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МЕТОДОЛОГІЧНІ ПІДХОДИ ДО ОЦІНЮВАННЯ ЕКОНОМІКИ ЗНАНЬ

Проблеми вимірювання економіки знань та ступеня просування країн на шляху до неї стали одними з основних при розробці концепції економіки знань. Оскільки знання – це особливий товар, вони не можуть бути зведені до якоїсь грошової одиниці вимірювання, як виробництво товарів та послуг. Методологія всесвітнього банку пропонує найбільш універсальний підхід вимірювання економіки знань на основі базових статистичних показників, що передбачає поділ країн за складовими індексу економіки знань на: передові, «напівпереферію» та «переферію».

В статті наведено еволюцію методології вимірювання економіки знань. З поміж існуючих підходів до вимірювання економіки знань варто виділити підходи, пов'язані з побудовою інтегральних індексів, які являють собою зважені агреговані індикатори, складені з ряду показників і відібрані залежно від цілі та завдань дослідження.

До складових індексу економіки знань відносяться: індекс економічного та інституційного режиму, індекс освіти, індекс інновацій та індекс інформаційних технологій і комунікацій. В статті наведено порівняння КАМ-2005 та КАМ-2012 за кожною складовою економіки знань.

Ключові слова: економіка знань, методологія, індекс економіка знань, індекс знань, індекс освіти, індекс інновацій, індекс ІКТ.

Рис. 1, табл. 3, літ. 10.

Л.Ю. Мельник

МЕТОДОЛОГИЧЕСКИЕ ПОДХОДЫ К ОЦЕНКЕ ЭКОНОМИКИ ЗНАНИЙ

Проблемы измерения и степень продвижения стран на пути к экономики знаний стали одними из основных при разработке концепции экономики знаний. Поскольку знания - это особый товар, они не могут быть сведены к какой-то денежной единицы измерения, как производство товаров и услуг. Методология всемирного банка предлагает наиболее универсальный подход измерения экономики знаний на основе базовых статистических показателей, предполагает разделение стран по составляющим индекса экономики знаний на: передовые, «наполпереферию» и «переферию».

В статье приведена эволюция методологии измерения экономики знаний. Среди существующих подходов к измерению экономики знаний стоит выделить подходы, связанные с построением интегральных индексов, которые представляют собой взвешенные агрегированные индикаторы, составленные из ряда показателей и отобраны в зависимости от цели и задач исследования.

К составляющим индекса экономики знаний относятся: индекс экономического и институционального режима, индекс образования, индекс инноваций и индекс информационных технологий и коммуникаций. В статье приведено сравнение КАМ-2005 и КАМ-2012 по каждой составляющей экономики знаний.

Ключевые слова: экономика знаний, методология, индекс экономики знаний, индекс знаний, индекс образования, индекс инноваций, индекс ИКТ.

L. Melnyk

METHODOLOGICAL APPROACHES TO THE ASSESSMENT OF THE KNOWLEDGE ECONOMY

Measurement problems of knowledge economy and the level of progress of countries on the way to it became one of the principal in developing the concept of the knowledge economy. Since knowledge is a special product, they can't be reduced to some monetary unit, as the production of goods and services. The world Bank's methodology offers the most

versatile approach to measuring knowledge economy based on the basic statistical indicators, which involves the separation of countries by the components of the index of knowledge economy: advanced, "napitupulu" and "periphery".

The article describes the evolution of methodologies for measuring the knowledge economy. Existing approaches to the measurement of the knowledge economy should also highlight the approaches associated with the construction of integral indices that represent the aggregate weighted indicators, compiled from a number of indicators and selected depending on the purpose and objectives of the study.

To the components of the index of the knowledge economy include: index economic and institutional regime, education index, innovation index and the index of information technologies and communications. The article presents a comparison of KAM 2005 and 2012 at each component of the knowledge economy.

Key words: knowledge economy, methodology, index, knowledge economy index, knowledge index education index innovation index ICT.

Entry. For the creation, dissemination of knowledge and its effective management are important to the statistical observation, measurement and evaluation of these processes. Measurement problems of knowledge economy and the level of progress of countries on the way to it became one of the principal in developing the concept of the knowledge economy.

Since knowledge is a special product, they can't be reduced to some monetary unit, as the production of goods and services. The use of knowledge generates a wide range of economic and social effects. Pointing to the specificity of knowledge and its measurement, the Russian scientist L. Pipiya noted that, first, there are no specific models or procedures, which allow to establish an unambiguous correspondence between the cost of production of knowledge and newly created knowledge. Second, it is practically impossible to identify all the resources spent on the production of knowledge, including the knowledge that act as a resource. Thirdly, knowledge it was not possible to measure single units, in each case knowledge is unique. Fourthly, new knowledge cannot be mechanically added to the existing body of knowledge whose elements are certain sets of knowledge about a few. It is also impossible to make an inventory of knowledge, identifying among them those that are suitable for use" and "those that are outdated" [4].

Relevance. The value methodology remains highly relevant especially in the new context of scientific research, where largely complicated tasks facing science, and the importance of those tools that she uses. Selection in form of a clear, systematic knowledge, with which it is possible to obtain an adequate reflection of reality has a decisive influence on the development of science at the present stage. This confirms the strong interest in methodology in economic research.

Goal. Find out the features assess the knowledge economy, consider the most universal measurement approaches methodology knowledge economy and their evolution; hold comparison of KAM-and KAM 2005-2012 each component of the knowledge economy index.

To achieve the goals were set the following tasks:
- to consider evolution of methodology for measuring the knowledge economy;
- to bring structure of the Economy Knowledge Index
- to conduct a comparison of KAM-and KAM 2005-2012 each component of the knowledge economy index.

The main material research. In the General philosophical sense, methodology is defined as the science of methods of scientific cognition and transformation of reality by man. This area of scientific thought consists of a system of theoretical knowledge ("knowledge about knowledge"), which act as guiding principles of scientific research, the logic of its holding, and also set of methods of research, aimed at studying specific problems and respond to its specificity.

The concept of "approach" Y. Surmin interprets as a set of methods, ways of influence on someone, learning something, doing business etc [5]. Note that in the studies Galusinski V. and M. Evtuha "approach" is regarded as a scientific category [1]. In our opinion, the approach to defining all components, for example, socio-economic systems, represents the guidelines for the implementation of appropriate doctrines and economic policy, it may not be the only, and provide alternatives to different strategies that are used.

The world Bank's methodology offers the most versatile approach based on basic statistics. In this methodology, all countries are divided into: advanced – in which there is a high level index of the knowledge economy; " half periphery" high level of knowledge index and a low value ndexold and economic modes; "periphery" - low value of both modes.

Table 1

Evolution of methodology for measuring the knowledge economy

Period	Characteristics
1960-ies – R. Solow	Was used production function R. Solow. Technical progress was seen as a factor that should affect production
1962 – F. Machlup	Measuring the extent of the knowledge economy uses the statistics of national income. Proposed to consider the knowledge economy from the standpoint of its structure. Distinguishes four main sectors of the knowledge economy: education, research, development, media, and information sector.
1967 – M. Porat	Proposed the following structure of the knowledge economy: - The primary sector engaged in the production of information for sale; - Secondary sector – carries out the production of information for their own pretrib.
1970 - I. Miles	Proposed to abandon the aggregate of ideas about the knowledge economy and allocates it - – information and communication technologies. Declared key role in the dissemination of knowledge
2000 years	Be the first integrated indices: the Index of the knowledge Economy (Knowledge Economy Index) world Bank innovation index of the EU (Innovation Union Scorecard) , regional new economy index The State New Economy Index)/ The most famous of integrated approaches to the measurement of knowledge economy is the approach proposed in 2004 by the world Bank in the framework of the special program "Knowledge for development" (Knowledge for Development Program). Experts of the world Bank Institute has developed a methodology for evaluating Economics of knowledge (Knowledge Assessment Methodology, KAM).

The European index is not given significant attention to the institutional aspects, with emphasis on the activity of innovative activity from the state and business. The U.S. index is based on the integration of production knowledge in production activities.

Among the currently available approaches to the assessment of knowledge economy, the popularity of approaches related to the construction of integral (composite) indexes, which represent a weighted aggregate indicators, made up of a number of indicators and selected depending on the purpose and objectives of the study. Information base, which is going to construct integrated indices, provides analysis for individual indicators and groups of indicators, and also makes the indices for these groups. On the scale of one country, such indicators allow a comparative analysis of the levels of development of separate regions and territories. International organizations use integrated indices for comparison and construction of the ranking of countries and regions in the world in terms of development.

The advantages of integral indices include ease of use and ease of interpretation of the results, the disadvantages – the presence of methodological problems related to selection of indicators that will be included in the index and the procedure of weighing. It is also unable to avoid the influence of the subjective factor, whereby the influence of some factors may peribiliary, others underestimated, and some will not be counted.

To analyze the ability of regions to create, adopt and disseminate knowledge is proposed to calculate the Index of the knowledge economy (The Knowledge Economy Index, KEI) for all regions of Ukraine. Index of knowledge economy (EEZ) is the average value of the four indexes: index economic and institutional regime index education index innovation index information and communications technology (ICT), and the average value of the last three indices is the Index of knowledge is a complex economic indicator, which is calculated to assess a country's ability to create, adopt and disseminate knowledge.

The world Bank in its program "Knowledge for development" has developed a special methodology (KAM) dimensions approximate to the knowledge economy of the world. This methodology allows developing countries to identify problems and their possible transition to the knowledge economy and the scope of possible stimulating investment to improve this process. KAM is based on four important elements, on the basis of which is measuring the level of approximation of the country to the knowledge economy (Fig. 1).

The Knowledge Economy Index, KEI is the average value of the four indexes: index economic and institutional regime, index education, index innovation, index information and communications technology (ICT), and the average value of the last three indices is the Index of knowledge is a complex economic indicator, which is calculated to assess a country's ability to create, adopt and disseminate knowledge.

In 2008, under the version of the CAM-2008 in addition to the index of the knowledge economy was proposed to calculate the integrated indicator of the knowledge Index (hereinafter, Knowledge Index, KI). It is calculated as the arithmetic mean value for the 9 variables that relate to three areas of knowledge: education and human resources, innovation system and information infrastructure. According to KAM, 2008, the name of the last field changed to information and communcation technology (ICT) (Fig. 1). IKE provides an opportunity to assess the country's capacity to create, adopt and distribute the knowledge economy and shows the potential of a particular country or region for the knowledge economy.
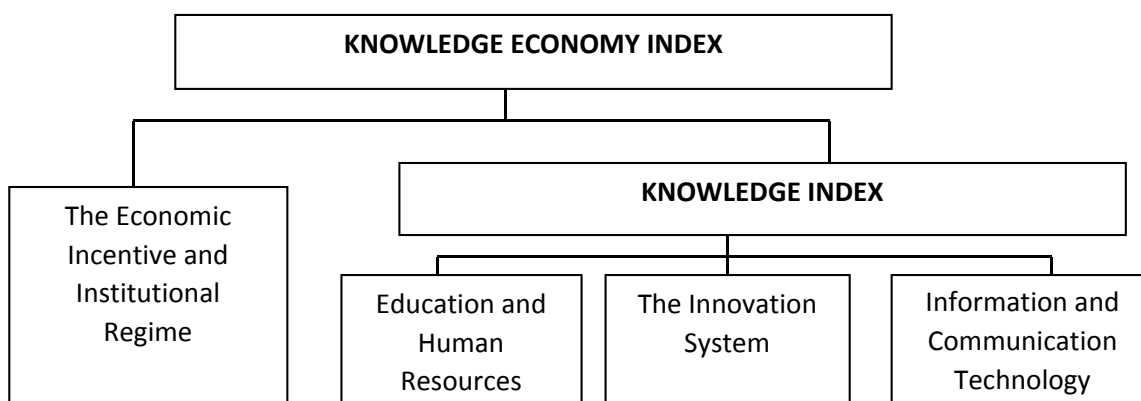
Fig. 1. Structure of the Knowledge Economy Index [4]

1. The Economic Incentive and Institutional Regime conditions, which are developing the economy and society as a whole, economic and legal environment, the quality of regulation, business development and private initiatives, the ability of society and its institutions to make effective use of existing and creation of new knowledge.

2. Education and Human Resources – the level of population education and sustainable skills to create, disseminate and use knowledge. Indicators of adult literacy, the ratio of registered students to the number of persons of appropriate age, and a number of other

indicators.

3. The Innovation System – the level of development of the national innovation system, including companies, research centers, universities, professional associations and other organizations perceive and adapt global knowledge for local needs, and create new knowledge based on new technologies. The number of scientists employed in NDDKR; the number of registered patents, the number and circulation of scientific journals and the like.

4. Information and Communication Technology, ICT – the level of development of information and communication infrastructure that facilitates the effective dissemination and processing of information [10].

In the first version of KAM-2005 [7], a comparative analysis was made for 128 countries and 9 regional groupings on the basis of 80 indicators, organized into 9 indicators General use 6 indicators of gender equality and 65 indicators to four components of the knowledge economy. For analysis according to the methodology of CAM, you can build two types of boards: basic (Basic Scorecard) and custom (Custom Scorecards) scoreboard.

Most often used basic scoreboard that includes 14 indicators: 2 indicators of level of economic development (average annual growth rate of GDP and human development index) and 12 indicators, divided into four groups, with three indicators each) according to the components of the knowledge economy. It should be noted that in the methodology of KAM there is no explanation as to why these three indicators were selected to characterize each of the branches of knowledge. We give a comparison of KAM-and KAM 2005-2012 each component of the knowledge economy (table. 2).

Table 2

Comparison of the structure of sub of the Knowledge Economy Index

KAM-2005		KAM -2012	
Subindex	**Indicators**	**Subindex**	**Indicators**
Economic Incentive and Institutional Regime	1. Tariff and non-tariff barriers 2. The quality of regulatory measures 3. The rule of law	Economic Incentive and Institutional Regime	1. Tariff and non-tariff barriers 2. The quality of regulatory measures 1. 3. The rule of law
Education and human resources	1. Literacy of the adult population aged 15 years and above (%) 2. Enrolment in secondary education (%) 3. Enrolment in higher education (%)	Education	1. The average number of years of schooling 2. Enrolment in secondary education (%) 3. Enrolment in higher education (%)
Innovative system	1. The number of researchers engaged in research and development (DIR), per 1 million population 2. The number of patents granted by USPTO (US patent office) per 1 million population 3. The number of articles in scientific and technical journals per 1000 population	Innovation	1. The amount of royalty and license fees per 1 million population 2. The number of patents granted by USPTO (US patent office) per 1 million population 3. The number of computers per 1000 population
Information infrastructure	1. The number of phones (fixed and mobile) per 1000 population 2. The number of computers per 1000 population 3. The number of Internet users per 1000 population	ICT	1. The number of phones (fixed and mobile) per 1000 population 2. The number of computers per 1000 population 3. The number of Internet users per 1000 population

Using these indicators, is carried out as assessment of the country in the transition to the knowledge economy, and comparisons between the different countries of the world. KAM uses

109 structural and qualitative indicators. The comparison is carried out by groups from 146 countries, including most countries of the Organization for economic cooperation and development (OECD) and more than 90 countries that are developing. To provide flexibility for comparisons across countries, each indicator is displayed in two ways: absolute and relative (this assessment is undertaken on the basis of the normalized data on a scale from 0 to 10), grouped countries: all countries of the region, the countries with high and low incomes [3].

Note that the indicator "tariff and non-tariff barriers" evaluates the existing barriers that restrict free trade: the import ban, quotas, duties, requirements concerning licensing and certification of products. For the assessment indicator, the index of economic freedom (Index of Economic Freedom), which is being developed since 1995 by the Heritage Foundation in cooperation with The Wall Street Journal [6].

The indicator "regulatory quality measures" describes the prevalence of a relatively hostile market action of the authorities, price controls, excessive banking supervision, inadequate regulation of foreign trade and business development, etc. For assessment will be used Governance Indicators – assessment of efficiency of activities of public authorities of countries members of the world Bank Group [8].

The indicator "rule of law" includes several indicators, which assess the confidence of economic agents in existing laws. In the framework of the indicator measured the level of crime, the effectiveness and predictability of judiciary, enforceability of contracts, etc. For evaluation of the indicator are also used Governance Indicators of the world Bank [8].

Given that the indicators on the basis of which make comparative analysis have their units and calculated according to different scales, each of which is subject to the normalization procedure [9]. Analyzed the totality of the actual values of one indicator for all countries, which are then ranked according to this index, by purchasing a rank from 1 to n. The rank 1 is the country with the best performance, and countries that have the same values given the same rank. Each country is also determined by the number of countries which stand above it in the ranking (Nh), and this number matches the total number of countries in the study group (Nc) by the formula:

$$P_{norm} = 10\left(1 - \frac{N_h}{N_c}\right) \qquad (1)$$

Normalized metric value is from 0 to 10: 10 is the maximum value corresponding to a country with the highest and 0 is the minimum value, it corresponds to the country with the lowest rate. Thus 10% of countries with the best indicators take the value of normalized rate of 9 to 10, the next 10% values from 8 to 9, etc.

The results of the calculations of the world Bank, 2012, country leader at IES Sweden with an index of 9.43 (table. 3). Special preference Sweden has in the field of innovation and ICT, ranking second for both subindexes. At the same time subindexes education Sweden has shifted from the third position that she has held in 2000 at six. The competitiveness of the Swedish ICT is largely associated with the increase in Internet users. In addition, Sweden has the best results on innovation indicators (royalties and licensing agreements, patents, articles in scientific journals [2].

The top five countries with the best economies of knowledge also includes the Scandinavian countries: Finland (of 9,33), Denmark (9,16), the Netherlands (9,11) and Norway (9,11). All four sub-indices of the knowledge economy in these countries have high and balanced values.

Conclusions. It should be noted that a single, universally accepted methodological approach to the measurement of the knowledge economy do not exist. For reflection in the international rankings of objective data, Ukraine needs to develop its own that come closest to

Table 3

The ranking of countries according of the Knowledge Economy Index (KAM, 2012)

Rank	Country	Indexes		Subindexes							
		KEI	KI	Economic and institutional regime		Education		Innovation		ICT	
				Rank	Індекс	Rank	Index	Rank	Index	Rank	Index
1	Sweden	9,43	9,38	4	9,58	6	8,92	2	9,74	2	9,49
2	Finland	9,33	9,22	2	9,65	11	8,77	3	9,66	6	9,22
3	Denmark	9,16	9,00	3	9,63	15	8,63	5	9,49	13	8,88
4	Netherlands	9,11	9,22	19	8,79	12	8,75	7	9,46	5	9,45
5	Norway	9,11	8,99	8	9,47	3	9,43	17	9,01	17	8,53
6	New Zeland	8,97	8,93	14	9,09	1	9,81	22	8,66	23	8,30
7	Canada	8,92	8,72	7	9,52	16	8,61	10	9,32	24	8,23
8	Germany	8,90	8,83	13	9,10	23	8,20	12	9,11	8	9.17
9	Australia	8,88	8,98	23	8,56	2	9,71	19	8,92	22	8,32
10	Switzerland	8,87	8,95	6	9,54	41	6,90	1	9,86	7	9,20
…	…	…	…	…	…	…	…	…	…	…	…
56	**Ukraine**	**5,73**	**6,33**	**93**	**3,95**	**21**	**8,26**	**59**	**5,76**	**77**	**4,96**

international, methods of measuring and assessing the components of the knowledge economy, to provide information on production, use, sharing and distribution of knowledge in the economy.

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