
Innovation Project Management in Theory

From a theoretical point of view, innovation project management is a research topic dealing with innovation (section 1.1) and referring to three main research fields, i.e. innovation management, entrepreneurship and project management. As these research fields emerged and expanded separately, they have to be combined to understand the reality of innovation project management practices. This is probably why scholars are beginning to bring them closer in pairs: project management and entrepreneurship, project management and innovation management, innovation management and entrepreneurship. The three research streams will be described in sections 1.2, 1.3 and 1.4, respectively. In section 1.5, I will propose a definition of innovation project management, based on both my own research experience and an academic literature review.

1.1. Defining the word “innovation”

What does innovation mean? What types of innovation are there? How can we evaluate the newness of an innovation? What is an innovation process?

1.1.1. A polysemous word

Innovation is a polysemous word: there are a lot of academic definitions which vary according to the context (firm, society and individual, for instance) in which they are used, and the theoretical background of the scholars defining them. These definitions can be classified in three groups [DAL 73, BAR 80]. The first group views innovation as a new object, the second group focuses on the adoptive process by users of a new object, and the third on the creative process aiming at creating a new object.

– The first group of definitions calls innovation the new object. “New” means that the thing did not exist before having been developed. What does matter is the newness.

– The second group of definitions deals with the new object’s adoptive process, i.e. the way the new object becomes an integral part of the culture and the behavior of individuals or groups. As innovation can create breakthroughs in habits, practices and lifestyles, it is difficult for people and society to easily accept it.

– The third group of definitions focuses on the creative process, aiming to combine two or several elements and concepts, so that a new configuration might emerge and be implemented. This process covers successive tasks: ideation, new configuration development and implementation. The innovation’s purpose is to provide an economic and societal value.

Let us take the example of the smart card. A smart card is an innovation, because it is a new object (it did not exist before). By avoiding the need for paying with cash, the credit card, a specific type of smart card, has provided an economical value for banks, firms and individuals. The smart card has also provided a societal value by increasing the protection of identity and financial transactions. However, it took a long time before the smart card became an integral part of habits and culture.

Innovation must be distinguished with invention and discovery:

– Invention is the result of an abstract reasoning [RIG 73]. It becomes an innovation only if it is turned into a concrete solution that

creates an economic and societal value. The microchip is the invention which has led to a high number of various applications of smart cards.

– Discovery is an existing fact, which was present before having been highlighted or observed. For instance, the discovery of the nanostructure and then the abstract reasoning of researchers (invention) made it possible to develop nanotechnologies, and hence new materials (innovations) which have a higher technical performance, such as drying concretes more quickly.

A lot of French words ending with “ation” designate both a process, i.e. a set of interrelated tasks and activities, and the result (output) of this process. Adopting this semantic point of view, I suggest combining the three groups of meaning because, in practice, innovation project management deals with innovating (the innovation process), implementing a new object (innovation as a result) and must take into account the adoption of this new object by its users.

1.1.2. The different types of innovation

The economist Joseph Schumpeter distinguished five cases of innovation [SCH 35]:

- new product;
- new method of production;
- the opening of a new market;
- the conquest of a new source of supply of raw materials or half-manufactured goods;
- the implementation of better organization of any industry.

During the 20th Century, innovation was often limited to the first two cases: product (covering goods and services) and industrial process (i.e. method of production). It might be because, during the first part of the 20th Century, innovating firms were essentially manufacturing firms. They managed projects which aimed to develop new or improved goods (called new product development projects)

and projects which aimed to develop new industrial processes (called new process development projects). At the end of the 20th Century, there was an increasing need for new services in a lot of sectors such as tourism, banking and insurance. Firms had to propose new or significantly improved offers of services and goods, while improving their processes in order to reduce their costs.

Type of innovation	Example
Good	A hybrid car, the famous American soft drink Coca-Cola when it was commercialized, wind turbines
Service	Home meal delivery service
Industrial process	Beer dealcoholization process, the float glass process (a revolutionary method of flat glass production avoiding the costly need to grind and polish plate glass to make it clear)
Method	Gantt diagram, PERT methods, frugal innovation, agile methods
Way of doing something (know-how)	Cutting of the weapon from flint
Concept Marketing concept Technological concept Design concept (specific visual or verbal scheme message)	Concept car Silver economy Multi-touch “Sophisticated elegance”
Business model	A free of charge service funded by advertisements, such as Google
Organizational mechanism or entity	Co-working spaces
Way of using or living	Mobile phone compared to desk phone
Technology	Virtual reality
Standard	Laser disk technology during the end of 20th Century Accounting standard
Law	A new labor law

Table 1.1. *Illustration for each type of innovation*

Today, innovation no longer only deals with products (goods and services) and processes but with every kind of matter (see Table 1.1.). Indeed, due to diffusion of open innovation [CHE 03], a lot of firms sell or license patents, technologies, and other intermediary outputs of the innovation process. As these intermediate outputs provide an economic (and sometimes societal) value, they can be viewed as innovations.

Most innovations combine different kinds of matter. An innovation can be very complex (e.g. smartphones compared to previous mobile phones).

1.1.3. The different perceptions of newness

The European Standard for Innovation Management¹ views innovation as a new object or a significantly improved one. What is the difference between “new” and “significantly improved”?

I think that newness is a matter of point of view. It depends on a reference point: the spatial context, the time context, the innovation user’s perception and the innovating organization’s perception (Table 1.2).

- An innovation can be new because it has been introduced for the first time in another spatial context than the one it existed in.
- An innovation might have existed, disappeared and been reintroduced in a new time context.
- The innovation users perceive it as new.
- An innovation is not new according to the time and spatial context but it is for the firm having developing it. “As long as the idea is perceived as new to the people involved, it is an ‘innovation,’ even though it may appear to others to be an ‘imitation’ of something that exists elsewhere” [VAN 86].
- An innovation can be new because it has not existed before and elsewhere (all the previous cases simultaneously).

¹ CEN TS 16555-1:2013-07 Innovation management – Part 1: Innovation management system.

Type of newness	Examples
New according to the spatial context of diffusion	Potato cultivation when the French agronomist Antoine-Augustin Parmentier decided to introduce it to France in the 18th Century.
New according to the time context of diffusion	<p>“Vintage” clothes</p> <p>The electric car: electric cars were developed at the same time as combustion engine-based cars (19th Century). It re-appeared several times in the 20th Century but electric technologies were given up because they were too costly. What about the future of electric cars today?</p>
Perceived as new by users	<p>Aren’t wind turbines simply modern windmills?</p> <p>In marketing, repositioning a product means changing the perception of the users without changing the formula and the manufacturing process. Reformulating a product means changing the formula or the industrial process without the user being aware of these changes.</p>
New for the firm which wants to develop it	Electricity companies in Western countries deciding to manufacture electric energy based on alternative technologies to petroleum and nuclear power. Thanks to this type of innovation, the French electricity company EDF evolved its business. It presents itself as “a global leader in low-carbon energy, covering every sector of expertise, from generation to trading and transmission grids” ² .
New in absolute terms	Hyperloop, a tube-based transportation system for inter- and intra-city transport: “With a drastic reduction of air in the tube, motion is achieved with nearly zero friction allowing passengers to safely accelerate to airplane speeds. And this is all powered by a combination of alternative energy and energy conservation systems” ³ .

Table 1.2. *Illustrations for each type of newness*

² EDF website, accessed 14th July 2017. <https://www.edf.fr/en/the-edf-group/who-we-are/edf-at-a-glance>

³ Hyperloop website, accessed 14th July 2017. <http://hyperloop.global/>

1.1.4. The different dimensions of newness

Thirty years ago, innovation was often limited to its technological dimension because its main source was an invention or a discovery. Van de Ven [VAN 86] proposed an alternative perspective by distinguishing between technical innovations (i.e. new technologies, products and services) and administrative innovations (new procedures, policies and organizational forms).

Innovation requires a wide range of skills other than technological ones (Table 1.3). The Oslo Manual, published by the OECD, reflects this evolution. The first edition (1992) aimed to compare the innovation performance of different countries by measuring technological innovation. The second edition (1997) introduced the idea of collecting non-technological innovation data. The third edition (2005) suggested considering organizational and marketing innovations as innovations in their own right.

From my point of view, innovation is rarely purely technological, organizational, marketing, etc. Indeed, it combines different types of new skills. Innovation is multi-dimensional. Table 1.3 proposes the main dimensions that the current literature highlights.

Dimension of innovation	Examples
Technical	Connected objects
<p data-bbox="154 1127 544 1360"> Managerial “Management innovation means management innovation as the invention and implementation of a management practice, process, structure, or technique that is new to the state of the art and is intended to further organizational goals.” [BIR 08] </p> <p data-bbox="168 1374 530 1479"> It includes marketing, organizational, logistical, information system, human resources and accounting related innovations. </p>	<p data-bbox="568 1127 956 1236"> Lean management method, agile methods, computerized patient records in hospitals, stress management tools, quality management approach, etc. </p>

<p style="text-align: center;">Social innovation</p> <p>“Social innovation is the process of developing and deploying effective solutions to challenging and often systemic social and environmental issues in support of social progress”⁴</p>	<p style="text-align: center;">Charter School</p> <p>Publicly funded primary or secondary schools, operating free from some of the regulations that typically apply to public schools. Administrators, teachers and parents thus have the opportunity to develop innovative teaching methods.⁵</p>
<p style="text-align: center;">Ecological (or green) innovation</p> <p>Dealing with preserving the natural environment</p>	<p style="text-align: center;">Ecological corridor</p>

Table 1.3. *Different dimensions of innovation*

1.1.5. *The intensity of newness*

It is difficult to evaluate the intensity of newness.

According to Schumpeter [SCH 42], innovation is a creative destruction process conducted by an entrepreneur. By innovating, the Schumpeter entrepreneur destroys existing structures, to move the system away from the even circular flow of equilibrium. He/she “is a leader contrasted with the many ‘imitators’ who follow the innovative lead of the entrepreneurs” [KIR 73]. During the 20th Century, many scholars then associated the process of “creative destruction” with the ability of new companies to commercialize radical technologies [COL 06]. Radical innovation and incremental innovation were usually opposed.

Radical innovation creates major disruptive changes, whereas incremental innovations continuously advance the process of change [SCH 42]. Radical innovation is based on new technologies, while incremental innovation concerns an existing product, service, process, organization, etc., having been enhanced or upgraded. Radical innovation is based on a technological breakthrough.

4 <https://www.gsb.stanford.edu/faculty-research/centers-initiatives/csi/defining-social-innovation>

5 <https://www.gsb.stanford.edu/faculty-research/centers-initiatives/csi/defining-social-innovation>

In 1997, Christensen [CHR 97] proposed the concept of disruptive innovation, which has become a standard. A disruptive innovation disrupts an existing market or sector, displacing established market leading firms, products and alliances. It has an impact on the sector's structure. It can be based on a radical technological innovation but not necessarily, as it is the business model enabled by the technology that disrupts the market impact and not the technology itself. For instance, the first digital camera is a disruptive innovation because it completely changed the rules of the photography industry. However, the technology already existed. It was perfectly mastered by Kodak, the leader of the industry [FRE 13].

I suggest evaluating the degree of newness by answering the two following questions: what is the degree of newness for each dimension of innovation (see Table 1.3) and what impacts are there on the market structure?

1.2. Innovation management research

Innovation management research is a management science focus inspired from economic science. It aims to study how the innovation process is managed in established firms. More particularly, it focuses on the new product development process and tries to point out some factors of innovation performance.

1.2.1 Adopting a managerial rather than economic perspective

Reviewing the previous academic literature, Brown and Eisenhardt [BRO 95] noted that previous research dealing with innovation was split into two broad areas of inquiry, i.e. the economics-oriented tradition and new product development (NPD).

The economics-oriented tradition emerged in order to study the differences in the patterns of innovation across countries and industrial sectors, the evolution of particular technologies over time, and intra-sector differences in the propensity of firms to innovate. In

my opinion, that is why the Frascati Manual, written by economists and first published in 1963 by OECD, has become the standard of conduct for R&D surveys and data collection over the years, in the OECD and European Union member countries and also in several non-member economies⁶. R&D national policies are compared by measuring several indicators, such as R&D personnel and expenditures devoted to R&D.

During the 20th Century, the innovation process was viewed as a multi-stage process aiming to turn an invention or knowledge results into an innovation. The process covers four stages: fundamental research, applied research, development and diffusion.

- Fundamental research aims to discover new technological paradigms, developing theories and validating them, thanks to empirical studies.

- Applied research uses the output of the fundamental research in order to develop and improve technologies.

- Development aims to elaborate a technological innovation, which would be commercialized.

- Diffusion means delivering the innovation to users.

As a result, innovation appears as technological. Every firm operating in a sector might create a competitive advantage and hence an economic added value by being the first to propose a technological innovation in a market. In the early 1980s, to be the first in a market was considered as more profitable because it allowed the firm to “capture” the market value. The R&D activity (applied research and development) was a key activity for innovating, because it aimed to integrate technologies in products. This is why several firms in Western countries created R&D departments during the second part of the 20th Century.

⁶ OECD website, accessed 30th July 2017.

In the 1980s, evolutionary theory economists [DOS 84, NEL 82, PAV 84] suggested that firms were not only able to integrate technologies in their products, but also create new technologies. Mastering technology became the basis of the competitive advantage. Innovation hence meant technological breakthrough.

In the late 1980s, it became clear that technology mastering was not the only innovation key factor of success. Japanese firms, such as Toyota, succeeded in acquiring a competitive advantage, thanks to innovation, because they had created unique dynamic capabilities. Dynamic capability is “the firm’s ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments” [TEE 97]. Toyota was thus able to propose cheaper cars which had more functionalities and options than Western car companies. As a result, competition based on patents, technological standards and also organizational capabilities became as important as competition based on radical technological innovations.

The economics-oriented tradition considered the firm as a “black box”. At best, economists described the evolution of “idiosyncratic innovation routines within organizations” [NEL 82]. According to Brown and Eisenhardt [BRO 95], management research dealing with innovation emerged to open the “black box”. It focused on the micro-level of innovation, i.e. the innovating firm and, more particularly, the structures and processes by which individuals create products. Innovation management thus became an important study focus.

From my point of view, the article of Van de Ven [VAN 86] constitutes a key turning point in innovation management research, because it proposes a general management perspective dealing with the process of innovation, i.e. “the development and implementation of new ideas by people who engage in transactions with others over time within an institutional context”. Van de Ven explains that this definition is sufficiently general to apply to a wide variety of technical, product, process and administrative kinds of innovations. He proposed understanding the process of innovation by studying the factors that facilitate and inhibit the development of innovation events over time:

“As our definition of innovation suggests, these factors include ideas, people, transactions, and context over time. Associated with each of these factors are basic problems or challenges that need to be addressed in a practical theory on the management of innovation”.

1.2.2. Focusing on new product development practices

The article that Brown and Eisenhardt published in 1995 [BRO 95] is very interesting to understand how the innovation management research field emerged and developed. According to these authors, innovation management research focused on studying new product development practices, i.e. how specific new products are developed in an organization. New product development is viewed as a critical core capability for many business organizations, new products enable a competitive advantage to be created: “although technical and market changes can never be fully controlled, proactive product development can influence the competitive success, adaptation, and renewal of organizations.” [BRO 95]

NPD literature deals with how different new product development players, processes, and structures affect performance. Manufacturing firms being divided into functional departments, having their own, sometimes antagonistic, way of thinking and considering innovation, communication and cross-functional teams appear as product development’s key factors of success.

Brown and Eisenhardt highlighted three groups of previous research dealing with NPD. The first group considers rational planning as the main factor of NPD success, the second focuses on a firm’s internal and external communication while the third suggests structuring NPD proceeding as a disciplined problem solver.

– The rational plan research suggests that successful product development is the result of rational planning and execution. It tries to point out some determinants of innovation financial performance: marketing and R&D involvement, speed of product development, and early involvement of cross-functional internal teams and customers/suppliers.

– The second research stream highlights the effect of communication on new product development performance. The role of gatekeepers, i.e. people in charge of looking for external information, is crucial because they pick up, translate and bring information into the organization and disperse it to NPD teams. Conversely, they facilitate the external communication of the NPD team.

– The third research stream views product development as a sequence of stages, each one is characterized by a problem-solving cycle (see Figure 1.1). It studies the effects of some determinants on NPD – cross-functional development teams, suppliers and leaders. According to Dougherty [DOU 90], success is correlated with cross-functional personnel combining their perspective in a highly interactive and iterative fashion, whereas failed products were characterized by sequential attention by functional groups so that each departmental view dominated a particular phase of the NPD process.

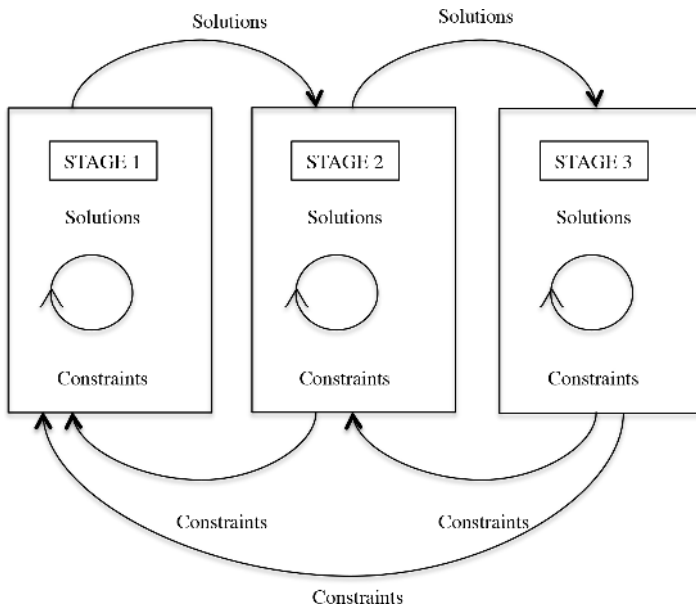


Figure 1.1. *The NPD as a multi-stage sequence of problem solving cycles [CLA 91, DEM 94]*

1.2.3. An established research stream in management science

Innovation management research has become an established research stream of management science. Academic reviews (Journal of Product Innovation Management) and international associations gathering academics and practitioners (Product Development and Management Association) are dedicated to the study of NPD.

There is a particularly rich and diverse academic literature about the NPD's key factors of success and its contribution to the firm's performance. It can be structured into six interest focuses [BAR 06]: 1) new product strategy, 2) NPD project portfolio management, 3) NPD process, 4) market research, 5) people and 6) metrics and performance measurement.

– New product strategy refers to the role of NPD in achieving the strategic goals of the organization. A clearly defined strategy appears as critical to high performance, regardless of whether the development effort is primarily tangible or intangible. One particular topic is how the strategy of for-profit product and service organizations guides their NPD activity.

– NPD project portfolio management refers to the decision-making process in which an organization's mix of projects is updated, revised and prioritized, and resources are allocated to the projects on the list.

– NPD process research aims to find out about NPD process practices in organizations. The NPD process has to be adapted depending on the radical versus incremental technological dimension of the projects. Even if unsystematic or informal NPD approaches are pointed out in some organizations, a formal process with clearly defined stages and gates, and also discipline in using and adhering to the NPD process, appears as the most suitable.

– Some NPD research focuses on the role of marketing. It inventories and analyzes the marketing tools and techniques in use to pick up market information. Collected data deal with customers' current and unarticulated needs; problems and benefits; customer reaction to the proposed product; market size and potential; expected sales revenue; customer price sensitivity; and competitive situation.

– Part of NPD research studies the role of organizational structures and personal endeavor (champions) from idea generation through product launching.

– Some NPD research aims to study how the NPD performance is measured. It appears that performance is measured at both the individual NPD project (profitability, revenue and customer satisfaction) and business unit levels (percentage of revenues derived from new products and percentage growth in sales from new products). Organizations delineate specific criteria for evaluating projects at the gate between two stages of the NPD process.

The NPD academic literature has become an important part of the literature dedicated to the way of managing innovation in different kinds of organizations. It offers both a marketing and strategic perspective on the NPD process and more broadly about the whole innovation process. It keeps on trying to highlight innovation's key factors of success and measure impacts of innovation efforts on the firm's performance. For instance, Beverland and Napoly [BEV 10] first provided a typology of the innovation practices underpinning differently positioned brands and, second, explored the strategic and tactical implications of different brand-related innovation efforts. They suggested brand position being a factor that moderates the success of NPD efforts.

In the 2010s, there emerged a new focus interest to address a significantly increasing critical management issue: "building cross-enterprise processes in order to leverage their internal strengths with partners' core competencies to enhance or to sustain their capabilities in providing superior products and services" [EMD 06].

1.3. Entrepreneurship research

Like innovation management research, entrepreneurship research is a management science focus based on economics. Its main contribution is an alternative mode of managing innovation, which can be applied to create new ventures in new and established firms.

1.3.1. *Theoretical economic foundations: from Cantillon to Schumpeter*

The article by Grebel *et al.* [GRE 01] provides a very relevant historical overview to understand how entrepreneurship economics research emerged and expanded.

According to these authors, the economist Cantillon⁷ was the first to use the word “entrepreneur” (a French word). He classified the economic agents into three groups: 1) landowners, 2) entrepreneurs and 3) hirelings. Whereas the landowners and hirelings behave passively, entrepreneurs significantly act in the business world because they connect producers and consumers, and they also engage in markets to “earn profits”⁸. At this time, the entrepreneur was viewed as an industry leader with a significant role in economic growth. It is only later that the role of the entrepreneur was limited to a business owner, although one endowed with individual energy and intelligence.

7 Richard Cantillon (1680s–May 1734) was an Irish–French economist and author of the book “*Essai sur la nature du commerce en général*” published in 1755 (Fletcher Gyles, London).

8 According to Grebel *et al.* [GRE 01], Cantillon was the first to propose viewing uncertainty as a constraint. Then, in 1921, Knight distinguished between risk and uncertainty (Knight, F. H.: 1921, *Risk, Uncertainty and Profit*, Houghton Mifflin, New York). In my opinion, this distinction is very relevant to risk analysis and control in innovation projects.

Later, French economists Baudeau⁹ and Say's work marked an important stage in the development of entrepreneurship research and paved the way for Schumpeter's theory [SCH 34, SCH 42].

“Baudeau suggested the function of the entrepreneur as an innovator and thus brought invention and innovation into the discussion. He emphasized the ability to process knowledge and information, which makes the entrepreneur a lively and active economic agent.

Say (1767–1832) elevated the entrepreneur to a key figure in economic life. ... He looked at the entrepreneur from an empiric perspective to find out ...that the function of this entrepreneur was to understand technology and to be able to transfer that knowledge into a tradable product that meets the customers' needs.

... Schumpeter's entrepreneurial concept has to be seen as the pivotal point in this field of research. ... Schumpeter suggested that economic actors' decisions and actions have to be repeated over and over again in the same way, so that eventually all actors' plans coincide to end up in equilibrium. Schumpeter calls a static situation that does not allow for change. His aim was to investigate the dynamics behind the empirically observable economic change. The explanatory element he called innovations, the economic agent to bring along innovations (i.e. “new combinations”) he called the entrepreneur” [GRE 01].

1.3.2. Entrepreneurship as an alternative mode of managing exploratory activities

Entrepreneurship has become an established research field in management science. It promotes an alternative mode of creating new

9 Baudeau is a French economist (1730–1792) who diffused the “*physiocratie*” economic school of thought. Grebel *et al.* refer to his book: *Première introduction à la philosophie économique*, Paris, Geuthner, 1919.

ventures and managing exploratory activities in new and established firms. The entrepreneur is Schumpeter's innovative entrepreneur, a risk-taker occupying a position of uncertainty such as that described by Knight¹⁰, and an individual whose imagination creates new opportunities and takes the initiative at the same time [CUE 07].

“Entrepreneurial initiative covers the concepts of creation, risk-taking, renewal or innovation inside or outside an existing organization. Lastly, the entrepreneurial spirit emphasizes exploration, search and innovation, as opposed to the exploitation of business opportunities pertaining to managers” [CUE 07].

The definition of entrepreneurship by Stevenson *et al.* [STE 90] appears as a benchmark definition: “The process by which individuals – either on their own or inside organizations – pursue opportunities without regard to the resources they currently control”.

Opportunity, risk and creativity are the key words of entrepreneurship research.

A body of knowledge has been gradually elaborated, which is taught in a lot of management schools and can easily be put into practice by individuals with the intention to create their own business. For instance, focusing on the new firms' creation by individuals, Barringer and Ireland [BAR 12] propose viewing the entrepreneurship model as a sequence of four steps (see Table 1.4):

- Step 1. Deciding to become an entrepreneur.
- Step 2. Developing successful business ideas.
- Step 3. Moving from an idea to an entrepreneurial firm.
- Step 4. Managing and growing the entrepreneurial firm.

10 Knight F.H., *Risk, Uncertainty and Profit*.

Steps	Activities and management issues
Deciding to become an entrepreneur	– Defining a purpose.
Developing successful business ideas	<ul style="list-style-type: none"> – Recognizing an opportunity. – Analyzing the feasibility. – Writing a business plan. – Analyzing the industry. – Developing an effective business model.
Moving from an idea to an entrepreneurial firm	<ul style="list-style-type: none"> – Preparing a proper ethical and legal foundation for a firm, including selecting an appropriate form of business ownership. – Analyzing the new venture’s financial strength and viability. – Building a new venture team. – Getting financing or funding.
Managing and growing the entrepreneurial firm	<ul style="list-style-type: none"> – The unique marketing issues facing entrepreneurial firms, including an appropriate target market, building a brand, and the four Ps –product, price, promotion and place (or distribution) for new firms. – The role of intellectual property in the growth of the entrepreneurial firm: the value of know-how exceeds.

Table 1.4. *The entrepreneurial process [BAR 12]*

1.4. Project management research

Project management was a practice before becoming a standardized body of knowledge and then a specific topic of research in management.

1.4.1. Historical overview

Project management might be the oldest practice of collective management [GER 08].

“People have undertaken projects for more than 6000 years, and projects are the key instrument for the development of society, starting from the pyramids and the Great Wall of China, and this is not going to change:

people will keep undertaking projects, and it is our duty to our children and grandchildren to continue developing project management” [GER 08].

Before the Second World War, project management was limited to major infrastructure and economic development state projects [GAR 03]. After the Second World War, project conducting became a specific business and a lot of engineering firms were created. The business of these firms was divided into two main activities: business engineering aiming to prospect and answer calls for tender launched by public funders, and a project-based activity of production aiming to conduct each individual project in order to fulfill client expectations. Indeed, project clients financed the work undertaken during the project and not the result.

As projects had to respect cost and time considerations, i.e. a budget and a deadline, while fulfilling client expectations concerning the project output, specific schedule and cost management methods were developed. Some of them are inspired from production management (Gantt diagram, for instance), and others from management control (project budget development and cost management). Several were specifically elaborated such as the US program (or project) evaluation and review technique, commonly abbreviated to PERT, and the French “Méthode des Potentiels Metra”, based on the mathematical graph theory, aiming to plan project tasks and ensure schedule management.

At this time, project management was a toolbox, a set of methods, and project managers were engineers trained in engineering schools and universities. Thus, project management research was based on engineering science and practice. It is only later that it became an interest focus of management science.

1.4.2. The Project Management Institute (PMI) methodology

In the 1960s, project management was used in the aerospace, construction and defense industries.

Under the initiative of a US non-profit professional association created in 1969, The Project Management Institute (PMI), and a European initiative (which would lead to the creation of the International Project Management Association), project management gradually became a body of knowledge and then a standardized project management approach. The project management body of knowledge expanded to a lot of firms and industries in order to manage new product development projects: manufacturing firms in the late 1980s (automotive, chemical and pharmaceutical firms) and the beginning of the 1990s (agro-food industry, for instance). It then expanded to the service providers (banks), and more recently to public and non-profit organizations. The software development firms used their own methods and it is only in the 2000s that there was a convergence of management tools.

The PMI produced the first Project Management Body of Knowledge (PMBOK) in 1996. The PMBOK appears as the pre-eminent global standard for project management practice. The PMI and the IPMA have also become certification bodies and deliver training courses worldwide.

The following extract of the PMI website is useful to understand the current viewpoint of a project and project management¹¹:

“A project is a temporary endeavor undertaken to create a unique product, service or result. A project is temporary in that it has a defined beginning and end in time, and therefore defined scope and resources. And a project is unique in that it is not a routine operation, but a specific set of operations designed to accomplish a singular goal. So a project team often includes people who don't usually work together – sometimes from different organizations and across multiple geographies.

11 <https://www.pmi.org/about/learn-about-pmi/what-is-project-management>, accessed 29th July 2017.

The development of software for an improved business process, the construction of a building or bridge, the relief effort after a natural disaster, the expansion of sales into a new geographic market – all are projects. And all must be expertly managed to deliver the on-time, on-budget results, learning and integration that organizations need.

Project management, then, is the application of knowledge, skills, tools, and techniques to project activities to meet the project requirements. Project management processes fall into five groups: initiating, planning, executing, monitoring, and controlling and closing. Project management knowledge draws on ten areas: integration, scope, time, cost, quality, procurement, human resources, communications, risk management and stakeholder management”.

1.4.3. Project management research

During the 8th conference of the International Research Network of Organizing by Projects (IRNOP VIII) in September 2007, the discussions indicated that project management research was in a “fruitful moment of paradigms revolution” [GER 08]. I will highlight the key points of the academic paper written by Geraldi *et al.* in order to summarize these exchanges.

– Project management research has provided insights, concepts and empirical research, rooted in a specific academic discipline inspired by the practice. Furthermore, “too much is kept within the walls of traditional project management communities instead of extending into cutting edge organizational research”. As a result, the project management research community appears as marginalized and neglected while traditional administration scholars and even other social sciences begin interest in the phenomenon of projects.

– Project management research focuses on techniques, procedures and efficiency rather than creativity.

“The wish to avoid inefficiency, and to dominate uncertainty and risks, bureaucratizes the project work and changes the function of project managers from a manager of creativity, change and risk to a manager of paper and forms. The chaos embedded in projects should be about striving for order by recognizing and structurally considering. The phenomenon of a project demands more than just dreaming of structure, it demands a ‘non-discipline’, which looks into the chaotic reality of projects and proposes feasible ideas to deal with this reality” [GRE 08].

– Project management research should better consider social skills in projects and contextualization.

Since 2008, efforts have been made in this regard. For instance, principles and theories have been borrowed from the strategy research field [KIL 12a]. Project management is studied more and more as a dynamic capability, which enables the organizations to face major environmental challenges [PET 12].

1.5. Proposing a definition of innovation project management

Following on from Fernez-Walch and Romon [FER 17], I suggest that innovation project management deals with “all the decisions made and tasks conducted in order to allow a new innovation project to emerge and successfully complete it”.

This definition is the result of 25 years of research aiming to study innovation management practices in firms and other organizations. I adopt the viewpoint of the innovating organization and hence innovation management practitioners. From a theoretical point of view, I combine, in a multi-disciplinary perspective, some principles of the three previously described research streams.

1.5.1. Combining the three research streams

Innovation management, entrepreneurship and project management research emerged and expanded separately. Each research stream has provided its own body of knowledge.

Comparing them leads us to the following key points:

- The three research streams deal with management practice study (management as practice). However, whereas innovation management and entrepreneurship research has theoretical economic foundations dealing with innovation and strategy, project management was initially a loosely focused practice before becoming a research discipline of management science. Most firms and other organizations implemented the PMI methodology in order to conduct different kinds of projects and not only innovation projects. For instance, project management has become a key component of New Public Management. But as project management research suffers from a lack of fundamental research, there is a need to borrow concepts and theory from the strategy field [KIL 12a].

- The three research streams view the innovation process, in the same way, as a multi-stage process starting from idea generation and ending with using innovation. However, they differ from each other in the manner of studying this process. Whereas entrepreneurship research focuses on the early stage of the process (ideation stage by pursuing an opportunity), project management research and innovation management research focus on turning this idea into an innovation (innovation project implementation). As a result, there might be a theoretical boundary between the ideation process and the NPD process. In my opinion, this has generated a gap between theory and practice because in innovating organizations, whether these be established or new, the innovation process is continuous. That is why several academics elaborated alternative theories to the multi-stage NPD process, such as the R-I-D model and the C-K theory [HAT 01, HAT 02].

- Project management and entrepreneurship research has provided methodologies to conduct part of the innovation process:

- to pursue opportunities and then a new venture (entrepreneurship research);

- to initiate and implement a project (project management).

Innovation management research highlights key innovation enabling organizational factors, such as coordinating an NPD cross-function team, promoting gatekeepers, considering each NPD stage as a problem solver, involving designers and users in the NPD process, etc.

– Innovation management and entrepreneurship research promotes creativity, whereas project management research points out the need for improving efficiency. This too is a gap between theory and practice, because balancing creativity and efficiency is a key innovation project management issue.

– Both innovation management and project management research focus on the contribution of innovation to the firm's performance and hence on innovation project cost, whereas the main financial key issue for the entrepreneur is to secure funding in order to successfully conduct a high risk innovation project. This also generates a gap between theory and practice, because the more innovative the projects are, the riskier and hence costlier they are. Balancing risk and gain is another key innovation project management issue.

Consequently, I argue that there is a need to combine some principles of the three research streams in order to reflect the innovation project management practices and issues more favorably. The European technical specifications strive unsuccessfully to achieve this.

1.5.2. Enhancing the European standard point of view

Over the last five years, technical specifications dealing with innovation management have been published at national¹² and European level¹³. An ISO standard is also in progress. Their

12 At the French level, for instance: FD X50-271–Management de l'innovation – Guide de mise en oeuvre d'une démarche de management de l'innovation, AFNOR, December 2013, Paris.

13 CEN TS 16555-1:2013-07 Innovation management – Part 1: Innovation management system.

purpose is to provide principles and methodology to firms and other organizations that would like to introduce, develop and maintain a framework for systematic innovation management practices.

The European standard defines innovation as the implementation of a new or significantly improved product (good or service), process, new marketing method, or new organizational method in business practices, workplace organization or external relations.

Indeed, the innovation process appears as a management process, whose input is ideas, and which aims to turn these ideas into innovation results. Innovation management is a set of interrelated or interacting elements of an organization to establish innovation policies and objectives as well as processes (i.e. innovation processes) to achieve these objectives (see Figure 1.2).

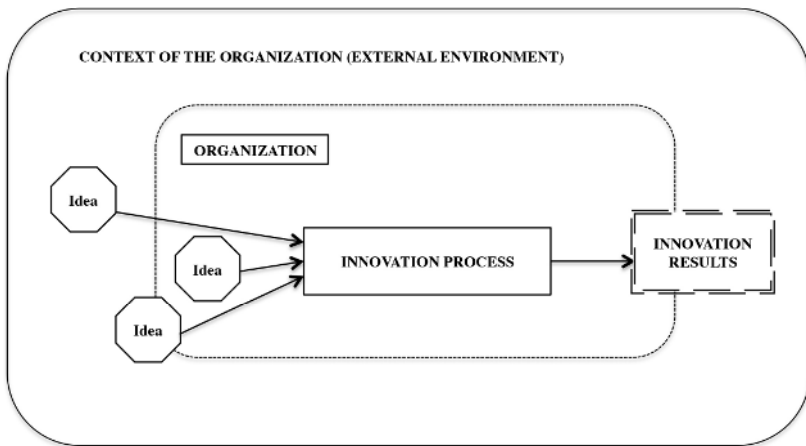


Figure 1.2. Analyzing the European standard view of the innovation management system¹⁴

14 CEN TS 16555-1:2013-07 Innovation management – Part 1: Innovation management system.

The innovation process covers all relevant steps from gaining insight about a problem or opportunity to successful launch. It is divided into four separate stages (Figure 1.3):

- Idea management aiming to find new innovation ideas, including the generation, capture, evaluation and selection of new ideas.

- Development of the innovation projects, by following a methodology, e.g. a “phase-gate” process or an innovation thinking process, or possibly combining both of them.

- Protection and exploitation of the outcomes of innovation activities.

- Market introduction of the innovation, dealing with identifying the intellectual property environment on the target markets, developing the marketing and sales plan and securing funding and organizational resources for market introduction and expansion, as well as establishing production, supply chain, customer support, feedback, and training of the involved disciplines as required.

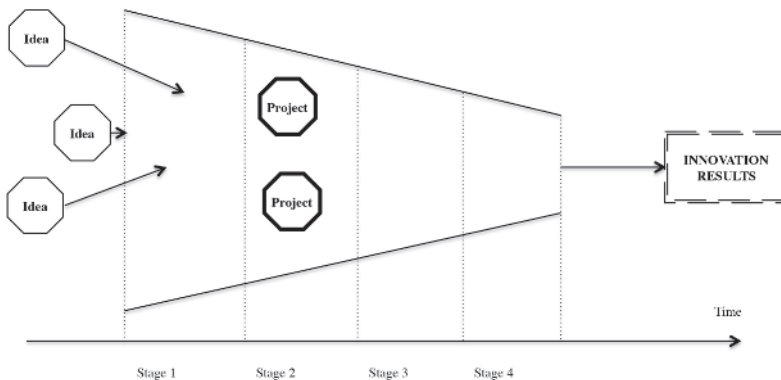


Figure 1.3. Analyzing the European standard view of the innovation process¹⁵

15 CEN TS 16555-1:2013-07 Innovation management – Part 1: Innovation management system.

Adopting the European standard point of view leads us to limit innovation projects to only one stage of the innovation process: development of projects.

In my opinion, although this viewpoint tries to link innovation management research and project management research, it maintains an artificial boundary between the ideation process and project initiation and implementation. Furthermore, some principles of entrepreneurship might be used due to the relevance of this alternative mode of management in allowing a new innovation project to emerge. In my opinion, the European standard does not address the two crucial challenges of innovation project management: 1) balancing risk and gain, and 2) balancing creativity and efficiency.

1.5.3. My definition of an innovation project

Following on from Fernez-Walch and Romon [FER 17], I define an innovation project as a deliberate and non-recurrent process which aims to propose and allow new offers of services to be adopted by an individual, a group of individuals or an organization (economic entity (a firm, for instance) community, network, etc.).

This process can not only occur in an entity (business organization, research laboratory, public organization, non-profit organization, etc.). It can also occur in an organizational network. An innovation project can be both intra- or inter-organizational.

The output of an innovation project is an innovation. It can be a technology, a good, a concept, a service, etc. (see Table 1.5). It always implies an encounter between a new offer of services and its user's needs. As a result, I suggest viewing the innovation project output as an offer of services. Why? Because even if the output is a good, an industrial process, an organization or a business model, it has to be accepted and used by an individual, a group of individuals or an organization. A concept, technology and standard might be the input

of one or several new product development projects. It therefore has a user who is the innovative organization itself or, in an open innovation concept context [CHE 03], another organization.

As an example, let us take the case of a big French company conceiving and commercializing materials such as concrete. Fifteen years ago, concrete was still viewed as a good. The R&D department of the company managed projects which aimed to develop new concretes dedicated to the construction industry. But it was difficult, because no microscope was sufficiently powerful to study the structure of the concrete. As microscopes became more powerful, the researchers of the firm succeeded in studying the concrete structure and highlighting its behavior and properties. One innovation goal became to improve craftsmen practices, by offering suitable concretes, i.e. enabling its users to become more efficient. Innovation projects were launched which aimed to shorten the concrete drying process and facilitate the coating process. Innovations have become service innovations based on a physical object: concrete.

The input of an innovation project can be an invention, a discovery, an observation on the market, etc. It is always an idea. Even when the idea of innovation is issued from creative reasoning, innovation is the result of a structured process. That is why I decided to use the French meaning of project, covering both stages: 1) elaborating a purpose and 2) embodying this purpose. I therefore combine the principles of innovation management and entrepreneurship research, on the one hand, and project management research, on the other.

Innovation is not an end in itself, it is a means for an organization to achieve strategic goals. Innovation should allow the innovating organization to create or strengthen a sustainable strategic advantage, to complement and to extend its core competencies and collective knowledge. Launching an innovation project is always the result of a strategic decision. This is why I use the word deliberate. Innovation projects embody the strategy of the innovating organization.

The innovating organization or individual has to evaluate newness. Evaluating the newness might be done by first taking into account the innovator's point of view, and second those of innovation users, and the spatial and time context of innovation diffusion. Table 1.2 might be applied. The different dimensions of innovation have to be identified (see Table 1.3) and the intensity of newness for each dimension evaluated, because an innovation project is more or less risky according to these two dimensions.

1.5.4. Managing a high number of various innovation projects

The literature revealed numerous innovation project typologies based on various criteria (see Table 1.5). I gathered them in two groups according to criteria in use: 1) typologies based on innovation project output related criteria and 2) typologies based on innovation project characteristics.

In my opinion, an innovation project should be managed in a contextualized manner. Is it relevant to manage a disruptive innovation project and a product-repositioning project in the same way, a technological renewal project such as a new product development project, and an intermediate product project as a product-differentiating project? As the PMI methodology emerged to conduct engineering projects and then was adapted to R&D and new product development projects, I argue that it is not relevant to apply it in every context. I hence suggest managing each innovation project by adapting principles and methodology to its specificities. Table 1.5 might be used to highlight the specificities of an innovation project and think about which theoretical principles related to the three previously described research streams to apply.

Given the increasing number of various innovation projects, a key innovation project management issue has become that of managing innovation projects in a multi-project setting. That is why I will dedicate Chapter 4 of this book to innovation multi-project management.

Groups of typologies	Used criteria	Typologies
Typologies based on innovation project output related criteria	Nature of the project output	<ul style="list-style-type: none"> – New manufacturing process development project/new product development project (goods and services) – Final product project (new offer of goods and services)/intermediate product (standard, concept or technology) project – Fundamental research project/applied research project/development project
	Dimensions of the novelty	<p>Kinds of knowledge used: technological, marketing, strategic, financial, juridical, logistics, etc.</p> <p>Marketing criterion: repositioning/reformulating/original projects</p>
	Intensity of newness	<ul style="list-style-type: none"> – Technological breakthrough project/incremental innovation project – Disruptive innovation project/improved offer project – Radical innovation project/imitation project
Typologies based on innovation project attributes related criteria	Innovation project firm contribution	<ul style="list-style-type: none"> – Risk criterion: very risky/little risk, non-risky – Strategic relevance: relevant/non-relevant
	Origin of the innovation project	<ul style="list-style-type: none"> – Technology push projects issued from discovery or invention/market pull innovation projects issued from existing client needs and expectations – Spontaneous innovation project versus planned innovation project

Table 1.5. *Several of the numerous innovation project typologies revealed by the literature*

