

Mechanism of the Innovation Development in the University

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Abstract. Emergence of the new education as a global phenomenon rather than a local or national one has been prompted by the awareness of the planetary scale of the environmental, economic and political challenges of the 21st century as well as by the ongoing trend toward the globalization of the economic, political and cultural life. For this reason, the elaboration of the mechanisms of the innovation development in the universities has become an urgent need of the modern society. In this case, the innovation development of a higher education establishment is perceived as a goal-driven process of the university transformation by means of building up the innovation infrastructure and integration of the education, science and business with the purpose of developing technologies of the future and, thus, acquiring new competencies by the mutual effort of the university staff, students and administration managing the educational process.

1. Introduction

In the 21st century, any targeted reform in the education system has to reckon with economic, environmental and global social challenges and provide access to the global knowledge. Herewith, a global transformation of the education systems is inherently driven by the following factors:

- increasing complexity of the socio-technical systems (information, telecommunication, transport, electric, public service and mass production systems, etc.); condition of the socio-economic, political and cultural environments that often acquire the VUCA features (volatility, uncertainty, complexity, ambiguity) [1] and growing demand for new skills and knowledge (competencies for the future);
- deterioration of the modern education system caused by its rigidity, low responsiveness to transformation and continuous investment into the industrial models of education and regeneration of the out-of-date teaching methods that fail to prepare the society for the challenges of the 21st century;

- active development of the information and communication technologies, mathematics, cognitive sciences, biopharmaceutics and other interdisciplinary sciences that provide for the outstanding mobility, capability of big data processing, automation of certain cognitive processes in the systems of artificial intelligence and new methods of individual and collaborative learning and development based on these tools.

These factors create ideal conditions for an open personal (networked) education based on the up-to-date advanced content, network of multiple education providers, cooperation between the students and the teachers and motivating interactive learning environment and space. Acquiring these features would allow the education systems to be more flexible, versatile, personalized and, at the same time, more and more globalized.

The industrial model of the so-called ‘assembly-line’ education was workable for the mass workforce training as it taught skills satisfying the needs of the industrial (factory-based or assembly-line) economy and industrial urban society. The major socio-economic changes of the 21st century have greatly undermined the industrial model; thus, different actors and process participants within the system and beyond acknowledge that “the education system has outlived itself” [2].

However, the destructive impact of the education system on the collective capacities of the society is, in fact, often underestimated. The criticism of the current situation usually concerns the failure of the system to build the competencies most sought after on the labor market, for instance, programming, engineering and administrative skills. In the meantime, it is evident that the transformation of the society and economy under the influence of the megatrends creates a much greater demand for ‘the competencies for the future’.

2. Methodology

The gap between the existing models and the changing needs of the society is getting bigger, which signifies the indispensability of a radical change in the educational paradigm. The flow of the technological and social innovations and diffusion of new global technological, financial and environmental standards lead to the elimination of many traditional sectors of employment and contribute to the emergence of new fields of specialization. This results into the massive demand for the ‘competencies for the future’ that would allow the people to successfully perform in the conditions of the expected socio-economic and technological changes. Accordingly, higher education establishments are obliged to introduce the mechanisms of innovation development in order to enhance their competitive advantages on the global market of education services.

3. Discussion and results

The competencies for the future are usually understood as competencies that include both professional (hard) skills and knowledge related to the transformations in the technologies and work organization and non-technical (soft) competencies and common sense that are applicable in nearly any field of employment as well as social and personal situations. These competencies include:

- competencies and knowledge that help overcome the fundamental changeability, uncertainty, complexity and ambiguity of the future, including the competencies of cooperation, creativity, entrepreneurship, etc. as well as the competencies connected with improving individual stress tolerance and ability to understand and/or practice various scenarios of the future in real life and develop adequate strategies of individual and collective actions [3];
- competencies and knowledge that help cope with the increasing complexity of the civilization, including systems thinking, ability to find solutions and see new opportunities [4];
- knowledge and competencies that help live in the world of information and communication technologies, including basic programming skills, information search, procession and analysis skills (information mapping), information and media literacy, etc. One of the key skills is attention control, a basic skill allowing to focus one’s attention and stay engaged when dealing with information overload [5];

- knowledge and competencies that lie beyond the scope of machine work, including emotional and interpersonal intelligence, body/kinesthetic intelligence and naturalist intelligence as well as ability for joint creative effort [6].
- knowledge and skills connected with goal-oriented multidisciplinary and striving for perfection in various fields of work and life [7].

It has to be borne in mind that education systems are ‘reflexive’ by nature. Each element of the education models (starting from the teachers’ performance and organization of the learning environment up to the content of the educational programs and principles of the administration of higher education establishments) carries an educational message for the learners and defines the educational outcomes.

The learners are hardly expected to be preparing for the world of tomorrow unless the learning environment and processes reflect the values and social organization of the future.

For instance, it would be hardly possible to:

- teach people to cooperate and collaborate provided we work with them individually or make them compete on a regular basis;
- teach empathy and emotional intelligence provided the emotional component is excluded and the main focus is on the cognitive skills;
- teach people how to be lifelong learners and achieve the set educational goals provided that from the first day we deny them any opportunity for independent research and destroy their endeavor to learn, provided we do not allow them to make their own educational program, pursue their interests (which includes withdrawal from the uninteresting fields) and provided they are punished once they do not conform to the criteria of success;
- teach people to adequately use resources of the new media technologies or follow the rules of the information hygiene provided we restrict their access to the information and communication technologies in the universities (which also includes the ban on use of personal communication devices);
- teach people to live in harmony with the biosphere provided we regularly deprive them of the contact with nature and some educational courses describe nature solely as a resource;
- teach self-awareness and noospheric thinking provided the teachers themselves lack these qualities, etc.

When analyzing the degree of conformity of the educational goal and educational means (processes, methodology, teachers’ competencies and mindset), the education system appears to be dysfunctional in too many aspects [8]. Instead of training professionals for the future, the system makes them fall behind and crawl in the past imposing obedience, executive rather than creative work, standardized working processes, competitive working environment, etc.

Today, the role of the education as a transformative power of the society is being underestimated as it is rather considered as a mechanism serving the needs of national economies [9]. However, education has a capacity not only to serve the current and emerging needs of the society but also to become a transformative gear for this society, unlock its potential and restore the balance with other global systems of the Earth. In fact, here humanity faces a choice – education systems of the future will, first of all, either serve the needs of the current economic, social and political agenda (e.g., cutting deficit in skills on the labor market and improving national competitive power) or they will transform into education ecosystems creating new opportunities for collective life (e.g., the sharing economy and nature-like saving economy).

The mission of education is to develop the potential of the learners in order to work together on finding solutions to the fundamental problems of sustainable development of the modern civilization and transition towards the planetary civilization. Apparently, education can and should be the source and driving force of the transformation of the society focusing on working out global solutions to global problems. It should be mentioned that an attempt to place education in the position of a secondary resource and adjust the system of higher education to the labor market has proven to be inefficient in the whole world. In particular, this is explained by the fact that the educational

(professional training) cycles and cycles of technological transition are absolutely out of sync and often diverge; thus, modern education falls behind the technological progress.

On the other hand, a radical shift from the conventional higher education to the practice-oriented one does not have an expected result due to the fact that equipment and technologies develop rapidly and getting a fundamental education is a primary requirement to be able to operate any kind of equipment [10].

In this regard, another topical issue is elaboration of the innovation development mechanisms for universities in the abovementioned conditions. The innovation development of a higher education establishment is perceived as a goal-driven process of the university transformation by means of building up the innovation infrastructure and integration of the education, science and business with the purpose of developing technologies of the future and, thus, acquiring new competencies by the mutual effort of the university staff, students and administration managing the educational process.

The mission of the innovation development in the university should be put as sustainable socio-economic development by means of the rapid development of the quality of the humans and the quality of education and generation of advanced knowledge as mechanisms of enhanced economic and social reproduction.

The specific nature of the innovation development in the universities is defined by the need to meet several objectives:

- making allowance for the ongoing technological transformation of the economy;
- making allowance for the strategic foci of state policy in education;
- making allowance for the economy and society becoming largely knowledge-intensive, intelligence-intensive and education-intensive;
- making allowance for the changing patterns of role balance in the education process (teachers and learners) [11].

In order to successfully meet the objectives, innovations have to be developed and implemented in all the fields of a higher education establishment's activity. Nevertheless, innovation development of a higher education establishment fails without building up the innovation infrastructure [12-14]. The goals of the innovation infrastructure are to provide for the modernization and development of the educational area taking into account the perspectives and major trends of the socio-economic development of the Russian Federation in the long period, implementation of the Russia's state policy priorities in education, integration of the Russian education system into the system of international education and improved satisfaction of the citizens' needs in education. For a higher education establishment, the goal of the development and implementation of the innovation technologies equals to creating premises for further transformation and transition to a highly competitive education establishment which will:

- provide for the qualitative change in the educational process allowing for the multidimensional development of the future professionals in conformity to the needs of the modern market;
- create conditions for knowledge production as a unique form of intellectual capital;
- provide for the generation of business ideas that are in high demand on the market;
- fully take into account the public interest of different groups of the population.

Nevertheless, it is noteworthy that the development and implementation of innovation technologies in the university are influenced by both external and internal factors:

- economic (lack of financing, outdated material support, equipment and logistics system);
- demographic (decline in demand for education services due to the demographic pitfall accompanied by market saturation with education services);
- social (inefficient system of the diffusion of innovations);
- legislative (United Russia initiated the project "The National Innovation System of the Russian Federation" as far back as in 2009; however, the system has not been established to date [15]);

- academic (emerging systemic contradiction between the organizational and academic conventions and innovative methods);
- institutional (strict regulation of the administrative system of the universities, which leads to the inevitable conflict between the academic bureaucracy and creative potential of the university);
- time-related (implementation of the innovations and diffusion of the positive experience require time so that the system could adopt the innovation).

One of the key principles of the innovation development in the university is the principle of student-centeredness. In fact, this principle means reorientation of the education process from the initial benchmarks (period of education, contents, goals set for the educational organization and the teachers) towards progression and learning results – the competencies of the graduates as a result of the educational process.

Thus, student-centered educational process focuses on the personal characteristics and needs of the students, individual work and self-reflection and greater responsibility of the students for their own learning results [16]. The concept of student-centeredness implies that everything in the educational organization is made for the students: the contents and organization of the educational process are upgraded, new technologies are implemented and best teachers are hired, which contributed to the favorable conditions for education and recreation.

It is reasonable to say that the students are the main consumers in the educational process and also the stakeholders of the educational activity; and this is the task of the teacher to become a kind of a student's assistant who exposes him to knowledge and skills. Hence, it can be ascertained that adopting this principle will contribute to the innovation development in the university.

Other basic principles include [17]:

- integrity of the research and educational processes and their focus on the innovation development of the university;
- natural combination of the fundamental, exploratory and applied research with the competitive business ideas having commercial potential;
- support of the leading R&D centers and teams and young researchers that are capable of maintaining high level of research and education;
- resource concentration in the priority research and development areas that target production of finished goods;
- integration of the research and education into the international community.

Studying the experience of domestic and foreign universities [18-20] that implemented the strategies of innovation development allows setting the objectives that have to be met in order to achieve the abovementioned goal:

- unification of the data formats that are generated by the universities in the process of their activity as well as unification of the integration protocols of the administrative and support services of various activities developed by the universities;
- organization of the network cooperation and dissemination of the best online courses, recommendations on using digital services and approved solutions in the area of digital architecture and design for universities;
- establishing the database accounting system, new intelligent services and predictive analytical systems supporting daily activities of the university as the results of the intellectual activity that have their authors and owners; the authors' and owners' rights protecting the intellectual property in this area to be guaranteed [21].
- establishing a specialized center of innovation support responsible for the coordination of the information sources about grants, the main purpose of the center being educating the staff on the use of information resources and increasing their competitive power.
- taking measures that would result in adopting the principles of project management in the university and its academic subdivisions;

- organization breakdown and encouragement of the delegation of authority in order to support the leaders who take responsibility for the exertion of the delegated power. Delegation of authority to the project teams when it concerns the organization processes of the research and innovation projects, which provides for the necessary autonomy and allows to engage students, post-graduates and other contractors (receiving the wages for their work) in the project and develop the interdisciplinary character of the research [22];
- developing efficient financial tools for project and research support that would provide for the necessary financial independence of the project teams, which also concerns allocation of the research project budgets;
- preparation of all the structures and academic staff for the implementation of the innovative technologies.

Thus, Figure 1 shows the mechanism of the innovation development of the university.



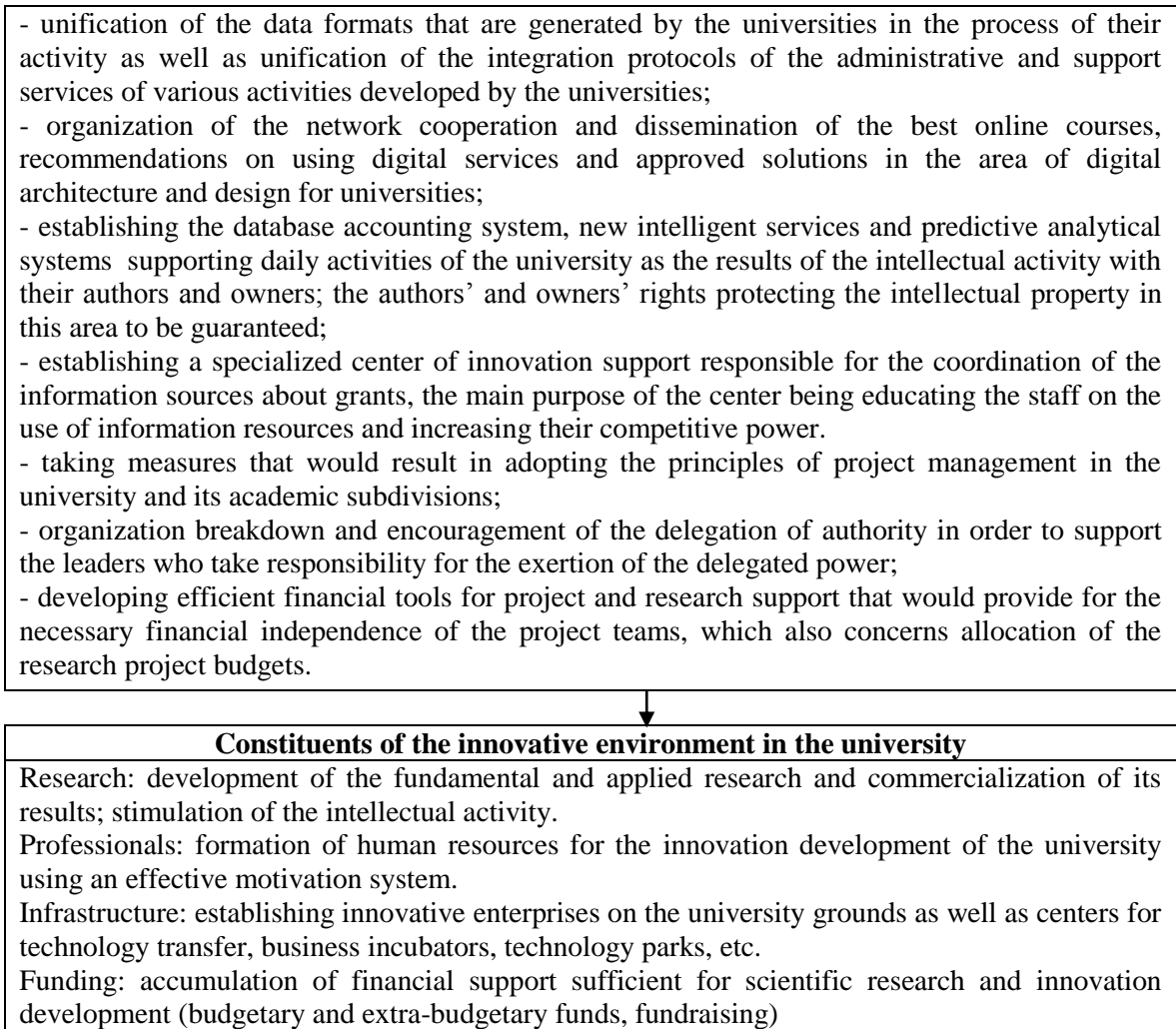


Figure 1. Formation of the mechanism of the innovation development in the university.

4. Conclusion

Implementing the set objectives on the basis of the selected principles and taking into account the factors of the internal and external environment makes a permanent mechanism of the innovation development in the university provided all the administrative, educational and research processes are digitized. Accordingly, the educational processes have to extensively use the technologies of gamification and microlearning (a new educational format when the learning process is divided into short-term learning activities) as well as video content with the option of augmented reality which helps better understand the structure and functioning of the objects and has the following advantages:

- visualization: the technology allows seeing the smallest details, zoom in, zoom out and interact with the object and facilitates the studying of the nuclear phenomenology, cell structure, molecular structure, architectural structures, etc.;
- safety: one can learn and get insight on the nature of various phenomena without the fear of breaking or damaging things;
- this method is cheaper than using virtualization technologies.

Hence, the mechanism of the innovation development in the university lies in creating the innovative environment including all the business development processes of its constituents (research, professionals, infrastructure and funding) provided well-designed goals are set on the basis of the

defined principles, the impact of the internal and external factors is accounted for and the principle of the pervasive digitalization is followed.

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