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# ЭКОНОМИКАНЫ ДАМУДУҢ ХАЛЫҚАРАЛЫҚ ТӘЖІРИБЕСІ МЕЖДУНАРОДНЫЙ ОПЫТ РАЗВИТИЯ ЭКОНОМИКИ INTERNATIONAL EXPERIENCE OF THE ECONOMIC DEVELOPMENT

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A.A.Kocherbayeva<sup>1</sup>, M.K.Abildina<sup>2</sup>, D.I.Syzdykova<sup>3</sup>

<sup>1</sup>Kyrgyz-Russian Slavic University, Bishkek;

<sup>2</sup>K.Karasayev Bishkek Humanities University, Kyrgyzstan;

<sup>3</sup>Ye.A.Buketov Karaganda State University

(E-mail: ainura\_koch@mail.ru)

## Current problems of knowledge economy formation in modern conditions

The article examines theoretical aspects of the knowledge economy study. Characterized are the basic economic trends related to the production and dissemination of knowledge. The features and the internal regularities of calculation of the index of knowledge economy and the index of knowledge are determined. The basic directions of development and forms of knowledge economy display based on a comparative analysis of the index of knowledge economy in different countries are observed. The article analyzes the current state of knowledge economy index in Kyrgyzstan and Kazakhstan, the ways of further development of the knowledge economy in these countries.

*Key words:* knowledge economy, knowledge economy index, innovation, science, human capital.

Moving the global economy into a new qualitative state is directly related to the increase of the theoretical knowledge role, the development of high-tech industries, the process of increasing the share of sphere, the influence of information network technologies. All these trends require particular study in light of the emergence of new modern economics theories (the theory of post-industrial, «new», global network, information economy), including for the purpose of determining the place of the theory of knowledge economy in their series. We need a theoretical analysis of system changes in the economy at the micro and macro levels. At the same time the accelerated emergence of the knowledge economy in Kyrgyzstan and Kazakhstan is one of the main conditions for the sustainable development of these countries as a full-fledged subject of the world economy. Consequently, the issue of the formation of the knowledge economy and the features of this process seems to be very relevant from both scientific and practical points of view.

Most authors while analyzing the modern economy consider it from the standpoint of study of individual features and manifestations of the emerging economic system, focusing on one or more of its features. This fact predetermines the scope of this study and the directions of research in each of the theories. Thus, in the framework of the information economy mainly studied are new methods of doing business in the digital environment and changes in the economic sphere, associated with the advent of modern technologies (for example, the activities of companies engaged in software development, virtual services, high-tech equipment, as well as research of space or area of genetic engineering). As for the issues related to the role of education and science, with a new quality of economic growth in the long term, they are the core of a new society in the theory of knowledge economy.

Basing on the analysis of a number of controversial concepts of modern economics by M.V.Chentsova, the conclusion has been made that the knowledge economy must be considered systematically and comprehensively in a broad sense. In this case, it appears as [1]:

- A post-industrial economy, because there is an increase of the share of service sector that begins to dominate as a percentage over the production area.
- An information economy, since information (knowledge, science) begins to play a crucial role in it as a factor of production.
- An innovative economy, because an economy can be considered as innovative, when a knowledge within allows to generate a continuous stream of innovation that meets the dynamically changing needs and often forming these needs.
- A global network economy, as in the knowledge economy, the interaction between knowledge carriers mediated broad network communications on a global scale (the emergence of the Internet as a new infrastructure of the economy).

Given the diversity of the problems of formation and development of the knowledge economy, their relationship with the various aspects of functioning of the economic system on the micro, meso, macro and international levels, some questions on this topic have been studied by many scientists of the most diverse schools of thought. Among them we can distinguish the works of scientists L.Mindeli, L.Pipia [2], J.Dozy N. [3], N.Rosenberg, L.Birdtsell [4], M.Porter [5], K.Freeman [6], B.A.Lundvall [7], R.Nelson [8], B.S.Yessengeldin, G.K.Murzatayeva [9].

Opinions of economists in determining the content of the concept differ. In general, they are reduced to the following central points:

- Knowledge becomes a key factor in the growth, along with capital and labor –the concept of knowledge as a resource;
- The production of knowledge is the most important and determining the «face» of the modern economy — the concept of knowledge as a product;
- Codified knowledge becomes an essential component of economic relations — the concept of a codified knowledge;
- Knowledge based on the development and change of information and communication technologies (ICT) — the concept of the knowledge economy as the most important consequence of the information society development.

This means that the knowledge economy ceases to be just an economic phenomenon that goes beyond the study of economic categories and becomes the object of attention of social scientists. Not only to economists, but also sociologists, political scientists, philosophers and other scientists working in interdisciplinary areas: at the crossroads of public and humanities sciences, as well as natural and social ones.

Therefore, scientific knowledge, technology and innovation, despite its importance at all times, in modern conditions become critical factors in the economic growth and well-being. Economic policy in the era of the knowledge economy should be based on the following fundamental principles:

- Creating a favorable investment climate and promotion of investments, especially in high-tech industries;
- Development of science and technology as an important resource feeding economic growth;
- Creation and maintenance of competitive conditions for all economic agents in order to promote innovation and growth in labor productivity;
- Formation of human resources able to adapt to rapidly changing conditions and possessing skills to manage emerging risks;
- Promoting flexible institutional environment, especially in the field of public administration.

New state institutions must be able to effectively invest in the areas of «market failure», especially where the creation of new knowledge and the process of their distribution begins, i.e., in the field of science and education. Understanding the new quality of economic growth, the critical role of science and technology to ensure the welfare and development of society leads to a significant change in economic consciousness not only in many European countries, where the government's role is traditionally strong, but also in the United States. An inviolable principle of economic liberalism, according to which the government failures in the economic sector always lead to worse consequences than market failures, becomes far from clear and certain. Moreover, it is believed that the role of government in areas such as science, education and infrastructure, is not only to be active, but with all conditions being equal, the state's investment in these areas is more effective than private investment.

That is why in recent years there is an increasing number of publications devoted to the problems of construction and development of knowledge-based societies, where knowledge economy serves as the foundation and prerequisite for such companies.

One of the most comprehensive and constructive approaches to the measurement of the knowledge-based economy has been proposed by the World Bank in the framework of the program «Knowledge for Development». The methodology also assesses the readiness of a country to move to a model of development based on knowledge.

The basis of the Index calculation is the «Methodology of assessment» (The Knowledge Assessment Methodology — KAM) proposed by the World Bank, which includes a set of 109 structural and qualitative indicators, combined into four main groups [10]:

1. Index of economic and institutional regime (The Economic Incentive and Institutional Regime). The conditions in which economy and society develop as a whole, economic and legal environment, control quality, business and private initiative development, the ability of society and its institutions to make effective use of the existing and the creation of new knowledge.

2. Education Index (Education and Human Resources). The population's education level and its steady skills of creation, dissemination and use of knowledge. The adult literacy, the ratio of registered students (elementary and high schools) to the number of individuals of corresponding ages, as well as a number of other indicators.

3. Innovation Index (The Innovation System). The level of national innovation system development, including companies, research centers, universities, professional associations and other organizations that accept and adapt global knowledge to local needs, and create new knowledge, and new technologies based on it. The number of scientific workers in the field of R & D; the number of patents registered, the number of copies of scientific journals, etc.

4. Index of information and communication technologies — ICT (Information and Communication Technology — ICT). The level of information and communication infrastructure development that contributes to the effective dissemination and processing of information.

For each group of indicators of the country there's a grade on a scale from 1 to 10. The higher the grade, the more highly country is rated on this criterion. The calculation takes into account general economic and social indicators, including indicators of the annual gross of domestic product growth and value indices of human development potential.

Knowledge Assessment Methodology also provides two composite indexes: the Knowledge Economy Index (KEI) and the Knowledge Index (KI):

1. Knowledge Economy Index is a comprehensive indicator to assess the effectiveness of the use of knowledge in the country for its economic and social development. It characterizes the level of development of a country or region in relation to the knowledge economy.

2. Knowledge Index is a comprehensive economic indicator for assessing a country's ability to create, receive and impart knowledge. It characterizes the potential of any country or region in relation to the knowledge economy.

Knowledge Economy Index is the average of the four indices: index of economic and institutional regime, education index, innovation index and the index of information and communication technologies. Knowledge Index is the average value of three of them: education index, index of innovation and an index of information technology and communications. These indices are calculated for each country, groups of countries and the world as a whole. The methodology allows us to compare the individual performance of various countries, as well as average values characterizing the group of countries. Comparisons can be conducted on individual indicators, and in the summary indicators.

Table 1 provides a comparison of Knowledge Economy Index (KEI) and its components for different countries calculated for the year 2012 compared to 2000.

Table 1

#### Index of knowledge economy in countries of the world

Rates for 2000	Rates for 2012	Change	Country	KEI	KI
1	2	3	4	5	6
1	1	0	Sweden	9.43	9.38
8	2	6	Finland	9.33	9.22

1	2	3	4	5	6
3	3	0	Denmark	9.16	9.00
2	4	-2	The Netherlands	9.11	9.22
7	5	2	Norway	9.11	8.99
15	8	7	Germany	8.90	8.83
4	12	-8	USA	8.77	8.89
12	14	-2	Great Britain	8.76	8.61
17	22	-5	Japan	8.28	8.53
64	55	9	Russia	5.78	6.96
78	73	5	Kazakhstan	5.04	5.40
82	95	-13	Kyrgyzstan	3.82	4.57

Note. Source — adapted from [11].

Table 1 shows that there is a significant gap between developed and developing countries both in generalizing index, and on its component factors. If in 2012, Kazakhstan has improved its position by 5 points, Kyrgyzstan has worsened by 13 points and now occupies 95 place among 146 countries in the world.

This «digital divide» in some way should affect the impact of the economy. Indeed, such a relationship exists. Thus, according to World Bank data, the use of knowledge and information as a determining productive forces in favor of mostly developed countries and major multinational companies leads to the fact that throughout the world, both within individual countries and between them, profits inequality increases.

Therefore, we consider the composition of the indicators that affect the index of knowledge economy of Kazakhstan and Kyrgyzstan (Table 2).

Table 2

**KEI indicators rating of Kazakhstan and Kyrgyzstan**

Year	KEI	EIR	Education	Innovation	ICT
Kazakhstan					
2000	68	106	36	94	91
2012	73	91	40	91	68
Change	+5	+15	-4	+3	+23
Kyrgyzstan					
2000	82	70	114	90	93
2012	95	72	115	96	90
Change	-13	-2	-1	-6	+3

Note. Source — adapted from [11].

As seen from Table 2, almost all Kyrgyzstan KEI indicators show negative trend, the worst indicator being «Education» (114th place among 146 countries of the world). Indicators such as «Innovation» and «ICT» also need to be improved. On the contrary, the best KEI indicators for Kazakhstan are «Education» (40th place), and the «ICT» (68th place).

Science and education take a special place in the society of knowledge and information. New possibilities brought by the information revolution, pose a challenge to traditional systems of generation, distribution and transmission of knowledge, i.e. the systems of science and education. Powerful data and knowledge bases play the role of a giant «warehouses» for endless facts and basic data in all areas of human activity, while global computer networks become powerful tools for high-speed access to this information from anywhere in the world.

In connection with this, substantially increases the role of methodological, systems, interdisciplinary knowledge of man needed for rational and intelligent operating in various knowledge and data in order to address new, non-standard problems. In this new paradigm, the most important place is given to the analytical abilities of the scientist or teacher, that is, his ability to search and find the information needed, to exactly formulate problems and hypotheses, to see in the data collections certain regularities, to find solutions to complex multidisciplinary problems.

These circumstances create new opportunities, but also bring new challenges to the methodology and organizational principles of modern science and education. Science becomes an investment in the global

public interest. Through research and education, scientists as participants in the global information process, contribute to the creation and dissemination of knowledge. This largely affects both the well-being of individual people and the world economy as a whole.

Scientific progress relies on full and open access to data, reflecting the general facts of nature or social development. This principle has led to breakthroughs in scientific knowledge, as well as to economic and social rewards. But in the last time free access to scientific common natural and public data is becoming increasingly limited, causing heated debate in the international scientific community. The following arguments are in favor of open access to data:

Firstly, the data obtained as a result of state financial studies is a property of all people. They should be as open and accessible as possible. Availability can reasonably be limited only by interests of national security, protection of privacy, intellectual property rights and exclusive rights of major developers operating for a limited time.

Secondly, scientists are both users and producers of databases in specific sections of knowledge. But scientific databases are seldom static. During their research, scientists often turn to different databases with the aim of creating a new database, designed for the needs of specific studies. Synthesis of data from different sources allows a new look and progress in the understanding of nature and is an essential component of the scientific process. The history of science is rich with examples of when data collection has played a crucial role in the scientific revolution, which has, in turn, a great impact on society. It may be noted that data is indeed the nourishment for science.

Third, market data access model is not acceptable for research and education. In science, principles of cooperativeness are more important, as opposed to the principles of competition. Not one person, organization or country can independently collect all the data necessary for a holistic consideration of complex scientific problems. Thus, approaches to facilitate the sharing of data necessary for the progress of science and to achieve the resulting social benefits. If the data is formally available for research purposes, but for access to charge excessively high, the negative impact on science is the same as in the closed access to data. This is especially true for scientists in developing countries.

Publication of data means a lot to research and dissemination of knowledge. The reliability of research results depends on the open publication of data that are a base for these studies and allow the playback of the results obtained by different scientists. Limitation on the publication of data and demand for colleagues to recollect the data from the original sources undermine the scientists to spread knowledge.

Society of knowledge and information makes a significant qualitative change in the methodology of modern education. In connection with the elimination of barriers caused by physical distance, the most advanced universities in the world are actively included in the geographical areas in other countries, where they successfully compete with local educational institutions with access to students anywhere in the world via the Internet and satellite channels.

This distance learning is often regarded not as an alternative to the traditional, but as supplementing it with new features that are not inherent in man. First of all, it delivers unrivaled speed of updating knowledge, selected from the world's information resources. It allows a teacher to reach a wider audience without limiting while ignoring geographical borders. This form allows getting closer to the special needs of persons with disabilities in their education. Countries possessing more advanced remote technologies and methodologies of training, attract students regardless of their place of residence, and get a huge financial resources, but most importantly — they are «tied» to their high-quality human capital.

Innovations in the field of information and telecommunication technologies pose new challenging tasks. They relate to pedagogy, methodology, administration and finance, quality assurance, training, intellectual property rights, etc.

At the conclusion of the World Bank, the best result is achieved by applying such methods as peer learning, self-organization, experiential learning, in conditions close to real training with the use of resources and problem based learning, reflection, critical self-analysis, and the combination of these methods any variants.

Thus, the society of knowledge and information brings mankind new challenges and huge opportunities to solve its main problems, as well as ensuring further development. In this regard, many studies prove conclusively that most technologies, companies, and even venture capital today move to places with greater concentration of creative people. A priority between business and government is to create the best conditions for their effective connection between them, that is, in our opinion, a decisive factor for the fullest involvement in market turnover an enormous potential of intellectual capital.

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А.А.Кочербаева, М.К.Абильдина, Д.И.Сыздыкова

### Қазіргі жағдайдағы білім экономикасын қалыптастырудың өзекті мәселелері

Мақалада білім экономикасын зерттеудің теориялық негіздері қарастырылған. Білімді өндіруге және таратуға байланысты негізгі экономикалық үрдістері сипатталған. Білім экономикасының негізгі дамыту бағыттары мен нысандары әр түрлі елдердің білім экономикасын индексінің салыстырмалы талдау негізінде зерттелген. Мақалада Қырғызстан мен Қазақстанның білім экономикасы индексі ағымдағы жағдайы талданған, осы елдерде білім экономикасын одан әрі дамыту жолдары ұсынылған.

А.А.Кочербаева, М.К.Абильдина, Д.И.Сыздыкова

### Актуальные проблемы формирования экономики знаний в современных условиях

В статье рассмотрены теоретические аспекты к исследованию экономики знаний. Охарактеризованы основные экономические тенденции, связанные с производством и распространением знаний. Определены особенности и внутренние закономерности расчета индекса экономики знаний и индекса знаний. Исследованы основные направления развития и формы проявления экономики знаний на основе сравнительного анализа индекса экономики знаний разных стран. Авторами проанализировано текущее состояние индекса экономики знаний Кыргызстана и Казахстана, предложены пути дальнейшего развития экономики знаний в этих странах.

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