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MODERN STATE AND PRIORITIES FOR FORMING THE NATIONAL INNOVATION SYSTEM OF GEORGIA

NOWOCZESNY STAN I PRIORYTETY FORMACJI KRAJOWEGO SYSTEMU INNOWACYJNEGO GRUZJI

Abstract

In the article the current state of the Georgian NIS is shown with the identification and characterization of its still few components, then the priorities for its formation are outlined and justified in the context of the following constituent blocks: the blocks for ensuring the state innovation policy, innovation, the scientific-research sector, technology transfer organizations and other elements of innovation infrastructure, the system of cooperation with international innovation environment, innovation financing unit, training unit, unit to support projects implemented by donors, the block to support innovation development of agriculture. Some directions of the formation of innovation clusters in Georgia were briefly discussed.

Keywords: *priorities of NIS formation, NIS units, components of the innovation infrastructure, technology transfer, financing innovation, innovation clusters*

Streszczenie

W artykule przedstawiono aktualny stan NIS Gruzji z izolacją i charakterystyką jego nie-licznych składników, a następnie priorytety jej tworzenia są zidentyfikowane i uzasadniane w kontekście następujących elementów: blok polityki innowacyjnej państwa, blok produkcji innowacji, sektor badań, organizacje transferowe) technologie i inne elementy infrastruktury innowacji, system interakcji z międzynarodowym środowiskiem innowacji, blok finansowania działalności innowacyjnej kręgosłupa, jednostka szkolenie jednostka

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wspierać projekty realizowane przez darczyńców, wsparcia grupowego dla rozwoju innowacji w rolnictwie. W skrócie omówiono niektóre kierunki powstawania klastrów innowacyjnych w Gruzji.

Słowa kluczowe: priorytety formowania NIS, Jednostki NIS, elementy infrastruktury innowacji, transfer technologii, finansowanie innowacji, klastry innowacyjne

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Statement of the problem in general outlook and its connection with important scientific and practical tasks.

Without the existence of an effective innovation system in the country, it is impossible to ensure sustainable economic growth and develop the necessary industries in order to achieve self-sufficiency of the economy in the future (at present, imports exceed export volumes by almost 4 times, due to the collapse of many industries after the collapse of the Soviet Union, whose enterprises produced both products for domestic consumption and for export) (Абесадзе Р., Бурдули В., 2014; Burduli V., 2015). Under the government of M. Saakashvili, although several enterprises equipped with

imported technologies were built, some of the surviving components of the innovation system also collapsed. Therefore, the task of creating a full-fledged innovation system is now acute before the country. However, for its formation, a sufficiently long time is required, large investments are needed. All this predetermines the gradualness of its formation. Therefore, in this chapter we have tried to highlight and justify the priority directions of the country's NIS development in the context of each key block.


Analysis of latest research where the solution of the problem was initiated.

When analyzing the current state of NIS in Georgia, we used our work (Abesadze R., Burduli V., 2009), (Abesadze R., 2014) and others, informational messages (A technological park ..., 2016), (FabLabs ..., 2016), (Machavariani K., 2016), ("Silicon Valley" ..., 2016), (What will bring ..., 2017), (Агентство инноваций ..., 2014), (В Грузии открылся ..., 2016), (Грузия стала ..., 2016), (ЕС поможет ..., 2017), (Партнерский фонд ..., 2016), as well as government documents (Law of ..., 2016), (Resolution of ..., 2015). When systematizing the NIS blocks and determining the pri-

orities of the formation of the NIS of Georgia, we relied on our own previous developments (Abesadze R., 2014), (Abesadze R., Burduli V., 2009), (Abesadze R., Burduli V., 2018), (Бурдули В. 2017) and others, and on extensive foreign literature – (Зверев А., 2009), (Сергеев В., Алексеенкова Е., Нечаев В., 2008), (Соснов Ф., 2011), (Цветков В, 2000), (Справка ..., 2011), (Модели формирования ..., 2013), (Национальные инновационные системы в России и ЕС, 2006), (Национальные инновационные системы крупных ..., 2015), etc.

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Aims of paper.

The objectives of the article are: assessment and systematization of the current state of NIS of Georgia; identification and justification of the priorities of the formation of the

NIS of Georgia in the context of its blocks; brief preliminary discussion about some areas of creation of innovation clusters in Georgia.

Exposition of main material of research.

Current state of NIS in Georgia

To date, the country's innovation system is very undeveloped and ineffective (although with the coming to power of the new government in 2012, some measures have been taken to improve it, but the reorganization is very slow, for example, only in June 2016, the Georgian Law on Innovations was adopted"), in particular:

1. The scientific potential of the country was in a deplorable state, before the arrival of the new government there was a strong reduction in the number of scientists, a number of scientific research institutes were closed, the salaries of the remaining scientists were purely symbolic; although under the new government salaries increased 2 times, but this was not enough to attract young scientists into the research institutes. The material and technical base of science is undermined, the share of GDP in financing of science, in particular, and in general, innovation activity is almost the lowest in the world.

2. A system of higher, secondary, professional and continuing education requires a serious transformation, which is not yet adequately oriented to the requirements of the economy, the system of retraining of personnel is poorly developed and ineffective.

3. Until recently, the system of transferring the results of innovative activities to production (services and mechanisms for technology transfer, technology parks, business incubators, consulting services, engineering and consulting firms) has been virtually absent and to date is insignificant.

4. The level of development of medium and small businesses was low, there was no infrastructure to support small businesses and small innovative enterprises.

5. There is no clearly defined innovation policy - an appropriate strategy, mechanisms of state regulation and business coordination.

6. At both the national and regional levels, there are almost no mechanisms for state financial and fiscal support for innovative activities, and financial support for innovative activities on the part of the bines.

7. There is no follow-up support for projects implemented by foreign donors, which in many cases practically nullifies the results of their activities.

8. The grant system is not developed and its management is low: the state does not give orders to scientists for innovation developments; although there is a special fund for the support of scientific research, which annually allocates grants for scientific research in the context of different scientific disciplines, but these scientific developments are not related to innovation.

9. The relationship between science, business and the state is weak, in fact, absent.

10. Innovations based on their own research are almost not implemented, and innovations are imported mainly in IT technologies, due to the fact that there are many factors inhibiting the import of new production technologies - lack of necessary knowledge, political will and institutional support, fear of financial risk in the case of

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real investments in the industry from the side of big business, and so on.

It can be said that until recently the Georgian economy did not develop along an innovative path. The previous government attributed this to the advantage of a liberal market economy as if only a market mechanism should regulate all areas of the economy. First, there was no liberal market economy in our country, as the state interfered in it, and, secondly, the liberal market economy does not exclude active, effective government intervention in the economy. On the contrary, it is the state that must create the conditions for the development of the economy in the right direction. At present, the state recognizes the need for innovation development of the country.

No previous government until 2012 considered innovative activity as a priority area of state interests. Therefore, the innovation system was not developed. **The formation of the legal and organizational base of innovative activity mainly began only in the last three to four years.** However, you can name documents that directly or indirectly meet the requirements of innovation development (these are the following documents: "The Law of Georgia on Science, Technology and Development" (1994), "The Law of Georgia on Higher Education" (2004), "The Law of Georgia on General Education" (2005), the Law of Georgia on Vocational Education (2007), the Law of Georgia on Entrepreneurship, the Innovation Concept of Georgia (2012), the Georgian Social and Economic Development Strategy" Georgia 2020 "), but they were absolutely inadequate for creation and strengthening of the innovation system. In recent years, certain steps have been taken in the field of innovation policy, the introduction of information and telecommunication technologies and the development of innovative infrastructure.

Currently, as it was noted, the "Law of Georgia on Innovations" (Law ..., 2016) was adopted, the provisions of which apply to the subjects of innovative activity, the infrastructure for the promotion of innovative activity, the financing of innovative activities and the commercialization of innovations, the state strategy in the sphere of innovations, which is approved by the Government of Georgia on the proposal of the Council of Research and Innovation. The tasks and functions in the sphere of innovations of the advisory body of the Government of Georgia of the Council for Research and Innovation and the legal person of public law of the Agency of Innovations and Technologies are also defined. Naturally, the adoption of this law has a positive effect on strengthening innovative activity in Georgia (Law ..., 2016).

It should be noted that this law was developed at a very high level, it provides for many provisions necessary to ensure such legislation, which is necessary to guide the formation of a modern model of the national innovation system in the country. In particular, the provisions of the law take into account some of the regulations that are necessary to regulate the interaction between the three leading institutional sectors (state, business and science) characteristic of the national innovation system built on the principle of the "triple helix model", which is currently replacing the so-called "Euro-Atlantic model," which has been in force in the United States, Canada and the EU countries so far.

In 2014, the government decree created the legal entity of public law - the Agency for Innovation and Technology of Georgia, the Agency's goal is to create an innovation ecosystem in the country, stimulate the use of innovations and technologies in various sectors, promote the commercialization of innovative entrepreneurship, inventions

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and research. The Agency will implement special programs and projects to promote the introduction of innovations and technologies in the country's industry. It will also promote the commercialization of research results, the creation and implementation of IT business, distance employment, the development of Georgian software. In the process of the Agency's work, attention will be paid to the formation of the IT industry, focused on exports, as well as to promote the emergence of innovative Start-ups and technology companies and to increase the efficiency of the use of innovations and technologies. The Agency will have both financial and non-financial instruments to achieve its objectives. The agency will form the infrastructure necessary for the commercialization of innovations and technologies, including creating technological parks, innovation centers, accelerators, innovation laboratories (Агентство ..., 2014). In 2015, an advisory body of the government was created in the innovation sphere - **the Council for Research and Innovation**. It has the following functions: coordination of the development of documents on the innovation strategy and their provision to the government; coordination of the development of national and regional innovation ecosystems both in government departments and between the public, private, educational and scientific sectors; coordination of the preparation of reporting on innovative activities and provision of it to the Government of Georgia (Resolution ..., 2015). Georgia is the first country in the South Caucasus where Fablabs appeared (FabLab). Fablab is a laboratory that is equipped with modern computer-controlled machines and equipment, through which materialization of ideas and creation of physically tangible products is possible. The Agency for Innovations and Technologies has started active work on their foundation

and operation since 2015, both in Tbilisi and in the regions. The first fablab with the assistance of the Agency for Innovations and Technologies of the Ministry of Economy and Sustainable Development was established in Tbilisi on the basis of the University of Ilya. To date, facsimile faculties of the Academy of Arts, the State University and the Technical University function in Tbilisi on the basis of universities, and in the regions there are active fablabs on the basis of the Batumi State University and the Kutaisi University named after Akaki Tsereteli. In several regions, there are also fablabs on the basis of vocational schools (FabLabs ...).

In early 2016, the first Technology Park was opened. It was organized by the Agency of Innovations and Technologies of the Ministry of Economy and Sustainable Development of Georgia.

The technological park combines both small incubators, training centers and laboratories, as well as offices for large companies, places for joint work and recreational space. The technology park offers resources to start-ups and small companies that were previously inaccessible and should play a special role in creating new businesses and new companies, in developing the existing business, in commercializing innovations and creating high-paying jobs [Вгрузии открылся ..., 2016].

At the end of 2016, the second technology park was opened in Georgian Zugdidi, where the universal laboratory for industrial innovation (FabLab), the training center, the co-working center, the conference hall, joint workplaces for companies, recreational space and other services, which create a unified ecosystem in the field of innovation and technology and contribute to the development of innovative ideas in the region. The purpose of the opening of the

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technopark is to help both start-up businesses (start-ups) and long-standing businesses to use hard-to-reach technologies to develop their own activities and gain new knowledge both in the sphere of innovations and technologies, and in the sphere of entrepreneurship (A technological ..., 2016).

In September 2016, Tbilisi opened the first private high-tech center "Silicon Valley Tbilisi". The high-tech center includes the IT Academy, the University of Business and Technology, the School, the Research and Laboratory Center and the Technology Incubator. There will also be offices of leading companies and brands ("Silicon Valley"..., 2016).

In May 2016, a presentation of a new technology institute project was held in Tbilisi. In size it will be the fifth, after the analogical institutes of Italy, Switzerland, Japan and Austria. At the institute, a particle accelerator, the so-called "collider," will be built. The cost of the project is several hundred million euros and it will be fully financed by the international charity fund "Cartu", founded by Bidzina Ivanishvili. Training of students of the institute and their trips to partner organizations will also fully fund the Cartu Foundation. The purpose of the foundation of the Georgian Institute of Technology is the creation of a research complex for fundamental and applied research and the implementation of master's and doctoral programs in physics, chemistry, biology, mathematics, computer technology and engineering. With the establishment of the Technological Institute, a base will be created for modern scientific and experimental research, which is necessary for the development of the country's research potential. In addition to the scientific purpose, the institute will have an applied load, including in the field of hadron

therapy of tumors. The creation of this scientific and educational center will contribute to the development of a new generation of scientists, their cooperation with leading professors and researchers of world-class universities. Students of the Technological Institute themselves will take part in the construction of the particle accelerator and put it into operation. To exchange experience, the Georgian government issued memorandums with CERN (the European Center for Nuclear Research), with the Italian CNAO (National Hadron Therapy Center) and with the INFN (National Institute of Nuclear Physics of Italy). The chairman of the Council of International Advisers Professor Gia Dvali was invited as well as the executive director of the Technological Institute is Professor Teimuraz Lomtadze [Machavariani K., 2016].

In 2017, within the framework of the European Union for Business initiative, the first cluster was established in Georgia, namely the Georgian Furniture Cluster, which unites 25 local furniture manufacturers. Vincent Rey, the head of the project department of the European Union, said that the project, within which the first cluster was created in Georgia, aims to promote small and medium-sized businesses, „Business Georgia“ reports. According to him, along with the furniture cluster, it is planned to contribute to the formation of a textile cluster, as well as clusters of film production and information technologies. "At first, the furniture sector was chosen because there were already enterprises in Avchala and they needed help to strengthen cooperation, we helped them in this, connected them with foreign professionals, and acquainted them with the experience of Germany and Bulgaria," said Vincent Rey (EC поможет ..., 2017).

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At present, a technological cluster is being created in Georgia to promote the introduction of innovation technologies. It will unite technology companies, start-ups, public and private universities, the private sector and international companies, as a result of joint activities of which the country's economic development will become more stable and faster. This project, which will become a platform for the development of high-tech and innovative business in Georgia, will be implemented on the basis of co-operation between one of Europe's leading Limerick University (Ireland) and the Georgian University of Business and Technology (What will bring Georgia ..., 2017). **Georgia in 2016 became a full member of the research and innovation program "Horizon 2020"**. In Brussels, the Minister of Education and Science of Georgia Tamar Sanikidze and the European Commissioner for Research and Innovation Carlos Moynihan signed an agreement on the association of Georgia in the 8th Framework Program of the European Union for Research and Innovation "Horizon 2020". The agreement allows Georgian researchers and innovators to participate in the program on the same terms as the EU member states. As a result, both individual and university researchers will be able to use all the opportunities that "Horizon 2020" gives. Georgia has so far participated in it as a third country (Грузия стала ..., 2016).

In 2016 the "Startup-Georgia" program was founded, coordinated by the Georgia Partnership Fund and the Agency for Innovation and Technology of the Ministry of Economy and Sustainable Development. The purpose of this program is to promote the development of a beginner, mostly innovative, business (start-ups). At the end of 2016, the Partnership Fund started financing the winners of Startup-Georgia by

providing 586.7 thousand lari (239.5 thousand dollars) to eight of the 36 project-winners of the state program to promote innovative business. Among the financed projects: "Parking of cars in vertical space", "Production and sale of decorative plates and ceramic, spatial bricks", "Production of innovative decorative brick", "Clinic online", Trippanner, Wingo, Georgian Toys Factory, CARGOHUB, etc. Each the winning project receives funding in the amount of 100 thousand lari (more than 40.8 thousand dollars). The project is financed after agreeing all the terms and signing the contract between "Startup-Georgia" and private project owners. The first winners of the "Startup-Georgia" program were announced in August 26, 2016. In the first competition, 56 projects were won, 36 of them in the innovation part, and 20 - in the high-tech part. At the first stage, GEL 11 million was allocated for the implementation of the program (about \$ 4.5 million), and later the budget was to grow to 35 million lari (about \$ 14.3 million) (Партнерский фонд начал ..., 2016).

Rapidly in Georgia, information and telecommunication technologies are developing: the number of fixed-line subscribers, mobile subscribers and Internet users is growing quite rapidly; WiFi in Georgia is the fastest growing technology (it should be noted that it is very intensive in those regions where wired Internet is less available); the income received from television and radio broadcasting has been growing for many years; the business sector of information telecommunications technologies has been formed and is developing; in a number of state institutions, local information networks have been formed and are successfully functioning - LAN; Within the framework of the international project, the creation and use of individual ICT components was realized; in Kutaisi, the second

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state interdepartmental information network was created - MAN; in Imereti created a regional interagency information network-WAN; wide layers of all social strata of society and ages receive computer education, etc (Абесадзе Рамаз, 2016).

Priorities for the formation of NIS in Georgia

In order to outline priority directions for the formation of Georgia's national innovation system, it is necessary to clearly structure its constituent blocks. Based on a number of works, where the systematization of the blocks was carried out on the basis of a study of the NIS of the EU countries and some other countries (Зверева., 2009; Модели ..., 2013; Национальные ..., 2006), and own developments (АбесадзеР., 2016), the following system of blocks can be suggested:

1. Block of ensuring the innovation policy of the state: a) government organizations that determine the state innovation policy, ministries, departments, agencies, funds and other regulatory and funding agencies; b) strategy and priorities of innovation policy; c) regulatory framework for the development and stimulation of innovation, including provisions regulating the relationship between science, business and the state.
2. Block of innovation production: a) business sector (companies producing innovative products - developing units in large corporations, small and medium-sized enterprises creating an innovative product); b) companies developing innovative products, the creation of which was partially or fully funded by the state (for example, on the basis of the state venture).
3. Research sector (universities and research institutes).
4. Organizations for the transfer of technology and other elements of innovation infra-

structure (technology parks, business incubators, centers for commercialization and transfer of technology, etc.). All these structures should help to identify and introduce into production both domestic and, in particular, import new production technologies.

5. The system of interaction with the international innovation environment, i.e., the relationship with foreign partners for innovation, both in the field of supplying (transfer) new technologies, and in the field of joint innovation development.

6. The block of financing of innovative activity: a) state (central and regional) financing of innovative activity; b) financing of innovative activities by the business sector; c) public-private partnership in financing innovative activities.

7. Block training.

8. Block of support for projects implemented by donors.

9. The block of support of innovative development of agriculture.

Now, in the context of the above blocks, we will discuss the priority directions for the formation of the national innovation system.

1. Block ensuring the innovation policy of the state. The Law of Georgia on Innovations defines the functions of the advisory body of the government of the Council for Research and Innovation, the most important of which is coordinating the development of a state innovation strategy and the development of an ecosystem of national and regional innovations both between government agencies and between public, private, scientific and educational sectors. The law also outlines the tasks of the legal entity of public law of the Georgian Agency for Innovation and Technology, which should promote the commercialization of innovations and stimulate the use of innovations. But nothing is said

about the innovation fund, some varieties of which exist in many countries with a successfully developing innovation system. Of course, the law outlines the rules for state funding of innovative activities by the agency, but it seems that in addition to this there must be an innovation fund for financing (in full or on a public-private partnership basis) the most relevant innovative operations or developments in modern conditions.

The innovation policy strategy should set priorities for the development of the country and outline the key industries with the prospect of industrial innovation, to which the main state resources should be allocated, and priority should be given to the innovative development of traditional industries, the work of most enterprises in the early 90s ceased for the non-competitiveness of products manufactured on obsolete technologies and the lack of knowledge (the termination of the work of these enterprises caused a huge imbalance between the volume of exported and imported products). In addition, the strategy should outline the priority tasks of the formation and development of national and regional innovation systems and select priority areas for the development of national innovations in the public sector. Part of the strategy should be the development of special programs of innovation development, which is practiced in many countries.


Despite the fact that the "Law of Georgia on Innovations" was adopted, further development of the legislative base of innovative activity is necessary. For example, the third chapter of this law (Articles 16 and 17) regulates the financing of the agency's innovative activities. But nothing is said about how the agency's financial resources are being formed. Meanwhile, only budgetary financing, with a very weak current tax base for replenishment of the budget, will clearly

not be enough. Therefore, it is obvious that the financial fund of the agency will have to be replenished at the expense of government borrowed funds, which should be reflected in legislation or other normative documents. It is also advisable to introduce into the legislation the provision that universities and other research institutions should own intellectual property rights for those developments that were carried out with the financial support of the state. This situation is one of the characteristics of national innovation systems built on the principle of a "triple helix" (Models ..., 2013).

2. Block production innovation. In all developed countries, most of the innovations are produced in the business sector. In Georgia, at present, the production of innovations in the business sector is at an insignificant level. There are few large corporations in the industrial sector in the country, although there are a lot of them in the trade sector (which mainly grow due to the excessive import and sale of consumer products in the country), but in the trade sector there is no need to produce a large number of new technologies. Therefore, before talking about the organization of innovative units in large corporations, it is necessary to rebuild the hypertrophied sectoral structure of Georgia in the direction that there are more enterprises in the relevant branches of industry and agriculture (on the ways of such restructuring and providing economic mechanisms in Georgia, see our works (Абесадзе Р., Бурдули В., 2014; Burduli V., 2015; Бурдули В., 2016)). Now it is more important to create small innovative private enterprises (which mainly need to explore new foreign technologies for their subsequent transfer to production) and a technology transfer network to ensure the accelerated growth of these import-substituting and export-oriented industries. Although in some industries, for example, in

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the rapidly growing construction materials industry, it is now possible to create innovative divisions in large companies, which, in particular, will help ensure the mastery of production in the country of many modern building materials that are now imported).

Priority is also the creation of state-owned (or public-private partnerships) small innovative enterprises, taking into account the imperatives of the state's innovation strategy (however, the latter has not yet been developed).

3. Research sector. Universities and research institutes need to pay more attention to scientific developments focused on innovation research.

In most developed countries (with the Euro-Atlantic model of NIS, now being transformed into NIS, built on the principle of the "triple-helix model"), the universities of NIS, as well as some other research centers, are actually the nucleus of NIS (Национальные ..., 2015). Today, the base of the NIS of the USA is about 150 universities, in which the basic research in the field of fundamental science and a significant part of applied research are concentrated. In addition to universities, in the United States, the institutions of higher research are engaged in fundamental research. The next structure of the NIS of the USA is the national laboratories (the largest institutes developing some field of applied science [Модели ..., 2013]. The leading role is played by universities in such large European countries as Germany, Great Britain and Italy, but in France the vast majority of fundamental research is carried out within the National Center for Scientific Research (CNRS), an analogue of the Academy of Sciences. In the country there are two more categories of research institutions associated with the state: state research institutes, state-owned industrial and

commercial institutions dealing mainly with the knowledge-intensive sector of the national economy (Национальные ..., 2015). In the small country of Denmark, in addition to universities, sector research institutes are an important part of NIS. GTS-institutes ("approved technology service provider"), acting as connecting elements between the state and private structures. In Denmark, a powerful innovative infrastructure has also been created. Nevertheless, most of the innovative activity is reduced to small innovations aimed at improving the production process in the field (Справка ..., p. 5).

From this experience, it should be concluded that in a small country it is impossible to do without large-scale borrowing of new technologies abroad. Especially it concerns Georgia, where, as mentioned above, it is necessary to straighten the hypertrophied sectoral structure of the economy. Therefore, in the country at each stage of innovation in production, special attention should be paid to the problem of borrowing (import) of innovations (i.e. new technologies), in particular, at the research stage in the relevant institutions (a university or research institute) - research unit engaged in research of in-demand foreign innovative technologies and development of recommendations on their promotion into production.

4. Organizations for transfer of technology and other elements of innovation infrastructure. The "Law of Georgia on Innovations" noted the following elements of the innovation infrastructure: scientific / technological park; business incubator; business accelerator; transfer center of technologies; laboratory of industrial innovations; Innovation Laboratory; center of innovation; another innovation infrastructure.

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In this area, it is necessary formally to create technology parks in several regions, the founders of which will outline the range of research organizations involved in it, will help to establish and deepen innovative relationships between research organizations and production, and also - to contribute to the creation of the necessary elements of an innovation infrastructure.

The main task of the innovation infrastructure is the transfer of technologies. However, transfer means a broader range of tasks than defined in the said law for a "technology transfer center". In fact, other elements of the innovation infrastructure directly or indirectly participate in the transfer. For example, the task of business accelerators usually consists in supporting the development of technologies (including investment) by innovative start-ups, which can also be considered as part of the technology transfer process. Therefore, along with business incubators, priority centers for the transfer of technology and business accelerators are needed in several regions of Georgia.

5. System of interaction with the international innovation environment. Georgia is a small country and therefore cannot produce a large number of new production technologies (and in general such production is now negligible). Basically, it should focus on borrowing (importing) production technologies in foreign countries (and in large countries there is a massive import of foreign and export of domestic new technologies). Therefore, domestic technology transfer centers should cooperate with the corresponding systems of foreign countries, in particular, to assist domestic enterprises in acquiring patent licenses, know-how, attracting foreign engineering firms for setting up new production technologies purchased abroad and delivering them "turn-

key", as well as assistance in the organization of joint ventures, in particular venture companies.

Another area of international cooperation in innovation is cooperation in the development and production of innovations, in particular at the stage of research and development. While the problem of international cooperation in this area has not been resolved at the proper level, there are broad prospects for development of such cooperation with the EU countries on the basis of the provisions of Chapter 12 of Section VI of the Agreement on the Association of Georgia with the EU "Cooperation in Research, Development and Demonstration of Technologies", where, in particular, it is said: "The parties will promote cooperation in all spheres of civil scientific research, development and demonstration (RTD) of technologies with a two-way benefit and in with all levels of appropriate and effective protection of intellectual property (Article 342)". "Cooperation in research, development and demonstration (RTD) of technologies covers: (a) sectoral dialogue and the exchange of scientific and technical information; (b) the appropriate facilitation of appropriate access to the programs of each party; (c) the growth of research capabilities and participation of Georgian research institutions in EU framework programs; (d) promote joint research projects in all areas of research, development and demonstration (RTD) of technology ...(Article 343)" (Association ...).

6. The block of financing of innovative activity. As noted above, both public and private funding for innovation in Georgia are at a very low level. Meanwhile, in the EU countries with a successful innovation policy, much money is expended on such financing. Thus, in 2009, the share of total expenditures for financing research and development in GDP was 3.70% in Finland,

3.75% - in Sweden, 2.63% - in Germany, 2.66% - in Germany, 2.72% - in Denmark, and 1.99% - in France (Соснов Ф., 2011, p. 222). And the share of the state in the total amount of costs accounts for a smaller share, for example, in Finland - 25.4%, Sweden - 30.0%, France - 36.2% (although later in France the share of state expenditures increased to 49.9% (Национальные ..., 2015)). Therefore, in order to form and use NIS in Georgia, it is necessary to dramatically increase both public and private expenditures in this area.

State financing of innovative activity depends on the possibilities of the expenditure part of the state budget. In view of the low tax base for its replenishment, it is now, as noted, negligible. Therefore, in order to ensure acceptable levels of public funding, it is necessary to improve the tax system by increasing the rates of some taxes. And private capital is not yet organized enough to allocate sufficient funds for NIS development and innovation. In private business, most free financial resources are concentrated in the sphere of commercial capital, which, because of the high risk due to incompetence, does not seek to place them in the innovation sector of the industrial sector. Therefore, it is necessary to restructure the system of self-organization of business. In order to confirm the correctness of our following proposals in this area, we first quote the following quotations: "South Korea's rapid successful innovation development was made possible through the active borrowing of foreign technologies and competent patent policy. Important role in the "economic miracle" of Korea was played by large **financial and industrial groups** (chaebols), which for many years were the basis for the development of the national economy" (Справка ..., p. 14). "In South Korea, initially, the modernization was based on the **borrowing** of foreign

technologies, which took place in various forms: turnkey contracts, licensing, advisory services. The study of foreign experience occurred mainly through **the creation of joint venture firms** with Japanese partners. At present, despite the fact that Korea is in the lead in many high-tech positions in world exports, the country still largely depends on imported equipment due to insufficient development of its own basic technologies" (Справка., p. 7, 8).

In Georgia, in order to increase the investment activity of the business, it is necessary, according to the previous example of the South Caucasus, to create a FIG with the inclusion of trading companies (like the USA (Цветков В., 2000)), and the bank in the FIG should have sufficient competence, in order to select the appropriate financing lines for the creation of innovative firms in the industrial sector, not only through lending, but also through venture capitals produced both directly by the bank and other companies affiliated with FIGs, possibly on public-private partnerships with the participation of the Georgian Agency of Innovation and Technology. Venture innovation firms should be created jointly with foreign partners.

7. Block training. The training of innovative personnel (including innovative managers) cannot be conducted haphazardly. It should consist of interrelated stages of increasing knowledge and competence. Along with universities preparing specialists in the field of fundamental and applied science, and institutions directly focused on gaining knowledge in the field of innovation (for example, innovation center under the version of the Law of Georgia on Innovations), national engineering schools play a huge role in developed countries [Модели ..., 2013; Сергеев В., Алексеенкова Е., Нечаев В., 2008, p. 8]. Of great importance for the development of

innovative activity is the training of highly qualified specialists, namely Doctor of Science. In some European countries, for example, in the Netherlands and Austria, there is an increasing shortage of doctors of science in science and technology or lack of competent personnel, which results in a low return on scientific and technical developments (Справка..., p. 6, 9, 10), and inadequate development of interaction between science and business in some countries, for example, in Germany, encourages them to establish business departments in universities to promote the wider commercialization of developments (Справка..., p. 12).

In our opinion, Doctor of Sciences in Georgia should be trained not only in university departments (as is currently practiced), but also in specialized research institutes, in which, mainly, scientific developments of both fundamental and applied nature are carried out.

8. Block of support for projects implemented by donors. Important projects in Georgia were carried out by donors, but their commercialization did not take place, and important financial and intellectual resources were spent inconclusively. Therefore, in the future, such projects should be realized, the implementation of which will necessarily occur in production. To this end, under the Georgian Agency for Innovation and Technology, temporary units should be established to support donor-implemented projects that will monitor, if necessary, pre-financing, commercialization of projects and other required activities.

9. The block of support of innovative development of agriculture. At present, agriculture in Georgia is extremely inefficient: its productivity is low; Organizational and institutional forms of agricultural production are not regulated, in particular, there is a large number of nonmarket small-scale households with extremely low labor

productivity; There are few specialists, in particular, agronomists, called upon to provide advisory assistance to agricultural producers, and there is no ordered system of their consulting services. Therefore, in our opinion, it is necessary to form a separate system to promote the innovative development of the agricultural sector. It seems expedient to establish urgently the Agency for Innovative Development of Agriculture under the auspices of the Ministry of Agriculture of Georgia, in which consulting and other necessary services will be created on the basis of public-private partnership.

In addition to priorities in the context of NIS blocks, it is advisable to discuss priorities in the formation of **innovative clusters** in the country that have been created in developed countries for the last twenty years (sometimes successfully, but more often without success and cease to exist). When designing clusters, it is necessary to take into account the following circumstances (which we discussed in (Abesadze R., Burduli V., 2018)): the coordination of economic activities in such clusters should take place not in the context of a narrowly understood innovation policy but in the context of structural policies that include industrial (structured industry) and in its composition innovation policy, as well as regional (and in its composition innovation) policy; coordination takes place with the help of instruments at the national, regional and supranational levels, with the instruments of the national level of coordination being of primary importance; clusters are specialized in the context of individual industries; Clusters are located in a limited area, but in small countries they can also be created at the national level. Thus, in Denmark, in the framework of the competitiveness program, 16 clusters of the national level and 13 regional ones were allocated, and in Finland

there are two successful national-level clusters - a telecommunications cluster (organized vertically) and a cluster of industrial timber (horizontally organized) (Abesadze R., Burduli V., 2018, p. 17). When creating the infrastructure of clusters and systems of government and business coordination of their activities, it is advisable to adhere to the principles of their organization, practiced in France or South Korea, which are described in detail and systematized by us in (Abesadze R., Burduli V., 2018, R. 20-28).

In Georgia, as mentioned above, a cluster of Georgian furniture has already been created, and a technology cluster is currently being created. In our opinion, adhering to the above requirements for the organization of clusters, we should also think about the organization of textile and shoe clusters. In these industries in Georgia there were large and medium-sized enterprises (for example, a large silk weaving factory that produced high-quality competitive products;

shoe companies, but their products were not competitive in comparison with imported products), and now there are small enterprises that are not capable of producing quality products. It is necessary to think about the revival of these industries on the basis of the acquisition and development of innovative technologies.

It is advisable to create a cluster of building materials industry. In Georgia, and now there are powerful enterprises for the production of building materials, but also a lot of materials are imported. For example, products for the construction of composite materials, which are more and more used in construction. Therefore, it is advisable to create a cluster of building materials, under the auspices of which enterprises producing traditional building materials will join efforts to create new industries based on the purchase and development of technologies necessary for the production of composite building materials.

Conclusions.

The national innovation system provides an intensive influx of new knowledge, their transformation into scientific and technological innovations and their commercialization. This process (including the import of innovations) is carried out through an innovative infrastructure, where the market plays a major role, but the state has the most important duty to promote the formation of an innovative economy through the use of various coordination tools (legislative, financial, incentive, organizational, etc.). That is, the state should take on the role of a "helmsman" of innovation processes and, in general, of the economy (Abesadze R., 2014).

The country faces the most difficult task of forming a national innovation system.

When forming it, one should adhere to the principle of gradualness, with priorities in the context of each key block of the innovation system. The innovation development strategy should outline the key industries with the prospect of industrial innovation, and special attention should be given to the innovative development of those traditional industries whose production has been severely curtailed during the post-communist collapse of the economy. In the context of the innovation production block, it is necessary to induce large industrial corporations to create innovative divisions, it is also important to create small private and public-private innovative enterprises, which, in particular and to a greater extent, need to absorb borrowed technologies. In

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the country, it is necessary to create an effective technology transfer network, in which, besides the "technology transfer centers", other elements of the innovation infrastructure will also participate. Domestic technology transfer centers should cooperate with the corresponding systems of foreign countries in order to assist domestic enterprises in mastering new production


technologies purchased abroad. It is necessary to increase both public and private funding for innovation, which is currently at an extremely low level compared to financing in developed and successful developing countries. In the private sector, this problem will help to resolve the creation of financial and industrial groups.

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