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**ESSENCE OF KNOWLEDGE ECONOMY AND THE DEGREE  
OF ITS INTEROPERABILITY WITH INNOVATIVE ECONOMY**

**ISTOTA GOSPODARKI OPARTEJ NA WIEDZY,  
A STOPIEŃ JEJ INTEROPERACYJNOŚCI  
Z INNOWACYJNĄ GOSPODARKĄ**

**Abstract**

*This article discusses the development of the concept of “knowledge economy” and the totality of its infrastructure components. Based on a comparison of the components of the infrastructures of the “innovation economy” and “knowledge economy”, the degree of interoperability of these concepts is established. The content of the “education” component of the knowledge economy and the content of the components of “intellectual capital”, “information sector” and “network structures”, which are both part of the infrastructure of the knowledge economy and the infrastructure of the innovation economy, are considered.*

**Keywords:** *knowledge economy, innovation economy, infrastructure components of the knowledge economy, education, intellectual capital, the information sector of the economy, network structures*

**Streszczenie**

*W artykule omówiono rozwój koncepcji „gospodarki opartej na wiedzy” i omówiono całość jej elementów infrastruktury. Na podstawie porównania elementów infrastruktury „gospodarki innowacyjnej” i „gospodarki opartej na wiedzy” ustalono stopień interoperacyjności tych koncepcji. Uwzględniono zawartość „edukacyjnej” części gospodarki opartej na wiedzy oraz zawartość „kapitału intelektualnego”, „sektora informacyjnego” i „struktur sieciowych”, które są częścią infrastruktury gospodarki opartej na wiedzy i infrastruktury gospodarki innowacyjnej.*

**Słowa kluczowe:** *gospodarka oparta na wiedzy, gospodarka innowacyjna, elementy infrastruktury gospodarki opartej na wiedzy, edukacja, kapitał intelektualny, sektor informacyjny gospodarki, struktury sieciowe*

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

In the last period, there is a growing understanding throughout the world that a substantial reform of the existing economic system is necessary, which is associated with the need to neutralize the threats posed by frequent economic crises, as well as threats associated with environmental pollution, climate change, and the depletion of a number of major non-renewable natural resources, waste accumulation, etc. Therefore, the whole world, and especially in developed countries, is the gradual formation of "alternative" economies, first of all, the innovation economy, "green" economy and circular (reusable) economies. At the same time, scientists pay great attention to the development of a "knowledge economy", an "information society" (information economy), and a global network economy. As you know, the main trend in developed countries is the construction of an innovative economy, for which the mechanisms of state and market (business) coordination are mainly developed. Recently, along with the theory of innovation economy, in particular, the theory of the knowledge economy has been developing. Therefore, in this paper we tried to identify the essence of the knowledge economy and by comparing the totality of the components of the structure of the innovation economy and the totality of the components of the structure of the knowledge economy, establish the degree of compatibility of these concepts. The paper also discloses a modern interpretation of the content of such a component of the knowledge economy as "education" and the content of such most important components (included in both the structure of the knowledge economy and the structure of the innovation economy) as "intellectual capital", "information sector of the economy" and "network structures". We do not imagine these components as separate economies, but as constituent elements in the systems of the knowledge economy and the innovation economy.

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

The knowledge economy is one of the alternative economies whose development (in discussion order) has recently received much attention. Moreover, in the process of research, the very concept of the knowledge economy is developing. Therefore, the work primarily considers the development of an understanding of the "knowledge economy" over the past period, relying on research (Макаров В., 2003), (Минаева О., 2009), (Унтура Г., Евсеенко А., 2007), (Сербиновский Б., Захарова О., 2010), (Экономика знаний), (Алексеева С., 2010) and others. To establish the degree of compatibility of the concepts of "innovation economy" and "knowledge economy", we compared the set of components of the infrastructures of the innovation economy and the knowledge economy. The components of the infrastructure of the innovation economy were classified by us in (Abesadze R., Burduli V., 2017), and to identify the components of the infrastructure of the knowledge economy, we used a number of works, such as (Унтура Г., Евсеенко А., 2007), (Батракова Л., 2012), (Экономика знаний), (Духнич Ю., Гриффин Р.), (Казакова О., Исхакова Э., Кузьминых Н., 2015), (Управление знаниями. Интеллектуальный капитал. 2012), (Ченцова М., 2008) and others. To determine the place of the knowledge economy in the system of modern economies and to identify the modern content of some of the most important components of the infrastructures of the innovative economy and the knowledge economy, we used studies (Ченцова М., 2008),

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(Сербиновский Б., Захарова О., 2010), (Бондарь А., 2015), (Духнич Ю., Гриффин Р.), (Казакова О., Исхакова Э., Кузьминых Н., 2015), (Управление знаниями. Интеллектуальный капитал. 2012), (Ярушкина Е, 2013), (Бурденко Г., 2017), (Reporting ..., 2006), (Тенденции ..., 2011), (Скрыль Т., 2008), (Сухарев О., 2008), (Вейлер В., 2011), (Белова Л., Стриженко А., 2007), (Базылев Н., Соболева Н., 2005), (Болычев О., Волошенко К., 2013), (Горденко Т., 2011) and others.

### **Aims of paper.**

The main goal of the work is to establish a modern interpretation of the concept of “knowledge economy”, to reveal the degree of its compatibility with the innovation economy and a modern interpretation of the content of such components of the knowledge economy and innovative economy infrastructures as “education”, “intellectual capital”, “information sector” and “network structures”.

The main goal can be represented in the form of the following sub-goals: 1. Identification of the modern interpretation of the concept of “knowledge economy”; 2. Based on a comparison of the components of the infrastructures of the innovation economy and the knowledge economy, establishing the degree of interoperability of these economies; 3. Determining the place of the knowledge economy in the system of modern economies; 4. The identification of modern understanding and structuring of such components of the infrastructures of the innovation economy and the knowledge economy as education, intellectual capital (as part of human capital, organizational capital and relations capital), the information sector and network structures.

### **Exposition of main material of research. Discussion.**

#### **The development of the concept of knowledge economy**

For the first time, the Austro-American economist Fritz Mahlup spoke about the knowledge economy in 1958, who considered it as a sector and included 5 types of human activity in it, which accounted for 29% of US GDP: 1. Education (44.1%); 2. Research and development (8.1%); 3. Mass media (radio, television, telephone, etc. - 28.1%); 4. Information technology (6.1%); 5. Information services (13.8%). F. Mahlup bases his theoretical views on the assignment of certain industries to the sector of the knowledge economy on the following points: 1. Knowledge is something known to someone; 2. Knowledge production is the process by which someone learns something previously unknown, even if it is known to others (Минаева О., 2009).

Then, as the “knowledge sector” increases, in the conditions of the greatest economic growth achieved through research and innovation, with an increase in the education of the population, the term “knowledge economy” has a more voluminous definition, which later became more used. Under the knowledge economy they began to understand a type of economy in which knowledge plays a decisive role, and their production becomes a source of economic growth and competitiveness (see, for example: (Макаров В., 2003; Минаева О., 2009)).

“Economics of knowledge”, according to the concept of experts of the Organization for Economic Cooperation and Development (1996), is an economy based on the production, updating, circulation, distribution and application of knowledge. Human capital is be-

coming a determining factor in the emergence and development of the knowledge economy. The knowledge economy is manifested in the form of innovations in various spheres of the population's life (Унтура Г., Евсенько А., 2007).

Recently, the "knowledge economy" is most often defined as the highest stage of development of the post-industrial economy and innovation economy, or simply as the highest stage of development of an innovative economy (see, for example: (Сербиновский Б., Захарова О., 2010, p. 8; Экономика знаний ...)).

Another modern definition is: Knowledge economy is an economy where the main development factors are knowledge concentrated in human capital, and the information environment in which this capital is used, and the development process of such an economy is to improve the quality of human capital, to improve the quality of life, in the production of knowledge, high technology, innovation and high-quality services (see, for example: (Алексеева С., 2010; Экономика знаний ...; Говорова Н., 2006: 110)).

The above definitions of a "knowledge economy" provide certain information for establishing the degree of interconnectedness of a knowledge economy and an innovation economy. However, in order to more accurately indicate the limits of this interconnectedness and interconnection, approaches to the classification of components (elements) of the knowledge economy should be discussed.

### **System (infrastructure) components and mechanisms of knowledge economy**

For the knowledge economy, we came across several options for classifying the components of its system (infrastructure) that are often found in economic literature, some of which, in our opinion, are unnecessarily complex on the one hand, and on the other hand are not well structured and lack coordination mechanisms, for example financing mechanism.

Before discussing these classifications, we present for comparison the structured and previously classified by us in (Abesadze R., Burduli V. 2017, p. 48) the totality of the components of the National Innovation System for Georgia, which, in our opinion, is quite realistic and clear.

In this article, we proposed the following block system:

1. State innovation policy support unit: a) government organizations that determine the innovation policy of the state, ministries, departments, agencies, funds and other regulatory and funding agencies; b) the strategy and priorities of innovation policy; c) the regulatory framework in the field of development and stimulation of innovation, including provisions governing the relationship between science, business and the state.
2. Innovation production unit: a) business sector (companies producing an innovative product - departments developing innovation in large corporations, small and medium enterprises creating an innovative product); b) enterprises developing an innovative product, the creation of which was partially or fully funded by the state (for example, according to the principle of state venture).
3. Research sector (universities and research institutes).
4. Organizations for the transfer (transfer) of technology and other elements of the innovation infrastructure (technology parks, business incubators, centers for commercialization and technology transfer, etc.). All of these structures should facilitate the identification and implementation of both domestic (of which there are few in a small country) and, in particular, imported new production technologies.

5. The system of interaction with the international innovation environment, that is, the relationship with foreign partners in innovation, both in the field of supply to the country (transfer) of new technologies, and in the field of joint innovative developments.

6. Block financing of innovation: a) state (central and regional) financing of innovation; b) financing of innovation by the business sector; c) public-private partnership in the field of financing of innovation.

7. Training unit.

8. Donor support block.

9. Support block for the innovative development of agriculture.

Now we will present several options for structuring the components (elements) of the system of the “knowledge economy” that are embedded in a number of publications.

In the article (Унтупа Г., Евсеенко А., 2007) the elements of the system of the “knowledge economy” are presented as follows:

- education (the formation of scientific and technological thinking);

- innovation system (development of a network of universities, laboratories, research centers, etc., providing generation of innovations);

- institutes of the knowledge economy (support of innovations in education and science, adaptation of new technologies);

- information infrastructure (circulation of ideas and solutions).

There are no elements of the institutional system in this classification, but the authors cite them separately in the system of mechanisms for developing the infrastructure of the “knowledge economy” ((Унтупа Г., Евсеенко А., 2007) from (Инновационный путь ..., 2005, p. 120)), in which the following items are marked:

- the formation of a consistent legislative base (including at the level of local legislation) of regulation of scientific, technical and innovative activities, in particular, property rights to knowledge;

- the creation of accessible information sources on the problems of the functioning of the knowledge economy (monitoring agencies, knowledge repositories and other institutions representing statistical, analytical, expert information from the individual components of the knowledge economy);

- formation of a knowledge exchange and a platform for trading in shares of high-tech firms;

- organization of the interface between producers and consumers of knowledge in the active work of consulting, brokerage, legal and other intermediary firms;

- creation of a network of incubators, innovation parks at the expense of state and regional budgets and venture financing);

- the creation of professional associations (inventors, scientists, investors, lawyers, etc.) that really work on the formation of an innovation economy;

- creation of conditions for active patenting and subsequent realization of intellectual property rights in domestic and international markets;

- development of exhibition and marketing activities within the framework of the relevant elements of the innovation infrastructure.

Approximately such a structure of 4-5 basic elements of the system of “knowledge economy” as in the article (Унтупа Г., Евсеенко А., 2007) is present in many other publications. Indirectly, this is evidenced by the totality of subindexes of the knowledge economy

index, calculated according to the methodology developed by World Bank experts. These are the following sub-indices (which can be represented by the basic elements of the knowledge economy system):

- economic incentives and institutional system;
- innovation system;
- education and qualifications;
- information infrastructure (see, for example: (Батракова Л., 2012)).

However, this is not a complete list of the basic elements of the infrastructure (system of elements) of the knowledge economy. According to the Wikipedia materials (Экономика знаний ...), the infrastructure of the knowledge economy includes a more extensive set of “basic components and drivers of development”:

- effective state institutions that implement a high quality of life;
- high quality education;
- effective fundamental science;
- effective scientific and technical venture business;
- high-quality human capital in its broad definition;
- production of knowledge and high technology;
- information society or knowledge society;
- the infrastructure for the implementation of ideas, inventions and discoveries from basic science to innovative industries and further to consumers.

This classification contains almost all the components, in particular, that we noted for the innovation economy, although in slightly different terminology (the education system, which is the most important component of the knowledge economy in full, is not usually considered in the innovation economy). However, the component of intellectual capital has been lost, which has recently been discussed in many sources as one of the most important components of the knowledge economy (see, for example: (Бондарь А., 2015: 31, 32; Духнич Ю., Гриффин Р.; Казакова О., Исхакова Э., Кузьминых Н., 2015; Управление знаниями. Интеллектуальный капитал. 2012)).

### **Approaches to determining the place of the “knowledge economy” in the system of modern economies**

Many scientists believe that such currently widespread concepts as “innovation economy”, “information society”, “new economy”, “post-industrial economy” are synonymous with the concept of “knowledge economy” (see, for example, (Крыштафович А., 2017, p. 61)). So M. Chentsova on the basis of the analysis of a number of controversial concepts of modern economy shows (Ченцова М., 2008, p. 11), that the knowledge economy must be considered systematically and comprehensively in the broad sense. In this case, it acts as:

- Post-industrial economy, since there is an increase in the share of the service sector, which begins to dominate in percentage terms over the production sector.
- The information economy, since information (knowledge, science) begins to play a decisive role in it as a factor in production.
- An innovation economy, since an economy can be considered an economy in which knowledge allows you to generate a continuous stream of innovations that meets dynamically changing needs, and often forms these needs.

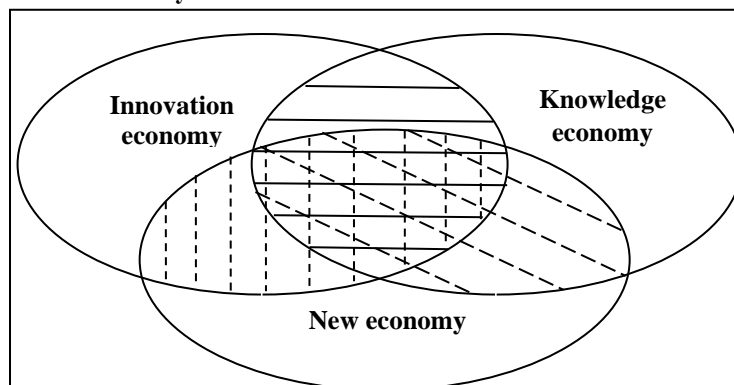


- The global network economy, since in the knowledge economy the interaction between knowledge carriers is mediated by wide network connections on a global scale (the emergence of the Internet as a new economy infrastructure).

According to other authors, each of these terms has its own definition, origin and purpose. The need to study the similarities and differences in the content of each of them is associated with the need for operationalization and use in the management of the economy, as well as the enterprise, its capital and value. The importance of comparing the content of terms is updated in connection with the solution of the problem of building an innovation economy in the post-Soviet countries - an economy of this type, which, according to many scientists, is able to ensure the sustainable development of the national economy, accelerate scientific and technological progress (STP), a qualitative change in the market, society, their improvement (Сербиновский Б., Захарова О., 2010, p. 1).

In these approaches, an attempt is made to distinguish between the functions of various economies, for example, the knowledge economy includes some elements of the general economic system, while others are part of other economies. But it is impossible to clearly distinguish elements completely, even in such approaches it is recognized that many blocks and elements belong to one and the other economy, that is, they are combined. In this regard, in the article (Сербиновский Б., Захарова О., 2010, p. 11), in particular, with the help of the "Euler circles" the limits of compatibility of innovative and new economies and the knowledge economy are shown (we have given this figure - Fig. 1).

**Fig. 1. The ratio of the concepts of “new economy”, “knowledge economy”, “innovation economy”.**



Source : Сербиновский Б., Захарова О., 2010, p. 11.

In our opinion, the “compatibility” (more precisely, complementarity) of these concepts is much closer than that shown in the graph. Therefore, this approach is unsuccessful, or rather, it does not correspond to reality and the problems of the practical use of the theory of a particular economy. The fact is that when delimiting elements, infrastructure components, mechanisms between different economies, we are primarily faced with the difficulties of state and business coordination of economic processes. For example, in a high-tech corporation, as a rule, R&D is carried out and then innovations are implemented on their basis. But both of them are financed by the corporation itself (possibly with the

participation of the state). Therefore, it makes no sense to distinguish between these processes in different economies (say, R&D is carried out along the lines of the knowledge economy, and innovation is introduced along the lines of the innovation economy - both are present in both economies).

In order to demonstrate the close interconnectedness of the concepts of “innovation economy” and “knowledge economy”, we give two definitions of an innovation economy, of which if not the full synonymy of these concepts is obvious, then there is a fairly complete similarity.

The following definition is given on Wikipedia: “An innovation economy (knowledge economy, intellectual economy) is a type of economy based on a stream of innovations, on constant technological improvement, on the production and export of high-tech products with very high added value and the most technologies” [Иновационная экономика]. This definition takes into account all high-tech industries (and not just those producing IT technologies), but low-tech industries are missed, however, naturally, innovations are also being implemented in them. But, most importantly, the factor of globalization in the formation of the national innovation economy has been missed. In this regard, “it is difficult to recognize this definition as relevant reality, because”, for example, “in Russia”, however, as in many other countries, “in different historical periods, innovations were borrowed abroad” (of course, a certain part) “and based on borrowed innovation built innovation economy. Now it is becoming a kind of tradition. But it should be noted that at one time China, Japan, South Korea and many other countries acted (and continue to do so)” (Сербиновский Б., Захарова О., 2010, p. 3).

A successful extended interpretation of the innovation economy given by A. Yu. Yudanov back in 1996 (Юданов А., 1996, p. 218), is not outdated, in our opinion, till now. We give it in full:

“Firstly, a national economy can be innovative if: a) simple and effective innovations based on old knowledge are created and successfully implemented; b) new knowledge is not created, but innovations built on it are borrowed.

Secondly, self-created improving innovations used in the national economy can be based on new knowledge (in this case we can talk about the knowledge economy) or on previously known knowledge (in this case, an innovation economy does not have the features of a knowledge economy).

Thirdly, a new (national) economy can be built: a) on the basis of new knowledge created in the country, which allows us to talk about the formation of a knowledge economy in it; b) borrowing from high-tech industries.

Fourth, the rational option, according to the authors, is a reasonable combination of: a) borrowed and proprietary developments based on both acquired abroad and new knowledge created in the country; b) the innovative and knowledge-based development of traditional industries and the priority growth of industries and fields of activity that are at the forefront of scientific and technical progress, which are priority and critical at the present stage. At the same time, a qualitatively reasonable combination can be obtained on the basis of the formulation and solution of the strategic problem of the efficient distribution of income for consumption and accumulation, taking into account the prospects for the development of high-tech industries. It is worth noting that in leading developed countries no more than 10% of the workforce is occupied in high-tech industries and



fields of activity, but these industries play the role of the scientific and technical progress locomotive”.

Despite the capacity of this definition, in our opinion, at the present stage it needs to be corrected, on the one hand, and supplemented on the other hand. Therefore, we have the following comments on this definition: a) instead of the term “new economy” in modern conditions it is more appropriate to use the term “neo-industrial economy”; b) the concept of “knowledge economy” has been narrowed - after all, the old knowledge used in innovation should also relate to the knowledge economy, and the definition assumes the opposite; c) at any stage of development, the country may need priority growth of some traditional industries (along with selected new industries), as is necessary, for example, in post-Soviet countries, where the issue of the reanimation of some traditional vital industries is urgent; d) and most importantly, the definition does not reflect the need for either state or corporate mechanisms to ensure innovation, but this is the essence of an innovation economy.

Therefore, in our opinion, in modern conditions, taking into account the above comments (as well as taking into account the capabilities of a small country), the definition of an innovation economy (using the positive aspects of the interpretations of A. Yudanov and Wikipedia) should be as follows:

The national innovation economy is, firstly, a type of economy based on the flow of borrowed and based on our own innovations, continuous technological improvement, production and export of high-tech products (including production technologies) with very high added value.

Secondly, it is an economy in which reliable state mechanisms (a system of state coordinating and research organizations, a system of state coordination instruments) and corporate (corporate and intercorporate, including interstate, structures that ensure the development and implementation of innovations) mechanisms are created and operate providing innovation.

Thirdly, an economy in which: a) simple and effective innovations based on old knowledge are created and successfully implemented; b) new knowledge is not created, but innovations built on it are borrowed.

Fourth, a neo-industrial innovation economy can be built: a) on the basis of new knowledge created in the country; b) borrowing of new (modern) production technologies provided by globalization opportunities.

Fifth, a rational option is a reasonable combination of: a) borrowed and proprietary developments (taking into account the capabilities of a small country) built both on acquired (or imported by TNCs) abroad and on new knowledge created in the country; innovative development (or reanimation on an innovative basis) of the necessary (priority) traditional industries and the accelerated growth of several selected (based on the capabilities of a small country and export opportunities for manufactured products) industries that are at the forefront of scientific and technical progress, which are currently priority or critical.

From the above definitions of the innovation economy, it is obvious that knowledge (i.e., the components of the knowledge economy - the research sector, R&D and others, presented in the blocks of the innovation system cited in the previous paragraph) is almost complete (with the exception of the education system) and in the innovation economy, and from the options given in the present and previous paragraphs for the structure of the

components of the knowledge economy, it can be seen that the components of the structure of the innovation economy are present in all the above systematizations of the components of the structure of the knowledge economy. It follows from this that the concepts of innovative economy and the knowledge economy, if not synonyms, are then very close in content.

As for such concepts as “information economy” and “global network economy”, which some authors identify with “the knowledge economy” (see, for example, the above quote by M. Chentsova), they, in my opinion, are not synonymous knowledge economy, and enter it as structural components, as can be seen from the options for systematizing the components of the knowledge economy presented in the previous paragraph.

In the above Wikipedia definition of an innovation economy, a synonym for an innovation economy, along with a knowledge economy, also presents an intellectual economy, but this is wrong, and the concept of “intellectual capital” is included in the knowledge economy and innovation economy as a structural component, which is discussed in many publications (see, for example: (Бондарь А., 2015, р. 31, 32; Духнич Ю., Гриффин Р.; Казакова О., Исакова Э., Кузьминых Н., 2015; Интеллектуальный капитал; Управление знаниями. Интеллектуальный капитал. 2012)).

Thus, intellectual capital (intellectual economy), information infrastructure and network economy are not synonyms of knowledge economy and innovation economy, but components of their infrastructure. Since in our previous works on the innovative economy these components were not considered, the further part of the work is devoted to their discussion. We will also briefly discuss the education system as a component of the knowledge economy, which formally does not belong to the components of an innovation economy.

### **Education in the knowledge economy**

As demand for an economic resource called “knowledge” grows, the number of offers of this resource begins to increase, and this offer, first of all, comes directly from the sphere of education. Education is the sum of knowledge and related skills acquired in a result of systematic training in educational institutions and less often - independently (Ярушкина Е., 2013).

The knowledge economy significantly increases the requirements for the education system as a whole. The knowledge that a person receives in the education system is no longer a constant value, but is only a foundation that requires constant add-on, refinement and improvement, that is, in the new knowledge economy, there is a need for continuous and regular training and additional education and, hence, new requirements for the education sector are being formed: continuity; following market conditions and introducing new educational programs; continuity of educational levels; practical orientation of programs; achieving a high educational level of ongoing programs through modern training technologies. With the formation and shaping of a knowledge economy, the field of education changes in the following directions: the cost volume of the market for educational services in the economy increases; there is an increase in education costs; the volume and types of educational services provided are increasing; competition among educational organizations is increasing.

The high level of competition in the field of education determines a new strategy for the educational services market participants - the integration strategy. The integration processes will involve both various levels of education, forming a continuous chain of educational links, and the creation of scientific laboratories, innovation incubators, technology parks, scientific innovation centers in the structure of educational institutions, the purpose of which will be the commercialization of scientific achievements and their practical implementation. And in essence, education, science and production are involved in the integration process (Ярушкина Е., 2013).

In this regard, it is necessary to highlight the main tasks of the state in building the knowledge economy: organization of the production and dissemination of knowledge by increasing the efficiency of the functioning of the education and science systems; strengthening the relationship of education with production and services; the formation of an effective support system for the development of innovative entrepreneurship. Further economic development and the establishment of a knowledge economy is impossible without the creation, accumulation, widespread application and further reproduction of knowledge, which are the basis of economic and scientific-technical changes. Thus, the state's efforts to develop a new economy should be focused on three areas: support for the fields of education and science, providing training for the new economy; creation of a healthy competitive environment in the field of education, including the correction of the position and status of the state in this market; the creation of effective mechanisms to support innovation, including mixed, public-private entities, engaged in promoting innovation on the market (Ярушкина Е., 2013).

Since the sphere of education is becoming a key element of the new knowledge economy, in the future it should become not only a source of intellectual rent, but also determine the country's international competitiveness. And in international competition, one who will be able to be a leader not only in the production of knowledge, but also in its wide and mobile dissemination through international educational systems will take priority positions.

Thus, in the knowledge economy, the field of education is turning into an instrument for the effective creation, dissemination and application of knowledge and competencies.

In conclusion of this section, we present the provisions of two major declarations that should be followed by all countries in order to strengthen the education system to maintain and increase their rank in the knowledge economy index.

In May 2015, the declaration "Education 2030: ensuring inclusive and equitable quality education and lifelong learning" was adopted in Incheon (Republic of Korea). The declaration was supported by UNESCO, UNICEF, the World Bank, UNFPA and other UN organizations. The adopted declaration determined the directions of development of education for 15 years in advance: a guarantee of 12-year free education funded by the state; equal access to primary and secondary education; justice and social inclusion in education; recognition of gender equality in ensuring the right to education; provide quality education and improve learning outcomes; contribute to creating opportunities for quality lifelong learning; etc. ((Бурденко Г., 2017), from: (Официальный ...)).

In order to harmonize higher education systems in European countries, in June 1999 the Bologna Declaration was signed by the Ministers of Education. The goal of the Bologna Declaration is the establishment of an European higher education zone, as well as the

activation of the European system of higher education on a global scale. The Bologna Declaration contains six key provisions: 1. Introduction of two-cycle studies - bachelor and master; 2. The introduction of the credit system - in all national education systems to introduce a system of accounting for the complexity of academic work in loans; 3. Quality control of education - the assessment will not be based on the duration or content of education, but on the knowledge, skills that graduates have acquired; at the same time, transnational education standards will be established; 4. Expansion of mobility - the expansion of mobility of students, teachers and other staff for mutual enrichment of European experience; 5. Ensuring the employment of graduates - all academic degrees and other qualifications should be in demand on the European labor market, and professional recognition of qualifications should be facilitated. To ensure the recognition of qualifications, the widespread use of the Diploma Supplement, recommended by UNESCO, is planned; 6. Ensuring the attractiveness of the European education system - increasing the competitiveness of the European higher education system compared to the American system (Бурденко Г., 2017).

### **Intellectual capital in an innovation economy and knowledge economy**

An integral element in the development of an innovation economy is the formation of a market for intellectual capital, innovation, scientific and intellectual services, rights to intellectual property, etc. At the same time, the priority activity of modern business entities is the formation and effective use of intellectual capital as the main driving factor of the “knowledge economy”, which ensures high competitiveness and leading positions in the domestic and world markets, economic growth, improving the quality and standard of living of the population (Казакова О., Исхакова Э., Кузьминых Н., 2015).

The concept of intellectual capital is broader than the more familiar concepts of intellectual property and intangible assets. At the same time, it is close in meaning to the concept of “intangible capital” used in works on economic theory and econometrics from the beginning of the 70s of the XX century. To give a simple example: the gap between the book value of Microsoft and its market capitalization in 1999 reached two orders of magnitude (100 times). The basis of this gap is intellectual assets. The bulk of these assets are directly related to company personnel (Духнич Ю., Гриффин Р., 2018).

In the modern sense, intellectual capital is the clear, unambiguous, transmitted knowledge that the organization possesses; knowledge that can be converted into value. The definition of intellectual capital can be formulated in different ways, depending on what aspect is being considered. Thus, economists define intellectual capital as a form of intellectual potential capitalization; in the business press, intellectual capital often refers to patents, managerial skills, processes, technologies, experience, communication with consumers and suppliers and knowledge about them. In business practice, the set of intangible assets of an organization that is accessible for valuation and management, although not formally documented, is often considered intellectual capital (Духнич Ю., Гриффин Р., 2018).

So, intellectual capital can be defined as “structured knowledge and abilities based on connections that have the potential for development and value creation” [Духнич Ю., Гриффин Р., 2018]. Here is another, more capacious, definition of intellectual capital from Wikipedia: Intellectual capital - the knowledge, skills and production experience of specific people and intangible assets, including patents, databases, software, trademarks,

etc. that are productively used to maximize profits and other economic and technical results (Интеллектуальный ...).

Intellectual capital is a type of capital in the sense that, along with other types, is a factor of production. Like physical capital, it also arises as a result of investments of various resources, in the same way it can depreciate and become obsolete. The main difference between intellectual capital and physical capital is its intangible nature and its inherent properties. An organization that makes efforts to develop its intellectual capital invests a lot of resources in research, training, development. Moreover, the market capitalization of such a company due to the developed intellectual capital is higher than the book value of its tangible assets and funds. Intellectual capital is a synergistic phenomenon, that is, it is formed not by simply adding up its individual parts, but as a property of their interaction. The carriers of the intellectual capital of an organization are employees, structures, customers (Духнич Ю., Гриффин Р., 2018).

**Intellectual capital has a definite structure.**

Many scientists consider intellectual capital as a combination of human, organizational and client (consumer) capital. So, human capital is represented in the form of mental abilities and moral principles of employees of the organization, characterizing knowledge, skills, creative abilities, moral values, work culture. Organizational capital is considered as the result of the mental activity of employees embodied in hardware and software, patents, trademarks and service marks, organizational structure. In turn, client (consumer) capital is formed as a result of interaction with clients and includes an information client base, client contracts and relationships, non-contract client relations (see, for example: Гапоненко Т., 2009; Духнич Ю., Гриффин Р., 2018)).

In a report to the European Commission, researchers at the RICARDIS expert group define intellectual capital as a combination of human, organizational, and capital relations (customer relations). In this regard, intellectual capital is not only the knowledge of people, abilities, experience, R&D, organizational programs, procedures, systems, databases and intellectual property rights (IP rights), but also all the resources associated with the company's external interaction system; e.g. with your customers, suppliers, R&D partners (Reporting ..., 2006).

Based on the above quotes, we characterize the main components of intellectual capital. Human capital. The main source of intellectual capital is human capital, which is a combination of knowledge, abilities, skills and experience, competencies and motivations, creative, managerial, entrepreneurial abilities, as well as moral values, attitudes to work. This should also include a work culture, know-how and other characteristics that are inseparable from the individual. Moreover, this is not a simple aggregate of knowledge and qualities of each specific employee: a synergistic effect manifests itself in collective work, which greatly increases the effectiveness of individual decisions. Human capital in principle cannot be the property of the organization, as it is an integral part of the personalities of employees. The organization can only strive to derive the maximum possible benefit from the work of each employee while he works for it. To achieve this goal, management aspects such as effective leadership, employee motivation, change management and so on are extremely important (Казакова О., Исхакова Э., Кузьминых Н., 2015; Духнич Ю., Гриффин Р., 2018; Интеллектуальный...; and others).

Organizational capital. An equally important component of intellectual capital is organizational capital, which characterizes the totality of procedures, technologies, management systems, hardware and software, the availability of information space, organizational structure, etc. Thus, organizational capital reveals the features of the use of human capital in organizational systems by converting information into values that are repeatedly used in the production and economic process.

In turn, organizational capital is divided into intellectual property and process capital. Intellectual property includes legal rights (patents, license agreements), intangible assets, as well as what determines the value of the company (ideas, know-how, etc.) to a greater extent, providing opportunities for innovative growth in the future. Process (operational) capital – firstly, infrastructure support (organizational structures, processes, methods, information systems that serve to exchange information and creatively apply general knowledge), databases, information systems, networks and technological infrastructure; secondly, corporate culture, mission, etc; thirdly, the strategy (systems and management processes that allow the company to concentrate on the strategy and adapt it to environmental conditions) [Казакова О., Исхакова Э., Кузьминых Н., 2015; Интеллектуальный ...; and others].

**Consumer capital (relationship capital, client capital)** of an organization is a system of stable relations and relations with customers and consumers. Consumer capital provides consumers, customers the opportunity for productive, satisfying their needs communication and interaction with the organization’s staff. Consumer capital is often understood as “relationship capital”. In this sense, it includes contracts and agreements, reputation, brand, trademarks, product distribution channels and portfolio of orders, customer relations. So, the business reputation of the organization, consisting of its ethical and behavioral norms, social responsibility, is a market category. If an organization is trusted, it can sell products at higher prices, increase sales, use the high loyalty of customers and employees, and attract the best specialists for employment. Trademarks and brands are often a symbol of goodwill. A marketing strategy is also part of the organization’s consumer capital: choosing target markets, creating distinctive advantages, stimulating customer loyalty, customer database and analysis, call centers for consumers [Казакова О., Исхакова Э., Кузьминых Н., 2015; Духнич Ю., Гриффин Р., 2018; Интеллектуальный...; and others].

It should be understood that such a division of intellectual capital into types is rather arbitrary, since in reality they are not isolated, but exist together, giving rise to a synergy effect. Whatever conditionally allocated types of intellectual capital are, they somehow exist in close unity, which means that investments should be invested in the development of intellectual capital as a whole, in all its varieties. The development of only one side of intellectual capital to the detriment of others will not only not bring great advantages to the organization, but may even cause damage. The factors of effective reproduction of intellectual capital are scientific and technological progress, the level of informatization of society, the policy in the field of intellectual property and innovation, the availability of modern market infrastructure, the state of the institutional environment, etc. [Казакова О., Исхакова Э., Кузьминых Н., 2015; Духнич Ю., Гриффин Р., 2018; Интеллектуальный...; and others]. Thus, intellectual capital is a multifaceted phenomenon, which is formed as a result of the interaction of human, organizational capital and



capital relations, which determines the acquisition of new knowledge and the intensification of innovative activity at all levels of the economy.

### **Information sector in the knowledge economy and innovation economy**

The knowledge economy in the broadest sense today usually includes three main areas: R&D and innovation, education and training that contribute to the formation of human capital, and information technology. Although each of them retains its relative independence, it is rather difficult to imagine one sphere without the other two. In fact, we are witnessing an ever closer convergence of three different spheres of social activity, since the diffusion of information technologies in other areas is impossible without an appropriate level of professional skill of developers and minimal information literacy of users. In addition, to create new applications of information technology, new scientific knowledge and mechanisms are needed to turn this knowledge into commercial products - goods and services. That is, we return to the knowledge economy as the most important condition for the development of information technology (Тенденции ..., 2011).

Naturally, information technologies play an equally important role in the innovation economy: the rapid development of information and communication technologies over the past 30 years has ensured high rates of knowledge creation and dissemination not only due to lower costs of computer data processing and electronic communications, but also due to that the researchers around the world got the opportunity to interact effectively, which increased the effectiveness of research and ensured the rapid development of R&D, the creation of new knowledge and technologies and, on this basis, the widespread introduction of innovations.

Therefore, considerable interest is currently being shown in the concept of “information” and its influence on modern industries and infrastructure. In connection with the global development of information and telecommunication technologies, the information sector of the economy stands out as the need for knowledge.

In the Modern Economic Dictionary, the following interpretation of the concept of “information” is given, namely: Information - 1) any message about something; 2) information, data, values of economic indicators that are objects of storage, processing and transmission and used in the process of analysis and development of economic decisions in management; 3) one of the types of resources used in economic processes, the receipt of which requires time and other types of resources, in connection with which these costs should be included in the costs of production and circulation; 4) one of the three fundamental substances (substance, energy, information) that make up the essence of the universe and encompass any product of mental activity, first of all - knowledge, images (Современный ..., 2003).

If we consider the process of informatization of the economy itself, then it can be defined as the process of turning information into an economic resource. In this regard, in information activities, the importance of information as an information resource is increasing. It appears on the market in the form of information products and services. T.V. Skryl notes those basic features of information that cardinaly distinguish it from other products: Firstly, the information does not disappear when consumed, but can be reused. An information product saves the information contained in it regardless of how many times it has been used.

Secondly, over time, information undergoes a kind of “moral deterioration”. Although it does not wear out when consumed, it can lose its value as the knowledge it provides ceases to be relevant and loses its value.

Thirdly, the production of information, in contrast to the production of tangible goods, does not require significant costs compared with the cost of replication. Copying a particular information product is usually cheaper than its production. This changes the approach to costing information as a commodity. The difficulty of production and the relative simplicity of replication create, in particular, problems in connection with the determination of property rights within the scope of information activities.

Fourth, the information product can be provided to consumers in various ways, for example, on paper or electronic media. It can be expressed as an information service, which is the delivery of information products to consumers in order to satisfy their information needs. It can also be expressed as a tangible product, for example, various information media (memory cards, hard drives, etc.) (Скрыль Т., 2008). Information is an integral part of any human activity. Hence the penetration of new technologies into all production processes and the combined influence of multiple effects on the final result. New information technologies create a new network logic for the formation and development of systems (Скрыль Т., 2008).

In economic publications, there are a number of modern extended definitions of the information sector of the economy (ISE). Here are some of the most popular definitions.

The definition of O.S. Sukharev, which is also cited in several other publications, is as follows: The information sector of the economy (ISE) is represented by three relevant elements. Firstly, those who create the content of the functioning of this sector itself, namely cultural, scientific, educational, engineering and technical intelligentsia, organizations that create new types of information and its presentation. All of them produce new information and provide an increment of knowledge. Secondly, economic agents that replicate information and provide services for its finding, selection, determination. This often includes television, the Internet, and mass media. The third element, which is probably the most important, is the electronic industry, or rather, developers of the corresponding equipment, creators of new computers, telecommunications devices, consumer electronics (Сухарев О., 2008; Скрыль Т., 2008).

In the opinion of L. G. Belova and A. A. Strizhenko, ISE does not cover all types of information activities, but only the direct production of information products and services. The authors consider the core of ISE to be the information industry – a set of industries and fields engaged in the production, processing and storage and dissemination of information, as well as the development and production of automation (Белова Л., Стриженко А., 2007).

R. M. Nizhegorodtsev calls ISE the set of sectors of the economy, the main product of which is scientific and technical information in all its types and forms, including information products and means of their production. In this case, the information sector of the economy includes: the industry of scientific and technical information (R&D), its processing, storage, transmission, transformation, as well as industries that produce new means of production and new consumer goods, including computers (information processing tools), means of communication and communication (tools for transmitting information), etc. (Нижегородцев Р., 2002).

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In our opinion, despite the capacity of these definitions, they made one serious inaccuracy, namely, the production of equipment for the information sector (computers, telecommunication devices, telephones, microphones, automation equipment, etc., etc.) all the same refers to the enlarged industry sector (there are three enlarged sectors - agriculture, industry and the service sector), and everything else (including the produced information technology) refers to the information sector, which is part of the service sector, in which the information sector is increasingly a more significant place, that is, an increasing part of the GDP of any country is provided by the production, processing, storage and dissemination of information and knowledge, which leads to a predominance of the number of people engaged in this activity.

Despite differences in points of view on the composition of the information sector of the economy, researchers, analyzing world practice, identify in its structure whole groups of new institutional formations that have appeared in recent decades. These include:

- Venture firms and joint risk firms. The largest share of risk capital (about 70%) is concentrated in the field of information technology, computer technology and communications. Since the 1960s, venture capital has become the main growth engine for Silicon Valley.

- Scientific and technical consortia, as one of the forms of cooperation of various scientific and production structures in matters related to R&D and the production of new scientific information. A high share of R&D costs in the total investment volume is a hallmark of a high-tech business, which allows to obtain a significant result from investments.

- Incubators of innovative business that integrate the efforts of many manufacturers of information products.

- Contract research organizations, whose task is to help transform information resources into commercially developed innovations.

- High-tech exchanges that perform intermediary functions when transferring an information product from a producer to a consumer, and many others (Вейлер В., 2011).

In the information sector, which includes the industry of information and telecommunication technologies, communications, computer equipment, information services, employment is constantly increasing, and the most qualified personnel work here. The problems of the information sector are, first of all, the problems of competitiveness of the economy, because the lag in processing and obtaining the necessary information, the inability to use the information resource and manage intellectual property, is, in the end, accompanied by the loss of previous positions not only in the markets of information and intellectual achievements, but also in markets for products and services, in consumer sectors (Сухарев О., 2008).

### **Network structures in innovation economy and knowledge economy**

In the modern economy, network structures play an increasingly important role (see, for example, (Абесадзе Р., 2011)). The role of network structures in the modern economy is very successful, so to speak, the quintessence of the role of network structures and network relationships in the innovation economy and the knowledge economy in the context of globalization is formulated in (Н., Соболева Н., 2005). Therefore, we cite this, one can say, detailed definition without comment: "In the modern economy, network interconnections play a system-forming role, having a direct impact on the development of innovative activity, the very possibility of which is determined by the totality of direct

and feedback links between different stages of the innovation cycle, producers and knowledge consumers, firms, markets, governments within national borders and, increasingly, globally. The effectiveness of innovative development ... depends not only on how effective the activities of independent economic agents (firms, scientific organizations, universities, etc.) are, but also on how they interact with each other, how – the knowledge system and their using" (Базылев Н., Соболева Н., 2005).

Interorganizational networks, the main purpose of which is to increase the efficiency of economic activities of partners participating in the network (including increasing the competitiveness of firms and organizations) through the network organization of innovative processes, are called "innovation networks" (see, for example, [Горденко Г., 2011]). In other words, innovation networks are networks that connect the processes of creating, disseminating and introducing innovations. Among the main types of innovation networks, the following stand out: cooperation networks in the field of R&D – “a set of research teams cooperating to carry out complex research projects (emphasis on generating new knowledge); the totality of strong partnerships between research and production teams that ensure the rapid commercialization of research results (emphasis on the commercialization of new knowledge); an actively interacting expert community whose goal is to build up common competence on key issues of science due to the synergy effect (emphasis on the generation of new knowledge); set of scientific, educational and industrial partner organizations united by a common goal (emphasis on supporting the pre-competitive stages of the full innovation cycle)” (Горденко Г., 2011).

There are various types of network organization (types of networks), focused not only on obtaining the economic effect of the organization of innovative activity, but also on other purposes. Among them, in economic literature, such types of network organizations are widely discussed as strategic alliances, virtual organizations, focal supply chains, mass service networks, industrial cooperation networks of small innovative businesses with large corporations, dynamic networks, innovative clusters, technology transfer networks, value creation networks (Баринов В., Жмуров Д., 2007; Большев О., Волошенко К., 2013: p. 29; Горденко Г., 2011).

In light of the development of an innovation economy in Georgia, the development of such a type of network as technology transfer network is of prime importance. In many countries, such networks are already quite developed. For example, the “Russian Technology Transfer Network” was founded in 2002 and currently unites more than 70 innovation centers (Большев О, Волошенко К., 2013: p. 29). In such a small country like Georgia, the national technology transfer network should, of course, be included in relevant international networks. For more than 15 years, Georgia has been operating in Alta, the supplier of new technologies, which, with the help of the consulting company Synergy Group, is actually introducing network forms for organizing work on deliveries to technology companies (Компания «Алта» ..., 2014). In our opinion, the productivity of this company will increase if it is actively included in the relevant forms of international network cooperation.

At present, Georgia, with the goal of accelerated innovative development of the economy, should be actively included in other types of international (global, regional) innovative network relationships.

In the process of standardization, companies (firms and organizations) of Georgia can join international strategic alliances, participation in which expands access to innovations and facilitates the generation and transfer of knowledge (note that strategic alliances are created not only to coordinate innovative activities, but also to solve many other tasks). It is possible to create strategic alliances within the country, but the participation of national firms and organizations in international strategic alliances can bring particular benefit in the development of innovative activities. In particular, the participation of national firms and organizations in such alliances will contribute to deepening Georgia's integration ties with the EU.

A distinctive feature of a virtual organization is the presence of many companies (usually small and medium), combining resources for the implementation of projects that they are not able to complete alone. Members of a virtual organization seek to expand the boundaries of their capabilities due to the existence of a "virtual" size while maintaining the flexibility inherent in small companies (Горденко Г., 2011). Such organizations can be created both within the national economy and by including the national economy in a network of international virtual organizations.

Network interconnections play a large role in innovation clusters, the cores of which "are usually a network of scientific and industrial organizations connected to each other through a large number of innovative projects and having an internal information space for the transfer of innovations" (Горденко Г., 2011). In innovation clusters, there are particularly close relationships and interactions between agents involved in the development and implementation of innovative projects. Innovation clusters are most often localized within certain territories, but the possibility of vertical-horizontal organization on an international scale is not excluded. However, when identifying a cluster, it must be borne in mind that it operates within a single value chain (Горденко Г., 2011).


## **Conclusions**

From an analysis of the definitions of the concept of "knowledge economy" and further research logic, we came to the conclusion that the modern definition of this concept should be as follows: The knowledge economy is an economy concentrated in intellectual capital (human, organizational and relationship capital), the education system, and the information environment, network structures and, most importantly, innovative systems that use appropriate financial resources.

The work also defines the place of the knowledge economy in the system of modern economies. Based on a comparison of the totality of the infrastructure components of the systems of the innovation economy and the knowledge economy, we came to the conclusion that the concepts of "knowledge economy" and "innovation economy", if not synonyms, are very similar in content — they differ only in the "education" component, which is one of the key components of the knowledge economy, however, it is not formally included in the system of an innovative economy. In our opinion, such concepts as "information economy", "intellectual economy" and "network economy" are not synonyms of the knowledge economy and innovation economy, but enter into them as structural components called "intellectual capital", "information sector of the economy" and "network structures" (which is discussed in many other publications cited in this paper). The content of these concepts is disclosed in detail in the last four sections of the paper.

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In conclusion, we consider it necessary to note the following circumstance: many researchers note that in recent years a lot of controversial concepts of the modern economy have arisen (see, for example: (Ченцова М., 2008: 11). However, while the concept of a “knowledge economy” is still in a discussion stage, the concept of an “innovation economy” has long been put into practice in many developed countries, which is discussed, analyzed and systematized in many publications of our institute (see, for example: (Abesadze R., Burduli V., 2018, LAP LAMBERT Academic Publishing; Abesadze R., Burduli V., 2018, IJONESS; Burduli V. 2019; and many others)). So, in the practical implementation of theories, it is first of all necessary to rely on the work of theoretical and practical orientation devoted to the formation of an innovative economy.

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