

Signs of Innovation Economy and its Assessment Indicators

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Abstract: This article describes in detail about indicators and indicators of innovative innovative economy. The world experience of economic development indicators and its application in Uzbekistan were also developed.

Keywords: Innovation; innovative economy; innovative development indicators; innovative activity indicator.

Introduction.

In recent years, the Government of Uzbekistan has paid great attention to accelerating innovation as the main driver of sustainable development. Some of the most significant government measures include the transformation of the State Committee for Science and Technology, the institutional strengthening of technology transfer centers, and the organization of an annual Innovation Fair. For Uzbekistan, the achievement of innovative and technological development is critical, since only through this path it is possible to create a modern technological base, produce competitive products, rational use of natural resources, increase the efficiency of agriculture, and strengthen international competitiveness.

In recent years, great efforts have been made to replace morally and physically outdated basic tools with high-level modern equipment and high technologies, and to transition to an innovative economy by applying them to production. The adoption of the "Strategy of Actions on Five Priority Areas of Development of the Republic of Uzbekistan in 2017-2021" and the declaration of 2018[1] as the "Year of Support for Active Entrepreneurship, Innovative Ideas and Technologies" in our country is an important step in this direction. After all, "Innovation means the future." If we start building our great future today, we should start it on the basis of innovative ideas and an innovative approach. In fact, in-depth scientific research should be conducted on the improvement of the mechanism of sustainable economic growth on the basis of innovative development. These include

increasing the share of high-tech finished products in the country's commodity exports, accelerating the implementation and commercialization of innovations[2].

The main part

"Innovation is a complex of novelties, inventions, discoveries, ideas and new approaches in the form of intellectual property, created on the basis of human intelligence and production experience, applied to production, and at the same time, bringing economic and social benefits." If an innovative idea is created, not put into production, if it does not prove its economic usefulness, it is not considered an innovation. The created innovations can be considered innovations only when they are commercialized, put into practice, and have economic and social effects. [3].

To understand the role and scale of the ongoing innovations, it is necessary to pay attention to the key trends in the indicators of innovative development, which cause tectonic changes in our daily and professional life. The pace of change suggests that the structure of the economy will change dynamically in the future, with innovative companies transforming entire industries and the entire economic landscape. So, first of all, it is appropriate to study the indicators of economic development. Economic development indicators include[4]:

1. **Real GDP per capita** – gross domestic product. The nation's total economic output which is the same as a nation's income.
2. **GDP at purchasing power parity (PPP)** takes into account the local purchasing power of the currency and is a better guide to actual living standards.
3. **Levels of absolute poverty**, e.g % of population with income less than minimum necessary to meet basic necessities of life.
4. **Malnutrition levels**. Percentage of population with insufficient food – levels of malnutrition.
5. **Access to safe water**. Percentage of population with access to safe water supply and sanitation
6. **Literacy rate** – The percentage of a population that can read and write. Also consider gender discrepancy.
7. **Mean years of education** – Length of education gives indication on deeper education standards.
8. **Number of doctors per 1,000 of population**.
9. **Average life expectancy**. Life expectancy generally rises with economic development.
10. **Openness of economy to international trade**. Also, levels of foreign direct investment.
11. **Quality of nation's infrastructure** – quantity and quality of roads, railways and airports.

12. **Share of agriculture in economy.** Over 90% indicates an undeveloped economy. Less than 10% of economy in agriculture suggests more developed economy.
13. **Political stability and security.**
14. **Wildlife Diversity**

Let's consider comparisons of indicators of innovative activity of some world economies.

1. OECD Innovation Indicators. Many of the innovative factors directly affect the economic growth and GDP of countries (for example, the main factors of GDP in the classical economic model of Cobb Douglas are labor (labor), capital (capital) and technology / productivity (total factor productivity). Changing demographics and the labor market (the labor factor) is both a challenge and an additional driver of innovation. We are seeing an aging population and a decline in the relative number of workers. The ratio between the working-age population (elderly and children) and the working-age population in East Asia will increase from 52% in 2015 to 64% in 2030, and in Europe from 63% to 78%. In part, this trend is offset by urbanization - more and more human capital is concentrated in large economic, scientific and industrial centers, as well as technological innovations: according to MCKINSEY calculations, 17% of the total profits of the top 500 American corporations come from technology companies. New technologies will create demand for new professions and skills[5]. Thus, in Western Europe and the United States, by 2030, automation and the introduction of artificial intelligence technologies will lead to an increase in demand for technological skills by 55% and a further decrease in the need for workers engaged in manual labor. Currently, the OECD (Organization for Economic Cooperation and Development) uses four groups of indicators that describe various aspects of innovation activity.

These include:

- 1) statistical indicators of the development of the field of research and development (R&D), or science statistics (expenditure on research and development, the number of scientific and technical potential, etc.);
- 2) patent statistics (dynamics of the issuance of titles of protection for objects of intellectual property);
- 3) bibliometric data on scientific publications and citations;
- 4) technology exchange statistics (balance of payments characterizing international technology transfer).

The OECD has established a working group to develop indicators of innovative activity of industrial enterprises. In 1992, a Manual for the Collection and Interpretation of Technological Innovation Indicators, known as the "Oslo Manual", was published. It focuses on the study of

innovative processes at the level of industrial enterprises, gives the main definitions used in this area, outlines approaches to the formation of a system of indicators to characterize innovative recommendations for processing and interpreting information. This methodology is recommended as a guide for collecting data on technological innovation. After conducting the first round of surveys in OECD member countries, the methodology was subjected to additional analysis over the course of three years, partially revised and further developed taking into account the experience gained. For a number of years research and development (R&D) has been seen as a key factor in technological development.

2. Innovative activity of the USA and Japan Experts of the European Economic Community note with alarm the lag of the OECD countries behind the USA and Japan in the level of innovative activity that has been outlined in recent years. The most important reasons for the advantage of the USA and Japan over the OECD countries in the innovation sphere, in our opinion, are:

USA:

- 1) active import of scientific results.
- 2) a high proportion of scientists and engineers in the active part of the population.
- 3) constant coordination of research in the civil and military fields (example of aeronautics).
- 4) close cooperation between universities and innovative companies.
- 5) a well-developed system for providing start-up high-tech companies with start-up capital.
- 6) a cultural tradition that encourages risky investment and entrepreneurial initiative.
- 7) low cost of licensing and patenting of intellectual property objects. unified patenting system in the country.
- 8) a simplified procedure for registering companies and a small number of prohibitive restrictions on their creation.

Japan:

- 1) active import of scientific results;
- 2) a high proportion of scientists and engineers in the active part of the population;
- 3) constant readiness to accept innovations created outside the company and outside the country;
- 4) constantly improving interaction between departments conducting R&D in companies and universities;
- 5) stable relations between the financial sector and industry, which contributes to the implementation of long-term projects;
- 6) a cultural tradition that encourages borrowing someone else's experience and making improvements to it;

7) coordination of activities of state bodies, universities and companies;

8) constant high mobility of personnel within companies.

In order to compensate for the lag behind the United States and Japan in the field of innovation, the OECD countries have developed a special action plan to support innovation, which includes work in the following areas:

- development of methods for technological monitoring and forecasting;
- conducting R&D directly focused on the development of innovations;
- development of methods of training and retraining;
- encouragement of professional mobility of scientists, engineers and students;
- development of methods for evaluating innovations;
- improving the financing of innovations;
- improvement of the taxation regime in the innovation sphere;
- effective protection of intellectual property rights;
- simplification of administrative procedures for the creation of venture firms;
- creation of a favorable legislative environment;
- stimulation of innovations in small and medium-sized enterprises;
- attracting public attention to the problems of innovation.

Participation and implementation of innovative economy in ensuring sustainable growth of the national economy can be determined by macro, meso and microeconomic level indicators.

At the macro-economic level, signs of the introduction of the innovative economy in the country are manifested in the following:

- in the new adoption of the legal framework and regulatory documents from the point of view of comprehensive support and protection of the innovative economy;
- in the establishment of new institutions for the organization of production and financing of business operations in the country. It is known that a new technology, idea or innovative economy introduced in any form of economic management requires financing through financial resources. If we pay attention to the experience of the countries that introduced the innovative economy, the financing of this sector was carried out at the expense of the state budget funds and private funds.

Its amount is estimated in relation to the country's GDP;

-introduction of the policy of gradual replacement of main and auxiliary funds with modern technologies at all stages of production and service. In particular, when it comes to this matter, attention is mainly paid to the age of the main means used in the country's production process. For example, in Japan, fixed assets are completely renewed every 6-7 years, in the USA 8-9 years, in Germany 9-10 years, that is, the average useful life of fixed assets is 6.5, 8.5 and 9.5 years,

respectively. is enough[6]. In the conditions of intensive use of the innovative economy, this indicator will decrease even more.

As we noted, one of the next signs of the introduction of innovative economy in the country is manifested at the macroeconomic level. As a result of research, the following processes occur at the macroeconomic level when the innovative economy is applied.

1. Innovative activity of the regions will increase. It is implemented through short, medium and long-term investment and economic development programs of the regions of the country, after the adoption of these programs, their implementation in practice, and its socio-economic effect is observed in the increase or decrease of the innovative activity of the regions.

2. Structural changes and diversification of production will occur in the main and leading industries in the regions.

3. There will be an environment for investment attraction and modernization of basic funds in the regions of the country. The main directions of the state's domestic and foreign policy are: "creating a business environment in the country, introducing market mechanisms, rules and procedures, and ensuring their full implementation. It is reasonable to mention gas, water and electricity supply in the regions and the quality of roads as indicators of the macroeconomic level of the introduction of innovative economy in the country's economy. In particular, the provision of sufficient and continuous infrastructure in Uzbekistan will provide an opportunity to effectively introduce an innovative economy, and at the same time, an environment will be created to attract investments to the regions and modernize the main means of production.

We have carefully considered the macro- and meso-level signs that determine the level of implementation of the innovative economy, as we noted, there are also micro-level signs, the main ones of which are: renewal of the main and auxiliary funds in enterprises and organizations and service links, increase in production productivity and profitability, structural changes in production processes and diversification is reflected in indicators such as having sufficient financial resources.

The results of researches and studies show that the indicators that determine the innovative economy in the economy are very multifaceted. It is not possible, and secondly, it is not important to mention all of them in this paragraph of the monograph work.

We tried to highlight their main points at the macro, meso, and micro levels, bringing them into a single system, and now, with their help, the socio-economic system of the country when the innovative economy is introduced in the national economy is shown in the following picture.



Figure 1. Signs reflecting the application of innovative economy in the socio-economic system of the country ¹.

Above, we studied in detail the application of innovative economy to the country's economy and its signs reflected in the socio-economic system. Of course, to some extent, the use of innovative economy in the country's economy plays an important role in determining its importance. However, it does not provide an opportunity to assess the state of development of the innovative economy in the country's economy.

Such an assessment, in our opinion, is carried out through the evaluation indicators of the innovative economy. It is known that economic indicators in the society of market economy are an important indicator in determining the social, economic and political situation of the country. The research of indicators of evaluation of the innovative economy was the basis for recognition of the following main aspects. After all, the positive resolution of these issues in every country and economy accelerates the processes of transition to the next stage of socio-economic development of the economy.

As a result of the restrictions imposed on the indicators that assess the state of the innovative economy, we managed to systematize it in the form shown in the following picture.

¹It was compiled by the authors based on the results of research.

Importance of indicators for evaluating the innovative development potential of the economy

Taking into account the diversity of indicators of the efficiency of the innovative economy and keeping statistical reports

Problems of introduction of indicators evaluating the level of innovative development

Figure 2. Signs reflecting the application of innovative economy in the socio-economic system of the country ².

1. Importance of indicators for evaluating the innovative development potential of the economy. Studying the history of the development of the theory of innovation, we can conclude that from the second half of the last century, innovation has been the main means of ensuring sustainable economic growth. In turn, the development and implementation of innovation indicators is of particular importance in assessing the potential of the innovation-based economy. In the economic literature, the system of indicators for evaluating the effectiveness of innovative development is calculated depending on the specifics of innovations and various other factors. Therefore, today, in international practice, there are such indicators as Innovation Index WB, Innovation Capacity Index, Global Innovation Index INSEAD, Innovation Index WEF for evaluating the level of innovation development of the economy. The importance of these indicators and specific features of calculation methods are different, and each innovative development index is designed to perform certain analytical and management tasks[7].

It should be noted that the calculation of innovation indices is mainly done by the World Bank [8], According to the order of international organizations such as the World Economic Forum WEF, the UN Development Program UNDP, the UN Industrial Development Organization UNIDO, the EU Commission European innovation It is carried out by the RAND Corporation and other major international analytical companies[9]. In addition, these analyzes are conducted in order to assess the innovation potential of the national economy of the state governments, to determine the tasks of the state in front of the innovation policy in allocating funds from large investors or international financial organizations.

If we look at the best practices of the world's leading countries, today about 100 quantitative and qualitative indicators (indices) are used to measure the innovative potential of countries and vary depending on various factors[8]. In the calculation of these indices, education, science, technology,

²It was compiled by the author based on the results of research.

human capital, innovative and socio-political environment, official national statistical data, survey results from the population and relevant experts are combined into a single system.

As we know, scientists are working on building an innovation ecosystem due to environmental problems in recent years. On the other hand, in developed countries, investments in human capital and innovation infrastructure are made taking into account the innovation ecosystem.

2. Taking into account the different indicators of the efficiency of the innovative economy and keeping statistical reports. In scientific sources, we can see that there are different approaches to evaluating the innovative development potential of the economy. Such approaches show the main goal of innovation processes and assess its effectiveness. Also, in determining the innovative potential of the country, it is understood the breadth of opportunities for conducting research, introducing scientific achievements into production (new knowledge, ideas, technology, goods, work, services, management methods, processes, socio-cultural examples, etc.) [10]. For example, A.A. Makarov notes the following indicators reflecting the results of scientific and technical activities [11].

- patent statistics;
- technological payment balance;
- the market of highproduction technologies.

Also, V.F. Sharov added the following to the innovation indicators for evaluating the innovation system [12].

- share of the population with higher education in the country;
- share of private capital in scientific research;
- newindustrial examples;
- number of patents, etc.

In the "strategy of innovative development until 2020" adopted by the Russian Federation for the development of scientific, technical and innovation, innovation indicators are divided into the following three groups [13]. That is:

- indicator of development of the scientific and technical complex (number and average age of researchers, share (number) of the country in the base of international discoveries and scientific developments, number of scientific and technical centers, etc.);
- innovative activity indicator (number of technologies introduced into production, number of patents per 10,000 population, share of realized innovative goods, number of enterprises engaged in technological innovations, etc.);
- indicator of business development based on high technologies (the

share of the innovative sector of the economy in GDP, the share of high-tech goods, work, services in international trade turnover, etc.)

This system of indicators is maintained in statistical reports approved by the state and includes 45 indicators of the country's education, science, scientific and technical developments, and their export.

Considerable work is being done in our country to develop science and technology. In particular, according to the Resolution of the President of the Republic of Uzbekistan dated August 7, 2006 "On measures to improve the coordination and management of science and technology development" No. PQ-436, a science and technology development coordination committee was established under the Cabinet of Ministers.

The adoption of the Decision PQ-916 of the President of the Republic of Uzbekistan dated July 15, 2008 "On additional measures to encourage the implementation of innovative projects and technologies in production" ensured the integration of science and production.

In the conditions of modernization of the national economy, the use of scientific achievements in production is increasing. However, it should be noted that indicators for evaluating the effectiveness of innovations have not been developed in our country. However, the share of funds allocated to the education sector from the state budget of the republic is more than 34 percent.

At the same time, the amount of funds allocated by the state for financing scientific-practical and technical projects also tends to grow. In this regard, it is appropriate to introduce a system of primary base indicators that determine the effectiveness of the national innovation policy and to keep statistical reports. At present, statistical report forms "On the implementation of scientific research and experimental-constructive developments and the training of high-class scientific and scientific-pedagogical personnel" and "On innovation activity" are kept in our country, which provide partial information about innovation activities.[14].

It is recommended that the indicators for evaluating the state's innovation activities in economic sources should not be less than the following indicators [15].

- Indicator of the intensity of introduction of ITTKIs;
- human capital indicator;
- indicator of production technology development;
- payment balance indicator;
- annual scientific research;
- introduction of scientific research into production;
- number of patents;
- new knowledge flow and models;

- surveys and interviews;
- evaluation of complex and permanent projects

In our opinion, the establishment of the system of indicators used in the assessment of the efficiency of innovation activity of enterprises or the state's innovation potential only from statistical data does not provide sufficient information about the quality of innovation processes. Therefore, it is necessary to introduce a complex system of indicators based on qualitative indicators along with quantitative statistical indicators when evaluating the efficiency of elements of the innovation system. Of course, the participation of the state in the organization and high-quality implementation of such processes is necessary.

Based on the results of researches and studies, it is worth noting that it is appropriate to take into account the following indicators in order to further increase the potential of innovation and evaluate its effectiveness in ensuring the sustainable growth of the national economy.

1. The level of provision of regulatory and legal bases for the organization, management and development of innovation activity: the regulation of this economic activity by laws, the development of the industry, strengthens the innovative relations between the state and the private sector. It is recommended to evaluate the effectiveness of this indicator based on the following criteria.

- through the level of application and efficiency of the state's tax policy in the application of innovative development in the country (tax incentives and financial support, obligations of enterprises to establish a laboratory for conducting research, etc.);

- the level of legal bases for strengthening relations between business and science (analysis of the number and quality of normative-legal documents. For example, the obligations of institutes, universities to engage in research or the establishment of innovation enterprises, the rights of participation are strengthened by law, the copyright of inventions to customers availability of mechanisms of giving and others);

2. The level of participation of the private sector in the creation of innovations: in developed countries, the private sector as the main consumer is an important force that activates the activity of innovation. In turn, the share of this direction is high in job creation and budget revenues. The evaluation of this indicator is carried out in relation to the amount of expenses spent on research and development by the state and private sector.

3. The level of participation of the scientific research sector in the creation of innovations: the sector of scientific research implementers is an integral part of the national innovation system, the development of practical and fundamental research, the effectiveness of scientific developments at

the level of the country or enterprises directly depends on this sector. In the assessment of this indicator, criteria such as specialists engaged in scientific research and their effectiveness are used. The system of indicators presented in this way serves to comprehensively assess the efficiency of innovation activity of the state, enterprise, organization.

3. Problems of introducing indicators evaluating the level of innovative development. It is known that there are different ways and methodologies for calculating economic indicators at the macroeconomic level. For example, there are different methodologies and approaches to calculating a country's GDP or inflation rate, which can lead to different results when applied in practice. It should be noted that the uniform methodology for calculating these indicators was developed by international organizations as a model, but due to the fact that they are of a recommendatory nature in most cases, they do not impose an obligation to introduce one or another economic indicator in the country. This, of course, will have a negative impact on the environment of investment attraction and modernization of fixed assets of countries that do not use a uniform methodology for calculating international standards.

Summary

In short, there are a number of signs of introducing an innovative economy into the economy, and indicators are used to assess their status in international practice. It is very important to have a socio-economic and political situation in the country in order to use these economic categories in the national economy and evaluate them.

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