

# Latency of innovations as economic category of innovative process

## Latencia de las innovaciones como categoría económica del proceso innovador

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#### ABSTRACT:

The article provides the systematic and generalized concept of latency of innovations as an economic category, which reflects the degree of uncertainty of innovation process. In the current context, the existing and prospective industrial competitiveness depends on innovation and, in particular, the competitiveness of innovations themselves. Latency of innovations may, having certain latent features and capabilities of novelty, become another competitive differentiator along with quality, price and up-to-dateness, and therefore the key to the successful sustainable industrial competitiveness. The main purpose is to review and analyze the concept of latency of innovations and their features, and to give recommendations on how to identify those for their further practical use. As a result of the research the following conclusions have been made: • Latency of innovations have hidden features and capabilities that can be identified and implemented in a specific time period, • Hidden features and capabilities of innovations may have a multiplicative and global significance if identified and implemented, • Latency of innovations generate new ideas and offer substantially extended

#### RESUMEN:

El artículo presenta el concepto sistemático y generalizado de la latencia de las innovaciones como una categoría económica que refleja el grado de incertidumbre del proceso de innovación. En el contexto actual, la competitividad industrial existente y futura depende de la innovación y, en particular, de la propia competitividad de las innovaciones. La latencia de las innovaciones puede, con ciertas características latentes y capacidades de novedad, convertirse en otro diferenciador competitivo junto con la calidad, el precio y la actualidad, y por lo tanto la clave para el éxito de la competitividad industrial sostenible. El objetivo principal es revisar y analizar el concepto de latencia de las innovaciones y sus características y dar recomendaciones sobre cómo identificarlas para su ulterior uso práctico. Como resultado de la investigación se han hecho las siguientes conclusiones: • La latencia de las innovaciones tiene características y capacidades ocultas que pueden ser identificadas e implementadas en un período de tiempo específico, • Las características y capacidades ocultas de las innovaciones pueden tener un significado multiplicativo y global si se identifican • La latencia de las innovaciones genera nuevas ideas y

lifecycle, and thus represent a key step in the whole innovation process, and • One should apply forecasting to reveal latency of innovations successfully throughout the entire innovation lifecycle.

**Keywords:** latency of innovations, innovation process, innovation capacity, hidden potential of innovation, uncertainties of innovations, intended implicit character of innovations, unexpected latency of innovations.

ofrece un ciclo de vida sustancialmente extendido, y por lo tanto representa un paso clave en todo el proceso de innovación. • Se debe aplicar la previsión para revelar la latencia de las innovaciones con éxito a lo largo de todo el ciclo de vida de la innovación.

**Palabras clave:** latencia de las innovaciones, proceso de innovación, capacidad de innovación, potencial oculto de la innovación, incertidumbre de las innovaciones, carácter implícito intencional de las innovaciones, latencia inesperada de las innovaciones.

## 1. Introduction

No industrial establishment can remain competitive if it fails to focus on the continuous search for and implementation of innovative products, approaches and technologies in the course of its business. Innovations have been the source of competitive advantages at any stage of social development. Industrial enterprises can support proper market competitiveness through innovation by reducing their costs and increasing productivity (Sekerin, et. al. 2015).

Innovations are the key stimulus for civilized development at this stage of the World-System's evolution (Freeman 2005). Effectiveness of any business largely depends on implementability of innovation capacity, while the absence of strategy focused on such implementation results in the loss of the competitive edge in the market. Efficient business development specifically depends on the focus on innovations both in the middle and long term. The innovation factor is considered to be a dominant factor of the stable development taking into account the restrictions in the inner and outer environment of business and corporate entities (Dudin, et. al. 2014). Moreover, currently there is much concern about overcoming the crisis for the industry. Innovations are also the means of overcoming the economic crisis (Schumpeter 1996).

The specific feature of innovations as a product is high degree of uncertainty in results (Lapin 1981). Innovations are able to be in a hidden, unmanifest state, without showing themselves properly for some period of time, which means they have latency.

However, innovations do not originate from nothing. They appear due to certain reasons, which include a number of technical, technological, economic, social and other components. These reasons represent innovative capacity. Innovations start with determination of availabilities in order to use them effectively (Drucker 2007). Innovation capacity is the key factor of business competitiveness and success.

The concept of *innovation capacity* has been developed at the end of the twentieth century due to the rapid development of innovation, and is now widely used in scientific theory and practice. Great attention to this aspect of innovation has been given in the relevant works (Buharova 2013; Korobeynikov, et. al. 2000; Mityakova 2009). At the same time, despite the rather deep study and creation of specific theoretical basis for evaluation of innovation capacity exploration, this concept has no clear interpretation but a number of definitions.

The business that has or tends to create and develop its own innovation capacity is innovation-receptive, which in turn provides important competitive advantages since it helps to protect itself from external risks. The business becomes more interesting and creative due to its innovation capacity, and accordingly improves its ability to adapt to the constantly changing market conditions.

One of the most important strategic management tasks the industry faces is to find and implement solutions that will ensure the company's competitiveness through the timely identification of the current and future success factors. Latency of innovations is one of such factors. Timely identification and implementation of hidden features and capabilities of innovations throughout the life cycle will contribute to the successful implementation of innovative projects and thus the proper business competitiveness both in the middle and long term.

## 2. Research Methods

The comprehensive approach as a methodological framework was used to write this article. In the process of writing the authors considered and used the findings and conclusions contained in numerous works of leading Russian and foreign experts in the field of innovation management and entrepreneurship, as well as Internet resources. The authors created their own vision of the further development of the latency of innovation concept based on available works.

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## 3. Results

One of the distinctive features inherent to innovations is uncertainty. By uncertainty we mean incomplete or inaccurate representation of the values of various parameters in the future generated by a variety of causes and particularly incompleteness or inaccuracy of information on the conditions of implementation of the solution, including related costs and results (Website for structural abstracts). The uncertainty depends on a number of reasons and can be divided into the following types:

- Economic uncertainty,
- Political uncertainty,
- Natural uncertainty,
- Time uncertainty, and
- Uncertainty of internal and external environment.

The uncertainty can be caused by conflict situations or tasks that do not coincide with the interests or tasks that pursue several objectives, etc. In fact, the uncertainty may be caused by a variety of factors that can have different effects on innovations and innovation processes.

A number of features and capabilities of innovation remain in a latent state for some period of time, and may manifest themselves in certain periods of time. While spreading, the innovation improves, becomes more efficient, and acquires new consumer attributes that allow to open new fields of application, markets and customers. Innovations are characterized by high degree of uncertainty based, in our opinion, on the features of innovations that may be of implicit nature, without showing themselves properly for some period of time (Sekerin, et. al. 2015; Lapin 1981).

As practice shows, new capabilities to manifest and apply hidden features are continuously found for new products, as well as those which would seem to become part of our daily lives. Take for example a laptop. Just a while ago they were large, cumbersome, not very powerful. They had a lot of connectors and slots: PS/2, COM, LPT, SCSI. Currently, almost all of them are replaced by the USB port, which was initially used mainly to connect a computer mouse and has even been called "Useless Serial Bus". However, after a certain period of time the original idea of manufacturers to make USB to be the universal port has been implemented in practice – it is now used to connect printers, scanners, monitors, flash drives, and is the universal port for any laptop or computer. The USB port provides a connection to a network or any external peripheral devices. It allows not to use the built-in CD, DVD and all other connectors. Furthermore, mini-USB and micro-USB have been designed based on this port, which are also widely used in a variety of gadgets. It really has become the "universal serial bus" as intended. However, this does not mean the port is not improved further. Further increase in its speed may be referred to hidden features.

Note that hidden features and capabilities of innovation may be either positive or negative. Suppose you want to buy certain items on the Web. Just a few minutes after the start of your search there appear advertisements of the product vendors on the screen, which significantly simplify the further search. That is now the vast majority of programs are aimed to collect and process various information anyway. Moreover, it may be done well-intended to offer something to buy, as mentioned above, or for the purpose of economic espionage, when

software, websites and even computer keyboard can be used to gather unauthorized information. These hidden and illegal features can harm computer databases, etc.

A great number of hidden features are built into our cars due to development of electronics and global computerization. A modern car may be called a wheeled computer center. All automotive electronics is called a "local controller area network" as a whole (Website for popular mechanics).

Currently, the entire system of wires and communication protocols that performs the function of the connective tissue between all sensors and vehicle computers is called CAN-bus. Until the mid-80s, when the automaker would like to add any electrical innovation to the car, e.g. heated seats, the proper wire should be laid directly to the button on the dashboard through the entire machine. With the growth of these innovations the car turned out to be more and more entangled in many kilometers of wires laid in bundles arm thick. Implementation of the CAN-bus allowed to perform the connection without individual wires, i.e. without complicated electric network. But most interesting is that the main reason to develop the CAN-bus is to comply with certain technical environmental requirements rather than to intent to save wiring kilometers. A further manifestation of this latency of innovation has resulted in the fact that the CAN-bus implementation allows (as a side-effect) not only to save wires, but also to obtain a hidden opportunity to carry out a consumer self-diagnosis of the car and its improvement. And that is not all. At the present time, owing to this innovation, it is possible not only to detect malfunction of the car, but also potential to optimize its performance. For example, consumers can make engine chip tuning by themselves at the relevant service stations.

It may be stated that the above examples of abilities and capabilities hidden in innovative products are already or virtually laid down in the product, i.e. **intended**. And the degree of their manifestation actually depends on the consumer in many respects, on his/her desire to learn something new about the product used or planned to use soon. Furthermore, knowledge of any hidden possibilities of the product may be accidentally. For example, it refers to such function in the car as a "turn signal extender". The consumer either accidentally learns about it, lightly touching the turn signal switch, or knows that it is possible to activate such function and visits the service station to set up this hidden feature.

In our opinion, hidden features of innovations are of much greater interest, their manifestation either is not predictable or predicted with a low probability, i.e. this is referred to **unexpected** latency of innovations.

Let's take, for example, the idea to use steam vapor which comes to mind in ancient times, at the beginning of the Common Era. The aeolipile proposed by Heron became the prototype of the first steam turbine created in the seventeenth century by Edward Somerset. The idea how to use steam arose as early as in the ancient times — at the beginning of the Common Era when the mathematician and engineer Heron of Alexandria showed such possibility. The aeolipile by Heron approved his theory and became the first steam turbine in fact.

The development of this idea was not stopped but continued. As steam could be used to lift something and drive the mechanism, it helped to develop the steam-driven pump, which in turn served as the basis for the development of the steam engine, which became popular in almost all means of transport, except for the aircraft industry and artillery. But not only this was the significance of the steam machine. The gas engine was constructed in the early nineteenth century and actually became the prototype for the combustion engine in response to low efficiency and clunkiness of steam engines. However, all the inventions related to hidden potential enhancement and using the steam, including the Papin steam engine, the principle of universality proposed by Polzunov, Watt crank mechanism, were actually used to develop a combustion engine which started a new era of social development. Thus, a combustion engine became the originator for a great number of innovations and implementation of plenty of hidden features and capabilities. The idea of the steam engine and its disadvantages mostly became a stimulus for creating a wide variety of engines and automotive applications thereof. In its turn, the development of the automotive industry accelerated the growth and

development of metallurgy, petroleum and chemical industries. In addition, it caused a great social impact.

To sum up the above, it should be noted that features and capabilities inherent to the created mine pump and hidden for a while had the multiplicative and global significance.

Note that hidden features and capabilities can manifest themselves after many decades or even centuries. For example, quite a number of cars with other engines — gas, hydrogen, electric, dodged the roads since the middle of the eighteenth century to the First World War. It took place until the vehicles equipped with combustion engines became dominant. During this period many inventions were delayed and became in demand only in our time. In fact, hidden features of a huge number of ideas and designs began to manifest the decades later. For example, hydrogen engines, gas and electric hybrids were developed in the same period of time, but they are only just beginning to take root in our daily living. Note that it is necessary to study information about the end user and his/her needs to accelerate the manifestation of innovation features as early as the development stage is started.

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## 4. Discussion

In our opinion, since innovations have hidden features and capabilities, a new concept of **latency of innovations** may be evolved.

*We refer "latency of innovations" to hidden innovative potential inherent to the idea, which is able to manifest after a period of time and determined by the level of culture and individual personality formed under the influence of social forces and social institutions (Sekerin and Burlakov 2016). Typically, from the psychological or functional point of view the deficit of hidden features and capabilities of innovations is realized due to situational factors.*

*At the same time, we refer "hidden innovative potential" to the existing ideas first as they help to reveal new features, characteristics or capabilities of the appropriate innovation. In our opinion, the concept of hidden innovative potential is not fully understood and represents certain scientific and practical interest for further study.*

It is commonly known that innovation process refers to implementation of ideas into real new products, equipment or technology with the subsequent distribution of the results. In other words, innovative process is a "process of creation, development and distribution of innovations" (Ilenkova 1997; Sergeev 1998). In our opinion, latency of innovations not only allows to have a fresh look at the concept, but to fill it with new content.

For example, there was a linear approach to scientific and technical progress in the twentieth century, i.e. innovations were created by the scientific community and implemented by the industry. In this case, innovations arose within R&D departments, and the market played a passive role as a consumer only, by taking the results of research and development.

There appeared new approaches to innovative process in Japan after the crisis of the 80s of the twentieth century. The peculiarity of the Japanese approach was that the Japanese companies began to apply to the consumers to clarify their preferences and attitudes in the early stages. This approach marked a transition from serial to parallel innovative process, which included both elements of marketing, research, development, production, promotion, etc. and was called the "integrated approach" (Naumenko 2006). One of the features of this integrated approach to innovation process is that it refers to integration of R&D and the industry and provides close cooperation of suppliers and customers.

In our opinion, the concept of latency of innovations is congruent with such approach, as it relates to features, characteristics and capabilities manifested at various stages of the innovative process and realized in the form of new innovations in a variety of ways: technical, technological, environmental, information, etc. "Duration" of innovations, i.e. the period of existence, use and additional results will be mainly determined by their implicit character. It may be stated that latency of innovations cancels the decline stage and causes the endless

innovative process.

Proper identification of latency and evaluation of their additional potential can serve as an additional basis for a decision to choose or develop the innovation and further implementation of the whole innovative project by the industrial enterprise. Forecasting is very important to choose a particular innovation, it should be performed for a sufficiently long period and determine its level of competitiveness and latency at any time during the life cycle of such innovation (Cliquet 2002; Porter 1980). Therefore, the commercial future of innovations and the relevant business depends on the reliability and accuracy of forecasting of innovation performance and its latency.

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## 5. Conclusion

One of the distinctive features inherent to innovations is uncertainty. In other words, innovations may be in a hidden, implicit state, without showing themselves properly for some period of time. We propose to call this feature the "latency of innovations", and it may also determine the competitiveness of innovations under favorable circumstances and various factors.

In contrast to the innovation capacity, which is generally represented by all available resources (material, financial, human, informational, organizational and technical), the hidden potential of innovation mainly refers to promising ideas, which exist but are hidden in innovations till a certain time, and may be implemented if they are constantly searched for, which will result in the formation of necessary framework for the optimal selection and implementation of new innovations sooner or later. This approach may support proper competitiveness for relevant industrial establishments, as well as their transition from innovation-simulating, i.e. so-called lame-ducks, to the innovative businesses to be followed or even copied (Maricheva 2013).

In our opinion, hidden potential of innovation is not just an additional factor of the company competitiveness but may be called the strategic factor of competitiveness for the innovation itself. In fact, latency of innovations may become just the vector (momentum) to support the present and future business competitiveness.

Latency of innovations allows to have a fresh look at the concept of the innovation process. All stages of the innovation process are interdependent and each of them contains the possibility to manifest ideas "built into" the relevant innovations. For example, promotion or marketing should be performed ceaselessly and should take into account changes in the internal and external business conditions. These hidden features and capabilities can be consciously laid into the innovations already in the development stages and may be completely unknown and appear during the life cycle of innovation, but the main fact is that they already exist, and the problem is to identify and implement them and then go to the initiation stage of the innovation process. Perhaps, the implicit character of innovations refers to the initial stage of the entire innovation process, and thus is the source of increasing innovation lifecycle. It may be stated that the latency of innovations cancels the decline stage and causes the endless innovative process. Taking into account the above, innovation process is not only just a sequence of actions to initiate, develop and promote relevant innovations, but it becomes an ongoing process aimed to reveal ideas hidden in the innovations, implementation of which can bring new knowledge, technologies, different effects.

In the modern conditions innovative ideas, including hidden features and capabilities, can appear at any stage of the innovation process, whether referred to science, production, marketing or consumption.

We have to admit that the majority of domestic industrial enterprises consider the innovation capacity only as the ability to use "foreign" ideas and the best practice, therefore they simulate innovations indeed, and this results in "catching-up" only. Such practice does not support the competitiveness of domestic enterprises — they are always outsiders. Therefore, first of all, they must understand that the innovative capacity refers to ability to create and implement

innovative ideas.

Every business should implement innovations in an integrated manner to cover all types of innovations as only their combination is capable to support high level of competitiveness and economic performance. At the same time, the success of businesses directly depends on the competitiveness of innovations and innovative projects. That is why forecasting the competitiveness and search for latency of innovations is an ambitious task to be resolved.

In our opinion, the latency of innovations should be searched for throughout the entire innovation lifecycle. The hidden potential of innovations may become an additional support for the current and prospective industrial competitiveness, if duly determined.

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