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Concept of national innovation systems. Role of government in innovation policy: practice of Azerbaijan

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The key topicality of the article is involved in what is the key role of the Concept of National Innovation Systems in the government's innovation policy, and actions that are considered necessary to be taken by the government in this sphere are involved in analysis.
The article broadly discusses drafting of new development strategies and concepts, determination of fundamental development pillars, and making of the conceptual approach to economic and political events a political necessity in order to realize the national targets planned for the modern postindustrial stage in developing countries, including Azerbaijan by considering rapid development trends taking place globally, and to establish a modern society. It has become the key goal of the article.
The empirical and theoretical-conceptual approaches and the methods of comparative and systematical analysis of scientific materials available in this sphere are applied in studying of the problem.
The key finding in the article is that the National Innovation System may be considered a sum of the full available 'capital' of the government, which is used in implementation of the innovation process. The harmony of the government, business and science is a foundation that ensures the operation of the NIS itself in this system. It should be pointed out that namely the government plays the leading role in this political-legal process.
And in Azerbaijan, the national innovation system should not only ensure development of the knowledge-based economy, but also making of the country an equal participant of the global innovation process.
Generally, solution of the following questions may be considered necessary to form the national innovation system and realize the strengths of the innovational development: there is a need for establishment of legal framework for formation of a relevant technological economic environment for innovational development; elaboration of state programs for protection and management of intellectual property; development and implementation of state programs for development of the material and technical bases for science; and development of state programs for protection and management of intellectual property.
Key words: *National Innovation System, Innovative Development, National Economy, Strategic Government Documents, Human Capital, Innovation –based Development Model, 'Education-Science-Production' Triangle.*

It should first be pointed out that the Concept of National Innovation Systems is considered a key approach to studying of the government innovation policy.

Current demands of the postindustrial world have forced scientific societies to think about the character of technical development. Information and knowledge have become one of the most important and necessary factors of development. It is not surprising that in such environment, the concept of national innovation systems (NIS) started to shape and develop in the 1980s. Increase in the number of scientific researches and of written scientific articles on this topic show that the concept has become extremely popular at the present time and its representatives have started to research the innovation process in general as a system including many components, which has made the NIS an important and complex tool in scientific and theoretical researches. And political scientific approaches contribute to determination and analysis of the relations system between various actors here, as well as the features of mutual relations and activity between them.

Establishment of the national innovation system is accompanied with at least two interrelated processes completing each other at the government level, which ultimately has an impact on the political system itself. On the one hand, as an appearance of implementation of the national policy and an appearance of national interests. And on the other hand, all spheres of the society filled with innovational "components". These components are as follows: in economic sphere – increase in production of innovational products; in social sphere – ensuring of the quality of human capital (improvement in healthcare, education and etc. spheres); in political sphere – active civic participation in political life; in environmental sphere – search for new interrelation principles with the environment; in foreign policy – integration in the global innovation complex, and etc.

One of the key conditions for effective activity of the NIS is explained with this point that whether innovation values can be created for all members of a society [6, p. 40−45]. The impact of the NIS on political processes should be first assessed for these factors.

However, we may face contradictions here, although innovations are accepted positively in general sense, the level of trust of some societies to the actors that are related with innovations is low. In other

words, the attitude of population groups to the capacity of innovations to contribute to the life of society is at the desired level. The trust level of the population groups to many government institutions and the entrepreneurship sector is assessed quite low [10]. The solution of this problem should be comprehensive and be focused on changing of the attitude of population to the government institutions.

In other words, the NIS may form as a result of a joint effective action of the actual network of public and private structures operating in the public and private sectors leading to creation and dissemination of new technologies. Thus, the "triangle" which is the symbiosis of the public, private and science sectors may play the key role in creation, application and dissemination of innovations. Researches point out that the effectiveness of the innovation process depends not only on operation of these structures and their components on their own, but also interrelation of these components as a united system. As for me, while studying individual parts of the NIS in this or other manner, we can see that although individual components act effectively on their own, the general result may not be always at the desired level. In other words, the sum of parts does not always reflect the quality and characteristics of the integrity. For this purpose, improvement of legal framework is the key objective in ensuring the government's innovation process. The legal framework can determine not only the 'game' rules between the gamers, but also their rights and obligations. No doubt, it is an issue that is at the sole discretion of the government, and of its functions is just development, adoption and enforcement of relevant legislation.

As mentioned above, the government plays the key role in operation of the national innovation system. Various government institutions, and private structures and scientific associations have a special role in dissemination of innovations.

In any case, the NIS development strategy is determined by the macroeconomic policy implemented through the government; normative legal guarantee; direct and indirect government regulation; scientific technological and industrial capacities; domestic commodity market; labor market; and historical and cultural traditions and characteristics.

Competitive development of the national economy based on establishment of the NIS requires first of all transition to knowledge economy. And its key characteristics is a dynamical growth of hi-tech areas, a rapid increase in investments in researches and development, enhancement of scientific capacity of goods and services and innovational activity of enterprises, and achievement of increase in innovational profit in economy. The key role in operation of the NIS belongs to information supply of the innovation activity based on scientific-technical information system, information communication technologies (ICTs), creation of an electronic environment for the activity of the public and private sectors, and use of an internet network [8].

As regards to the basic spheres of the national economy, which forms the foundation of the NIS, the followings may be examples: knowledge generation (science and its segment in other spheres); knowledge dissemination and application, scientific-technical and innovation activity, commercialization of novelty (production of and service to research and development products); education and professional training of human resources; innovation-finance guaranteed infrastructure; government and regulation (legal framework, government macroeconomic and innovation policies, corporative management, market mechanism).

Today, there is no common definition of national innovation systems and its common forming methodology. A range of scientists even conclude that it is impossible to describe the universal model of the innovation system [2]. However, if we try to give a general definition to the NIS, we can describe it as follows: "A national innovation system means 'sum of interrelated organizations (structures) (large and small companies, universities, public laboratories, technical parks and incubators), engaging in production and commercial sale of scientific knowledge and technologies" [5, p. 13−14].

Summarizing the above stated we can state that the National Innovation System (NIS) is sum of components and objects developing the interaction of governmental and non-governmental actors implementing the innovation activity based on forming economic mechanisms.

Within the framework of this common model, the national characteristics of the NIS are shaped. These characteristics are reflected in the role of the public and private sectors, as well as large and small businesses in application of the mentioned forms; relation of fundamental and applied researches and development; development dynamics, and sectoral and regional institutions of the innovation activity.

Any government combines not only the characteristics of the action components of the NIS structure, but also historical traditions and cultural specifications influencing the innovation process in the government in any manner, as a unique case. Furthermore, the NIS has various targets depending on countries, such as today the key objective in France is creation of additional jobs; creation of more effective innovative technologies and using and applying of them effectively in Germany, and etc.

After transition to the modern market economy, the modern Azerbaijan government's key economic goals are to establish a strong economic system, ensure development of the non-oil sector of the country, develop various spheres of the economy, increase the production capacity of the country, stimulate the export

capacity and etc. In order to achieve these goals, no doubt, creation of a strong and flexible National Innovation System has become important. In this regard, very intensive activities are implemented in the country, a relevant legal framework and infrastructure are developed, and the process of creation of industrial parks, technical parks and industrial zones continues rapidly. At this time characterized by implementation of all of these processes and creation of the National Innovation System of Azerbaijan, exploration of the forms of National Innovation Systems in various countries and study of their practices surely has a great importance for us, in order to improve the organizational structure of its components. Research of the National Innovation Systems of the countries representing various forms of National Innovation Systems, determination of the key strengths and weaknesses of them and determination of opportunities for application of their practices in our National Innovation System are among important issues.

In developed countries, the key part of the national resources is human capital and intellectual work has a special prevailing weight. In Azerbaijan, formation of human capital to ensure sustainable development of the country and use of this capital effectively are also considered key priorities and any steps taken in this regard are always supported by the government. Over the past years, some actions for development of the human capital were determined and implemented, and it is reflected in a range of currently implemented strategies, state programs and concepts.

As regards to the strategical government documents of Azerbaijan, the innovative policy and establishment of an innovative economy should be assessed as key priorities here. In the documents already prepared and currently being implemented in this regard, such as the Development Concept of Azerbaijan 2020: A Look into the Future; State Strategy for Development of Education in the Republic of Azerbaijan; National Strategy for Development of Science in 2009-2015 in the Republic of Azerbaijan, and Strategic Roadmaps for National Economy Perspective, development based on knowledge and innovations is set as a priority. And an active participation of the experts trained at higher education facilities in management of the government and private companies, economic growth and increasing of the labor productivity are determined as priorities.

The key point of each document is that for development of an innovation-based model, it should be supplied with physical, institutional and social capital.

Establishment of the NIS structure in the country and the Development Concept of Azerbaijan 2020: A Look into the Future developed to ensure a competitive development of the national economy is very interesting from this point of view.

In the Concept, directing available resources to supply the demands of the non-oil industries by using these resources maximally and further developing the production based on the latest achievements of the scientific-technical development to realize this factor, as well as implementing the process of organization of comprehensively formed modern industries, are considered necessary conditions to ensure transition to knowledge economy in light of rapid development tempos [3, p. 109]. In other words, the innovation activity should be increased and strengthening of a long-term stainable economic development of the country and ensuring of production of new innovative and competitive products should be made a requirement.

In the Development Concept, enhancing of the innovational activity is considered important for the key pillars for Support of Scientific Capacity & Innovational Activity, that is, ensuring of a long-term sustainable economic development, forming of knowledge economy and accelerating development of scientific technologies and products (works, services) [3, p. 18].

In the National Strategy for Development of Science in 2009−2015 in the Republic of Azerbaijan, adopted yet by the Presidential Decree dated May 4, 2009 in order to ensure increasing and enhancing of the innovational activeness [4], development of the innovational activity, enhancement of the business incubators network and financing of the activity of technological centers, technical parks and the innovational activity are determined as the key pillars of the government's scientific-technological and innovational policy. These actions are determined more specifically in the Concept then.

It should first be pointed out that the provisions related to development of human capital are underlined as the key factor in the Development Concept of "Azerbaijan 2020: A Look into the Future" and is described as follows: Development of human capital is one of the priorities of the Concept. Increasing of the quality in education and healthcare, strengthening of the social protection of the population, ensuring of the gender equality and development of families, and development of youth capacity and sport are key pillars under this priority [3, p. 12].

In this document, the idea of further increasing of the quality of the process of development of the human capital as one of the most important and key pillars of improvement in light of calls for transition to the innovation-based development model is already reflected.

These ideas more comprehensively offer encouragement of development in the format of 'Education-Research-Innovation' at higher education facilities in the Strategic Roadmap: Establishment of university clusters proposes conducting of researches and improvements, stimulating of application of scientific results in production, increasing of the effectiveness of the "Education-Science-Production" relations [9, p. 87].

It is not surprising that at the universities in Azerbaijan, training of experts with abilities to organize production processes and work with innovative technologies are conducted at available science-based industrial facilities based on the current growth rate of the economy.

The current reforms being made in education are reflected in annual reports of the Ministry of Education. Improvement of the teaching quality at IT Departments of universities and enhancement of education of youth abroad and establishment of IT vocational schools, as well as foundation of a regional IT University are focused on creation of human resources that is critical for development of ICT as a priority and may be considered vital steps in this sphere.

It is not surprising that the Part titled Support of Enhancement of R&D and Building of Knowledge Based Society of the Strategic Roadmap for National Economy Perspective includes actions for development of science, increasing of the quality of R&D and encouragement of application of the R&D results in production in Azerbaijan: 'Development of science will be encouraged and stimulating actions will be conducted to ensure investment in researches and improvements by the private sector' [9, p. 88].

Improvement of the physical and technological infrastructure participating in development of the human capital encourages development of the material and technical bases in science, education and production to the level of modern standards, conducting, testing and applying of scientific researches, optimization of the "Science-Production-Market" relations, and establishment of supporting institutions. In order to improve financial status to optimize the Education-Science-Production' relations train qualified human resources for these institutions and conduct market oriented R&D, development of the financial and loan infrastructure (budgetary and extra-budgetary funds, commercial banks) is considered. In order to establish a flexible operation mechanism of the "Education-Science-Production" infrastructure, the activities for establishment of regional and functional university and production clusters should be encouraged and a continued education system, university complexes, R&D institutions and development of the production and service spheres increasing the economic effectivity should be supported [9, p. 90].

"Encouragement of investment in innovational activity" is reflected in this document as follows: The country proposes creation of a wide-range knowledge network by granting awards and loans for production of hi-tech products for scientific researches and improvements, in order to stimulate the innovational activity while development of action plans and state programs that will stimulate encouragement of innovation in Azerbaijan [9, p. 92].

In order to ensure an active participation of the Azerbaijan National Academy of Sciences (ANAS), the Hi-Tech Park of the Academy has been already established under the Executive Order of President Mr. Ilham Aliyev, dated November 8, 2016. The goal of the establishment of ANAS's Hi-Tech Park (ANAS HTP) is explained as follows: It supports implementation of successful projects by focusing on enhancement of the national innovation system and strengthening of investment flow to this sphere to contribute to the national economic development through sustainable development of economy, increasing of competitiveness, enhancement of innovation and hi-tech spheres based on the latest scientific and technological achievements, and science, technology and innovation. It cooperates with relevant public, private or international institutions for development of science, R&D activities and innovation projects in the country within the framework of its goals and conducts necessary works for technology transfer and commercialization of science. It is planned to implement projects for conducting of R&D and practical design works and applying of their results in industrial, service and other spheres. As for us, it may be hopefully said in terms of the issues that the ANAS HTP has set for it that the Park will give its great contribution to the participation of Azerbaijan in the global production chain in the near future.

Today, ANAS takes steps to create a "Science-Education-Production" chain and research university, which may increase the weight of the private sector in financing of science by improving the business environment and stimulating investments in researches and improvements by private companies [7].

It is worth to say that the implementation of the Strategic Roadmap has taken under a strict control by our government and the general leadership and control over the works being implemented in this context are conducted by the Administration of the Presidential Office of the Republic of Azerbaijan. And monitoring, assessment and communication actions in relation to the activities included in the Strategic Roadmaps are implemented by the Center for Analysis of Economic Reforms in Azerbaijan & Communication.

As shown, the only way to achieve the goals underlined in strategic documents is related to transition of the society to the innovation-based development model. For transition to this way the process of formation of a national innovation system of the country which is competitive at the global level and an infrastructure supporting the innovational activity in all spheres of the social life has been already started.

As a result of the goal-oriented policy being currently implemented in Azerbaijan, the country has started to take its specific well-deserved place in a range of prestigious rating schedules. For instance, according to the Human Capital Index made by the World Economic Forum (2015), Azerbaijan was the 63th among 124 countries, and the 15th among 30 countries with high-medium income for the human capital [9, p. 25]. And in the Global

Competitiveness Report that Azerbaijan declared for 2016−2017, the country reached to the 37th place among 138 countries [9, p. 82]. Such a dynamical increase in these indicators shows that the country already has formed human capital and opportunities to increase its competitiveness. We may definitively say that Azerbaijan will increase its competitiveness in future by using these opportunities effectively and further developing the human capital.

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Поняття національної системи інновацій. Роль уряду в інноваційній політиці: практика Азербайджану

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Актуальність статті пов'язана із сутністю ключової ролі національних систем інновацій в інноваційній політиці уряду, також проаналізовано заходи, які вважаються необхідними для прийняття урядом у цій сфері.

У статті широко обговорюється питання розроблення нових стратегій та концепцій розвитку, визначення основних компонентів розвитку та формування концептуального підходу до економічних та політично необхідних подій для реалізації національних цілей, запланованих на сучасному постіндустріальному етапі в країнах, що розвиваються, в тому числі Азербайджані, з урахуванням тенденції швидкого розвитку, що відбуваються в усьому світі, а також для зміцнення сучасного суспільства. Вищезазначене і стало головною цілю статті.

У процесі вивчення проблеми застосовувався емпіричний і теоретико-концептуальні підходи та методи порівняльного і систематичного аналізу наукових матеріалів, доступних у цій сфері.

Головний висновок статті полягає в тому, що національна система інновацій може вважатися прикладом повно доступного «капіталу» уряду, який використовується для реалізації інноваційного процесу. Гармонія влади, бізнесу та науки – це фундамент, який забезпечує функціонування НСІ у цій системі. Варто зазначити, що саме уряд відіграє провідну роль у цьому політико-правовому процесі.

І в Азербайджані національна система інновацій має не тільки забезпечити розвиток економіки, заснованої на знаннях, а й зробити країну рівноправним учасником глобального інноваційного процесу.

Як правило, вирішення наступних питань може вважатися необхідним для формування національної системи інновацій та усвідомлення сильних сторін інноваційного розвитку: існує потреба у встановленні законодавчої бази для формування відповідного технічно-економічного середовища для інноваційного розвитку; розроблення державних програм для захисту та управління інтелектуальною власністю; розроблення та впровадження державних програм для розвитку матеріальної-технічної бази для науки; та розвиток державних програм захисту та управління інтелектуальною власністю.

Ключові слова: *Національна система інновацій, інноваційний розвиток, національна економіка, стратегічні державні документи, людський капітал, модель інноваційного типу розвитку, трикутник «Освіта−Наука−Виробництво».*