

MAIN CONCEPTS OF HIGHER EDUCATION AND SCIENCE INNOVATICS

Academic capitalism, which is based on university entrepreneurship and also on the commercialization of R&D results of research institutes and laboratories, has created optimal opportunities for the development of innovative activities in the field of higher education and science (HE&S). HE&S innovatics studies the economic, scientific, technical, organizational, and educational aspects of innovative activity both in the entire sphere of higher education and science and in its structural elements – higher educational institutions, scientific institutions, and research organizations. In another words, the objects of study in HE&S innovatics are the sphere (field, industry) of higher education and science, and its components – higher educational establishments (universities, institutions, colleges) and scientific-research institutions.

The subject of study in the innovatics of higher education and science is – the educational (training) process; the upbringing of students; fundamental and applied R&D, creating and implementing of new techniques and technologies, an educational or scientific service, and all items that belong to these activities.

1. Concepts of HE&S Innovatics

The concepts of innovation and entrepreneurship are among Schumpeter's most outstanding contributions to economic theory. And, of course, one of the most important themes in Schumpeter's writings was the role of innovation or “new combinations” and entrepreneurship in economic growth. In the "Theory of economic development" [1] and further work [2-3], Schumpeter described the development as the historical process of structural changes, substantially driven by innovation which was divided into five types [31

1. Launch of a new product or a new species of already known product.
2. Application of new methods of production or sales of a product (not yet proven in the industry).
3. Opening of a new market (the market for which a branch of the industry was not yet represented).
4. Acquiring new sources of supply of raw material or semi-finished goods.
5. New industry structure such as the creation or destruction of a monopoly position.

Thus, for Schumpeter, innovations are novel combinations of knowledge, resources, etc. subject to attempts at commercialization – it is essentially the process through which new ideas are generated and put into commercial practice.

The theoretical foundations of innovation proposed by J. Schumpeter are also fundamental for HE&S innovatics theory. Also, Everett M. Rogers made a great contribution to the development of the theory of diffusion of innovations [4-5].

Considering works, devoted to the theory of innovation, it would be desirable to note the following publications. The Oslo Manual [6] is one of the universally used guidelines for collecting and analyzing innovation performances. The article [7] examines innovative business models developed by entrepreneurs outside of higher education institutions (in the field of educational technologies). The main elements of innovative business models in the field of “edtech” startups in the field of higher education are analyzed and the most original teaching and learning practices are identified.

In the publication [8] are shown that: a) the student’s vision of the landscape of higher education contributes to institutional support for management and quality assurance; b) innovation is not simply based on technology but on the use of new technologies to more fully and effectively achieve the goals of (higher) education for all.

The works [9-11] present the theoretical and practical foundations of innovatics.

The article [12] is devoted to clarifying the concept of “higher education innovatics” and considering the examples of the use of the term “innovatics” in other areas and cases of application – in the formation of the modern theory of innovatics; in pedagogical innovatics; and also in the innovatics as a new toolbox of skills for innovative production managers.

This article briefly presents the main formalized concepts, theoretical foundations, and models of innovation in the field of HE&S. It is important to note that fundamental theoretical, methodological, applied, and practical foundations and concepts of the science of “innovation” can be used to a greater or lesser extent in the study of HE&S.

The theory and practical implementation of HE&S innovatics can include the following main sections of innovative activity in the sphere of innovatics of higher education [12]:

- ❖ The concept of HE&S innovation activity.
- ❖ Theoretical bases of HE&S innovation activity.
- ❖ Models and modeling of innovative processes.
- ❖ Organization and management of innovation activities.
- ❖ State regulation of innovation activity.
- ❖ Commercialization of the results of scientific, technical, and creative activities and management of the innovative.

- ❖ Innovation project management.
- ❖ Investment management in innovative projects.
- ❖ Human resource management in the process of innovative development of the sphere of higher education and science as an integral part of the socio-economic system.
- ❖ Risk management in innovation.
- ❖ Technical marketing (marketing in the early stages of a product or technology life cycle).
- ❖ Logistics of innovative processes.
- ❖ Innovative methods of environmental protection, ecological and resource-saving technologies.
- ❖ Intellectual property management.

Let's consider the definition of key concepts of the HE&S innovation activity. We will carry out our consideration using as a base definitions and concepts from the Eurostat Dictionary of Science and Technology [13].

It should be noted that the HE&S innovation framework is a fundamental set of theories, practices and tools that help higher education and research institutions generate ideas, evaluate them and turn the best ideas into added value in the sphere of academic business (in the field of educational and research activities).

1). HE&S innovation activity.

HE&S innovation activities are all scientific, technological, pedagogical, psychological, organizational, environmental, life-protection and resource-saving, financial and commercial steps which actually, or are intended to, lead to the implementation of innovations in the field of higher education and science. Some HE&S innovation activities are themselves innovative; others are not novel activities but are necessary for the implementation of innovations. HE&S innovation also include research and development (R&D) innovations that are directly related to the development of a specific innovation.

A common feature of a HE&S innovation is that its results must have been implemented. A new product or improved HE&S innovative product is executed when it is introduced to the educational and scientific market. New (innovative) product, processes, marketing methods or organizational methods in HE&S are implemented when they are brought into actual use in the universities, colleges, institutions, and educational and R&D firm's operations.

HE&S innovation activities vary greatly in their nature from one educational or scientific establishment to another. Some establishments engage in well-defined innovation projects, such as the development and introduction of a new innovative product, whereas others primarily make continuous improvements to their products, processes and operations. Both types of establishments can be innovative: an innovation can consist of the implementation of a single significant change, or of a series of smaller incremental changes that together constitute a significant change.

2). HE&S product.

HE&S product consists of the result of scientific research or university studying/education, and/or educational or scientific service. It also includes scientific and applied research, technical and educational pedagogical characteristics, necessary components and materials, embedded software, user-friendliness, methodological issues, and other functional characteristics.

The product may use knowledge or technology or may be based on applications or combinations of existing knowledge or technology.

The term "HE&S product" is used to cover both the results of research and scientific and pedagogical services and include the introduction and use of R&D results and scientific and pedagogical services on the educational and scientific market.

3). HE&S new (innovative) product.

A new (innovative) HE&S product is an R&D result or an educational or scientific service that differs significantly in terms of its characteristics or purpose from products previously produced by the educational, or scientific establishment.

Developing a new use for a HE&S product with only minor changes in its technical characteristics is a product innovation.

An HE&S novel product is a new or improved product not, only new for the establishment, but also for the educational and scientific market.

4). HE&S innovation.

HE&S innovation is the use of new educational or scientific ideas, products, or methods that have not been used before. For the Community Innovation Survey (CIS), an innovation is defined as a new or significantly improved product (good or service) introduced to the market or the introduction of a new or significantly improved process in an enterprise [14].

HE&S innovations are based on the results of new educational, scientific, or technological developments, new combinations of technologies, or the use of other knowledge obtained by the institution. Innovations can be developed by an innovative educational or scientific institution or another establishment. However, the pure sale of innovations entirely produced and developed by other institutions is not considered an innovative activity of the establishment, nor is the introduction of products with purely aesthetic changes.

The innovation must be new to the institution concerned: for product innovation it need not be new to the market, and for process innovation the institution need not necessarily be the first to introduce the process.

Establishments that carry out innovative activities cover all types of innovators, including educational or scientific product and process innovators, as well as those establishments that carry out only ongoing and/or

discontinued innovation activities. The share of institutions that carry out innovative activities is also called the propensity (tendency) to innovate.

HE&S product innovation is the introduction to the market of a new or significantly improved educational or scientific product or service.

A HE&S process innovation is the introduction of a new or significantly improved educational or scientific process, distribution method, or support activity for R&D results or services.

5). Research and development (R&D).

Research and experimental development, is carried out in the HE&S field by universities, colleges, and scientific institutions using the newest research methods, techniques, and technologies. R&D is innovative because it leads to new discoveries and advances in basic and applied research. R&D carries out new design developments and improves existing outcomes. According to Commission Implementing Regulation (EU) "Research and experimental development (R&D) includes creative and systematic work carried out with the aim of increasing the stock of knowledge – including knowledge about humanity, culture, and society – and developing new applications of existing knowledge" [15].

6). HE&S product innovation.

HE&S product innovation is the implementation of the results of scientific research or educational or scientific services that are new or significantly improved in terms of their characteristics or intended use. This includes significant improvements in technical characteristics, components and materials, embedded software, user-friendliness, methodological or pedagogical issues, and other functional characteristics.

Product innovations may use new knowledge or technology or may be based on new applications or combinations of existing knowledge or technology. The term "HE&S product" is used to cover both the results of research and scientific and pedagogical services. HE&S product innovations include both the introduction of new R&D results and scientific and pedagogical services, as well as significant improvements in the functional or user characteristics of existing R&D results and educational services on the educational and scientific market.

7). HE&S process innovation.

HE&S process innovation is the implementation of new or significantly improved R&D results or delivery of novel methods in educational and scientific activity. This includes significant changes in R&D, techniques and technologies, education and research methods, equipment, software, etc.

Process innovations can be intended to decrease unit costs of production or delivery of R&D results and education activity, to increase quality, or to produce or deliver new or significantly improved products.

Process innovations include new or significantly improved methods for the creation and provision of services in the sphere of HE&S. They can involve significant changes in the techniques and technologies, education and research methods, equipment, and software, used in services-oriented institutions or in the procedures or techniques that are employed to deliver services.

Process innovations also cover new or significantly improved techniques, equipment, and software in ancillary support activities, such as management, marketing, accounting, computing, advertising, students and personal recruiting, purchasing, and maintenance. The implementation of new or significantly improved information and communication technology (ICT) is a process innovation if it is intended to improve the efficiency and/or quality of ancillary support of establishment activity and scientific and educational process organization..

8). HE&S marketing innovation.

HE&S marketing innovation is the introduction of a new method of marketing, which involves significant changes in the institution's organization of scientific research, design and development, and educational and upbringing activities in order to obtain competitive and high-quality results that can interest users. It is important to highlight and disseminate the innovative achievements of a scientific institution or educational establishment; design materials regarding the achievements and advantages of the institution's activity in the market of educational and scientific services, high level of employment of graduates; innovative advertising and positive feedback from employers; informing potential users about further development of the institution, etc.

It is necessary to apply the latest approach HE&S to the further promotion of the establishment to the international educational and scientific markets and innovative methods of pricing in the institution.

Marketing innovations are aimed at better meeting customer needs, opening or capturing new markets, and repositioning HE&S of the institution's product on the markets with the aim of increasing student recruitment and strengthening the material and financial condition of the establishment.

A distinctive feature of a marketing innovation compared to other changes in an institution's marketing tools is the introduction of a marketing method that the institution has not used before. It should be part of a new marketing concept or strategy that represents a significant departure from the establishment's existing marketing methods. A new marketing method may be developed by the innovator institution or adopted by other institutions or establishments. New marketing techniques can be applied to both new and existing HE&S products.

9). HE&S organizational innovation.

An organizational innovation is the implementation of a new organizational method in the educational establishment or scientific institution business practices, workplace organization, or external relations.

Organizational innovations can be intended to increase the establishment or an institution's performance by reducing administrative costs or transaction costs, improving working and study conditions, expanding professors' scientific potential and professional internships, flexible system of bonuses for high-performance, and improving

workplace satisfaction (and thus labor productivity), gaining access to non-tradable assets (such as non-codified external knowledge) or reducing costs of supplies.

The distinguishing feature of an organizational innovation compared to other organizational changes in an educational establishment or scientific institution is the implementation of an organizational method (in business practices, workplace organization, or external relations) that has not been used before in the firm and is the result of strategic decisions taken by management.

10). Innovatively active educational organization or scientific institution.

An innovatively active educational organization or scientific institution is one that conducted innovative activities during the period under review, including those that continued or ceased such activities.

Educational organizations or scientific institutions that carried out innovative activities during the period under review, regardless of whether this activity led to the introduction of innovation, are innovatively active.

11). Innovating educational organization or scientific institution.

Innovating educational organization or scientific institution is one that has introduced new or improved products or services on the educational and scientific market or new or improved processes. Educational organization or scientific institution can have innovation activity without introducing an innovation on the market (it may either have unsuccessful, or not yet completed, innovation projects).

2. The innovation process.

An innovation process is a set of steps between an idea's conception and its implementation. It is a streamlined process that is managed in a way that reflects a company's structure and innovation goals.

A process innovation is the implementation of a new or significantly improved production or delivery method. This includes significant changes in techniques, equipment and/or software.

The innovation process begins with a felt need for change and culminates in its successful implementation. Key process stages include the generation of ideas, the development of the most promising, and their acceptance by relevant parties.

That is why an innovative process is the translation of an idea into goods or services that create value. In business, innovative processes can help products or services seem more appealing to customers and may increase an organization's competitive advantage.

As a rule, there are six stages in the process of innovation: generating ideas, capturing ideas, beginning innovation, developing a business-effectiveness strategy, applying business improvement, and decline.

Running a successful innovation process in the following ten steps [16]: Step 1: Define innovation. Step 2: Define the goals. Step 3: Assemble your team. Step 4: Secure the budget. Step 5: Create diverse teams. Step 6: Select collaboration tools. Step 7: Don't be afraid to take risks. Step 8: Implement incrementally. Step 9: Evaluate and improve. Step 10: Work on your culture of innovation.

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ПРИВАТНО-ДЕРЖАВНЕ ПАРТНЕРСТВО В ОСВІТІ ДЛЯ РОЗВИТКУ КОМПЕТЕНЦІЙ ПЕРСОНАЛУ ВІДПОВІДНО ВИМОГ INDUSTRY 5.0

Цифрові трансформації та вже окреслений перехід до Industry 5.0 вимагає від працівників не лише сучасних знань, а й інновацій та креативного мислення, здатності до перекваліфікації та адаптації, слідування за цифровими трансформаціями у професійній діяльності, тобто модернізації [1]. Індустрія 5.0 ліквідує певні робочі місця, разом з тим створює навіть нові професії з вимогами щодо нових навичок. Узгодження цих процесів знаходиться в площині перетину інтересів як самого працівника і його роботодавця, так і освітніх закладів та держави в цілому.

Перед освітою стоять завдання і підготовки фахівців для перспективних вимог ринку, і адаптації персоналу до кваліфікаційних потреб сучасного етапу технологічного розвитку.

Концепція «Освіта впродовж всього життя» є реальністю і всі учасники процесу мають адаптуватись до цих умов.

У Європейській програмі навичок [2] співпраця зацікавлених сторін, державні та приватні інвестиції вказані як важливі фактори для підтримки доступного підвищення кваліфікації та перекваліфікації працівників протягом усього життя.

Значний потенціал реагування на зазначені виклики мають ДПП у сфері освіти, які зосереджуються на формуванні комплексного підходу до розвитку навичок.

Основні тенденції розвитку ДПП досліджено в дослідженнях міжнародних інститутів [2-5], зарубіжних та українських вчених [6-8]. Аналітики досліджують перспективні тенденції розвитку ринку праці та вимоги щодо ключових навичок [2]; роль ПДП у реалізації сучасної політики у сфері освіти [6, 7]. Значення ПДП для розвитку інноваційно-інвестиційної політики України розкрито в праці [8].

Метою дослідження є систематизація умов, чинників та форм ДПП у сфері освіти.

Розвиток освіти в багатьох країнах відбувається на основі державного чи приватного фінансування. І хоча держава залишається основним фінансистом приватна освіта знаходить поширення. Тобто в багатьох країнах це два конкуруючих напрями освіти.

Тенденція формування ДПП в сфері освіти сформувалась на початку 1990-х років в таких країнах як Данія, Бельгія, Нідерланди. В останні роки в країнах ЄС зростає кількість ДПП у сфері освіти [4]. Якщо порівнювати з іншими секторами, в яких створювались ДПП, то освіта стала об'єктом лише в останні роки. В останні роки в багатьох країнах активно досліджують ДПП в сфері освіти як спосіб зміцнення та укріплення своїх освітніх систем.

Так, в США створена організація «Партнерство для навичок 21 століття», яка об'єднала бізнес-спільноту, лідерів освіти та політиків, щоб визначити потужне бачення освіти 21-го століття та забезпечити, щоб учні виходили зі шкіл із навичками, необхідними для того, щоб бути ефективними громадянами, працівниками та лідерами 21-го століття.

Партнерство в освіті можна вважати інноваційним підходом щодо пропонування освіти для всіх, що особливо важливо з точки зору відкриття нових освітніх можливостей для найбільш уразливих верств населення.