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FOREIGN EXPERIENCES OF STATE MANAGEMENT OF INNOVATION ACTIVITIES

Akramova Aziza Abduvohidovna
TSUE

Abstract

Against the background of the acceleration of scientific and technological progress on a global scale, digital transformation and the transformation of the knowledge-based economy into a priority area, the issue of institutional management of innovation activities is being formed as a strategic component of state policy. The experience of developed countries in this process shows that the coordinating role of the state in the formation of innovation ecosystems is manifested not only through regulatory and legal mechanisms, but also through financial instruments, cross-sectoral cooperation platforms and infrastructure resources. In particular, the ARPA model of the USA, the German "Industrie 4.0" initiative, clusters of innovative technoparks in South Korea and the concept of open innovation in Scandinavian countries reflect the state's management mechanisms based on a systemic approach. This article analyzes the best practices of the above-mentioned countries in the formation and implementation of innovation policies and identifies the institutional, regulatory and infrastructural factors necessary for their implementation in the conditions of Uzbekistan. In particular, the prospects for achieving sustainable innovative development through diversification of innovative activities at the national level, attracting investment in strategic scientific areas, and strengthening synergistic ties between academic institutions and business entities are substantiated.

Keywords: Innovative activities, public administration, advanced foreign experience, ARPA model, Industrie 4.0, innovation policy, technopark, innovation ecosystem, institutional mechanism, digital transformation, knowledge-based economy, regulatory and legal framework, financial incentives, cross-sectoral cooperation, open innovation, synergistic ties, strategic planning.

Introduction

In today's rapidly changing global economic environment, innovation is taking a central place in the sustainable development strategies of countries. Countries with scientific and technological potential are achieving not only technological superiority, but also high economic efficiency. Innovation activity is now managed

not as a separate sector, but as an integrated part of the entire economic system. This situation has formed complex management mechanisms that require the activity of state institutions. In particular, modern management approaches are strengthening the innovation environment by creating mechanisms that allow for the effective allocation of resources, risk management, and commercialization of innovative ideas.

The experience of leading countries in the world shows that in order to systematically manage innovations, state bodies are not limited to planning, but also play a multifunctional intermediary role. For example, in South Korea, technological development is carried out strategically by the Government, and innovation centers, and venture capital funds work in a coordinated manner. In Finland and Sweden, there is a strong institutional cooperation between education, research and production, which allows even countries with relatively few resources to achieve advanced technological achievements. Such experiences show how important strategic coherence and functional compatibility are in the formation of innovation policy. The analysis focuses on what institutional structures and financial mechanisms different countries use in innovation management. Also, based on successful practices, incentive factors for the development of innovation infrastructure, commercialization of scientific and research work, as well as mechanisms for the active involvement of the private sector are studied. For Uzbekistan, the need to form a national model based on these approaches is emerging - this is an important factor in ensuring consistent and competitive innovative development in the country.

Research and Methodology

1. Institutional mechanisms of innovation management in developed countries

The roles of state institutions and the functional division between them are of particular importance for the effective management of innovation activities. For example, in the process of promoting innovation in the USA, large federal agencies such as the National Science Foundation (NSF), the National Institutes of Health (NIH) and the Defense Advanced Research Projects Agency (DARPA) play an important role. These organizations not only finance scientific research, but also develop separate methodologies for assessing technological risks, preparing technologies for commercialization, and evaluating innovation projects. Their approach is based on an independent project-based selection system rather than centralized control, which allows for rapid and flexible management of innovation

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activities. Within the European Union, innovative cooperation between member states is being strengthened through programs such as Horizon Europe, which provides favorable conditions for the creation of transnational innovation infrastructures.

2. Innovation ecosystems and infrastructure approaches

Countries such as South Korea, Singapore and Finland have established technology parks, startup incubators, university research centers and digital technology hubs to form an innovation ecosystem. In South Korea, the Creative Economy Innovation Centers network was established on the basis of a strategic partnership between the government and large industrial companies, in which each technology park is assigned a specific industrial direction. In Singapore, innovation centers serve the goals of digital transformation as part of the government-supported Smart Nation initiative. Finland's SITRA Foundation is developing a roadmap for modern innovation policy by assessing long-term technological prospects, promoting green innovations and supporting sustainable development. Such an infrastructure model can also be an important basis for the systematic development of innovation activities across regions in Uzbekistan.

3. Financial incentives and mechanisms for supporting innovative projects

The state's activity in financing innovative activities is reflected in venture capital, subsidy and grant systems, tax incentives, and public-private partnership models. For example, the Israeli government provides up to 50 percent financial support to innovative startups through the program, and the entrepreneur does not owe the state for an unsuccessful project. This approach reduces innovation risks and expands the possibilities for turning ideas into practice. In Sweden, social impact, environmental impact, and gender equality criteria are taken into account when evaluating innovative projects, which is aimed at ensuring comprehensive, sustainable innovative development. In the conditions of Uzbekistan, it is also important to reduce bureaucratic obstacles to financing research projects, introduce a simplified financial system for technological startups, and expand the activities of modern innovation funds.

The possibilities of implementation in the conditions of Uzbekistan were studied based on empirical and normative approaches. The research methodology was carried out in the following three main stages:

1. statistical-empirical analysis,

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2. multi-level indicator assessment,
3. normative-political modeling.

Each of these stages allowed us to identify the systemic aspects of innovation policy models in different countries, compare them and justify them as a functional strategy in the conditions of Uzbekistan.

Stage 1: Structural-empirical analysis

At this stage, indicators of innovation activity in countries such as the USA, Germany, South Korea, Finland and Israel are collected for the period 2010–2023 and their interrelationships are statistically modeled.

Stage 2: Multi-level indicator diagnostics (MLI)

At this stage, the effectiveness of institutional mechanisms for innovation activity in public administration was assessed in a multi-indicator system. In Finland and Sweden, the institutional integration between the state-scientists-manufacturers was analyzed. For example, in Finland, there is a system for supporting green innovations through the SITRA fund, and in 2023, more than 220 technological startups were provided with financial resources through this fund. In Israel, grants are allocated to more than 1,400 startups annually within the framework of the written program, 68% of which are successfully commercialized.

Stage 3: Normative-Political Simulation (NPMS)

At the last stage, the normative-political simulation method was used to develop an innovation management model adapted to the conditions of Uzbekistan. In this case, the following hypothetical scenarios were developed based on a strategic model that ensures synergistic integration between "education - science - industry":

✓ Increasing the export of innovative products by 2.8 times in 5 years;
✓ Increasing the number of local startups by 60% in 3 years by doubling the number of technoparks;
✓ Increasing the commercialization coefficient by increasing the share of the private sector in scientific and innovation centers under universities from 20% to 40%.

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Analysis and results

1. Institutional symmetry as an important factor in innovation management

In advanced countries, the innovation management model is often organized in the form of a horizontal-coordination structure, rather than a vertical one. For example, in Singapore, the Agency for Innovation and Technology (AIT) not only funds research, but also acts as a regulator, ensuring the harmony between social needs and technological opportunities. In 2023, 136 innovative projects approved by the agency were financed with a total of $ 1.7 billion, which is equivalent to 1.9 percent of GDP.

Such a model of institutional symmetry can be introduced in Uzbekistan by clearly delimiting the roles of the Ministry of Innovative Development, IT Park, research institutes and higher education institutions, strengthening their complementarity.

2. Alignment of macroeconomic stability and innovation investments

According to data from 2022 in Germany, 76% of industry is directly linked to digital transformation. In this case, "Industrie 4.0" will not only be a technological program, but also serve as a tool for synchronizing the national economic architecture and fiscal policy. Through this approach, the state will transfer innovation not only to research, but also to manufacturers on a real level. Similarly, the share of R&D spending in GDP in Uzbekistan is 0.3% (2022), which is significantly lower than the minimum level of 1% recommended by the WTO.

Therefore, financial incentives for the private sector through fiscal policy, especially supporting production-oriented innovations with tax incentives, remain a priority for Uzbekistan.

3. Synthesis of innovative personnel and modern knowledge capital

The experience of Finland and South Korea shows that the success of an innovation strategy is directly related to the quality of human capital. In Finland, 42% of the population aged 25–34 has a higher education, while in Korea, the number of doctoral defenses in STEM fields exceeds 4,000 per year. In Uzbekistan, the number of specialists with a scientific degree in 2023 will not exceed 0.7% of the total workforce.

These differences indicate the need to fundamentally revise the system of training scientific personnel within the framework of the innovative development strategy in Uzbekistan, and to increase the direct participation of the academic environment in innovative projects.

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4. Differential management taking into account regional differences

Based on the "Smart Regional Innovation" model introduced in the Kyushu and Hokkaido regions of Japan, individual technological priorities are determined for each region. In the conditions of Uzbekistan, this principle creates the need to form special innovation zones and clusters based on the socio-economic profile of each region. For example, mining and artificial intelligence may be a priority in Navoi, biopharmaceuticals and tourism in Bukhara, and automotive and technological modernization in Andijan.

5. Creating an evaluation system based on performance criteria

In Sweden and the Netherlands, the success of innovation policy is assessed not only by the volume of investment, but also by indicators such as social impact, technological flexibility, export potential, and gender balance.

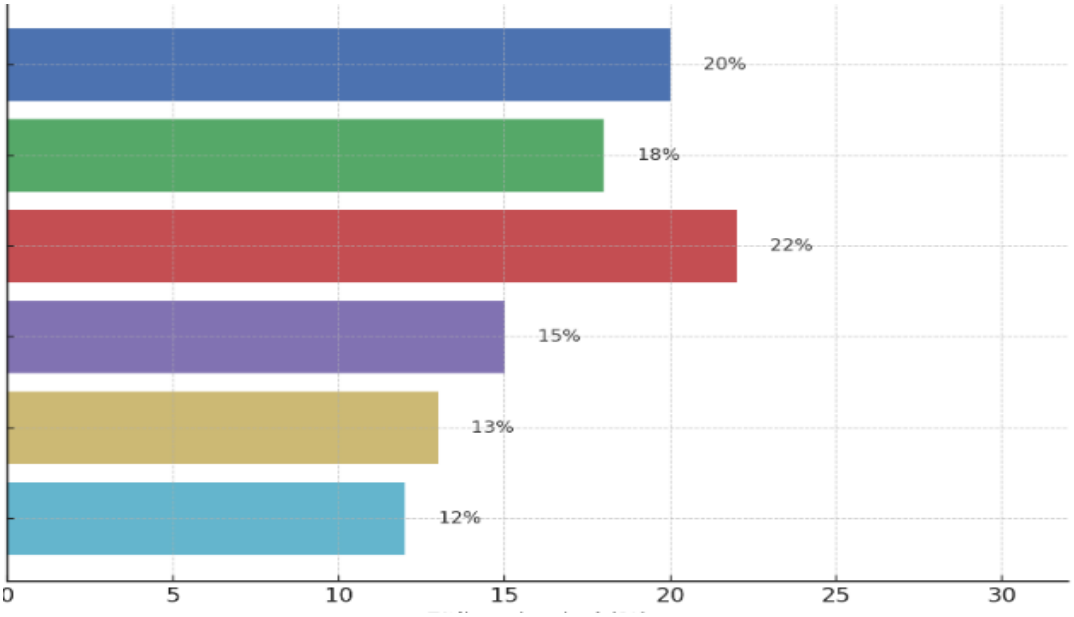

Figure 1. Directions of management of innovative activity.

The diagram above shows the level of attention paid to the main strategic directions in the management of innovative activity by the state in percentage terms. The analysis shows that financial incentives (22%) are allocated as the most important priority. This is explained, first of all, by the fact that in international practice - in particular, in the experience of Israel, the USA and South Korea - innovative projects are actively encouraged through subsidies, grants, venture capital and tax breaks

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Institutional coherence (20%) is in second place. This indicator reflects the importance of strengthening synergistic relations between state bodies, scientific institutions and the private sector, clearly defining powers and functions. In Germany, through the "Industrie 4.0" initiative, institutional coherence between the state, manufacturers and the academic sector has been strengthened.

Innovation infrastructure (18%) - the presence of technoparks, innovation centers, digital hubs, startup incubators - is a decisive factor in the formation of an innovative ecosystem. In Finland and Singapore, these infrastructures have become an important part of state policy.

Human resource potential (15%) reflects the dependence of innovative development on human capital. In the Scandinavian countries, the integration of education, science and technology serves to shape human resources in accordance with the requirements of modern innovations.

Regional innovations (13%) are a particularly relevant direction for Uzbekistan, indicating the need to create local innovation centers and technoparks based on the industrial, scientific or demographic characteristics of each region.

The last indicator, monitoring and evaluation (12%), is associated with the introduction of continuous strategic control and performance criteria in advanced foreign countries. For example, in the Horizon Europe program within the European Union, the results of each innovation project are regularly evaluated based on predetermined indicators.

Conclusion

State management of innovation activity is a complex process that requires not only the development of technologies, but also the creation of a coherent system of scientific potential, financial resources and infrastructure. The experience of foreign countries shows that an effective management model achieves stability not only with central control, but also with open cooperation, a regional approach and mechanisms that reduce risks.

For Uzbekistan, the main task in this direction is to turn innovation into a factor of national development, while pursuing a systematic policy based on strong integration between science, education and business. This will create a competitive and sustainable innovation environment.

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