

UDC 330.34:330.5

*Oleksandr Kendiuhov, Doctor of Economics, Professor
(Head of the Chair of Economics and Entrepreneurship, State Economy and
Technology University of Transport)
Ekaterina Yahelska, Ph.D. in Economics
(Docent of the Chair of Strategic Management of Economic Development, Do-
netsk National Technical University)*

ECONOMIC FORCE AND ECONOMIC ENERGY AS NEW INDICATORS OF ECONOMIC EFFICIENCY

In the article, the use of economic force as an indicator of the economic efficiency of the national economy is proposed and justified. Article describes the structure of economic force and the algorithm to measure it. Economic force of Ukraine is calculated during the study period.

Keywords: system, efficiency, development, economic energy, economic force, time

*Олександр Кендюхов, д. е. н., проф.
(завідувач кафедри «Економіка та підприємництво»,
Державний економіко-технологічний університет транспорту)
Катерина Ягельська, к. е. н.
(доцент кафедри «Стратегічне управління економічним розвитком»,
Донецький національний технічний університет)*

ЕКОНОМІЧНА СИЛА Й ЕКОНОМІЧНА ЕНЕРГІЯ ЯК НОВІ ПОКАЗНИКИ ЕФЕКТИВНОСТІ ЕКОНОМІЧНИХ СИСТЕМ

У статті викладено та обґрунтовано авторську позицію щодо показників оцінки ефективності функціонування економічних систем. Запропоновано та обґрунтовано доцільність використання економічної сили в якості показника економічної ефективності національної економіки. Стаття описує структуру економічної сили й алгоритм її вимірювання. На основі проведених досліджень розраховується економічна сила України протягом досліджуваного періоду.

Ключові слова: система, ефективність, розвиток, економічна енергія, економічна сила, час.

© Кендюхов О. В., Ягельська К. Ю., 2014

*Александр Кендюхов, д. э. н., проф.
(заведующий кафедрой «Экономика и предпринимательство»,
Государственный экономико-технологический университет транспорта)
Екатерина Ягельская, к. э. н.
(доцент кафедры «Стратегическое управление экономическим развитием»,
Донецкий национальный технический университет)*

ЭКОНОМИЧЕСКАЯ СИЛА И ЭКОНОМИЧЕСКАЯ ЭНЕРГИЯ КАК НОВЫЕ ПОКАЗАТЕЛИ ЭФФЕКТИВНОСТИ ЭКОНОМИЧЕСКИХ СИСТЕМ

В статье изложена и обоснована авторская позиция к показателям оценки эффективности функционирования экономических систем. Предложена и обоснована целесообразность использования экономической силы как показателя экономической эффективности национальной экономики. В статье описывается структура экономической силы и алгоритм её измерения. На основе проведённого исследования рассчитывается экономическая сила Украины в исследуемый период.

Ключевые слова: система, эффективность, развитие, экономическая энергия, экономическая мощь, время.

Statement of the problem. For years, economics has been wondering how existing systems of efficiency indicators of national economies and individual businesses are adequate to long-term goal of sustainable development. Rational national economics or microeconomic system assumes the ensuring of the long-term well-being of a particular society (the people, the staff, and the owners), that is the highest efficiency of the economics should be combined with the humanistic goals of development. However, it is controversial whether existing indicators are able to reflect this long-term and assess directly the process of development.

Analysis of recent research and publications. Much attention was devoted to evaluation of the economic systems dynamics by foreign and domestic scholars, including O. Polovtsev [1], C. Clark [2-4], J. Forrester [5], N. Kondratyev [6], W. Weidlich [7], V. Kushlin [8], E. Orekhova [9], B. Pun'ko [10], who focused in their researches on a comprehensive approach that would include economic, social, institutional, investment and other areas. M. Hirooka [11], A. Korotych [12], Yu. Mazur [13], A. Dubovoy and O. Kindrat [14] investigated the dynamics of key macroeconomic indicators from the standpoint of economic growth. Works by A. Halchynskiy [15], P. Oryehovskiy [16], V. Satsyk [17], G. Malynetskiy [18], M. Proskurina [19], M. Dovbenko [20], A. Poruchnik [21], V. Feschenko [22], A. Fuks [23] allowed to master the basic methodology of the formation of crisis indicators system and cycle development. J. Alan [24], W.-B. Zhang [25], S. Smirnov [26], A. Lopatin, T. Obukhovskaya [27], P. Trunin [28] and other scientists studied the system of leading indicators of the economy. **Selection of the unsolved problems.** However, indicators that adequately reflect the development of the economic system in the long term and today are still not available.

The purpose of the article is to present and to justify the author's position on indicators of evaluating the efficiency of the economic system; to invent the alternative indicator for economic development evaluating based on the energy approach.

The results of the analysis. There are many concepts of economic development based on neoclassical and neo-Keynesian theories, but most of them describe the process of quantitative changes, that is growth, what is their main disadvantage [29, p. 25]. Thus, when evaluating the efficiency of the national economy, primarily such indicators as GDP per capita and economic growth are usually used in percentage of GDP to the previous year, income and consumption of the population and so on. Thorough analysis of macro-economic indicators, which are used for the estimation of economic dynamics, is presented in [30], but none of them can testify to sustainable development, because is short-term and does not reflect the process of development fully. For example, GDP can grow by a temporary increase in exports of non-renewable resources (that does not talk about development, but rather threatens prosperity and high living standards of future generations) or by stimulating the economy by foreign loans (which increases the risks of loss of economic independence). V. Inozemtsev notes that in industrial society «economic growth, to assess which GDP growth is commonly used, was synonymous with development, and for the time difference between them is not allocated» [31]. In the post-industrial society, economic processes divided into two areas: one continued to develop the production of material goods; another increased the knowledge production and formed a new quality of person. The above named researcher points to a number of problems in post-industrial society while trying to display in the statistics the processes of economic development, because traditional economic growth does not take into account the qualitative changes of production and human potential [31]. In addition, false focusing on GDP growth ignores the objective foundations of this growth: structural changes, resource-intensive of economics, labor productivity in major industries, etc. [32, p. 16-17].

A similar problem occurs in micro-systems, because when evaluating the efficiency of enterprises profit in its different variations and gross income are used as the main indicators. In our view, income much more reflects the growth of microeconomic system than the development. For example, income may increase due to seasonal demand in the market; it is no evidence of the company development. In terms of market uncertainty, this indicator can be considered less objective, because the strengthening market fluctuations result the micro-economic system to a no equilibrium state. Often in this case the income increases, but the system approaches a certain critical point, after the passage of which the structure is destroyed and transformation and formation of a new structure of higher quality is observed (or vice versa decay and degradation of structural relations systems) [33, p. 83]. R. Feschur and V. Samulyak also stress that the greater part of domestic enterprises use only the system financial indicators, which is unrepresentative because in modern conditions intangible assets, market impacts, potential become increasingly important [34]. Thus, the conventional indicators of effectiveness of macro- and microeconomic systems are based on the temporary result and overlook the long-term result. Even a positive trade balance does not mean economic success. For example, the budget surplus in 2010 (5030 million dollars) compared with a deficit of 2009 (-13726 million dollars) was formed by a positive balance on loans and bonds account. Actual balance depends entirely on the commitment. That government which took loans and praised surplus dooms the future leaders of the country to worse indicators through financial commitments. Therefore, this kind of surplus does not reflect the reality of economic development.

In [30] we attempted to define indicators of leading national economic development, as a result of what we have found that special attention as an indicator that would brought us closer to solving the problems outlined, should be given to the so-called economic energy, the author's position on the nature, structure and features of which was given in [35, 36].

J. Schumpeter his classic work «The Theory of Economic Development» drove to «energy search», which is formed within the economic system and, according to the scientist, «changes it directly» [37, p. 4]. M. Hvesyk and I. Bystryakov also consider that «the relevant force should be standing by the economics that can be expressed in the form of energy. That energy is mostly capital» and its flow from one form to another [38]. According to A. Dombrovskiy, modern economic model is characterized by a «fictitious capital», arising from the triad of industrial, commercial and financial capital and focuses mainly on the stock market as production of securities – derivatives that exist in electronic form. «Fictitious capital» in the form of «financial bubbles» is nowadays the most profitable, that is in today's economy money plays hypertrophied role [39, p. 262]. In principle, all resources can be expressed in monetary terms: the traditional energy sources and alternative energy, level of technical and technological equipment, industry backlogs, presence and state of infrastructure, human resources and intellectual capital, etc., that we will operate in the future.

A. Sekatskiy calls money as «time objectification» [40]. Today impossibility of economic system timeless is undeniable. W.-B. Zhang noted that time should be included as an independent variable in the description of each economic value [25, p. 27].

Most researchers note a significant increase in the speed of the time flow in modern society, which is reflected in accelerating scientific and technological progress, economic and social processes. As aptly noted by S. Pogodaev, the word «success» means «catch», «in time». Successful people accelerate their biological time, catch to do more than others during the day, overcome greater distance to market goals. Successful firms accelerate their corporate time and outperform competitors in the market. Successful countries accelerate their national market time and overtake other countries [41].

Finnish writer M. Larne, ironically speaking about the American way of life, wrote, «In New York streets waddle walk is not accepted. Here all passers-by hurry somewhere to be in time, not forgetting for a moment that time – money...» [42].

Therefore, the key development factors are time and energy, which to some extent may be expressed in monetary terms.

Manipulation of economic energy in the physical sense allow to consider economic (productive) forces as any other actions of non-economic forces – natural forces, biological forces (plants, animals) and others. In this regard, all production resources (material, fuel and energy, capital, labor, etc.) participate equally in the economic movement and generating economic energy. The movement of the real world is based on energy costs and is the result of implementation of the relevant drivers (work). The work describes the quantitative and qualitative changes in the system under the influence of force [43, p. 99-103], in our opinion – under the influence of economic energy.

I. Newton explained the movement by the external influence on internal forces that provide impulse of the object movement. Depending on the size and the vector of attached external forces, object moves with acceleration or deceleration [44, p. 92]. Broadly speaking, the momentum of economic development is defined as the force impact that is sufficient to make the system transition to the new quality and structure. Management based on the impulses of economic development is timely detection of external and internal generation of impulses and their desired direction and implementation in practice [45, p. 30].

According to [43, p. 23], the force means active movement, action of one element to the other, real or possible energy display under certain circumstances. The trajectory of economic dynamics depends on the strength of various factors and duration of their action. While some factors act in the same direction, in which the economic movement is, the increase in strength of its

effect on the flow of economic events increases its speed (time performance) and reduces cycle events (the time required to implement each event).

If economic forces in the system are not enough, time productivity decreases, generating of economic energy is slowed down, dissipative processes activate bring chaos. Economic energy dissipation means the loss of resources and money, so economic force should primarily attract outside resources and stimulate their generation within the system. Using this indicator assesses the system effectiveness for the long term, reflecting the loss or acquisition of potential, which is the driving force of development.

Any simple structure occurs around the point of maximum concentration of resource and seen around its «energy center» in the development of the resource. Structural center is not only an attribute of proportion, but also an inexhaustible source of energy and knowledge that organizes and shapes the entire structure [44, p. 91]. Such center and energy generator in the macroeconomic system is a country (government), which is responsible for synchronizing speeds and generates economic energy. Generation of moving of economic energy depends on the government, which is the supreme coordinator of structural, technological, and institutional change, on the timeliness and comprehensiveness development and implementation programs of institutional and technological changes [43, p. 408]. It emphasizes the awareness of time as the main economic resource and requires urgency of action by the government to reform the economy to achieve leading development and high living standards.

In terms of modern synergetic paradigm, time describes a relationship and hierarchy of individual time vectors of motion of the system elements. As noted by M. Kuzmin, time becomes the «operator». Using it the «system state», we get more and more states. The value of «operator», which is the whole system, is due to some «critical mass», which represents the system as a whole. This total factor may be mass, energy, information, size, connectivity of the system and other factors of integrity. Development of the system involves changing of the integrity, leading to changes at the level of parts (structure, metabolism, quality of behavior, etc.)» [46, p. 72-73].

Thus, in our view, it is quite correct to determine the economic system as a whole, which is inherent economic weight, economical energy, economic time, information, size and so on.

Proceeding from the above and generally accepted interpretations of energy and force, we will operate the categories of «economic energy» and «economic force».

In our opinion, economic energy is a potential of the economic system, which is its ability to supply efficient functioning and positive qualitative transformations. The structure of economic energy is an array of abilities that determine the qualitative and quantitative state of the economic system and cause the transformation of its structure by changing the space-time location of the system. Economic fluctuations are caused by different energy values (states) of abilities («sub energies»). State of ability is defined by its location in time and space.

Abilities are displayed in economic force, i.e. economic force is a display of economic energy, which leads to the development of the system. In other words, it is the intensity, the ability to generate and to attract resources providing wealth of the country. Economic force stimulates conversion of potential energy into kinetic one that actually promotes a positive trend. Thus, the economic energy of the country comes out of dormancy and activates the structural elements of the system, stimulating them to action.

Economic force (F) may be represented by the formula (1):

$$F = EM * g ; \tag{1}$$

where EM – economic weight of the country;

g – acceleration of economic growth in the national economy that characterizes time efficiency as an economic resource and determines the quantity of money which increases the balance of payments surplus (excluding loans and other obligations) for the period (2):

$$g = \frac{\sum_{t=1}^T (B_t - B_{t-1})}{T}; \quad (2)$$

where B_t – balance without obligations at the end of the period;
 B_{t-1} – balance without obligations at the beginning of the period;
 T – duration, years.

The economic weight of the country is a set of all economic resources (inputs) (excluding credit) and is calculated as a total value of these resources (3):

$$EM = \sum_{i=1}^I \bar{m}_i; \quad (3)$$

where m – the average value of the i resource for the period (4),
 i.e.

$$\bar{m}_i = \frac{m_{i,t-1} + m_{i,t}}{2}; \quad (4)$$

where $m_{i,t-1}$ – cost of i resource at the beginning of the period;
 $m_{i,t}$ – value of i resource at the end of the period.

Among resources required for the calculation of economic force, we allocate land, labor, capital, information, intellectual capital (innovation, entrepreneurship).

We propose Abel (Ab) as a derivative unit of economic force measuring (based on «economic abilities» and «Bel» which is commonly used for «force» (intensity) indicators). That is Abel – a unit of measuring of economic power value, characterizing the intensity of economic abilities of the country (1 Ab = 1 billion currency² over a period).

As far as the aim of the proposed indicator – to show the effectiveness in the long term, the latter refers to the length of time during which the changes of all factors of production are possible. Based on the experience of countries that have demonstrated economic miracle, in our opinion, the analyzed period should be at least ten years.

From a practical point of view, the indicators should meet the following criteria: their fluctuations must have cyclical nature; there should not be sudden and unexplained jumps; rows must be sufficiently reliable and comparable throughout the test period; information should be promptly updated [27, p. 213]. In our case, the obstacle to accurate calculations is the difficulty of access to full and timely information. For example, according to various sources, the cost per hectare of land is ranging from 5000 UAH to 10000 UAH, but the starting price in future projections of increasing prices for land in Ukraine 300 EUR is also featured. Stated official data is often incomplete or not comparable.

In any case, if a single researcher may encounter significant error in the calculation of economic force, such problem can be easily avoided at the state level.

ІНШІ СФЕРИ ЕКОНОМІКИ

We will operate such categories as land, labor, capital, entrepreneurial skills and information as the main resources to test methods of economic force calculating. Partial intermediate calculations of economic force are presented in the table 1 based on [47-49].

Table 1. Some intermediate calculations of economic force

Type of resource	The cost of the resources over selected years, mln. UAH					
	2005	2007	2009	2010	2012	m _i
Land	302195,5	302247,6	302148,6	302194,7	302194,7*	302195,1
Labor	21,346809	34,4769836	45,23413317	53,4179907	69,33365431	45,340232
Equity	1133603,7*	1133603,7*	1269537,7	1426711,6	1904940,2	1519271,95
Capital investment	93096	188486	151777	150667**	293691,9	193393,95
The residual value of fixed assets	661565	993346	1597416	1731296	2135987 ***	1114541,5
Human capital ¹	16102,5	19065,7	24580,3	32629,8	40454,1	28278,3
Innovative capital	4818,6	6700,7	8653,7	9867,1	11252,7	8035,65
Output	995630	1565055	1955685	2388289	3150653	2073141,5
Information ²	215,5	361,8	506,6	592,4	799,2	507,35
In total	3407507,8	4541375	5736561	6549676	8535214,5	5239410,64
The dynamics of the consolidated balance of payments, mln. UAH.						
Balance	10721	9421	-13726	5030	-4175	-
Loans and bonds	7563	23105	-9137	6762	6019	-
Balance without obligations	3158	-13684	-4589	-1732	-10194	-

The source: [21-23].

¹ – minimum cost of human capital; ² – cost of economically active information;

* data of the closest year with available information is accepted;

** without value added tax;

*** the cost of fixed assets of local governments are not included.

The land value is calculated based on the accepted average fixed cost of land 5000 UAH for one ha. to ending the ban on the basis of the entire territory of Ukraine and on the basis of the value of natural resources, calculated in [49]. Productivity was calculated based on the «Interim guidelines of productivity calculating in the economy as a whole and by economic activities» [50]. Assessment of human capital comes from the minimum value of the population for the country, the initial data for which is the cost of living per person per year, the average life expectancy and population. Evaluation of innovative capital, in our view, should take into account at least the cost of technology and science, and art. In this paper, we relied only on the volume of scientific and technical work. Failure at this stage of the study to express the state of entrepreneurship in cash we showed with manufacturing activity through the release (account of production). To calculate the value of the information the concept of economically active information was introduced

as useful information to perform certain functions in the industrial and other activities, underlying of functioning of economic mechanism and economic development of the system. Obtaining, transfer, recruitment with information as instructions for performing economically beneficial actions are expressed in average wage of economically active population. The time factor as a resource is released in the table because it is reflected in the calculation of the acceleration of economic growth in the national economy.

So, $EM = 5239410,64$ mln. UAH., that is according to the average exchange rate over the analyzed period equal to 788474 mln. USD.

Then

$$g = 251:8 = 31,375 \text{ mln. USD. / period}$$

$$F = 788474 \cdot 31,375 = 24738,4 \text{ Ab}$$

As the figure does not allow making a full conclusion on economic force, we offer further calculation of generalizing economic indicator – the index of economic force (I_F):

$$I_F = \frac{F}{F_n}; \quad (5)$$

where F_n – economic force of comparable country.

As far as international trade is inevitable principle of economic development, the country close to the value of foreign trade turnover may be chosen for comparison. In addition, the country for comparison may be selected to Pareto principle, according to which for many phenomena 80 percent of consequences are caused by 20 percent of the causes. As 20% of customers give 80% of profits, foreign trade partners, turnover with whom exceeds 20%, can provide 80% success rate of the economy. For example, such countries in 2012 were the Russian Federation (exports – 25,6%, imports – 32,4%) and Poland (exports – 15,1%, imports – 26%).

Thereby, $I_F > 1$ will indicate leading economic force.

Conclusions and directions of further researches. The insertion of economic force to the system of macroeconomic indexes as an efficiency indicator of the national economy will measure the level of long-term development and identify effective low resources. However, the technique requires a new approach to the collection of internal and external information of prospects for further research.

REFERENCES

1. Polovtsev, O. (2010). Metody modelivannia dinamiki sotsialno-ekonomichnyh system [Methods of modeling the dynamics of socio-economic systems]. *Visnyk Natsionalnoi akademii derzhavnoho upravlinnia pry Prezydentovi Ukrainy – Bulletin of the National Academy of Public Administration under the President of Ukraine, 1*, 105-111 [in Ukrainian].
2. Clark, C., Gilbert, M., Stone, J. R. N., Perroux, F., Lieu, D. K., Divisia, F. et al. (1949). The Measurement of National Wealth: Discussion. *Econometrica, Vol. 17*, 255–272.
3. Clark, C. (1937). National Income at Its Climax. *The Economic Journal, Vol. 47*, 186, 308–320.
4. Clark, C. (1933). The National Income and The Net Output of Industry. *Journal of the Royal Statistical Society, Vol. 96, 4*, 651–659.
5. Forrester, J. (1977). *Mirovaia dinamika [World Dynamics]*. Moscow: Nauka [in Russian].
6. Kondratiev, N. (1989). *Problemy ekonomicheskoi dinamiki [Problems of Economic Dynamics]*. Moscow: Finansy i statistika [in Russian].
7. Weidlich, W. (1988). Stability and Cyclicity in Social Systems. *Behavioral Science, 33*, 241-256.
8. Kushlin, V. (2004). *Traektoriiia ekonomicheskikh transformatsii [The trajectory of economic transformations]*. Moscow: Ekonomika [in Russian].

9. Orekhova, E.A. (2008). Razvitiie teorii natsionalnogo hoziaistva v sovremennih usloviiah [The Development of the Theory of National Economy in Modern Conditions]. *Doctor's thesis*. Volgograd [in Russian].
10. Pun'ko, B. M. (2012). Pokaznykovo-statystychna otsinka ta ekonomiko-matematychne modeliuvannia rozvytku natsionalnoi ekonomiky u globalnomu ekonomichnomu seredovyschi [Index-statistical estimation and economic-mathematical design of national economy development in global economic environment]. *Ekonomichnii chasopys XXI – Economic Annals-XXI*, 3-4, 12-15 [in Ukrainian].
11. Hirooka, M. (2006). *Innovation Dynamism and Economic Growth. A Nonlinear Perspective*. Cheltenham, UK – Northampton, MA: Edward Elgar.
12. Korotych, A. (2009). Dynamika sotsialno-ekonomichnogo rozvytku Ukrainy ta ii regioniv [The dynamics of socio-economic development of Ukraine and its regions]. *Aktualni problemy derzhavnogo upravlinnia – Actual problems of governance*, 1(35), 142-145 [in Ukrainian].
13. Mazur, Iu. (2007). *Modeli dinamiki ekonomicheskogo rosta s uchetom nalogovogo faktora [Models of the dynamics of economic growth, taking into account the tax factor]*. Donetsk: IEP NAN Ukraini [in Russian].
14. Dubovoy, A., Kindrat, O. (2010). Metodyka vyznachennia tendentsii ekonomichnogo rozvytku Ukrainy ta chynnyky, scho na nyh vplyvaiut [Method of determining the trends of economic development of Ukraine and the factors that affect them]. *Naukovyi visnyk NLTU Ukrainy – National Forestry and Technical University of Ukraine*, 20.10, 155-161 [in Ukrainian].
15. Halchynskiy, A. (2009). *Kryzy i tsykly svitovogo rozvytku [Crises and cycles of the world]*. Kiev: ADEF-Ukraina [in Ukrainian].
16. Oriehovskiy, P., Diachenko, A. & Sukhinin, I. (n.d.). Otsenka vliianiia ekzogenih i endogenih faktorov na mehanizm tsiklov Kondrateva [Assessing the impact of exogenous and endogenous factors on the mechanism of Kondratiev cycles]. www.ss.xsp.ru. Retrieved from <http://www.ss.xsp.ru/st/020/> [in Russian].
17. Satsyk, V. (2005). Tsiklichnist ekonomichnogo rozvytku Ukrainy [Cyclical of economic development of Ukraine]. *Ekonomist – Economist*, 5, 80-83 [in Ukrainian].
18. Malynetskiy, G. (2002). *Haos. Struktury. Vichislitel'nyi eksperiment: Vvedenie vnelineynuiu dinamiku [Chaos. Structure. Computational Experiment: Introduction to nonlinear dynamics]*. (3d ed.). Moscow: Editorial URSS [in Russian].
19. Proskurina, M. (2012). Rozvytok teorii tsyklichnosti v svitovii ekonomichnii dumtsi drugoi polovyny XX-pochatku XXI st. [The development of theories of cycling in the world economic thought of the second half of the XXth and early XXIst century]. *Extended abstract of candidate's thesis*. Kiev [in Ukrainian].
20. Dovbenko, M. (2010). Tsyklichni Indykatory A. Bernsa iak odyn z Instrumentiv ekonomichnogo prognozuvannia [Cyclical indicators A. Burns as a tool for economic forecasting]. *Ekonomika i prognozuvannia – Economics and Forecasting*, 4, 141-151 [in Ukrainian].
21. Poruchnik, A., Lukianenko, D., & Stoliarchuk, J. et al. (2010). *Antytsyklichne reguliuvannia rynkovoi ekonomiky: globalizatsiina perspektyva [Countercyclical regulation of market economy: globalization in perspective]*. D. Lukianenko, A. Poruchnik (Ed.). Kiev: KNEU [in Ukrainian].
22. Feschenko, V. (2004). Dynamichniy analiz problem tsyklichnosti u rozrobkah ukrainskykh ekonomistiv kintsia XIX – pochatku XX st. [Dynamic analysis of the problems in the development of cycling by Ukrainian economists of the late XIX – early XX century]. *Visnik Ternopil'skoi akademii narodnogo gospodarstva – Herald of Ternopil Academy of National Economy*, 4, 189-195 [in Ukrainian].
23. Fuks, A. (2000). Tsyklichnist iak forma ekonomichnogo rozvytku [Cycling as a form of economic development]. *Problemy formuvannia rynkovoi ekonomiky – Problems of formation of market economy*, 8, 9-15 [in Ukrainian].
24. Alan, J. (1981). *The index of leading indicators. Measurement without theory, twenty-five years later*. Cambridge: National Bureau of Economic Research.
25. Zhang, W.-B. (1999). *Sinergeticheskaya ekonomika. Vremia i peremeny v nelineinoi ekonomicheskoy teorii [Synergetic Economics. Time and Changes in the Nonlinear Economic Theory]*. (N. Ostrovskaia Trans., V. Lebedev, V. Razgevaikin Ed.). Moscow: Mir [in Russian].
26. Smirnov, S. (2001). Sistema operezhaiuschih indikatorov dlia Rossii [The system of leading indicators for Russia]. *Voprosi ekonomiki – Problems of Economics*, 3, 22-30 [in Russian].
27. Lopatin, A. & Obukhivs'ka, T. (2009). Sistema vyperedzhaiuchykh pokaznykiv dlia vyjavlennia zakonimirostey funktsionuvannia ekonomiky ukrainy naperedodni kryz dilovykh tsykliv [System of leading indexes for detection the regularities of functioning of the economy of Ukraine before the business cycle crisis]. *Aktualni problemy ekonomiky – Actual problems of economics*, 12(102), 210-217 [in Ukrainian].
28. Trunin, P. (2007). Metodologicheskie podhody k razrabotke i obosnovaniiu indikatorov-predvestnikov finansovoi nestabilnosti Rossii [Methodological approaches to the development and justification of pre-indicators messengers of financial instability of Russia]. *Extended abstract of candidate's thesis*. Moscow [in Russian].
29. Kozubenko, A.V. (2011). Teoriia ekonomicheskogo razvitiia: vzaimodeystvie gosudarstva, rinka i grazhdanskogo obschestva [Theory of economic development: the interaction of the state, market and civil society]. *Candidate's thesis*. Moscow [in Russian].

30. Iagelska, K. Iu. (2013). Systemnyi pidhid do vyznachennia indyktoriv vyperedzhaiuchogo natsionalnogo ekonomichnogo rozvytku [Systematic approach to identifying indicators of leading national economic development]. *Zbirnyk naukovykh prats Donetskogo derzhavnogo universytetu upravlinnia: «Ekonomichni ta ekologichni mehanizmy rozvytku Ukrainy»: seriia «Ekonomika» – Scientific Papers of Donetsk State University of Management, «Economic and environmental mechanisms of Ukraine»: series «Economics», Vol.4, 267, 104-114* [in Ukrainian].
31. Inozemtsev, V. (2000). *Sovremennoe postindustrialnoe obschestvo: priroda, protivorechiia, perspektivi [Modern post-industrial society: nature, contradictions, prospects]*. Moscow: Logos [in Russian].
32. Pikus, A. (2010). Pytannia ekonomichnogo zrostantia ta rozvytku v ekonomichnyi nauki [The issues of economic growth and development in economics]. *Ekonomichniy prostir: Zbirnyk naukovykh prats – Economic Space: Scientific Papers, 34, 152–168* [in Ukrainian].
33. Popovich, O. (2001). Prybutok iak chynnyk rynkovoi samoorganizatsii [Profit as a factor of market self-organization]. *Ekonomika i prognozuvannia – Economics and Forecasting, 1, 77-84* [in Ukrainian].
34. Feschur, R.V. & Samuliak, V.Iu. (2010). Grupy pokaznykiv (indyktoriv) otsiniuvannia rivnia rozvytku pidpryemstv [Groups of indicators for evaluation of enterprise development]. *Menedzhment ta pidpryemstvo v Ukraini: etapy stanovlennia i problemy rozvytku – Management and Entrepreneurship in Ukraine: stages of formation and development problems, 691, 231-239*. Retrieved from <http://ena.lp.edu.ua:8080/handle/ntb/10053> [in Ukrainian].
35. Iagelskaia, E.Iu. (2013). Suschnost i struktura ekonomicheskoi energii [Nature and structure of economic energy]. *Problemy ekonomiki i menedzhmenta – Problems of Economics and Management, 8(24), 98-111* [in Russian].
36. Iagelska, K.Iu. (2013). Osoblyvosti ekonomichnoi energii krainy [Features of the economic energy of the country]. *Ekonomichnyi chasopys XXI – Economic Annals-XXI, 9-10 (1), 46-49* [in Ukrainian].
37. Galchinskiy, A. (2012). Ekonomichnyi rozvytok: metodologiya onovlenoi paradygmy [Economic development: methodology of revised paradigm]. *Ekonomika Ukrainy – Economics of Ukraine, 5, 4-17* [in Ukrainian].
38. Hvesik, M. & Bistriakov, I. (2012). Paradygmalnyi pogliad na kontsept stalogo rozvytku Ukrainy [Paradigmatic view of the concept of sustainable development of Ukraine]. *Ekonomika Ukrainy – Economics of Ukraine, 6, 5-12* [in Ukrainian].
39. Dombrovskiy, O.G. (2012). Temporalnyi vymir ekonomichnogo buttia: metodologichnyi aspekt [Temporal dimension of economic life: methodological aspects]. *Visnyk ekonomiky transportu i promyslovosti – Bulletin of the economy and transport industry, 38, 259-264* [in Ukrainian].
40. Sekatskiy, A. (n.d.). Vremia i ego rol v sovremennoy ekonomike [Time and its role in today's economics]. [www.contextclub.org](http://contextclub.org). Retrieved from <http://contextclub.org/events/y2010/m9/n48> [in Russian].
41. Pogodaev, S.E. (n.d.). Trehmernoe sotsialno-ekonomicheskoe vremia kak element rinochnogo prostranstvenno-vremennogo kontinuumu [Three-dimensional socio-economic time as element of the market space-time continuum]. www.chronos.msu.ru. Retrieved from http://www.chronos.msu.ru/old/RREPORTS/pogodaev-trehmernoe_vremia.pdf [in Russian].
42. Stepanov, S. (n.d.). Vremia – dengi... [Time is money...]. www.financialfamily.ru. Retrieved from http://www.financialfamily.ru/index.php?s_id=articles&e_id=234 [in Russian].
43. Biriukov, V.V. (2000). Vremia kak ekonomicheskoe prostranstvo razvitiia hoziaystvennoy sistemy [Time as the economic space of the economic system]. *Doctor's thesis*. Saint Petersburg [in Russian].
44. Stepanenko, S.V. & Volkova, O.M. (2013). Derzhava v organizatsii gospodarskoi systemi [The state in organization of the economic system]. *Nauchnie trudi DonNTU. Seriya: ekonomicheskaiia – Scientific papers DONNTU. Series: Economic, 2(44), 85-99* [in Ukrainian].
45. Sidorova, A. & Anisimova, A. (2010). Upravlenie na osnove impulsiv ekonomicheskogo razvitiia: kontseptualnyi pohod [Management based on the pulse of economic development: a conceptual approach]. *Ekonomist – Economist, 1, 30-33* [in Russian].
46. Kuzmin, V.M. (1996). Ekstatcheskoe vremia [Ecstatic time]. *Voprosi filosofii – Problems of Philosophy, 2, 67-79* [in Russian].
47. Sait derzhavnoi sluzhby statystyky [Sait of public service statistics]. www.ukrstat.gov.ua. Retrieved from <http://www.ukrstat.gov.ua> [in Ukrainian].
48. Platizhnyi balans Ukrainy [Balance of payments of Ukraine]. www.bank.gov.ua. Retrieved from http://www.bank.gov.ua/control/uk/publish/category?cat_id=44464 [in Ukrainian].
49. Mischenko, V. (2012). Mineralnye resursy Ukrainy v rynochnykh transformatsiiah [Mineral resources of Ukraine in market transformations]. *Ekonomist – Economist, 3, 55-58* [in Russian].
50. Nakaz Ministerstva ekonomiky Ukrainy 26.12.2008 № 916 «Tymchasovi metodychni rekomendatsii rozrahunku produktyvnosti pratsi v tsilomu v ekonomitsi ta za vydamy ekonomichnoi diialnosti» [Order of the Ministry of Economy of Ukraine 26.12.2008 p. № 916 «Interim guidance of productivity calculating in the economy as a whole and by economic activities»]. [www.me.kmu.gov.ua](http://me.kmu.gov.ua). Retrieved from <http://me.kmu.gov.ua/file/link/126733/file/Metodika.doc> [in Ukrainian].