers little advantage. The success of the disruptive technology often promised lower profit margins to established firms. The decision makers values and the goals of the firm forbid giving serious consideration to technologies that will destroy an established market. These disruptive technologies were adopted by small firms that were not established in the market, and for whom adoption of the disruptive innovation represented new opportunity.

## Evolutionary innovation vs. Radical Innovation

Similarly, [incremental innovation](#) is evolutionary innovation, a step forward along a [technology trajectory](#), or from the known to the unknown, with a high chance of success and low uncertainty about outcomes. [Radical innovation](#), on the other hand, involves larger leaps of understanding, perhaps demanding a new way of seeing the whole problem, probably taking a much larger risk than many people involved are happy about. The chances of success are difficult to estimate. There may be considerable opposition to the proposal and questions about the ethics, practicality or cost of the proposal may be raised. People may question if this is, or is not, an advancement of a technology or process.

## Sources of innovation

There are two main sources of innovation. The traditionally recognized source is *manufacturer innovation*. This is where an agent (person or business) innovates in order to sell the innovation. The other source of innovation, only now becoming widely recognized, is *end-user innovation*. This is where an agent (person or company) develops an innovation for their own (personal or in-house) use because existing products do not meet their needs. [Eric von Hippel](#) has identified end-user innovation as, by far, the most important and critical in his classic book on the subject, *Sources of Innovation*.<sup>[1]</sup>

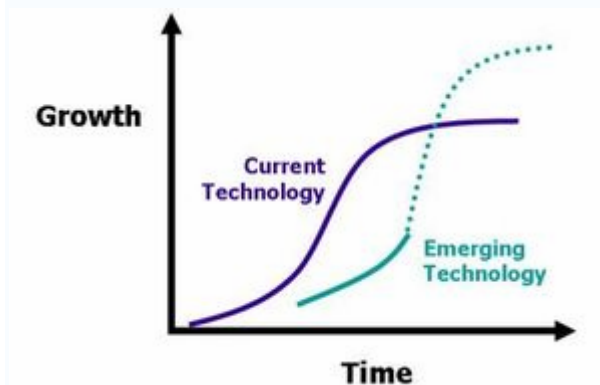
Innovation by businesses is achieved in many ways, with much attention now given to formal [research and development](#) for "breakthrough innovations." But innovations may be developed by less formal on-the-job modifications of practice, through exchange and combination of professional experience and by many other routes. The more radical and revolutionary innovations tend to emerge from R&D, while more incremental innovations may emerge from practice - but there are many exceptions to each of these trends.



Regarding [user innovation](#), rarely user innovators may become [entrepreneurs](#), selling their product, or more often they may choose to trade their innovation in exchange for other innovations. Nowadays, they may also choose to freely reveal their innovations, using methods like [open source](#). In such [networks of innovation](#) the creativity of the users or communities of users can further develop technologies and their use.

Whether innovation is mainly [supply-pushed](#) (based on new technological possibilities) or [demand-led](#) (based on social needs and market requirements) has been a hotly debated topic. Similarly, what exactly drives innovation in organizations and economies remains an open question.

## Diffusion of innovations



Main article: [diffusion of innovations](#)

Once innovation occurs, innovations may be spread from the innovator to other individuals and groups. This process has been studied extensively in the scholarly literature from a variety of viewpoints, most notably in [Everett Rogers'](#) classic book, *The Diffusion of Innovations*.

Rogers proposed that the life cycle of innovations can be described using the 's-curve' or [diffusion curve](#). The s-curve maps growth of revenue or productivity against time. In the early stage of a particular innovation, growth is relatively slow as the new product establishes itself. At some point customers begin to demand and the product growth increases more rapidly. New incremental innovations or changes to the product allow growth to continue. Towards the end of its life cycle growth slows and may even begin to decline. In the later stages, no amount of new investment in that product will yield a normal rate of return.

The s-curve is derived from half of a normal distribution curve. There is an assumption that new products are likely to have "product Life". i.e. a start-up phase, a rapid increase in revenue and eventual decline. In fact the great majority of innovations never get off the bottom of the curve, and never produce normal returns.

Innovative companies will typically be working on new innovations that will eventually replace older ones. Successive s-curves will come along to replace older ones and continue to drive growth upwards. In the figure above the first curve shows a current technology. The second shows an emerging technology that current yields lower growth but will eventually overtake current technology and lead to even greater levels of growth. The length of life will depend on many factors.

## Goals of innovation

Programs of organizational innovation are typically tightly linked to organizational goals and objectives, to the business plan, and to market competitive positioning.

For example, one driver for innovation programs in corporations is to achieve growth objectives. As Davila et al (2006) note,

*"Companies cannot grow through cost reduction and reengineering alone . . . Innovation is the key element in providing aggressive top-line growth, and for increasing bottom-line results" (p.6)*

It is not surprising, therefore, that companies such as [General Electric](#) and [Procter & Gamble](#) have embraced the management of innovation enthusiastically, with the primary goal of driving growth and, consequently, improving shareholder value.

In general, business organisations spend a significant amount of their turnover on innovation i.e. making changes to their established products, processes and services. The amount of investment can vary from as low as a half a percent of turnover for organisations with a low rate of change to anything over twenty percent of turnover for organisations with a high rate of change.

The average investment across all types of organizations is four percent. For an organisation with a turnover of say one billion currency units, this represents an investment of forty million units. This budget will typically be spread across various functions including marketing, product design, information systems, manufacturing systems and quality assurance.

The investment may vary by industry and by market positioning.

One survey across a large number of manufacturing and services organisations found, ranked in decreasing order of popularity, that systematic programs of organizational innovation are most frequently driven by:

1. Improved quality
2. Creation of new markets
3. Extension of the product range
4. Reduced labour costs
5. Improved production processes
6. Reduced materials
7. Reduced environmental damage
8. Replacement of products/services
9. Reduced energy consumption
10. Conformance to regulations

These goals vary between improvements to products, processes and services and dispel a popular myth that innovation deals mainly with new product development. Most of the goals could apply to any organisation be it a manufacturing facility, marketing firm, hospital or local government.

# Failure of innovation

Attaining goals must be the ultimate objective of the innovation process. Unfortunately, most innovation fails to meet organisational goals.

Figures vary considerably depending on the research. Some research quotes failure rates of fifty percent while other research quotes as high as ninety percent of innovation has no impact on organisational goals. One survey regarding product innovation quotes that out of three thousand ideas for new products, only one becomes a success in the marketplace. Failure is an inevitable part of the innovation process, and most successful organisations factor in an appropriate level of risk. Perhaps it is because all organisations experience failure that many choose not to monitor the level of failure very closely. The impact of failure goes beyond the simple loss of investment. Failure can also lead to loss of morale among employees, an increase in cynicism and even higher resistance to change in the future.

Innovations that fail are often potentially 'good' ideas but have been rejected or 'shelved' due to budgetary constraints, lack of skills or poor fit with current goals. Failures should be identified and screened out as early in the process as possible. Early screening avoids unsuitable ideas devouring scarce resources that are needed to progress more beneficial ones. Organizations can learn how to avoid failure when it is openly discussed and debated. The lessons learned from failure often reside longer in the organisational conscientiousness than lessons learned from success. While learning is important, high failure rates throughout the innovation process are wasteful and a threat to the organisation's future.

The causes of failure have been widely researched and can vary considerably. Some causes will be external to the organisation and outside its influence of control. Others will be internal and ultimately within the control of the organisation. Internal causes of failure can be divided into causes associated with the cultural infrastructure and causes associated with the innovation process itself. Failure in the cultural infrastructure varies between organisations but the following are common across all organisations at some stage in their life cycle (O'Sullivan, 2002):

1. Poor Leadership
2. Poor Organisation
3. Poor Communication
4. Poor Empowerment
5. Poor Knowledge Management

Common causes of failure within the innovation process in most organisations can be distilled into five types:

1. Poor goal definition
2. Poor alignment of actions to goals
3. Poor participation in teams
4. Poor monitoring of results
5. Poor communication and access to information

Poor goal definition requires that organisations state explicitly what their goals are in terms understandable to everyone involved in the innovation process. This often involves stating goals

in a number of ways. Poor alignment of actions to goals means linking explicit actions such as ideas and projects to specific goals. It also implies effective management of action portfolios. Poor participation in teams refers to the behaviour of individuals and teams. It also refers to the explicit allocation of responsibility to individuals regarding their role in goals and actions and the payment and rewards systems that link individuals to goal attainment. Finally, poor monitoring of results refers to monitoring all goals, actions and teams involved in the innovation process.

Innovation can fail if seen as an organisational process whose success stems from a mechanistic approach i.e. 'pull lever obtain result'. While 'driving' change has an emphasis on control, enforcement and structure, it is only a partial truth in achieving innovation. Organisational gatekeepers frame the organisational environment that "Enables" innovation; however innovation is "Enacted" - recognized, developed, applied and adopted - through individuals.

Individuals are the 'atom' of the organisation close to the minutiae of daily activities. Within individuals gritty appreciation of the small detail combines with a sense of desired organisational objectives to deliver (and innovate for) a product/service offer.

From this perspective innovation succeeds from strategic structures that engage the individual to the organisation's benefit. Innovation pivots on intrinsically motivated individuals, within a supportive culture, informed by a broad sense of the future.

Innovation, implies change, and can be counter to an organisation's orthodoxy. Space for fair hearing of innovative ideas is required to balance the potential autoimmune exclusion that quells an infant innovative culture.

## **Innovation management**

Innovation management is the process of managing innovations (e.g. ideas) in organisations. The first stage in innovation is for someone to generate an idea. It is typically a technical insight into a product or process or thought about a service. In some cases ideas arises from observed problems either now or in the future. Ideas can also be stimulated by the goals of the organization or an opportunity that appears suddenly. Various stimuli can lead to the generation of an idea from reading magazines and observing problems to visiting other organizations and having informal discussions with colleagues.

Idea generation leads to opportunity recognition where someone can see an opportunity for developing the idea into a new product, process or service. The opportunity recognition stage involves the idea evaluation stage where ideas are prodded and tested. Often ideas are improved, merged with other ideas and in many cases abandoned. An important test for an idea is that it matches the goals of the organization and available resources – people and money.

If an opportunity is recognized then the idea moves to a new stage where it can be developed further. The development phase may involve prototype development and marketing testing. Many ideas wait at the end of the development phase for market conditions to be right. There are currently many new products languishing in the laboratories of Philips and Nokia waiting for their moment to begin replacing or even disrupting existing technology. The final stage of the innovation process is realization and in many cases exploitation where the customer makes the final evaluation.

## Innovation funnel



The innovation funnel provides a solution for explicitly defining the information requirements for managing the innovation process. The funnel illustrates how innovation goals, innovation actions, innovation teams and innovation results interact with each other to create change in any organisation. The innovation funnel can be visualized as containing four arrows flowing around a funnel. Each arrow represents the flow of goals, actions, teams and results. Actions enter the wide mouth of the funnel and represent among other things, alternative ideas for change. These actions flow towards to the neck of the funnel where many will be eliminated. The neck of the funnel is constrained by two arrows – goals and teams. These constraints loosen or tighten depending on the availability of teams and definition of the goals. Tightly defined goals can be visualized as closing the neck of the funnel with the change of fewer ideas flowing through. The availability of more teams on the other hand can be visualized as opening the neck of the funnel and allowing more ideas to be worked on. The final arrow, results flows from the narrow end of the funnel and represents information concerning the results of execution of goals, actions and teams. This arrow flows back towards goals representing the impact of results on the process of defining and redefining goals.

An important aspect of the innovation funnel is the associations generated between actions and both goals and teams. Ideas, for example, that cannot easily be associated with goals will find it difficult to proceed into the funnel. This has two effects. First, individuals and teams will focus on ideas they believe are in-line with established goals. Second, goals may be re-defined to accommodate good ideas. This is a natural learning process within an innovation community.

## Measures of innovation

Individual and team-level assessment can be conducted by surveys and workshops. Business measures related to finances, processes, employees and customers in balanced scorecards can be viewed from innovation perspective (e.g. new product revenue, time to market, customer and employee perception & satisfaction). Organizational capabilities can be evaluated through various evaluation frameworks e.g. **efqm** (European foundation for quality management) -model.

The OECD Oslo Manual from 1995 suggests standard guidelines on measuring technological product and process innovation. The Oslo Manual should be considered as complementary to the [Frascati Manual](#) from 1963. Other ways of measuring innovation has traditionally been expenditure on R&D (Research and Development) as percentage of GNP (Gross National Product). Whether this is a good measurement of Innovation has been discussed, and the Oslo Manual has incorporated some of the critique against earlier methods of measuring. This being

said, the traditional methods of measuring still informs much policy decisions. The EU [Lisbon Strategy](#) has set as a goal that their average expenditure on R&D should be 3 % of GNP.

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## Innovation Policy Links

- [Welcome to the DTI's Innovation Home Page](#) - [Department of Trade and Industry, UK](#).
- [Innovation and Technology Policy](#) - [Organisation for Economic Co-operation and Development](#) (OECD).
- European Union:
  - ["Communication on Innovation policy: updating the Union's approach in the context of the Lisbon strategy"](#) - The [European Commission](#).
  - [Innovation articles](#).

## External links

- [Urban and Regional Innovation Research Unit](#)
- [KAM](#) - the interactive database provides data on innovation and other “pillars” of the knowledge economy for more than 130 countries.
- [ISPIM - The International Society for Professional Innovation Management](#)

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