

INNOVATION: TOWARDS A CONCEPTUAL CLARIFICATION

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ABSTRACT

The term innovation is commonly used together with the terms research and development, invention and entrepreneurship. There exist strong interplay and interrelation between them, but the precise relation and distinction between these concepts is not always clear. Each of these terms may be seen as a particular piece of the innovation puzzle. The aim of this note is to further the understanding of the concept innovation by explicitly clarifying its relationship with related terms, namely, invention, research and development (R&D), and entrepreneurship. Rather than focusing on the individual identity, the paper explores the social identity of the innovation.

Keywords: innovation, invention, R&D, entrepreneurship, novelty

KAVRAMLARIN AÇIKLIĞA KAVUŞTURULMASINA YÖNELİK OLARAK İNOVASYON

ÖZ

İnovasyon terimi çoğunlukla araştırma-geliştirme, icat ve girişimcilik terimleriyle birlikte kullanılmaktadır. Aralarında güçlü bir etkileşim ve karşılıklı ilişki olmasına rağmen bu kavramların arasındaki kesin bağlantı ve ayırım her zaman açık değildir. Bu terimlerin her biri inovasyon bulmacasının belli bir parçası olarak görülebilir. Bu yazının amacı; icat, araştırma-geliştirme (AR-GE) ve girişimcilik gibi bağlantılı terimlerle arasındaki ilişkiyi açık bir şekilde aydınlığa kavuşturarak, inovasyon kavramının daha iyi anlaşılmasına katkı sağlamaktır. Bu makalede, inovasyonun bireysel kimliğinden ziyade sosyal kimliği üzerinde durulmaktadır.

Anahtar Kelime: inovasyon, icat, AR-GE, girişimcilik, yenilik

1. INTRODUCTION

Governments implement science-technology-innovation policies to improve social and economic development of nations. Companies allocate particular expertise and budget to research and development (R&D) in order to survive and not to fall behind. Individuals seem more inclined to do new things, or to do old things in a new way. We are living in an age of novelty and change.

Concepts which are in use to refer novelty and change include research and development, invention, entrepreneurship and innovation. There exists a strong interrelation and interplay between these concepts; however, the precise distinction between these terms is not always apparent and they are not always chosen to be used with proper distinctions. While novelty is the overarching attribute, it is helpful to regard each of these terms as particular pieces of the innovation puzzle.

In this note, I attempted to further the understanding of the concept innovation by focusing the interplay, interrelations and the differences with related terms, namely, invention, research and development (R&D) and entrepreneurship. The attempt is not to provide a full definition of innovation and come up with an agreed upon definition, but to enhance conceptual understanding. Since words are defined by other words, it is helpful to consider innovation and a bunch of related terms together. Therefore, the aim is, rather than exploring a universally accepted common definition, to give spaces to these related terms and to position them in a spatial framework. From this aspect, the paper scrutinizes the *social identity of innovation* in its social environment. Thus, the investigation of unique individual attributes of innovation, that is, its *personal identity*, is beyond the limited scope of this paper.¹

The paper first provides an overview of concepts related to innovation and summarizes their main traits. After exploring the social environment to which innovation belongs, I offer a concluding diagram that properly represents the spatial positions of innovation and related concepts in the novelty space. This

¹ The interested reader is referred to OSLO Manual (2018) of OECD, first published in 1992, about *what is innovation and how should it be measured?*. The manual provides a general definition of an innovation as follows:

“An innovation is a new or improved product or process (or combination thereof) that differs significantly from the unit’s previous products or processes and that has been made available to potential users (product) or brought into use by the unit (process).”

It was defined in OSLO Manual (2005) as

“An innovation is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organisational method in business practices, workplace organisation or external relations.”

diagram, which portrays particular pieces of the innovation puzzle, is the main novelty of the paper.

2. SOCIAL IDENTITY OF INNOVATION

RESEARCH AND DEVELOPMENT (R&D)

Frascati Manual 2015 of OECD provides a conventional reference for the definition of research and (experimental) development (R&D) and its main components - basic research, applied research and experimental development.²

The manual defines R&D as

“Research and experimental development (R&D) comprise creative and systematic work undertaken in order to increase the stock of knowledge – including knowledge of humankind, culture and society – and to device new applications of available knowledge.”

Research and development are used as R&D as if it is a single term. However, analyzing the terms research and development distinctly is helpful. Katz and Shapiro (1987) emphasizes the differences between 'R' and 'D' as follows: “Basic research discoveries often are difficult to appropriate, and frequently are undertaken outside of the for-profit sector. Development efforts, on the other hand, often generate benefits that can be largely appropriated via intellectual property rights, and are undertaken chiefly by for-profit firm.” Parker (1974) states three typical types of R&D: basic, applied and development. Roughly speaking, ‘R’ in R&D refers to basic and research activities as ‘D’ refers to development activities.

The term R&D covers three types of activities (Frascati Manual 2015):

“*Basic research* is experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundations of phenomena and observable facts, without any particular application or use in view.”

“*Applied research* is original investigation undertaken in order to acquire new knowledge. It is, however, directed primarily towards a specific, aim or objective.”

² The Manual, which published first in 1963, offers an internationally recognized methodology for collecting and using R&D statistics. Although its fundamental purpose is to offer guidance for the measurement of R&D activities, it includes definitions of basic concepts. For interested readers, this statistical manual also provides examples of R&D, boundaries and exclusions in order to illustrate how these definitions are applied.

“Experimental development is systematic work, drawing on knowledge gained from research and practical experience and producing additional knowledge, which is directed to producing new products or processes or to improving existing products or processes.”

The five core criteria that an R&D activity must satisfy are listed as (i) to be aimed at new findings (novel); (ii) to be based on original, not obvious, concepts and hypothesis (creative); (iii) to be uncertain about the final outcome (uncertain); (iv) to be planned and budgeted (systematic); and (v) to lead to results that could be possibly reproduced (transferable and/or reproducible) (Frascati Manual 2015).

To summarize, basic research is concerned with a search for the new knowledge and the advancement of existing knowledge for its own sake without any potential particular application. It does generally need not to be sold and commercially oriented. This type of research activities is mostly undertaken by universities, laboratories, non-profit institutions and government bodies. Applied research forms ideas into operation. There is an active effort, in the pursuit of economic or social benefits, to apply the results to solve some actual problems. Development, which uses the results of basic and applied research, is towards the introduction of new products, processes or applications. Thus, there exists a dynamic interaction, that links these three activities, between knowledge generation and the solutions to problems.³ However, this interaction, described until now, does not cover the overall process from the knowledge generation to commercialization. There needs more to be done to bring such a process to a ‘successful end’.

INVENTION

Invention can be regarded as another key piece in the novelty space. The term invention is generally used to refer to the generation of a new idea. Among others, here, I consider the invention in the way that Scherer (1980) describes:

“Invention is the act of insight by which a new and promising technical possibility is recognized and worked out (at least mentally and perhaps also physically) in its essential, most rudimentary form.”

³ The interested readers are referred to the Frascati Manual 2015 OECD for criteria and examples from various fields that illustrate differences and interactions between the classification of R&D activities by type - basic and applied and experimental development.

A new invention does not form part of the state of the art (EPO Guidebook, 2018)⁴. This implies that it should have *absolute novelty*. I should note here that an attempt to give a full and complete definitions of such concepts may be in vain. It might be often much reasonable to formulate a *negative definition* that contrasts something with what it isn't rather than directly define what it is. Therefore, it appears that invention and similar terms are commonly described by what they aren't.⁵ For instance, in the guide for the patent applicants, the European Patent Convention (EPC) prefers not to define the meaning of 'invention', but it provides a *non-exhaustive list of subject-matter and activities that may not be regarded as inventions*.⁶

The concept of invention, doctrinally, is at the center of patent laws which provide a form of testing whether a novelty deserves patent protection or not. The United States Patent and Trademark Office (USPTO)⁷, the federal agency in the U.S. Department of Commerce for granting U.S. patents and registering trademarks, explains invention relying on *patentability*:

“Any art or process (way of doing or making things), machine, manufacture, design, or composition of matter, or any new and useful improvement thereof, or any variety of plant, which is or may be patentable under the patent laws of the United States.”

(“Invention,” 2014).

Patentable, which is explained as 'suitable to be patented', entitled by law to be protected by the issuance of a patent. According to the European Patent Convention (EPC), patentability requirements are summarized in Eurostat (2017) as,

“An invention is a new solution to a technical problem which satisfies the criteria of:

- *novelty*: the solution must be novel (new)

⁴ “The *state of the art* comprises everything made available to the public anywhere in the world by means of a written or oral description, by use, or in any other way, before the date of filing or priority.” EPO Guidebook 2018.

⁵ For a historical discussion on the definition of invention, refer to Potts (1944):

Potts, H. (1944). The Definition of Invention in Patent Law. *The Modern Law Review*, 7(3), 113-123.

For a more recent discussion on 'What is the Invention?' in regards to Patent Law in U.S., refer to Cotropia (2012):

Christopher A. Cotropia, What is the "Invention"?, 53 *Wm. & Mary L. Rev.* 1855 (2012),

<http://scholarship.law.wm.edu/wmlr/vol53/iss6/2>

⁶ Guide for applicants: How to get a European patent, European Patent Office, 2018, 18th edition, <https://www.epo.org/applying/european/Guide-for-applicants/html/e/index.html> Last accessed on 10/12/2018.

⁷ See <https://www.uspto.gov/>

- *inventiveness*: it must involve a (non-obvious) inventive step,
- *industrial applicability*: it must be capable of industrial use.”
 (“Invention,” 2017).

To sum up, we may regard invention as the origination of an idea which arises from inventive efforts of individuals, or from the R&D efforts of organizations. Again, however, these efforts do not cover the complete process towards to the realization and commercialization of ideas. A novel thing may be fully inventive, but may not be fully realized or may have no commercial value.

INNOVATION

The Community Innovation Survey (IS), which is biennially conducted in the EU countries to collect data for tracking innovation across Europe, with reference to Oslo Manual (2005), defines innovation as,

“A new or significantly improved product (good or service) introduced to the market - *product innovation* (goods or services); or the introduction within an enterprise of a new or significantly improved process - *process innovation* (organisational and marketing aspects).”
 (“Innovation,” 2012).

Later, Oslo Manual (2018) provides a broader definition of innovation as

“New or improved product or process (or combination thereof) that differs significantly from the unit’s previous products or processes and that has been made available to potential users (product) or brought into use by the unit (process).”

Main types of innovations in regard to novelty are product, process, marketing, organizational and social innovations (Oslo Manual 2005)⁸:

- *A product innovation* is the introduction of a good or service that is new or significantly improved with respect to its characteristics or intended uses.
- *A process innovation* is the implementation of a new or significantly improved production or delivery method.
- *A marketing innovation* is the implementation of a new marketing method involving significant changes in product design or packaging, product placement, product promotion or pricing.

⁸ In terms of their impacts rather than in regard to novelty, innovations are also classified to incremental, radical and disruptive innovations (Oslo Manual 2005).

- *An organisational innovation* is the implementation of a new organizational method in the firm's business practices, workplace organisation or external relations.
- *A social innovation* is defined by their (social) objectives to improve the welfare of individuals or communities.⁹

The requirement for an innovation is that the product, process or methods must be either new or be significantly improved. All innovation types must involve, by definition, a degree of novelty in the way to achieve objectives like more profitability, increased market share, higher consumer satisfaction, creating public benefit or meeting a social need.

An inherent goal of innovation seems *value creation*: "Changed selling effort, improvement in the subjective image of the product, a new emphasis, better performance, a different location more convenient to the customers, and improved service, any of these may enhance the value of the article to the buyer" (Parker, 1974).

To sum up, it appears that innovation means more than the R&D and invention. Innovative activities cover R&D efforts, which result in new ideas, methods or prototypes, which can potentially lead to innovations. Innovation starts with new ideas, but it requires implementation. This requirement differentiates innovation from invention. Innovation is more than the generation of knowledge and idea. A new or improved product, process or method are implemented when it is introduced into the market, that is, when the successful 'commercialization' happens.¹⁰ Thus, innovation seems to be the *successful exploitation of new ideas*, that is, the realization of invention. However, it doesn't come to fruition of its own accord. There needs an agent who is motivated enough for doing the necessary to reach the 'successful end'.

ENTREPRENEURSHIP

For the full process of innovation to take place, it is not enough that some goods, services or methods are conceived and produced and so on. It also must be sold at a 'profit' - *an entrepreneurial profit*.¹¹ "As long as they are not carried into practice, inventions are economically irrelevant. And to carry any improvement

⁹ "European Commission states *social innovations* as "new ideas that meet social needs, create social relationships and form new collaborations." Last accessed on 10/12/2018.
http://ec.europa.eu/growth/industry/innovation/policy/social_en.

¹⁰ The *commercialization*, here, refers to the process that makes 'the new' available on the market for commercial gain or non-commercial social gain.

¹¹ I simply used the term 'profit' for all cases in a way to imply the output of all types of innovation including social innovation. Here, the term 'profit' includes the 'payoff' or 'return' meanings as well.

into effect is a task entirely different from the inventing of it” (Schumpeter, 1934). Thus, a novelty that does not bring a rewarding payoff is not an innovation.

An entrepreneur is a person who noticed formerly unspotted and untapped opportunities to ultimately earn profits. The driving forces behind the entrepreneurship are summarized by Schumpeter (1934) as, *“First of all, there is the dream and the will to found a private kingdom, usually, though not necessarily, also a dynasty...Then there is the will to conquer: the impulse to fight, to prove oneself superior to others, to succeed for the sake, not of the fruits, but of success itself... Finally, there is the joy of creating, of getting things done, or simply of exercising one’s energy and ingenuity.”*

In short, entrepreneurship is the process that turns ideas into action by creating new organizations or new markets. The whole process involves risks in a world of uncertainty. Entrepreneurs are the ones who boldly shoulder these uncertainties. In return for the risk taken, as a reward, they gain entrepreneurial profits in case of the ‘successful end’.

3. TO CONCLUDE: A SUMMARY DIAGRAM

All in all, novelty is the overarching feature. Each of the concepts, discussed in the previous section, constitutes a particular piece of the overall ‘innovation puzzle’. The concluding diagram in Figure 1 positions these concepts spatially in the novelty space and summarizes properly the interrelations and interplay between innovation and a handful of the related concepts discussed above in a way that it covers the overall process from knowledge generation to commercialization.

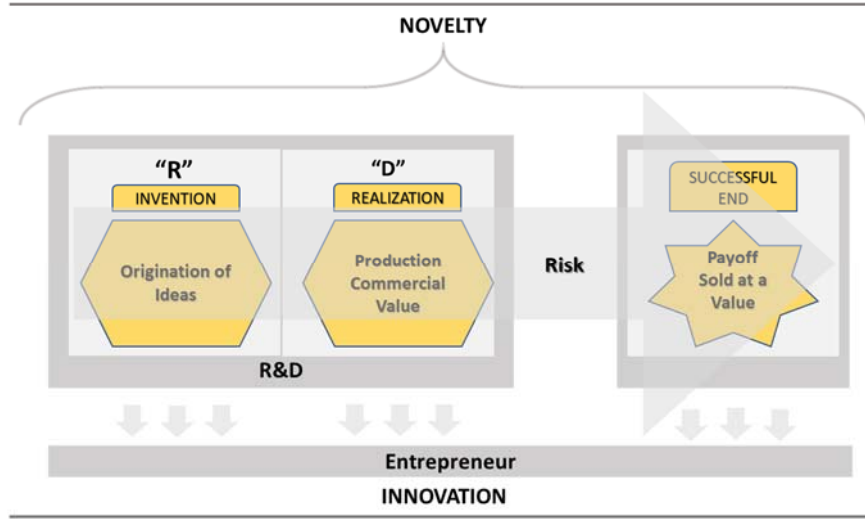


Figure 1 *Innovation - concluding summary diagram*

The paper attempts to further the understanding of the concept innovation by exploring the social environment to which innovation belongs. It helps to figure out innovation better by focusing the interplay, interrelations and the differences of innovation with the related concepts discussed above. However, it does not cover exhaustively the whole literature on innovation and every aspect of innovation. To come up with a full definition of innovation and to cover all dimensions of it, a more thorough systematic review and synthesis of the relevant literature are needed.

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