

**ЕКОНОМІКА ТА УПРАВЛІННЯ НАЦІОНАЛЬНИМ ГОСПОДАРСТВОМ**

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**MAIN BLOCKS AND MODELS OF THE NATIONAL INNOVATIVE SYSTEM****ОСНОВНІ ЗАСАДИ ТА МОДЕЛІ НАЦІОНАЛЬНОЇ ІННОВАЦІЙНОЇ СИСТЕМИ**

**Urgency of the research.** In our article, on the bases of analysis of the national system of the world, it is also discussed models of innovative development on the example of individual countries: Euro –Atlantic, Eastern Asian, alternative and triple spiral models.

**Target setting.** That the system of scientific knowledge is becoming dominant of economic growth, as well as the system of new processes, products and services, and new forms of business organization.

**Actual scientific researches and issues analysis.** The combination of the national innovative system blocks has been studied in this: creative block, block of the technological transfer, financing block, production block, staff training block.

**Uninvestigated parts of general matters defining.** Component blocks of the basic structure of national innovative system generate knowledge, they make innovative infrastructure, produce innovative production and implement state policy

**The research objective.** We will try to make modest bit in the setting of the said problem and the scheme of learning conceptual grounds.

**The statement of basic materials.** Alternative model of innovation development is mostly used in agrarian countries having no scientific potential of fundamental and applied nature, having no rich reserves of raw materials, processing technologies, realized of which may become grounds of national competitiveness. Thus, not only fundamental and applied scientific block, but also high-tech component is weakly represented in such innovation system.

**Conclusions.** Hence – future belongs to the innovation economy. Due to this point of view of American economists regarding the fact that formation of national innovation systems in USA is the most important phenomenon in the 20<sup>th</sup> century.

**Keywords:** national innovation system; institutional aspect; concept; models of economic growth; centres of knowledge generation; creative block; venture funding; innovation infrastructure; Euro Atlantic model; East-Asian model; alternative model, the model of triple spiral.

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**Urgency of the research.** Justification based on studying economic essence of the national innovation system, its establishment, functioning, main characteristics and main models of development in different countries, as well as the necessity for its establishment and development of the concept of national innovation system will be long-term process particularly for Georgia; however, it is regular and hoping.

**Актуальність теми дослідження.** У нашій статті на основі аналізу національної системи світу обговорюються також моделі інноваційного розвитку на прикладі окремих країн: євроатлантичні, східноазійські, альтернативні та потрібні спіральні моделі.

**Постановка проблеми.** Саме система наукових знань стає домінуючою в економічному зростанні, а також у системі нових процесів, продуктів і послуг, а також нових форм організації бізнесу.

**Аналіз останніх досліджень і публікацій.** Досліджено поєднання національних інноваційних системних блоків: креативний блок, блок технологічного перенесення, блок фінансування, виробничий блок, блок підготовки кадрів.

**Виділення недосліджених частин загальної проблеми.** Компонентні блоки базової структури національної інноваційної системи генерують знання, вони створюють інноваційну інфраструктуру, виробляють інноваційну продукцію та здійснюють державну політику

**Постановка завдання.** Ми постараємося зробити скромний прорив у постановці зазначеної проблеми та схеми вивчення концептуальних засад.

**Виклад основного матеріалу.** Альтернативна модель інноваційного розвитку використовується переважно в аграрних країнах, які не мають наукового потенціалу фундаментального і прикладного характеру, не мають багатих запасів сировини, технологій переробки, реалізація яких може стати підґрунтям національної конкурентоспроможності. Таким чином, не тільки фундаментальний і прикладний науковий блок, а й високотехнологічний компонент слабо представлені в такій інноваційній системі.

**Висновки.** Звідси - майбутнє належить інноваційній економіці. Саме тому американські економісти вважають, що формування національних інноваційних систем у США є найважливішим явищем у XX столітті.

**Ключові слова:** національна інноваційна система; інституційний аспект; концепція; моделі економічного зростання; центри генерації знань; творчий блок; венчурне фінансування; інноваційна інфраструктура; євроатлантична модель; східно-азійська модель; альтернативна модель, модель потрібної спіралі.

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**Target setting.** 21<sup>st</sup> century is the Era of Knowledge. New system of values is being established in the modern world, giving fundamental change to the main vector of economic development and forming economy of new type; sector of knowledge in the said process plays decisive role. Provision of knowledge is the source of economic growth. This means that the system of scientific knowledge is becoming dominant of economic growth, as well as the system of new processes, products and services, and new forms of business organization. Innovations are being transferred into the strategic factor of growth, influencing upon the structure of public production, changing economic organization of society, providing stabilisation of social situation in the country.

Thus, study of the theoretical base of origination, establishment and development of national innovation system is extremely actual and of great interest today. The process of forming national innovation systems is being relatively intensively developed in the economies of the developed countries, which does not take place in the developing countries newly entering market economy, i.e. Georgia. Thus, we will try to make modest bit in the setting of the said problem and the scheme of learning conceptual grounds.

**Actual scientific researches and issues analysis.** K. Freeman (The Institute for Scientific Policy Research of Sussex University, Great Britain), B. A. Lyndval (Upsal University Switzerland) and R. Nelson (Columbia University, USA) are recognized to be the founder of the theory of formation of national innovation system, who analysed development of innovation activities in different countries and based on this, they gave explanation of the national innovation system. Herewith, the study was founded on the outcomes of researches earlier performed by I. Shumpeter (theory of economic dynamics), F. Hayek (distributed knowledge ratio), D. North (Institutional Theory), R. Solow (the role of scientific-technical progress in economic growth), P. Pomery and R. Lucas (New Growth Theory). All authors offer own description of national innovative system, focusing on its separate elements and interrelations. Herewith, all of them share common methodology principles. They are:

- Knowledge performs special role in economic development;
- Main factor of economic dynamics is a competitor among the entrepreneurs, which are founded on the innovations;
- institutional context of innovation activity directly influences upon its content and structure.

Following main characteristics of the national economic system are observed in the native literature (Russian Federation):

- 1) systemic nature, i.e. it is considered as the totality of the interacting elements through special rule;
- 2) Institutional aspect, i.e. the influence of formal and informal institutes existed in public upon rates and scales of development of innovations;
- 3) Distribution of new knowledge and technologies, as main function of national innovation system.

**Uninvestigated parts of general matters defining.** In the beginning of 90s of 20<sup>th</sup> century, the concept for the national innovation system was used in the researches conducted by the international organizations (for example, Organization of Economical Development and Cooperation), and within the framework of the political program of separate countries. Under the modern conditions, this concept was widely developed as in the native, so – foreign sciences, through the following main directions: different methods of approach towards definitions of innovations and typologies; researches in the field of development of the national innovation system, researches of cognitive apparatus, dynamics of innovative process in the field of state innovation policy, on the level of the enterprise in the field of innovative analysis. Development of the models of scientific-technical progresses, study of these factors performed during building of macroeconomic industrial function of intellectual and innovation activity; development of the model of economic growth, based on the innovative activities; analysis and modelling of diffusion of innovations; modelling the country on the competitive markets against innovations; evaluation of the role of regions in development of economy and formation of innovative policy [Qoqiauri, 2015; Abralava A., et al., 2009].

Besides the fact that in different times, multiple works were dedicated to the research of the national innovation system, there is no recognized definition of this concept. Find below general description of national innovation system.

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Lundvall, 1992 – The system of innovations is formed out of the elements and relations, interacting in the process of provision of new and economically useful knowledge, distribution, and application. National system is comprised of the elements and relations inside the national state borders.

Freeman, 1987 – Network of institutions in public and private sectors, based on the activities and interaction of which new technologies are being created, imported, modified and distributed.

Nelson, 1993 – This is the complex of institutions, interaction of which provides determination of the innovation activities of national firms.

Patel and Pavitt, 1994 – National institutions, the systems of their stimulation and competence, determining quality and direction of technological education (or change-generating activity) inside the country.

Metcalfe, 1995 – Totality of different institutions, making common or individual bit in the development and distribution of new technologies. They establish frameworks, inside which it forms and implements the policy for influencing innovative processes. This system, as such, is the system of inter-related institutions, for creation, maintenance and transfer of knowledge, skills and instruments, determining development of new technologies.

Ivanova, 2001 – National innovation system is the totality of interrelated organizations (structures), performing implementation of scientific knowledge and technologies and their commercial realization, inside national borders (small and large enterprises, universities, laboratories, technoparks, and incubators). At the same time, the national investment system is the complex of institutions of legal, financial and social nature, providing innovative processes and having sustainable national roots, trends, policies and cultural peculiarities.

Golichenko, 2006 – **National Innovation System** – this is the totality of the organizations of national state, private and public organizations and their interaction, within framework of which implementation of activities related with establishment, main.

**The research objective.** Tenance and distribution of new knowledge and technologies takes place.

Existence of different definition of the national innovation system speaks of the fact that no unified opinion has been developed regarding the essence, structure and function of the term, which greatly depends on and is significantly determined by the national peculiarities. For example, innovation system in the USA is understood in a narrow sense, according to which this is the scientific-technical system, which included, in the first place, the institutions, the centres of generation of new knowledge – universities, research laboratories, high-tech corporations, and innovation business.

European school understands the term Innovation System in wider sense. This is not only provision of knowledge, but also its distribution, development and application, through educational processes, performed among economic subjects, as well perfection of experiments and technologies and products in course of their application. Currently, B. L. Lyndval tries to unit above two methods of approaches, as two interfiling subsystem of the national innovation system within BRICS project (Brazil, Russia, India, China, Republic of South Africa) through comparative study of the national innovation system, at the example of these large developing countries. Besides this, during last period they often use the concepts” regional economic system and sectorial innovation system, and supranational and global innovation systems. Innovation system may be supranational due to several opinions – as truly global, including most of the countries of the world, or as a part of particular field of the world (for example: European Union) [Golichenko, 2006]. Besides this, they offer new directions of analysis of national innovation system – research of national innovation system in dynamics, as gradual process of transforming one complex of institutions into another or as the process of radical institutional changes.

**The statement of basic materials.** In course of processing the concept of national innovation systems, the method of approach was being dominated for long time, during which main attention was paid to the high-technology fields of industry and science. However, it is more purposeful to refer to the wide understanding of the national innovation system and form flexible horizontal system of interaction among economic subjects, allowing it provide rapid generation, develop and distribute new knowledge. Determination of national innovation system as the totality of the interrelated structures (organizations) is relatively acceptable, related with through production and commercial realization of scientific knowledge and technology within the framework of national borders of production and commercial realization (small and large companies, universities, laboratories, technoparks and incubators),

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at the same time national innovation systems make complex of the institutions of legal, financial and social nature, providing innovation processes and having firm national roots, traditions, political and cultural features.

**3.1. General Signs of Innovative Systems Functioning.**

Though innovation systems are extremely different from each other in details, they have common signs and market structure, which are necessary for their functioning and are comprised of the totality of interrelated blocks. As a rule they allocate following five-six blocks.

**I. Creative block**, i.e. the block forming knowledge (universities, scientific institutes, complex social networks) providing informal interaction of the researchers of various institutes and universities.

**II. Technologies transfer block** (intermediaries of different kinds, including non-commercial funds of professional expertise, forming special field through wide network ties, being able to provide contacts between the authors of creative ideas and potential purchasers).

**III. Funding block.** For the purpose of transforming idea into the experimental sample (engineering processing, preparing sample, establishing experimental industrial sample) and consistent inclusion into massive production external funding is necessary. There are three potential sources of such funding:

**1) Bank credit.** Author of the idea supporting its development, establishing a company for manufacturing of new product and raising bank credit.

**2) Selling innovations.** Author of the idea sells one of the largest firm to this entity, preparing similar products. This method of funding, releasing innovator from risk, at the same time releases him/her from profit, which could be earned from development of innovation introduced by him/her into the production.

**3) Venture funding.** Based on the studying of the offered innovations and business plan established by the investor venture company establishes an enterprise manager of which, as a rule, becomes an investor. At the same time, venture company maintains full control right on the activity of this enterprise and in case of insufficient profitability – sells it.

**IV. Production block.** Two alternative options of organization of industrial entity is possible. The first – inclusion of such production in the industrial structure of one of the largest firms. This allows use of the priority of vertical integration and reduce transaction costs at the expense of the independent management complex (accounting, the system for staff registration etc.). And another – establishment of new entity, where industrial transaction costs are minimized due to its small size.

**V. Staff training block.** Through inclusion of innovative managers (universities, and the establishments focused on formation of scientific staff, national engineering schools). [Sergeev, 2008].

According to several specialist, main elements of innovation system may be unified in six main blocks: (1) business sector (the companies manufacturing innovation products); (2) state (governmental organizations determining innovation policy, ministries, agencies and other regulatory and financial agencies); (3) scientific-research sector (higher institutions and scientific-research institutes); (4) organizations for transfer of technologies and other elements of innovation infrastructure (technoparks, business-incubators, innovation transfer and commercialization centres); (5) organization civil societies (public organizations influencing upon innovation development); (6) foreign partners of innovation activities. [National Innovation Systems in Russia and EU, 2006].

By generalization of civil and foreign studies, some economists represent the structure of national innovation system through the system comprising of ten blocks. They are: (1) strategy and priorities of innovative policy; (2) regulatory-legal base in the issue of development and stimulation of innovative activity; (3) innovation infrastructure; (4) the system of knowledge generation and distribution; (5) innovation enterprises, comprising of large scientific-industrial corporations, high-tech industrial enterprises; (6) establishments in the field of education and professional training, preparing staff in direction to the organization and management of innovative domain; (7) market conditions supporting development of innovations; (8) marketing and financial elements of establishing innovations and their forwarding on the market; (9) the system of interaction with international innovation environment; (10) the mechanism of innovation development reflecting interaction system among listed elements. [Zverev, 2009].

Hence, market structure of the national innovation system includes the blocks providing generation of knowledge and being engaged in training of scientific staff; establishing innovation infrastructure;

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manufacturing innovation products and performing state policy. As a rule, interaction between the blocks is provided according to the scheme: “state-science”, “science-production”, “state-production”. The simplest model of interaction of the elements of national innovation system includes in the fact that the role of private sector exists in processing of technologies, based on own researches and development of innovations; state role – supporting provision of fundamental knowledge and complexes of strategic nature for innovation activities. Different options of realization of these terms of the model form national innovation system.

**3.2. Innovation Development Model.**

Analysis of national innovation systems existed in the world allows application of their four kinds. The first of them is called “Euro-Atlantic Model”, second – “East-Asian”, third – “Alternative” and the fourth – “the Model of Triple Spiral”.

**Euro-Atlantic Model** is the model of complete innovation cycle from formation of idea until massive manufacturing of products. In the countries using this model, as a rule, all components of the structure of innovation system are represented: science of fundamental and applied nature; researches and processing, creation of experimental works and their issuance in massive production. This model is used by the developed countries, which are of high rating from the point of global competitiveness of national economies (Great Britain, Germany, and France etc.).

**East-Asian Model** – this is the model of innovation development, in the innovation cycle of which no stage of forming fundamental ideas figurate. Innovation system founding on this model in face lack the component of fundamental science (and partially, applied scientific components). This model is used in the countries of the region of south-eastern Asia (Japan, South Korea, Hong-Kong, and Taiwan). Being oriented towards export of high-tech products, countries of Eastern Europe, as a rule, receive technologies from the countries applying Traditional model. Classic example of the model of innovation development is innovation system of Japan.

Alternative model of innovation development is mostly used in agrarian countries having no scientific potential of fundamental and applied nature, having no rich reserves of raw materials, processing technologies, realized of which may become grounds of national competitiveness. Thus, not only fundamental and applied scientific block, but also high-tech component is weakly represented in such innovation system. As such countries are not able to reach observable results in establishment of new technologies, in their innovation policy they are focused training of staff in the field of economy, finances, management, labour, sociology and psychology, and in several field of light industry, creative industry and recreation. Great attention is paid to the training of managers for local subdivisions of transnational companies, international banks, and international political structures. This model includes national innovation systems in Thailand, Chile, Turkey, Portugal, etc. [10 Bertalanffy, 1968]. And last “Triple Spiral” model, finding practical realization only during last years in USA, are principally different from the above models not only by the structure of national innovation system, but also with the mechanism of interaction of separate elements. Currently the process of forming separate elements of this model is noted in some countries of Western Europe and Japan.

Let us consider four models of national innovation systems at the example of separate countries.

**3.3. Euro-Atlantic Model.** This model of national innovation system is widely distributed in the countries of Western Europe, having multi-year scientific traditions and being established due to the multiple military conflicts. For example. After the Second World War it appeared that in NATO block and under protection of US nuclear weapon these countries cardinally changed their research preferences and transferred accent on obtaining scientific-technical information through relatively cheaper method. For example, Great Britain rejected carrying out expensive researches since 1940s in the field of nuclear physics (except those related with manufacturing nuclear arms) and is focused on researching biology features of radio astronomy and high-molecular substances. It was successful in multiple direction; making foundation to two fundamental scientific disciplines – astrophysical and molecular biology. Currently British innovation system is accumulated around small amount of high level universities recognized worldwide (Oxford, Cambridge, London Universities). Its innovative infrastructure started intensive development from 2000, when the board for technological strategy was established and innovative strategy of long-term development was adopted.

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The Board performs innovations, establishes high technologies, supporting its development and commercialization. Besides this, large amount of innovative centres is being formed in the country. First of them are oriented towards specific technologies and forwarding of their application from the point of business requirements or compliance. Another is focused on particular sector of economy and market, for the purpose of uniting interfiling disciplines of science and technologies. [Bertalanffy, 1968].

National innovation system concentration system is being realized around large universities in Italy and Germany. The situation is different in France, the national centre for scientific studies performs larger share of fundamental studies (excluding mathematic science) and in particular form, it is similar to the functioning of the Academy of Sciences of Russia. Mathematic studies are mostly concentrated in Ekil Normal University and some other large universities (Nans and Sorbonne Universities).

**National innovation systems in small European countries** (Sweden, Netherland, Denmark, Switzerland, Finland). Here they are mostly focused on the university fundamental science, which is mostly funded by the government. For example, in Sweden – this is mathematic and classic researches (Upsalski and Lend Universities), economy (Upsal and Stockholm Economic School), computer studies (Linchpin University), biology and medicine (Karolin University), new technologies and urban planning (royal technology institute in Stockholm). In Netherlands – physics, law, economy, classic studies and oriental studies (Leiden University), economy and energy problems (Groningen University).

Administrative management and the history of science (Amsterdam University), in the innovation systems of the above countries national academies of sciences occupy important place. In Sweden and the Netherlands higher research institutes operate (Upkhal and Vasenar Universities). These universities provide not only training of high-qualified staff in the field of fundamental science, but they are also permanently caring of talented young people in direction of interaction with the international scientific elite. Studies of applied nature in small European countries are initially funded by grants and by participation in the unified project of large transnational corporations (Shell and Phillips – Netherlands, Volvo and Erikson – Sweden). Herewith, middle and small businesses actively participate in funding of scientific studies and processing. In the field of high technologies of regional projects are of great importance. Silicon Valley in USA is good example to this. Energy Valley in Groningen (Netherlands) is also another example to this, the essence of which is energy-saving technologies and alternative carbon heater, as well as Computer Valley in Linchpin (Sweden), where the technoparks of research establishments and venture enterprises are accumulated in the field of computer technologies and telecommunications.

Similar principles of building (strong university science by restricted number of directions, funded by government; financing researches of applied nature and processing by business, regional concentration of attempts in the field of sciences and technologies) are used in the national innovation systems of Denmark, Finland and Switzerland, providing their leadership in the rating of global competitiveness of national economies [Sergeev, 2008]. At the same time, in each above countries there are national peculiarities in the issue of building national innovation system. For example, in Denmark, sectorial scientific-research institutions make important part of innovation system together with universities. They are subordinated to the different ministries and perform scientific studies subject to the requirements of the respective ministries. Besides this, the system of GTS institutes is operating, which plays the role of connecting element between government and private structures. They are independent consulting companies developing and selling knowledge of applied nature and technological service to the private entities and state establishments. They are non-commercial organizations, established by the Ministry of Science, Technologies and Innovations and performing three main activities. Independent development of know-how, participation in joint projects with the state scientific research establishments and private companies, and performing commercial activities. Important element of the national innovation system of Denmark is scientific parks, being co-establishers of innovative incubators [Miettinen, 2013].

Under modern conditions, in West European countries unification of national innovation systems into the unified scientific-technical and innovative entities takes place. For this purpose, they develop different mechanisms (various programs, technological platforms, road maps etc.), supporting realization of new innovation strategy of European Union. This strategy is directed towards solving the issues of liquidation

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of vertical and horizontal fragmenting scientific-technical and innovative policy and formation of unified innovation market for the purpose of rising competitiveness in relation with USA and other countries. Coordination instruments of Pan-European programs (innovation network, technological platforms, uniform technological initiatives, Road Map ESRI), and new kinds of partners perform the role of main mechanism in synchronization of national policies of member countries in supranational policy of European Union. Unified European innovative domain is direct and "soft" regulation of the elements comprising formation levels (regional, Pan-European, Intra-European, national, regional innovation processing, technologies, innovations, markets, societies) and instruments (establishment of institutes, national and Pan-European policy and programs, the mechanism of complex interrelation and interfiling. Convergence of scientific-technical and innovation development of European region is performed, in the first place, for the purpose of solving European social and public problems. This is changing climate, establishment of low-carbon economy, healthcare, etc. Correspondingly, innovation systems in Europe are not established only in national, regional or pan-European direction. The process of establishing reconfiguration, multi-level and multi-layer innovation systems takes place. National innovation system also remains to be main core, though its borders become perfect, and fields of responsibilities are transferred to another side. New forms of cooperation are formed. Transnational cooperation is strengthened and it extends unified national innovation system [Global Transformation System, 2010].

**3.4. East Asian model of national innovation systems.** It is developed in East Asian region, differing from other models in the first place by its structure, in which universities, as centres of fundamental studies play much less role than laboratories on the basis of corporations. Typical example of national innovation centres of such kind is Japan, where innovation system is oriented towards main technical innovations and new technologies and not on provision of fundamental knowledge.

**National innovation system of Japan was being formed gradually.** Three stages may be allocated in its development: the first: 1950-1980s; second – 1980-2000s and the third – from the beginning of 21<sup>st</sup> century till today. Each of these stages has own specificity, which were determined by economic condition, and undertaken scientific, technical, educational and social policies. In post war years until 1970s, scientific-technical and innovation policy of Japan was built on application of two approaches. First was transfer of foreign scientific-technical achievements (procurement of licenses, establishment of joint enterprises, participation of multinational research projects) and another – promotion of development of own researches, primarily on corporate level (on the base of large corporations). Until the end of 1980s, the first approach exceeded; however, its importance in common strategy has been being gradually reduced. In 1980s, maximum scientific-technical principle of self-reliance, focusing on national innovations, several research programs were established and developed, the most important of which was the program processed by the Ministry of Foreign Trade and Industry in new fields of development of basic technologies. And another program – flexible research systems for development of creative sciences and technologies, developed by the Service of Sciences and Technique of Japan. [Yoon, Hyun, 2009].

Purpose of this latest was identification of the risks of revolutionary technologies, promotion of inventions and discoveries, which should make foundation to new directions of scientific-technical progress. Research organization unique to Japanese economy has been applied, which was characterised as the leader of Design Leaders, i.e. the system of State Ventures. In 1985, Board of Science and Technique published program document – "Grounds of Scientific-Technical Policy", in the processed edition of which (1992) there are 7 main directions of scientific development until the end of 20<sup>th</sup> century are stipulated. They are:

- 1) Provision of harmony in the system: "Science and Technique – Human and Society".
- 2) Supporting those engaged in the field of science and technique.
- 3) Increasing costs on scientific-research and experimental-designing works.
- 4) Establishing scientific-research infrastructure.
- 5) Stimulating original thinking and creativity of researchers.
- 6) Intensification of international scientific-technical activities.
- 7) Supporting scientific-technical development for the region of the country.

**Third stage** of forming national innovation system of Japan is commenced from the beginning of

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2000s, when the Board for Science and Policy of Technique developed national strategy in the field of scientific-technical development based on the analysis of global trends of developing global economy and based on the actual problems faced by Japanese society. Grounds for the strategy is granting main national priorities to the fundamental science and allocation of two large-scale preferable fields. The first includes four departments: science about life, informatics and telecommunication nanotechnologies and materials, ecology. Another field mostly includes researches and technologies of applied nature, energy and industrial technologies of resources, and industrial and social infrastructure, problems of land and space. All above departments are priorities of innovation development in the first decade of 21<sup>st</sup> century.

We may say that formation of national innovation systems in Japan was performed through gradual transfer of primary import of foreign technologies and know how to own original processing and scientific-technical achievements based on the native fundamental researches. Largest share of fundamental studies in Japan are performed at the universities and state laboratories. However, quality of their development is insufficient. Larger share of scientific-research processing of applied nature is performed earlier at the laboratories of large industrial corporations, without transferring to potential users within respective field. Necessary coordination is not always met among state fundamental studies and researches of applied nature of private sector. Most of the costs incurred on scientific-research and experimental-construction works comes from private sector in Japan. Based on such method of approach, Japan had great success in such directions of scientific-technical progress, which are related with manufacturing of consumer goods of massive consumption. With fundamental researches and non-massive production Japan goes significantly behind other high-developed countries [Yoon, Hyun, 2009].

No attempt for solving the problems of interaction of universities and research institutions with industry took place in 1980s. During that period the concept has been adopted, according to which accent was transferred to the development of technopolices with active state assistance at different levels of government. More than 70% of technopolices in Japan were established for assistance of small and middle business entities in the regions, 58% of which were oriented towards manufacturing of high-tech products [Van looy, en et, 2006].

Important distinguishing peculiarity of Japanese system of building innovation system in private companies is orientation towards all main stages of innovation process – maximally effective interaction of scientific-research and experimental-designing works, manufacturing, distribution, and marketing. All these elements are organized in the way providing active generation, selection, rapid distribution of innovation ideas at all stages of the process of developing new products (from development of the concept to the organization of serial production) and its successful realization in production. This is achieved through the principle of organization knowledge used by Japanese companies. Its essence exists in the ability of the company, as one whole (and its separate worker) to create new knowledge, distribute it through entire organization and reflect in production and services. According to Japanese managers, knowledge, expressed in words or figures, is only top of an iceberg, and knowledge is not formalized at all, i.e. it is not easy to understand and explain. Informal knowledge exists on the level of an individual. It is closely related with the actions and experience of particular human, giving rise to the transfer of knowledge and specificity of distribution methods.

Provision of effective interaction of each stage of innovation process with main resources at large Japanese companies is formation of teams of employees out of the staff of different subdivisions of the company. Due to this, processing innovation production in Japanese companies is the result of share relation of each group included in the teams of processors.

When giving general characteristic of national innovation system of Japan we shall note that early model, oriented towards receipt of foreign innovations and technologies and their further perfection, expired itself in the beginning of 1990s. Under modern conditions, Japan is on the stage of transferring to the principally new model, forced for provision of economic and scientific-technical leadership by the national companies at the expense of commercial realization of scientific achievements and processing, which has not been used earlier by competitors. Important peculiarity of new national innovation system is realization of the developed intellectual creative concept in the country.

**3.5. Alternative model of innovation development.**

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Alternative model of innovation development is being formed in the countries, having no important scientific potential, due to which there are no fundamental and applied scientific blocks in the national innovation systems. Examples to such kind of national innovation system are Thailand, Chile, Turkey, Jordan, and Portugal. For example, Thailand and Chile, through developing agricultural field of economy, are large exporters of agricultural products. In course of forming national innovation system they make focus on the development of innovation management of such fields. They also provide transferring and not creation of new technologies. Herewith, necessary innovation infrastructure is being gradually formed. For example, in Thailand, in 2003, they established national innovation agency, objective of which is development of the strategy for innovation development of national economy and rising competitiveness. Besides this, establishment of high-tech parks has begun, which is comprised of local universities, and governmental and local scientific-research institutions, including invitation of foreign scientists. Main field of activity is creation of nanomaterial's, nan biotechnologies and nanoelectronics. Development of biotechnologies is related with establishment of national centre of genetic engineering and biotechnologies. [Miettinen, 2013]. In 2006 National Board was formed according to the innovations.

Development of fundamental science is mostly performed at the universities. Leading national universities (Chile and Santiago Universities, catholic universities in Valparaiso and Consuelo and Federico Santa Maria Technical University in Valparaiso) in Chile exercise highest governmental support. Scientific-research centres at these higher institutions develop half of entire programs, which is performed throughout the country. Gradually agricultural fields, tourism, innovation management, telecommunications and technological unions are becoming priority of economic innovation policy of the country.

Since 1960s, Turkey has been actively working on formation of national innovation system and accent is made on establishment of innovation infrastructure. For example, in 1963, Board of Infrastructure and Technologies (TUBITAK) was founded in the country. It is not central organization, carrying responsibility for scientific studies and technological development of a country. The board is exercising great authorities in the field of innovations, starting with the determination main directions of scientific-technical and innovation policies and finished with identification and assistance of young talents (organization of secondments, conferences, olympiads), as well as issuance of scientific magazines and monographs. Warranty committee operated on the basis of the Board, which is comprised of the leading specialists of the country from respective fields of science, allowing these committees not only to provide distribution of warranty funding, but also perform functions of innovation expertise. Besides this, national academic network is established within the bounds of TUBITAK, as well as documentation centre and number of laboratories. Since 1991, the fund for Nongovernmental Non-commercial Development of Technology (TTGV) was established under the Board, which is aimed on funding scientific studies (R&D) in private sector. TTGV provides up to 50% of budget in the industrial sector of R&D. Most of the projects supported by the Fund belongs to the field of telecommunications and electrical engineering, determining competitiveness ability of national economy, and 73% of the project is initiative of small and middle businesses.

During recent years, 12 technoparks and technological development zones were established in Turkey, supporting strengthening of cooperation between universities and production. Inside such technoparks and technological zones special labour conditions are being formed, legal and financial assistance of researchers and entrepreneurs are provided. Reduction of the breakthrough between university science and business is main purpose of other structures: they are the centres of development of technologies (their number in the country already is 11, including private ones), as well as special centres of expertise under universities and the faculties of open lessons. Their specialization is distance learning, scientific interaction and development of technologies in the fields of telecommunications and informatics. Preferable directions also include biotechnologies and technologies of communications, including digital ones (Turkey reached special success in this direction) and recreation. Management is paid special attention in training programs. Respective classes are created in 52 universities out of 77 throughout the Country. Herewith, many universities offer programs of innovation management. Preferable development of education against development of scientific researches is the formed peculiarity of national innovation system of Turkey [Sergeev, 2008].

Hence, alternative model of innovation development excluding affords for establishment of funda-

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mental science and full industrial cycle in high technologies, are preferable and less-wasteful fields for the country, which may not bear high financial and organizational costs.

**3.6. The model of Triple Spiral.**

The model of Triple Spiral is the newest model of forming national innovation system developed based on Euro Atlantic model, does not exist in completed form in none of the countries. This model was mostly developed in the USA, and its separate elements – in some countries of Western Europe, Brazil and Japan.

The Triple Spiral Theory, as perfect form of the model of innovation development was established in England and Holland in the beginning of 21<sup>st</sup> century by the Professor of Nivasle University G. Itskovits and Professor of Amsterdam University L. Leide Dorph. Grounds to the idea of Triple Spiral is the synthesis of several sociological theories, using analogues from biological sciences, and similar objectives in relation with the movement of three bodies, having no common solution, but private solution is possible for some particular primary terms. It is adequate for non-linear, poly-variant processes. Its main options are: 1) existence of internal indefiniteness of the described process, foreseeing arrangement of relatively independent influence of each allocated spiral and their interaction; 2) Existence of multiple possible solutions, including subject to the particularity of relations; 3) dependence of these solutions on primary conditions. Functioning of the model is performed by observance of the following principles: two out of three spirals form limiting conditions of interval situation against the third one, and the third – intermediary formation “envy”, and framed function may perform transversal action, from each allocated variable. [Lundvall, Jonson, 1994; Lundvall, Jonson, Andersen, Dalum, 2002].

Triple Spiral in relation with innovation development describes interaction of three institutes (science, state, business) at each stage of creating innovation product. This is dynamic model of inter-organization relations, formed through evolution of economy and society. If earlier, interaction between these three institutes in industrial era was linear, under modern economy, it reminds us ties of DNK spiral structures, letting the institutes to receive and maintain several characteristics of each other. Its main elements are: 1) main scientific knowledge in the society is characterized by strengthening the role of universities in interaction with industry and government; 2) three institutes (university-state-business) try to cooperation. Herewith, innovation compiler is generated out of this interaction and not with the initiative of the state; 3) in addition with the traditional functions, each of three institutes partially undertake the function of another institutional function, and the skill of performance of non-traditional functions is the source of innovation. In practice, this is expressed in the fact that the universities, where education and scientific studies are combines, make their bit into economy, through establishment of new companies in the incubators of the universities. Business partially performs educational services, and the state place the role of public entrepreneur (manufacturer) and venture investor, together with the traditional legal and regulatory role. Leading importance in this model is granted to the universities, which are transformed into the industrial universities or the universities of industrial type, using knowledge in nature and new educational disciplines give respective results. [Itskovits, 2011; Katukov, et, 2002].

Classical example with the principle of innovation development and triple spiral is establishment of Silicon Valley in the USA. History of development of Silicon Valley is related with desire of the State of Massachusetts to review the influence of great depression (1930s), by means of the dialogue between business and science, through technological institute of Massachusetts. Initially this was bilateral interaction “University-Enterprise” and “State-University”. Accent in the university was transferred not only to the development of fundamental science (physics, chemistry), but also on the scientific studies of applied nature, oriented towards practical application of outcomes in the industrial activities. Foundation of the production was multi-year effort on establishment of a firm, by state assistance of scientific-research and experimental-designing works and processing of the policy supporting business. Gradually, bilateral interrelation was transformed into the triple spiral. Special role in its formation was performed by the amendments to the legislation on patents and trademarks (1980). According to this document, universities and other research establishments will grant intellectual property ownership right for the processing, performed under the financial assistance of the government. [Castellacci, Natera, 2013].

Currently, ground for national innovation system of the USA is made by about 150 universities, im-

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portant share of which occupy leading places in the rating of the world universities (Harvard, Columbia, Barkley, Stanford, Massachusetts Technology Institute, Minnesota University, Wisconsin University, etc.). Main studies accumulated in the universities represent main share of studies of fundamental scientific and applied nature. Universities have large financial resources, owning land plots and important financial funds, being continuously filled with the sources of rich graduates. Universities are permanently graded in the USA. Ratings are evaluated between one-profile faculties of different universities as well. Such ratings are extremely important for attraction of students and best professors, and using newest methods of education [Sergeev, 2008].

Together with the universities, fundamental studies in USA are performed by the higher research universities (institutes in the city of Ariston, Los-Angeles, Santa-Fe). Their main objective is training high qualified staff and cooperation with the representatives of global science, working at these institutes permanently or temporarily. For example, Einstein and Fon Neiman were employees of the higher research institute of Princeton, Murray Holman (author of quantum theory) was permanent employee of the institute existed in Santa-Fe.

The structure following national innovation system in the USA is national laboratories (large institutes), developing researches of applied nature in direction of particular science. For example, Los-Alamon laboratory was the place, where nuclear bomb was created; herewith, there are multiple private research corporations in the USA, relatively famous of which are Rend-Corporation. These structures protect interests of US state agencies, including private companies, performing studies of fundamental and applied nature on commercial basis.

Transfer of technologies in the USA is performed from main universities to the industry through venture companies, or inside the company itself, by establishment of large research subdivision. Such subdivisions are held by practically all more or less famous companies. Classic example to it is the laboratory Ben Telefoncompany, in the development of theory forming and newest means of communication.

However, when characterising national innovation system of USA, decisive role of the universities shall be emphasized, and well developed system of attraction of the best professionals and talented student from entire world, allows USA become leader in the most of the fields of knowledge and accumulate the specialists reaching the highest results in the scientific, technical and technological fields.

The state, which does not only perform its traditional functions in legislative, financial and management field, but also determines prospects for economic development through creation of and realization of programs is of great importance in the development of modern national innovation system of the USA. Such programs include the program of leading technologies initiated in 1988 and realized by the US Department of Commerce.

Purpose of the program is supporting development of technologies at the earlier stage, performed by companies and consortiums. They include the firms and universities or nongovernmental laboratories. The program is oriented towards industry and due to this, universities and state laboratories participate in it in form of junior partners. The program is focused on the limited amount of preferable directions, one of which is biotechnologies. Herewith, particular researching objectives are determined by companies and not the state. The funding is provided simultaneously: consortiums comprising of two or more companies, cover half of the project cost; large companies – 60%. If small enterprise performs the role of single partner in this process, it shall pay the minimum of indirect costs. Selection of the projects is provided based on two basic criteria; profitableness of the project for entire country (i.e. opportunity for establishment of the technologies having potential for wide interfiled investments or opening new markets) and ownership of the project from the early stage of development of the technologies. Assessment of the program identified that its realization influenced upon conduct of the firms in relation with the scientific-research and experimental-designing works realized by them; the 61% of firms increased funding of these works, 67% increased investments in long-term scientific projects, 71% expressed more interest for cooperation compared with the earlier and 73% of the firms became more intended to the risky investments [20]. In view of promoting cooperation between private sector, universities and state laboratories, according to the outcomes of the program, importance of cooperation has been increased.

And finally, separate direction of state assistance is stimulation of technological development and

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commercialization of the outcomes of scientific-research and experimental-designing works, adopted in the scientific sector of science and universities.

Grounds to this latest is widely recognized legal acts, such as Bea-Dowel's Law, the act on transfer of technologies and other legislations, intended for encouraging private sector to commercialize works performed within framework of state scientific program. Namely, it became possible to issue right for intellectual property, established with state resources. The processor for state organizations, which may transfer to the companies engaged in commercialization based on the licensing. State forms conditions for rapid transfer of knowledge received at the universities and state laboratories, through programs supporting start-ups and development of liberal rules of their establishment. Hence, above state activities, and the programs supporting small business, regulation norms of the intellectual ownership rights, in the field of scientific-research and experimental-designing works of the instruments promoting interrelation of science and business condition supporting of the process for establishing new model of national innovation system.

The process of forming the model of innovation development based on the principle of triple spiral, is being continued in some developed European countries (at the market of competitiveness poles, as in France), in Scandinavian states, Brazil, Japan (based on technopolices), There are separate examples of practical experience of using the model of Triple Spiral in Russia (under the management system and radio technique of Tomsk State University).

Under modern conditions, complex type of the model of triple spiral is being developed in foreign countries – the model of quadruple spiral, described by I. Karaian and D. Campbell in 2009. This model touches upon interactive network interaction based on entire national society and not only between three leading institutional sector. As influencing upon innovation process was commenced by other institutes in the form of different social levels, this phenomenon is theoretically reflected in the addition of the fourth element to the triple spiral, which includes representatives of civil society. It is recognized that the fourth spiral gives better characteristic of modern post-industrial economy than the third one, as in 21<sup>st</sup> century civil society obtains critically important role in creation and distribution of new wealth and values. [Katikov, et, 2012].

**Conclusions.** Thus, global experience of creating national innovation system of different type speaks of the fact that currently most of the countries changes directions and orientation of their economic development changes in regards with the economy of innovations. For this, the countries select the model of relatively adequate national innovation system. Herewith, selection of models greatly depends on the existed level of economic development, and the system of education and science.

Development of particular model of national innovation system for particular economy is long-term process, in which business and state interact, performing their traditional functions and obtaining new ones. The countries of high scientific and educational potential become the leaders, being able to introduce innovative processing into production. Performance of this task is greatly conditioned by the established business ties between science and business, and active protectionist policy of the state.

Hence – future belongs to the innovation economy. Due to this point of view of American economists regarding the fact that formation of national innovation systems in USA is the most important phenomenon in the 20<sup>th</sup> century is natural, as it is national innovation system is the foundation to the achievement in any field, mechanism, through which it is possible to meet any demand of the society.

Due to the fact that new models of innovation system is being successfully developed and new methods of approach are being formed in regards with the revival and distribution process of innovations, this process is being only commencing in Russia based on the new main basics of revival.

**References**

1. Abralava, A., Gvajaia & Qutateladze, R. (2009). *Innovation Management*. Tbilisi: TSU [in Georgian].
2. Bertalanffy, L. & Von. (1968). *General System Theory; Foundations, Development, Applications*. New York: George Braziller [in English].
3. Freeman, C. (1987). *Technology Policy and Economic Performance: Lessons from Japan*. London; New York: Pinter Publishers [in English].

**Література**

1. Abralava A., Gvajaia, Qutateladze R., 2009. *Innovation Management*. Tb. TSU. Pg. 263 (in Georgian).
2. Bertalanffy L. Von, 1968. *General System Theory; Foundations, Development, Applications*. N. Y.: George Braziller.
3. Freeman C., 1987. *Technology Policy and Economic Performance: Lessons from Japan*. London; N. Y.: Pinter Publishers.

**ЕКОНОМІКА ТА УПРАВЛІННЯ НАЦІОНАЛЬНИМ ГОСПОДАРСТВОМ**

4. Ivanov, N. I. (Ed.). (2010). *Global Transformation Innovation System*. M. IMEMO RAN [in English].
5. Golichenko, O. G. (2006). *The National Innovation System of Russia: Condition and Ways of Deployment*. Moscow: Nauka [in English].
6. Itskovits, G. (2011). Model of Triple Spiral. *Innovation Russia*, 4 [in English].
7. Ivanova, N. I. (2002). *National Innovation Systems*. Moscow: Nauka [in English].
8. Katikov, D. D., Maligin, V. E. & Smorodinskaia, N. V. (2012). *Institutional Environment of Globalized Economy: Development of Network Interaction*. Moscow. Institute of Economy [in English].
9. Lundvall, B. A. & Johnson, B. (1994). The Learning Economy. *Journal of Industry Studies*, 1(2), 23-42 [in English].
10. Lundvall, B. A. (1992). *National Systems of Innovation. Towards a Theory of Innovation and Interactive Learning*. London: Pinter [in English].
11. Lundvall, B. A. & Dalum, B. (2002). National Systems of Production, Innovation and Competence Building. *Research Policy*, 31(2), 213-231 [in English].
12. Metcalfe, S. (1995). *The Economic Foundations of Technology Policy: Equilibrium and Evolutionary Perspectives*. Stoneman P. (ed.). Handbook of the Economics of Innovation and Technological Change. Oxford: Blackwell Publishers [in English].
13. Miettinen, R. (2013). *Innovation, Human Capabilities, and Democracy: Towards an Enabling Welfare State*. Oxford: Oxford University Press [in English].
14. Invanov, V. V. (Ed.). (2006). *National Innovation Systems in Russia and EU*. Moscow: Tsipran Ran [in English].
15. Nelson, R. R. (1993). *National Innovation Systems: A Comparative Analysis*. New York: Oxford University Press [in English].
16. Patel, P. & Pavitt, K. (1994). The Nature and Economic Importance of National Innovation Systems. *STI Review*, 14, 9-32 [in English].
17. Qoqiauri, L. & Qoqiauri, N. (2015). *Innovation*. Tbilisi: GTU [in English].
18. Sergeev, V. M., Aleseenkova, E. S. & Nechaev, V. D. (2008). Typology of the Models of Innovation Development. *Politiya*, 4 (51) [in English].
19. Van, L. B., Debeckere, K., Callaert, J., Tijssen, R., Van, L. T. (2006). Scientific Capabilities and Technological Performance of National Innovation Systems: an Exploration of Emerging Industrial Relevant Research Domains. *Scientometrics*, 2(66), 295-310 [in English].
20. Yoon, W. & Hyun E. (2009). How Relevant and Useful is the Concept of National Systems of Innovation? *Journal of Technology Management and Innovation*, 3(4), 1-13 [in English].
21. Zverev, A. V. (2009). Formirovanie natsionalnoy innovatsionnoy sistemy: mirovoy opyt i rossiyskie perspektivy [Formation of National Innovation System: Global Experience and Russian Prospects]. *Extended abstract of Doctor's thesis*. Retrieved from <http://dissers.ru/avtoreferati-dissertatsii-ekonomika/a840.php> [in Russian].
4. Global Transformation Innovation System. 2010. Under edition of N.I. Ivanov, M. IMEMO RAN.
5. Golichenko, O. G., 2006. The National Innovation System of Russia: Condition and Ways of Deployment. Moscow: Nauka. 1.
6. Itskovits, G., 2011. Model of Triple Spiral // *Innovation Russia*, No. 4.
7. Ivanova, N. I., 2002. National Innovation Systems. Moscow: Nauka.
8. Katikov, D. D., Maligin V. E., Smorodinskaia N. V., 2012. Institutional Environment of Globalized Economy: Development of Network Interaction. M. Institute of Economy.
9. Lundvall, B. A., Johnson B., 1994. The Learning Economy // *Journal of Industry Studies*. Vol. 1, No 2. P. 23-42.
10. Lundvall, B. A., 1992. National Systems of Innovation. Towards a Theory of Innovation and Interactive Learning. London: Pinter.
11. Lundvall, B.-A., Johnson BAndersen E.S., Dalum B., 2002. National Systems of Production, Innovation and Competence Building // *Research Policy*. Vol. 31, No 2. P. 213-231.
12. Metcalfe, S., 1995. The Economic Foundations of Technology Policy: Equilibrium and Evolutionary Perspectives // Stoneman P. (ed.) Handbook of the Economics of Innovation and Technological Change. Oxford: Blackwell Publishers.
13. Miettinen, R., 2013. Innovation, Human Capabilities, and Democracy: Towards an Enabling Welfare State. Oxford: Oxford University Press.
14. National Innovation Systems in Russia and EU, 2006. M.: Tsipran Ran., Under edition of Invanov V.V. (Russia), Ivanova N. I. (Russia), Rozebum I (Netherlands), Haisbers Kh (Netherlands)
15. Nelson, R. R., 1993. National Innovation Systems: A Comparative Analysis. N.Y.: Oxford University Press.
16. Patel, P., Pavitt, K., 1994. The Nature and Economic Importance of National Innovation Systems // *STI Review*. No 14. P. 9-32.
17. Qoqiauri, L., Qoqiauri, N., 2015. Innovation. Tb.: GTU p. 661.
18. Sergeev, V. M. Aleseenkova, E. S., Nechaev, V. D., 2008. Typology of the Models of Innovation Development // *Politiya*, No. 4 (51).
19. Van Looy, B., Debeckere, K., Callaert, J., Tijssen, R., Van Leeuwen T., 2006. Scientific Capabilities and Technological Performance of National Innovation Systems: an Exploration of Emerging Industrial Relevant Research Domains // *Scientometrics*. Vol. 66, No 2. P. 295-310.
20. Yoon W., Hyun E., 2009. How Relevant and Useful is the Concept of National Systems of Innovation? // *Journal of Technology Management and Innovation*. Vol. 4, No 3. P. 1-13.
21. Zverev A.V. 2009. Formation of National Innovation System: Global Experience and Russian Prospects. Extended abstract of Doctor's thesis. <http://dissers.ru/avtoreferati-dissertatsii-ekonomika/a840.php>.

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