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A SYSTEMIC APPROACH TO SCIENCE, EDUCATION AND INNOVATION POLICY IN UZBEKISTAN

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A R T I C L E I N F O.

Keywords: "science", "education" and "innovation", "knowledge triangle", basic functions of universities, knowledge transfer system, National Innovation System.

Abstract

The article is devoted to the formation and development of the innovation system of the Republic of Uzbekistan. The article analyzes and describes the inevitability of combining three previously independent complex systems "science", "education" and "innovation",the causes and factors influencing the formation and development of the innovation system, problemsand solutions, points out that universities can provide competitive advantages of enterprises in the short and long term, the innovation process in the economy and are one of the drivers of innovation in the country. Uzbek model of creation NIS is analyzed.

Subject: The main reason for the deep transformation processes that most countries are undergoing today is the sharply accelerated, especially during the second half of the twentieth century, progress of knowledge, the increase in its volume, the volume of information, and the consequent gradual transition to a new paradigm of social development. The globalization of the economy, as well as constant technological changes, the revolution in information and communication technologies and the rapid pace of social change caused by them, are accompanied by an increase in the mobility of labor and capital and the creation of a society in which knowledge is of particular value.

This makes the merger of the three previously independent complex systems of "science," "education," and "innovation" inevitable. The unification is based on system principles, taking into account the uniqueness of each system and in their close interaction.

The high degree of complexity of the new formation of "science - education - innovation" or "Knowledge Triangle" makes us think about the ways of interaction between its constituent subsystems, among which universities play an important role. The increase in their role during the formation of a knowledge-based economy has been noted by many researchers[1].

Universities are unique in that they are producers, distributors, keepers and users of knowledge and information, i.e. they hold the key to knowledge-based economy. The "knowledge triangle" model implies not only strengthening the educational, scientific and innovative components, but also strengthening the links between them, as well as scaling the associated positive externalities. Therefore, the traditional notion of knowledge production in universities as a linear and sequential process should be abandoned in favor of a systematic approach to scientific, educational and innovation policy. The "knowledge triangle" concept formalizes the links between the traditional "basic" functions of

universities - teaching, research and public activities. In this model, by implementing educational programs and research projects, universities generate knowledge, and multifaceted interaction with the general public helps them find application in creating new products, processes and services. The "knowledge triangle" is formed as a result of the interaction of the three mentioned functions of universities through the bidirectional circulation of knowledge flows between them.[2]

Methodology. Purpose and objectives . How to link knowledge creation with innovation activity?Because of its inclusiveness, the concept of the "knowledge triangle" is seen as an attractive framework for policies that aim to link knowledge creation to innovative activity. However, it provides limited insight into the specific ways in which such interactions can be deployed and managed, due to differences in the economic structure of countries and the functions of universities.

In developed countries, universities and education in general are important for finding solutions to common problems of adapting to a market economy and for the development of scientific and technological progress.

Universities in Uzbekistan have yet to find their place in this process. Sustainable economic growth and living standards of the country's population depend on the ability of society to produce new knowledge and implement economic strategy with its help. The missions of such leading educational institutions of Uzbekistan as the NUU, TIIAME National Research University, F P I, FSU -are based on the knowledge triangle concept and are aimed at preserving and strengthening their role as the leading research-based institutions of higher education in Uzbekistan, which train highly qualified specialists in the sphere of higher education. By now, they have formed the necessary institutional prerequisites for creating a system of knowledge transfer.[3]

Universities, following the experience of other countries, can provide a competitive advantage for enterprises in the short and long term by catalyzing innovation in the economy. For this purpose, the education system should play a leading role in the process of transformation, and innovation, creation of new enterprises, transfer and dissemination of knowledge should become the priority tasks of higher education. Uzbek universities need to carry out the advanced development of education and science: to use new forms, mechanisms that allow the university to predict the needs of enterprises, to train specialists taking into account these needs and patterns of development of the enterprise, to encourage competition on the way to excellence, to develop research infrastructure. These are urgent problems today, because cooperation between universities and industrial enterprises in Uzbekistan traditionally remains insufficiently effective, despite the dynamic development of both parties. The main reasons preventing the correction of the existing situation are as follows:- disinterest on the part of university faculty;- different timelines for product research: short and definite for industry, long and flexible for the university;- different objectives of activities: industry is looking for practical applications, solving existing problems, improving quality and productivity; university is looking for new knowledge, new theories- confidentiality considerations on the part of industry, clashing with the university's desires to publish and disseminate knowledge;- the lack of laboratory and specialized equipment in universities, which is already obsolete

Based on the existing world practice and many decades of formation and development of the system of fundamental and applied research, the Uzbek model of formation of NIS should represent something in between the traditional Euro-Atlantic and East Asian model, where universities play less important role in the innovation process than for example in countries of the mentioned .According to experts, the development of nanotechnology based on integration of a number of disciplines: chemistry, physics, mechanics, material science, electronics, etc. will affect almost all areas of human activity in the coming decades.

In other directions the development has the character of imitation type of development or features of an alternative model of formation of NIS, such as the innovative development of Turkey and Chile. These

countries in their innovative development emphasize training of highly skilled personnel and development of light industry, creative industry; i.e. a complex of "creative" technologies, uniting more than 10 sub-branches of industry and services, connected with industrial and artistic design. In these countries great attention has always been paid to textile industry, production of building materials and high-hume industries (fashion, national cuisine, international and domestic tourism, medieval architectural constructions in Samarkand, Bukhara, Khiva and Shakhrisyabz, etc.). Today, these sectors are the driving force of the economic growth.

Uzbekistan, as a center of tourism industry and being at the crossroads of civilizations, possesses exceptional opportunities in recreational sphere. This sphere of activity contributes to the emergence of unusual, striking to Western countries forms of art and development of aesthetic standards in the population. It is intensively used nowadays in innovative activity - Uzbek fashion industry.

Results: Creation of innovative infrastructure as the main link in the chain of interaction between the sphere of knowledge generation and production **.**Since 2005, expenditures on scientific and technological research in the republic have increased significantly, but in terms of R&D funding, the republic lags far behind the global average. Most of the research, as has already been noted, is financed by the state. The private sector does not actually participate in the innovation process. Venture capital funds are not widely developed in the republic, and small and medium-sized businesses are not very willing to invest in innovation due to the high riskiness of innovative projects and lack of financial resources.

This demonstrates that although Uzbekistan has the basic components of the national research and development system, the urgent task is to form an innovative infrastructure as the main link in the chain of interaction between the sphere of knowledge generation and production.

Over the past few years, Uzbekistan has been creating conditions for the development of the National Innovation System and is actively trying to enter the orbit of the knowledge economy. Ensuring effective interaction between science, education and production is the most important condition for increasing the competitiveness of Uzbekistan on the world stage.

In the Decree of the President from 06.07.2022 №UP-165 "About the approval of strategy of innovative development of the Republic of Uzbekistan for 2022-2026" is approved:- Innovation Development Strategy of the Republic of Uzbekistan for 2022-2026;- Targets for the implementation of the Strategy for Innovative Development of the Republic of Uzbekistan for 2022-2026;- Targets for the implementation of the Strategy for Innovative Development of the Republic of Uzbekistan for 2022-2026 by regions.and Decree of the President dated 06.07.2022 "On organizational measures for the implementation of the Strategy for Innovative Development of the Republic of Uzbekistan for 2022-2026" indicates

The main directions of the Strategy:- Supporting start-up initiatives by forming a network of innovation infrastructure entities (innovation technopark, technology transfer center, innovation cluster, venture capital organization, innovation center, start-up ,spin-off, acceleration center, incubator), as well as the organization of large-scale production (capital creation);- increasing the share of innovation-active organizations by improving the institutional mechanisms of state support of innovation activity;- ensuring accelerated socio-economic growth of the regions by increasing the innovative activity of small businesses;- stimulation of demand for innovation by providing a comprehensive system of creating new types of products and innovative technologies from the idea to the end consumer;- development of human capital in the management of innovative activity by developing the skills of creation, innovative entrepreneurship and rationalization at all stages of education.[4]

As is known, -R&D includes three main groups of activities: -fundamental research; -applied research; -experimental and technological development. National spending on R&D is considered one of the key indicators of the scientific and technological development of the country .According to the State

Statistics Committee of the Republic of Uzbekistan, in 2020, the ratio of spending on R&D was 0.14% of the Gross Domestic Product. Official statistics recorded that at the end of 2018 the ratio was 0.12%, 2019- 0.11%. Israel had the highest spending on science in 2018 - 4.95% of GDP. South Korea- 4.81% and Japan- 3.26% followed.

1-January 2021 in Uzbekistan there were 254 organizations that carried out scientific research and experimental design developments. Including the state sector - 108, the entrepreneurial - 79, in the system of higher education - 65, private non-profit sector - 2.

As a result of implementation of the Strategy for Innovative Development of the Republic of Uzbekistan for 2019-2022, great success was achieved in ensuring and stimulating innovative and technological progress in the sectors of the economy and the social sphere, including agriculture, energy, construction, education and health care. In particular: In 2021 the republic has risen by 36 positions compared to 2015 in the Global Innovation Index, which is measured by 81 indicators; If in 2021 Uzbekistan was on the 86th place of 132, now it reached the 82nd. Among the countries of Central and South Asia, the republic ranks third, after India and Iran. Along with Pakistan and Indonesia, Uzbekistan was included in the number of "Innovation Achievers". Innovation performance is higher than expected at the current level of the economy, the authors noted.[5].

Conclusion

The tasks of innovative development of the state:

- establishment of human innovative potential, the basis of which will be highly educated citizens;
- Increasing the investment activity of modern technological modes;
- modernization of the state economy;
- Creation of a competitive research and development sector and conditions for its expanded reproduction;
- attraction of investments for development of innovative area of the republic; -development of indicators of innovative activity and development of its monitoring system; -attraction of scientists and young people to science of the republic

Thus, Uzbekistan, which uses an alternative model of innovative development, is based on historical, national features of the country. In innovative development it is focused not only on development, but on borrowing of new innovative technologies, their improvement, distribution and introduction into production. Innovative activity of enterprises and organizations plays a major role in the fulfillment of the main objectives of economic development of the republic. These purposes are connected with increase of competitiveness of the economy and well-being of the population. For this purpose it is necessary to create such conditions, in which innovative activity of the enterprises will receive full support for performance of their innovative activity.

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