

UDC 331.44 : 37.072

JEL Classification A23, I21, I25, O31, O32

Oleksandr O. Romanovsky

Yuliia Yu. Romanovska

Oleksandra O. Romanovska

Mokhamed El Makhdi

Clarification of the Concept of Innovatics of Higher Education

The article is devoted to clarifying the concept of "higher education innovation." Examples of the use of the term "innovatics" in other areas and cases of application are analyzed. The formation of the modern theory of innovatics, pedagogical innovatics and innovatics as a new toolbox of skills for innovative production managers are considered.

Keywords: *innovatics, higher education innovatics, academic capitalism, pedagogical innovatics. Innovations, innovation activities*

DOI 10.37659/2663-5070-2022-9-77-82

Introduction

Recently, the term "innovatics" has become widely used. When studying innovative processes in the field of higher education and science, it is necessary to clarify the concepts associated with the term "innovatics" and with the scientific-applied direction — "innovatics of higher education."

Also, it is of interest in what areas and how the term "innovation" is used.

Formation of the modern theory of innovatics [1]

J. Schumpeter's research on innovation had a direct and fundamental impact on the formation of the modern theory of innovatics. It is neces-

sary to note, that innovatics is a field of knowledge about the essence of innovation activity and innovation processes, their organization and management, which ensure the transformation of new knowledge into innovations demanded by society, both on a commercial basis (commercialization of the results of scientific, technical and creative activities) and on a non-profit basis (innovations in the social sphere).

"Innovatics" got its name from the term *innovation*. The term itself can be found in Russian scientific literature since the mid-1980s. In St. Petersburg, Professor V. G. Kolosov organized research to study the processes of transformation of a planned economy into a market one. These studies were called "engineering". Also, A. G. Porshnev at the State University of Man-

agement, in 1990, founded the Department of Innovation Management, on the basis of which the mechanisms of innovation management in economic and social systems were studied. After some time, these Russian scientific schools became one of the leading ones in the emerging new scientific field of knowledge — innovatics.

Now innovatics as a science is at the stage of its development, maintaining continuity with the theory of innovation by J. Schumpeter in the economic field. However, it should be noted that the specificity of this scientific direction lies in the fact that it has an interdisciplinary nature, and within its framework, knowledge about innovations, innovative activities, and innovative processes is integrated in various scientific areas (economics, sociology, philosophy, political science, psychology, cybernetics, technique, technology, etc.).

In a broad sense, innovatics studies the patterns of development processes, the formation of innovations, innovations, change management mechanisms, overcoming resistance to innovations, human adaptation to them, the use and distribution of innovation flows, innovation activities, their impact on the sphere of competition, on the development of society as a whole.

Like any science, innovatics has two directions of development: theoretical and applied. The theory of innovatics studies the conceptual foundations of innovation, innovation activity, and innovation processes, the problems of regularities and synthesis of innovative development of complex socio-economic and technical systems (the formation of new knowledge, ideas, new technologies, inventions, discoveries).

Within the framework of applied innovatics, the issues of planning, organization, management, and implementation of innovations and innovative activities are solved.

The main concepts of the theory of innovatics are:

- innovation;
- innovative activity;
- an innovative process.

The concept of “innovation” has many definitions as it’s used in various branches of scientific knowledge and has a dual character. On the one hand, *innovation* is the end result of innovative activity. This means that innovation which in fact means “investment in innovation” is the end re-

sult of innovation activity, realized in the form of a new or improved product sold on the market, a new or improved technological process used in practice.

On the other hand, *innovation* is the process of implementing a new idea into a final product, i.e. innovation commercialization process. The process of introducing innovations to the market is called the process of commercialization. The commercial aspect defines innovation as an economic necessity that turns it into a source of income. The presence of demand for innovation indicates its competitiveness, which is the result of innovation. Innovation is the materialized result of scientific and technical activity.

Thus innovation is the process of implementing a new idea in any sphere of human life, contributing to the satisfaction of an existing need in the market and bringing an economic effect.

In accordance with international standards, innovation is defined as the end result of innovative activity, embodied in the form of a new or improved product introduced to the market, a new or improved technological process used in practice, or in a new approach to social services.

Innovatics as a pretty new field of knowledge has integrated many ideas of modernization theory, socio-philosophical and cultural doctrines, sociology, general and social psychology. The formation of the theory of innovatics and the practice of its application in professional activities is based on the methodology of systems theory as a fundamental basis for the formation of research and inventive activities. Achievements in the field of informatics, system analysis, theory of organizations and management, cybernetics, and the latest information and social technologies had a special impact on the development of innovatics.

Innovatics has integrated many ideas of modernization theory, socio-philosophical and cultural doctrines, sociology, general and social psychology. Therefore, the modern theory of innovation includes the following main *sections* of scientific knowledge:

- theoretical bases of innovative activity;
- and modeling of innovative processes; organization and management of innovation activities;
- state regulation of innovation activity;
- management of innovative business;
- management of an innovative project;

- management of investments in innovative projects;
- commercialization of the results of scientific, technical, and creative activities;
- management of human and intellectual resources in the process of innovative development of the socio-economic system;
- risk management in innovation activities;
- technical marketing (marketing in the early stages of the life cycle of a product or technology);
- logistics of innovative processes;
- management of intellectual property and intellectual capital.

Innovatics is a theoretical and methodological basis for a formalized description, modeling, organization and management of innovation activity. Unlike other scientific fields of knowledge, innovatics studies the process of development of socio-economic objects, the transition of socio-economic systems from one stable and high-quality state to another, which is characterized by higher parameters of functioning and performance. The fundamental basis of innovatics is the problem of creating, identifying, accounting, evaluating and managing intellectual resources and intellectual capital as new economic categories that meet the growing market needs for products and services with new qualities.

The subject of research in innovatics is the principles, laws and patterns of innovation processes in socio-economic systems, models and methods for describing, researching, organizing and managing innovation activities at the macro level (national innovation systems), meso level (sectoral and regional innovation systems, innovation clusters) and micro level (strategies of innovative development of individual enterprises and organizations).

The main **objects** of research in innovatics are:

- technological structures;
- business cycles;
- life cycles of products, technologies, goods;
- innovative activity;
- innovative processes.

At the present stage of innovatics, there are different concepts of development. One of them is the theory of accelerating innovation, which is

associated with the rapid development of digital and nanotechnologies.

Pedagogical innovatics

Pedagogical innovatics is a section of pedagogy that studies the nature, patterns of emergence and development of pedagogical innovations in relation to the subjects of education, as well as providing a connection between pedagogical traditions and the design of future education.

The key concepts of pedagogical innovatics are: pedagogical innovation, innovation, innovation process, innovative pedagogy, innovation activity, innovation.

The object of pedagogical innovatics is the process of emergence, development and mastering of innovations in the education and upbringing of students, leading to progressive changes in the quality of their upbringing and development.

The subject of pedagogical innovation is a set of pedagogical conditions, means and patterns associated with the development, justification of the effectiveness, and development of pedagogical innovations in pedagogical activity. Pedagogical innovation is based on taking into account the personal characteristics of students using the modernized pedagogical tools of teachers. The issues of pedagogical innovation are being studied at the Institute of Pedagogical Innovations of the Russian Academy of Education, at the scientific school of A. V. Khutorsky [2]. The structure of pedagogical innovatics is shown in the public diagram [3].

Innovatics as a new toolbox of skills for innovative production managers [4]

In this article, a metaphorical "toolkit" for innovatics — a new set of skills for managers who specialize in managing innovation and studying innovation is described. The importance of quantitative skills, interdisciplinary inspiration, and heuristic methods for creating innovative solutions is emphasized, as well as the need for knowledge of organizational behavior to create an environment conducive to innovation in the workplace.

Innovatics is defined as a new term introduced to highlight the challenges that arise in today's social and economic reality, in a world of inter-connectedness, vast and easily accessible databases, open borders, and the butterfly effect. At the same time, the most distant and local phenomena can be connected by seemingly weak indirect connections, when a trivial change in one phenomenon can give rise to unexpectedly powerful nonlinear cascades of distant effects. In such a reality, innovation is the fuel of technical and social progress. They spread through networks, and development is fueled by innovation, which are the basic building blocks of economic life. Therefore, innovation is important and it is necessary to know not only how to manage it, but also how to study it and how to discover the laws that govern it.

It is suggested that innovatics has a wider scope and requires a wider range of skills than traditional innovation management. The purpose of the article is to explore the question, how should innovation managers be trained to prepare them for work in the industry? This is a particular case of the problem of teaching innovative thinking or incorporating the practical relevance of manufacturing management topics into college curricula. E-learning can also be an effective and satisfying method, i.e. in teaching industrial engineering students if certain conditions are met — the right mix of human interaction and IT.

Also, the term innovation is found in the names of various companies and organizations that conduct innovative activities.

Innovatics of higher education

Most of the innovative changes in higher education are related to academic capitalism and are based on market principles. It is necessary to show and prove that all innovative changes and innovative activities in all areas of higher education are in demand by the constant social and economic development of society and are implemented in the environment of academic capitalism with market relations. This means that they entirely depend on the requirements of the markets for educational and scientific services (local, regional, national, international), are in constant competition, belong to the economic category, and largely depend on the organiza-

tional and legal framework for their implementation.

Obviously, absolutely all types of activities in the field of higher education and science can be subject to innovative changes and transformations. Therefore, it is necessary to study, classify and develop innovative achievements in the field of higher education and science. To further study and determine the innovative directions of the reform of higher education it is necessary to create and implement a scientific and applied system that combines theoretical and practical approaches to the innovative development of higher education. It can be quite reasonable to propose the development of a new scientific direction in the field of higher education — “innovatics of higher education.” The main concept of innovatics of higher education is: all innovations in all spheres of higher education take place in the environment of academic capitalism and are based on market principles. Theoretical foundations and practical issues of higher education innovatics include innovative changes in a number of activities: teaching, training, and studying; R&D, engineering, IT and technologies development, project activity and design creativity; managerial, organizational, legal, financial, and economic support of the educational process, activities development and business expenses; inventive and patent-licensing activities, technology transfer, academic/university entrepreneurship; cultural and moral development and upbringing of human values; sports, recreational, festive and extracurricular activities including other types of university activities.

Thus, innovatics of higher education includes innovative changes in almost all areas of higher education to enhance the quality training of professionals and responsible citizens of the modern community. More innovations can guarantee financial independence, economic stability, and competitiveness for a university's development. This will be useful both for reforming the higher education systems and for the further development of university R&D in any country.

The main purposes of the published works of the authors [5–8] of this article are the introduction into scientific circulation and further development of the concept and fundamentals of the innovatics of higher education; to concretize and define its tasks as an applied scientific direction in the field of higher education and science;

to identify features and directions of its application.

At the same time, it is very important to note that, unlike pedagogical innovatics, higher education innovatics is the brainchild of academic capitalism and studies market-oriented innovation processes that have spread to the field of higher education. This is the main difference between higher education innovatics and pedagogical innovatics (studied and structured in the Russian Academy of Education). Moreover, pedagogical innovation can be considered an integral part of higher education innovation.

Conclusion

It is shown and proved that all innovative changes and innovative activities in all spheres of higher education are demanded by the constant social and economic development of human society and are implemented in the environment of academic capitalism with market relations. They absolutely depend on the requirements of the markets for educational and scientific services — local, regional, national, and international, are in constant competition, belong to the economic category, and largely depend on the organizational and legal framework for their implementation.

Innovatics of higher education studies and developing innovative changes in almost all areas of higher education to enhance the quality training of professionals and responsible citizens of the modern community. It is shown that innovations can guarantee financial independence, economic stability, and competitiveness for a university's development. This will be useful both for reforming the higher education and science systems and for the further development of universities and college's R&D in any country.

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Романовський О. О., Романовська Ю. Ю.,
Романовська О. О., Ель Махді М.

Уточнення поняття “інноватика вищої освіти”

Стаття присвячена уточненню поняття “інноватики вищої освіти”. Проаналізовано приклади використання терміну “інноватика” в інших сферах та випадки його застосування. Розглянуто формування сучасної теорії інноватики, педагогічної інноватики та інноватики як нового інструментарію навичок керівників інноваційного виробництва.

Ключові слова: *інноватика, інноватика вищої освіти, академічний капіталізм, педагогічна інноватика, інновації, інноваційна діяльність*