

SOCIAL COMPONENT IN THE MODERN NATIONAL INNOVATION SYSTEM

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Abstract. With the intensification of globalization processes and the high level of competition in international, regional and national markets, innovation has acquired the status of a major advantage for any country and has become the basis for ensuring its sustainable economic development. The use of new knowledge and technologies provides an opportunity to implement and intensify innovation and, as a result, to build an efficient and competitive innovation economy. Based on the above, the question arises of building a fundamentally new national innovation system, adapted to the socio-technological challenges, which should determine the competitive position of the national economy in the global arena. In this context, social capital, as a factor of readiness for technological transformations of the state and strengthening of competitive positions in the international markets, forms the basis for the expansion of research and transformation of the NIS. *The purpose of the article* is a theoretical substantiation of objective processes of transformation of NIS, taking into account modern trends and identifying the role and place of the social component in it. Given the fact that scientific and technological progress is an inevitable process, the relationship between the center and the periphery of the global economic system is characterized by unequal scientific and technological exchange, in which the peripheral countries are forced to pay intellectual rents contained in imported goods and services, as well as to act as a raw material and production appendage of the developed countries. *The subject* of the article is the transformation processes that take place in modern innovation systems under the influence of global challenges, as well as the social component, which is undoubtedly the driving force in the modern world for the promotion of domestic innovations, the development of high-tech business, and the increase of the level of technological readiness of society. *The methodological basis of the study* is the historical-logical method, the system-structural analysis of economic processes and phenomena, and the methods of qualitative comparison. *Results.* Social capital in NIS acts as a kind of litmus test, reflecting its efficiency and competitiveness, since the functionality and social role of the innovation system is expressed in providing society with innovations, technological goods, products and services that effectively satisfy the entire spectrum of human needs.

Key words: innovation system, social capital, financing, innovative product, technology, globalization, research and development (R&D).

JEL Classification: O31, O32, O33, O38, O57

1. Introduction

Modern economic conditions dictate the need to solve the problems of activating innovation processes in the national economy and ensuring the creation of a highly efficient NIS. The main factor of the country's economic growth is the system of innovation processes taking place in the country. The formation and improvement of innovation

systems is one of the key issues of economic development not only of industrialized countries, but also of developing countries, which creates an objective need to search for new forms and mechanisms of interaction between the state, science, business, production and education. In the classical structure of the NIS there are three actors: the government as a guarantor, which provides

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and implements mechanisms for regulating the innovation processes taking place in the country; directly the scientific and technological sector, which is a generator of innovative ideas and novelties; and business as a system of commercialization and transformation of scientific results into finished products and goods. Unfortunately, in the theoretical base of world research, as well as in practice, there is no social component of the NIS, as a system of popularization, promotion and consumption of domestic R&D. Therefore, the real question is how to embed a social element into the modern system of innovative values, i.e. society itself, which motivates and stimulates the above mentioned actors to development. The purpose of the article is a theoretical substantiation of the role and place of society in modern NIS, which is implemented through the main tasks, namely: on the basis of a conceptual framework to explore the prerequisites for the formation and development of NIS; to analyze the most effective national systems in the world; to determine the methods and ways of introducing the social component in NIS; to highlight the main problems of innovative development at the global level. The article reveals both the theoretical approach to the structure and development of the NIS, and determines the relationship with its participants, taking into account the social component.

2. Theoretical views on the formation and development of the national innovation system

Modern social, economic and political attitudes are creating qualitatively new approaches to consumption, communication, lifestyle, production, advertising, etc., which is due to the intensive development of innovative technologies. In this context, the task of any progressive government is to introduce these technologies into society in order to create a society that is responsible and ready for innovative transformations. It is expedient to create a National Innovation System (NIS), which would rely not only on economic, political and legal institutions, but also to cover the social side, which acts as a kind of basis for the adoption and development of new technologies. The purpose of the article is to determine the role and place of the social component as a new player in the national innovation system and the theoretical argumentation of its importance.

At the present stage, the leading countries of the world economy have accelerated the pace of socio-economic development through the use of scientific and technological cooperation as part of modern globalization processes, which in turn ensure the trade and production integrity of the world economy through innovation and effective functioning of national innovation systems.

Since the beginning of the 1990s, the concept of the national innovation system has been in the center of attention of scientists dealing with economic, technological and innovative development, as well as state and international organizations responsible for the development of innovation and industrial policy. Accordingly, the theoretical justification of innovation infrastructure and its elements in scientific circles is the "Concept of National Innovation Systems" (CNIS), which was proposed by a group of scientists as K. Freeman, B. Lundvall and R. Nelson. (Freeman, 2011; Lundvall, 1992)

K. Freeman considered NIS as "a system of institutions in public and private sectors, the activities and interactions of which are aimed at initiating, importing, modifying and diffusing new technologies". (Freeman, 2011). Based on the conclusions of the institutional theories of scientists R. Coase and D. North, he continued to study the institutional context of innovation, emphasizing that NIS is a kind of institutional structures in the public and private sectors, whose activities and interactions initiate, create, modify and promote the diffusion of new technologies.

B. Lundvall, based on the concept of "national production systems" of F. List and the work of Von Hippel on technological cooperation between firms, studied the relationship between producers and consumers of new knowledge and technologies within a state and compared the priority characteristics of innovative innovation systems in the countries of Northern Europe. According to the ideas of B. Lundvall, the interaction of firms in the process of technological development is much more often realized within the country and is determined by the peculiarities of its institutional structure, to which special attention was paid by the economist – scientist D. North. He assumed that institutions create a system of incentives (positive and negative) that direct people's activities in a certain direction. According to him, technology only sets the upper limit of achievable economic growth.

In the theory of economic development, the founder of the concept of innovation is the Austrian scientist J. Schumpeter, who for the first time substantiated its economic and business essence. He, in the long run, identified the complexity of this phenomenon, namely, innovation is: a brand new product; improved product; a new way of manufacturing existing products; a new way of promoting existing products; use of a new raw material. It marked the beginning of a new round of economic views and mainstream, which led to the formation of a structured system not only at the business level, but also at the technological level. It can be assumed that this is a kind of synergy of natural sciences and humanities, which is present today in almost all scientific approaches.

Since the 1960s, research on innovation has been carried out in Germany, in particular by Professor G. Mensch. His contribution to the theory of innovation was the refinement of its classification and the nomination of the "continuity hypothesis". It should be noted that he was one of the few researchers who were able to identify the first negative manifestations of the situation in the 1970s, when the signs of a new global stagnation were not yet obvious. G. Mensch described the crisis of the 70's as a "technological stalemate", i.e., a natural pause in the progressive development of the economy.

At the end of the twentieth century, NIS has already emerged as a system that requires appropriate research methodology and regulatory mechanisms. For example, in the work of S. Naubar "Formation and development of the concept of national innovation systems", the search and formalization of the ideological and methodological basis of the concept. D. Metcalfe – an English economist from the University of Manchester, Director of the Center for Innovation and Competition – proposes to consider NIS as a set of developed institutions that individually and in cooperation contribute to the development and transfer of technology, as well as provide conditions for public policy influencing innovation processes. (Metcalfe, 1993). There are also scientists who consider the national innovation system from a purely socio-political point of view. They do not distinguish its technological determinants. Sociologist Reio Miettinen belongs to such scientists. He sees and writes about NIS as a term and concept used for a limited period of time, which is not only characterized by a particular technology and political situation, thus giving the conceptual meaning to the phenomenon of socio-political context.

The concept of G. Mensch is shared by the American economist R. Foster, who, summarizing a large amount of factual material and using S-shaped logistic curves as the main analytical tool, found the existence of technological limits and technological gaps and proved the objectivity of cyclical development. He noted that innovations are subject to a certain logic and predictability, and on this basis, it is possible to assess the depth of those changes that will occur in the future. In order to do this, according to R. Foster, companies must carry out a concentrated program of accumulation of scientific knowledge through research.

The neoclassical theories of endogenous development form the basis for the further development of the concept of NIS and its structure at the present stage. Among the economists who have dealt with this issue, it is worth mentioning: R. Solow, P. Romer, K. Erode, R. Lucas, S. Grossman. The main idea is the implementation of technological

changes through research and development in order to maximize profits over time. In models of endogenous growth, the production function is based on three factors of production: labor, physical capital and human capital.

That is, it can be assumed that "innovativeness" – is a system of factors that affect the parameters of a product, but provided that these factors are applicable for the first time specifically to it. It is clear that the very mode of production or the market may not be new, but in relation to a specific product, it acts as an "innovation", considered as an object in space and time. (Schumpeter, 2008)

It marked the beginning of a new round of economic views and mainstream, which led to the formation of a structured system not only at the business level, but also at the technological level. It can be assumed that this is a kind of synergy of natural sciences and humanities, which is present today in almost all scientific approaches. American scientist, economist, publicist, one of the most influential management theorists of the twentieth century P. Drucker in his works "Innovation and Entrepreneurship" (1985) formed a theory of innovative economy and entrepreneurial society, in which scientist believed that the economy of the 90s is fundamentally different from the economy of the 60s and 70s, which was based on production, and as a result entrepreneurs focused on improving their production, including large companies that dominate the market. Innovative economy includes the formation of an effective NIS, taking into account balanced mechanisms of regulation by the government and cooperation between the scientific and business sectors.

Drucker's theory was supported by economists K. McConnell and C. Brew, who considered large companies as a factor of innovative development and argued that new technologies require the use of large capital and market, centralized and integrated market, rich and reliable sources of raw materials. In other words, only large firms can afford a technological breakthrough because they have the appropriate market power and a sufficient resource base, while small firms cannot.

Considering the concept of NIS, it is also worth emphasizing some of its negative aspects. Among the publications devoted to the study of the development and functioning of NIS, there is a large number of works devoted to the study of infrastructural and institutional problems and shortcomings of real innovation systems (B. Carlson, S. Jacobson). Noteworthy are the works whose authors try to determine the determinants of NIS functions, the non-fulfillment of which means the failure of NIS (M. Heckerte). However, these functions are often rather abstract and indirect. Important work is

devoted to the study of the links between R&D and technology creation processes at the level of individual industries (W. Loy) and countries (S. Louis). They are considered through the prism of the barriers created by the introduction of the latest technologies, which is a rather long and expensive process that not every country can afford.

It is worth noting that in the XXI century scientific schools are being formed that consider and research NIS in the relevant specialties. Such associations are formed, for example, on the basis of universities where NIS theorists work. An example of such an association is the IKED (Innovation Knowledge and Economic Development) group. The most famous project of this group is GLOBELICS – an international network of researchers, practitioners and policy makers who share and use the concept of innovation systems in their activities. It is an international network of scholars who take the concepts of "studying, innovating, and building innovation systems" (LICS) as a core and use them to strengthen LICS in developing countries, economic systems, and societies in transition. Researchers seek to locate systems with unique features that contain common positive developments in order to develop tactics for innovation, innovation systems, international competitiveness, regional development, the labor market and human capital.

Important achievements in the study of innovative systems are the works of Ukrainian scientists. For example, according to M. Kundryk, K. Friedman's definition of NIS is limited only to institutional regulation and innovative institutions, while, in his opinion, the concept of NIS has expanded from a single enterprise to the business environment and, finally, beyond purely economic categories, today covers the field of politics, management, education and science. Mykytyuk Z. defines the national innovation system as "a set of interconnected institutions designed to create, store and transfer knowledge, skills and artifacts that define new technologies." M. Sharko considers the national innovation system as an economic mechanism based on the development and use of new knowledge, entrepreneurial approach, integration into foreign markets and accelerated development of competitiveness of the country and its regions. (Sharko, 2005)

Nowadays the question of innovative orientation development arises not only on cooperation between scientific sector, state and business, but also on integration of a social component into the given form of communication. Accordingly, social capital becomes a determinant and a new participant in the NIS, expanding and transforming it. It can be seen in the form of links between market participants, human potential, and in the context of innovative development, as a society ready for the latest

transformations. J. Coleman believed that social capital is "...the value of aspects of social structure to actors as resources they can use to achieve their goals...". (Coleman, 1988) Today, this statement is expressed in the form of popularization of innovation, as well as tightening of ties between NIS participants. The scientist P. Bourdieu drew attention to the fact that the well-being of an individual depends to a greater extent on the intensity of his connections with other individuals, since useful economic information circulates along such chains, so social capital is a useful resource that forms the readiness and awareness of society to new information and technologies. N. Kondratyev considered innovative activity as an interweaving of not only material, but also social aspects (elements), noting that human potential becomes the basis of innovative competitiveness of the country and, accordingly, of NIS.

The modern scientific school of international business and law (V. Vergun, D. Glukhova, Y. Humeniuk, R. Yedeliev) defines NIS as a complex of relations between the state, scientific sector and business in the context of formation and development of the innovation-technological nation, ready for new global transformations.

3. The social component as a modern element of the national innovation system

Today, innovations have become a larger category that form state, national, international and global institutions, such as innovation systems and infrastructures, and interpret all socio-economic and political-legal processes in the form of modern concepts and paradigms, among which are: inclusive paradigm of the innovative model of global economic development and the concept of sustainable development.

Modern problems related not only to the environment, but also to the asymmetry of economic development, information security, militarization, terrorism, etc., are somehow correlated with innovative development. Therefore, there is an opinion that scientific and technological progress has a negative effect not only on the environment, but also on all humanity as a whole, enslaving it.

But one way or another, innovative technologies have become a determinant of international competitiveness of any participant in business processes at the national and global levels. In this context, for each state the question of organizing an effective national innovation system, which would be focused on country specialization and specification, and also satisfy global challenges and requirements.

There are many interpretations of the NIS structure as an institutional and infrastructural complex that

ensures the innovative development of the country. (Patel, Pavitt, 1994)

First of all, for a graphic description of the NIS it is necessary to identify its main participants, namely: *the state* (guarantor), *the scientific sector* (research institutes, universities, scientific and educational institutions) and *business*. Most researchers are limited to this list, but today the defining component of this system is *society*, which determines a country's willingness to adopt and develop certain technologies.

The figure shows the components of the national innovation system and the relationship between them.

First of all, it should be noted that the *first Chain* (number 1) is the state – the science sector. The government directs and finances science through grants, competitions, as well as scholarships and subsidies, thereby stimulating the latter to create a critical mass of R&D.

Chain 2 shows the "return" of contributions and privileges of the state in relation to science. In this regard, the majority of scientists see the volume of government contracts, the development of the military-industrial complex and other public sectors at the expense of R&D. (Haagedoorn, 1994) However, it should be said that this connection is not limited to this. The state should be interested in increasing the innovative potential, first of all, to increase international competitiveness, create an attractive investment climate, develop intellectual capital, and expand external relations. (Kolomytseva, Pavlovska, 2020) All this, strangely enough, is achieved at the expense of the scientific sector. This sector should be open and communicate with all components of the NIS, such as the state.

The relationship between science and business is bilateral, complex and multifaceted. Consequently,

this link is not effective in all countries. For example, in peripheral countries, *Chain 3* is rather weak, because there is a very low level of confidence in the quality of local innovations. Unfortunately, Ukraine is one of these countries. Entrepreneurs prefer to buy foreign technologies, spending more money and reducing the innovative potential of the country. In the countries of the center, the opposite is true; the level of trust in national developments is so high that their quality is beyond doubt. These countries include USA, Japan, Belgium, Switzerland, UK, China. In each case there is an element of specialization, but in the general picture of the world these countries are recognized as innovative.

The high quality of the offered products (in this case, R&D) stimulates the demand for them, which is represented by *Chain 4*, the density of which reflects the effectiveness of the relationships between the components. If technologies meet or exceed customer expectations, it is logical that the business sector will be interested in their development and will invest in them.

As mentioned above, society is a new actor in the NIS, as it used to be considered from the point of view of R&D commercialization. Society is an element that generates demand for certain innovations, acts as a determinant of the state's readiness to produce technologies and, as a consequence, its international competitiveness. As shown in Figure 1, "society", in parallel with the state, provides the demand for innovative products. Therefore, it is important to assess the innovative development of society and the extent to which the state provides it with access to new technologies.

Today, there are a large number of indicators that measure the innovative capacity of society, the economy and business. They are diverse and are

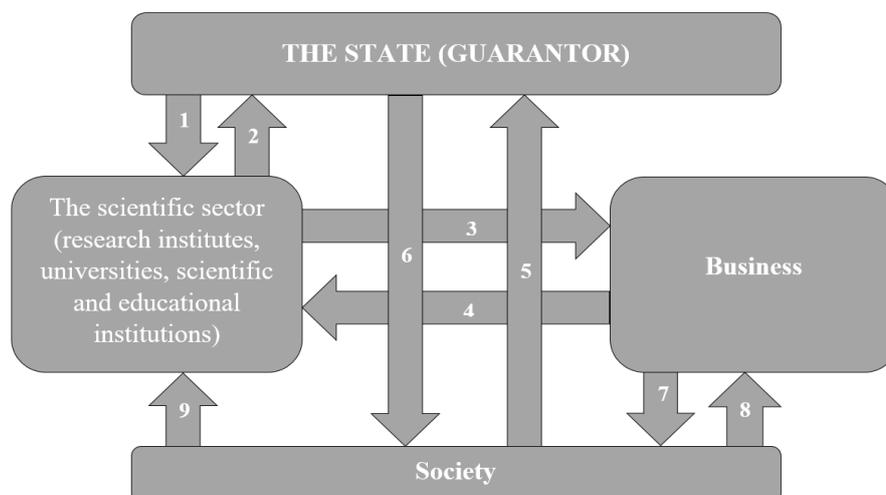


Figure 1. The structure of relations between NIS participants

Source: compiled by the author

formed depending on the development of the country and the region; they can be generalizing and integral. The most popular is the Global Innovation Index (WIPO), which accumulates an overall measure of the innovation development of countries and ranks them accordingly.

The Digital Economy and Society Index (DESI) is a composite index published by the European Commission since 2014, measuring the progress of EU countries in the digital economy and society. It establishes a set of relevant instruments that operate in the European digital policy framework. There are also national parameters that characterize the degree of society's readiness for modern technologies. As a rule, they are focused on business and government. (Müller, Potters, 2019).

In the context of the popularization and diffusion of information and communication technologies (ICTs), the following parameters are important: ICT Development Index, E-Government Development Index, Global Networking Index, Inclusive Internet Index, Networked Society Readiness Index, E-commerce Index, Global Cybersecurity Index, European Bank for Reconstruction and Development (EBRD) Knowledge Economy Index. Developed countries annually assess the effectiveness of measures taken to improve NIS and innovation infrastructure. These indicators are a kind of tool for determining its strengths and weaknesses, as well as priority directions of development, taking into account not only economic, political, legal and technological factors, but also socio-cultural, religious and psychological.

Society creates demand for innovative products by consuming and using new technologies. The *5th and 6th Chains* clearly show that in the conditions of globalization, the state should already be prepared for the relevant needs of society and ensure their turnover.

Using the example of the leading developed countries of the world, it is possible to determine the industrial and technological policy of the country. Therefore, according to the expert data of the Harvard Business Review in 2019–2020, the following countries held the leading positions.

The Czech Republic is an industrial country. The main industries are fuel and energy, metallurgy, engineering, chemical, light and food industries. The Czech Republic spends about 500 million euros annually on research and development to improve these industries.

In recent decades, Sweden has made a breakthrough in modern industries – digital technology and telecommunications. For ten years, the share of information technology in the country's economy has grown to 16%, and 5% of the working-age population is already employed in the IT industry.

France is a highly developed country, a nuclear and space power. It ranks second in the European Union (after Germany) in terms of total economic volume and is consistently among the top ten in the world. The French government has earmarked 15 billion euros for the state program *Le Grand Plan d'Investissement 2018–2022* ("Great Investment Plan 2018–2022", also called "Plan of Investment in Professional Development").

The French Tech Horizon 2022 program pays special attention to the issue of public support for the development of start-ups in the elite category of "deep technologies" – high-tech companies with a "special profile", which often experience serious problems in obtaining external financing due to the existence of a significant time gap between the development of innovative products or services and their subsequent launch on the market. For the targeted support of such companies in the French Tech Horizon 2022, it was envisaged to allocate approximately 70 million euros from the budget of the government's industrial investment fund (ESPAS, 2019).

In recent years, the Republic of Korea has accelerated the development of innovative technologies and is now one of the world's top consumer electronics manufacturing locations.

The government focuses on the development of "green technologies" and spends 2% of GDP annually on them, and in 2009 a long-term national strategy for "green growth" (2009–2050) was adopted, with funding of \$320 million.

The People's Republic of China, or the "World Factory", which has the largest gold and foreign exchange reserves, is a powerful innovative and technological potential in every sense: it increases the education of the population, the number and quality of highly qualified personnel, and spares no financial resources to create a technological base.

Putting science and technology and innovation above other tasks and giving specific substantive tasks – this message rang out for the first time in the history of the formation of five-year plans for the country's socio-economic development (2021–2025). Over the past 5 years, the indicator of China's scientific and technological progress has increased from 55.3% to 59.5%, and a number of important results have appeared in this direction. In terms of innovation capability, the country ranks 14th among 131 economies in the world. According to the latest data, in 2019, China's innovation index was 228.3, an increase of 7.8% compared to 2018, while investment in technology research and development (R&D) amounted to 2.23% of total GDP (Gross Domestic Product), exceeding the average EU level in 2018 (Mark J. Greeven, George S. Yip, Wei Wei, 2019). According to Deloitte, the most promising innovative

areas of China's economic growth are: fintech, artificial intelligence, and new energy sources and telecommunication technologies.

The United Kingdom is one of the leading countries in the world with innovative industry, which is reflected not only in the country's strategic plans, but also in the trends of increasing government spending on R&D: in 2014 it amounted to 1.66% of GDP, in 2015 – 1.67%, in 2016 – 1.68%, in 2017 – 1.7%, in 2018 – 1.72% of GDP. In the industrial strategy of the UK government was set the goal of becoming the most innovative country in the world, which provides for further gradual increase of R&D spending to 2.4% of GDP by 2027, and in the long term – up to 3% of GDP. In relative terms, these are not the highest figures, but in absolute terms – this amounts to about 10 billion pounds sterling.

The United States leads the world in terms of technology sales, modernization trends, and innovative development. The innovation support system in the United States is highly diversified and decentralized (SGIR, 2020). Its members include federal and local government agencies, universities, the private sector, nonprofit organizations, and intermediary firms. The system combines a large amount of R&D (basic research is funded by government agencies) with a focus on the practical application of developments in the marketplace. The federal government supports innovation through infrastructure development and targeted programs (World Investment Report, 2020).

Local governments usually provide direct support to companies related to regional business and development of the state economy. According to the White House, in fiscal year 2020, total spending on innovation and R&D in the United States amounted to \$523 billion, which is 26% of the funds allocated for similar purposes by all states in the world.

Ukraine is also not worth the global innovative trends and increasing its potential in this area. This can be seen in the following trends.

Thus, according to WIPO in 2020, Ukraine ranked 45th out of 131 countries in the rating

Table 1

Ukraine's place in the modern innovative business system

Indicator	Place	Dynamics (+/-)
Education	23	+20
R&D	44	+10
Creation of knowledge (patents and inventions)	23	-6
Political and operational stability	123	+2
Government's effectiveness	93	+2
The rule of law	109	-2
Regulatory policy	88	+6
Doing business	52	-4
StartupBlink	29	-

Source: compiled by the author

"Global Innovation Index 2020", scoring 37.4 points out of 100.

In 2019, 782 enterprises carried out innovation activities in the industrial sector. At the same time, the share of the number of industrial enterprises that implemented innovations (products and/or technological processes) in the total number of industrial enterprises was 13.8%.

At the same time, the share of expenditures on research and development will decrease from 26.3% in 2018 to 20.5% in 2019, on the acquisition of other external knowledge – from 0.4% to 0.3%. In addition, no less important indicator is the share of expenditures on scientific and technical work in GDP, which in 2020 will be only 0.47%.

As can be seen from Table 2, the studied indicators show a correlation between the state's level of innovative development through the popularization of technology in society, its transformation and modernization.

Returning to Figure 1, *Chain 6* shows that everything is interconnected and it is very difficult to determine who dictates the rules in this situation, but the government as a guarantor ensures the promise not only to popularize technologies, but also to create conditions for their comfortable and appropriate use. This means that not every innovative technology is

Table 2

Global indicators of innovativeness the world's leading countries

Country	Networked Readiness Index		Global Innovation Index		Global Competitiveness Index	
	Place	Score	Place	Score	Place	Score
The Czech Republic	28	66.33	24	48.3	33	-
Sweden	1	82.75	2	62.5	6	-
France	17	73.18	12	53.7	32	-
The Republic of Korea	14	74.60	10	56.1	23	-
People's Republic of China (Hong Kong)	40	58.44	11	54.2	5	-
United Kingdom	10	76.27	4	59.8	19	-
USA	8	78.91	3	60.6	10	-
Ukraine	64	49.43	45	36.3	55	-

Source: compiled by the author

obliged to "take root" in this or that society. Based on specialization, cultural characteristics, climate, level of urbanization, and age qualification, the guarantor balances the technological equilibrium in society.

It is impossible not to mention the relationship between society and business (*Chains 7, 8*), which determine the commercial core. Starting from the fact that the essence of entrepreneurship lies in the innovative component, it is they who, through advertising, PR, social networks, etc., create in the consumer's subconscious the need for a certain technology (product). At the same time, the business sector must monitor and study the reaction of society to what it offers. In this context it is important to create one's own niche and think about the customer's needs. As practice shows, after a certain period of time (less than a year), 90% of consumers expect an improved product, not a new one, but an improved one or one with additional options. Apple can serve as such an example, orienting its consumers to a new iPhone every year.

Science and society are most closely related, and the main indicator is education. The level of society and the characteristics of innovative development determine the specifics of education and science in the state. The quality of national education is proportional to the level of confidence in it. By raising domestic standards and bringing them closer to international ones, the state maintains and strengthens its intellectual potential (Lundvall, 1992). Naturally, it is necessary to take into account not only the specialization of the national economy, but also the prospects for its development, as well as the needs of society, which cannot be ignored. The formation of a differentiated complex of scientific and educational approach increases the international competitiveness of all economic entities, meeting the needs of all NIS participants.

An important question is that of the indicators of social capital in this field. They are multifaceted and have different measures, as well as scientific affiliation, namely: the number of innovative products used, the number of applicants who enter national universities, the number of scientists involved in national innovative programs, the number of views and "likes" in social networks of national projects, the number of applicants who choose natural sciences, the number of individuals who finance domestic innovative projects, the identification and recognition of domestic innovative products, the level of popularization of national innovations and technologies in universities, schools, colleges (subjects that are considered on a practical case), the way of popularization of innovations (through friends, relatives, at work, at school, at university, etc.), number of social innovation projects, etc. These indicators are not included in any index that is considered in the study of innovation, because they are polyscientific.

It is advisable to abstract from the "complaints" about the imperfect legislative system, insufficient funding for R&D, obsolete physical capital and brain drain from the country and look at NIS from the point of view of social capital. It can be discussed not only within a country, but also in the context of glocalization, for example, the creation of the EU Digital Single Market, the European Innovation Platform, the global fintech network, technoparks and technopolises. Representative structures create trust in the national product and stimulate its consumption.

Chain 9, which determines society's willingness and confidence in national education, is no less important and perhaps the most decisive. National achievements shape social interest and desire for education. This phenomenon can also be called capital substitution in the context of human capital formation, which in turn can increase the international competitiveness of the NIS.

It is seen that the above processes are complex, institutional and inseparable, which requires a response from all NIS participants, namely: *the state* (balanced and adaptive legislative framework; preferences and benefits for small and medium-sized businesses; expanding the range of relations with foreign investors; simplifying registration innovative companies and obtaining permits for activities; creation of project databases with open access; formation of state projects with the right to invest; convergence of national and international standards, etc.); *scientific sector* (attracting foreign specialists and colleagues in joint areas of research; collaboration of natural and human sciences, as: formation of a services' range for the development, promotion and support of innovative projects on the part of marketers and managers; motivation for publication activity; openness to cooperation with business and public organizations; elimination of bureaucratic webbing, etc.); *business sector* (increasing confidence in national innovations, expanding access to information, creating a base of preferences in R&D; financing scientific developments at the local level, creating regional technology parks, organizing and participating in scientific and educational events, etc.); *society* (first of all, it must be said that society ceases to perceive the educational and scientific spheres as a service. Moral norms form the basis for the competence and professionalism of each individual, and thus for the strength of the nation. Avoid blindly applying foreign experience at the national level, and even more so, waiting for an adequate reaction. If it is copied, abruptly switching to Western models, then all efforts will fail. The readiness of society as social capital is formed gradually, because not everyone in it can perceive changes in the same way, or they can be implemented in a "distorted" way. This issue is of great and comprehensive relevance. So far, it has been perceived

exclusively in terms of ethical norms, but if to talk about the social basis of innovation, it should already concern socio-economic, political and legal mechanisms for regulating public opinion).

4. Conclusions

There are many definitions of the concept of the national innovation system and its management interpretations. Each author considers it on the basis of his scientific interests. NIS cannot be considered as standardized: from the economic, political and legal point of view, as it serves as a broader concept than the national innovation policy or infrastructure, including all areas of social development.

These theories consider NIS as an auxiliary system of economic growth, socio-political transformations, diffusion and technology transfer. Today, it is necessary not only to create a qualitatively new structure of relations between participants, but also to use the mechanism of eclecticism – to comprehensively adapt to the development and research of NIS and not to ignore social issues. Practice shows that economic indicators are not a decisive factor in the competitiveness of the company, industry and even the country, because the social component forms the demand that will determine the proposal in the future. Therefore, the task of the new forces is to interest and prepare the society for innovative discoveries and to make it adhere to them.

The article presents the structure of the NIS, clearly tracing the links between its classical actors and the social component.

In this context, it is important not only to broaden scientific opinion on the role of society in increasing the country's innovative activity, but also to consider it as a determinant of progress in all areas. Unfortunately, today there are few scientific and theoretical works that explicitly define this issue. At the same time, the article attempts to provide a justification for considering the social component as the fourth actor in the NIS, since it can be used to popularize national R&D and its implementation in business and industry.

Having studied social capital as a determinant of the development and transformation of the national innovation system, the following conclusions can be drawn: NIS implements a social, educational function, provides training, provides resources, manages and

regulates innovation processes, while the social function (aimed at improving the quality of life) is one of the main determinants in providing society with innovations, technological goods, products and services that allow more efficiently meet the full range of human needs.

The formation of an effective and competitive NIS is a strategic task for all its participants, including society. Balanced relationships can minimize the need for large amounts of state funding and distribute it correctly among all actors to the fullest extent. This issue is very relevant and open, especially in the context of global transformations and orientation towards sustainable development, which should reduce not only physical negative impact on the environment, but also socio-cultural, increasing the level of education, responsibility and readiness of society for modern challenges and changes.

Social capital is a critical component of all processes that take place at the national and international levels, especially in the field of innovation, because it reflects the potential of the state and its readiness for further innovative development. When designing innovation systems and infrastructures, it is particularly important to take into account the willingness and ability of society to perceive, consume and use innovative products and services. Unfortunately, in many countries the social factor is not used as a determinant in the study system.

Modern trends in economic growth and characteristic features of innovative economies, determine the basic requirements for the development of NIS in independence from the national framework. Among them, the basis is that it should include: ensure sustainable economic growth and competitiveness of the country through the use of scientific and technical potential; possess self-sufficiency (support on own resources of the national economy) and resistance to the effects of the external environment; implement mechanisms for aligning socio-economic development of society; comply with world development trends, have the ability to interact and integrate into higher level innovative systems; to form on the basis of a balanced combination of state, commercial, scientific, market and social regulatory mechanisms. This can be achieved through well-coordinated interaction and exchange of capital in the economic nature of the NIS, thus ensuring the international competitiveness of the state.

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Received on: 5th of February, 2023

Accepted on: 19th of March, 2023

Published on: 31th of March, 2023