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Council on Competitiveness of Ukraine

Content

Issue' emphasis

Expert opinion

Recommendations of the Council on Competitiveness of Ukraine

Dear readers!

Upon analysis of the events that have occurred since the first release of the "Competitiveness Monitor" (CM), I am pleased to state that the idea of the country's competitiveness has been obviously entrenching itself in the Ukrainian society. In other words, the principal mission of the NGO "Council on Competitiveness of Ukraine", which consists in consolidating the society by accepting competitiveness as a national idea, is gradually achieving implementation.

It is also evidenced by programs of lead political parties represented in the Verkhovna Rada of Ukraine and projects of Ukraine's long-term development strategies which have been lately presented to the community both by government and research quarters and non-governmental organizations. The approaches first utilized by the CCU in its Competitiveness Monitor were in part applied in the draft Major National Priorities of Socio-Economic Development recently published by the Ministry of Economy of Ukraine.

We also welcome a decision by the Cabinet of Ministers of Ukraine to establish a National Strategic Assembly with the main objective of scientifically and practically substantiating the strategic signposts of Ukraine's development and coordinating them with the business and intellectual elite, civil society, and political community.

This CM issue offers you an insight into further development of the Technology for Economic Breakthrough initially presented in the previous issues of the Monitor. Pursuant to the earlier adopted approach, this double issue deals with the analysis of the Knowledge Economy and the Sustainability matrices. We will leave an in-depth consideration of the Critical Gap Fix and Social Cohesion matrices for future issues. The novelty of this CM issue is the publication of articles by leading scientists and experts on topics connected with the analysis of factors and indicators constituting the Knowledge Economy and the Sustainability matrices.

For the first time, we are bringing to your notice CCU experts' recommendations in the format "Meaning of Benchmarks – Achievement Time – Proposed Actions". In our opinion, the approach can be beneficial both for the Government and for the society which should have a clear methodological framework for comparing political promises (objectives), government priorities, and, most important, results of authorities' actions. Preparation of such a "road map" for individual factors and matrices of competitiveness can provide a solid foundation for constructive discussions in the expert and research communities, both on the pages of the future CM issues and the CCU webpage.

This issue also expands a statistical database for Ukraine's competitiveness analysis by complementing the IMD Lausanne World Competitiveness Yearbook with the World Economic Forum ratings.

A doubtless priority, in our opinion, is the updating and harmonization of statistical data prepared by relevant agencies in Ukraine with account for the national dimension of competitiveness using international methodologies. This concerns such critical aspects as, for example, measuring various indicators which characterize the development of knowledge economy, quality of life, sustainable development, social capital, etc.

Today, such significant aspects of competitiveness as competitiveness of regions, cities, and enterprises still lack coverage. Therefore, despite certain accomplishments in promoting the idea of competitiveness in society, we still have a long way to go.

Allow me on behalf of the CCU to express sincere gratitude to the authors and scientific consultants of this issue, and everyone who assists the CCU. It is my special pleasure to note interest shown to our publication by Leonid Kravchuk, the first President of Ukraine.

I hope that our Monitor will contribute to building a competitive and fair country.

Sincerely yours,
Yuri Polunеev
Chairman, CCU
MP of Ukraine

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L.M. Kravchuk, President of Ukraine in 1991-1994

SYSTEM OF VALUES FORMULATED IN THE CONSTITUTION OF UKRAINE SHOULD PROVIDE FOUNDATION FOR ENHANCING THE COUNTRY'S COMPETITIVE ADVANTAGES

Competitiveness goes hand in hand with the entire human history. At the early stages it assumed rather fierce forms due to struggle for survival in the context of extremely limited resources and physical elimination of potential consumers. In the estimate of Jean-Jack Babel, a Swiss researcher, the planet has lived through 14.5 thousand wars. They claimed the lives of 3 billion 640 million people which equals the world population in 1975. Hostilities were almost exclusively caused by economic reasons and attempts to obtain additional sources for development. Thus, economic competition often revealed a military nature. At the same time, purely economic aspects of competitive relations manifested themselves in exchange (between clans, tribes, communities, and states). History has demonstrated that human communities established through military annexation were usually unstable and short-living. And on the contrary, economic advantages allowed some countries to retain lead positions either individually (today's USA, Japan, Germany, etc.) or at the head of the empires founded by them (Spain, Portugal, the Netherlands, and Great Britain). In the latter case, obviously, they resorted to force. In the 2nd half of the 20th century only Iraq openly tried to take possession of Kuwait's oil resources by military methods.

The 21st century is characterized by exacerbated competition, as, on the one hand, the world's main energy and material resources shrink, and on the other hand, the number of their potential consumers continuously increases. Also, the difference between consumption of some countries comes up to hundreds of times. This brief flashback in history was to emphasize the importance and relevance of developing scientifically substantiated approaches to Ukraine's competitiveness, whose economy is open, i.e. included in modern globalization processes.

The application of the Technology for Economic Breakthrough matrices developed by the Council on Competitiveness of Ukraine which combine criteria, approaches, quantitative and qualitative indices of the world renowned agencies and institutions to analyze the country's competitiveness is of special importance for a number of reasons. Firstly, it helps overcome isolation and autarchy typical of the former Soviet economy, touting whose "successes" statistical and other government agencies turned to all sorts of wheeling and dealing which absolutely digressed from the accepted world standards in accounting, monitoring and analysis. Secondly, collation with other countries provides for a comparative analysis to identify critical gaps and apply appropriate incentives for bridging the existing disproportions. Thirdly, the methodology proposed in the journal covers all aspects of economic, social, and political life of the country, offers a comprehensive and integrated idea of the status and prospects of our development, and of Ukraine's place in the modern world. In particular, the Critical Gap Fix matrix covers the key aspects of macroeconomic, institutional, and regulatory environment development: macroeconomic indicators, institutional system development level, capital market and business efficiency, regulatory environment and competition, fiscal and currency policy, openness of the economy, etc. It is a barometer which not only shows an objective economic picture, but also offers appropriate recommendations for developing and implementing the economic policy, amending the effective legislation, and taking expeditious measures to improve the situation. Consideration of challenges in the Knowledge Economy matrix is of critical importance for competitiveness analysis. Our advantage in this domain dates back to antiquity and roots in the times of Kyivan Rus. The education level of the Ukrainian nation, its aspiration for knowledge and for the novel have always been characteristic of our people and lavishly shared with neighboring communities. This component of competitiveness can and must be enhanced, taking into account the available research and educational potential of the Ukrainian society, the quality of the human capital, and a flexible labor market. At the same time, entrenchment of knowledge economy requires to find expeditious solutions to science challenges and to make science face the economic activities, to de-bureaucratize governance, to put an end to "brain drain" from the country, to increase the quality of education, to train qualified mid-level professionals, and ultimately to create an efficient national innovation system capable of competing on the world technology market.

The Sustainability matrix has a wide global context. Problems of sustainable development are known to have been formulated at the Conference on Environment and Development at Rio de Janeiro in 1992. For Ukraine, which survived Chernobyl and still feels its harmful effects, the issue of environment conservation and ensuring sustainable development for the present and future generations is of primary importance. This also includes such crucial sustainability aspects as the quality of life enjoyed by the population, health care, energy supply and energy efficiency of the economy. The latter is a most sensitive area for Ukraine. It concerns all other components and elements of sustainable development. Periodic complications in relations with Russia which arise in this respect must obviously be resolved, first of all, through de-politicized oil-and-gas relations. Secondly, it is high time that we pass from words to deeds and gradually but steadily diversify energy supply sources through Transcaucasia, Central Asia, Middle East, (Africa), and make a breakthrough in adopting energy efficiency as a public ideology.

In the matrix approach to the country's competitiveness, a lead place is held by the concept of the Unity of the Nation. In the context of today's political situation in Ukraine, it can be ranked first without reservation. Its components, such as the national idea, system of values, culture, political and law institutions, social capital in the context of rapid social changes and transformation processes which take place in Ukraine, are becoming priorities. The system of values, formulated in the Constitution of Ukraine should become a foundation for the activities of political parties and movements and a basis for strengthening the country's competitive advantages. Apparently, the ways and mechanisms of establishing such values in society may vary. However, with the completely opposite views professed on such issues as language, economic integration and others, the unity of the nation and its competitiveness wane, whereas investors and foreign partners become wary of cooperation prospects. For Ukraine it is of particular importance to build up social capital and to boost people's trust in the authorities and their main representatives. Drawing up and approval of the overall state development strategy must account for the opinion of the intellectual elite, business (predominantly medium and small), trade unions, NGOs, and other elements of civil society.

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WHAT DOES THE COUNTRY NEED AND ASPIRE TO?

Last July, the Ministry of Economy published draft Major National Priorities of Socio-Economic Development for 2009-2012. Given a general nature of the document, its authors must have intentionally chosen not to name the country whose priority development it deals with. A number of positions, events, and priorities have been aired in governmental and other programs in the past 10-15 years (macroeconomic stability, pension system, energy security of the economy, innovation system, regulatory policy, strengthening the ownership institute, court reform, etc.). Instead, the previous practice of market transformation of Ukraine's economy or the connection of declared priorities with the current state of economic and social development have not been subjected to any analysis whatsoever. Therefore, the general language and the standard quantitative indicators included in the document may be applied to any post-socialist country.

At the same time, certain positive aspects embodied in the proposed priorities deserve attention. It is, in particular, worth noting and supporting a methodological approach based on the competitiveness discourse of the national economy. It evidences, on the one hand, a new stage of the country's socioeconomic development, when its agenda less prioritizes survival issues than ascending the world economic arena, when the country is capable of interfacing on the par with the main economic stakeholders on some world markets. On the other hand, competitiveness is viewed as a synthetic indicator which embraces all the components of the national potential, i.e. capital, labor, science, education, technologies, human development, institutional capabilities, social capital, environment, etc. Unfortunately, the above categories and socioeconomic processes have not been covered and substantiated properly, and have not been translated to appropriate quantitative and qualitative parameters and criteria.

An important section deals with establishing favorable framework conditions for enhancing the economy's competitiveness, of which the first place is justly taken by macroeconomic stability. This commonly acknowledged system of indicators is also attractive in being the main one in the Maastricht EU convergence criteria. In the National Priorities until 2012, the only criterion Ukraine will meet is the state budget deficit. It explains the EU position with regard to our integration aspirations and their meeting the existing requirements. One should also bear in mind the Copenhagen criteria which are directly linked to the depth and quality of market reforms for some reason totally neglected by the authors. Of the macroeconomic stability indicators, the government position on the following indicators should have been taken into account – the national currency exchange rate and the discount rate of the National Bank of Ukraine (NBU), even though they belong to the latter's domain.

There is a contradiction in the premise to reduce the consumer price index to 5% before 2012 on the one hand, and bring up the average price level to economically justified production costs on the other. It would appear that price growth should matter less here than matching prices and costs, stressing on the need to reduce costs through utilizing modern production technologies and increasing labor productivity. Such discrepancies and omissions are characteristic for other Priorities sections as well. They virtually lack mechanisms to implement the planned action items in the context of available funds, legislative adjustment (drawing up new laws of Ukraine or amending the effective ones), etc. Court reform, for example, is limited to a mere statement on enhancement of the efficiency of the legislative branch in Ukraine. Or in the section "Man and Sustainable Development" the state targeted program provides for treatment of cardiovascular and other diseases. No emphasis is made as to how this treatment will differ in 2012 from the existing one. It is difficult to agree with the postulated need to enhance energy supply of the economy (Section 3). It is known that Ukraine consumes considerably more energy resources per GDP unit than advanced European countries. The stress, therefore, should be laid on saving energy resources, on comprehensive modernization of the economy, in-depth structural reorganization of the national economy, and implementation in production of modern high technologies of the 4th, 5th, and 6th waves. Some sections, like, for example, "Ukraine and the World", set absolutely implausible objectives and establish priorities which can only bring a smile to the faces of our foreign partners. Specifically, it speaks of Ukraine's institutional integration into the EU, which is equivalent to joining this regional union.

In general, as evidenced by the experience of other post-socialist countries, which truly and not by lip service pursue market reforms and take real steps towards the European Union, Ukraine desperately needs to follow the path of more intensive reforms and to initiate a new stage, a new wave of reforming the national economy. Such reforms have to target, first and foremost, the creation of a favorable business environment for large, medium and small domestic companies, and for foreign investors (the document lacks appropriate sections). This is the only foundation capable of ensuring sustainable dynamic economic growth and solution to urgent economic and social issues. The topmost priority along this vector is the improvement of the taxation system and a gradual but unswerving transfer of the tax load from production to consumption, which yielded positive effects in a number of advanced countries. Another vector has to do with a decrease in public expenditure and reduction in redistribution of costs through the state budget. A third component is improvement of the tax administration system and de-shadowing of a significant share of economic activities. It would be appropriate to hold a public discussion on a broad number of issues related to reforms in the tax system, of the "National Round Table" kind, involving researchers, politicians, and businessmen (entrepreneurs). Special attention should be paid to small and medium business, which requires improved funding, a better access to credit resources, trained staff, and availability of prerequisites for entering international markets in compliance with WTO and EU norms and regulations. Incidentally, given the arduousness of debate raging in the past few years between the political, economic, research. and public communities over Ukraine's accession to the WTO, it is, at least, puzzling that the priorities until 2012 fail even to refer to the WTO. In terms of small, medium, and large businesses, the still pressing issue is legislation on joint stock companies, the economic code, bankruptcy, protection of intellectual property rights, more extensive utilization of information and communication technologies in their activities, etc.

It is necessary to populate such sections as knowledge economy, skills-based economy, and administrative, pension, educational, and health reforms. Such issues as land, development and prospects of science have to be investigated more rigorously and comprehensively.

Thoroughness and thoroughness of the government's intentions is evidenced by the Concept of the draft National Targeted Economic Program for Industrial Development until 2017 (Resolution No. 947-r of July 9, 2008). The Concept justly accentuates that insufficient industrial competitiveness poses a major threat to national security. Ambitious quantitative indicators of industrial growth in 2017 (3 times) and profound structural changes in the sector would not be casting doubt if they had adequate financial, institutional and legislative support. Apparently, the Program development will have to provide these issues with appropriate coverage, as well as financial and economic substantiation.

Ukraine in World Competitiveness Ratings

World Competitiveness Index by the Institute for Management Development, Lausanne, Switzerland

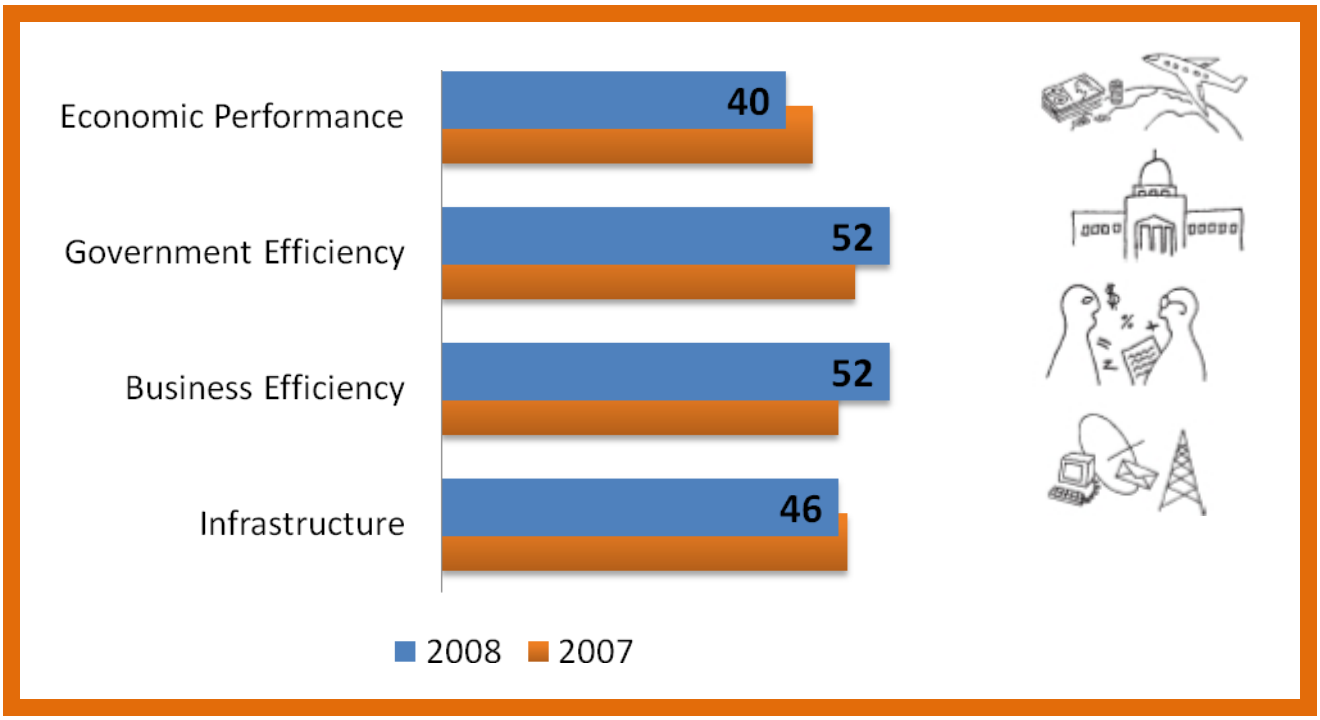
The index compiled by the Institute for Management Development, Lausanne, Switzerland (IMD) is based on the methodology of calculating international indicators, rating countries by 320 variables grouped into four sub-indices: Economic Performance, Government Efficiency, Business Efficiency, and Infrastructure. The latest 20th IMD rating was published last June. This year the index includes 55 countries, with the USA confidently ranking first. The index for Ukraine was first calculated last year, when Ukraine rated 46th. This year Ukraine lost positions virtually in each index and ranked second from the end, namely 54th.

In the past 5 years, the most dynamically developing countries in the IMD index were Slovenia, which in 2008 increased its average 2004-2007 rank by 8 positions (rated 32nd in 2008), Poland – by 6 positions (44th), and Switzerland – by 5 positions (4th). The countries which have been dramatically lost their competitiveness include South Africa, which lost 12 ranks to rate 53rd, Columbia, Greece, and Finland, which lost 5 ranks each to rate 41st, 42nd, and 15th respectively, as well as Ukraine (– 8 points) and Lithuania (– 5 points), even though their presence in the IMD index is only two years old.

IMD' Scoreboard

1	USA	17	China	35	Peru
2	Singapore	18	New Zealand	36	Lithuania
3	Hong Kong	19	Malaysia	37	Portuguese
4	Switzerland	20	Israel	38	Hungary
5	Luxemburg	21	United Kingdom	39	Bulgaria
6	Denmark	22	Japan	40	Philippine
7	Australia	23	Estonia	41	Columbia
8	Canada	24	Belgium	42	Greece
9	Sweden	25	France	43	Brazil
10	Holland	26	Chili	44	Poland
11	Norway	27	Thailand	45	Romania
12	Ireland	28	Check Republic	46	Italy
13	Taiwan	29	India	47	Russia
14	Austria	30	Slovak Republic	48	Turkey
15	Finland	31	Korea	49	Croatia
16	Germany	32	Slovenia	50	Mexico
	1	33	Spain	51	Indonesia
		34	Jordan	52	Argentina
			2	53	South Africa
				54	**Ukraine**
				55	Venezuela
					3

Ukraine in IMD scoreboard



Dynamic of Selected Countries' Ranking in IMD scoreboard

	Integrated ranking					Average 2004-07 ranking	Changes in the average 2008 ranking relative to 2004-07
	2004	2005	2006	2007	2008		
Poland	48	48	50	52	44	50	6
Germany	19	21	25	16	16	20	4
China	22	29	18	15	17	21	4
France	27	28	30	28	25	28	3
Brazil	44	42	44	49	43	45	2
Estonia	25	24	19	22	23	23	-1
Korea	31	27	32	29	31	30	-1
Italy	42	44	48	42	46	44	-2
Spain	28	32	31	30	33	30	-3
Russia	41	45	46	43	47	44	-3
Turkey	46	39	43	48	48	44	-4
Hungary	35	31	35	35	38	34	-4
Finland	8	6	10	17	15	10	-5
Ukraine	–	–	–	46	54	46	-8

Positive and Negative Factors Influencing Ukraine's score

Economic Performance

Favorable international trade conditions/ **L**ow unemployment rate among the young / **H**igh growth rate of real GDP per capita / **F**oreign direct investment in the country

High inflation
Low capitalization of Ukrainian companies on foreign markets
Low GDP per capita

Government Efficiency

Share of social expenditures
Relatively low level of national debt
Absence of "overregulated" labor relations

Absence of social unity in society
Inefficient implementation of legislation on competition
Protectionism
Risks of political instability

Business Efficiency

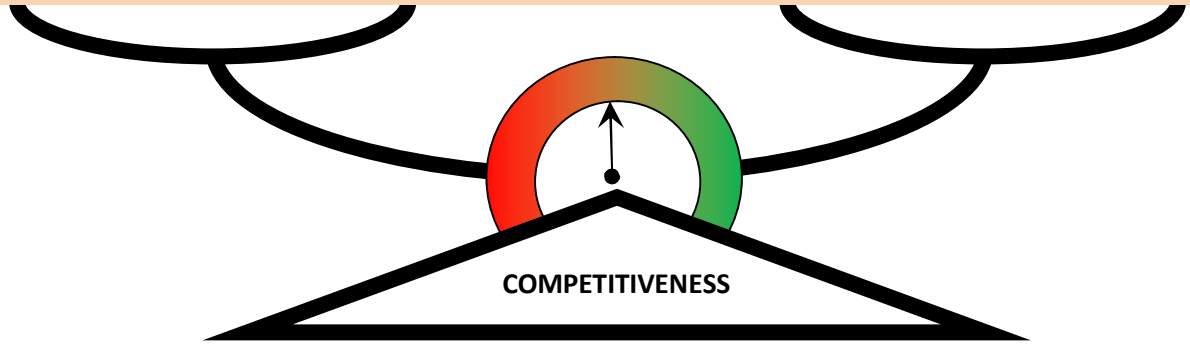
Growing stock market index
Low salaries
High fraction of women among employees
High level of managers' "ingenuity"

Lack of protection for shareholders
Non-transparency of fiscal institutions
Inadequate attitude towards employees' labor safety and health issues
Low confidence in business owners
Restricted access to funding

Infrastructure

Investment in telecommunication
Patent productivity
Relatively high level of expenditure on education

High energy intensity of economics
Low cyber-security
Inefficient support to research
Lack of research support system
Unprotected intellectual property rights

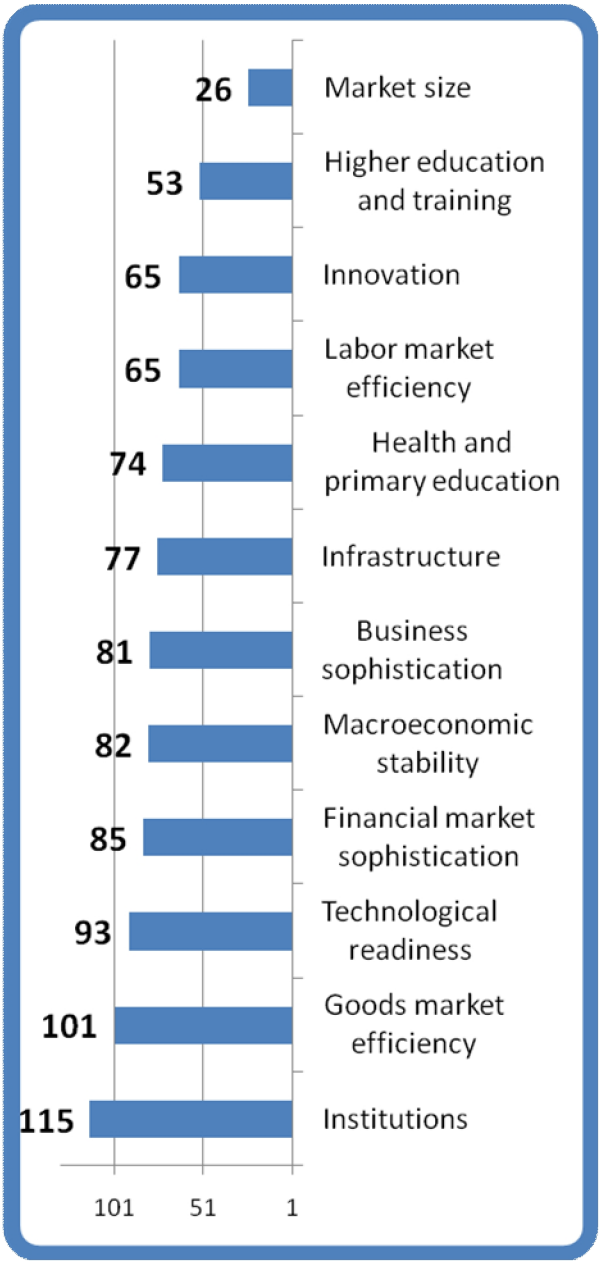


Global Competitiveness Index by World Economic Forum, Davos, Switzerland

The ranking of countries by their competitiveness was initiated by the World Economic Forum (WEF) in Davos, Switzerland, in 1979. Ukraine has been rated since 1997. Countries' global competitiveness rankings are formed according to the main development indices, which were 9 before 2007 and 12 after 2007. The latest report on global competitiveness includes information on 131 countries of the world. The report is published each fall and presents rankings for the publication year and the following year. The 2007-2008 index rated Ukraine 73rd, which is down from the previous year (69th rank, considering methodological adjustments made by WEF and an increased number of rated countries from 125 to 131). Comparing the rankings of 53 countries rated in 1997, Ukraine's worst rankings (53rd) were in 1998 and 2000 when it rated last, and the best (47th) rating position was in 2006-2007.

The 2007-2008 WEF report positively states that Ukraine is making a gradual transition to a development stage where competitiveness is determined less by availability of natural and other resources, such as production factors, than by their more efficient utilization.

Ukraine in WEF scoreboard



WEF Scoreboard

1	USA ●	43	Bahrain ●	87	Guatemala ●
2	Switzerland ●	44	South Africa ●	88	Libya ●
3	Denmark ●	45	Latvia ●	89	Namibia ●
4	Sweden ●	46	Italy ●	90	Georgia ●
5	Germany ●	47	Hungary ●	91	Serbia ●
6	Finland ●	48	India ●	92	Pakistan ●
7	Singapore ●	49	Jordan ●	93	Armenia ●
8	Japan ●	50	Barbados ●	94	Macedonia ●
9	Great Britain ●	51	Poland ●	95	Niger ●
10	Netherland ●	52	Mexico ●	96	Dominic Rep. ●
11	Korea ●	53	Turkey ●	97	Moldova ●
12	Hong Kong ●	54	Indonesia ●	98	Venezuela ●
13	Canada ●	55	Cyprus ●	99	Kenya ●
14	Taiwan ●	56	Malta ●	100	Senegal ●
15	Austria ●	57	Croatia ●	101	Mongolia ●
16	Norway ●	58	Russia ●	102	Gambia ●
17	Israel ●	59	Panama ●	103	Ecuador ●
18	France ●	60	Maurice ●	104	Tanzania ●
19	Australia ●	61	Kazakhstan ●	105	Bolivia ●
20	Belgium ●	62	Uzbekistan ●	106	Bosnia & Herz. ●
21	Malaysia ●	63	Costa-Rica ●	107	Bangladesh ●
22	Ireland ●	64	Morocco ●	108	Benin ●
23	Iceland ●	65	Greece ●	109	Albania ●
24	New Zealand ●	66	Azerbaijan ●	110	Cambodia ●
25	Luxemburg ●	67	Salvador ●	111	Nicaragua ●
26	Chili ●	68	Vietnam ●	112	Burkina-Faso ●
27	Estonia ●	69	Columbia ●	113	Surinam ●
28	Thailand ●	70	Sri-Lanka ●	114	Nepal ●
29	Spain ●	71	Philippines ●	115	Mali ●
30	Kuwait ●	72	Brazil ●	116	Cameroon ●
31	Qatar ●	73	**Ukraine** ●	117	Tajikistan ●
32	Tunic ●	74	Romania ●	118	Madagascar ●
33	Check Republic ●	75	Uruguay ●	119	Kirgizia ●
34	China ●	76	Botswana ●	120	Uganda ●
35	S. Arabia ●	77	Egypt ●	121	Paraguay ●
36	Puerto-Rico ●	78	Jamaica ●	122	Zambia ●
37	UAE ●	79	Bulgaria ●	123	Ethiopia ●
38	Lithuania ●	80	Syria ●	124	Lesotho ●
39	Slovenia ●	81	Algeria ●	125	Mauritania ●
40	Portuguese ●	82	Montenegro ●	126	Guiana ●
41	Slovakia ●	83	Honduras ●	127	Timor-Leste ●
42	Oman ●	84	Trinidad &T. ●	128	Mozambique ●
		85	Argentina ●	129	Zimbabwe ●
		86	Peru ●	130	Burundi ●
				131	Chad ●
1		2		3	

● countries on innovative stage of development ● countries on efficiency stage of development ● countries on factor stage of development

L.L. Antonyuk, Doctor of Economics, Professor, Vadym Hetman Kyiv National Economic University

WHAT IS UKRAINE LOSING ON?

Despite high economic growth rates, Ukraine has unfortunately failed to enhance its competitiveness. This was confirmed by WEF experts after calculating the global competitiveness index for the past 10 years for all the countries selected for assessment in 2007. During the period, for example, Ukraine lost 21 positions and descended from the 52nd place in 1997 to the 73rd place in 2007-2008, which is four rating positions lower than in the previous year, thus giving way to countries like Lithuania (38th position), Russia (58th), Kazakhstan (61st), Uzbekistan (62nd), Azerbaijan (66th), Vietnam (68th), and Brazil (72nd).

The situation was precipitated by deterioration of all the key sub-indices ("pillars") of the global competitiveness index:

firstly, the ***basic requirements subindex*** by 10 positions to the 90th place (which includes efficient public and private institutions, infrastructure, macroeconomic stability, health and primary education);

secondly, the ***efficiency enhancers subindex*** by 3 positions to the 66th place (which includes higher education and training, goods market efficiency, labor market efficiency, financial market efficiency, technological readiness, and market size); and

thirdly, the ***innovation and sophistication factors subindex*** (which includes business sophistication and innovation).

Pursuant to the WEF methodology, Ukraine is among the countries which ensure international competitiveness "in transition" from the "factor-driven stage" to the "efficiency-driven stage", with companies predominantly competing against each other on the level of prices and deriving their competitive advantages from cheap factors. Low productivity translates to an insufficient level of salaries and the quality of life of the population.

The principal factors playing a decisive role in building up competitiveness at this stage, first and foremost, include ***efficient public and private institutions***, whose index dropped during the period (from the 97th to the 115th position – the lowest Ukraine's result). It was mostly affected by such components as:

– responsibility level (ethical behavior) of firms (128th position);
– transparency of government policymaking (119th);
– property rights (118th);
– strength of auditing and reporting standards (118th);
– efficiency of legal framework (112th);
– intellectual property protection (108th);
– efficacy of government boards (101th).

In terms of ***infrastructure*** (77th position), the rating lost 6 positions over the previous period due to deterioration of the following indices:

– quality of roads (116th position);
– quality of air transport infrastructure (116th).

The macroeconomic stability subindex (82nd position) lost 2 rating positions due to the reduced national discount rate (77th position). There was an improvement in the ***health and primary education*** subindex (74th position), but the weak areas still include the cost of tuberculosis to businesses (110th position) and the prevalence of HIV (104th position), as well as low primary education enrollment rates (106th position).

Factors included in the efficiency enhancers subindex also significantly impact the competitiveness of transition economies, namely ***higher education and training***. According to the index, Ukraine has improved to the 53rd position. Experts specifically refer to this index as a forte and new opportunities for building competitive advantages of the country. The indices that adversely affect its level include personnel training (98th position) and the quality of management education (85th position).

The period witnessed a considerable drop in the ***goods and services market efficiency*** subindex (from the 85th to the 101st position). It was mostly caused by the factors of the scopes and efficiency of taxation scheme (123rd position); trade barriers (123rd); and ineffective anti-monopoly policy (93rd).

Three positions were lost on the labor market efficiency (65th position) due to the deterioration of the relationship between employers and employees index (85th). A dramatic drop was observed in the ***financial market efficiency*** (85th position) which was caused by the deterioration of the financing through local equity market component (93rd) and an extremely low assessment of such indices as the soundness of banks (119th), regulation of security exchanges (115th), and financial market sophistication (90th).

A major deterioration was observed in the ***technological readiness*** ranking (by 7 positions). While by the GCI higher education and training subindex (human capital) Ukraine ranks 53rd, the availability of latest technologies ranks the country 93rd, by which Ukraine fell even behind Pakistan (89th), Kenya (88th) and Senegal (87th), which by the availability of human capital subindex rank 116th, 88th, and 105th respectively. The quantitative assessment of technological readiness is more than twice lower than in the case of Sweden, which leads in this area, and other key innovator countries. Such low ranking of the index was affected by direct foreign investment and technology transfer (106th), the availability of latest technologies (97th), and the adoption of technologies (91st). An evident competitive advantage of Ukraine is its ***market size***, which ranks our country 26th.

Highly competitive countries are at the innovation-driven stage and use higher-level competitive advantages. While ***business sophistication*** ranks Ukraine 81st (76th in 2006-2007), its ***innovative capacity*** earned it 65th position (61st in 2006-2007). Such low rating in terms of business sophistication was caused by the following factors:

– willingness to delegate authority (101st);
– state of cluster development (89th);
– extent of marketing (87th).

The factors that affected the ***innovation*** subindex include the following:

– government procurement of advanced technology products (75th);
– availability of scientists and engineers (70th);
– company spending on R&D (67th);
– university-industry research collaboration (65th);
– quality of scientific research institutions (60th); and
– USPTA utility patents (58th).

A relatively high capacity for innovation remains a competitive advantage in this area – 40th position. There is a major discrepancy between the country's R&D potential and the overall productivity of the national economy caused by low efficiency of the national innovation system in general. Despite all the steps and government programs, there have not yet been created conditions for the country's transition to the "new economy". Thus, when comparing global competitiveness of our country and highly competitive economies, it should be stated that Ukraine desperately needs to speedily take systematic measures and implement structural reforms for an expeditious transition to the innovation-driven stage. This should make the essence of the "Ukrainian breakthrough".

Yuri Poluneev, CCU Chairman, MP of Ukraine, Candidate of Economic Sciences

TECHNOLOGY FOR ECONOMIC BREAKTHROUGH: Competitiveness of the country and identification of priorities

The question of what determines the well-being (success) of a nation has always been in the focus of the economic science and has exerted a strong effect on the economic policy for centuries. In the 20th century, neoclassical researchers emphasized investment in the production capital and infrastructure as the main driving factors of economic growth. As a result, such investment, especially in developing economies, had a limited effect on their well-being. Then, apart from investment in production capital, the stress was made on the education and training system.

Late in the last century, the factors contributing to the well-being of a nation were complemented with such determinants as technological progress, macroeconomic stability, efficacious governance, transparent and efficient institutions, etc. The impact of each mentioned factor on labor productivity (LP) rests on a solid theoretical foundation and empirical evidence. Moreover, to ensure expedited economic growth most of these determinants have to "synergize". Such evolution of the theory of economic growth was continued in professor Porter's works on competitive advantages of a nation and on development of an index to assess countries' competitiveness. In 1979, with the appearance of the first Competitiveness Scorecard, the concept of competitiveness (both of a business and of a country) and the methodology for its analysis have been continuously upgraded to become the most up-to-date trend of the world economic science and political practice in the past twenty years.

A clear dividing line should be drawn between the competitiveness of a company, a branch, and a country. A crucial competitiveness criterion for a company (firm) is long-term growth of its sales, market share, and profits. A competitive branch is characterized by seizing a significant and growing share of the world market through export of high-quality goods and services. The concept of a country's competitiveness has its own peculiarities, as countries cannot disappear under the influence of global competition, like uncompetitive companies. In the narrow sense (value indicators of the foreign economic activities), countries indeed compete on international markets. Heed is paid to such indicators as specific production costs in the processing industry, prices, real exchange rate, i.e. everything that forms price-based competitive positions of domestic branches in the global economy. That is to say, in this sense a country's competitiveness can be viewed as a sum total of international competitiveness capabilities of national exporters. In a broad sense of the "country's competitiveness" category, the main criteria are the indicators which characterize sustainable improvement of the population's living standards. A country's competitiveness (CC) consists in its ability to establish internal and external conditions allowing its enterprises to produce goods and services capable of competing on international markets, and its people to continuously increase their incomes and enhance their quality of life.

Enhancement of a country's overall competitiveness – either gradual or planned by the ruling political elite as a chase (lead) "game"[1] – has to be viewed, in the first place, as an investment project in which results are achieved through targeted, successive over a relatively long period of time[2] and carefully modeled investment in the main factors of sustainable economic growth.

This results in a dynamic growth of labor productivity (LP), innovativeness and environmental friendliness of production (business) processes, incremental creation of added value to science- and knowledge-intensive sectors of economy, i.e. more efficient utilization by the country's economy of the available (and increasingly scarce) production factors, such as natural and human resources, capital and technologies for production of high-quality goods and services. Sustainable LP growth increases salaries and other incomes of the population in a non-inflationary manner, which produces the main result of the "competitive country" project – sustainable growth of the population's real incomes and the quality of life.

The LP level also determines the average level of investment profitability in a country. Since the latter is a fundamental factor influencing the economic growth rate, a more competitive economy will probably grow faster in the mid- and long-term perspective and will be more attractive for direct foreign investment.

Within the "national project" on enhancing competitiveness, investment comes from the two principal sources – the country's state budget and corporate profits. Public investment predominantly targets such sectors as education, re-training, fundamental science and research, as well as infrastructure. Private investment funded through company profits and household savings are funneled to upgrade production assets, train managers and personnel, carry out R&D and innovative activities, etc.

Therefore the world's most respected US school of competitiveness, which virtually considers the state economic policy and the competitiveness enhancement policy to be tantamount, believes that the country's priorities are:

- ✓ to establish and provide a long-term support to a sustainable macroeconomic environment;
- ✓ to eliminate barriers and simplify the regulatory and legislative framework for the private sector;

[1] In our case as a "Ukrainian Breakthrough" towards a competitive country.

[2] It took Finland, for example, almost 20 years to accomplish its breakthrough, following which the country has been unchangingly holding lead positions in international competitiveness ratings.

- ✓ to eliminate barriers for free international trade and movement of capitals; and
- ✓ to create fiscal and economic incentives for channeling private investment to the main structural and infrastructural areas which enhance "natural" competitive advantages of companies and sectors of economy.

The need for Ukraine to select a paradigm of its competitiveness as the main signpost of the long-term strategy is fully confirmed by the philosophy and focus of the Lisbon Strategy of the European Union, participation in which currently is an almost commonly acknowledged priority for our country.

The Technology for Economic Breakthrough (TEB) is a methodology designed by the author to transform a detailed analysis of international competitiveness ratings (in this case, the IMD rating) into a comprehensive approach to working out a long-term strategy of a country's development.

TEB has the advantage of supplying the main areas and measures of economic and social policy with internationally measured statistical indicators and expert assessments on the one hand, and on the other, with a system of comparison built on the most important indicators with a group of reference countries and identification of strategic milestones based thereon. For the first time, the elements of such a "competitive-comparative" approach were implemented by the Council on Competitiveness of Ukraine in the previous issue of the "Competitiveness Monitor".

The economic breakthrough must be based on a consistent elimination of the country's critical gaps in the institutional and regulatory environment and development of the main factor markets (capital, labor, land, etc.), on intensive establishment of knowledge-economy principles, on ensuring sustainable development conditions (i.e. building up responsible competitiveness) and on bolstering social solidarity of the population through the accumulation of social capital.

TEB, which is based on the IMD methodology and uses indicators resorted to by such international organizations and agencies as the World Bank, UN ECE, UNIDO, OECD, Dow Jones, Account Ability and others, is the first to set a four-matrix system of state policy influence – through "direct action indicators" (DAI) and "indirect action indicators" (IAI) – on a country's competitiveness in the mid- and long-term perspective.

DAI include indicators which have a statistical and an assessment level, and which can immediately change under the influence of decisions by public authorities (legislative and regulatory acts, budget allocations, state investment programs and interventions, other decisions and measures, etc.). IAI include indicators and expert assessments that are an integrated result of both DAI and other factors which, as a rule, characterize macroeconomic trends and structural changes.

The Technology for Economic Breakthrough as a methodological approach to identifying components of the national development strategy consists of four interrelated phases, which, at different stages, must involve not only government agencies and relevant state power institutions, but also the expert environment, representatives of science and education, civil society and business.

Phase One is Quantification: a detailed professional analysis of the country's IMD competitiveness rating, organization of public debates and discussions of the rating, identification of current values and the history of the main direct and cumulative action indicators in the context of four TEB matrices.

Phase Two is Orientation: identification of reference countries and/or international "benchmarks" (for example, the system of EU structural indicators) and comparison of the country's direct and indirect (cumulative) action indicators with the relevant indicators for the reference countries to identify critical gaps.

Phase Three is Navigation: expert analysis of the best international practices on closing similar gaps and implementation of relevant structural reforms (both content- and time-wise), development – on this basis and with account for "Ukrainian peculiarities" – of the system of critical milestone objectives (strategic benchmarks) and optimum motion path (OMP) to eliminate the gaps and achieve the set indicator levels. This process must be supported with the country's motion path developed by experts in pursuance of the prescribed indicators, and with policy mix alternatives which must ensure their achievement, provided there is successiveness of power and "heredity" of milestone objectives from government to government and their accomplishment within the time set.

Phase Four is Consensualization: public concurrence of the optimum motion paths.

Today, however, it has become clear that Ukraine's quality breakthrough in competitiveness depends not only and not so much on a correctly drafted government development strategy or its drafting technology, but rather on strengthened social capital and social consolidation of society. It also depends on adoption of a truly uniting and pragmatic national idea[3] in the country and on constructive interaction of all stakeholders to the long-term investment project the "Competitive Country".

Such stakeholders include employers (business), employees, the authorities, science and education, and civil society at large. Therefore, establishing a platform for regular strategic consultations and achieving a consensus on strategic objectives and optimum development motion paths must become important tools for achieving a consensus on the milestone development objectives[4].

[3] The Council on Competitiveness of Ukraine (www.compete.org.ua) promotes the country's competitiveness in the global knowledge economy as a national idea capable of consolidating the country.

[4] The National Strategic Assembly established under Yu. Tymoshenko's government could, in certain situations, become a platform for consensualization.

TECHNOLOGY FOR ECONOMIC BREAKTHROUGH:

	Factors	Direct Action Indicators (DAI)	Cumulative Action Indicators (CAI)
CRITICAL GAP FIX	Macroeconomic dynamic	Final public and private consumption Public and private capital investment	Real GDP growth and forecast Unemployment rate and forecast
	Public finance management	Budget deficit Public expenditure Total tax revenue Fiscal policy influence on business competitiveness	Consumer price index and forecast Growth in entrepreneurship, small and medium business
	Financial policy	Real interest rate National currency stability Currency exchange policy influence on business competitiveness and economic growth	Currency exchange policy influence on private business competitiveness Capital cost and business activity
	Promotion of foreign direct investment (FDI) and export	State support to exporters Positive country image abroad	Trade condition index Current account balance Foreign direct investments Country credit rating Country investment risk (EUROMONEY)
	Banking sector efficiency	Banking regulation influence on business competitiveness National bank efficiency in transparency of banking system	Banking sector assets Spread level Banking retail
	Capital market sophistication	Regulation policy influence on openness of financial institutions Equity holder right protection	Stock exchange Capital market availability to domestic companies Venture capital sophistication
	Labor market regulation	Law efficiency in hiring and sacking employees Unemployment legislation Immigration legislation Remuneration in industry and service Average working hours	Labor market size Part time employment
	Economy openness	Protectionism in economy Availability of state contract for foreign companies Trade facilitation and customs Availability of major equity share for foreign investors	International transaction freedom
	Regulatory environment	Business regulation Regulation on goods and services State control on prices	Ease of doing business Ease of new business creation
	Competition	Budget subsidies to enterprises Legislation efficiency in open competition	Parallel economy size
	Government and institution effectiveness	Policy direction of the government Efficiency in government decision execution Judicial power efficiency Corruption and bureaucracy Protection of private freedom and property	Risk of political instability Legislation and regulatory environment influence on business competitiveness
	Government influence on business effectiveness	State control on business management and owners International standards in audit and accounting practice	Business flexibility and adaptability Large business efficiency Small and medium business efficiency Financial management efficiency in companies
	Development of basic infrastructure	Public financing in transport infrastructure Basic IT sophistication	Transportation infrastructure influence on business facilitation Transport infrastructure intensity Quality of telecommunication system
COHISION	Social cohesion	Unifying ideas and principles in society Attitudes toward market reform and democracy	Ethnic, cultural, historical and ideological breaks
	Income differentiation	Income distribution – lowest 20% Income distribution – highest 20%	Aggression level in society, its influence on business
	Gender issues	Men –Women ratio	Discrimination in society Gender parity
	Value system	Attitude toward globalization B Unhealthy life style in media Attitude toward country competitiveness	National culture openness to modern foreign ideas People adaptability to changes

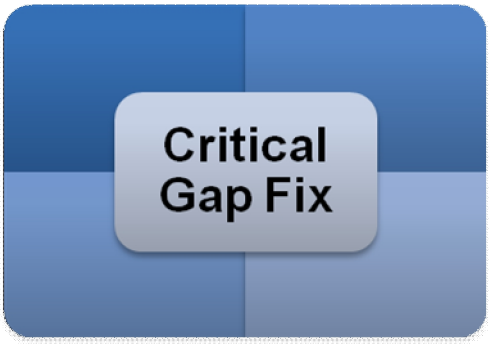
FACTORS AND INDICATORS

Factors	Direct Action Indicators (DAI)	Cumulative Action Indicators (CAI)	
Scientific development	Total expenditure on R&D Basic research Legislative and administrative support to R&D Intellectual right protection	Business expenditure on R&D R&D personnel R&D personnel in business enterprises Scientific degrees Scientific articles Nobel laureates	KNOWLEDGE BASED ECONOMY
System of education	Public expenditure on education Educational system and needs of business community University education and needs of competitive economy Pupil-teacher ratio in primary and secondary school Language skill	Population with secondary education Population with higher education Quality of education Literacy Economic literacy Education in finance	
Management practice	Competent senior managers Skilled labor Priority of training	Entrepreneurship Foreign high-skilled people Marketing and sales practice Attracting and retaining foreign high skilled people Brain drain	
Innovation and new technology	Share of high technology export Legislative support to new technologies State regulation in high tech sector Availability of financing for technological development	Qualified engineers at labor market Technology transfer between university and companies Technological cooperation between companies Patent activity Patent productivity	
Technological infrastracture	Internet users Broadband subscribers Cyber security	Mobile phone contracts Mobile phone prices Computers in use Internet costs Broadband costs	
Quality of life	Urbanization level	General assessment of life quality UN human development index Age dependency ratio	SUSTAINABILITY
Efficiency of health care system	Expenditure on health care Medical infrastructure	Life expectancy at birth Health problems and business Medical infrastructure and society needs	
Environment protection	Priority of sustainable development for government Ecological legislation and business CO_2 emission level	Pollution problems in economy Paper reprocessing Water reprocessing	
Energy efficiency	Priority of energy efficiency for government	GDP intensity	
Energy security	Energy infrastructure efficiency Energy prices for industry	Energy production and consumption Primary energy import	
Quality of products and services	Products with international quality standards Consumer rights protection Priority of population needs and interests for government	Practice of international standardization	
Responsible competitiveness	Intention of company' management and owners to health, job condition and ecological issues	Social responsibility and ethic of business enterprises Credibility of managers Corporate values and personnel needs	

TECHNOLOGY FOR ECONOMIC BREAKTHROUGH:

Technology for Economic Breakthrough (TEB) is based on:

A four-matrix system allowing the government policy to influence Ukraine's competitiveness and consisting of statistical indices or expert opinions (used by such international organizations and agencies as the World Bank, UN ECE, UNIDO, OECD, IMD, WEF) and subdivided into **direct action indicators** and **indirect action indicators**.



The first TEB component is the Critical Gap Matrix, which is a set of measures that positively impact macroeconomic fundamentals, quality of public institutions, efficiency of state regulation of main markets (capital, labor, land, and intellectual property) and supporting institutions, as well as openness of economy and efficiency of competitiveness.

TEB's main area. The society's efforts and resources should be focused on investment, which form foundations for the knowledge based economy and facilitate accumulation of the intellectual capital (IC).

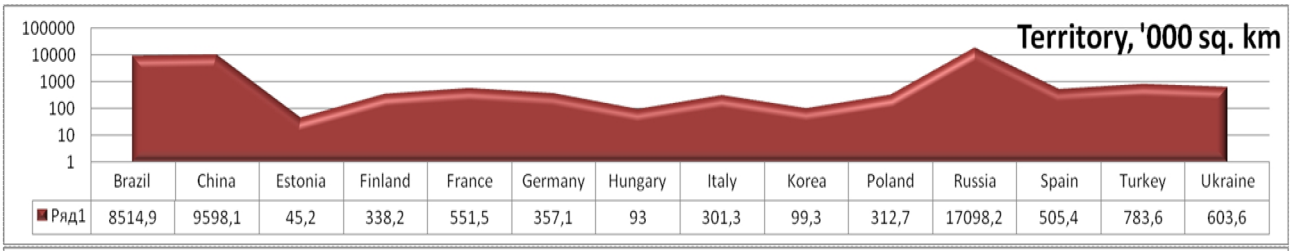
The matrix provides for integrity and harmony of the economic, social, and ecological systems, reproducibility of processes in all components of a country's development, and matching the standard indicators of sustainable development.

A combination of indicators which show the availability of a system of social values, their impact on a country's institutional environment, and ways and means of achieving a value consensus.

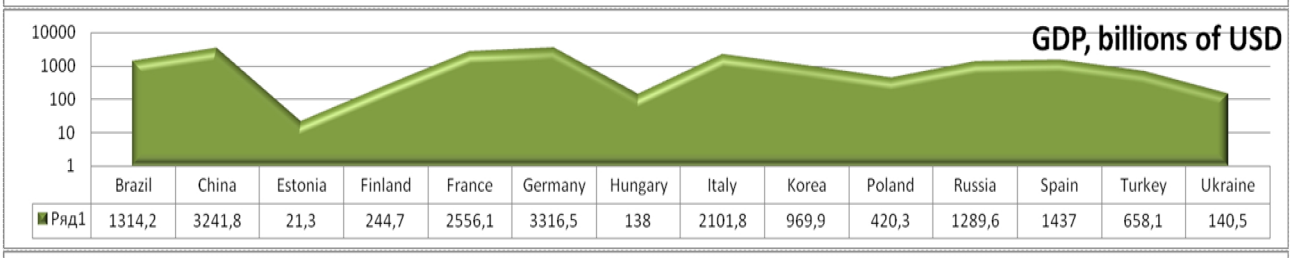
Fundamentals

A system of comparison by individual most critical indicators with a group of countries which may become benchmarks for emulation and competition.

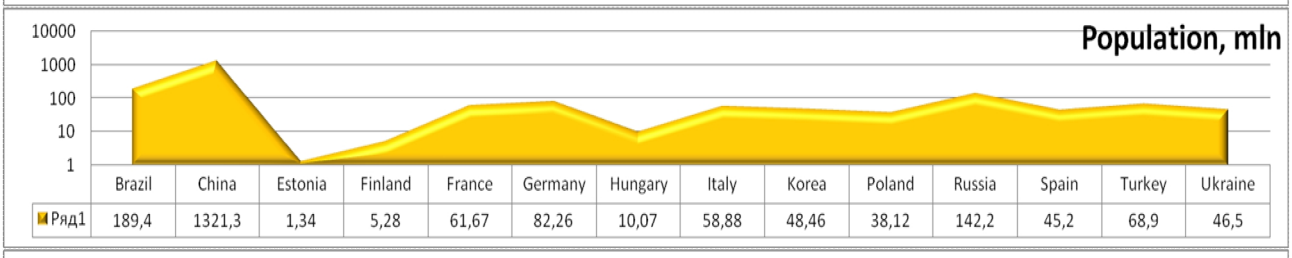
Benchmark Countries and Ukraine in 2007♣



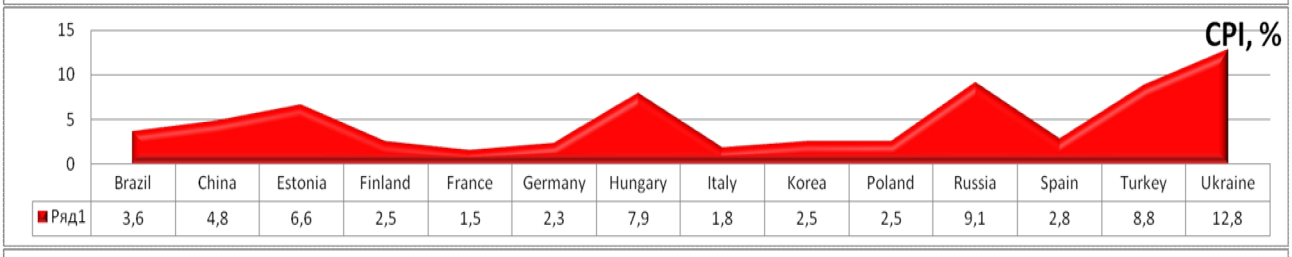
	Brazil	China	Estonia	Finland	France	Germany	Hungary	Italy	Korea	Poland	Russia	Spain	Turkey	Ukraine
Ряд1	8514,9	9598,1	45,2	338,2	551,5	357,1	93	301,3	99,3	312,7	17098,2	505,4	783,6	603,6



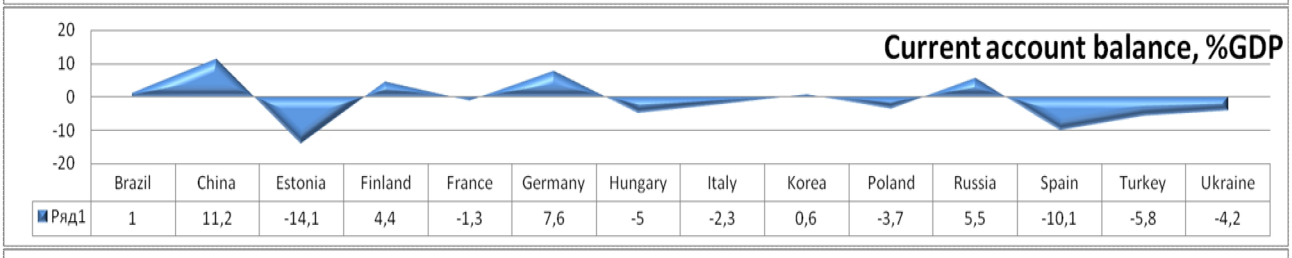
	Brazil	China	Estonia	Finland	France	Germany	Hungary	Italy	Korea	Poland	Russia	Spain	Turkey	Ukraine
Ряд1	1314,2	3241,8	21,3	244,7	2556,1	3316,5	138	2101,8	969,9	420,3	1289,6	1437	658,1	140,5



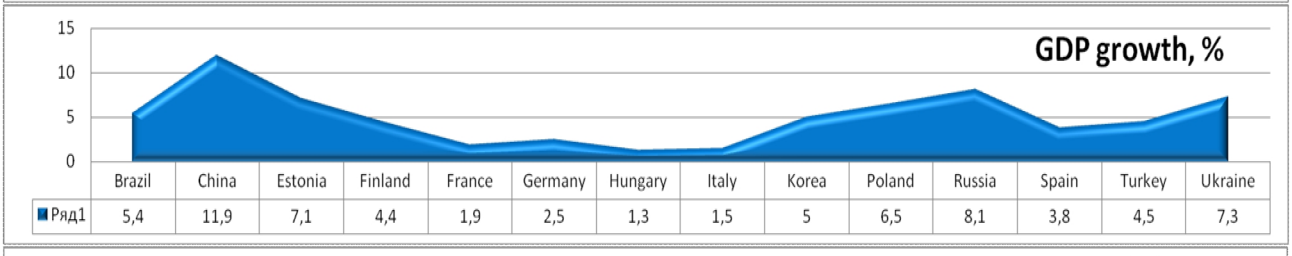
	Brazil	China	Estonia	Finland	France	Germany	Hungary	Italy	Korea	Poland	Russia	Spain	Turkey	Ukraine
Ряд1	189,4	1321,3	1,34	5,28	61,67	82,26	10,07	58,88	48,46	38,12	142,2	45,2	68,9	46,5



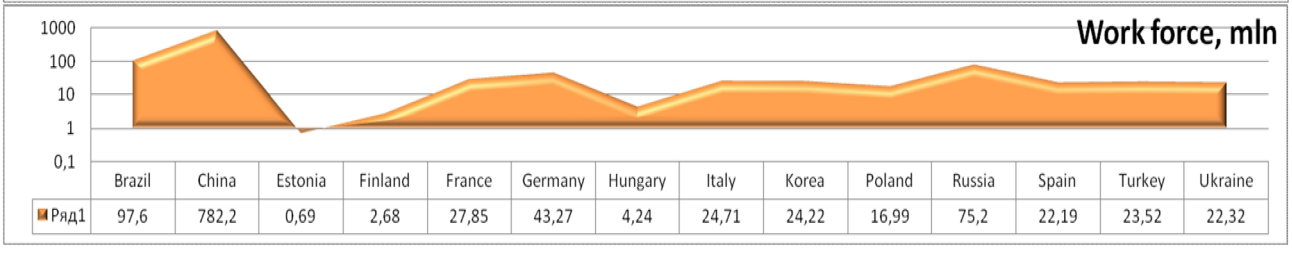
	Brazil	China	Estonia	Finland	France	Germany	Hungary	Italy	Korea	Poland	Russia	Spain	Turkey	Ukraine
Ряд1	3,6	4,8	6,6	2,5	1,5	2,3	7,9	1,8	2,5	2,5	9,1	2,8	8,8	12,8



	Brazil	China	Estonia	Finland	France	Germany	Hungary	Italy	Korea	Poland	Russia	Spain	Turkey	Ukraine
Ряд1	1	11,2	-14,1	4,4	-1,3	7,6	-5	-2,3	0,6	-3,7	5,5	-10,1	-5,8	-4,2



	Brazil	China	Estonia	Finland	France	Germany	Hungary	Italy	Korea	Poland	Russia	Spain	Turkey	Ukraine
Ряд1	5,4	11,9	7,1	4,4	1,9	2,5	1,3	1,5	5	6,5	8,1	3,8	4,5	7,3

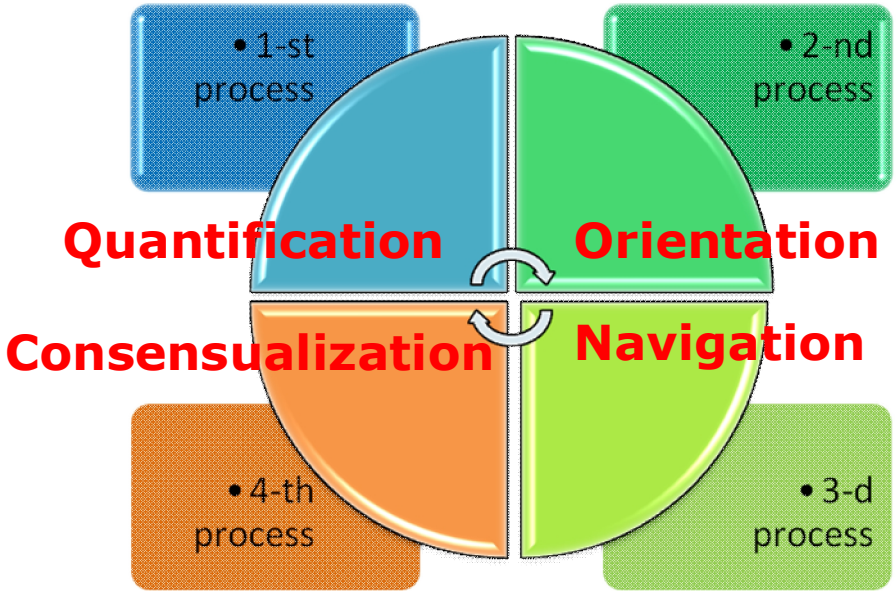


	Brazil	China	Estonia	Finland	France	Germany	Hungary	Italy	Korea	Poland	Russia	Spain	Turkey	Ukraine
Ряд1	97,6	782,2	0,69	2,68	27,85	43,27	4,24	24,71	24,22	16,99	75,2	22,19	23,52	22,32

TECHNOLOGY FOR ECONOMIC BREAKTHROUGH:

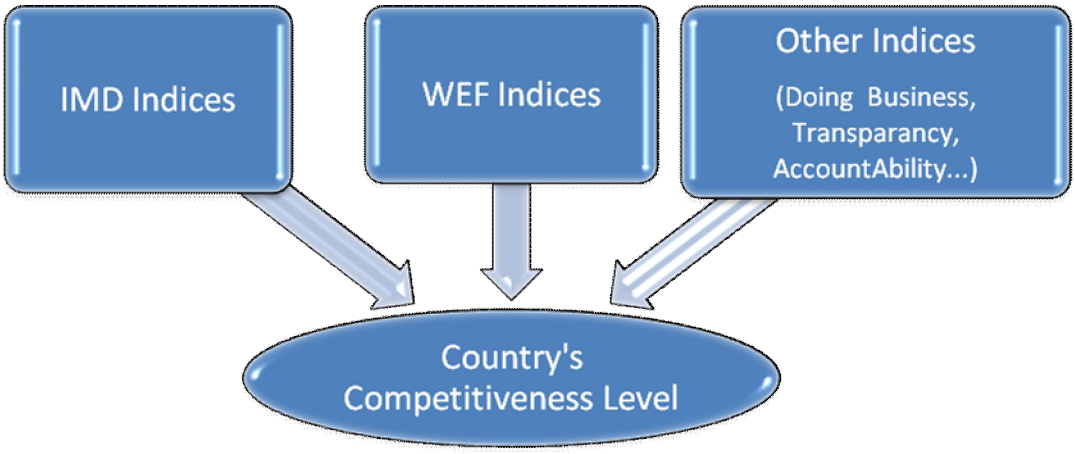
Objective
of the Technology for Economic Breakthrough:

Enhance the country's competitiveness by allowing the state to positively influence the key competitiveness parameters

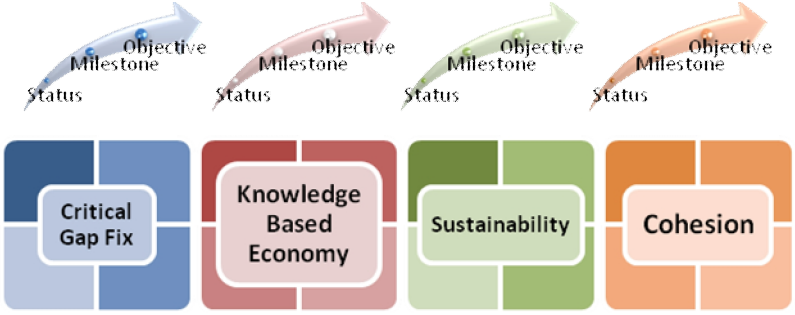


Analytical Stages of TEB

Stage 1: Identify the current level of the country's competitiveness (in a simplified model – pursuant to IMD competitiveness rankings)



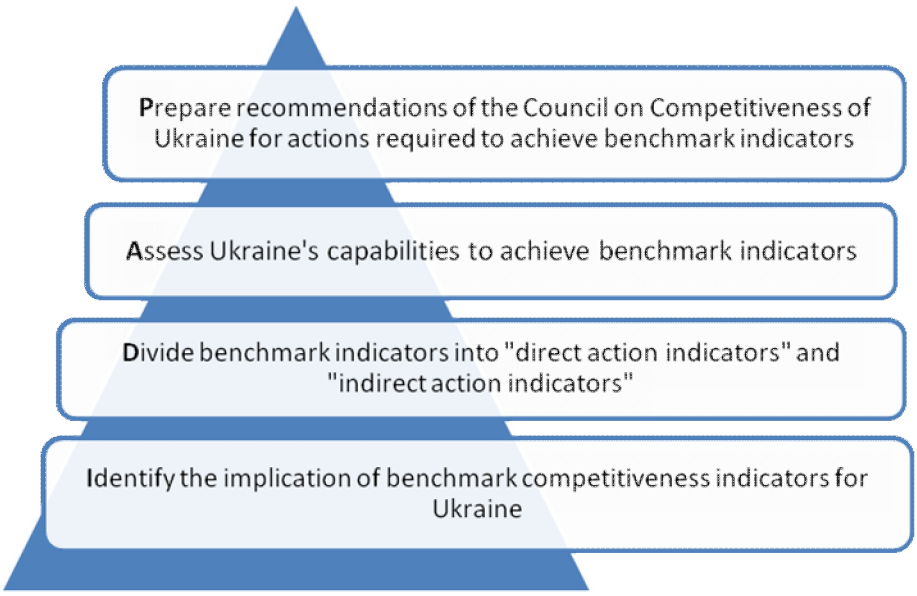
Stage 3: Each indicator is to be reviewed in the context of benchmark countries (a simplified model uses an integrated list of benchmark countries by all indicators). For each indicator identify a milestone (a short-term goal), an objective (a long-term goal – a consensus indicator), and deadlines for accomplishing the values.



How it works?

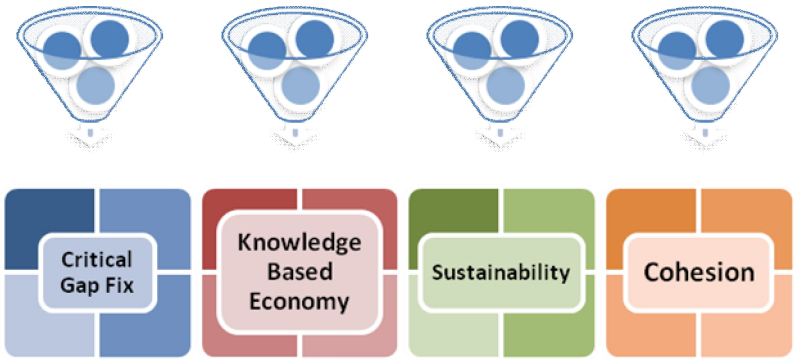
Mission
of the Technology for Economic Breakthrough:

Identify the place of Ukraine on the world competitiveness map and make assessment of competitiveness enhancement possibilities

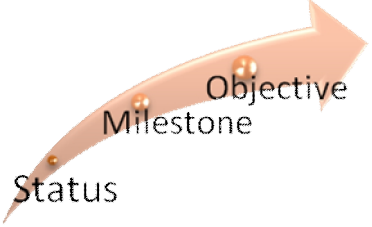


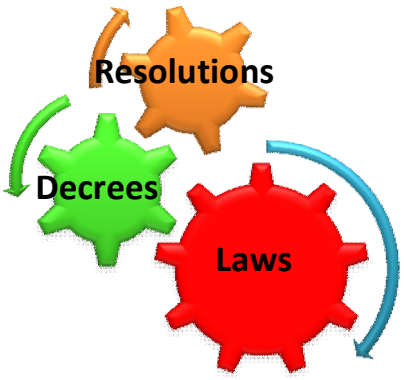
Implementation

Stage 2: Indicators which characterize socio-economic development of society are distributed among four matrices, each with its own constituents – matrix factors



Stage 4: For each indicator group (each matrix factor) recommendations on actions of public authorities are determined as a function of benchmark values and accomplishment deadlines.





Sample Analysis of Technology for Economic Breakthrough

● – direct action indicators
● – indirect action indicators
EO – expert opinion, points

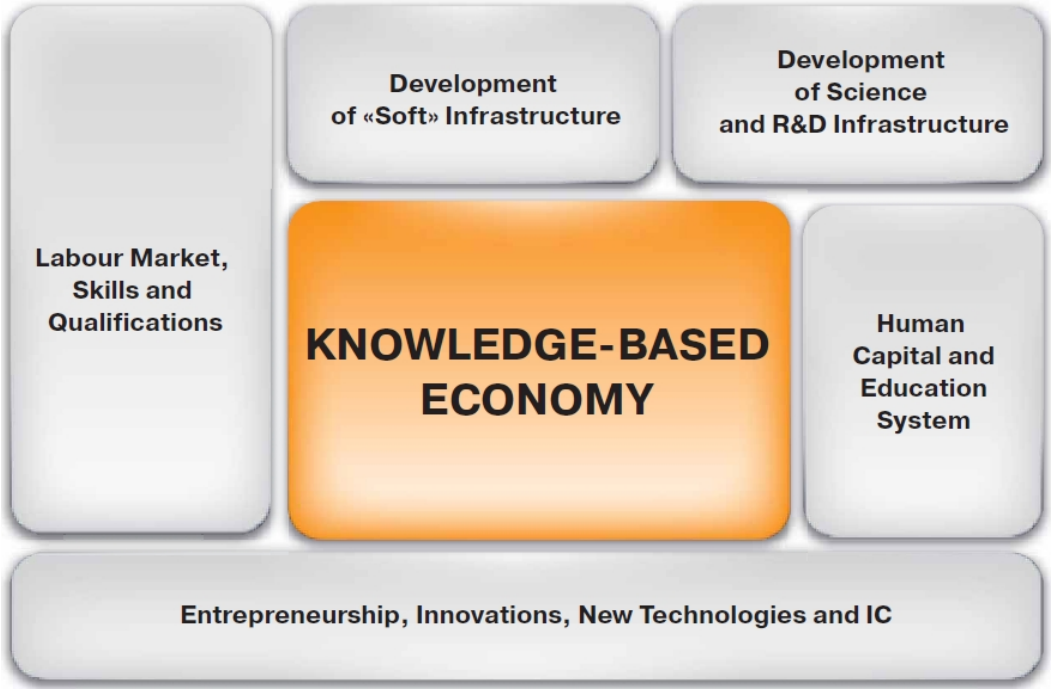
		Benchmark countries			IMD rating leaders	Ukraine		
		Min.	Avg.	Max.		Status 2008	Milestone 2010-2012	Objective 2013-2015
●	Legislative support for research, EO	3.3	5.06	6.8	8.7	2.7	5.0	7.0
●	Legislative support for development and implementation of technologies, EO	4.7	5.9	7.2	8.7	5.0	7.0	7.0
●	Level of fundamental research, EO	3.3	5.3	7.6	8.5	4.7	7.0	8.0
●	R&D expenditure, GDP %	0.6	1.5	3.5	4.5	0.9	2.0	3.5
●	Private R&D expenditure, GDP %	0.2	1.0	2.5	3.5	0.6	1.2	2.0
●	Sufficiency of funding for technological development	3.6	5.0	6.9	8.3	3.6	5.5	8.0
●	Company-to-company technological collaboration, EO	4.3	5.4	6.9	7.7	4.1	6.5	7.0
●	University-industry technological collaboration, EO	2.5	4.2	6.0	6.9	2.6	5.5	7.0
●	Employment in R&D, thousand	49.3	312	1502	1502	161	180	200
●	Number of scientific publications	430	13,165	44,100	205,320	2,105	3,000	5,000
●	High-tech exports as percentage of total exports	1.5	14.5	32	67.7	3.3	8.0	20.0
●	Patent activity, patens per 100 thousand population	14	229	965	5,605	69	150	400
●	Patent productivity, patents per 1000 employed in R&D	2	63.7	348	348	154	250	300
●	Expenditure on education as percentage of GDP	2.4	4.7	6.2	8.3	6.2	7.0	8.0
●	Expenditure on education, USD per capita	42	838	2,256	4,652	143	500	1000
●	Conformity of education system, EO	2.4	4.41	7.7	8.2	3.4	5.0	6.0
●	Conformity of university education system, EO	3.4	4.75	7.3	8.2	3.6	5.0	7.0
●	Labor force, employment, and registered unemployment, mln	0.7	83.4	782.2	782.2	22.3	24.0	26.0
●	Labor force as percentage of population	34.1	48.2	59.5	73.9	48.0	50.0	60.0
●	Part-time employment as percentage of population	2.7	10.6	21.9	35.5	6.2	7.0	10.0
●	Labor force growth, annual %	-0.2	0.8	2.8	12.3	0.4	2.0	2.0
●	Average wage, USD/year	1.1	12.5	34.2	0.3	1.7	10.0	30.0
●	Sufficiency of qualified personnel, EO	2.4	4.7	6.0	6.8	3.9	5.0	7.0
●	Priority of qualifications development, EO	4.2	5.6	6.9	8.2	4.7	6.0	8.0
●	International experience of managers, EO	3.6	4.9	6.4	7.9	4.7	6.0	7.0
●	Attractiveness of business environment for highly qualified international employees, EO	3.0	4.6	5.4	9.0	4.3	5.5	7.0
●	Impact of brain drain, EO	2.3	4.4	6.5	7.4	2.8	4.4	7.0
●	Treatment of talent, EO	4.0	6.13	7.7	8.33	5.9	6.5	8.0
●	Number of mobile network subscribers per 1000 population	353	937	1351	1516	1068	1400	1500
●	Cost of mobile call, USD per 1 min local call	0.07	0.28	0.71	0.01	0.14	0.07	0.05
●	Number of Internet users per 1000 population	129	446	747	787	215	400	750
●	Cost of Internet use, USD per 20 dial-up hours	7.4	15.0	31.7	1.8	7.7	7.0	7.0
●	Cost of broadband Internet use, USD per month of high-speed Internet (100 kbit/sec)	0.03	4.04	28.1	0.03	1.44	1.00	0.80
●	Priority of sustainable development, EO	4.6	6.1	7.4	7.7	5.7	6.5	7.0
●	Amount of CO_2 emissions per USD 1 million of GDP	182	1,020	2,020	121	5,086	3,000	2,000
●	Dependence on import of energy sources, % of total supply	-83.2	40.1	85.1		43.5	40.0	30.0

Matrices: Knowledge-Based Economy and Sustainability

Develop and adopt a strategy for innovative development of Ukraine for the period of 2009-2014.	●
Expedite building up of the national innovation system which has to function both on the regional and industry level.	●
Legislatively identify priority areas of science and technology development which will become future growing points.	●
Ensure increased collaboration on international R&D projects.	
Establish a system for funding innovation activities – from all possible sources: first of all, from private and public venture funds.	●
Ensure legislative regulation of financial incentives for R&D expenditure.	●
Stimulate acquisition of new technologies.	
Adopt a law on small innovation companies and venture capital funds, and provide them with a system of government guarantees and incentives at early stages of their life cycle.	●
Adopt the law "On Technological Clusters in Ukraine" and develop cluster initiatives.	●
Made amendments to the Law "On Higher Education" to implement mechanisms of university-industry partnership and joint patenting of their research results.	●
Restructure state-owned industry research institutes: transfer them to the system of the National Academy of Sciences, Ministry of Education and Science, industry public monopolies, or sell.	●
Create a motivation system for creative activities of researchers and engineers.	
Ensure inclusion of lead national universities and research institutions to international quotation systems, for example, EPSCO.	●
Legislatively identify mechanisms of granting loans to the high-technology sector, patenting of inventions abroad, and promotion of products on international markets.	●
Strengthen the requirements of the law "On Copyright".	●
Establish a public databank on domestic and international patents in Ukraine with free access to information.	●
Stimulate patenting by business entities in international patenting organizations.	
Legislatively ensure increased financial and economic independence of national universities.	●
Stimulate development of education by priority areas of innovative development, including vocational and technical education.	●
Establish a national rating system by quality of education at all educational institutions and ensure participation in international rating systems.	
Establish a system for encouraging work with talented children.	
Stimulate increased international competitiveness of national universities.	●
	●
Stimulate employers towards part-time employment and employment of highly qualified retirement age professionals.	●
Encourage development of novel social partnership forms to resolve issues of employment and labor remuneration.	●
Introduce a system of hourly pay and a system of monitoring labor productivity.	
Regulate relations between the system of compulsory pension insurance and the tax system.	●
	●
Introduce a progressive taxation system of citizens' incomes with a simultaneous reduction in the lower tax rate margin.	●
Improve the methodology of identifying the minimum cost of living by accounting for regional differences in prices for goods and services, as well as subsistence expenses in general.	●
Ensure improved social status of high-qualified education employees by priority areas of innovative development.	
Stimulate employers to enhance employees' qualifications by priority areas.	●
Take system measures to bring foreign and Ukrainian high-class professionals to Ukraine's economy (e.g., establishment of registered technological parks, simplified nostrification of foreign degrees in Ukraine, etc.).	●
Promote funds designed to support talented youth and guarantee free education to winners of all-Ukrainian and participants of international academic competitions at Ukraine's lead universities.	●
	●
Provide state support to building up modern information and communication technologies, namely networks of telecommunication centers in rural areas.	●
Advance the establishment of national information systems in the spheres of health care, education, science, culture, environment protection, and business administration (in the regulatory and taxation systems).	●
	●
	●
	●
Develop and adopt a National Strategy for Sustainable Development of Ukraine and ensure its implementation in the context of the National Strategy of Innovative Development and the Energy Strategy.	●
Ensure approximation of Ukraine's environmental legislation to norms and standards of advanced countries.	●
Develop and implement a system for Ukraine's international trade in environmental quotas based on the Kyoto Protocol principles.	
Determine and ensure implementation of the Energy Strategy's funding system.	●
Determine the national policy on electricity tariffs.	

Technology for economic breakthrough

Matrix #2



DEVELOPMENT OF SCIENCE

R&D expenditure

Level of fundamental research

Number of employed in R&D

Private R&D expenditure

INNOVATIONS AND NEW TECHNOLOGIES

High-technology exports

Level of legislative and institutional support for research

Sufficiency of funding for technological development

Degree of technological collaboration

Patent activity and patent productivity

SYSTEM OF EDUCATION

Expenditure on education

Conformity of the education system with the requirements of a competitive economy

LABOR MARKET

Labor force

Part-time employment and labor force growth rate

Share of female labor

Number of foreigners

Hours worked and wages

Skills and qualifications

Attractiveness of business environment

Brain drain

TECHNOLOGICAL INFRASTRUCTURE

Mobile communications

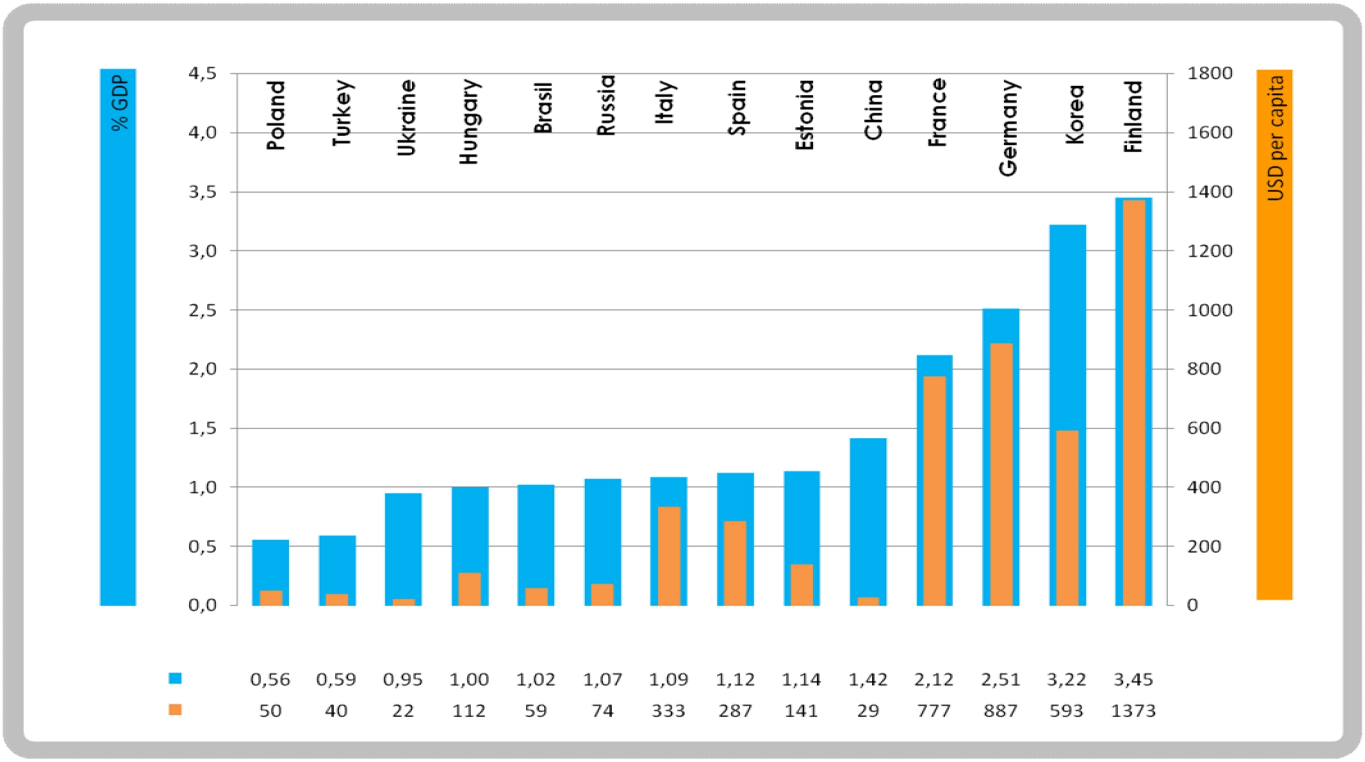
Availability of computers

Use of the Internet

Use of the broadband Internet

EXPENDITURE ON R&D, 2006

0.12 Philippines	0.95 Ukraine 32 (28)	4.48 Israel
1.4 Philippines	22 Ukraine 48 (48)	1,809.4 Sweden
Minimum in IMD Ranking	Ukraine in IMD Ranking 2008 (2007)	Maximum in IMD Ranking



Source: IMD World Competitiveness Yearbook 2008

Expenditure on R&D is a one of the overall criteria which reflects the level of national innovation potential. This criterion is in the range from 2.5% to 4% of gross domestic products in the countries known as key innovators. 55 countries from IMD ranking spent USD 933,5 billions on R&D in 2006. The first five of them including USA, Japan, Germany, France and UK spent 70.2% of total R&D expenditure. This indicator also represents clearly the even character of innovation development in the world. The total R&D expenditure in Ukraine was equal to USD 1 billion or 0.95% of GDP in 2006 (and USD 1.3 bln or 0.93% of GDP in 2007). Sufficient funding on research and development is a necessary condition for effective activity of national innovation system. A majority of economists working in the area of technical development consider funding growth as a key factor for economic development. Dr. F. Sherer, an American scholar, has established "a natural law of technical progress" which means that R&D expenditure should grow faster than GDP. At that an optimal level of R&D funding is equal to 3% of GDP).

NOTA BENE

positive experience of key innovator countries shows that ever more R&D is carried out in the entrepreneurial sector, first and foremost, by large corporations. At the same time, a relative reduction in the share of public expenditure on R&D does not evidence reduced government role in the science and technology sphere. Stepped up government regulation combined with its reduced direct involvement in R&D funding is a legitimate process and a general trend characteristic of all advanced economies. It is triggered, first of all, by improvements in financial mechanisms and administration-and-management systems of innovation processes, and by building up efficient national innovation systems integrated into the global one. R&D trends reveal fundamental differences between countries and regions. The enhancements witnessed in the EU and USA were brought to life by increased public expenditure, while in Japan and other Asian Pacific region economies – by business expenditure.

GLOBAL EXPERIENCE

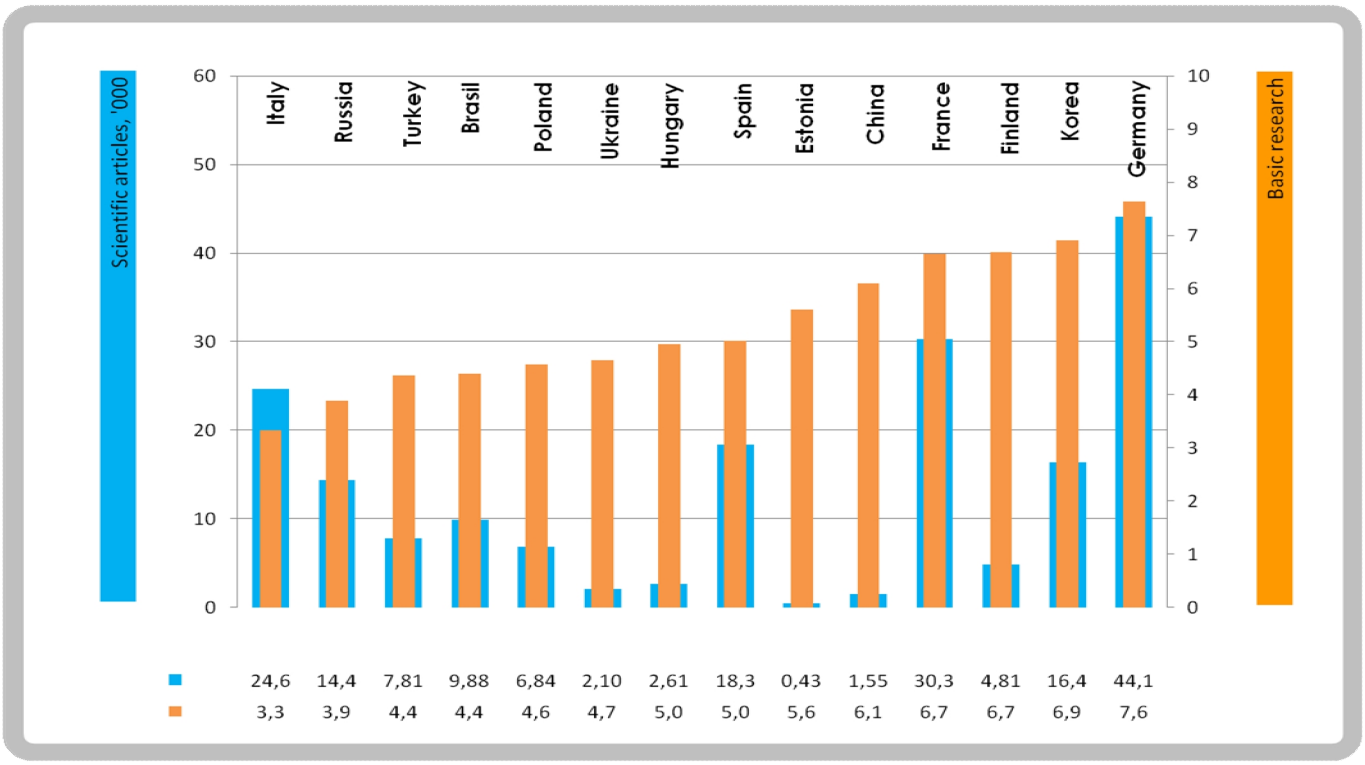
in order to assess the innovative potential of a country, experts resort to an indicator which shows a country's share in the global R&D expenditure. In 2007 the leaders included the United States whose share in the global R&D expenditure was 36.69%, EU – 22.85%, Japan – 20.4%, Germany – 6.58%, France – 4.21%, Great Britain – 3.86%, China – 2.12%, Korea – 1.98%, Canada – 1.97%, Italy – 1.68%, Sweden – 1.42%, the Netherlands – 0.97%, Switzerland – 0.87%, Brazil – 0.86%, Spain – 0.84%, Australia – 0.83%, Israel – 0.80%, Belgium – 0.71%, Finland – 0.59%, Austria – 0.59%, Denmark – 0.56%, India – 0.53%, and Russian Federation – 0.49%. Ukraine accounts for a mere 0.06% of the global expenditure, which testifies to an extremely low level of funding for implementing the innovation-based development model.

High level of funding, however, is mandatory but insufficient. It is for good reason, therefore, that the European Commission assesses the efficiency of countries' national innovation systems using a Global Innovation Index based on such criteria as innovation drivers, knowledge creation, innovation and entrepreneurship, applications, and intellectual property. According to this rating, the global innovation leaders are Finland, Sweden, Switzerland, Japan, Singapore, and the United States.

Source: Global Innovation Scoreboard Report 2006. European Trend Chart on Innovation (MERIT), 2007

SCIENTIFIC ARTICLES & BASIC RESEARCHES, 2008

0.059 Luxemburg	2.105 Ukraine 37 (36)	205.320 USA
3.34 Italy	4.85 Ukraine 42 (29)	8.5 Switzerland
Minimum in IMD Ranking	Ukraine in IMD Ranking 2008 (2007)	Maximum in IMD Ranking



Source: IMD World Competitiveness Yearbook 2008

The number of scientific articles according to the Science Citation Index and Social Science Citation Index
Indicator reflects if level of basic research is sufficient for long-term economic development

According to the expert assessment the level of basic research in Ukraine is two times lower than in benchmarking countries. Ukraine is 42th among 55 IMD ranking countries and far behind the key innovator countries. Ukraine' expenditure on basic research was merely USD 200 mln in 2006 and USD 300 mln in 2007.

GLOBAL EXPERIENCE

The countries with dynamic scientific and technological development as well as with their effective commercial application are in leading places in competitiveness rankings. The main reasons of that are:

Firstly, high level of productivity;

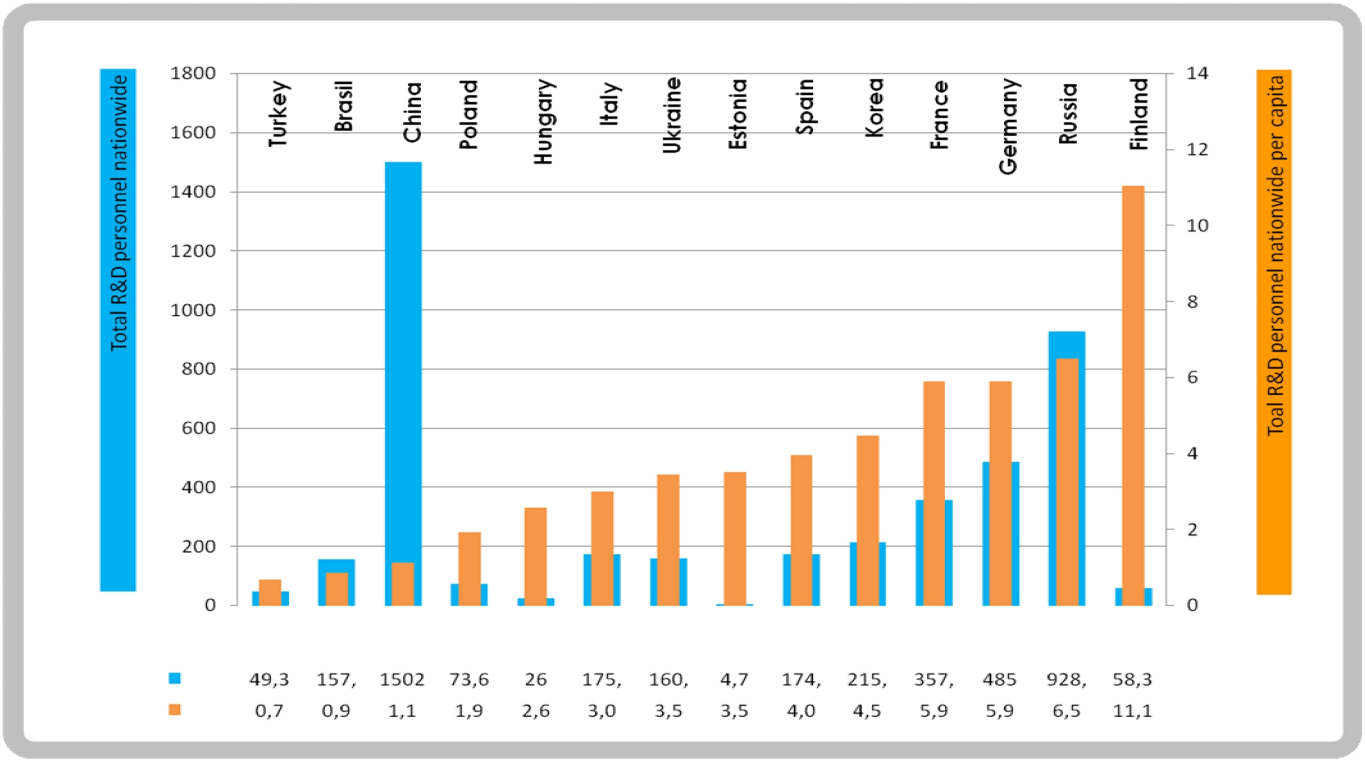
Secondly, ability to react promptly on changes in market conditions, to impact future demand, to renew product proposal, to decrease expenses;

Thirdly, ability to change fundamentally a structure of economy.

An effect is that 80-95% of GDP growth is due to the products made on the new knowledge basis and its implementation in technique, technology, education, and management approaches.

TOTAL R&D PERSONEL, 2006

2.1 Venezuela	**160.8 Ukraine 12 (10)**	**1,502.0 China**
0.08 Venezuela	**3.45 Ukraine 27 (25)**	**11.06 Finland**
Minimum in IMD Ranking	Ukraine in IMD Ranking 2008 (2007)	Maximum in IMD Ranking



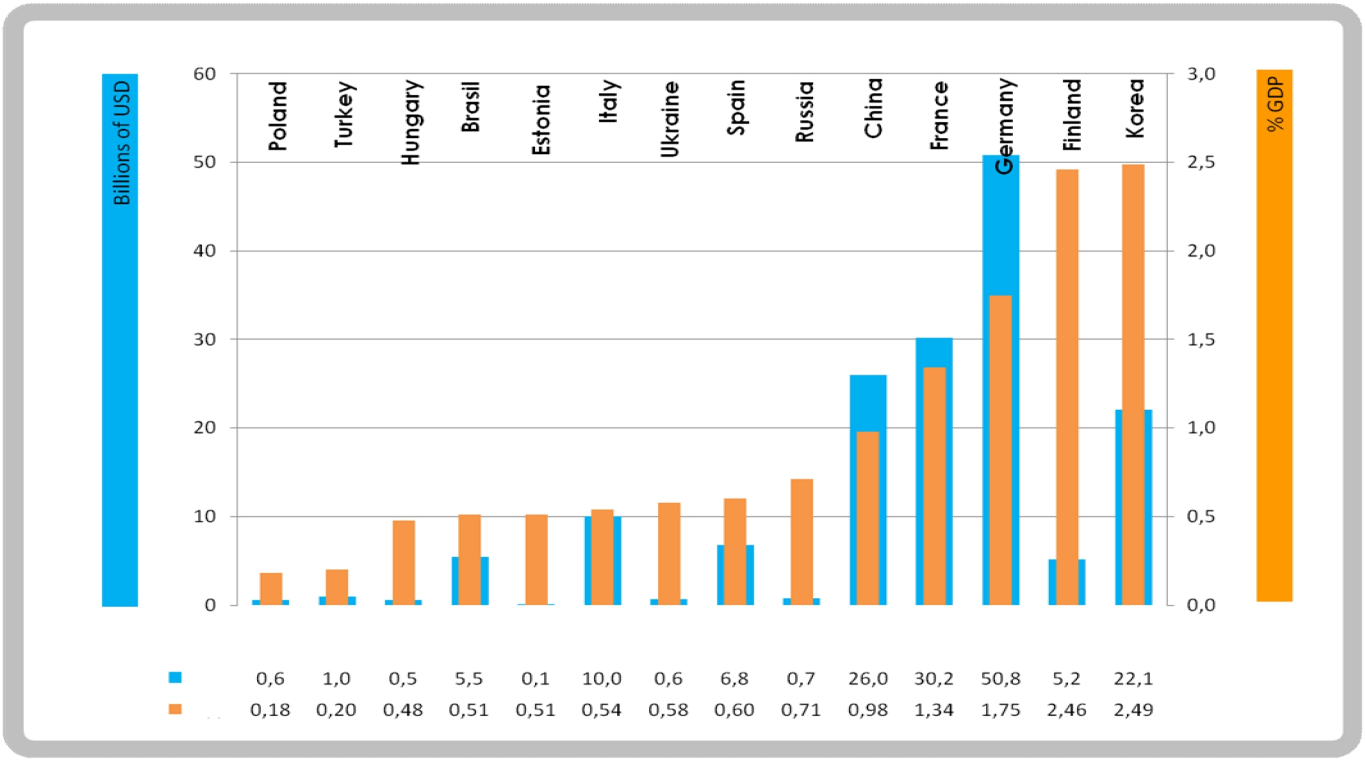
Source: IMD World Competitiveness Yearbook 2008

Ukraine places 27th position among 55 countries far ahead of Italy, China and Brazil by the total R&D personnel per 1000 of population. Due to the low overall effectiveness of national innovation system there is a substantial inconsistency between Ukrainian scientific potential and national economy productivity.

The total R&D personnel was equal to 96820 in 2007, that is three times lower than in 1990, when this factor was equal to 313079. A total Ukrainian R&D personnel was a substantial part of economic structure of former USSR. By those times according to the UNESCO data, Ukrainian share in worldwide R&D personnel was about 7%. Remaining R&D specialist flow-out trend is a serious challenge for the development of innovations in Ukraine.

BUSINESS EXPENDITURE ON R&D, 2006

0.009 Jordan	0.623 Ukraine 33 (31)	241.809 USA
0.04 Peru	0.58 Ukraine 27 (26)	3.46 Israel
Minimum in IMD Ranking	Ukraine in IMD Ranking 2008 (2007)	Maximum in IMD Ranking



Source: IMD World Competitiveness Yearbook 2008

By total level of business expenditure on R&D Ukraine is ahead of Poland and Estonia, which are according to the European Innovation Tabloid belong to the group of catching up countries (Poland) and the group of moderate innovators (Estonia).

By overall level of business expenditure on R&D as a share of GDP Ukraine again is ahead of Poland and Estonia as well as ahead of Turkey, Brazil and Italy, which are also according to the European Innovation Tabloid are in the group of catching up countries and the group of moderate innovators. Ukraine is 27th among 55 countries with average value of 0.91.

GLOBAL EXPERIENCE

Transnational corporations are the most important players in innovative processes. Some experts guess that almost half of total business expenditure on R&D and no less than two thirds of commercial expenditure on R&D belong to transnational corporations. Total business expenditure on R&D at some TNK is much higher than correspondent expenditure of many countries.

RANKING OF COMPANIES BY EXPENDITURE ON R&D, 2005-2007

Name	Country of origin	Sector	Total expenditure, bln of USD		
			2005	2006	2007
Pfizer	USA	pharmaceutical	9,09	9,82	10,61
Toyota Motors	Japan	auto	8,36	8,94	9,4
Ford Motors	USA	auto	8	7,8	7,6
Microsoft	USA	IT	7,01	7,5	8,03
General Motors	USA	auto	6,7	7,02	7,34
Daimler Chrysler	Germany	auto	6,67	7,34	8
Johnson&Johnson	USA	pharmaceutical	6,67	7,34	6,7
Siemens	Germany	electronics	6,35	6,52	6,7
Sony	Japan	electronics	5,77	6,24	6,71
GlaxoSmithKline	UK	pharmaceutical	5,39	5,84	6,13

The companies with leading positions in expenditures on R&D are concentrated in several economic sectors. Primarily, in pharmaceutical, auto and IT sectors. There is a majority from US companies among the biggest investors in R&D: Pfizer, Ford Motor, Microsoft, and General Motors. Thus in 2007 Pfizer spent more than bln10USD on R&D. Toyota Motors' expenditures were almost bln10USD.

UKRAINIAN EXPERIENCE

In Ukraine there are near 9% of innovative enterprises which used to work in R&D. In compare with 2006 their share has increased by 3% while their R&D spending has decreased by 7%. It witnesses a lack of promotional character of domestic innovation system. Expenditure structure of innovation activity also proves a mentioned fact. Thus the biggest share in total innovation expenditure (70%) was the capital investment in technical renovation (acquiring new machines, equipment etc). It was not spending on technological development of enterprises at all. Other expenditures were equal to 20%.

NOTA BENE

By WEF data Ukrainian rank by innovation factor is 65-th (or 3.22 as a score). This low value is caused by the following aspects:

1) low score of innovation sub-factors, e.g. government support to high tech sector (75-th place);
2) insufficient scholar and engineer staff (70);
3) low level of business expenditure on R&D (67);
4) low level of cooperation between universities and firms (65);
5) inadequate amount of R&D entities (60);
6) insufficient amount of registered triadic patents (58)

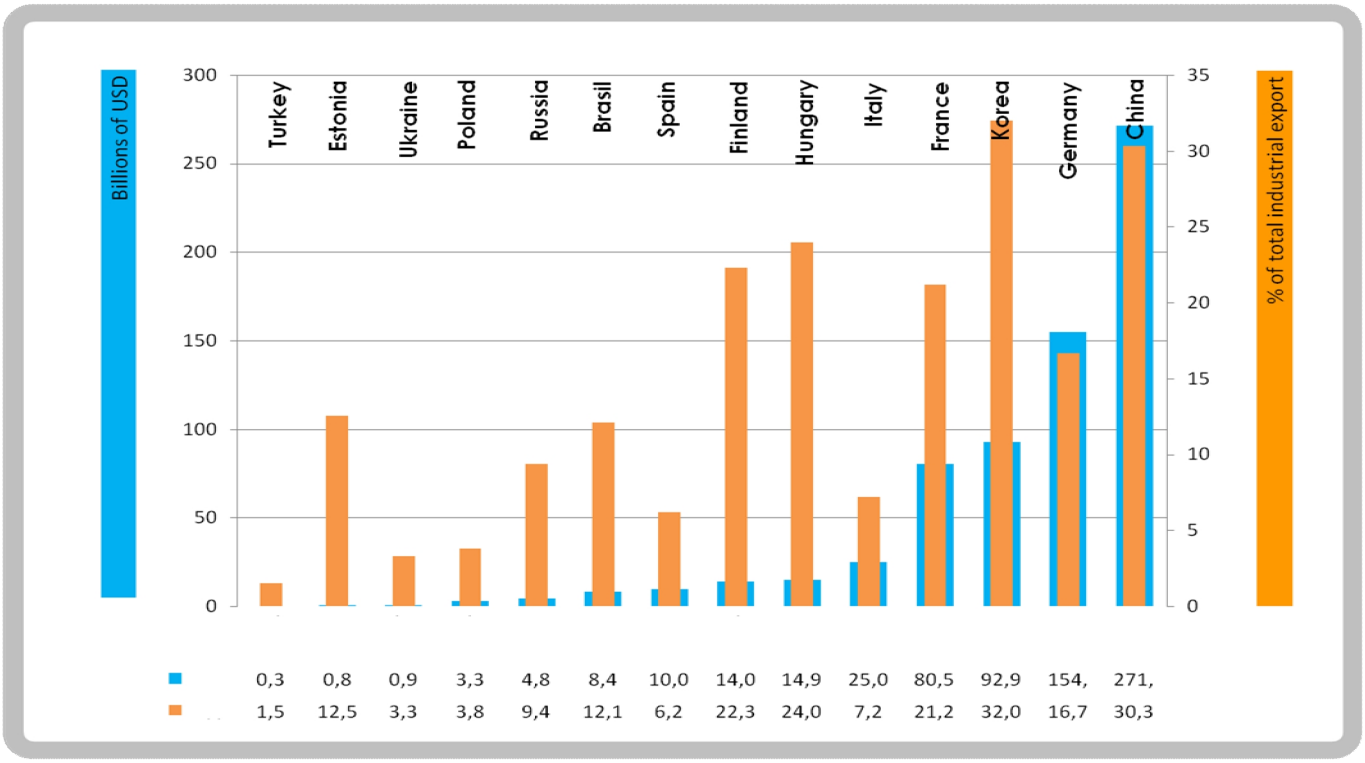
CCU RECOMENDATIONS

1. improve the system of budget funding of the science sector and increase funding for science development to 3% of the GDP from all possible sources;
2. implement an efficient mechanism for competition-based selection of fundamental science projects and establish a system of governmental and non-governmental funds, namely the National Science Fund;
3. carry out an efficient R&D and innovation policy during development and implementation of state R&D programs;
4. establish National R&D centers to provide R&D support to individual high-technology sectors of economy;
5. restore and expand the operation of research centers as part of joint stock companies, corporations, etc.;
6. use the facilities of lead universities and academic institutions to establish and develop technological parks, technopolises and technological development zones, which would ensure practical industrial application of new knowledge and technologies;
7. change education strategies at lead universities from textbook-based teaching to research laboratories-based learning and carry out an appropriate faculty remuneration reform;
8. grant autonomy and self-governance to lead universities in all areas of their operation with appropriate requirements for deliverables and responsibility for the quality of science and education;
9. ensure real rather than declarative enhancement of the R&D role in society, prestige of research work, promotion of scientific knowledge, etc.;
10. strengthen and advance research components in universities' activities and provide conditions for setting up research universities;
11. stimulate development of venture capital industry as the main source of funding for radical innovations;
12. design programs for integration of the national science into the world system, thus providing for Ukraine's gradual accession to the European research environment, opportunities for young scholars to intern abroad and conditions for return to Ukraine of those researchers who are efficiently working abroad;
13. improve the certification system for top qualification researchers;
14. rejuvenate research staff;
15. expand information supply of the research sector, namely by reforming the state system of scientific, technical, and economic information.

*(The proposals are based on the draft Concept of Science Development in Ukraine prepared by a task force headed by **V.S. Bryukhovetskyi** and **Ya.S. Yatskiv** in pursuance of the Implementing Order by President of Ukraine No. 1183.2005-rp of Oct. 03, 2005)*

HIGH TECHNOLOGY EXPORT, 2007

0.035 Jordan	0.926 Ukraine 44 (44)	271.170 China
1.2 Jordan	3.3 Ukraine 51 (52)	67.7 Philippines
Minimum in IMD Ranking	Ukraine in IMD Ranking 2008 (2007)	Maximum in IMD Ranking



Source: IMD World Competitiveness Yearbook 2008

The share of high technology exports in the overall industrial exports in Ukraine (3.3% in the overall industrial exports) is almost five times lower than the average indicator for the 55 countries (16.6% in the overall industrial exports) which came under scrutiny of IMD experts.

The global experience demonstrates that the main criterion of effective innovation activities is a growing share of science-intensive branches in the country's production and export structure. However, low innovation activity, especially in creating and utilizing new technological processes, adversely affects the structure of industrial production in Ukraine, thus bringing down its science intensity. Structural changes occurring in the past few years are characterized by a certain stagnation in the development of high-tech branches which determine the country's competitive status.

Ukraine's industrial production is dominated by branches which cannot be referred to as high-tech: metallurgy and metalwork (22.1%), food industry (18.9%), mining (9%), and coke and petrochemical production (8.3%).

Relation between UN Human Development Index and High-Technology Exports

Human Development Index rank	High-technology exports	
	1990	2005
High human development countries	18.1	20.3
Medium human development countries	7.2	24.3
Low human development countries	–	3.1
High-income countries	18.3	20.9
Medium-income countries	–	21.5
Low-income countries	–	3.8
World	17.5	21.0

Source: Human Development Report 2007/2008. Fighting climate change: Human solidarity in a divided world. – New York and Oxford: UNDP / Oxford University Press.

Reasons for Low Efficiency of National Innovation System

1. **a national strategy for Ukraine's innovative development and its implementation mechanism are lacking;**
2. **an efficient national system integrated into global innovative environment has not been formed;**
3. **shortage of solid financial support for innovative activities;**
4. **high level of risk for innovative activities and lack of a flexible system of incentives for companies' R&D and commercial application of new developments;**
5. **obsolete production infrastructure of domestic companies and insufficient investment in its upgrade; and**
6. **low interaction level among stakeholders of the national innovation system.**

NOTA BENE

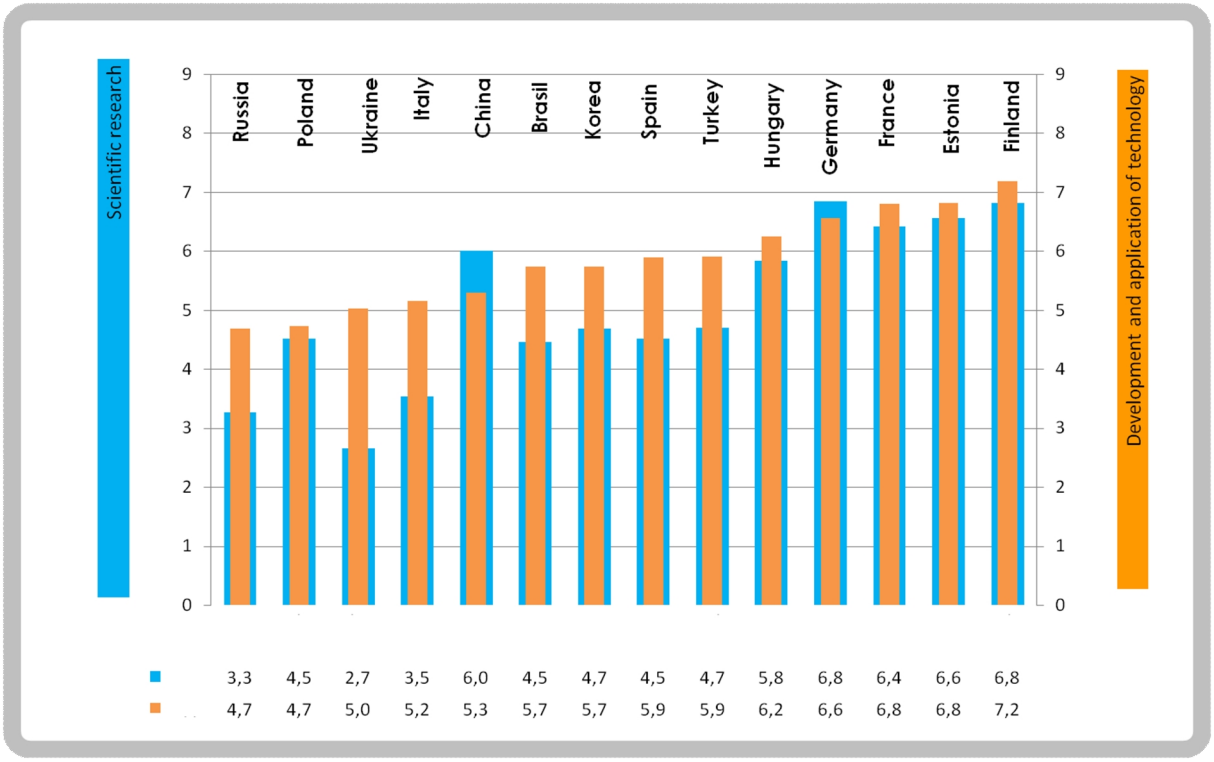
BY assessment of IMD experts, the USA holds a leading position in international competitiveness by absolute volumes of high-technology exports, which account for 31.8% of industrial goods exports. Cf.: The indicator for Singapore is 56.6%, Hong Kong – 33.9%, Switzerland – 21.7%, Luxembourg – 11.8%, Denmark – 21.6%, Austria – 12.7%, Canada – 14.4%, and Sweden – 16.7%.

SUPPORT TO SCIENTIFIC RESEARCH AND NEW TECHNOLOGY, 2008

2.65 Ukraine 55 (51) — **8.69 Singapore**

4.58 Mexico — **5.02 Ukraine 50 (53)** — **8.72 Singapore**

Minimum in IMD Ranking | Ukraine in IMD Ranking 2008 (2007) | Maximum in IMD Ranking



Source: IMD World Competitiveness Yearbook 2008

Lower index represents the lower level of legislative support to scientific research

Lower index – lower legislative support to development and application of new technologies

Ukraine ranks last among 55 countries by the level of legislative support for research, which is almost twice lower than the average (5.1), and 50th by the level of legislative support for development and implementation of technologies, which is considerably higher than the average (5.8). It evidences absence of an efficient national innovation system and enables the European Innovation Scoreboard to qualify Ukraine as an innovation outsider.

A complex of organizations which carry out fundamental and applied R&D is the keystone of the national innovation system's structure. In order to attract investment in R&D, to receive return on them, and to compensate possible expenditures, the governments of lead innovator economies have resolved a number of political and institutional issues. First and foremost, they have established an institutional background favorable for innovations, where a special political focus is placed on four spheres: human resources, state research potential, protection of intellectual property, and competition.

GLOBAL EXPERIENCE

Innovation policy is implemented through formation of a national innovation system meant for increasing competitiveness of national companies, regions, and the country in general. To assess the efficiency of the functioning national innovation systems, experts of the European Innovations Scoreboard have designed the methodology of SII (Summary Innovation Index) which identifies the strong and weak points of EU member states and the gap between them and the USA according to the following criteria:

1. Innovation drivers to assess structural requirements needed to develop the innovation potential of a country.
2. Knowledge creation to identify the sufficient level of investment into R&D to develop a postindustrial economy.
3. Innovation & entrepreneurship to assess the degree of innovation development at the microeconomic level.
4. Application to assess the structure of employment, manufacturing, and implementation of innovations and their role in creating the added value.
5. Intellectual property to characterize achieved results from the standpoint of patenting activity.

According to the innovation efficiency of the National Innovation System, all countries can be categorized into the following groups:

innovation leaders, including Denmark, Finland, Germany, Israel, Japan, Sweden, Switzerland, Great Britain, and the USA;

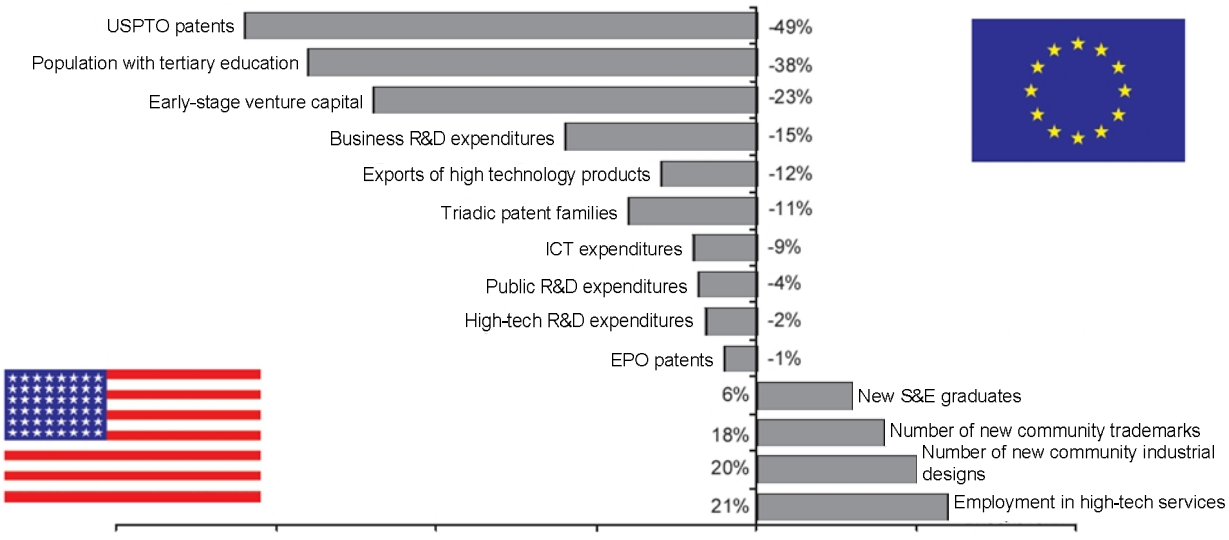
innovation followers, including Austria, Belgium, Canada, France, Iceland, Ireland, Luxemburg, and the Netherlands;

moderate innovators, including Australia, Cyprus, the Czech Republic, Estonia, Italy, Norway, Slovenia, and Spain;

catching-up countries, including Bulgaria, Croatia, Greece, Hungary, Latvia, Lithuania, Malta, Poland, Portugal, Romania, and Slovakia.

Source: *The European Innovation Scoreboard 2007. Comparative analysis of innovation performance*

Innovation Asymmetry between EU and USA



Source: *The European Innovation Scoreboard 2007. Comparative analysis of innovation performance*

Structure of R&D Expenditure in USA

Source: R&D Report, 2007, 2006

COMMENT

To function as the most technologically dynamic economy in the world and to ensure its future competitiveness, an economy must build its own innovation system so as to combine the country's scientific and technical potential with a body of legislative and economic measures and infrastructure which support rapid applications on the domestic and foreign markets. The innovation model of Ukraine's development objectifies the need for a radical reform of the R&D system:

– legislative policy must ensure a transparent system of encouraging scientific, innovation, and educational work via a flexible system of tax benefits for non-profit educational and research organizations, while the assessment of researchers' work and conferring of scientific degrees and ranks should be based on world standards;

– the academic and the university sectors of science should be mostly funded through grants via the established Ukrainian Research Fund and specialized funds, including private charities and, especially, venture funds;

– establish conditions for attracting private and foreign investment to fund and develop fundamental research in the private sector;

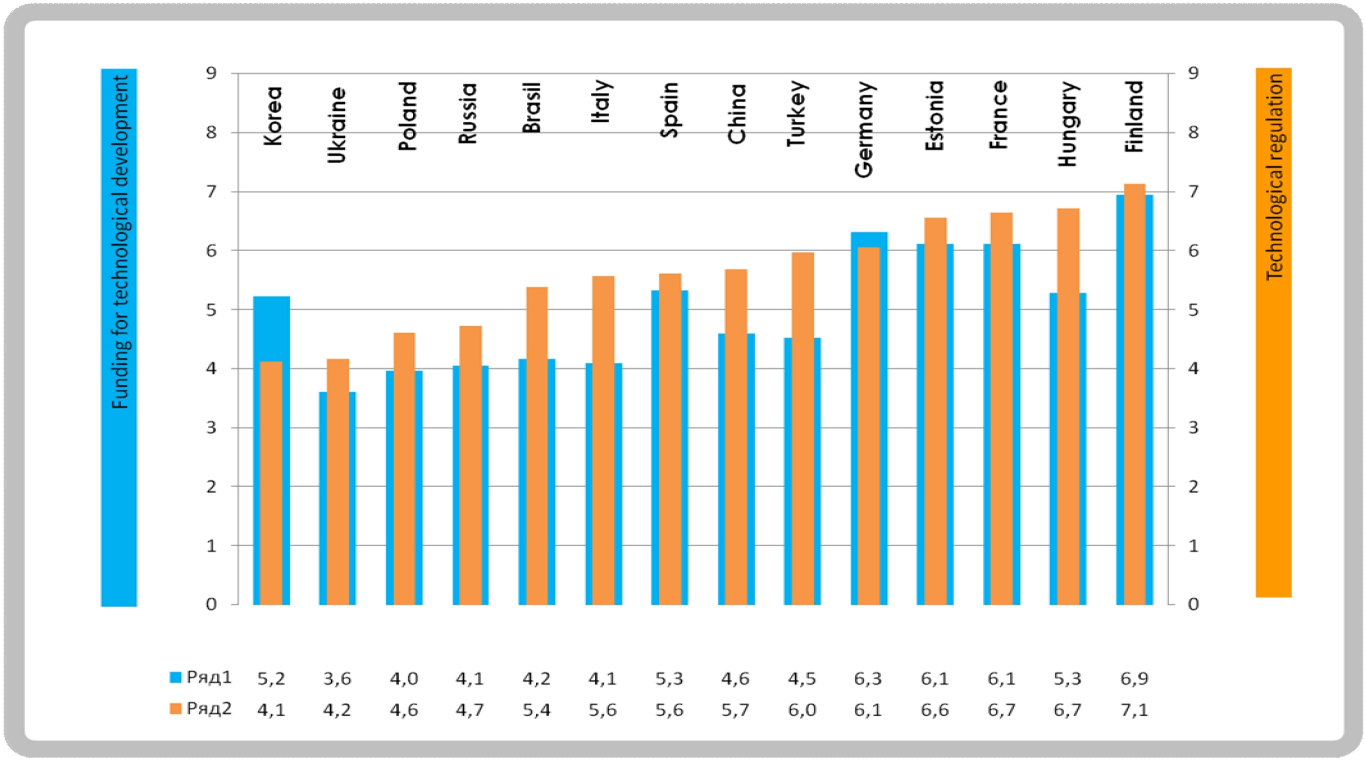
– specific research and educational institutions capable of contributing to the priority branches of economy should serve the basis for creating the National R&D Clusters, which would enjoy academic independence and basic state funding;

– it is necessary to encourage the creation of "personalized" technological parks with heads capable of generating innovative ideas in the priority areas of the 5^{th}–6^{th} technological wave and to introduce a corresponding system of registering researchers and companies. Service companies will benefit from grouping around a technological park through getting the corresponding taxation benefits;

– there is a need to provide state support to scientists and inventors capable of creative thinking, producing original ideas and concrete inventions of great scientific value; to encourage young scientists to freely participate in international projects, "co-laboratories", conferences, and internships in the leading research centers, etc.

TECHNOLOGY REGULATION & FUNDING, 2008

2.81 Argentina	3.61 Ukraine 53 (51)	8.33 Singapore
4.12 Korea	4.16 Ukraine 54 (52)	8.53 Singapore
Minimum in IMD Ranking	Ukraine in IMD Ranking 2008 (2007)	Maximum in IMD Ranking



Source: IMD World Competitiveness Yearbook 2008

Lower index represents the lower ability for funding of technological development

Lower index – less impact of technological regulation to technology implementation

Ukraine is 53th with 3.61 points (average is equal to 5.02) by level of ability for funding technological development. It is also 53th by level of technological regulation with 4.16 points that is also sufficiently above an average score which is equal to 5.64.

Funding for Technological Development, 2007

Countries	mln. USD according to purchasing power parity	including	
		business	government
USA	343 747.5	64.9	29.3
Japan	138 782.1	77.2	16.3
Germany	66 688.6	67.6	28.4
France	41 436.2	52.2	38.4
Korea	35 885.8	75.4	23.1
Great Britain	35 590.8	45.2	31.9
Canada	23 838.9	47.8	32.8
OECD non-members			
Russia	20 154.9	28.8	61.1
China	86 758.2	69.1	24.7

Source: OECD, Main Science and Technology Indicators, April 2008

GLOBAL EXPERIENCE

World practice has shown that in industrialized economies the innovation process is co-funded by the government and the private sector, acting as partners. Such interaction in innovation applications encourages economic growth on a radically new basis. In the USA two thirds of all R&D expenditure is covered by private corporations that actively fund both applied and fundamental research.

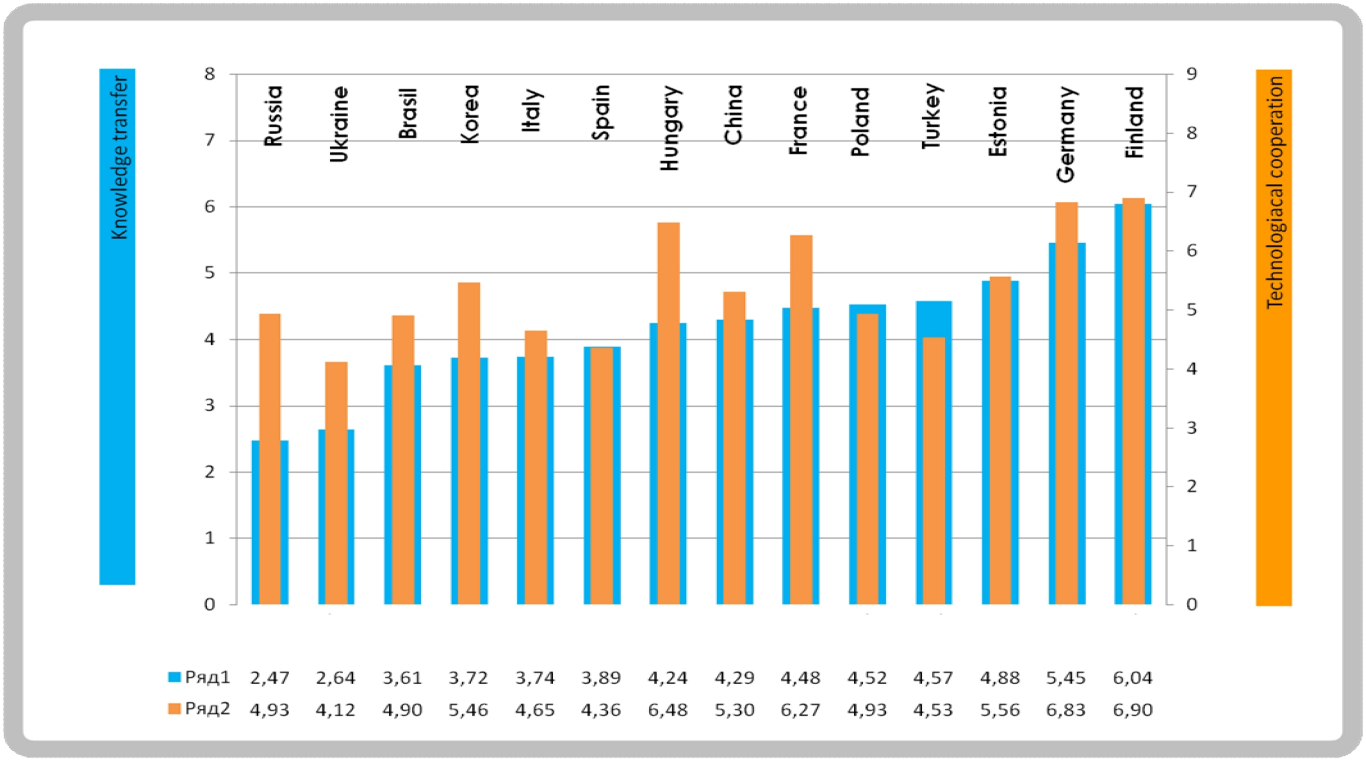
In 2007, China became the third R&D investor after the USA and Japan (by the purchasing power parity). This growth was registered at the annual level of over 18% during 2000-2005.

A comparative analysis of various innovation systems is an important foundation for developing solutions in the scientific and technological sphere. Experience shows that more and more countries are drawing up state programs and strategies of innovation development and are supporting them with increased funding and changes in institutional structures. Key innovating countries are adopting more competitive models of funding public and private scientific research and encouraging innovation activities of national companies. The governments of the USA, Japan, EU member-states, and new industrialized countries (NIC) are stimulating innovations by using the instruments of economic, investment, and credit policies, as well as by creating administrative infrastructures for prompt application of novelties (intensive use of fiscal and depreciation benefits, legal protection of intellectual property, fostering international scientific and technical cooperation, support of innovative projects, etc).

Support rendered to enterprising structures in the innovation sphere is swiftly growing and the bulk of innovation stimulation measures in OECD countries is being diversified. In 2005, direct state funds financed the average of 7% R&D enterprises, which is less than 11% in 1995. Nonetheless, at the same time OECD experts have spotted a transition from state purchases (direct subsidies) to tax benefits. In 2006, 20 OECD countries proposed tax benefits to enterprises for conducting R&D in comparison with 12 in 1995 (and 18 in 2004), and most of them intend to make such benefits even more substantive in future. In 2006, tax credits for conducting R&D made 23% of direct subsidies in the USA and 43% in France, which is twice more than the total direct subsidies in the Netherlands and 2.2 and 1.3 times more than in Ireland and Australia respectively.

TECHNOLOGICAL COOPERATION, 2008

2.47 Russia	**2.64 Ukraine 54 (49)**	**6.93 Singapore**
3.36 Mexico	**4.12 Ukraine 51 (51)**	**7.66 Sweden**
Minimum in IMD Ranking	Ukraine in IMD Ranking 2008 (2007)	Maximum in IMD Ranking



Source: IMD World Competitiveness Yearbook 2008

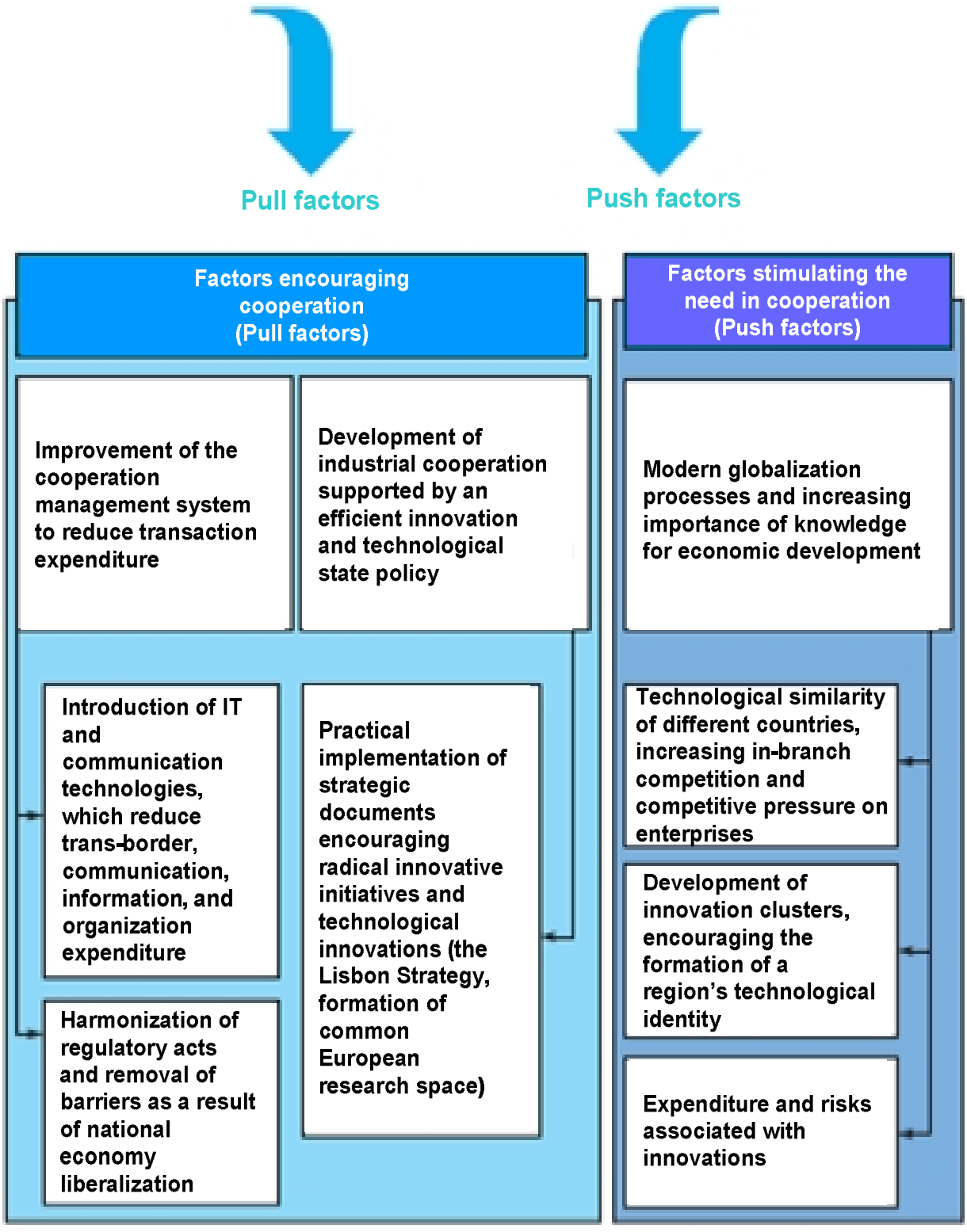
Lower index represents the lower ability for funding of technological development

Lower index – less impact of technological regulation to technology implementation

Among 55 countries from IMD ranking Ukraine placed 47th by level of technological cooperation between companies and 51th by level of technological transfer between universities and companies.

Dynamic development of science and technology is available due to cooperation and partnership. It decreases risks, which are natural for innovative process; it makes effective a business optimization process, which stores time and money; it helps to avoid the odd researches, and it also provides rational use of national innovative potential.
Innovative system is effective if there is a free movement of information, if any component of innovative infrastructure takes a proper place, and if transfer from one life-cycle stage to another realized with minimal expense.

Factors Which Maintain and Develop R&D Cooperation



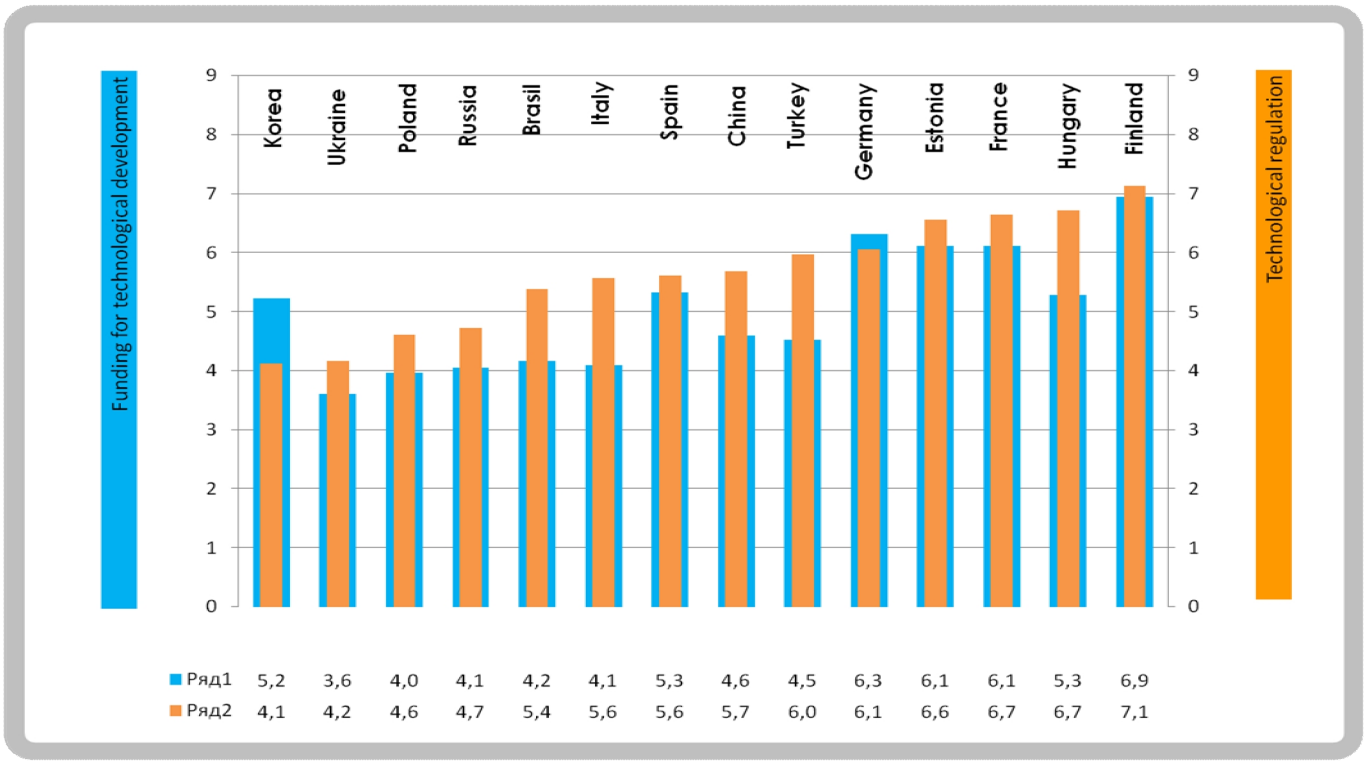
GLOBAL EXPERIENCE

US scientific and technological partnerships have challenged the international competition. They are based on a new paradigm of public and private relations, which establish a partnership between the state and the private sector regarding the development and application of new technologies. Such partnerships are viewed as cooperation agreements, which set up various combinations of private industrial companies, universities, and state agencies, organizations and research laboratories to mobilize resources to jointly achieve specific R&D results. In the USA, the legislation regulating scientific and technological cooperation between companies was adopted in 1984 (National Cooperative Act). The Act prohibited partners to use results of joint research and so prohibited scientific and technical cooperation of companies regarding manufacturing and implementation of innovative products. But already in the early 1990s, the Act on cooperation and research was expanded, with an aim of saving a range of joint enterprises from antitrust legislation sanctions. In the USA, the implementation of modern and promising trends in R&D cooperation is the province of the Office of Technology Policy, which introduces programs aimed at developing innovation partnership as a framework for federal agencies to cooperate in overcoming obstacles concerning the use of high-tech products, as well as to implement the program stimulating the technological competitive potential of regions. Such partnership relations establish a principally new level of cooperation between companies to stimulate development, create well-paid work places and support competitive entrepreneurship in general, by means of fostering innovation activities. Partnership between universities and business is the key to successful application of technologies. The USA has almost 150 years of experience in this area, which roots back to the provisions of the law of 1862 on establishing the American college system. The modern era of technological development started after the adoption of Bayh-Dole Act which set up the legal framework for the interaction between universities and industry. The need to improve the competitiveness of economy through implementing state-of-the-art technologies has become the main factor of strengthening the alliances between universities, laboratories, and business.

Partnership between universities and business, which the USA started more than 150 years ago, is the key to successful application of technologies

PATENT ACTIVITY & PRODUCTIVITY, 2007

1 India	69 Ukraine 31 (31)	5,605 Luxembu
1.8 Estonia	153.8 Ukraine 4 (4)	348.2 Kore
Minimum in IMD Ranking	Ukraine in IMD Ranking 2008 (2007)	Maximum in IMD Ranking



Source: IMD World Competitiveness Yearbook 2008

Lower index represents the lower ability for funding of technological development

Lower index – less impact of technological regulation to technology implementation

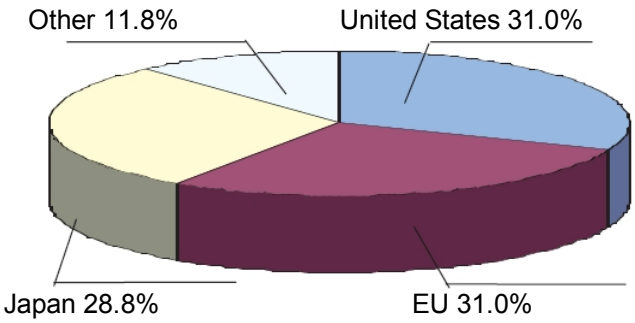
A level of patent activity has been defined as a ratio between a number of patents in use and a number of people in country (in 100 thousand people). By this index Ukraine is ahead of many countries of the world including some innovator countries such as Finland, Brazil and China.

A level of patent productivity has been defined as a ratio between a number of patents of country's residents and a number of R&D employees. By this index Ukraine is 4th among 55 countries with value, which is four times bigger than average one. However it does not mean that this index is a strong competitive feature of national innovative system, because major methodologies take into account only the patents registered in patent agencies of USA, EU and Japan.

GLOBAL EXPERIENCE

The nation's innovation capability is measured, first and foremost, by utility patents registered with authorities in the USA, EU, and Japan (triadic patent families). Countries are referred to the "lead innovator" category using the World Economic Forum approach if they annually register with the US Patent and Trademark Office at least 15 utility patents per million population. The United States, EU countries, and Japan hold leadership positions in the world in terms of patenting high-technology inventions in triadic patent families.

Competition Map of Triadic Patens, 2005



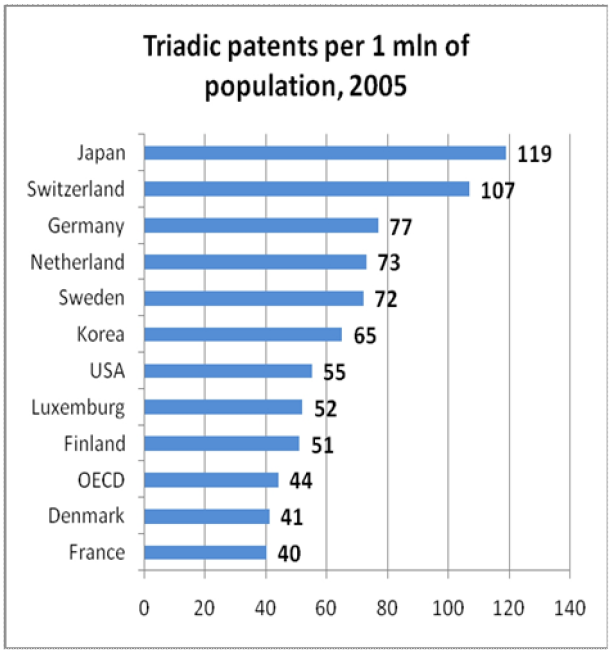
Source: OECD Science, Technology and Industry Scoreboard, 2007

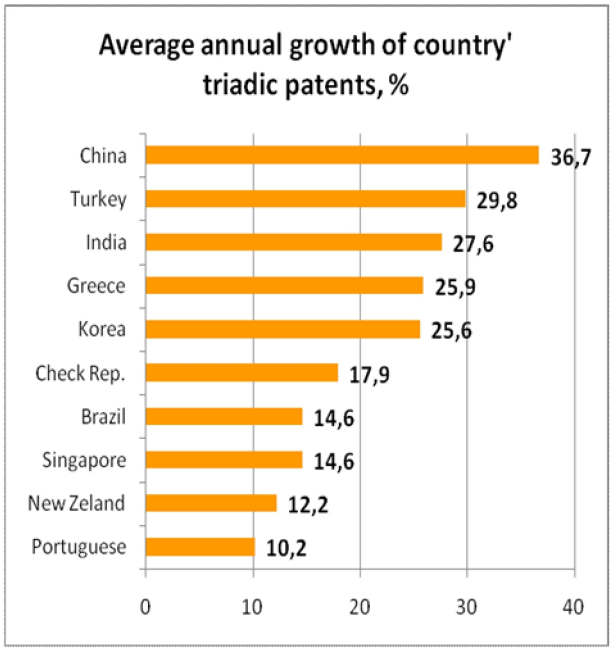
According to OECD data, the United States continue their global leadership with 31% of the country's share in the amount of triadic patents, which is lower, though, than in 1995 (34.4%). The EU share is also on decline (from 33% in 1995 to 28.4% in 2005). Japan's share is going up (from 27% in 1995 to 29% in 2005).

NOTA BENE

Recent years have witnesses an expedited growth in globalization of scientific and technological activities, including research. The trend has been facilitated by flexibility in managing transnational research projects (due to ICT), increased R&D costs, and major changes in political aspects (more stringent intellectual property rights or tax benefits in R&D). The USA, EU countries and Japan are front-runners in transnational cooperation on inventions (the share of co-authored patents from more than two countries has almost doubled). International co-authorship of research papers tripled from 1995 to 2005. The named countries have taken the world lead in the number of research publications, with 30%, 33%, and 8% of the world total publications respectively.

Leader Countries in Triadic Patent Families





By the number of triadic patents per capita, Japan is world number one, followed by Sweden, Germany, the Netherlands, and Sweden.

Patent area statistics demonstrates that such countries as India, China, Israel, Singapore, and USA concentrate their innovative efforts on high-tech sectors (computers and pharmaceuticals), whereas EU countries focus on medium-tech spheres (automobile and chemical industries).

The United States and Japan have a comparative advantage in patenting bio- and nanotechnologies. The EU is a world leader in environmental technologies (solid waste, renewable sources of energy, and reduction of car emissions), with Germany being very pro-active. Japan ranks second after EU in all three spheres of environmental technologies.

NOTA BENE

As reported by the US Patent and Trademark Office, in 2007 the US issued 89.7 thousand patents to non-residents, of which companies accounted for more than a half, with the rest awarded to individuals. Japan got 36.6 thousand patens, Germany – 10.3 thousand, France – 3.8 thousand, Canada – 3.97 thousand, Russia – 183 thousand, and Hungary – 55 patents. Ukraine received 14 patens, which is twice less than in 2006.

CCU RECOMENDATIONS

1. Within the shortest possible time, it is necessary to develop and adopt a long-term strategy of Ukraine's innovation development for the period of 2009-2016, thus providing conditions for transition to an innovation-based model of economic growth with clearly outlined priorities in the development of science infrastructure, research, and international cooperation.

2. Expedite the buildup of the national innovation system based on long-term forecasts and stimulation of business innovation activities to enhance micro- and macroeconomic competitiveness. Also, the national innovation system has to be closely related to the regional innovation policy and function both on the regional and branch levels within a uniform system for managing commercial application of intellectual activity results.

3. Establish a system for funding innovation activities from all possible sources. These can include private and government venture funds, means of legal entities and individuals, foreign investment, etc.

4. It would be appropriate to complement the anti-monopoly legislation with a provision stating that the effective legislation does not apply to the sphere of venture entrepreneurship and high-tech companies, as well as cases of mergers and acquisitions which stimulate innovation activities and enhancement of innovation advantages:

– draw up a law on small innovation firms and venture capital funds which should identify their legal status and also offer them a system of certain government guarantees, incentives, etc.;

– the law on income taxation of companies and organizations should provided for tax benefits to venture firms and funds;

– the law on higher education should provide for a mechanism of university-enterprise partnership and joint patenting of their research results. Absence of such law renders the venture funding mechanism ineffective.

5. Stimulate the development of cluster networking between business entities to boost their interaction and pool their resources, which will step up innovation activities and create new competitive advantages for business.

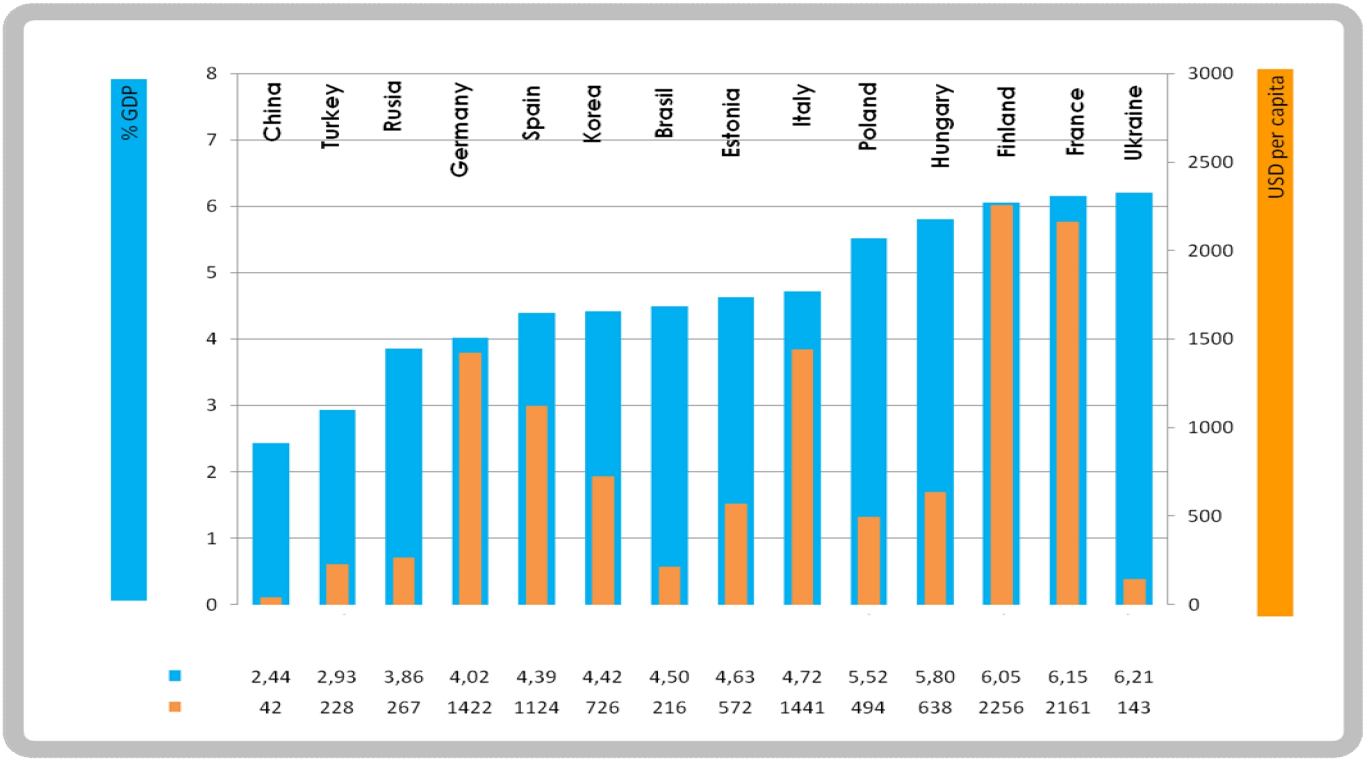
6. Establish a State Innovation Bank with a state-owned controlling interest offering a special mechanism of providing loans to the high-tech sector and patenting of inventions abroad.

7. Make amendments to the intellectual property legislation to regulate relations of scientific invention utilization and know-how protection, and set forth criminal liability for disclosure of trade secrets:

– improve patent legislation to meet modern economic requirements for relations between business structures to resolve disputes arising out of expanded exclusive rights; establish a dedicated patent court. It should be clearly stated that a patent for an invention may be jointly owned by several legal entities and individuals in various combinations. Authors should be awarded a just and fair compensation for the country's utilization of their inventions and industrial samples in special cases. A rigorous control should be exercised over patent utilization.

EXPENDITURE ON EDUCATION, 2006

0.035 Jordan	0.926 Ukraine 44 (44)	271.170 China
1.2 Jordan	3.3 Ukraine 51 (52)	67.7 Philippines
Minimum in IMD Ranking	Ukraine in IMD Ranking 2008 (2007)	Maximum in IMD Ranking



Source: IMD World Competitiveness Yearbook 2008

Ukraine ranks 7th by the amount of state expenditure on education in percent of GDP, but this relative indicator cannot fully characterize the high competitiveness of national educational services. In particular, this is evidenced by the expenditure on education per capita, which makes USD 143 and corresponds only to the 48th position in the overall rating.

21ST CENTURY – "ERA OF EDUCATION"

UNESCO has proclaimed the 21st century to be the "Era of Education". The information revolution shifts priorities onto development and support of education. Expenditure on education is a major component of investment in the human capital.

Experts view intellect as the main resource, the driving force of knowledge-based economic development. The World Bank and other international organizations research into the main features of knowledge-based economy and the factors accelerating growth. The World Bank has identified that countries can significantly accelerate the rate of economic growth by improving the standard of education, providing for open international trade, and setting up a telecommunication infrastructure. So, the standard of education defines the capacity of population to apply, build up and enhance knowledge. Openness in trade linked to the transfer of technological knowledge provides access to world technology via products or services.

Dynamics of State Expenditure on Education

Countries	state expenditure on education			
	% GDP		% total state expenditure	
	1991	2002-2005	1991	2002-2005
Ukraine	6.2	6.4	18.9	18.9
Poland	5.2	5.4	14.6	12.7
Spain	4.1	4.3	–	11.0
Italy	3.0	4.7	–	9.6
Russia	3.6	3.6	–	12.9
Brazil	–	4.4	–	10.9
Estonia	–	5.3	–	14.9
Germany	–	4.6	–	9.8
France	5.5	5.9	–	10.9
Finland	6.5	6.6	11.9	12.8
China	2.2	1.9	12.7	13.0
Korea	3.8	4.6	25.6	16.5
Turkey	2.4	3.7	–	–

Source: Human Development Report 2007/2008. Fighting climatic change: Human solidarity in a divided world. – New York and Oxford: UNDP / Oxford University Press

NOTA BENE

The experience of developed countries shows that in the last decade, among many factors shaping economic growth and improving the countries' international competitiveness, innovative and creative activities have been acquiring crucial importance: countries with dynamically growing education and technologies are becoming absolute leaders according to the competitiveness indicator.

Global tendencies in education emerge from the following factors:

– firstly, the mass nature of higher education and its continuous character;

– secondly, the expansion of the market of educational services;

– thirdly, customization of the academic process according to individual demands and needs;

– fourthly, focusing on active personal acquisition of cognition methods instead of knowledge and skills;

– fifthly, reduced influence of state authorities and supranational organizations on the system of education and hence strengthening its trans-nationalization;

– sixthly, establishment of new forms and methods and the change in the essence and functions of education.

One of the major reasons of the current changes in the organization and structure of higher education is the growing competition between the players of this sphere and the emergence of new forms of competitive struggle. A growing global demand for education is not satisfied by traditional educational methods and this stimulates the use of innovation technologies via distance training, computer technologies, and other new structures, specializing on the following kinds of activities: corporate, virtual, and franchising universities; offshore zones of higher education; consortiums of universities; brokers in the area of education; software producers, publishing houses, and many others.

Reforming the US System of Education

The situation in post-industrial society made the US government review its policy concerning education:

– to upgrade the standards of education and to adapt them to the demands of the information society;

– to supply schools with necessary equipment and Internet access, and to develop modern training methods;

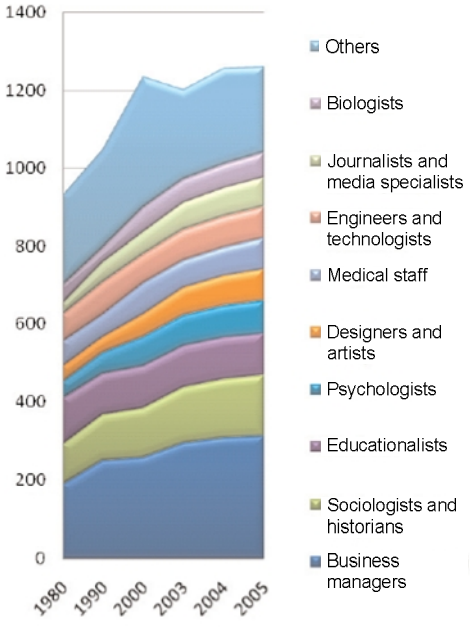
– to provide targeted support to schools in depressive regions;

– to train and re-train faculty;

– to reduce the number of students in primary grades.

The adoption of a range of programs and laws in the sphere of education allowed the USA to provide Internet access to 95% of schools and 63% of classrooms before 2000. It is not accidental that in 2002 the increment of funds to support only school education in the USA went up almost by 12%. This is the largest increase among all the federal Departments. At the same time, much attention is paid to re-training the staff of specialized vocational schools that provide training in new professions.

Obtaining the Bachelor's Degree in USA, '000



Source: U.S. National Center for Education Statistics, Digest of Education Statistics

Federal Support to US Universities in 2003, million USD

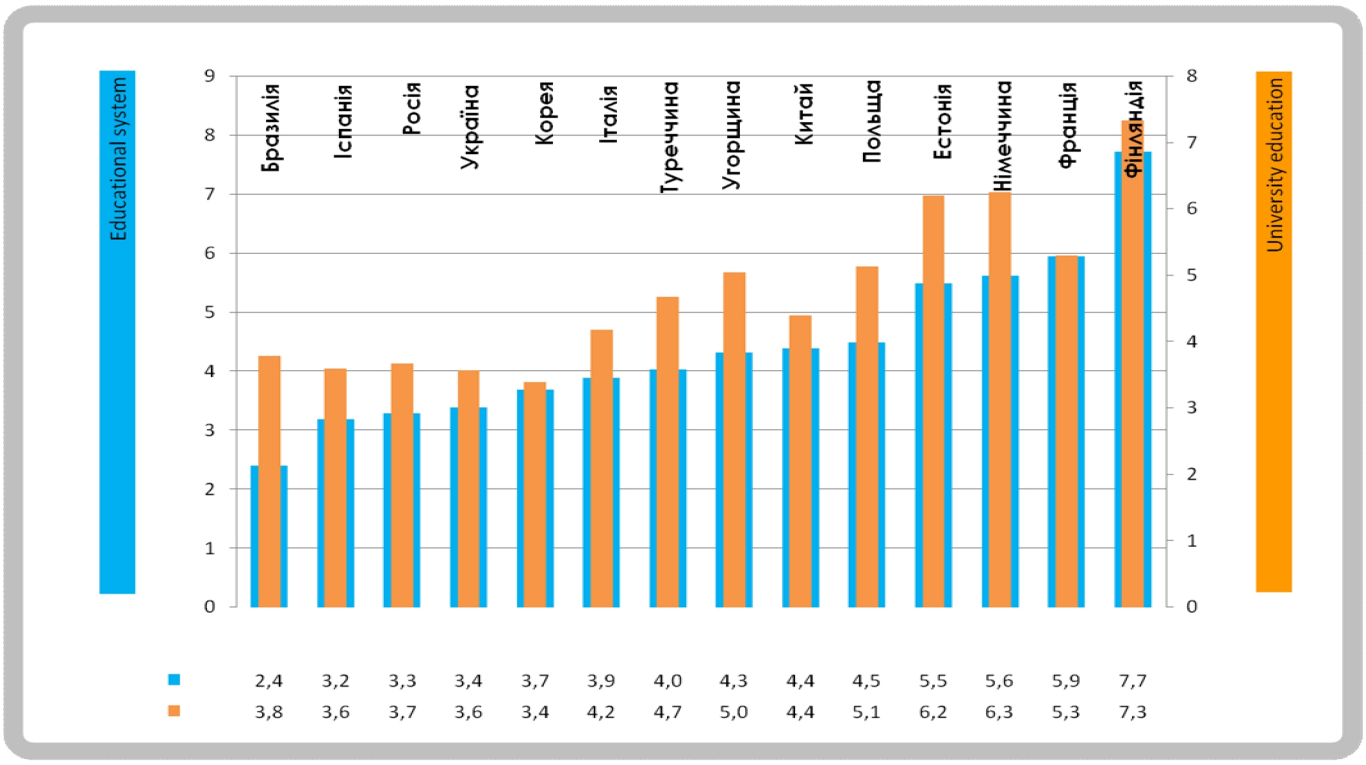
University	R&D amount	Federal support
All universities	**59,479**	**26,656**
Johns Hopkins University	*1,244*	*1,137*
California State University, LA	*849*	*476*
Michigan State University	*780*	*521*
Wisconsin State University	*721*	*422*
Washington University, Madison	*685*	*576*
Washington State University	*671*	*393*
California State University, San Diego	*647*	*466*
Stanford University	*603*	*467*
Pennsylvania University, Pittsburgh	*565*	*346*
Cornell University	*555*	*327*
Pennsylvania State University	*533*	*318*
Duke University	*520*	*412*
Minnesota State University	*509*	*346*
California State University, Berkeley	*507*	*222*
Ohio State University	*496*	*197*
Illinois State University	*494*	*220*
Massachusetts Technological Institute	*486*	*291*
California State University, Davis	*482*	*208*
Washington University	*474*	*419*
Baylor College of Medicine	*462*	*305*
Total of 20 lead universities	***12,283***	***8,069***

Source: US National Science Foundation

The analysis of the US experience in developing a competitive society (1980s-1990s) has shown that the innovation capacity is linked not only to scientific work, but also to the situation in the national engineering system, which includes designing new products, organization of manufacturing, and application. For this reason the training of engineers was improved, including teaching of science and technology subjects in secondary schools and the introduction of post-graduate opportunities at universities. This proved to be a powerful impetus for creating new products and services, technical creativity, and activation of innovation activities in society. According to David Ward, the president of American Council on Education, it is crucially important to develop university education. The cost of supporting one educational establishment of the world standard in Europe makes around 1.5–2 billion US dollars a year. But such a university plays the role of a "scientific hub" and academic leader for all the system of higher education in the aspect of training and research work and the innovation system.

COMPLIANCE OF EDUCATIONAL SYSTEM, 2008

1.88 Peru	3.38 Ukraine 42 (28)	8.23 Singapore
3.28 Greece	3.57 Ukraine 51 (27)	8.19 Singapore
Minimum in IMD Ranking	Ukraine in IMD Ranking 2008 (2007)	Maximum in IMD Ranking



Source: IMD World Competitiveness Yearbook 2008

Higher index shows higher level of correspondence between educational system and needs of competitive economy

Higher index shows higher level of correspondence between university education and needs of competitive economy

Universities became the main participants of national innovation systems, organizational mediators for cooperation between educational, scientific, business and governmental entities. The goal of cooperation is the unification of the efforts for interdisciplinary tasks of educational, scientific and innovative activity.

Professionals stated that the most impotent occurrence in educational development at the end of XIX – beginning of XXI century was an appearance of prime league of the world universities or "the world class universities". They explore competitive and partner strategies for enhancing their educational service. Competitiveness became a universal condition, which open economy demand from any subject of international relations.

NOTA BENE

A university's international competitiveness is its ability to take and keep a sustainable competitive position on the global market of educational services. Low competitiveness of universities and also insufficient integration of science and manufacturing testify to the need to reform national higher educational establishments. Innovative education implies training in the process of creating new knowledge by means of integrating fundamental science, the academic process, and manufacturing.

In the situation of globalization, the top standards of the quality of education can be maintained only through increasing and diversifying financial flows. The ability of a university to adapt to challenges and changes and to react to a changing demand directly depends on the extent of its autonomy and role in the national innovation system.

Most Competitive Universities Rating

Countries	% of Top 100	% of Top 500	% of global GDP	% of world population
USA	53.5%	32.5%	27.4%	4.6%
Great Britain	10.9%	8.2%	4.9%	0.9%
Germany	5.9%	8.0%	6.0%	1.3%
Russia	1%	0.4%	2%	2.2%
China	–	2.7%	5.5%	20.1%

Source: Institute of Higher Education at Shanghai Jiao Tong University

The USA has around 5% of the world population and produces around 27% of the world GDP, and, according to all reputable international organizations, is a country with a high competitive status. It enjoys more than a half of the world's best 100 universities. Unlike the USA, China, which has 20% of the world population, does not have a single top competitive higher educational establishment.

GLOBAL EXPERIENCE

The quality of education is the key indicator of the competitiveness of higher educational establishments, which characterizes not only the compliance of education with certain objectives, requirements, and standards, but also, first of all, the high competence of graduates, which defines their competitiveness on the global labor market. But in the last years, the criteria of the higher education quality have changed dramatically. Good quality education implies availability of modern equipment in classrooms, research laboratories, and residence halls. Innovative curricula are increasingly more based on the latest information sources rather than on textbooks. Information for students is scanned and made available on the Internet to be accessible at different time and from various places. Scientific and academic achievements have always been a result of collective effort taken within the framework of conferences, seminars, joint virtual laboratories, etc. But experts compare the intensity of the involvement of scientists and researchers in joint utilization of knowledge and joint design of academic scientific and training materials with a tectonic shift and consider it to represent the emergence of a meta-university, which will rapidly develop in the future.

For instance, one of the most competitive universities in the world, the Massachusetts Institute of Technology, takes great efforts to increase the educational potential of its own electronic network, which becomes an important instrument of self-study, i.e. provides an online access to all its training materials, curricula, exercises, solutions, and basic works free of charge. 500 courses have already been converted into the electronic format and the remaining 1,500 will be converted by the end of 2008. A similar policy of opening intellectual resources is also implemented on the initiative of numerous competitive universities, which is evidenced by a daily emergence of seven million new web-pages, many of which do not even exist in hard copies.

Ranking "World-Class Universities"

The last five years have seen a considerable growth in the number of international and national ratings and an increase in their importance for efficient functioning of higher educational establishments and strengthening their position both on the global and the national markets of educational services. In this context it is important to research the competitive advantages of world-class universities and the factors that ensure their high international competitiveness.

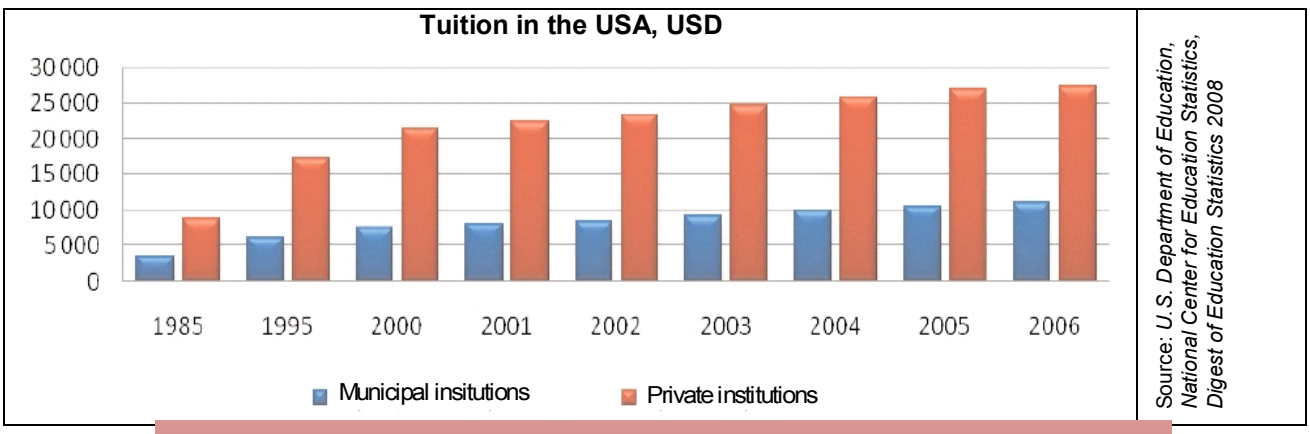
For instance, according to the rating of 50 most competitive universities of the world designed by the experts of the Times Higher Education Supplement (THES-QS), the top positions are occupied by American and British higher educational establishments.

Most Competitive Universities of the World According To THES-QS Methodology

Ranking	University	Country
1	Harvard University	USA
2	Cambridge University	Great Britain
3	Yale University	USA
4	Oxford University	Great Britain
5	Imperial College London	Great Britain
6	Princeton University	USA
7	California Institute of Technology	USA
8	Chicago University	USA
9	University College London	Great Britain

This is a result of structural and organizational factors, which allow these educational establishments to occupy high competitive positions on the global markets of educational services. Among the existing advantages are diversification of educational establishments and a free choice of courses and topics for scientific research, research and academic activities, international students enrolment, state support to fundamental research, and effective selection of students.

The THES-QS rating includes indicators according to the following criteria: the quality of research, graduate competence assessment, graduate employability, international relations, and the quality of training. These also include employer review score (the assessment of higher educational establishments by the faculty and employers), international staff score (the proportion of international faculty in the overall number of staff) and international student score (the proportion of international students in the overall university enrolment), staff/student score (the ratio between the number of students and the number of the university faculty), as well as citations staff score (the impact factor of faculty publications).



CCU RECOMENDATIONS

Ukraine, being a new independent country, is gradually integrating into the modern world, whose staple feature is global interdependence which covers and changes political, social, and ecological development conditions. For Ukraine, economic globalization consists, first and foremost, in the new quality of external development conditions which are to be accounted for, in particular in the context of competitiveness of the national economy.

It is important to acknowledge that today's paradigm of international economic progress is formed by post-industrial values, when the competitiveness of countries is determined by their dynamic advantages in knowledge priorities, innovations, and information, rather than static factors predominantly or exclusively related to availability of material and labor resources. Lead countries show sustainable internal and international competitiveness by implementing their post-industrial development strategies. They increasingly feature a drastic reduction in raw material and, partly, energy dependence due to committed buildup of the service sector; restructuring of the international markets of mass consumer goods; the priority of a new, independent, truly strategic and globally competitive product – knowledge and information; re-channeling of investment from expanded production and accumulation of material assets to "human capital" development.

Post-industrial economy is explicitly innovative, when new discoveries, inventions, technologies, goods and services, instead of making sporadic or irregular appearance, become a staple and most important determinant of the economic progress. It increasingly becomes the economy of materialized knowledge, whereas information (access to present-day knowledge and communication means) along with land, capital and labor, is becoming not only an independent, but also a decisive production factor.

In the context of globalization, the issues of current importance for Ukraine include not only providing for factor competitiveness (bolstered by the required, though until recently unused, resources and technological prerequisites, such as minerals, arable lands, skilled labor, scientific and technological resources, favorable geo-economic situation), but also for transforming initial (factor) advantages into investment, scientific, and technological ones. To this effect, a clear and rather hard-line state strategy is required, concentrating resources on relevant priorities, of which education should become one of the paramount factors ensuring economic and social development of the country, and reproduction and development of its intellectual potential. Ukraine's innovation-based development model objectively stipulates a need for modernization of its education sector. The priority steps in developing a national higher education system should include the following:

In the first place, it is establishment of a national Ukrainian higher education model based on the continental model of educati (Germany, France, Scandinavian countries) characterized by state paternalism towards universities; accessibility of higher education at large; and support of academic freedom of universities. Its components are:

- granting autonomy to higher education through increased financial and administrative independence of colleges and universities, advancing their self-sufficiency, extended rights to resolve issues of innovation, R&D, and staffing policy;
- an optimized system of colleges and universities accomplished through reduction in their number; consolidation of minor higher education institutions into single education centers; concentration of state funding in large research universities and their expedited integration into the global innovation system;
- implementation of mechanisms for university-industry partnership and joint patenting of their research results.

CCU RECOMENDATIONS

– establishment and development in lead universities and academic institutions of technological parks, technopolises, technology development zones, and national research centers which would ensure practical industrial application of new knowledge and technologies to boost investment attractiveness and international competitiveness of national education in general, and to increase its contribution to knowledge economy;

2

Secondly, it is necessary to improve the systems of budget funding of educational institutions (spending on education should not depend on the country's economic situation) and guarantee its sufficiency both legislatively and through rigorous adherence to a compulsory standard (at least 8% of the GDP). The components include:

– development and practical implementation of a mechanism for additional funding of universities' educational activities through term grants (2-3 years) offered by the state to universities on the competitive basis with account for effectiveness of their work, availability of research staff, and national and international ratings. Funding of university research should become predominantly grant-based and administered through dedicated funds, including private, charity, and venture ones;
– setting up a system of available loans for education; enhancing quality of education through an upgrade of material and technical resources of educational institutions, providing teachers with a decent remuneration and reducing the teaching load of the faculty involved in research; researchers' achievements should be assessed and academic degrees should be conferred in accordance with the world standards;
– ensuring a transparent system of encouraging innovative research and teaching activities through tax benefits for essentially non-profitable research institutions and associations, targeted charity funds, and contributions for the development of science.

3

Thirdly, it is necessary to support universities in developing their own social responsibility codes and their implementation through encouraging local communities, local governments, ethnic minorities, and businesses to participate in university activities and through including them in university administrative boards. Namely:

– retention by the state of control functions over the quality of education with the transfer of relevant monitoring powers to dedicated educational agencies, international educational institutions, and dedicated non-governmental organizations to ensure high quality standards on the educational market and to balance its main stakeholders' interests;
– stepping up national universities' participation in the social and economic life of the country and region, and their transformation into the key entities of national and regional innovation systems.

4

Fourthly, it is necessary to intensify internationalization processes in higher education, supported with adequate funding, logistical and regulatory framework, and mandatory coordination on the part of the educational institution and the Ukrainian public to facilitate teachers' and researchers' access to global educational and research resources and their entering international educational markets:

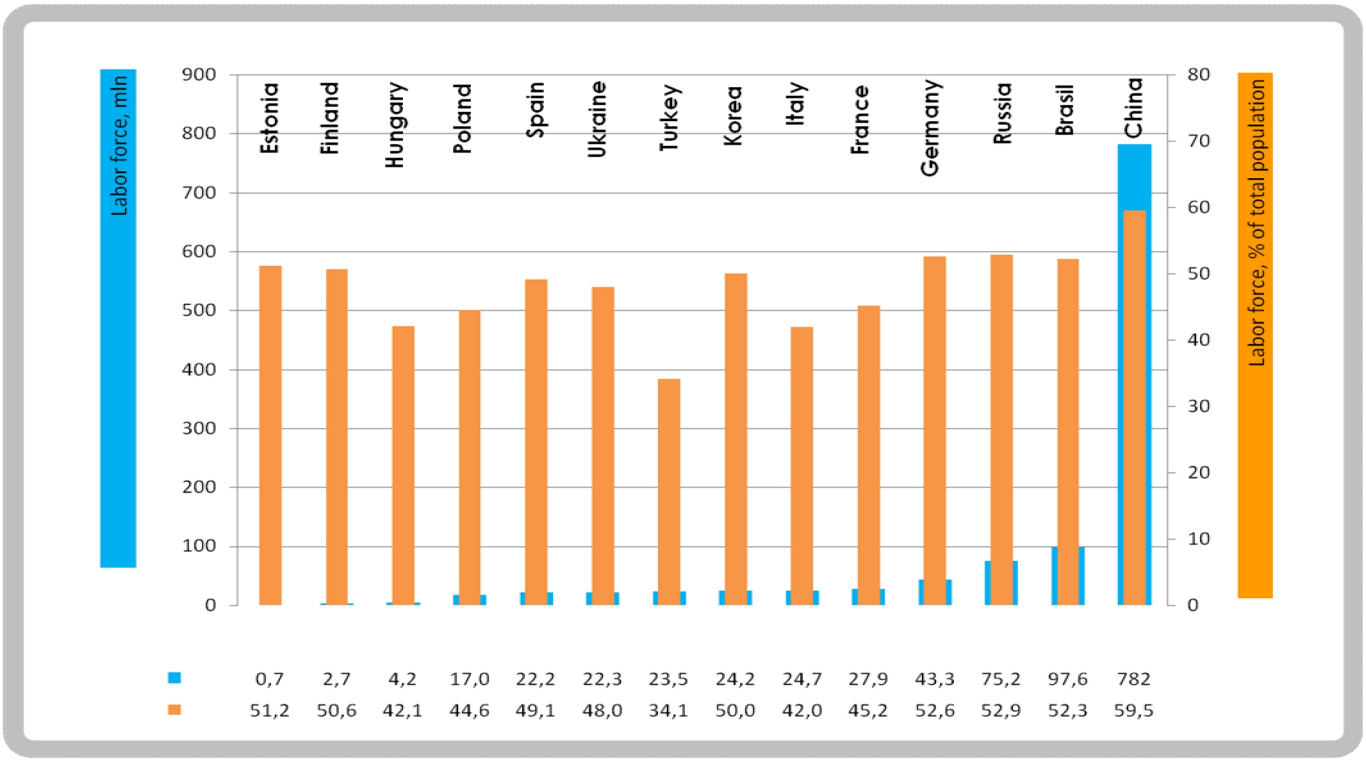
– including lead Ukrainian universities and academic research institutions into the international quotation systems (namely, EPSCO);
– encouraging an international educational dialogue and global university partnerships involving Ukrainian higher educational institutions, stepping up joint research of Ukrainian scholars with their foreign partners (universities, corporations, dedicated educational institutions), and their participation in international programs for enhancing higher and post-university education. Simplified recognition of foreign higher education certificates in Ukraine and Ukrainian certificates submitted for acquiring a profession abroad;
– establishing a national rating system for higher educational institutions based on the quality of education, availability of qualified staff, effectiveness of research and international cooperation, and quality rating on the part of employers; monitoring international systems which provide university ratings.

All these measures require adequate changes in the legislation, as well as development and implementation of a number of government programs in the education sector.

(The materials were provided by D.H. Lukyanenko, Doctor of Economic Sciences, Professor, Dean of the School for International Economics and Management, Vadym Hetman Kyiv National Economic University, Honored Worker of Education and Engineering of Ukraine)

WORK FORCE, 2007

0.35 Luxemburg	22.3 Ukraine 17 (17)	782.2 China
27.9 Jordan	48.0 Ukraine 34 (31)	73.9 Peru
Minimum in IMD Ranking	Ukraine in IMD Ranking 2008 (2007)	Maximum in IMD Ranking



Source: IMD World Competitiveness Yearbook 2008

Among the benchmark countries, Ukraine demonstrates a moderate indicator of the labor force amount against the number of population (48%) with a relatively slow increase in the number of its economically active component (0.35% average annual growth in 2007).

During 2000-2007, Ukraine's labor market showed the following trends:

– stabilization of the number of economically active population aged 15-70 at the level of 22.3 million and 20.5 million working-age population;

– gradual increase in employed population to 21 million aged 15-70, 19.2 million working-age population; a corresponding decrease in the unemployed population;

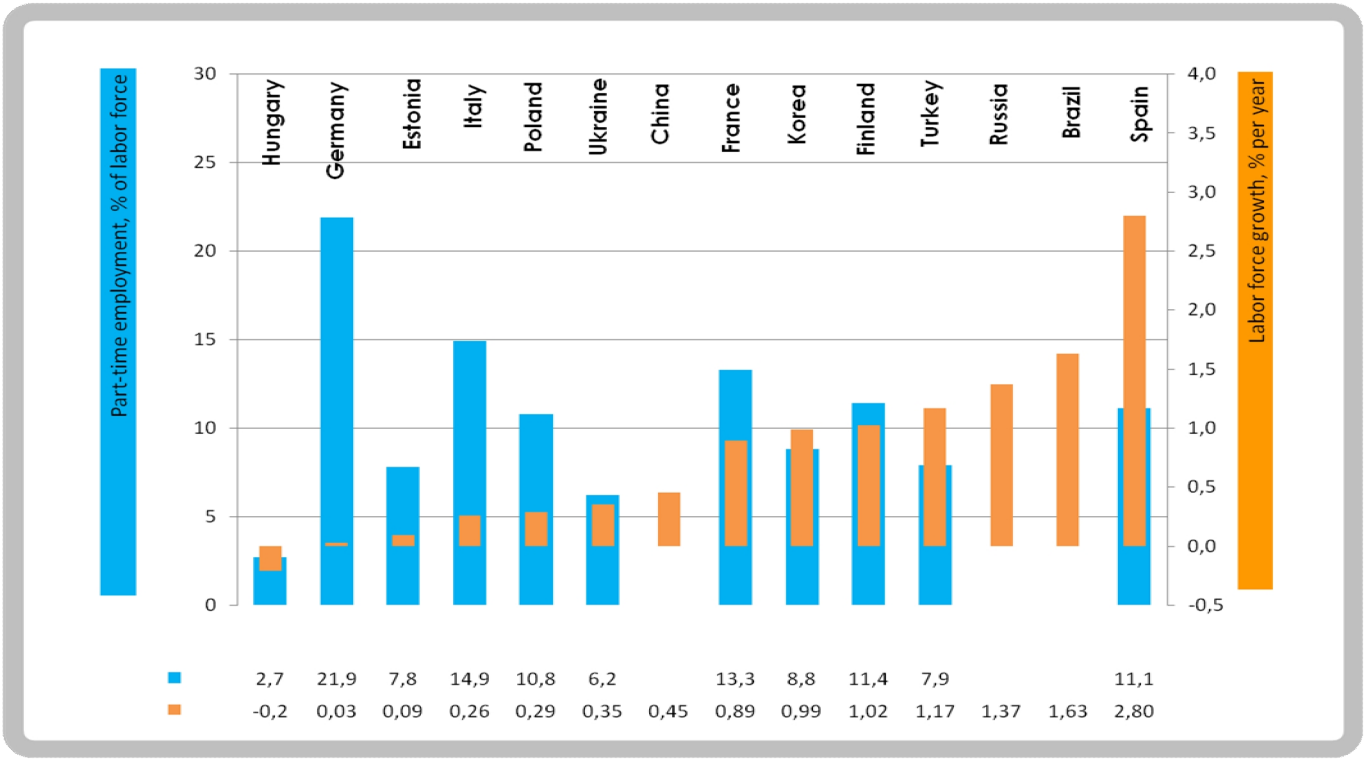
– further increase in the number of private sector employees;

– on-going negative trends concerning the number of employees at state enterprises with a simultaneous decrease in the average annual rate of their release.

Establishing a flexible market, which would swiftly respond to the dynamics of the economic reforms, is a major premise for forming a modern market mechanism to support balanced public production and the development of socially-focused economy of Ukraine.

PART-TIME EMPLOYMENT & LABOR FORCE GROWTH, 2007

1.8 Bulgaria	6.2 Ukraine 37 (34)	35.5 Netherland
0.21 Hungary	0.35 Ukraine 46 (51)	12.28 Venezuela
Minimum in IMD Ranking	Ukraine in IMD Ranking 2008 (2007)	Maximum in IMD Ranking



Source: IMD World Competitiveness Yearbook 2008

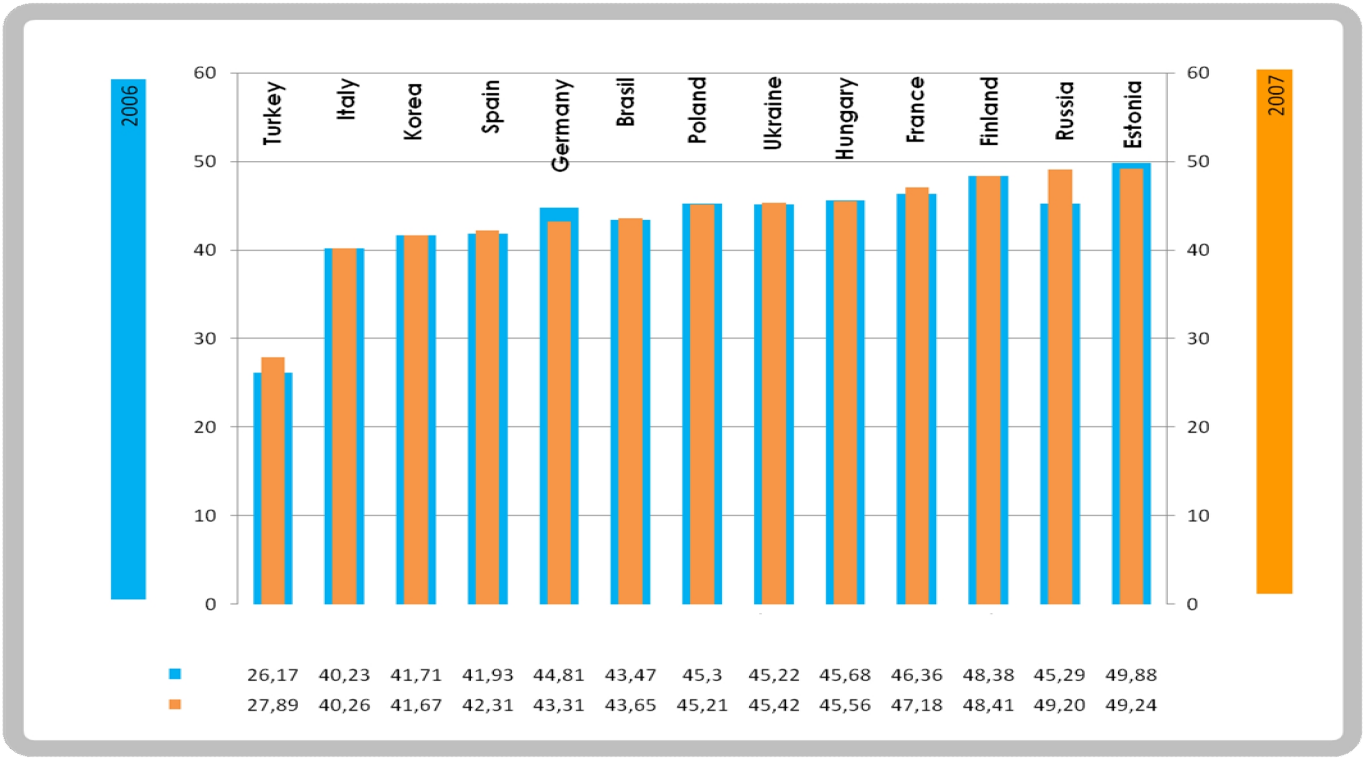
The part-time employment indicator, which is 3.5 times lower than in Germany and 2.5 than in Italy, places Ukraine in the lowest position among the analyzed countries.

Urgent Issues of Regulating the Labor Market of China and Its Functioning

The specific features of China's national labor market are caused by the gradual nature of market reforms implemented there. The state policy on the labor market is determined by the nature of the country's demographic situation and available economic potential, namely a large proportion of the working-age population with a relatively low level of education, qualification, and income; intensive employment in agriculture, which does not satisfy the need for extended reproduction of their labor potential; the process of accelerated transformation aimed at forming the post-industrial foundation for economic development and intensification of the economy. The country has so far failed to set up a corresponding system of education and vocational training to ensure a high-quality economic growth, so there still remains the issue of a large army of unqualified labor force and its resolution requires support and development of labor-intensive manufacturing.

WOMEN IN LABOR FORCE

14.9 Jordan	45.22 Ukraine 25	49.88 Estonia
14.9 Jordan	45.22 Ukraine 20	57.25 Thailand
Minimum in IMD Ranking	Ukraine in IMD Ranking 2008 (2007)	Maximum in IMD Ranking



Source: IMD World Competitiveness Yearbook 2008

Women employment in Ukraine is characterized by a high relative indicator (45.42% of the total labor force), which is much higher than in Italy, Korea, Spain, Germany, and Brazil, but trails behind France, Finland, Russia, and Estonia.

In the past decade, the improvement of the women's status on the global labor market has not significantly bridged the gender gap in this sphere. Since 1996, the proportion of women engaged in vulnerable employment – predominantly unpaid family employees or self-employed at their own expense (with an output-based remuneration or a fixed salary) has decreased from 56.1% to 51.7%. According to 2006 average global indicators, women unemployment was 6.6% against 6.1% of men unemployment. There were fewer than 70 economically active women per every 100 economically active men. The service sector has lately become the primary employer of women, leaving agriculture behind. In 2007, 36.1% women were employed in agriculture and 46.3% – in the service sector as compared with 34.0% and 40.4% men respectively.

Global Employment Trends for Men and Women

Indicators	Total		Men		Women	
	1996	2006	1996	2006	1996	2006
Labor force (mln. pop.)	2,644.2	3,090.9	1,592.2	1,852.0	1,052.0	1,238.9
Employed (mln. pop.)	2,482.8	2,895.7	1,497.5	1,738.6	985.4	1,157.1
Unemployed (mln. pop.)	161.4	195.2	94.7	113.4	66.7	81.8
Labor force-to-population ratio, %	66.7	65.5	80.5	78.8	53.0	52.4
Employment-to-population ratio, %	62.6	61.4	75.7	74.0	49.6	48.9
Unemployment, %	6.1	6.3	5.9	6.1	6.3	6.6

Source: ILO, Global Employment Trends Model, 2006

Ukraine has made considerable progress in the gender sphere. Namely, it has initiated the establishment of a national regulatory framework on the issues related to family, women, and equality of men and women.

Ukraine has adopted a Declaration on General Principles of State Policy of Ukraine Regarding Family and Women (of March 5, 1999),

Concept of State Family Policy (of September 17, 1999),

National Action Plan on Improvement of Women's Situation and Promotion of Gender Equality in Society in 2001-2005 (of May 6, 2001),

Law of Ukraine "On Ensuring Equal Rights and Opportunities of Women and Men", effective of January 1, 2006.

Laws of Ukraine and relevant regulatory acts provide for non-discrimination of women.

The Constitution of Ukraine (Article 24) safeguards equal rights for women and men and provides conditions which enable women to combine work and motherhood.

National legislation on women's labor accounts for effective international legislative acts ratified by Ukraine.

GLOBAL EXPERIENCE

The formation of stable migration flows results in the emergence of the so called transnational migration networks, which foster the reduction of expenditure and risk associated with migration and support the continuous migration flow. African migrants have long got used to investing into the economic development of their countries of origin. One of such networks, Réseau des Associations de Développement de la Valée du Fleuve Sénégal, unites migrants from Senegal, Mali, and Mauritania. It is officially registered in France and deals with the investment into the projects of constructing mosques, schools, rehabilitation centers, and hydraulic engineering structures back in the native country. A similar principle is used by another migrant network, Gidimaxa Jikké Association, an organization of immigrants from the Kaye region of Mali now residing in Seine-Saint-Denis, France. Members of this network are engaged in improving the infrastructure, in particular, in constructing transportation networks.

There is also a whole range of formal mechanisms through which business diaspora encourages international trade and investment. These include, firstly, business diaspora networks, like the South African Diaspora Network (SADN), the Lebanese Business Network (LBN), and the Silicon Valley Indian Professionals Association (SIPA);

secondly, chambers of commerce and industry, focusing on diasporas, such as the Federation of Indian Chambers of Commerce and Industry (FICCI), and the Caribbean American Chamber of Commerce and Industry, Inc. (CACCI);

thirdly, state agencies for fostering diaspora investment, e.g. the Indian Investment Center (IIC) and the Armenian Development Agency (ADA).

UN and OECD experts have modeled the number of migrants required by the EU, the USA, and Japan (for the period till 2050) to maintain the number of population, including working age population, which these countries had as of 1995.

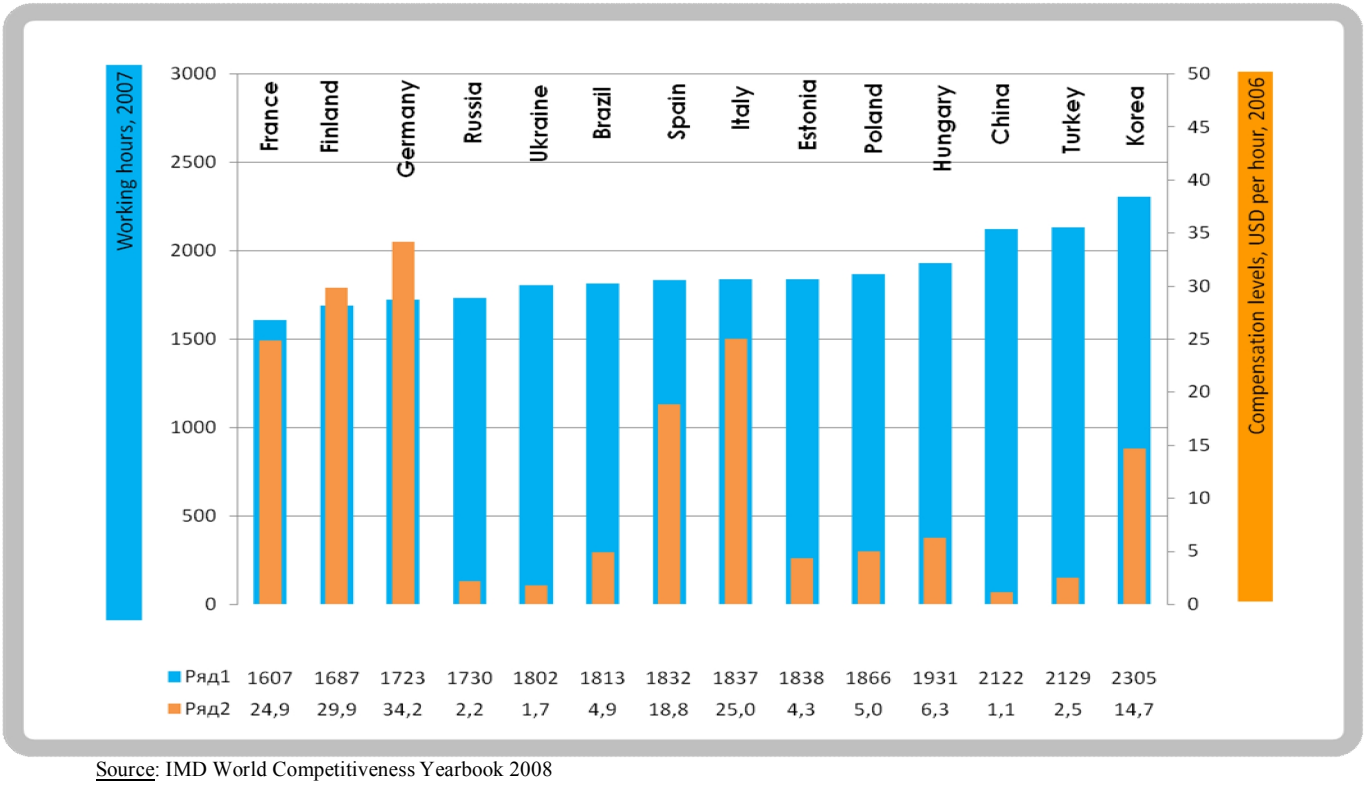
Increasing population employment under the Lisbon Strategy:
70% men
60% women

According to the conducted assessment, to ensure the stable number of EU population, it is necessary to annually engage about 1 million migrants, while to ensure stable indicators of the number of working age population – over 1.5 million migrants. In comparison with Japan and the USA, the EU will be experiencing the most urgent need in migrants before 2010 and in the period of 2030–2040 with the corresponding maximum indicator of around 20 million people in 2035 and with further migration stabilization after 2040. The need to improve the demographic situation and employment indicators in connection with the constant aging of the population, birth rate decrease, and other economic factors is reflected in the objectives of the Lisbon Strategy concerning the EU economic development, which envisages focusing the economic policy of the EU member-states on increasing the population employment up to 70% (for people aged 15-64) and up to 60% for women.

The number of migrants required for stable indicators of the number of the EU population:
1.5 million / year

WORKING HOURS &WAGES

1,607 France	1,802 Ukraine 43 (43)	2,385 Mexico
41.03 Norway	1.74 Ukraine 8 (9)	0.33 Indonesia
Minimum in IMD Ranking	Ukraine in IMD Ranking 2008 (2007)	Maximum in IMD Ranking



Source: IMD World Competitiveness Yearbook 2008

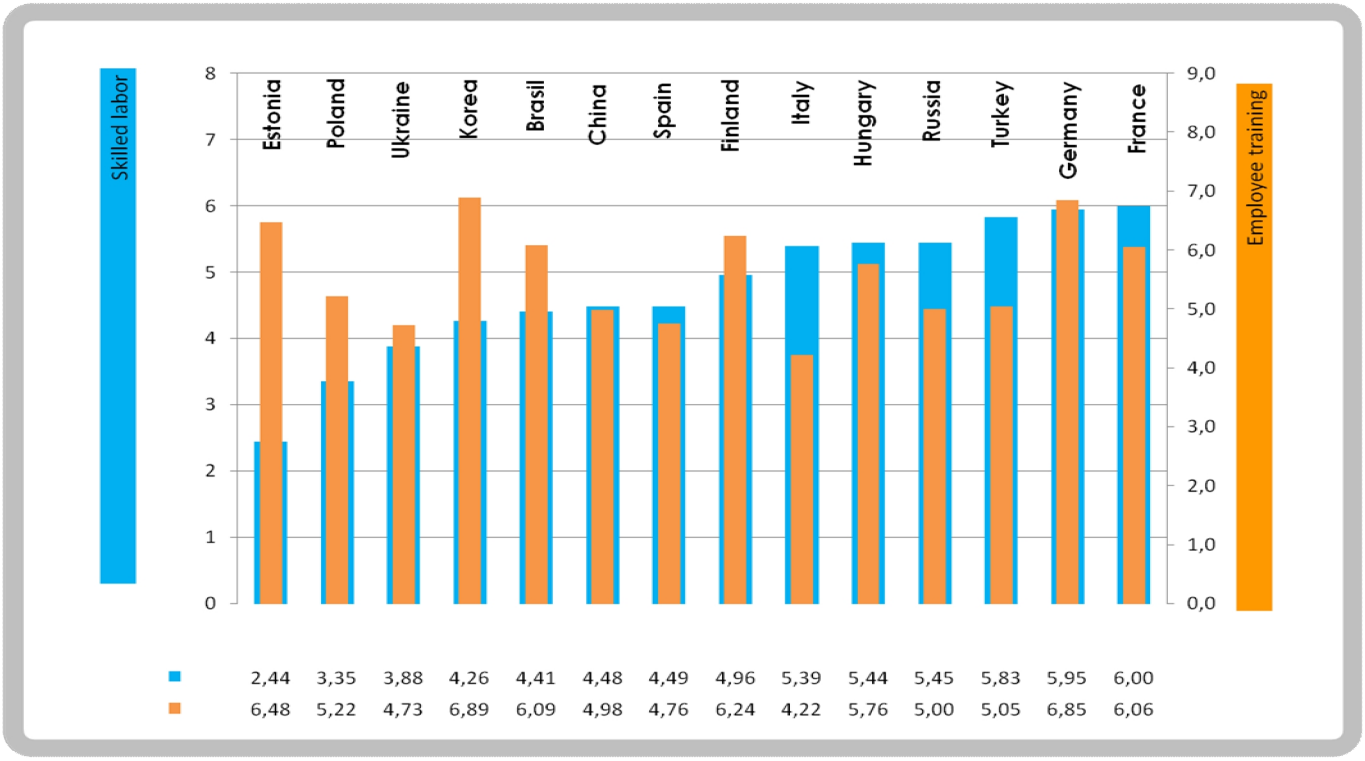
In 2007, the average monthly nominal wage in Ukraine was UAH 1,351 thus exceeding the corresponding indicator of the previous year by 29.7% and almost twice exceeding the cost of living of an employable individual effective in December (UAH 568). One of the main levers of state policy in labor remuneration is legal enhancement of social guarantees, i.e. the minimum wage and the cost of living. Nonetheless, Ukraine has a much lower minimum wage of EUR 63 as compared with the corresponding standards of EU member-states. For instance, in the new EU member-states the minimum wage in December 2007 ranged from EUR 92 in Bulgaria to EUR 288 in the Czech Republic. According to different estimates, the proportion of the unofficial income of Ukrainians makes 15-45%.

In 2007, the growth rate of the nominal wage remained almost the same as in 2006 and ranged from 17.3% in state administration to 35.2% in financial institutions. At the same time, the manufacturing sector showed a quicker wage growth – from 21% in paper manufacturing and publishing to 35% in manufacturing of other non-metal mineral products. Despite appreciable wage growth in Ukraine in 2005-2006, the country's lag behind other states by this indicator not only has failed to decrease, but has in most cases grown. The extent of lagging behind looks very convincing, especially when compared with Slovenia (EUR 1,049 in 2006), the Czech Republic (EUR 549), Hungary (EUR 484), and Poland (EUR 473).

Source: State Statistics Committee of Ukraine;
E. Libanova. Who profits from cheap labor force? // Zerkalo Tyzhnya (*Weekly Mirror*). – No. 16 (645), 2007.

SKILLS AND QUALIFICATION, 2008

1.88 South Africa	3.88 Ukraine 47 (45)	6.77 Taiwan
3.76 Greece	4.73 Ukraine 51 (30)	8.22 Denmark
Minimum in IMD Ranking	Ukraine in IMD Ranking 2008 (2007)	Maximum in IMD Ranking



Source: IMD World Competitiveness Yearbook 2008

Index shows availability of skilled personnel at labor market

Index represents the level of priority of personnel training for company management

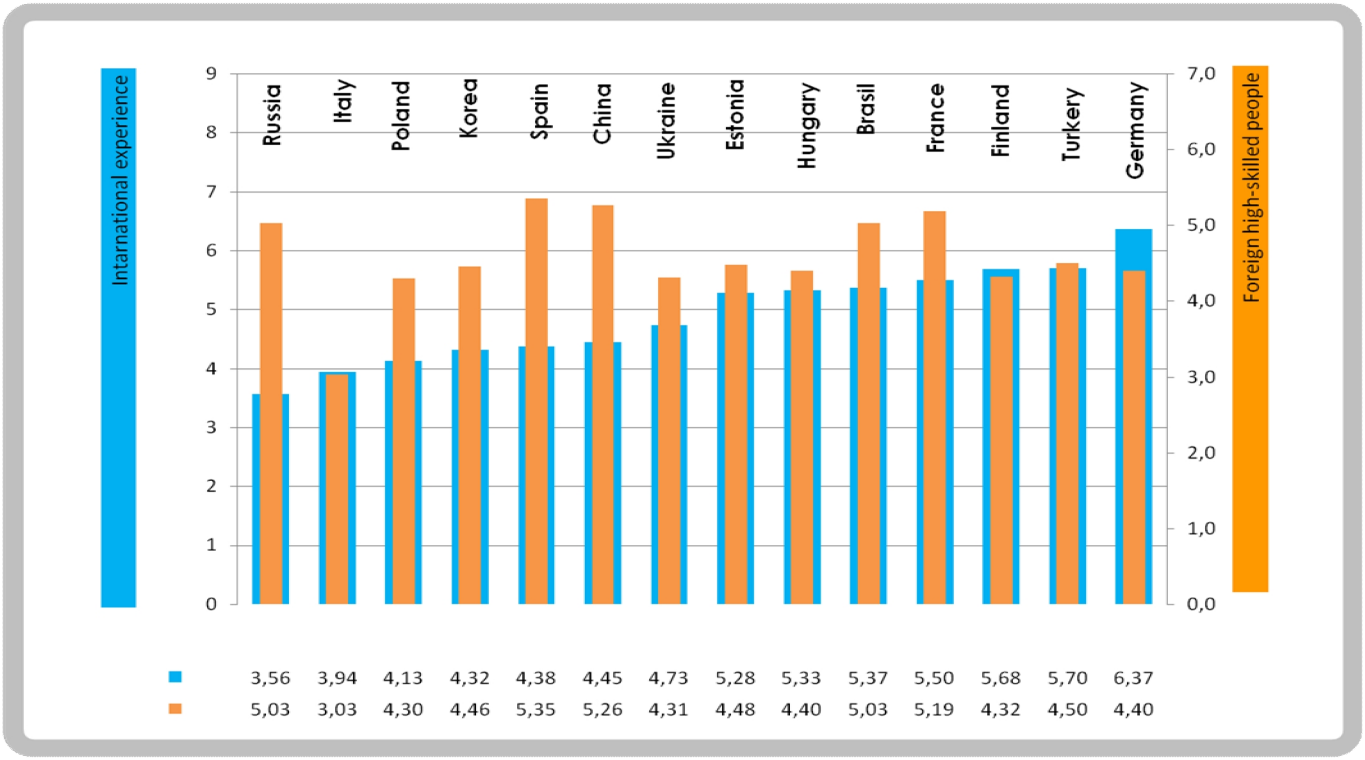
Ukraine's highly qualified and cheap labor force fails to be fully utilized; further, it gives way by relative indicators to many countries, such as China, Russia, and Turkey.

The main reasons for shortage of qualified personnel in Ukraine are:
– insufficient state funding for the system of training and re-training qualified personnel and education system at large;
– low labor remuneration in the country's economy, which de-motivates personnel competence building;
– low standard of living of Ukrainians and the resulting emigration of highly qualified specialists abroad.

Korea's high rating regarding prioritized enhancement of personnel competence in the corporate sector is explained by a large number of transnational corporations on its territory and their focus on building up the intellectual capital. Personnel competence building is a traditional priority for companies of all sizes in Germany (12th rank). In Italy (54th rank) and Spain (29th rank) personnel competence building is not practiced by small companies (60% of Italian labor force are employed by small companies). Ukraine's low rating results from a relatively imperfect corporate culture and drawbacks of the national system of personnel (re-)training, which generally does not encourage either periodical or on-going personnel competence building.

BUSINESS ENVIRONMENT, 2008

3.56 Russia	4.73 Ukraine 39 (48)	7.94 Switzerland
1.28 Venezuela	4.31 Ukraine 39 (36)	8.97 Switzerland
Minimum in IMD Ranking	Ukraine in IMD Ranking 2008 (2007)	Maximum in IMD Ranking



Source: IMD World Competitiveness Yearbook 2008

Index shows the level of international experience of top managers

Index represents how does business environment attract the foreigners

Due to certain political, legal, economic, and psychological factors of the national corporate environment, the rating of countries by availability of managers' international experience is absolutely country-specific.

Ukraine's business environment is generally less favorable for highly qualified foreign employees unlike that of the analyzed countries (especially Russia, France, China, and Spain).

NOTA BENE

In many developed countries the aggregate expenditure of all enterprises on personnel competence development can be compared with state expenditure on education. Modern corporations spend from 2 to 20% of their revenues on training their personnel (depending on the adopted corporate training policy, the company size, and the industry). In Ukraine, this indicator ranges from 0.1% to 0.4%.

GLOBAL EXPERIENCE

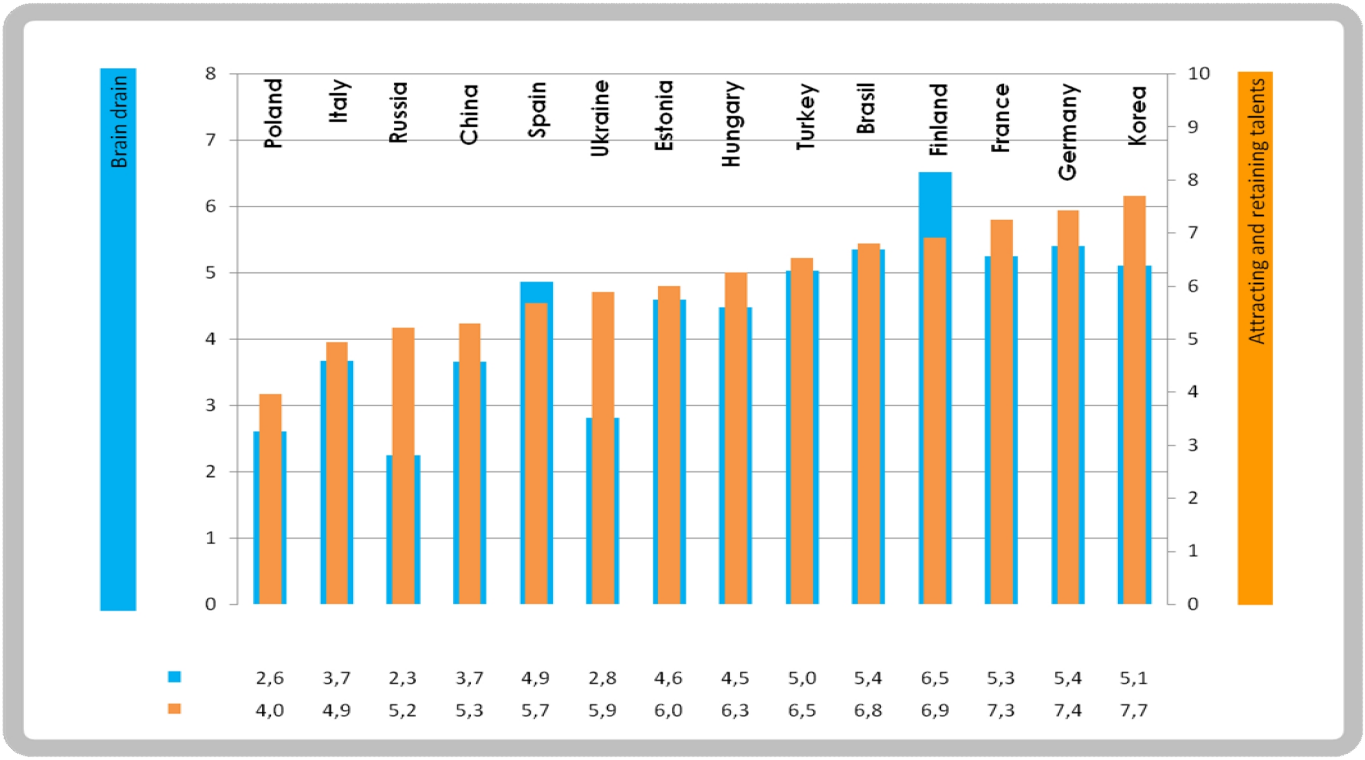
Certain large transnational companies have long ago started a tradition for their managers to acquire effective international managerial experience. For instance, Coca-Cola Inc. has designed and implemented an innovation strategy of recruiting managers for future international business trips. To this end, the company actively selects international students, who study in American colleges and universities and after graduation intend to go back to their home countries. Coca-Cola Inc. recruits and hires the best of these graduates and proposes them a one-year training program. These new managers can return to their home countries already as the company's staff employees and get a corresponding position in its national subdivisions. A US Honda subsidiary sends American managers to Tokyo for several years of internship, during which they get a better concept of the manufacturing and operational philosophy of the leading car manufacturer. The Samsung company resorts to another original strategy: to send young managers for a whole year to certain places abroad without giving them a specific job description. It is supposed that during this time the managers will learn the local language and get to know the local culture of their country of residence. The idea is that during his/her next designation, the manager who, until that moment occupied a higher position, will be able to work as an international manager much more efficiently. And though this program costs Samsung around USD 80,000 a year per person, the management of the company believes that the investment will quickly pay back.

GLOBAL EXPERIENCE

Countries like China, India, the Philippines, Sri-Lanka, and Vietnam stimulate emigration of intellectual resources against all warnings by means of designing and implementing the corresponding programs on the national level, expecting that highly qualified staff will return in the future. In this case, the change of the brain drain tendency for brain gain, which provides the country with a new store of human capital, for instance, highly educated scientists-businessmen returning to Korea, Taiwan, China, and other countries of South-Eastern Asia, is mostly a result of macroeconomic transformations successfully implemented on the national scale. International practice traditionally uses several criteria to rank countries according to brain drain indicators. According to R. Adams' criterion, a country experiences brain drain, if 10% of the population with university degrees have emigrated abroad. Analytical research by M. Bain, F. Docquier, and H. Rapoport shows that especially harmful for a country's economic growth is the emigration of 20% population with university degrees or when the number of emigrants with a tertiary education exceeds 5% of all the population.

BRAIN DRAIN & RETAINING TALENTS, 2008

1.52 Lithuania	2.81 Ukraine 47 (54)	7.44 Norway
3.96 Poland	5.88 Ukraine 40 (29)	8.33 Singapore
Minimum in IMD Ranking	Ukraine in IMD Ranking 2008 (2007)	Maximum in IMD Ranking



Source: IMD World Competitiveness Yearbook 2008

Lower index corresponds the lower influence level of brain drain to the economy competitiveness

Index shows the priority level of attracting and retaining talents

In comparison with the majority of analyzed countries, at the present stage of Ukraine's economic development the emigration of national intellectual resources is limited due to the following circumstances:
major brain drain out-flows from Ukraine during the 1990s have largely reduced the available potential of highly qualified personnel; Ukraine's improving economic situation encourages stabilization in the migration of intellectual resources; building up the global scientific environment and Internet penetration allows to satisfy the interests of researchers and other high-class specialists without leaving the country.

An important role in setting up international high-tech centers is played by intellectual centers (organizations, networks) of migrants abroad. Such centers usually number from several hundred to several thousand members and are grouped into five categories, i.e. student/research networks, local associations of highly qualified emigrants, expert associations (like the UN Transfer of Knowledge Through Expatriate Nationals – TOKTEN), and diaspora intellectual networks. There are over 50 networks of expatriates on the Internet, which brings together highly qualified specialists from more than 30 countries. Quite well-known are the Columbian Network of Scientists and Engineers Abroad (Red Caldas), the South African Association of Researchers Abroad, the Global Korean Network, associations of Thai professionals in the USA, Canada, Europe, and Japan.

CCU RECOMENDATIONS

State employment policy has to immediately address a number of issues, the principal of which include the development and retention of the country's labor potential, enhancement of its competitiveness and provision of high-tech work places, establishing social responsibility of business, overcoming a considerable professional and qualification discrepancy between the demand on the labor market and staff training by educational institutions, and creation of adequate economic conditions for halting a mass drain of qualified specialists. In order to overcome these imbalances and to enhance the efficiency of the government employment policy at large, the country's government should:

1 – In the shortest possible time introduce a minimum hourly rate with simultaneous implementation of a clear and fair tariff system taking into account qualitative characteristics of the labor force; develop and implement system-based measures to eliminate the adverse impact of inflation processes on the population's effective income growth.

2 – Grant the priority status to the science and education system in the country, given their decisive role in the establishment of the post-industrial society. This calls for an upgrade of material and technical resources of educational and scientific institutions, a considerable increase in the scopes and diversification of their funding sources, the transfer of the faculty to the category of well-paid public servants, and enhancement of education quality through improved content and training technologies.

3 – Assist companies and employers in setting economically justified norms of financial expenditures on training and re-training of labor resources, competence building of employees, and a procedure for utilizing these costs coupled with tax benefits.

4 – Through mediation of Ukraine's embassies and other diplomatic institutions, and international NGOs, with an active government support, continuously provide information on the activities carried out by migrants' social networks abroad (migrants' intellectual centers, students'/researchers' networks, associations of skilled migrants, experts, and expatriates' Internet resources) to involve Ukrainian citizens, including those staying abroad, in their activities, thus gratifying their social and economic interests. – Take efficient measures to enhance the effectiveness of social partnership for mutually concurred resolution of employment and labor remuneration issues on the central, regional, branch, and production levels through documenting them in labor agreements, individual and union contracts.

To refine the mechanism of the interstate labor exchange and efficient involvement of Ukrainian migrants' funds in the national economy, Ukraine should:

5 – Ratify all government-to-government agreements between Ukraine and involved countries on mutual employment of citizens and on cooperation in international migration and social protection of labor migrants; improve the procedure of licensing in the provision of tourist services by cracking down and imposing more stringent control on legal entities willing to pursue tourist business, which will help prevent abuse in international labor migration.

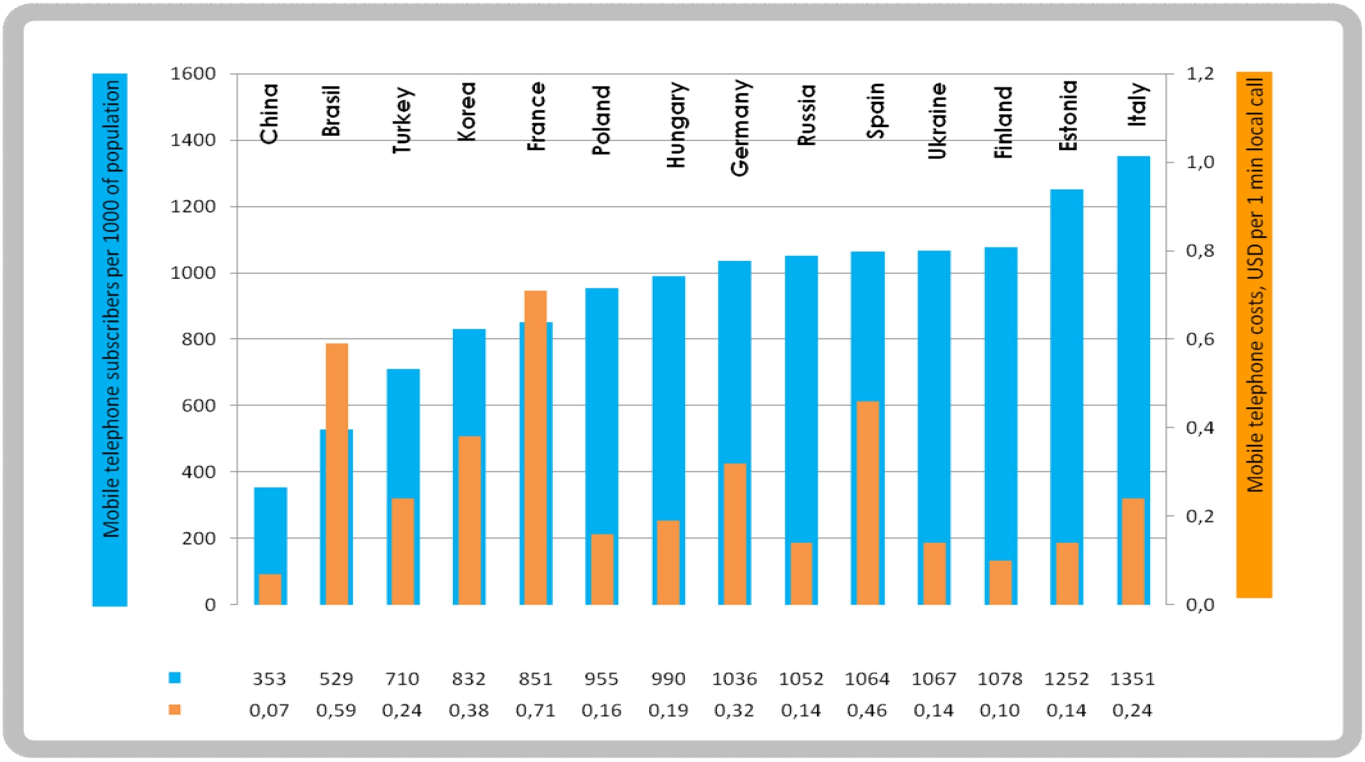
6 – Develop and implement an efficient policy designed to improve the transparency of transactions related to money transfers by international migrants for their legalization and further efficient use; stimulate competition between domestic banks and other operators of money transfers on the national market of international money transfers, which, due to increased competitive pressure, will reduce service charges and de-shadow the money fluxes.

7 – Take an active part in training specialists and the establishment of an appropriate infrastructure for servicing the international transfer market, which will help invest the money assets in domestic economy more efficiently; assist banks and other financial institutions in implementing, under an appropriate legislative procedure, modern information and communication technologies in the sphere of international money transfers in order to provide the population with a broader access to them and reduce their cost.

(CCU Recommendations were based on the following source: **Poruchnyk A.M.** National Interest of Ukraine: Economic Self-Sustainability in the Global Dimension: Monograph. – Kyiv: Kyiv National Economic University, 2008. – 352 p.)

MOBILE COMMUNICATIONS, 2006

1.48 India	1,067 Ukraine 18 (51)	1,516 Luxemburg
0.71 France	0.14 Ukraine 14 (14)	0.01 Canada
Minimum in IMD Ranking	Ukraine in IMD Ranking 2008 (2007)	Maximum in IMD Ranking



Source: IMD World Competitiveness Yearbook 2008

Ukraine's mobile communications market is one of the most dynamic sectors of the country's economy. The extent of its penetration has exceeded 100% and this indicator has already placed Ukraine ahead of many developed countries, including Germany, Spain, France, Korea, Poland, Russia, and China.

The cost of mobile communication services in Ukraine has practically caught up with the price indicators of countries like Finland, Estonia, Russia, and Poland, and is much lower than in the lead countries.

Comparative Assessment of Mobile Communication Penetration in Ukraine (2007)

As of 31 December 2007, Ukraine had 55.58 million subscribers to mobile communication services, which is almost 13% more than the previous year. At the same time, the growth rate of the subscribers pool significantly dropped in 2007 over 2006 and 2005 indicators (63.1% and 117% respectively). The extent of the nominal mobile communication penetration in 2007 grew from 105.1% to 119.8%. The biggest subscription share last year was provided by the "Astelit" (3.3 million subscribers, or 59%) and Kyivstar (2.1 million subscribers, or 9.7%).

Ukraine's Mobile Operators

	Number of subscribers as of 31 December 2007	Yearly Growth of Subscribers
Kyivstar	23,604,000	9.73%
MTS	20,003,671	0.01%
Astelit	8,823,000	58.97%
URS	2,646,647	41.07%
Velton Telecom	115,229	23.81%
ITC	115,214	92.43%
Intertelecom	105,825	202.36%
Ukraine Telesystems	86,800	–
Golden Telecom	42,500	–12.25%
CST-Invest	26,000	117.59%
Ukrainian Wave	9,500	–25.20%
Ukrtelecom	8,500	–

Source: IKS-Consulting (http://www.iks-consulting.ru)

GLOBAL EXPERIENCE

Mobile telephony is one of the most common information and communication technologies of the 21st century. In 2006, the average global number of subscribers to mobile telephone communication services was 40.6 users per 100 population, which is 80.4% more than in 2003. By groups of countries, its deepest penetration is characteristic for developed economies, followed by transition countries. The latter, however, are characterized by the highest dynamics in the penetration of this technology. Ukraine is also quite prominent among them, both for its modern level of mobilization and by the rate of its change, beating the global trends and the trends of mobile communication penetration in developed countries.

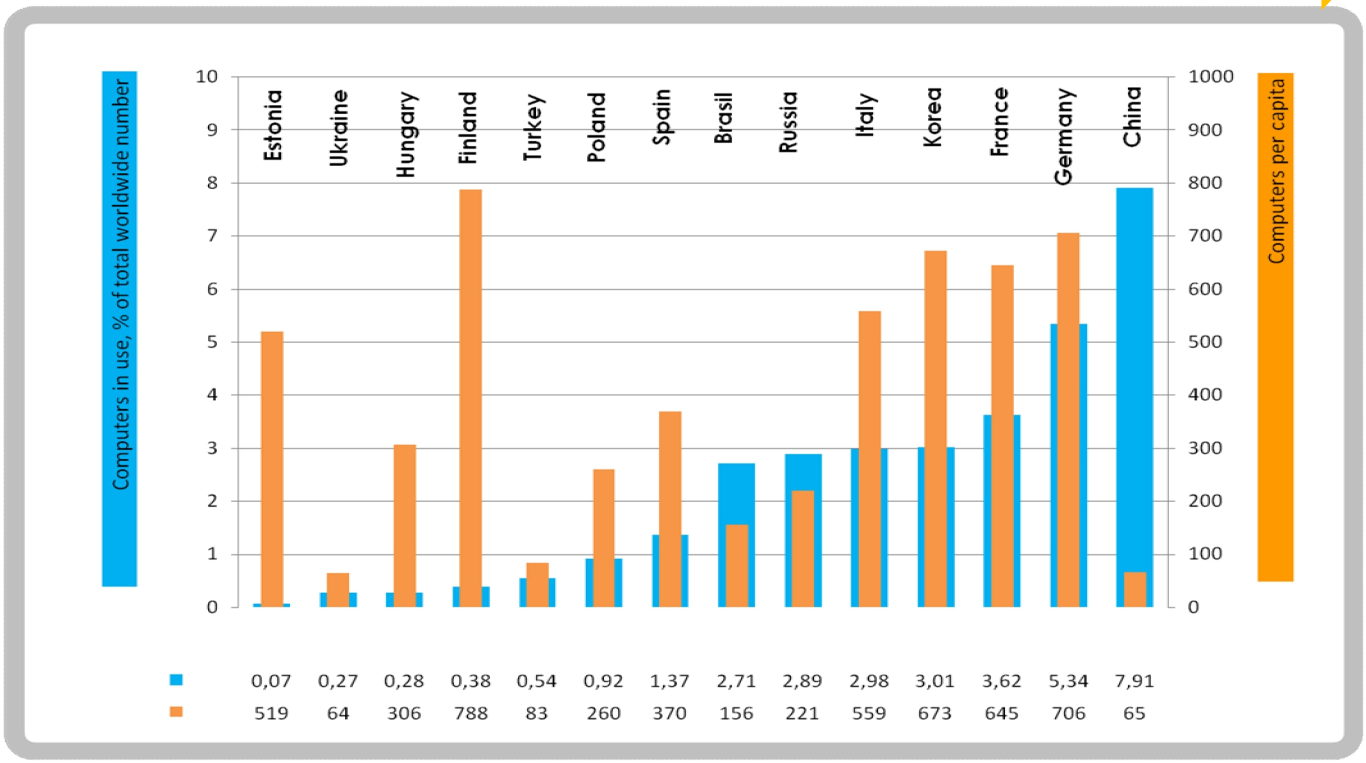
Mobile Communication Penetration (Number of Mobile Network Subscribers per 100 population)

Groups of Countries	2003	2004	2005	2006	Changes over 2003-2006, %
World	22.5	27.6	33.4	40.6	80.4
Developed countries	69.6	77.1	83.3	90.8	30.5
Developing countries	13.9	17.6	22.7	29.5	169.1
Transition countries	20.6	37.6	55.9	69.3	236.4
UKRAINE	13.7	29.0	36.7	105.2	667.9

Source: United Nations Conference on Trade and Development. International Economy Report 2007-2008.

COMPUTERS IN USE, 2007

0.03 Luxemburg	0.27 Ukraine 44 (46)	23.07 USA
24 India	64 Ukraine 52 (53)	847 Sweden
Minimum in IMD Ranking	Ukraine in IMD Ranking 2008 (2007)	Maximum in IMD Ranking



Source: IMD World Competitiveness Yearbook 2008

By its computerization indicators, Ukraine stays far behind a lot of developed, developing, and transition countries. In terms of computer utilization ration as compared with the world indicator Ukraine falls behind virtually all world economies, except Estonia.

ICT Prospects in OECD Countries

The key service and, to a large extent, the driving force of today's telecommunication markets in OECD countries is transfer of oral information, with annual estimated profits of about USD 1 trillion. Today mobile services account for up to 40% of the entire telecommunication revenues in the OECD zone, while the number of subscribers to mobile communication services has exceeded the number of fixed-phone owners in the 3:1 ratio. The reduction of voice service cost is generally encouraged by such technologies as Voice over Internet Protocol (VoIP). VoIP affects the prices of international phone calls via fixed phone lines, which many operators are linking with a fixed tariff. A dynamic growth of high-speed Internet, intensified competition on telecommunication markets, building up of municipal Internet networks, convergence of fixed-phone and mobile communication, permanent intensification of telecommunication commerce in the near future will become the decisive factors of penetration and high-quality upgrading of mobile and Internet communication.

Source: OECD Communication Outlook 2007

At the official national level, Ukraine recognizes that in comparison with the world tendencies, its extent of the information society development is insufficient and does not correspond to Ukraine's potential and capabilities due to:

– low efficiency of using financial, tangible, and human resources aimed at IT penetration and implementing ICT in the social economic sphere, in particular, in agriculture;

– current lag in implementing electronic business technologies, electronic stock exchanges and auctions, electronic depositaries, utilization of non-cash payment for commodities and services, etc.;

– underdevelopment of the legal framework in the information sphere;

– low level of Ukraine's information presence on the Internet and insufficient presence of information resources in the Ukrainian language;

– insufficient level of state support for the production of the instruments of IT penetration, software products, and ICT introduction, which does not satisfy all demands of economy and social life;

– unequal possibilities concerning the population access to computer and telecommunication means, exacerbating information inequality between specific regions, branches of economy, and social strata;

– lack of comprehensive solutions to the issues of software intellectual property protection, lack of system-based state decisions aimed at creating national innovation structures (centers, technopolises and technological parks) specializing in the development of competitive software.

Source: Law of Ukraine "On the Basic Prerequisites for Developing Information Society in Ukraine for the period 2007-2015"

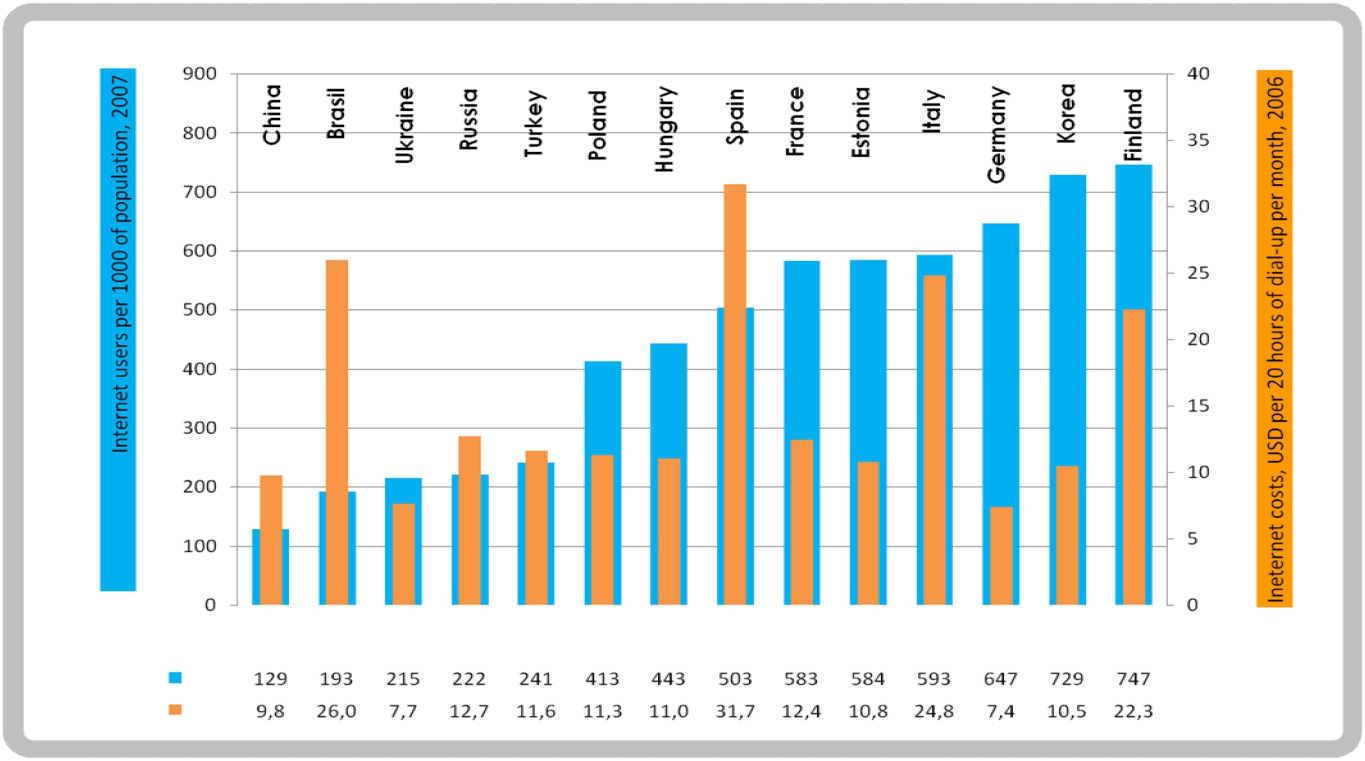
GLOBAL EXPERIENCE

Reforming ICT Sphere in Sweden

Sweden, a world leader in the IT sphere has a rich and rather educative experience in IT reforms. A remarkable reform was conducted by the Swedish authorities in the late 1990s – early 2000s and concentrated on providing households with good quality computer equipment (the so called PC Reform, which officially started on 1 January 1998). The main reform objective of was to encourage people to buy and upgrade PCs, and the main mission – to support Swedish citizens in their access to new opportunities provided by modern information society. According to the state policy, Swedish enterprises obtained tax benefits to buy PCs, which were proposed to the employees' households. The price for such computer equipment was much lower than the market one. Following successful measures, the number of employees with the overall access to computers at home has grown from 50% to 70% during just one year.

INTERNET IN USE

82 India	215 Ukraine 44 (45)	787 Sweden
63.2 South Africa	7.67 Ukraine 9 (9)	1.81 Philippines
Minimum in IMD Ranking	Ukraine in IMD Ranking 2008 (2007)	Maximum in IMD Ranking



Source: IMD World Competitiveness Yearbook 2008

Despite sustainable positive dynamics in the pattern of Internet users and improvement of the required technological infrastructure, the overall availability of the Internet in Ukraine is low (a little higher than 20%).
In terms of Internet availability, Ukraine ranks second from the bottom in Europe after Albania (the average indicator in the European countries being 39.8%).

20 dial-up hours of access to the Internet in Ukraine cost considerably less than in developed and developing or transforming countries (four times less than in Spain and Brazil; three times less than in Italy and Finland; and twice less than in Russia and Poland).

2006 revenues from providing Internet access amounted to only 1,058.1 million UAH or 2.2% of Ukraine's overall market of information and communication technologies.

The highest number of Internet users resides in the Kyiv region (61.92% of the total number of users), followed by Odesa (6.67%), Dnipropetrovsk (5.2%), Donetsk (4.45%), Kharkiv (3.72%), and Lviv (2.98%).
The remaining regions aggregately account for 15.06% of users.

Source: Cabinet of Ministers Report to the Verkhovna Rada of Ukraine "On Status and Development of Informatization in Ukraine in 2007".

Main Factors Which Hold Back Internet Penetration in Ukraine

The existing level and dynamics of the Internet penetration in Ukraine, in comparison with the global tendencies, are insufficient and do not correspond to our country's potential and possibilities of in the sphere due to the following reasons:

– physical and moral obsolescence of the telecommunication infrastructure limit the possibilities of swift Internet penetration into Ukrainian business environment and household sector;
– the current state approach towards the Internet penetration in Ukraine is inefficient, because of the existing problem of coordinating the politicum, the authorities and specialists in drawing up and implementing the strategy and tactics of the Internet penetration;
– state support to the development of the infrastructure aimed at providing information services through the Internet is insufficient and does not meet today's demands; the current legal infrastructure of the IT penetration is imperfect and not upgraded on a continuous basis;
– the currently low level of computer literacy of Ukrainian population, especially in the rural parts of the country, does not encourage an intensified introduction of Internet technologies into various spheres of life;
– a high level of monopolization of communication networks, numerous barriers on the way to their utilization entail a non-transparent tariff policy regarding the Internet;
– a relatively high cost of good quality service of Internet access hinders IT penetration.

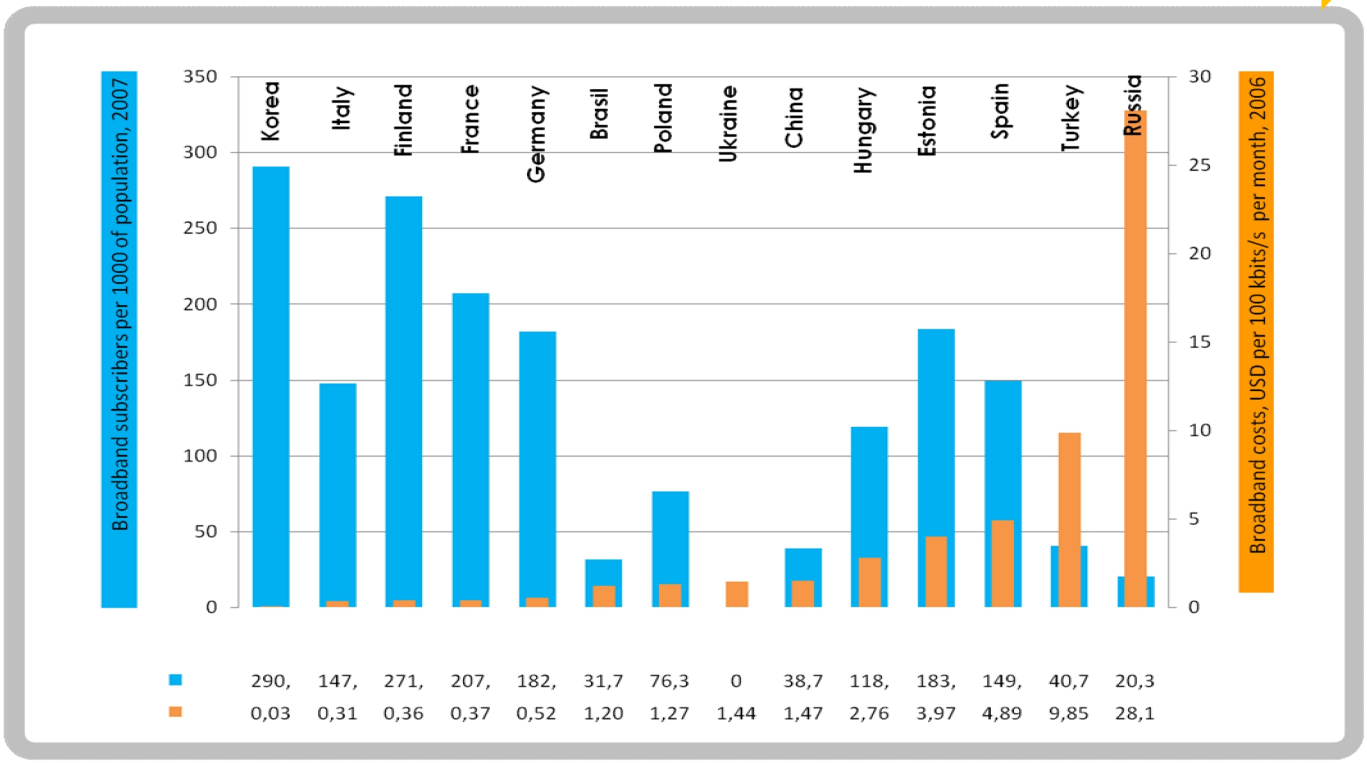
Extent of Internet Penetration (number of Internet users per 100 population)

Groups of Countries	2003	2004	2005	2006	Changes during 2003-2006, %
World	11.4	13.6	15.6	17.3	51.8
Developed Countries	44.7	51.3	54.8	58.2	30.2
Developing Countries	5.3	6.6	8.4	9.7	83.0
Transitive Countries	7.3	11.1	13.0	16.3	123.3
UKRAINE	5.3	7.9	9.7	11.9	124.5

Source: United Nations Conference on Trade and Development, Information Economy Report 2007-2008.

BROADBAND INTERNET IN USE, 2006

0.88 Indonesia	Ukraine is out of data	319.75 Denmark
28.13 Russia	1.44 Ukraine 22 (n/a)	0.03 Korea
Minimum in IMD Ranking	Ukraine in IMD Ranking 2008 (2007)	Maximum in IMD Ranking



Source: IMD World Competitiveness Yearbook 2008

In the first quarter of 2008, the number of the broadband Internet subscribers in Ukraine reached 1.05 million, thus increasing its availability to 5.0% of Ukrainian households from 2.8% for the same period last year. In March 2008, Ukraine had an overall 820 thousand broadband access subscribers, both individuals and legal entities.

The cost of broadband in Ukraine is moderate, although appreciably higher than in the world's developed countries, such as Korea, Italy, Finland, France, and Germany.

The rating of broadband Internet access operators as of March 31, 2008 (thousands of subscribers):

1) Ukrtelecom – 250; 24.0%.
2) Volia-Cable – 200; 19.0%.
3) Optima-Farlep-CSS – 85; 8.0%.
4) TeNet (Odesa) – 27; 3.0%.
5) Golden Telecom – 22; 2.0%.
6) Datagroup – 18; 2.0%.
7) IPNet (Kyiv) – 12.6; 1.0%.

Comparative Assessments of Broadband Internet Penetration in Ukraine

The number of Internet users continues its global growth. Although the majority of Internet users are registered in the developed countries, developing nations and especially transit economies are steadily and confidently catching up. By the dynamics of Internet penetration, Ukraine has taken the lead among all groups of countries, though its Internet availability rate is generally lower than in the developing nations.

Forecasted penetration of broadband Internet networks into Ukrainian households will not exceed 5% until 2010, according to the materials summarizing the meeting of investors of the American media-holding Central European Media Enterprises Ltd (CME). According to the assessment of the holding, in Romania this indicator now makes around 3% and will exceed 10% before 2010. In Slovakia, the broadband networks penetration into households already makes around 10% and will reach 40% before 2010. According to CME, Slovenia is leading in the household use of broadband networks access with its 40% current penetration, which will reach 55% before 2010.

Source: Ukrainian Internet Association, Interfax-Ukraine.

CCU RECOMENDATIONS

1. To encourage activities aimed at providing Internet access to everyone and everywhere; to stimulate development of markets which improve the broadband Internet access infrastructure of top quality and at competitive prices and offer users the opportunity to choose.
2. To develop communication based upon the leading broadband Internet technologies between agencies, ministries, and the private sector in the vital sectors, including health care, education, environmental protection, and transportation as well as in the social and economic sectors, including commerce, antimonopoly and regulatory spheres, tax and social policy.
3. To provide reliable protection of information infrastructure with regard to possible threats.
4. To stimulate investment into projects developing Internet-technologies aimed at the improvement of the service quality.
5. To improve the taxation system for enterprises using information and communication technologies to avoid hidden taxes contradicting the general system.
6. To harmonize Ukrainian national programs and activities in the sphere of developing information and communication technologies with the global processes, in particular those taking place in the OECD countries.

(Recommendations are provided with account for the materials of the OECD Ministerial Meeting in Seoul, 2008, on the future of Internet-economy).

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KNOWLEDGE ECONOMY: WORDS AND DEEDS

Terminology Is Important

The modern paradigm outlining the essence and the factors of a country's global competitiveness in terms of methodology is directly linked to the new category introduced into scientific usage by an originally English term "knowledge-based economy." Only after a certain period of conceptualization of its contents, the term started to be used in its shortened form "knowledge economy." This linguistic history manifests a conscious attempt to render the conceptual meaning as accurately as possible. The relevance and timeliness of such linguistic rigor have also found their proof in Ukraine, where most specialists translate this category into Ukrainian as "economy of knowledge" ("економіка знань"). Such a translation prompts a common perception of this category as a branch phenomenon similar to the economy of industry, agriculture, transport, etc. Nonetheless, this translation is confusing, because the main conceptual meaning of this category is positioning the knowledge resource as the major incentive of the economic growth of a country. The methodological core of this category is presented not by the features of functioning of specific branches which deal with knowledge production in its various forms, but rather by the final synergetic result constituted by the application of knowledge to ensure sustainable economic development. For Ukraine, this "nuance" is critical, because we have a substantive gap between the achievements of individual branches of knowledge and the standard of well-being in the country on the whole. Thus it will be more accurate to translate the traditional term "knowledge-based economy" into Ukrainian as an attributive phrase, "knowledge economy," and not as an of-phrase "economy of knowledge." Further analysis will provide additional support to such use of terminology.

The paradigm of knowledge economy has established itself at the turn of the millennium and today it has become a major theoretical platform for the policy of economic growth both for the developed and the developing countries. It is known that the concept of knowledge economy served the basis for the Lisbon Strategy adopted by the European Union in 2000, which aims at creating in Europe before 2010 the most globally competitive and dynamic knowledge economy, ensuring sustainable economic growth, an increasing number of attractive vacancies and a better social well-being. Relevant criteria are applied also to EU accession countries already as specific requirements to their current economic policy. This also applies to Ukraine as a potential candidate to join the united Europe and as a neighboring country and an important economic partner of the European nations. So, adequate understanding of the essence of the knowledge economy concept and the relevant activities of the state economic policy concerning its practical implementation are timely for today's Ukraine, both for it to pursue the strategy ensuring its strategic competitiveness and within the geopolitical context.

Knowledge Economy Is a Solution for Bridging the Gap between the Levels of Competitiveness

The concept of knowledge economy advances a cardinally new theoretical and practical conclusion, i.e. that the principles of policy to obtain global leadership become a necessity for outsider countries as well, provided they do not give up on the economic growth. This especially concerns the countries striving for powerful development. The peculiarity of today's phase of the global economy evolution is that it is now impossible to hesitate about implementing the strategy used by the leading countries of the world without being an outsider. The main impetus of this strategy is presented by efficient knowledge application via creation and global diffusion of R&D innovations. This conclusion is convincingly validated by a well-known group of scientists headed by Michael Porter with a series of researches into competitiveness factors conducted as part of the annual Global Competitiveness Report preparation under the aegis of the project of the Davos World Economic Forum.

In the 2002 Global Competitiveness Report, Michael Porter's group presented one interesting result of a multicriterion research into the factors of the countries' competitiveness, namely, that the level of global competitiveness of a country can in an aggregated way represent one indicator – utility patents granted per million population. The analysis of competitiveness by dozens of parameters has shown the same assessment result, as by the above one, which actually reflects the efficiency of the processes of applying innovative and technological knowledge. The analysis of this parameter brought about the conclusion that all countries could be grouped into two categories: the key technologically innovative ones and the rest. The first group is formed by the most successful countries according to their level of well-being and competitiveness, while the classification into this group depends on ensuring such a level of innovative technological development when the indicator of utility patents exceeds 15. In 2001, there were 24 such countries, which substantively surpassed other countries' indicators (according to the 2006 Report, these countries were joined only by Luxemburg, which was not presented at all in 2001). The analysis also showed that for the first group of countries the technological factor ensured half of the total high level of the general competitiveness indicator, while for the countries classified as the non-innovating the contribution of the technological factor did not exceed one third.

Unfortunately, for Ukraine this indicator equaled only 0.5 patents in 2006. This proves that our country is seriously lagging behind with regard to the level of global competitiveness. This is also confirmed by the multicomponental general index, according to which in 2006 we ranked only 73rd among 131 analyzed countries.

The indicator of the number of USPTA utility patents granted in 2006 per million population for the countries neighboring Ukraine was the following: Russia – 1.2; Poland – 0.8; Hungary – 4.9; Slovakia – 0.7; Romania – 0.4; Bulgaria – 0.4; and Turkey – 0.2. These data can be somewhat reassuring if one ignores the dynamics of these processes, which can be observed using the statistics of the US National Science Foundation.

Ukraine is not even presented in the statistics, which proves that the number of patents granted to our citizens is insignificant. This is confirmed by the data of the State Statistics Committee of Ukraine.

It can be noted that according to the criterion under discussion, Russia, Hungary, the Czech Republic, and Poland have a serious strategic competitive advantage over Ukraine, which is not only falling considerably behind, but (and this is more dangerous) does not demonstrate any changes for the better. Nonetheless, if we consider the experience of the countries, which have recently successfully implemented their strategy of an economic breakthrough and have substantively bridged or even liquidated the gap with the world leaders, one can see that their economic achievements were directly dependent on targeted extraordinary efforts and targeted policy on the platform of dynamic formation of innovation knowledge economy.

In our opinion, Table 1 convincingly illustrates the above said. It presents data concerning the countries, which in the 1980s were not yet members of the group of the key technological and innovating states and which have caught up with the leaders during the last 20 years. Among these countries are the Republic of Korea, Singapore, Taiwan (China), Hong Kong, and Ireland. Economic achievements of these countries are well-known and assessed according to many parameters. But the discussed criterion of knowledge economy development not only confirms its mono-representativeness, but also gives a very palpable demonstration of the nature of the measures that have ensured the success, i.e. active application of acquired innovation technological knowledge. The rate of such processes in these countries is impressive: within 20 years our criterion has increased there 94.7; 39.0; 21.9; 8.0; and 4.7 times respectively.

Table 1. **Growth Rate of Knowledge Factor, i.e. USPTA Utility Patents, Used by Countries, Which Have Caught Up with Key Technologically Innovative Countries (admission level – 15 USPTA Utility Patents Granted per Million Population) in the Past 20 Years**

2006 Rating	Country	Qty USPTA Utility Patents Granted in 2006 per Million Population	Average Annual Qty USPTA Utility Patents Granted in 1980-89 per Million Population	2006 Growth Rate to the Average Annual of 1980s, %
8	Republic of Korea	123.1	1.3	9,469%
11	Singapore	93.6	2.4	3,900%
13	Taiwan, China	280.2	12.8	2,189%
21	Hong Kong	43.4	5.4	804%
22	Ireland	41.4	8.8	470%

Source: The Global Competitiveness Report 2007-2008. – The World Economic Forum, Geneva, 2007

This example is very representative for the Ukrainian situation, where the economic policy is so far characterized only by declarations about the goodwill concerning the "innovation vector of the economic growth," while top politicians have for many years delayed cardinal reforms aimed at developing modern knowledge economy of the post-industrial type. They still do not dare to take radical measures to stimulate progressive structural reconstruction and efficient reforms in education, science, and innovation.

Competitiveness according to Innovation Cycle Stages

The analytical database presented in the Global Competitiveness Report 2007-2008, drawn up under the supervision of Klaus Schwab and Michael Porter, allows a more detailed analysis of Ukraine's global competitive position from the point of view of conceptual approaches and criteria concerning the formation of knowledge economy.

As remarked, the main peculiarity of these criteria is their focusing on the final result of the innovation cycle, i.e. the application of innovation technological knowledge. The traditional linear model of this cycle, which distinguishes management systems for its different stages (education – R&D – manufacturing technologies – implementation) today is justly criticized for its concentration on the R&D stage and not on the final result – commercial application of innovations. Developed individual stages do not guarantee the desirable final result, which is transformation of available knowledge into a factor of economic growth. Ukraine's situation can be clearly identified by using the rating of the above Global Competitiveness Report.

To this end, we have arranged certain indicators used to build the aggregate competitiveness index according to their inclusion in different stages of the innovation cycle. Then we have compared the country ratings by each indicator to assess the development of each stage and compared these indicators. Such analysis can also be used to compare situations in different countries. In this analysis we have also compared Ukraine, Poland as a counterpart country, and Finland as a recognized world leader in developing knowledge economy and as a country which has very quickly managed the transition from a European outsider to a leader of the global competitiveness rating.

Innovation Cycle Stages Present the Following Parameters of the Above Report:

Education Stage:

1. Tertiary education enrolment. 2. Quality of the educational system. 3. Quality of math and science education. 4. Quality of management schools.

R&D Stage:

5. Capacity for innovation. 6. Quality of scientific research Institutions. 7. Company spending on R&D. 8. Government procurement of advanced technology products.

Innovation Management Stage:

9. Nature of competitive advantage (*scale 1-7, global competitiveness of companies is established by 1=low cost and availability of local resources, 7=unique products and technologies.*)

10. Production process sophistication (*scale 1-7, production process involves 1=labor-intensive methods and outdated technologies, 7=world best and most efficient technologies.*)

11. USPTA utility patents.

12. Extent of marketing.

Knowledge Application Stage:

13. Brain drain (***the lower the drain***, the higher the rating).

14. Availability of latest technologies.

15. Firm-level technology absorption.

16. FDI and technology transfer.

Table 2 presents the ratings of the three above countries for all the above competitiveness indicators, which reflect the situation of a certain stage of the innovation cycle. The analysis of the Report lists a total of 131 countries. The best rating is 1, the worst – **131**.

Table 2. **Ratings by the Davos World Economic Forum for the Selected Countries by Indicators of the Innovation Cycle Stages in 2006**

	Ukraine	Poland	Finland
Education Stage			
1. Tertiary education enrolment	**17**	**22**	**2**
2. Quality of the educational system	**47**	**49**	**2**
3. Quality of math and science education	**44**	**48**	**1**
4. Quality of management schools	**85**	**50**	**12**
R&D Stage			
5. Capacity for innovation	**40**	**44**	**5**
6. Quality of scientific research Institutions	**60**	**64**	**6**
7. Company spending on R&D	**67**	**42**	**9**
8. Government procurement of advanced technology products	**75**	**89**	**11**
Stage of Innovation Management			
9. Nature of competitive advantage	**78**	**51**	**6**
10. Production process sophistication	**69**	**62**	**6**
11. Utility patents	**58**	**51**	**4**
12. Extent of marketing	**87**	**67**	**29**
Stage of Knowledge Application			
13. Brain drain	**93**	**77**	**10**
14. Availability of latest technologies	**97**	**80**	**2**
15. Firm-level technology absorption	**91**	**76**	**7**
16. FDI and technology transfer	**106**	**81**	**74**

Source: The Global Competitiveness Report 2007-2008. – The World Economic Forum, Geneva, 2007.

If the stages of education and R&D present us quite favorably and approximately at the same level with Poland, the final stages of the cycle, which imply getting a commercial innovation result, show our lag. The data on Finland, a world leader in developing knowledge economy, reveals the importance of striking a balance in the development of all innovation cycle stages. It also illustrates a previously made conclusion about the comprehensive organic nature of knowledge economy, where all stakeholders efficiently cooperate to achieve the final innovation result while maintaining continuous feedback between the presented stages. Such methodology reveals the fallacy of the policy by which specific innovation cycle stages are managed separately , which is exactly the case in Ukraine.

Knowledge Economy Development Policy

The presented analysis has once more shown that the technological determinism in many ways shapes the nature and the results of the "civilizing" competition between national economies for a position in the global development rating and for

the corresponding well-being and social and economic prosperity of these countries. Hence, Ukrainian society and its authorities desperately need to understand the objective nature of these processes. Today's situation of international competition simply leaves Ukraine no other choice, but to implement a policy mobilizing the national potential to ensure an efficient integration of Ukrainian economy into the technological path of human evolution, which today depends on the ability of a country to implement the concept of knowledge economy.

The factor of innovative technological changes is of great importance specifically for mid-term and long-term economic development. Although a country can improve living standards during a short-term period without such changes, for instance, by increasing investment, it does not guarantee a sustainable result. Modern economic analytical studies convincingly prove that only the factor of technological changes ensures a continuous economic development of a country regardless of its position in the global development rating.

International comparative research has shown that one can identify three main hindrances in the outsider countries which prevent them from efficient implementation of innovative technologies.

– an insufficient legislative and institutional framework to stimulate dynamic, independent, risky business competition;

– a decreasing number of businessmen motivated to work on the high technologies market;

– low income per capita, which does not provide incentive and financial opportunities to work for the long-term perspective.

Real development of **knowledge economy** should start with a design and implementation of the following three clusters of social economic policy:

1. Designing a comprehensive national strategy to start and maintain sustainable development of knowledge economy. The key element of this strategy is setting up priorities in the mass consciousness of people: mastering the latest knowledge, searching for it and forming scientific and technical innovations in business as a form of efficient application of such knowledge. In this context, it is also very important to establish the dominant features of susceptibility and readiness to continuous changes in the processes of participation in international global economic competitions.

2. Implementing this concept on a broad social platform of participation and responsibility of all strata of the government community, including, apart from statesmen, the private sector, academics, researchers, innovators, civil society institutions, mass media, etc.

3. Ensuring close and efficient cooperation, coordination and balancing of the development of the key sectors of economy, which are required for progress towards knowledge economy, as well as accelerated establishment of modern information infrastructure for **broad** access to modern advanced knowledge.

Social economic consistency and comprehensive nature of knowledge economy should be ensured by the coordinated and balanced development of the major six governance segments, which guarantee efficiency of the corresponding state policy.

1. To set up a system of economic motivation and institutional environment to stimulate large-scale and efficient use of national and global knowledge in all the sectors of economy, to activate entrepreneurship, and to provide opportunities and support to economic and social transformations, required by the current stage of the scientific and technological revolution.

2. To form the society of highly qualified, mobile, and creative individuals, who, during their life, have a constant opportunity to master new state-of-the-art knowledge and to have a broad access both to public and to private funding of innovation activities.

3. To establish a dynamic information infrastructure, a competitive and innovative information sector in the economy, which would expedite spreading efficient and competitive information and provide broad communicative possibilities for all social strata.

4. To set up an efficient innovation system and a favorable business environment, which would stimulate innovation and business. The national innovation system includes companies, scientific and research centers, universities, analytical centers, and other organizations capable of mastering and processing information from a constantly growing global "knowledge bank", making their own contribution to it, and also efficiently using this knowledge to meet the needs of their own country and to create new products, technologies, services, and business trends.

5. To set up a favorable financial environment and its institutional structure capable of ensuring capitalization of high-technology manufacturing facilities as the final result of innovative activities. This should create a growing effective demand for technological and product innovations, foster a structural reform of manufacturing facilities on the platform of the modern technological base, which should build a reliable foundation for sustainable economic growth of the country.

6. To set up a new cultural environment maximally adequate for implementing the policy of developing knowledge economy. Experience shows that quite a lot of countries have a cultural environment which constrains the development of knowledge economy and remains conservative and dominated by historical and mental tradition that is not always favorable for succeeding in today's situation of international competition. Thus, for certain countries lack of transformations in the cultural environment can be a negative factor for meeting the development challenges.

It is important to emphasize that the policy of forming knowledge economy will be efficient, provided all the above segments of state governance work for the final **result**, i.e. national mass production of innovative products and technologies, which would be competitive on the world market. Special importance is acquired by the upgrading of "assembly shop" elements of this complex system, i.e. the scientific and technical innovation sphere of the national economy. In Ukraine this sphere is lagging behind the potential of the educational and scientific-and-technical spheres, but the latter need cardinal innovation reforms, too.

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STATUS AND DYNAMICS OF INNOVATION ACTIVITIES IN UKRAINE

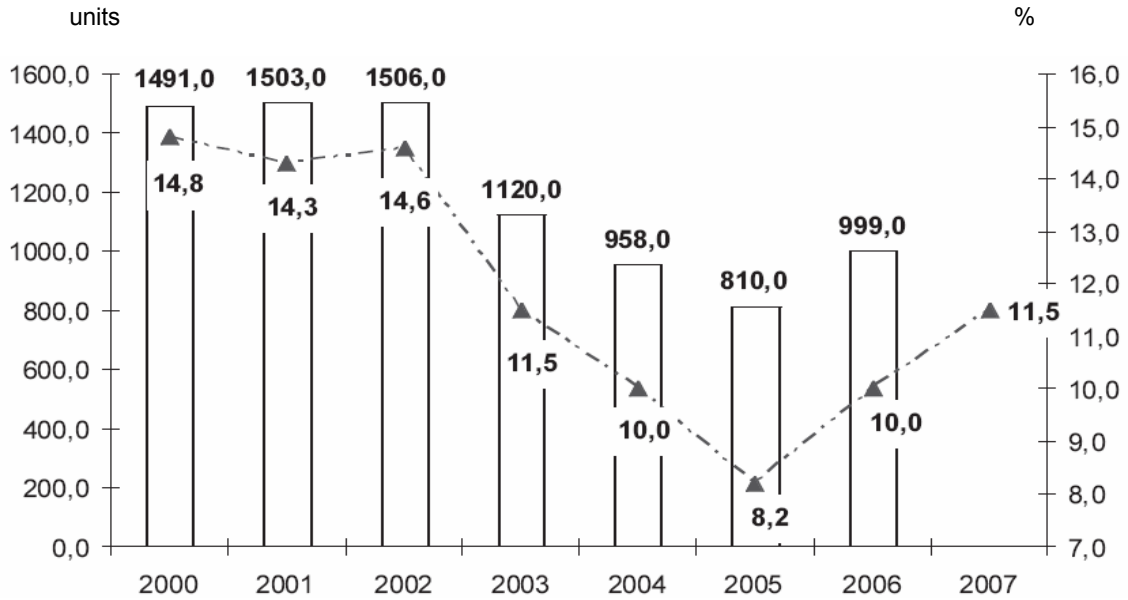
1. General Dynamics of Traditional Indicators

For several years, the dynamics of innovation activities in Ukraine has been contradictory. On the one hand, the proportion of innovating companies demonstrated a tendency towards getting smaller (see Fig. 1). On the other hand, the expenditure on innovation activities has been steadily growing. Besides, innovatively active companies have strengthened their export focus. At the same time, the expenditure on innovation activities has become more and more diversified. The proportion of the general expenditure on new equipment is growing smaller in the total expenditure on innovation. At the same time, enterprises have started to spend almost twice as much on R&D activities and R&D results purchase.

The weakness of the Ukrainian banking system together with high interest rates and lack of state support to innovation activities are forcing innovating enterprises to rely basically on themselves, though the proportion of the banking funding grew from 6.7% in 2000 to 8.5% in 2006. At the same time, the proportion of companies self-funding in the overall structure of funding innovation activities grew from 79.6% in 2000 to 84.6% in 2006, while the proportions of the international funding, funding by national customers, and funding from non-budget funds have substantively decreased.

It should also be noted here that the overall level of innovation funding, especially at the early stages of a company's development, still remains quite low. Since 1999, Ukraine has had several operating registered technological parks created on the basis of lead institutes of the National Academy of Sciences, which support inside firms at the expense of the basic institutes. Nonetheless, it is difficult to qualify such funding as venture funding.

Fig. 1 Number of Companies Which Implemented Innovations and Their Proportion in the Total Number of Industrial Companies



Among innovation-active companies, the lead is taken by large enterprises of the fuel and energy complex. It is quite natural, because large enterprises have better opportunities (and a larger need) to introduce at least one innovation. In general, in the sector of small and medium enterprises only 6% of small enterprises were innovative in 2006, among the medium enterprises this proportion reached 16%, while among the large ones – 40%.

Insufficient transformation of the R&D results into innovation activities still remains a major problem. Starting 2001, the proportion of applied research in the overall structure of scientific and technological work has remained smaller than the expenditure on fundamental science, which is not at all characteristic for developed economies.

Ukraine strongly depends on foreign trade, but the proportion of its high-technology export in the aggregate export was as insignificant as 2% in 2000-2006 and remains relatively small in comparison with EU countries.

An analysis of the implementation of Ukraine's innovation policy has shown that this policy involves a limited number of instruments. Their structure suggests a very strong accent on direct government measures, primarily, on direct funding of certain programs with innovative or R&D components. Indirect stimulating measures of innovation activities and, in particular, the creation of intellectual property objects, virtually do not work in Ukrainian economy. Such an approach does not fully meet the challenges of the development of the national innovation system. Besides, it reduces the efficiency of the state policy. Certain projects, for instance, the operation of efficient technological parks, are stopped without achieving a unanimous consensus, which finally stagnates the process of modernizing the national economy. From the strategic point of view, there is a

need to review the balance between the activities to stimulate innovations in the business environment and the instruments of direct government funding through innovation (R&D) programs.

2. Ukraine and the European Innovation Scoreboard (EIS)

For many years, different countries have been designing various comprehensive indicators of R&D and innovation development. The most well-known among such comprehensive indicators, extensively used lately, is the European innovation index calculated on the basis of a system of scientific and technical development indicators – the European Innovation Scoreboard (EIS), which, according to EU experts, allows to get an objective assessment of the level of scientific and technical development of EU countries.

EIS indicators are presented in five groups, which reflect various aspects of innovation development:

1. Innovation drivers, i.e. indicators reflecting the situation of the innovation potential and its structure.
2. Knowledge creation, i.e. indicators reflecting R&D funding levels.
3. Innovation & entrepreneurship, i.e. indicators reflecting the levels of innovation activity at enterprises (firms).
4. Applications, i.e. indicators, reflecting employment and commercial activity in the innovation sectors.
5. Intellectual property, i.e. indicators, reflecting patent and other kinds of activities in intellectual rights protection.

When analyzing EIS indicators, the experts of the European Commission resort to the following approaches:

– indicators of specific countries and the EU on the whole are compared with similar indicators of the undisputed leaders of innovation development, namely, Japan and the USA;

– most indicators focus on assessing the efficiency (and not the overall amount) of innovation activities;

– comparative quantitative assessments are presented by specific groups of indicators.

On the whole, indicators relevant for Ukraine have been calculated practically for all available groups, but not all groups have been presented fully. Generalized data can be presented in a table, which will list concise information about the innovation potential of the country.

Nonetheless, even this limited data shows that Ukraine is significantly lagging behind the average EU-25 indices in terms of the possibilities in the IT area and especially in the area of intellectual rights protection on foreign markets.

Table **Ukraine Compared with EU-25: Generalized Conclusions**

Indicator	Ukraine / EU-25 (%)
IT potential	**69.0**
R&D potential	**68.0**
Industrial structure potential	**47.8**
Patents, trade marks, industrial samples	**0.1**

It should be noted that though Ukraine, like other former socialist countries, has quite high indicators of the population's education level and industrial production potential, the technological upgrading of manufacturing facilities and the innovation activity of enterprises remains comparatively low. Relative indicators of the expenditure on R&D in GDP are comparatively high, but their dynamics lags behind the similar dynamics of developed economies and rapidly developing nations. In the near future, the growth of the innovation potential of Ukraine should be mostly ensured by strengthening "input" flows aimed at upgrading and enlargement, as well as more efficient use of resources in the area of innovation.

Obviously, despite the implementation of a whole range of joint projects and declared necessity of the innovative way of development, the levels of scientific, technical, and innovation development of Ukraine and the EU lead countries are essentially different. Most of all it concerns the problems of intellectual property protection and somewhat less – the outdated economic structure. Approximation of these levels will require great efforts.

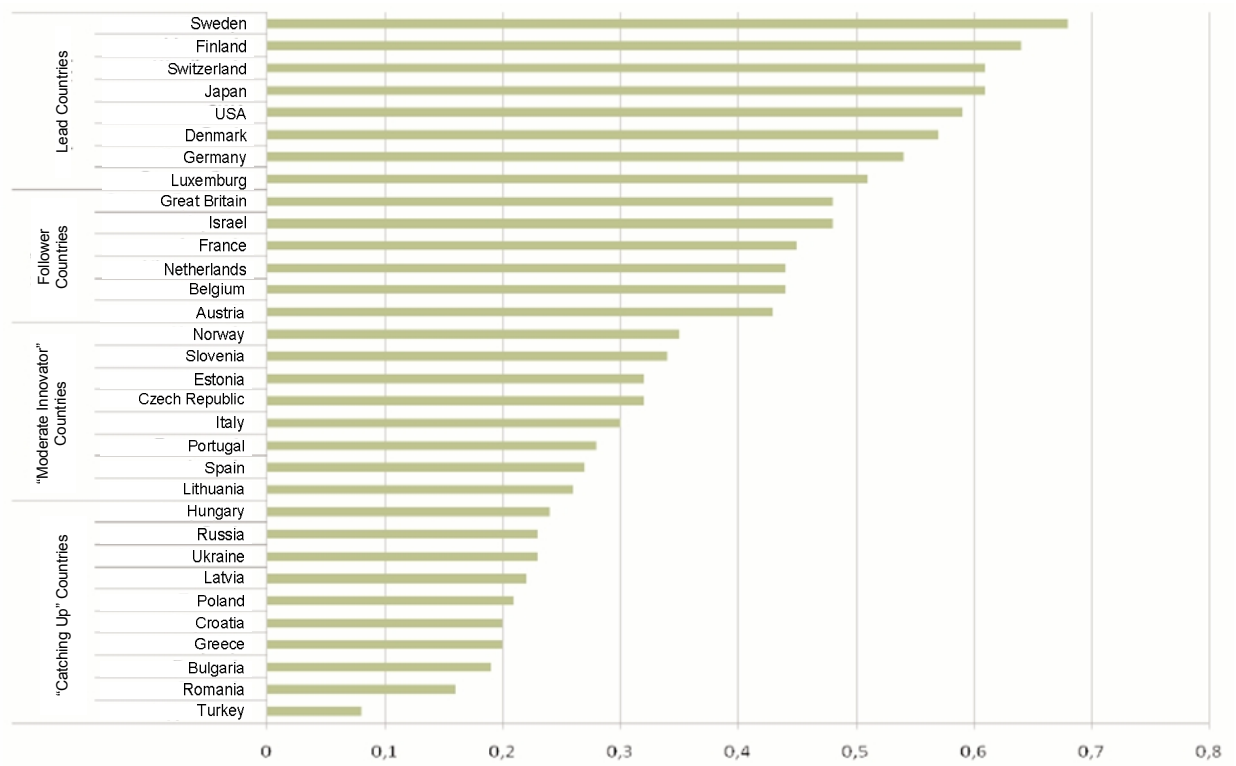
Another problem for Ukraine is that far not all EIS indicators can be obtained from the available statistics. Besides, the interpretation of specific indicators and the methodology of their calculations do not always follow international standards (this remark in particular concerns the peculiarities of accounting R&D expenditures and calculating the number of staff in the full employment equivalent). Many of the indicators can be calculated only on the basis of expert assessment and additional calculations. Such calculations should not limit themselves to the data of science and innovation statistics proper, but also make use of the indicators of social statistics and the statistics of small and medium enterprises, etc. At the same time, this data can be obtained by a corresponding polling during specialized innovation examination according to the methodology of the European innovation examination of enterprises, which is regularly conducted in the EU countries. Today such an experiment is conducted in several regions of Ukraine, which will help to considerably raise the level of trustworthiness of the obtained initial information. Nonetheless, the number of such regions is not large (five) and the examination involves only industrial enterprises. At the same time, it can be noted that part of the indicators listed in the questionnaire used in the examination is already used in the existing forms of statistical reports. So, there is a need to approximate the content of the examination questionnaire and the existing statistical forms.

3. European Innovation Index

To define relative positions of each country in the EU in the area of innovation development, the experts of the EU Commission calculate the Summary Innovation Index (SII), which is directly connected with the indicators of scientific, technical, and innovation development and is calculated on the basis of the EIS indicators.

For the first time, SII was calculated for Ukraine in 2007 within the framework of the specialized project BRUIT, carried out with the support of the European Union (see Fig. 2).

Figure 2. **Level of R&D and Innovation Development of Certain Countries by Innovation Index, 2006**



Regarding the position of different countries in the European Innovation Scoreboard, it shows that Ukraine, together with the majority of the countries IN Central and Eastern Europe, is in the group of "catching up" countries.

Figure 2 demonstrates the countries' ranking on the basis of the comprehensive indicator of innovation development. This indicator should be interpreted as a manifestation of how much the economic development of a country is based on innovations. It is evident that innovations in terms of EIS should be understood broader than just technological innovations. They reflect different aspects of innovations, R&D, innovations proper, as well as indicators of their diffusion, including the indicators of spreading new knowledge and the extent of IT application.

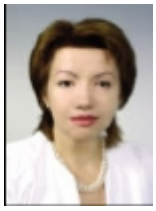
The overall value of the integral EU index turned out to be quite high for Ukraine (0.23 – the same as for Russia), but it is mainly conditioned by the fact that the values of several indicators, for which it was impossible to find the required data, have not been included in the calculations for Ukraine.

Conclusions

In 2007, during preparations to Parliamentary hearings, Ukrainian experts identified the key problems of innovation development:

1. A substantive difference in GDP per capita between Ukraine and other neighboring countries, like Poland, Hungary, etc., which have already started to create modern innovation systems.
2. A weak focus of the financial system on supporting innovation activities.
3. A generally low level of funding innovation activities.
4. An outdated branch structure of the economy with a high proportion of the mining and iron-and-steel industry, which fails to stimulate the development of innovation activities.
5. Very few results of national scientific research are used in innovation activities. Patent activity of the state research sector is insignificant.
6. Lack of incentives to develop high-technology small and medium enterprises.
7. External focus of mediating service companies, which strive to sell research results and innovations only to foreign clients.
8. Lower qualification of scientists and researchers.
9. Constant changes in the system of state management of the innovation development, which results in the loss of qualified specialists and strategic changes.
10. An insignificant influence of educational programs on innovation activities in Ukrainian society.

It is important to emphasize positive changes that have been taking place during the past few years resulting in better macroeconomic indicators of Ukraine. For instance, during the last seven years the difference in GDP per capita between the EU and Ukraine has been decreasing. The structure of the economy (the share of different sectors) also gained some positive momentum in 2003–2007, though the rate of the changes is still very slow. There is a need to concur and coordinate the innovation and the industrial policies.



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EDUCATIONAL IMPERATIVE TO ENSURE COMPETITIVENESS OF THE NATIONAL ECONOMY

In the context of the post-industrial paradigm of social development, education becomes one of the decisive incentives for changes in the major factors of production and the system of economic relations. The growing overall interdependence of all countries of the world and the emergence of information technologies, which essentially expedite all processes and change the whole system of technological relations, emphasize the challenges of finding adequate ways to foster the socioeconomic development of a country, and the competitiveness of its economy in the new global space.

Modern globalization highlights the issue of ensuring one's own competitiveness for each country and for each participant of international economic relations. This is possible only on the basis of a search for or formation of one's own competitive advantages, which would allow to advance to the international scene to implement one's own economic interests. The growing importance of information and knowledge in modern production results from the fact that competitive advantages are not predominantly formed by the availability of natural resources or raw materials. The factors which potentially can give competitive advantages in the modern complex environment include, first of all, those tangible, intangible, and human resources, which are information-intensive. Swift intellectualization of the economy has determined the next stage of the society development as information-based, for which the most valuable resource is information and science-intensive technologies. The first compulsory condition of creating an environment to spread and develop such resources is the availability of qualified personnel capable of producing information resources and working with them.

Obviously, in this situation the role of education as a system meant for transferring and spreading knowledge and cultivating a new quality of qualified labor force is growing and at the same time requires reconsideration. Globalization of all world economic processes and a growing interdependence and information unity of all countries objectively demand new approaches both to identifying the place and the role of education in the development of society and to the forms of its organization and management. A stronger need to resolve the challenges of education standardization results from the importance to ensure and improve the quality of educational services in the situation of the growing openness of national economies and freedom of movement of people, capitals, and commodities between countries.

The world leadership is taken by the countries, which, at first sight, have no resource prerequisites for it. In the post-war years these countries included Germany and Japan, to be later joined by South Korea, Singapore, and Taiwan, and lately acceded by Iceland, Finland, etc. These countries have prioritized the development of education and science and transition to principally new, resource-saving, low-waste, and ecologically friendly production technologies. Therefore, while previously education was merely given recognition for the development of society, today education and science are perceived as strategic factors for survival of the civilization against the background of exacerbated global problems.

The challenges of modern globalization concerning the development of education are reflected in the need for a growing scale of education and so its funding, a longer education period in the employee's career, a change in the demands concerning the quality features of the human resources involved in the modern production process, and the emergence of international forms of organizing and funding education.

Global development of education tends to attach to it greater importance for modern employee training, which is reflected in longer education. In today's situation higher education is confirming its status as the finalizing part of the primary education of the population, the education, which the new society of the 21st century must provide to each of its members before they start working or assume the responsibility of an adult family member.

The process of extending primary education for the entire population including the period of higher education started in the leading countries in the last quarter of the 20th century and gradually involved more and more countries of the world. In 2005, the period of primary education was 20.7 years in Great Britain and Australia, 20.3 years in Sweden, 20.0 years in Finland, 19.7 years in Iceland, 19.6 years in Belgium. 19.0 years in Denmark, 17.4 years in Germany, 16.9 years in the USA, and 16.9 years in Russia [1]. For Ukraine this indicator has not been calculated, but a certain counterpart can be the average length of primary education for Ukrainian population, which, according to the latest census, was 9.5 years of study as of 2001.

In understanding the need to extend primary education, higher education becomes its final stage with the objective to provide the youth and each of its representatives with a maximally high and accessible standard of general and professional competence before the start of their productive life, In the developed countries 40 to 60% of all employees have a higher education, and this proportion is constantly growing. According to the OECD data for 2005, the share of population aged 55 to 64, i.e. those who entered the labor market in the 1960-1970s, with a higher education was 7 to 27%, except for the USA and Canada, where this proportion exceeded 30%. At the same time, in the age group of 25-34, the proportion of persons with a higher education in 19 OECD countries exceeds 30%, and in 6 countries – 40% [1, p.11].

In the light of the Lisbon Strategy, the European Union pays special attention to this indicator. For instance, at the conference in Bergen, Norway, which took place on May 19, 2005, Jan Figel, the EU Commissioner for Education and Culture, listed the following figures in his report "Towards the European Space of Higher Education": only 21% of the EU population of the working age have a higher education, which is much lower than in the USA (38%), Canada (43%), and Japan (36%) [2]. According to the data of "Education at Glance 2007", the proportion of people with a higher education among the population aged 25-64 makes 32% in Australia, 46% in Canada, 35% in Finland, 40% in Japan, 30% in Great Britain, 39% in the USA, and 46% in Israel. For OECD countries in general, this indicator makes up 26% and for the EU countries – 19-24%. Unexpectedly high figures are presented by Russia – 55%, which most probably can be explained not only by the growing scale of higher education, but also the incorporation of secondary vocational education into higher education. Statistically, only 26% of all employees in Ukraine have a higher education, which includes not only completed, but also basic higher education, i.e. it includes graduates of higher educational establishments of all levels of accreditation.

The growing demand for higher education is objectively reflected in the growing enrolment of students both in absolute and relative terms. This tendency is common for all the countries of the world. During 6 years from 1999 till 2005, China has increased its student enrolment from 6.3 mln to 23.4 mln, i.e. 3.7 times. According to the number of students, the world leaders also include the USA (17.2 mln), India (11.8 mln), Russia (9 mln), Japan (4 mln), the Republic of Korea (3.2 mln), Thailand (2.3 mln), Great Britain (2.3 mln), France (2.2 mln), and others. On the whole, there were 137.8 mln students in the world in 2005, which exceeded the 1999 enrolment by 48.3%. Positive dynamics can also be spotted in Ukraine, where in the 2007/2008 academic year the number of students of higher educational establishments of all types was 2.8 mln people, including 2.4 mln people enrolled by the establishments of the 3^{rd}-4^{th} levels of accreditation. In comparison with 1999, the total enrolment increased by 61,2% [3].

Among the relative indicators the most widely used in international comparisons is the number of students per 10 thousand population. In Ukraine, the growth of student enrolment in the absolute figures has also been reflected in the growing relative indicators. In the 2007/2008 academic year, there were 606 students of higher educational establishments of the 1^{st}–4^{th} level of accreditation per 10 thousand of population, including 511 students of higher educational establishments of the 3^{rd}–4^{th} level of accreditation, which surpassed some other countries. The counterpart data for the countries of Central and Eastern Europe for 2004 is the following: Poland – 484, Hungary – 403, Slovenia – 523, and Latvia – 550.

In general, the total enrolment of higher educational establishments of the 1^{st}-4^{th} levels of accreditation in Ukraine exceeds 2.8 million students; the higher educational establishments of the 3^{rd}-4^{th} levels of accreditation enroll over 0.826 million students whose tuition is funded out of the state and local budgets and 1.546 million students with tuition sponsored by individuals and legal entities. There are over 0.327 million full time students in higher educational establishments of the 1^{st}-2^{nd} levels of accreditation and over 1.300 million full time students in higher educational establishments of the 3^{rd}-4^{th} levels of accreditation. Private higher educational establishments of the 1st-4th levels of accreditation provide education to almost 0.4335 million students [4].

Another important indicator which recognizes the importance of education and higher education in particular for ensuring competitiveness of the national economy, is the level of funding. UNESCO experts believe that the critical level of expenditure on education is 5% of GDP, below which the system of education will simply collapse. The average expenditure on all levels of education in the developed countries is 6.2% of GDP (including both public and private funding). According to OECD, the level of expenditure on education makes 5.97% of GDP in Australia (including 4.53% of state funding), 7.1% (6.92%) in Denmark, 6.7% (6.15%) in Iceland, 8.2% (4.79%) in South Korea, and 7.34% (5.08%) in the USA. In Ukraine the funding of education is constantly growing both in absolute and in relative indicators, but its level remains insufficient: in 2005, expenditure on education was 6.5% of GDP against 3.5% in 1999 [3]. The growth of the expenditure on education is achieved by combining public and private funding channeled to educational establishments through the Treasury since 2000. Due to such an approach, the factual amount of the overall expenditure on education is increased by the amount of the private resources, coming to state institutions in the form of tuition.

Higher educational establishments are the main generators and distributors of knowledge and information in a new economy. The role of universities in the modern social progress is so important that western researchers have already proved the interrelation between the development of educational establishments and the economic growth of a country. The countries which have prioritized education development managed to ensure stable rates of economic growth and to finish the transition to post-industrial society. B. Knall has described the vicious circle of poverty connected to backwardness of educational institutions. In this vicious circle, weak economy brings about insufficient funding of education, which results in an underdeveloped system of education and professional training. The latter entails lack of qualified labor force and a deficit of professionals, which, in its turn, bars increase in productive labor. Low labor productivity and a low rate of its growth again reaffirm the weakness of economy, which no longer can allot the funds required for cardinal changes.

The growing importance of education in the development of the modern society implies not only the need to change its economic parameters, but also generates new global challenges. There is a continuous giant buildup of the amount of knowledge and information stored and operated by the humanity, which is combined with their significant differentiation. At the same time unlimited availability of information and knowledge can lead to ambiguous results. The avalanche of information, which is uncontrolled and unlimited with moral and non-economic considerations, can have a controversial impact on the establishment of social consciousness, the existing system of values, level of culture, and even the intellect of a nation.

New active agents of influence on people's mentality, i.e. mass media, do not always disseminate the values of moral and cultural education to individuals. Unlimited access to information, which can be of various quality and various nature, destroys moral barriers, leads to the dethronement of authorities, significance of moral values and, most importantly, reduces the influence of traditional institutions (the family and the system of education) on the personality. It is clear that in a situation like this the family and education must seek new ways and methods to influence the personality so that their impact might remain decisive.

There is a need in a state policy which would focus on the highest spiritual values and which could make the core of all forms of the country's social life, i.e. the work of the state authorities, mass media, the system of education and upbringing, etc. Ukraine adopts numerous concepts, but so far it lacks both an integral strategy of economic development and a unified ideological doctrine, which could be the ideological platform of the Ukrainian society at this stage.

Therefore, spiritual development of a person cannot occur freely, without any targeted impact from the society. Calls for the unrestrained freedom of individual development and manifestation made under the slogans of democracy are not always appropriate in terms of preserving the spiritual health of a person and the spiritual potential of the humanity at large. One of the main principles of democratic development is the need for a person to make his/her own choice instead of following somebody else's instructions. But a person can make the proper choice only after shaping his/her own proper background or structure. And it is this background that will allow making the right decision in various unexpected situations.

A negative result of uncontrolled spread of market relations is the dominance of consumer psychology, excessive rationalism, and, as a result, – the loss of spirituality. The focus on market values forms the dominance of consumer interests as those which shape an individual's mentality and behavior as a consumer, i.e. a buyer of commodities on the market, and shifts aside all other values, including moral and spiritual ones. Quite characteristic in this respect are the words by G. Soros, a world-famous successful financier and sponsor. While contemplating over the modern society in his book "The Crisis of Global Capitalism," he emphasizes his deep conviction that the market values, which have become widely spread, is not what is needed for successful functioning of society [6, p. 72].

In the modern world it is acknowledged ever more that such rationalization, a strictly pragmatic focus of human life, can become ruinous. Society is strong and viable through its citizens, for whom public values are not only empty rhetoric and who attach real importance to such spiritual values as patriotism and responsibility for the fate of their country. In the complex globalized world, success will only come to a country, which emphasizes development of education not only in terms of strengthening its economic potential, but also in terms of supporting it as a universal human value, a special social benefit.

References:

1. Education at Glance 2006. OECD, 2007. Available online: http//www.oecd.org

2. Figel calls for new partnership between university and state // CORDIS focus. – Luxemburg, 2005. – No. 256 (June).

3. United Nations Educational, Scientific, and Cultural Organization (UNESCO). 2006. *Education for All Global Monitoring Report 2008: Education for All by 2025. Will We Make It?* Paris: UNESCO.

4. Higher Education in Ukraine – European Dimension: Situation, Challenges, Perspectives. *Information and Analytical Materials for Final Board of the Ministry of Education of March 21, 2008.* Kyiv: Ministry of Education. – 103 p.

5. Commission calls for university reform to help deliver Lisbon goals // CORDIS focus. – Luxemburg, 2005. – No. 255 (May).

6. Soros G. 1999 The Crisis of Global Capitalism: Open Society Endangered // Translated into Ukrainian by R. Tkachuk and A Frolkin. Kyiv: Osnovy, 1999. – 259 p.

Technology for economic breakthrough

Matrix #3

QUALITY OF LIFE

Quality of life based on IMD assessment
UN human development index

HEALTHCARE SYSTEM

Expenditures on healthcare
Life expectancy at birth
Healthy life expectancy

ENVIRONMENTAL POLICY

Priority of sustainable development
Impact of environmental legislation on companies' competitiveness
CO2 emissions
Impact of pollution on economic development

ENERGY EFFICIENCY

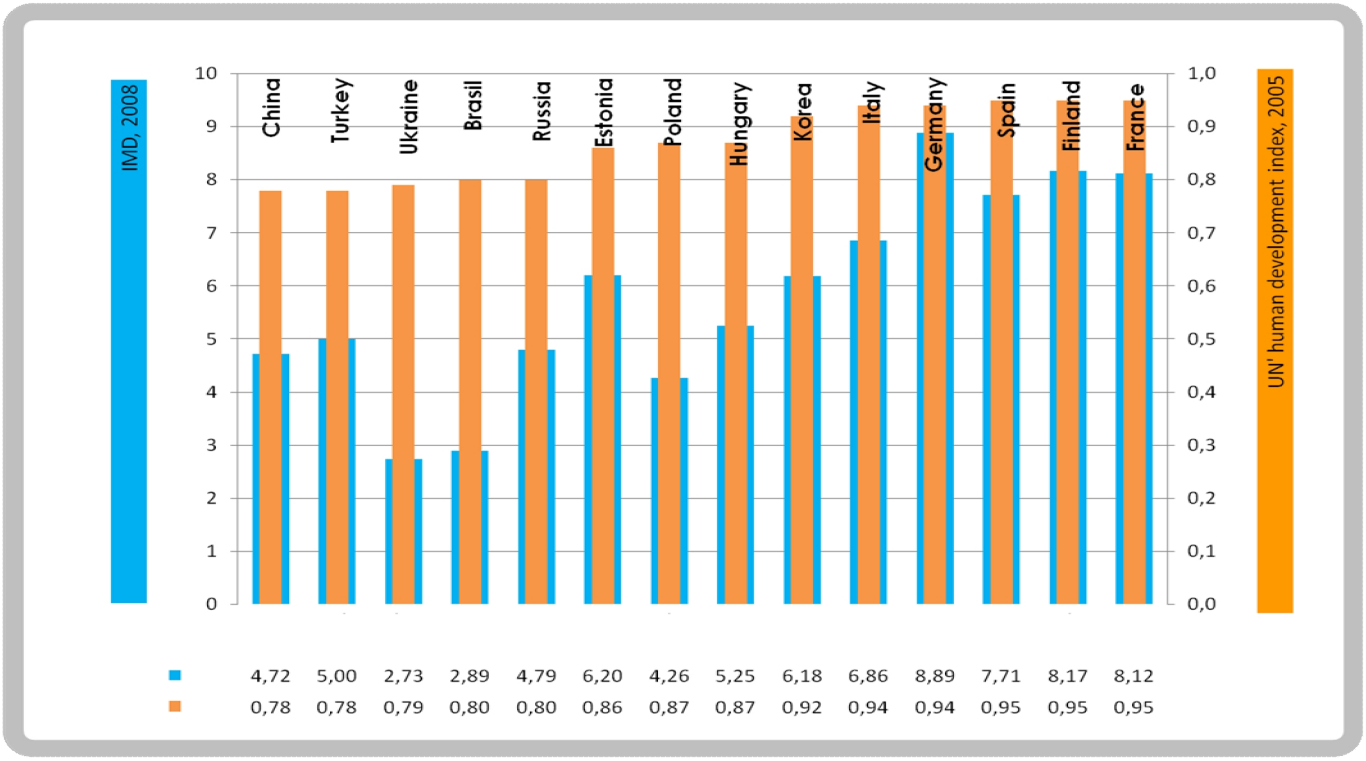
GDP energy intensity

ENERGY SECURITY

Energy production, supply and consumption
Energy consumption per capita
Dependence on imports of energy resources

QUALITY OF LIFE ASSESMENT

2.44 Venezuela	**2.73 Ukraine 53 (54)**	**9.71 Switzerland**
0.62 India	**0.79 Ukraine 45 (47)**	**0.97 Norway**
Minimum in IMD Ranking	Ukraine in IMD Ranking 2008 (2007)	Maximum in IMD Ranking



Source: IMD World Competitiveness Yearbook 2008

A research conducted by IMD experts ranks Ukraine 53rd among 55 countries with a rating twice lower than the average for all countries.
Quality of life is an integral characteristic of social development, the health of population being its most important indicator.

The human development index is based on three dimensions: life expectancy, education, and material level of life (GDP per capita), all being of equal value. It is believed, however, that a person's life expectancy has a 25% dependence on environmental factors. The countries with the best environment, therefore, rank first in the rating (Iceland, Norway, Australia, Canada, Ireland, Sweden, Switzerland, and Japan).

Some countries' rating is caused by low per capita GDP (2007): Brazil – 9,431 USD; China – 5,131 USD; Turkey – 9,313 USD; Russia – 14,208 USD; and Ukraine – 6,707 USD. For comparison: the same indicator in France is 32,382 USD.

Despite a relatively low per capita GDP in Ukraine and the state of its environment, Ukraine's human development index is higher than in China and Turkey which is explained by a high education level of its citizens.

Human Development in Ukraine

In Ukraine, human development substantially deteriorated during the first half of the 1990s. While in 1990, for instance, the Human Development Indicator was 0.809, within 15 years the country slid from 45th to 76th position (in 1990, the USSR generally ranked 26th out of 130 rated countries, and the indicator value was 0.920). If today's human development indicators were extrapolated, their modern level in Ukraine would correspond to the level of the 1940s in developed economies. This implies that, being one of the world leaders in the population's education level and its exposure to education and having a considerable scientific potential, our country by far gives way to many others by the level of the quality of life.

The latest data show that the Human Development Indicator in Ukraine in 2005 made 0.788. Over the previous year, Ukraine improved its rating by one position – from 77th to 76th out of 177 countries under analysis. However, regardless of the changes that took place and according to the occupied rating position, our country is still one with a medium level of human development. In particular, by life expectancy it falls behind 11 countries from the comparative list, for which this indicator exceeds 80 years, and ranks only 110th in the world rating. Ukraine performs well in adult population literacy and general exposure to education (population literacy index is 1.3 times higher than the average global rate).

At the same time, the GDP per capita is relatively small and equals 6,848 international dollars (US dollars according to the purchasing power parity of currencies) and only approaches to 2/3 of the 1990 pre-crisis level. By this indicator the national economy ranks 85th. Analyzing the long-term dynamics of GDP in the national economy, it should be noted that both its overall amount and its specific value calculated per capita have not yet reached the 1990 pre-crisis level.

As a result of the growing incomes and consumption, the real differentiation of the population by the level of well-being, which is evidenced by the Gina coefficient, has stabilized in Ukraine at the level of 0.29-0.30 after the highest level in the 1990s (in 2006 the Gina coefficient was 0.327 against 0.326 in 2005). According to the available calculations by the Institute for Demography and Social Research at the National Academy of Sciences of Ukraine based on the data of the State Statistics Committee of Ukraine, the 2006 poverty level grew by 1% over 2005 to hit 28.1%. Poverty is experienced by every third household with children and every third household without children, involving at least one unemployed person, every fifth household consisting of retired persons only, and every seventh household with the working age members only. Besides, the population incomes, which have lately grown due to rising basic salaries, pensions, and some social benefits, have increased their average monthly total expenditure, but have not mitigated the population differentiation by well-being.

The gap between the growth of the real salary and labor productivity can be explained by de-shadowing of the economy. At the same time, the achieved level (a little over 200 dollars per month in the equivalent in 2006 over about 60 dollars in 2001) retains the national competitive advantages. The fact that the salary growth rate exceeds the increase in labor productivity poses a constant threat of a growing inflation pressure.

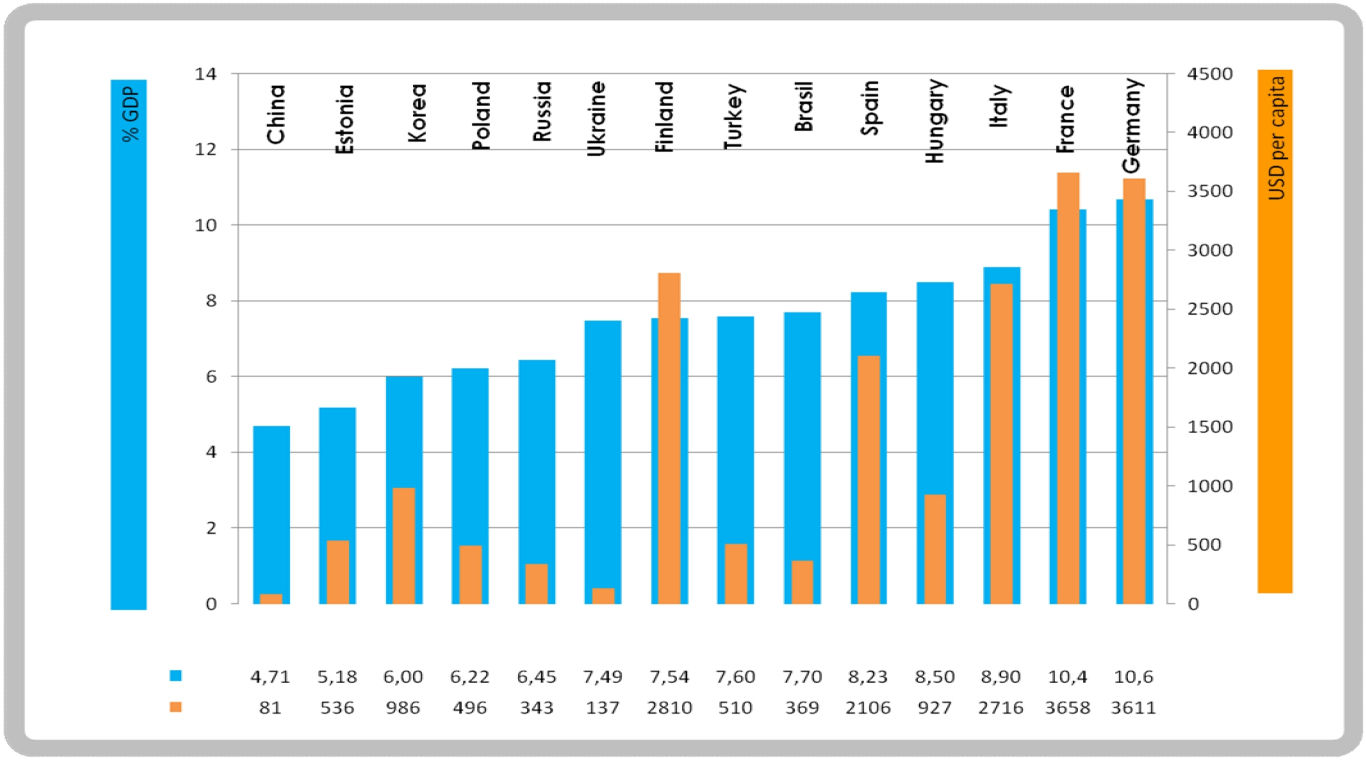
GLOBAL EXPERIENCE

Leadership in the UN Human Development Index is taken by Iceland, which achieved it due to a focused human development and ecology policy. The key trends of its human development policy are as follows:

- improved quality of secondary education (a shorter term of higher education in exchange for optimized training time and a better syllabus);
- focus on agricultural development (the Soil Conservation Strategy, which covers the period from 2003 to 2014, is efficient and is beneficial for the environment: soil pollution in Iceland is among the lowest in all OECD countries);
- openness of the health care sector for competition (as Iceland's experts believe the health care expenditure will grow by 15% in the nearest couple of years);
- professional training development (1992 started the Vocational Training Program, which has a significant positive impact on human capital development).

EXPENDITURE ON HEALTHCARE, 2005

51.0 South Africa	67.0 Ukraine 52 (51)	82.5 Japan
42.8 South Africa	60.2 Ukraine 50 (49)	76.3 Japan
Minimum in IMD Ranking	Ukraine in IMD Ranking 2008 (2007)	Maximum in IMD Ranking



Source: IMD World Competitiveness Yearbook 2008

Deteriorated state of health of the population, high mortality rates among employable individuals, reduced life expectancy, and conspicuous inequality in access to healthcare caused, specifically, by faults in the healthcare system, adversely affect the country's economic and political development and halt Ukraine's integration into the international community.

The paradoxical data on the relation of the number of population versus the number of healthcare workers and availability of healthcare infrastructure is also indicative for Ukraine. The first ratio ranks Ukraine first in the world with 197 persons per doctor and 80 persons per nurse, whereas the second one ranks Ukraine almost last (54th in the world), with an indicator of 1.69, which is five times less than in the world leader Switzerland (8.91).

Main Healthcare Indicators

Countries	Health Expenditure			Physicians per 100 thousand population 2004	Spread of AIDS, %, age 15-49 2005	Tuberculosis incidence per 100 thousand population 2005
	Public (% of GDP) 2004	Private (% of GDP) 2004	Per capita PPP in USD 2004			
Poland	4.3	1.9	814	247	0.1	29
Spain	5.7	2.4	2,099	330	0.6	22
Italy	6.5	2.2	2,414	420	0.5	5
Russia	3.7	2.3	583	425	1.1	150
Brazil	4.8	4.0	1,520	115	0.5	76
Estonia	4.0	1.3	752	448	1.3	46
Germany	8.2	2.4	3,171	337	0.1	6
France	8.2	2.3	3,040	337	0.4	10
Finland	5.7	1.7	2,203	316	0.1	5
China	1.8	2.9	277	106	0.1	208
Korea	2.9	2.7	1,135	157	0.1	135
Turkey	5.2	2.1	557	135	0.2	44
Ukraine	3.7	2.8	427	295	1.4	120

Source: Human Development Report 2007/2008. Fighting climate change: Human solidarity in a divided world. – New York and Oxford: UNDP / Oxford University Press.

GLOBAL EXPERIENCE

Global experience shows that a major priority in building up national healthcare systems against the deficit of financial and personnel resources must be the development of primary health care. Primary health care is designed to resolve the issue of maintaining and improving the health of the entire population and is one of the most efficient strategies to enhance effectiveness of the healthcare system at large, as well as to ensure fair distribution and rational use of costs in the sector.

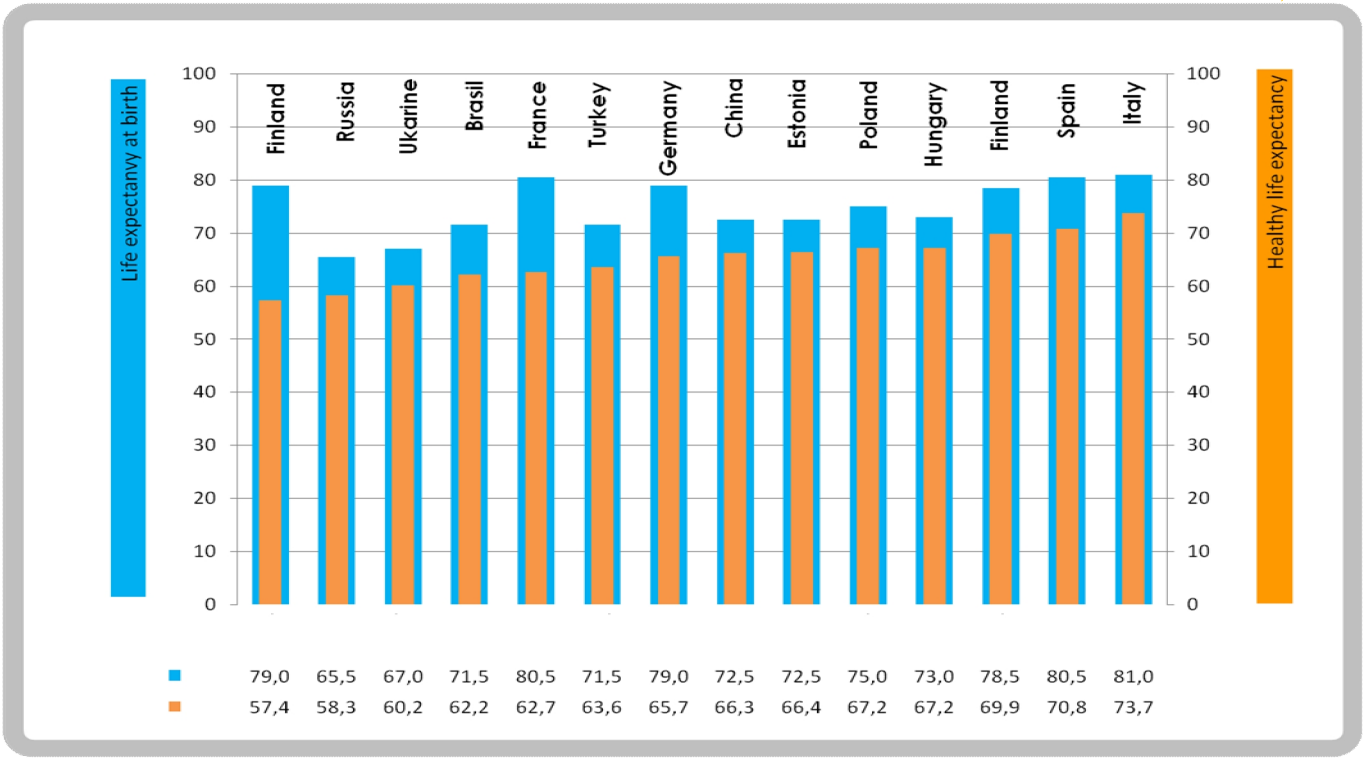
The issue of healthcare sector's low overall efficiency may be primarily resolved by changing the funding pattern. There are two options for solving the problem:

– transition to a healthcare system based on budget funding (through government dues and taxes) and

– transition to a healthcare system based on social medical insurance.

LIFETIME EXPECTANCY, 2005

2.44 Venezuela	2.73 Ukraine 53 (54)	9.71 Switzerland
0.62 India	0.79 Ukraine 45 (47)	0.97 Norway
Minimum in IMD Ranking	Ukraine in IMD Ranking 2008 (2007)	Maximum in IMD Ranking



Source: IMD World Competitiveness Yearbook 2008

UN experts calculate life expectancy at birth when estimating the human development index. With an average level of human potential development, Ukraine ranks 52nd out of 55 countries in terms of life expectancy of its citizens (the average life expectancy for the group of the countries being 75.4 years).

Life Expectancy at Birth

HDI rank of countries	Life expectancy at birth, years		Infant mortality rate (per 1 thousand live births)		Under-five mortality rate (per 1 thousand live births)	
	1970 – 1975	2000 – 2005	1970	2005	1970	2005
Turkey	57	70.8	150	26	201	29
Brazil	59.5	71	95	31	135	33
Korea	62.6	77	43	5	54	5
China	63.2	72	85	23	120	27
Russia	69	64.8	29	14	36	18
UKRAINE	70.1	67.6	22	13	27	17
Estonia	70.5	70.9	21	6	26	7
Poland	70.5	74.6	32	6	36	7
Germany	71	78.7	22	4	26	5
Italy	72.1	79.9	30	4	33	4
France	72.4	79.6	18	4	24	5
Spain	72.9	80	27	4	34	5
Finland	79.7	78.4	13	3	16	4

Source: Human Development Report 2007/2008. Fighting climate change: Human solidarity in a divided world. – New York and Oxford: UNDP / Oxford University Press.

GLOBAL EXPERIENCE

Concept of Quality of Life in Medicine

The medicine of the 21st century is rife with paradoxes and controversies. On the one hand, it is characterized by preservation of the classical foundations of the art of healing, which reach back into the Middle Ages and the earlier period, on the other, it relies upon the latest achievements of computer technologies, immunology, and molecular genetics. At the same time obvious successes in diagnosing and treating a range of diseases, which once were considered to be incurable, combine with the complete impotence of therapy regarding a rather large spectrum of diseases in oncology, hematology, cardiology, endocrinology, neurology, and psychiatry.

The notion of the quality of life appeared in the Index Medicus in 1977 and is now widely used in the medicine of foreign countries. The emergence of the criterion of the quality should be treated as an important scientific achievement of the 20th century.

The definition of the concept of the "quality of life" is logically and structurally connected with the definition of health provided by the World Health Organization (WHO): "Health is a state of complete physical, mental, and social welfare and wellbeing and not merely the absence of disease or infirmity." Hence, the quality of life is a mental, social, physical, and spiritual welfare and wellbeing. The quality of life is the notion important not only in the area of health care, but also for other aspects of the life of the modern society, because the final objective of the activities of all life institutions is the wellbeing of a person.

Today the concept of the quality of life acquires a special importance in the implementation context of prioritized national projects. An efficient implementation of a national project aimed at making the people's life better can and must be defined using the method of quality of life assessment. It should be emphasized that the commonly accepted methodology of investigating the quality of life has started a principally new stage in the life of society and suggested a simple, informative, and reliable method of identifying the key parameters comprising the essence of human wellbeing.

While characterizing the concept of investigating the quality of life in medicine, two key aspects merit attention. On the one hand, the concept has allowed to return to the most important principle of clinical practice, i.e. "to treat the patient rather than the disease" at the new stage of evolution. According to this paradigm the patient's quality of life is either the principal or an additional objective of treatment:

it remains the main objective, when the disease does not limit the patient's life expectancy;

it becomes an additional objective when the disease limits the patient's lifespan (in this case the main objective is to prolong the patient's life expectancy);

it is the only objective at the incurable stage of a disease.

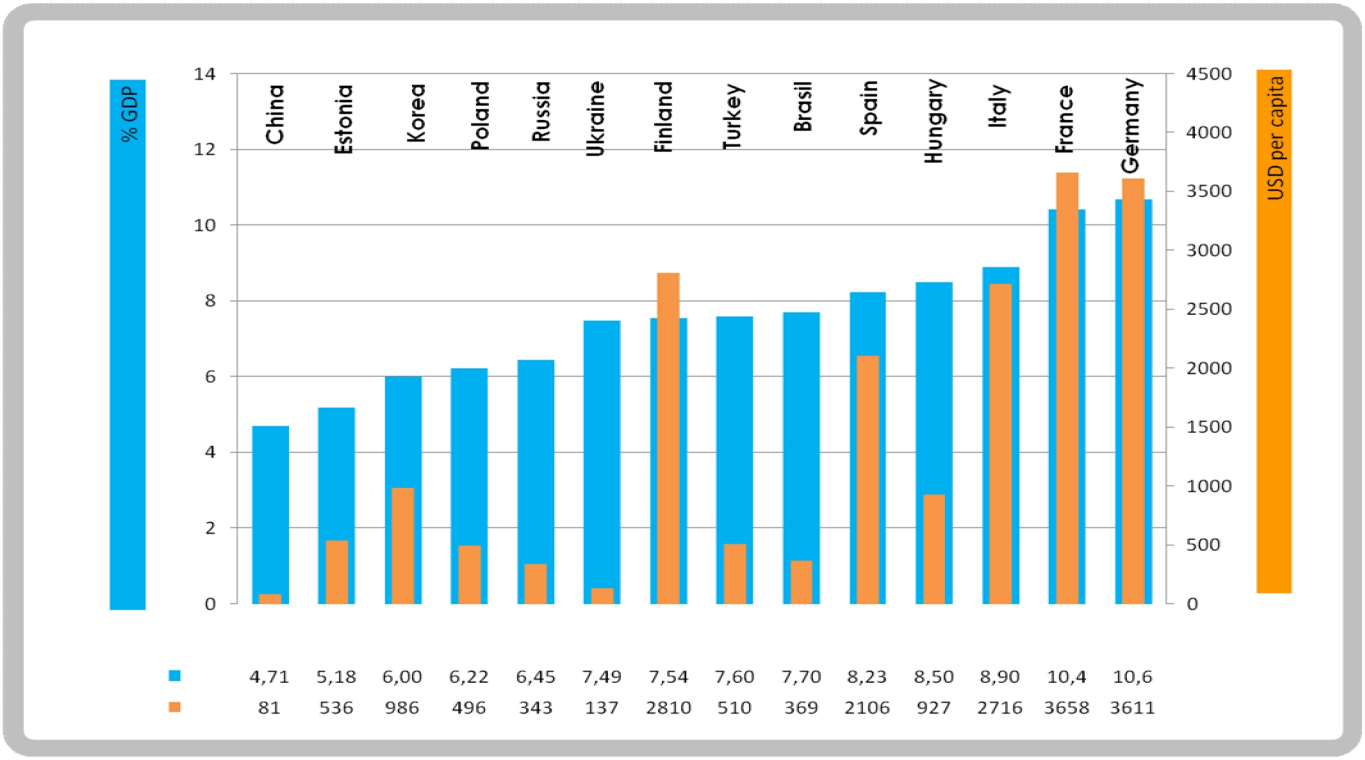
On the other hand, the new concept proposes a well developed methodology, which allows obtaining valid data on the quality of life parameters both in clinical practice and in case of conducting a clinical research. Medicine is one of the very conservative sciences, which today is going through a tough transition period with obvious significant controversies between the archaic descriptive methods of examining the patient and astonishingly sophisticated molecular and computer technologies, whose physical and biological content is hardly understood by the clinician. Under the powerful and continuously growing information and technological pressure, which creates the background for the smearing of clear priorities in clinical medicine, it is exceptionally important to keep the structure and the logic of the interrelations between the patient and the doctor and to preserve the principle focus of the efforts of health care institutes and all social structures responsible for the destiny of a patient. The resolution of this issue will be mostly possible due to the concept of investigating the quality of life, which will enable designing a new paradigm in clinical medicine that will outline the strategy of developing clinical practice and clinical research for many years to come.

A combination of the latest achievements in the sphere of high medical technologies and the classical traditions of the national clinical school will allow reviving its humane foundations with the key formula "treat the patient rather than the disease". Thus, the quality of life should become the key element and the essence of the efforts of all life institutions without exception, and not merely medicine.

(*Materials provided* ***by L.I. Vorobyova****, Doctor of Medicine, National Cancer Institute*)

SUSTAINABILITY AND LEGISLATION, 2008

51.0 South Africa	67.0 Ukraine 52 (51)	82.5 Japan
42.8 South Africa	60.2 Ukraine 50 (49)	76.3 Japan
Minimum in IMD Ranking	Ukraine in IMD Ranking 2008 (2007)	Maximum in IMD Ranking



Source: IMD World Competitiveness Yearbook 2008

Index shows the level of priority of sustainable development for companies
Lower index – lower negative impact of ecological legislation to business

Ukrainian companies do not usually prioritize sustainable development, unlike economic entities in Germany, Estonia, Korea, Finland, and France.

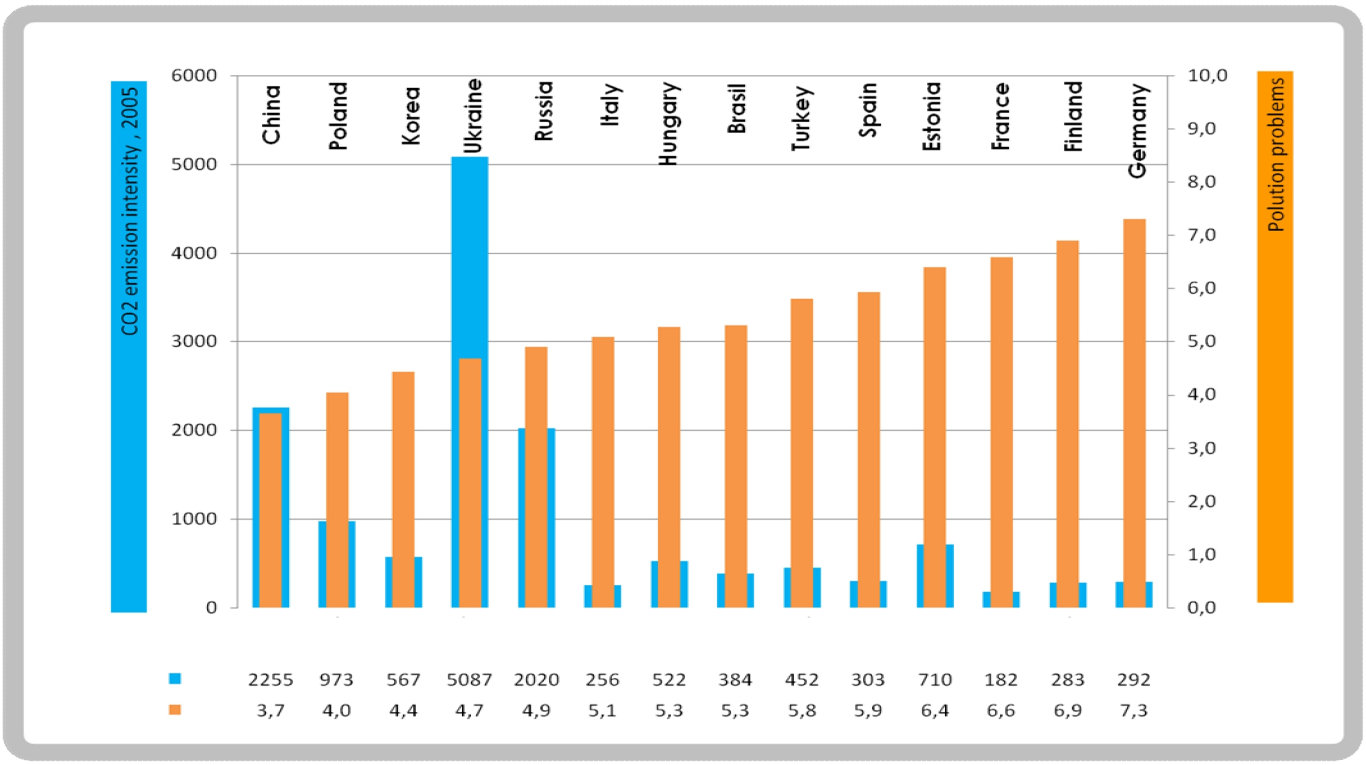
GLOBAL EXPERIENCE

In OECD countries, environmental taxes levied from companies for environmental pollution are meant to be stimulating. As a rule, they apply to exhausts of only one or two pollutants and, except for specific cases, such taxes are transferred not to ecological funds, but directly to the country's budget (for instance, taxes for emitting nitrogen oxides and sulfur dioxide in Scandinavian countries). Unlike in the developed countries, environmental taxation of enterprises in Eastern Europe, the Caucasus, and Central Asia fails to serve its purpose.

Due to the excessive amount of pollutants subject to ecological taxation (in Kazakhstan the taxation applies to 1,217 different air pollutants and 1,345 water pollutants), it is practically impossible to arrange reliable calculation of such payment. In the taxation and budget system of Ukraine, the ecological component is also explicitly fiscal and is primarily designed to contribute to the state coffers, while the centralized levying of the environmental pollution taxes by the central and local budgets does not encourage a pro-active local environmental policy.

ENVIRONMENTAL POLUTION, 2008

5,086.9 Ukraine 55 (55)		120.9 Switzerland
2.94 Romania	4.69 Ukraine 40 (44)	8.27 Austria
Minimum in IMD Ranking	Ukraine in IMD Ranking 2008 (2007)	Maximum in IMD Ranking



Source: IMD World Competitiveness Yearbook 2008

Lower represents the level of impact of pollution problems to the economy

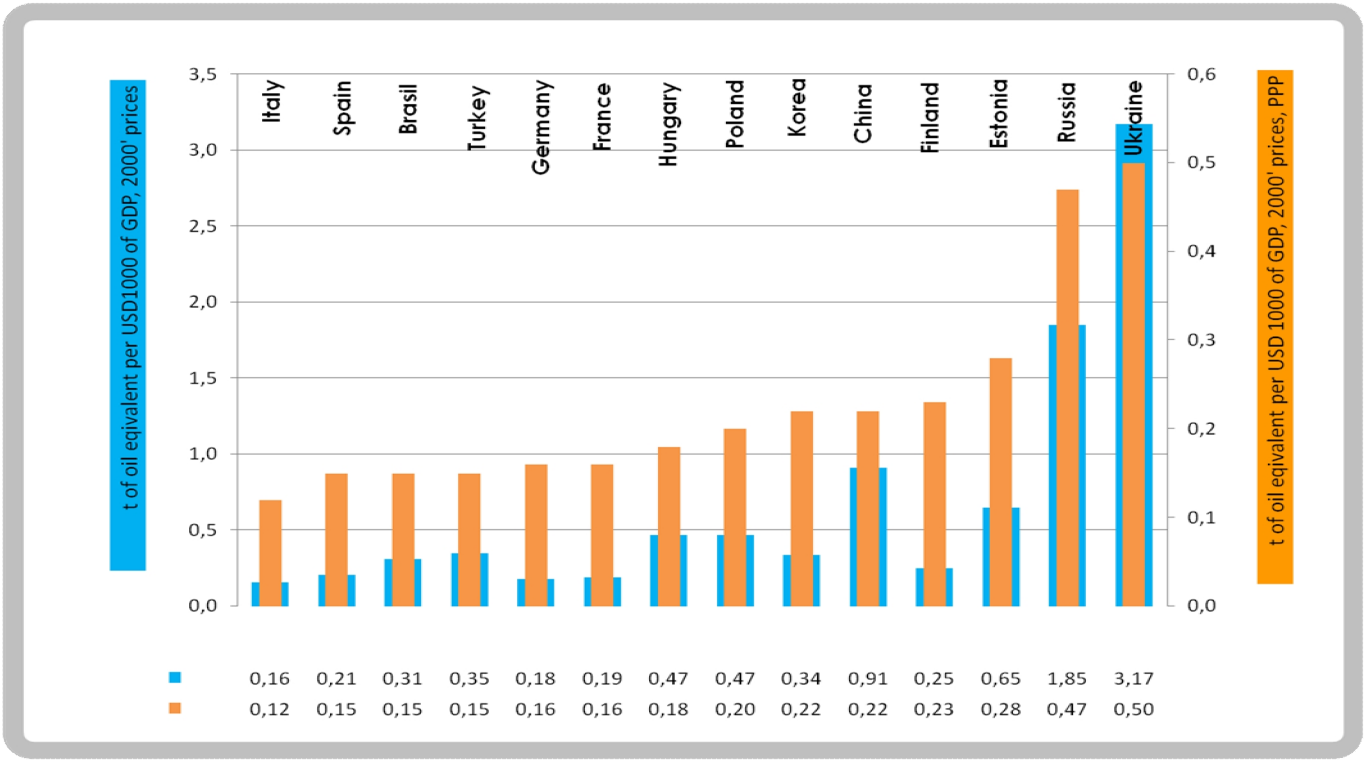
Ukraine is lagging behind the developed countries, Russia, Brazil, and Turkey in recognizing the impact of environmental pollution on the national economy. At the same time, the "environmental consciousness" of the Ukrainians exceeds that of the Chinese, Poles, and Koreans.

Among the analyzed countries, Ukraine is an absolute leader by the amount of industrial carbon dioxide emissions into the atmosphere. Mining and incineration of organic fuels in Ukraine are responsible for 95% of all carbon dioxide emissions. Of the industrial processes, cement production is the largest carbon dioxide emission contributor.

Ukraine has acquired the right to trade in environmental quotas after it signed the Kyoto Protocol, under which our country is permitted to annually exhaust up to 925 tons of greenhouse gases into the atmosphere (last time Ukraine emitted that much in 1990). And though after the collapse of the USSR, which entailed a curtailment of industrial manufacturing, Ukraine has almost twice reduced its amount of exhausts, the level of 1990 is still used as a benchmark by all the parties to the Kyoto Protocol. This enables Ukraine to sell the unused part of the quota. As forecast by the Ukrainian Ministry of Economy, in 2008-2015 this surplus quota will exceed 2.2 billion tons. The larger share is intended for sale on the international market, which can yield a potential EUR 2-2.5 billion annually. Meanwhile, foreign experience shows that the system of trading in quotas requires a transparent strategy for its implementation.

GDP ENERGY INTENSITY, 2005

3.17 Ukraine 55 (55)		0.10 Switzerland
0.5 Ukraine 55		0.12 Switzerland
Minimum in IMD Ranking	Ukraine in IMD Ranking 2008 (2007)	Maximum in IMD Ranking



Source: IMD World Competitiveness Yearbook 2008

Ukraine's GDP energy intensity exceeds that of all the analyzed countries: France, Italy, Germany, Spain, and Finland are outstripped in general about 3 times, Poland – 2.5 times, and Russia – 1.5 times. According to IMD, this gap is substantively bigger (82.6 thousand kJ per USD 1 of GDP in Ukraine against 3.5 thousand kJ per USD 1 of GDP in France), but in this case, it is necessary to compare the data provided by the International Energy Agency (IEA). The rating corresponding to the IDM data also lists the IEA data.

Factors of GDP High Energy Intensity

The high energy intensity of Ukraine's GDP results from excessive consumption of energy resources in the branches of economy to manufacture a product unit, which leads to a corresponding increase in the import of carbohydrates to Ukraine. The problem of high energy intensity and the resulting low competitiveness is also inherent in the Ukrainian fuel and energy complex. The most energy intensive is coal production, with its electricity expenditure averaging at 13% (28% in the mines of Central Donetsk Basin). A recession in coal mining goes along with an even larger increase in the energy intensity of production. For instance, in 1990, with its output of 164 million tons of coal, the specific electricity consumption to mine one ton of coal made 81.9 kWh/ton, while in 1997 (76.9 million tons) it was 116.2 kWh/ton and in 2005 – 84.8 kWh/ton.

Factors Threatening Ukraine's Energy Intensity

Due to its heavy dependence on external supplies of energy resources, Ukraine has to take into account the existing situation on the world energy markets. Because of the excessive energy intensity of its basic and, at the same time, export-oriented industries, self-sufficient development of Ukrainian energy system is objectively impossible. Thus, the national economy and its real sector are compelled to take into account the trends in the development of the world market of energy resources. This situation, generating numerous threats to the energy security of Ukraine, stems in a range of internal and external factors.

Internal factors:

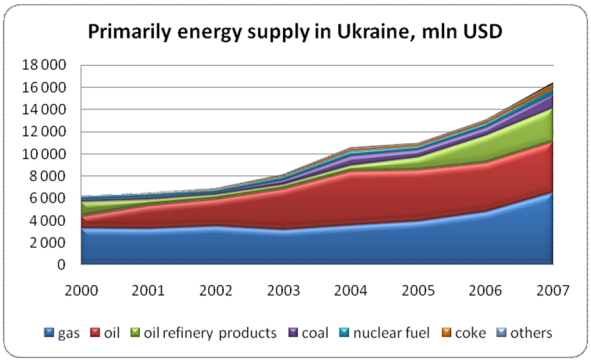
– aging and considerable wear and tear of the bulk of energy capacities, untimely revaluation of the capital assets of the national power sector;
– insufficient investment in the development of the fuel and energy complex;
– insufficient domestic manufacturing of equipment and materials for the fuel and energy complex;
– absence of domestic fabrication of nuclear fuel (using the available uranium ore deposits) and of a complete nuclear cycle;
– absence of proper control over traders' activities, who have virtually monopolized the markets of energy resources supply;
– excessive energy intensity of GDP;
– imperfect legal support of the functioning and development of the fuel and energy branches in the market environment.

The most important external factors:

– highly monopolized supply of imported fuel and energy resources;
– dependence on the imports of a major part of production equipment, products of power plant engineering, materials and services for the branches of the fuel and energy complex;
– active expansion of foreign suppliers of finished energy products to the Ukrainian market.

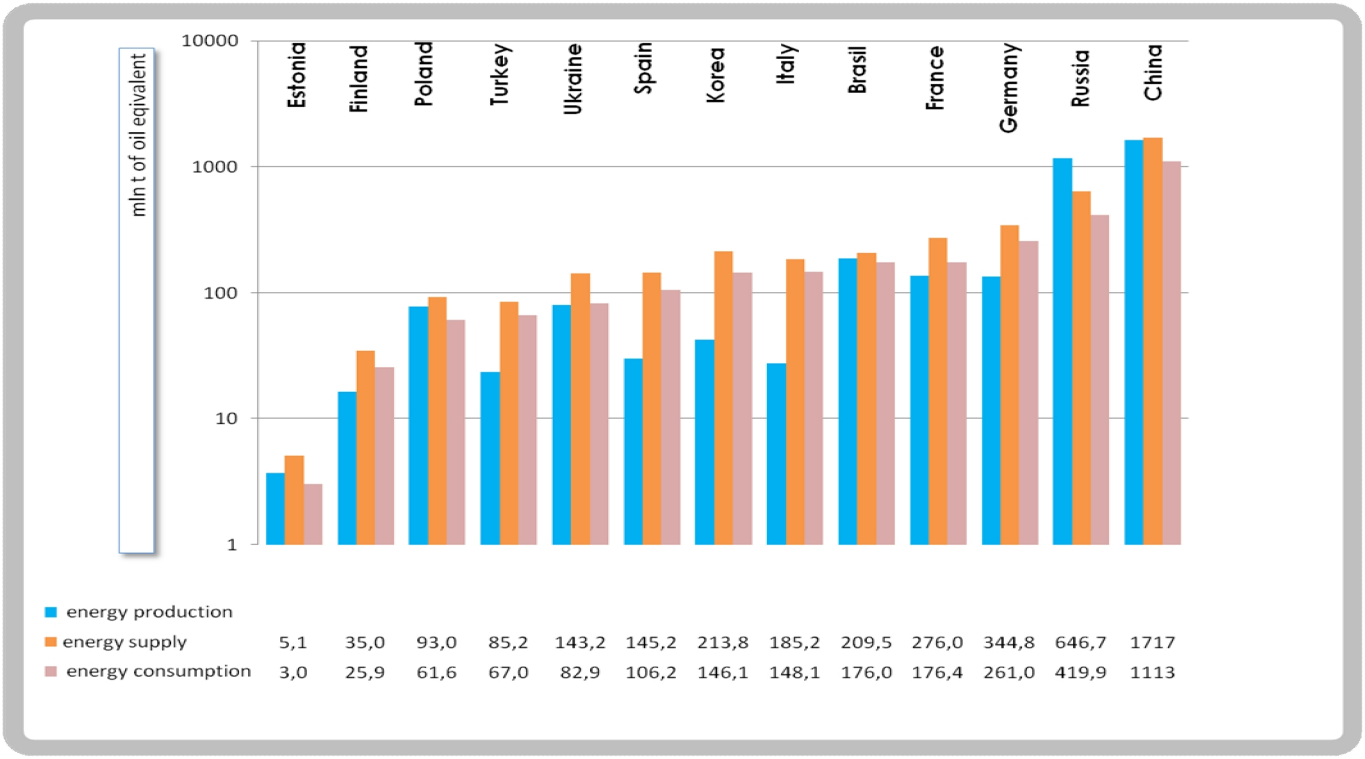
NOTA BENE

Today's world economic development identifies the availability of energy resources and the efficiency of their use as a major prerequisite for the countries' economic development. The extent of energy dependence results from the lack of diversification in energy resources supply. The new economic situation explains the need to increase the number of suppliers of fuel and energy resources, to ensure their efficient utilization, and to search for alternative sources of energy supply.



Source: DZI Ukraine's Economic Passport

ENERGY PRODUCTION, SUPPLY AND CONSUMPTION, 2005



Source: IMD World Competitiveness Yearbook 2008| Key World Energy Statistics, IEA 2007

NOTA BENE

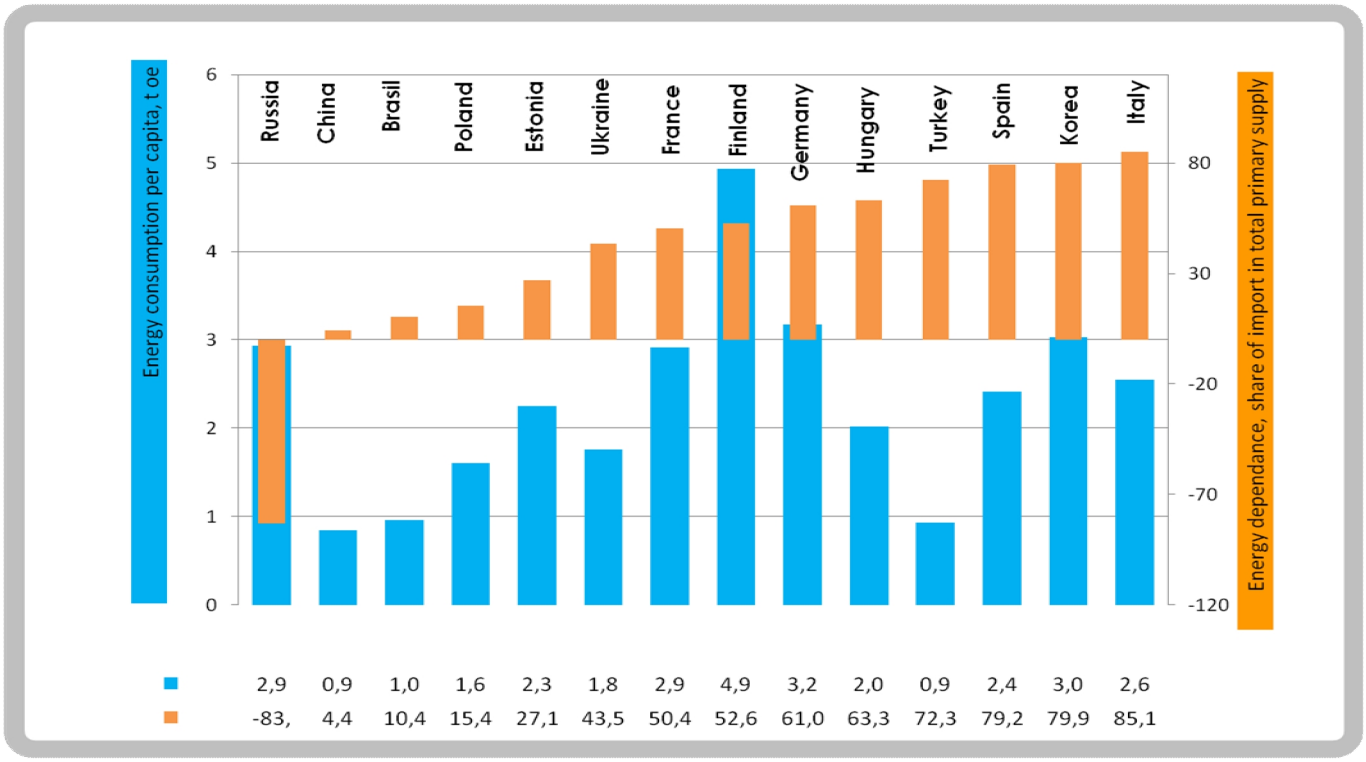
The Economist experts maintain that the next decade will witness swift development of new technologies in energy production. The lead venture capitalists, who opportunely earned their fortunes during the computer boom of the 1980s, the Internet boom of the 1990s, and the biotechnology booms of the 2000s, have looked into the future and concluded that the next bet should be placed on the power industry. The main question to be answered is: on which of its sectors – the solar, the wind, the geothermal, or the bio-fuel one? Is man on the rising curve of evolution and technological progress, which call for upgrades in the already tested nuclear technologies and investment in thermonuclear dreams? Or has the humanity entered just another coil of the evolutionary spiral, when it is necessary to use predominantly renewable sources of energy? Modern development of science confirms certain opportunities, which only yesterday man recognized as nothing more but bold dreams. Nonetheless, history has proven that the road to victory will be the most economically beneficial one.

The energy needs of mankind during 2005-2030 **will increase by 60%**

This will cost the investors more than **USD 20 trillion** in 2005 prices

ENERGY CONSUMPTION & DEPENDANCE ON IMPORT, 2005

0.32 India	1.8 Ukraine	9.89 Luxemburg
	43.5 Ukraine	
Minimum in IMD Ranking	Ukraine in IMD Ranking 2008 (2007)	Maximum in IMD Ranking



Source: IMD World Competitiveness Yearbook 2008| Key World Energy Statistics, IEA 2007

The overall energy balance of Ukraine in energy manufacturing and consumption, due to corresponding factors, is objectively formed as negative. Nominally, the absolute leaders of energy consumption are the USA (1,598.1 million tons of oil equivalent) and China (1,112.5 1,598.1 million tons of oil equivalent), which together account for 40.8% of the total amount of energy consumption in the 55 countries of the IMD rating.

NOTA BENE

According to the forecasts of the International Energy Agency (IEA), man's demand in the primary sources of energy up to 2030 will annually grow by the average of 1.6%. According to the same forecasts, the main sources of energy during the period will be oil, gas, and coal, traditional today. Meanwhile, the current situation demonstrates a leading growth in the demand for primary energy (2.6% in 2007), the economic factor being the main driving force for changes in consumption patterns. Despite all controversies regarding the environmental protection policy, in 2007, against the background of rocketing oil and gas prices, the consumption of the cheapest traditional energy source – coal – showed the largest increase (by 4.5% compared with 3.1% for gas and 1.1% for oil). Against this background, British Petroleum data suggests, the fastest growth is demonstrated by alternative energy sources: ethanol – 27% a year, wind energy – 28.5% a year, and solar energy – 37% a year.

NOTA BENE

EU countries use two basic implementation models for alternative and renewable energy sources (RES):

– The British model based upon compulsory quotas on using RES energy. Apart from Great Britain, the model is used in Ireland and France.

– The German model based upon guaranteed subsidies to RES projects and a tariff policy (Germany, Denmark, and Spain).

The main case for the German support model is the development rate of renewable energy engineering – the RES capacities in the countries using them are several orders of magnitude higher than in the others. Nonetheless, it is believed that the German model violates the free competition principle, so currently Europe is drawing up utilization standards for renewable energy engineering, which would integrate various models and stimulate a twofold increase in the capacity of the RES-based equipment before 2010.

Important incentives for RES expansion include various benefits provided by the state in the area of renewable energy engineering, i.e. subsidies and low-interest credits; partial fiscal exemption for the revenues invested in the development of the sector; ecology tax exemption for the "green" energy consumers; compensations (premiums) on energy tariffs for using renewable energy; tax exemption for some revenues invested in development of renewable energy engineering; and tenders and quotas ("green certificates") for supporting various RES types from a specialized fund.

CCU RECOMENDATIONS

To ensure the country's sustainable development through an increased role of the human capital in society and introduction of a transparent policy aimed at improving the quality of life, the Council on Competitiveness of Ukraine recommends the following:

1. To legislatively resolve the issue of monitoring the country's energy balance, the environment, and registration of harmful exhausts (to ensure the establishment of energy and ecological passports for Ukrainian enterprises and agencies).

2. To ensure ultimate performance to prepare and publish the annual National Report on the Natural Environment Situation in Ukraine.

3. To finalize the 2030 Energy Strategy of Ukraine in order to identify:
   – the state strategy concerning the property structure in the power sector;
   – the sources and mechanisms of obtaining funding required for implementing the strategy;
   – the state strategy concerning the tariff policy and the market principles of state monopolies and enterprises with a significant share of state ownership;
   – the state strategy concerning the development of Ukraine's energy market;
   – the state strategy concerning the policy supporting the RES development;
   – the state strategy concerning reduction of CO_2 exhausts into the atmosphere;
   – the state strategy concerning the integration of Ukraine into international projects developing and introducing new power sector technologies.

4. To adopt the Law on 2030 Energy Strategy of Ukraine.

Igor Bystryakov, Doctor of Economic Sciences, Professor, Council on Productive Force Study of Ukraine, the National Academy of Science of Ukraine

SUSTAINABLE DEVELOPMENT OF UKRAINE: ECONOMIC AND METHODOLOGICAL DISCOURSE

Problem Background

The problem of sustainable development is not new for Ukraine.

In 1972, at the international conference in Stockholm, the problem of environmental pollution and air pollution in particular, was discussed as the headline issue. In 1982, at the conference in Nairobi, the focus was on the problem of biodiversity preservation. The paradigm idea of the conference in Rio-de-Janeiro, 1992, was ensuring sustainable development, while in 2002, the conference in Johannesburg, unfortunately, suggested nothing new. In essence, it reconsidered the idea of sustainable development to state that during the decade since the Rio-de-Janeiro conference the idea had not found a proper practical implementation. While during the decade between the first two conferences (1972 and 1982) the world community managed to take quite constructive steps according to the adopted decisions, because the tasks set there were quite specific, it turned out to be difficult to implement the decisions of the third conference (1992). The author explains these difficulties by the fact that the sustainable development concept has not focused on the person or rather on interpersonal relations in the context of using limited ecological resources. The main challenge is posed here by the great variety of beliefs on the environment and thus the need to account for various value development milestones.

Meeting this challenge will definitely enrich the concept of sustainable development and, consequently, stimulate its implementation. There exist all premises to that effect, because back at the Rio-de-Janeiro conference it was stated that the responsibility for implementing the decisions of the Agenda for the 21st century should be born by national governments. This position, when considered in a broad context, implies taking into account national and regional peculiarities, which, in its turn, demands creativity in meeting the system-based methodological challenges.

Man and Nature: Generated Conflict

The relations between man and nature are quite diverse. From the economic point of view, such diversity merits attention, as it has a bearing on peculiarities of forming national economic systems. The thing is that uneven economic development implies various types of economic relations. If so, then every economic management type entails specific ecological conflicts. These interrelations are important to understand, as various types of economic management shape their own concepts of sustainable development. A great number of entrenched stereotypes regarding such concepts often do not correlate, which causes discrepancies in perception and hence in the assessment of certain proposals for the solution of the problem.

It is currently possible, for instance, to identify three major types of economic management: financial, technological, and ecological. The ecological one, though, is only declarative. Its advanced form is practiced only among the so called "primitive" nations, which preserve the ecologically focused economic management because they rely upon a myth-based system of beliefs about the world. In this case, however, instead of "primitivism" one should speak about the "difference", which is something else. Therefore, preserving the necessary ethic and natural variety is of paramount importance to ensure sustainable operation of the economic system.

The type of economic management is selected by the nation as a factor of development objectives, with the choice primarily resulting from the world outlook. In this way, the notion of sustainable development for the financially-oriented economic management is excessively influenced by the financial factor. This type of economic management will be inevitably based on the use of resources in its relations with other types of economic management and nature. Financially-oriented economic management is linked with information systems, which make their own contribution by leading man beyond the physically perceptible world into the domain of virtual worlds, where human desires are formed at the intersection of the psyche, mind, and spirit. The problem is becoming more explicit and is getting increasingly more researchers' attention [1–8].

Technological economic management implies the production of goods. Unlike the above type, technological management focuses on satisfying the traditional needs rather than desires. The economic system of this type implies creation and development of an artificial living environment. Of course, this type of economic management can be ecologically balanced. But to achieve this, the focus has to be placed on limiting the use of ecological resources for economic needs. Abandonment of such limitations would provoke destruction of natural formations and disruption of their natural reproduction cycles, which is, in essence, ubiquitously observed at the moment. The third type of economic activities is ecology-oriented. It clearly prioritizes ecology over economy. This type of economic management springs not from the competitive economic principles, but rather from the vitality requirements, i.e. the need for people to survive as a special unique community of individuals with a high self-awareness level. This type of economic management subordinates virtually everything to the idea of forming a special living environment, where the efforts aim at supporting natural cycles to ensure less the reproduction of specific geobiocoenoses, than the peoples who live in them and constitute an integral whole with them.

The analysis of the above economic management types should consider that in reality they co-exist and are concurrent, though sometimes one of them prevails. Modern history is characterized by domination of the first two types of economic management whereas the financially-oriented type is explicitly or implicitly identified with the category of the so called post-industrial society.

The above considerations prove that each discussed type of economic management generates its own specific ecological conflicts. For the financial type, the basic conflict involves ecological barriers on the way to implementing desires. This aspect is critical, because desires are generated on the intangible basis. Motivation stems in excessive financial resources, and the excess forms a specific type of the outlook and a corresponding system of values.

Technological economic management is dominated by the ecological conflict based on a significant technological impact on natural ecosystems. Such a conflict is triggered by "saving" at the expense of

the ecological development factor, which is partially conscious and partially unconscious due to faults in the management of economic processes.

In ecological management the nature of ecological conflicts is different and mainly associated with the problems of feasibility (unfeasibility) of ecological aspirations. The ecological factor in this case is not a hindrance to desires, but rather their restraint. In the current civilization development paradigm, the situation is unfeasible.

The presented comparison of the conceptual vision of the process of ecological conflicts formation shows that "sustainable" development as a concept of the development perspective in case of its incorrect application may change reality into a myth.

Ecologically Competitive Society

In the market situation competitiveness is known to be the main condition for the national economy survival. Nonetheless, this truth, in terms of economy, so far is not extended to the ecological component. To implement the concept of sustainable development it is necessary to form an ecologically competitive society. But, if so, the ecological resource should be economically tinted. It means that the ecological factor should be viewed as ecological capital. Unfortunately, this aspect is overlooked by researchers. Presently, due to the dominating financial relations, economic systems are taking the ecological toll, sparing no chance for restoring ecological resources, i.e. one can say that ecological problems result from underdeveloped market relations, because they do not fully encompass the ecological aspect. In the current situation, an ecologically competitive society is a society, where the ecological factor is naturally integrated into the economic system. The very fact that the ecological resources are limited provokes quite tough competition between the candidates competing for a resource. As the capital qualities of ecological resources unfold, the struggle for their ownership is bound to incessantly intensify. So, to avoid monopolization, there is a need to institutionalize the relations which concern property rights for the ecological resource, which till now has remained "ownerless."

The analysis of the problem shows that its solution lies in the plane of establishing partnership relations between the authorities, business, and society. Thus, there is a need to strive to harmonize the interests of the economic entities. As demonstrated by European experience, it is easier to ensure such relations at the local and territorial level. Since a lot of ecological problems are local in their essence, they accumulate through ecological negligence and gradually snowball into one big problem. Unfortunately, the relations between the authorities, territorial community, and business are not legislatively regulated on the territorial level.

It appears that priority should be assigned to the task of improving the quality of space management based upon innovative technologies, i.e. establishing a system of cooperative management. For instance, to ensure self-development of an ecologically oriented municipal economy, it is necessary to establish social financial groups to accumulate financial resources for the development of the territorial ecological infrastructure. An equally important aspect of solving ecological problems is regulating the population's property rights for ecological resources in the municipal community. Each municipal community resident should co-own everything located in that area according to the principle of equal and joint ownership. Private property formed by the municipal community residents according to the principle of equal and joint fractional ownership should form the basis for reaching corporate ecological objectives, which satisfy the community interests. Examples of such innovative approaches are galore. They are on the surface, because they are widely employed in business practices. However, the problem is different – business management methods have not yet arrived in the ecological sector. A direct "transplant" is difficult, but this does not imply impossibility of finding adequate ways to do it; the issue should be addressed creatively, not mechanically. Solutions are latently imbedded in the essence of market mechanisms and in understanding their transformation and evolution in today's situation.

Instead of Conclusions: Several Methodological Benchmarks

1. Today the concept of sustainable development is going through a period of essential reconsideration. It should be noted that it is done on the basis of the problem issues from the output documents of the 1992 Rio-de-Janeiro Conference.

2. Modern knowledge about man allows to state that *homo sapiens* actively develop if they harmonically "integrate" into the natural living environment. In this case, the relations between man and nature should be institutionalized in a special manner with regard to the modern situation.

3. The conceptual provisions of the sustainable development methodology should be constructed in the plane of metaphysical beliefs about development processes of complex social, ecological, and economic relations formed in society.

4. Today there is an urgent need to draw up a new cognition paradigm – management economics, which would naturally combine the traditional and the innovative. To this end, however, it is necessary to expand the very space of the so called eco-oriented knowledge.

5. Finally, sustainable development means ensuring coherent functioning and harmonization of human ecology, the ecology of space and economy within the system of a certain type of economic management.

6. The model of the system of sustainable development of economy should focus not only and even not so much on satisfying traditional needs and desires, but rather on ensuring a balanced functioning of the ecological economic system on the whole.

7. System-based analysis of the dynamics of the transformation processes in Ukraine allows to assert that a country's sustainable development is in the plane of the innovative technologies of the living space management, which show a critical dependence on forming a self-sufficient, self-sustaining nationally-oriented economic system. Within this paradigm, the ecological development factor becomes the core of economic management, rather than its husk.

References:

1. Soros, George. 1999 The Crisis of Global Capitalism: Open Society Endangered. Translated from English. – Moscow: INFRA, 1999. – XXV + 262 p.
2. Castels, Manuel. 2000 Information Age: Economy, Society, and Culture. Translated from English. – Moscow: State University "Higher School of Economics", 2000. – 608 p.
3. Gateways to the Global Economy. Translated from English. – Moscow: FAZIS, 2001. – XXIV+440 p.
4. Inozemtsev V. L. Limits of "Catching Up" Development. – Moscow: CJSC Economics Publishing House, 2000. – 295 p.
5. Bauman, Zygmunt. 2002 Individualized Society. Translated from English. Moscow: Logos, 2002. – 390 p.
6. Politics on Economics. Lectures of Nobel Laureates in Economics. – Moscow: Modern Economics and Law, 2005. – 560 p.
7. Bauman, Zygmunt. Modernity and Ambivalence. Translated from English. – St Petersburg: Piter, 2008. – 240 p.
8. Danylyshyn B. M., Veklych O. O. Ukraine in International Sustainable Development Ratings. – Economy of Ukraine. – 2008. – No. 7. – P. 13-23.

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SCIENTIFIC AND TECHNOLOGICAL DEVELOPMENT OF UKRAINE: ASSESSMENT AND PROSPECTS

In the past half a century, the mechanisms of sustainable economic development have been viewed by the economic science through the context of scientific and technological progress and technological changes. Traditional works by a well-known economist Robert Solow have emphasized the issues of a country's technological development as the main determinant of economic growth upon striking a balance in availability of the physical capital. He estimated that over 85% of the US economy growth can be referred to an overall productiveness of factors, which in its turn is linked to technical progress and certain technological innovations in production. An increasing gap in the economic development of countries, which should have been bridged according to R. Solow's traditional model of exogenous economic growth, triggered a rapid development of new economic theories that would explain the mechanism of technological progress, as well as institutional, educational, and financial components of innovation activities.

Lately, a number of international organizations, namely the World Economic Forum, UN economic organizations UNCTAD and UNIDO have been involved in a technological assessment of counties by various parameters and methodologies. What are the peculiar features of Ukraine's economy and what are the main parameters of innovation activities in Ukraine?

The WEF methodology of assessing technological development is applied through identification of a country's global competitiveness index. The latest research into Ukrainian economics was based on statistical data and on polling companies and organizations in Ukraine (84 entities in 2006 and 159 entities in 2007). It is worth noting that the methodology used to assess the competitiveness of countries differs from the methodologies employed in 2004 and relies on developments of US economists X. Sala-i-Martin and M. Porter and combines a stage-based approach to assessment of a country's development with macroeconomic and microeconomic analysis foundations [5, p. 21-23]. Countries can be subdivided according to their development stage: Stage 1 – factor-driven economy; Stage 2 – efficiency-driven economy; and Stage 3 – innovation-driven economy. Each stage is different in the weight of factors which determine a country's competitiveness and are subdivided into three groups: ***basic requirements:*** institutions, infrastructure, macroeconomic stability, and health and primary education; ***efficiency enhancers:*** higher education and training, goods market efficiency, labor market efficiency, financial market sophistication, technological readiness, and market size; and ***innovation and sophistication factors:*** business sophistication and innovation. The weight of the basic requirements changes with the development stage to account for 60%, 40%, and 20%; efficiency enhancers – for 35%, 50%, and 50%; and innovation and sophistication factors – for 5%, 10%, and 30% of Stage 1, 2, and 3 respectively of a country's economic development. This research categorizes all countries versus their economic development stage. Such detailed methodology explanations are needed to identify the level of technological development of Ukraine's economy, because the WEF classification is based on the technological and innovation level of economy. Ukraine is making a transition from Stage 1 to Stage 2, when the critical determinants of economic development include institutions, infrastructure, macroeconomic stability, primary education, and health of citizens, with the growing importance of efficiency enhancers related to efficiency of goods and financial markets, quality of higher education, and readiness to implement technological innovations.

Let us dwell in more detail on Ukraine's technological development indicators concentrated in the two main competitiveness pillars: ***technological readiness*** *and* ***innovation***.

Table 1

Indicators of Technological Readiness of Ukraine's Economy in 2005-2008

Technological Readiness Indicators	2007-2008 (out of 131 countries)		2006-2007 (out of 122 countries)		2005-2006 (out of 114 countries)	
	Rank	Score	Rank	Score	Rank	Score
Availability of latest technologies	**97**	3.4	**87**	2.5	**80**	2.8
Firm-level technology absorption	**91**	4.4	**93**	4.1	**82**	4.0
Laws relating to information and communication technologies (ICT)	**83**	3.3	**88**	2.9	**84**	3.0
FDI and technology transfer	**106**	4.2	**111**	4.0	**108**	3.7
Mobile telephone subscribers (per 100 population)	**79**	37.0	**70**	28.5	**78**	13.6
Internet users (per 100 population)	**77**	9.8	**72**	7.8	**74**	5.3
Personal computers (per 100 population)	**88**	3.9	**85**	2.8	**82**	2.4
Overall technological readiness ranking	**93**	2.7	**86**	2.5	**85**	2.6

Source: The Ukraine Competitiveness Report 2008. – World Economic Forum, 2008. – p. 85

Table 1 provides both expert assessment results for the technological readiness of Ukraine's economy (1 is the lowest score and 7 – the highest) and statistics on availability of computers, the Internet, and mobile telephones. One can observe some regress in this component of Ukraine's technological development; namely in terms of availability of latest technologies we went down from 80th to 97th position below Poland, Kazakhstan, and Russia. The indicators of technology transfer through FDI – a dominant mechanism in post-socialist countries of Central and Eastern Europe which joined the EU – are extremely low. The growth rate of PC availability per 100 population is relatively high (more than 60% in three years), but, unfortunately, in absolute terms the indicator is three times smaller than in Russia and 12 times smaller than in Estonia. By the integral indicator of the economy's technological readiness, Ukraine demonstrates more than a two-time lag behind advanced countries (USA and EU), and regarding Central and Eastern European post-socialist nations this gap is 20-30%, which testifies to weak adaptive abilities for implementing new technologies in Ukraine's economy.

The innovation component and its weight in the overall competitiveness indicator is estimated by WEF researchers to be in the range from 5 to 10%, which corresponds to the transition of an economy from the stage oriented at development of the fundamental factors of economy to the stage of its efficient functioning.

It is important to consider the assessment of key parameters of Ukraine's performance in the innovation pillar. Table 2 shows the main elements of innovative activities dynamically assessed by experts. Despite the low assessment of innovative performance in Ukraine, it should be observed that Ukraine's enterprises have a high potential for independent R&D and development of new products and technologies. During 1998-2007, this indicator showed a steady upturn, whereas in the new EU member-states and in Russia the indicator has been on the decline, because companies tend to obtain licenses for utilization of foreign technologies and imitation of goods. A predominant focus on the in-house abilities of Ukraine's enterprises, given the considerable human capital, may become a major drive towards economic growth in the future.

Table 2

Technological Readiness Indicators	2007-2008 (out of 131 countries)		2006-2007 (out of 122 countries)		2005-2006 (out of 114 countries)	
	Rank	Score	Rank	Score	Rank	Score
Capacity for innovation	**40**	3.7	**38**	3.7	**31**	3.9
Quality of scientific research institutions	**60**	3.9	**45**	3.9	**42**	4.0
Company spending on R&D	**67**	3.2	**59**	3.1	**45**	3.3
University-industry research collaboration	**65**	3.1	**58**	3.0	**48**	3.0
Government procurement of advanced technology products	**75**	3.6	**89**	3.4	**92**	3.1
Availability of scientists and engineers	**70**	4.3	**66**	4.4	**55**	4.7
Utility patents	**58**	0.5	**52**	0.4	**50**	0.4
Overall technological readiness ranking	**65**	3.2	**61**	3.2	**50**	3.2

Source: The Ukraine Competitiveness Report 2008. – World Economic Forum, 2008. – p. 94

Let us turn to other international organizations, specifically to the United Nations Conference on Trade and Development (UNCTAD), which has developed a comprehensive ***Innovation Capability Index*** consisting of ***Technological Activity Index (TAI)*** and ***Human Capital Index (HCI)*** of equal weight [6, p.111-117]. The TAI structure includes three components of equal weight: the R&D personnel per million population; United States patents granted per million population; and scientific publications per million population. The Human Capital Index includes Literacy rate as % of population, secondary school enrolment as % of age group, and tertiary enrolment as % of age group. Countries are classified by the Innovation Capability Index into three groups: high, medium and low. In 2001 with the index of 0.705, Ukraine ranked 33rd among 117 countries with high innovation capability, whereas Poland's and Russia's indices were 0.732 and 0.788 respectively.

The Technological Activity Index assessed separately was 0.600, and the Human Capital Index – 0.810, which ranked Ukraine 27th by this indicator, giving way to Poland and Russia, though in mid-90s Ukraine surpassed all the post-socialist counties. Combined with 2006 statistics, these indices list the number of researchers in Ukraine as 2,136 per million population compared to 2.445 researchers in 2000 [5, p.95].

In general, Ukraine's research potential is relatively high. Experts of the National Institute for Strategic Studies estimated that the average R&D intensity (research costs as a GDP share) in 2001-2005 was 1.23%. In terms of the effect exerted by the research potential on the economic development of the country – 4.8 researchers per 1,000 economically active population – Ukraine is below the average European level (5.4), but leaves behind almost all new EU member-states [1, p.127].

The State Statistics Committee of Ukraine informs that in 1990-2007 the number of researchers dropped more than three times from 313 thousand to 96.8 thousand. In 2007 the specific weight of completed R&D in the GDP

was 0.93%, which evidences some reduction since 1996, when the indicator was 1.36%. In comparison with the USA and EU countries, Ukraine has demonstrated a 2-3-fold lag, and this was only in relative terms [8].

Although in Ukraine the human potential is sufficient for innovative activities, its structure at colleges and universities bends towards economics and law, the specific weight of graduates in sciences, mathematics, information science and engineering is 26.4%, and the sciences show a 1.5-2-fold lag behind developed countries. At the same time, in 1992 Ukraine ranked second after South Korea by the number of students majoring in natural sciences and engineering (1639 students per 100 thousand population) [9].

Though Ukraine has lived through a radical structural transformation of higher education, the country trails behind its western post-socialist neighbors in terms of the number of university students. In the past 15 years enrolment in Ukraine grew by 50% to reach 69% of the age group. In Hungary, for example, enrolment rose from 14% to 65%, in Romania from 10% to 45%, and in Poland from 22% to 63%, which shows that the advantages in human capital which our country enjoyed at the early stages of its market reforms are dwindling [5, p.69]. Also, most scholars moved from research institutions, both ministerial and subordinated to the Academy of Sciences, to colleges and universities, where research is poorly funded and intensive academic load discourages enhancement of scientific qualification.

When assessing the technological development of a country, the United Nations Industrial Development Organization takes into account the structural element of industrial production, namely the share of medium- and high-tech products in the added value of the processing industry and exports. UNIDO experts have estimated that for more than 100 countries the correlation between the added value in the processing industry and the share of medium- and high-tech products is 0.671, with the share of the product in exports equaling 0.631, which demonstrates that over 65% of changes in the added value is explained by the high-tech share [4, p.148-150].

Using these figures, UNIDO has calculated the industrial-cum-technological advance indicator consisting of the industrial and technological advance indicators. For Ukraine the indicator is 0.260, with the constituent indicators 0.546 and 0.475 respectively, ITA has made 0.166 for Russia, 0.236 for Poland, 0.396 for Hungary, and 0.407 for Germany, which demonstrates that Ukraine exports medium-tech products [4, p.160-161]. The World Bank data shows that the export of high-tech products in the overall industrial export had a considerable fluctuation range from 5% in 2000 to 7% in 2003 to 3% in 2006, or 926 million US dollars in absolute terms [10]. One explanation for such low indicators can be found in the distribution of researchers by sectors of Ukraine's economy. The industrial sector, for example, concentrates only 37.4% of researchers, while in the US the figure comes up to 80.5% and in Japan – to 67.9%. More than 38% of Ukraine's researchers are employed in the government sector. Therefore, applied technological developments do not have either human resources or funding [1, p.128].

In our opinion, the focus in technological development should be shifted onto the entrepreneurial sector, where technological developments find their immediate implementation.

References

1. Bublyk S. Prospects and Priorities of National Science Research Potential Development // Ukraine: Strategic Priorities. Analytical Assessments-2006. Monograph / Editor: O.S. Vlasyuk. – Kyiv: NISS, 2006. – P.125-138.

2. Pokryshka D.S. Competitiveness of Ukraine's Economy: Status and Enhancement Prospects // Ukraine in 2007. Annual Assessments of Social-Political and Social-Economic Development. Monograph / Editor: Ruban Yu.G. – Kyiv: NISS, 2007. – P.242-251.

3. Fedulova L.I. Innovative Economy. – Kyiv: Lybid, 2006. – 480 p.

4. UNIDO Industrial Development Report 2005.

5. The Ukraine Competitiveness Report 2008. – World Economic Forum, 2008.

6. World Investment Report 2005 Transnational Corporations and the Internationalization of R&D. – United Nations, New York and Geneva, 2005.

7. BEEPS 2005. – www.ebrd.org.

8. State Statistics Committee of Ukraine. – www.ukrstat.gov.ua.

9. World Education Report: 1995. – United Nations Economic and Social Council: Oxford, 1995.

10. World Development Indicators. – http://ddp-ext.worldbank.org/ext/DDPQQ/

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COMPETITIVENESS OF UKRAINE'S ENERGY SECTOR

Energy plays the key role in the country's economic and social development and in shaping the decisive foundations of its national security in the context of globalization processes. To this effect, however, it is necessary to ensure a competitive environment within the fuel and energy complex (FEC), enhance energy efficiency of its branches, and improve and upgrade the energy-generation structure. Regretfully, the analysis shows that inefficient state governance and poor implementation of the proclaimed energy efficiency policy, lack of the appropriate legislative framework to support the mechanisms of its implementation, inconsistent and uncoordinated actions of the executive agencies prohibit real progress in enhancing the country's energy competitiveness. The purely market mechanisms which could add to the energy efficiency have not been legislatively adopted. At the same time, the EU countries are exerting themselves to boost the global energy efficiency, intending to produce an overall impact on climate changes and to strengthen the EU energy security and competitiveness. The USA is treading the same path. State agencies govern the structure of fuel balance, the use of the strategic reserves of hydrocarbon commodities, the production of oil, gas, and other types of fuel and energy resources (FER), and even the costs of energy per product or work unit.

In terms of energy competitiveness, it is crucial to acknowledge that the sector's branches make a synergy which springs from two roots: on the one hand, it is industry which produces goods and services and via them is characterized by some competitiveness on the internal and external markets, and on the other hand, the goods and services produced by power industry make part of tangible costs of other industries and sectors of economy. It is, therefore, unreasonable to analyze the energy efficiency of the entire economy laying the blame for its low level solely at the door of the country's fuel and energy complex. It is known that in the overall structure of energy and petroleum product consumption, industry (together with energy sectors) accounts for 78%, agriculture – for 1.5%, transportation and communication – for 3.8%, and construction – for 0.7% (2006 data). The higher the share of fuel and energy expenses in the prime cost of the national economy's industrial and other output (some experts estimate it at 30%, ranging from 10% to 80% in various branches, which several times exceeds the indicator for advanced countries), the more exacerbated becomes the issue of its competitiveness in terms of the energy factor. Continually rising prices on imported gas, which is extensively used in Ukraine's industry, makes the reduction in specific and overall gas consumption an imperative issue. The 2007 data, however, evidences that Ukraine's industry (without the power sector) increased its gas consumption by 1,475 million cubic meters which translates to 6.1% over the previous year, whereas its share in the overall consumption of natural gas grew from 33.3% to almost 37%. Technological needs and losses are also on the rise to 10.4% from 9.9% in 2006.

If energy consumption in non-energy sectors remains unpractical (i.e. wasteful), any technical and financial efforts to enhance the power industry potential and the quality of its goods and services will be inadequate for overcoming the shortage of energy resources and ensuring their required production rate. Inefficient use of fuel and energy resources in the sectors of economy is a major determinant of its low competitiveness that triggers potential threats to national security. At the same time, the economic parameters of power industries have an immediate effect on the competitiveness of goods and services produced in other sectors, therefore, it would be appropriate to make an in-depth analysis of the situation in the power industry branches.

Power industry has traditionally been held equal to the fuel and energy complex combining industries which explore, mine (produce), transfer (transport), store, distribute, market (sell), transform, and consume (use) certain energy resources (fuel, electric and thermal power). The power industry, thus, consists of the electric power industry; thermal power industry; hydropower industry; nuclear power industry; transmission, interstate and distribution grids within a single electric power system; heat supply; coal industry; and oil-and-gas sector within oil- and gas-producing companies, underground gas storages, and refineries. A separate consideration should be given to the oil-and-gas transmission system also involving the facilities related to preparation of the hydrocarbon commodities and their products for transportation, etc.

Competitiveness of the power industry is determined, first and foremost, by its ability to supply itself with the primary energy resources (oil, natural gas, nuclear fuel, coal, hydro resources, wind and solar energy, and other renewable sources). The difference between the overall amounts of supplied fuel and energy and their internal production versus the overall production level determines the energy dependency level. Pursuant to the Energy Strategy of Ukraine for the Period until 2030, the country's energy dependence is to be reduced from 54.5% (in 2005) to 11.7% (in 2030). The document also states that economically practical potential of using the country's own resources at that time is evaluated at 166.7 million tons of fuel equivalent. The shortage of resources is currently repaired by imported natural gas, oil and petroleum products, nuclear fuel, coal, etc. The global practice,

however, gives reasons to claim that no country builds its energy strategy on imported fuel, ignoring its own energy sources.

Ukraine has a considerable potential for efficient and competitive future development of its energy sector. Apart from its advantageous geographic location and geopolitical status, developed R&D and skilled personnel potential, there is also a range of material grounds. Firstly, these include sufficient reserves of coal (black and brown) and major elements of nuclear fuel (uranium and zirconium), some reserves of hydrocarbons, and significant reserves of non-traditional and renewable resources. Some estimates predict coal reserves at 117.5 billion tons, of which explored reserves make 56.7 billion tons and power-generating types – 39.3 billion tons; extractable oil reserves – 117.1 million tons; gas condensate – 71.0 million tons; and natural gas – 1,030 billion cubic meter. In other words, in organic fuels coal accounts for 95.4%, oil – for 2.0%, and natural gas – for 2.6% (in terms of world resources the figures are respectively 67%, 18%, and 15%). Secondly, an important potential energy source is coal mines methane, whose deposits rank Ukraine fourth (with 12 trillion cubic meters) after China, Russia, and Canada. Experts maintain that with the required investment available, application of proper technologies, and international experience, Ukraine's annual production level of methane can reach 2 to 4 billion cubic meters by 2010, and 6 to 9 billion cubic meters by 2030. Thirdly, 36 million tons of fuel equivalent can be produced by using local energy sources (brown coal, peat, straw, industrial wood residue, etc.). Fourthly, Ukraine is located in one of the largest uranium ore provinces, whose potential can provide for more than a 100 operation years of the existing nuclear power plants, whereas transfer to fast reactors will increase this potential by another 60-70 years. Fifthly, a well-developed energy infrastructure and spare capacities that can be used to transport additional amounts of hydrocarbon commodities both for domestic use, for transit purposes, and also for electricity transmission make 30% for the gas-transmission system, 50% for the oil transmission system, and 84% for the electric grid. Naturally, these spare capacities entail certain maintenance expenses, which will obviously tell on the prime cost of the services provided thereby. This also explains the unsatisfactory technical conditions of most fuel-and-energy complex facilities and desperately low rates of the complex's simple and extended reproduction. In the estimate of the Ukrainian National Academy of Sciences (as of 2005), the wear and tear of the transmission pipelines was 70%, of the technical means for coal production – up to 60%, and of the electricity grid – 65%. Similar conditions are attributable to the fixed production assets of most power generating facilities, specifically thermal and cogeneration power plants. Over 92% of thermal power plant units have exhausted their design operation life (100 thousand hours), with about 20% of 0.4-150 kV distribution electric grids being in need of reconstruction. This causes a slow reduction, and sometimes an increase, in specific consumption of resources for energy production and transmission: while in 1990 it was 346.1 g/kWh, in 2004 the figure rose to 377.6 g/kWh, in 2005 – to 379.3 g/kWh, and in 2007 – to 395 g/kWh, as opposed to 270-300 g/kWh in the EU countries. The State Statistics Committee of Ukraine reports that in 2006 specific consumption of energy resources per electricity unit produced by general purpose cogeneration plants was 309.3 g (304.7 g in 2005), produced by cogeneration plant units – 378.5 g (367.6 g), and produced by general purpose thermal power plants, without cogeneration plants, 397.6 g (400.6 g). At the same time, technological upgrade and retrofitting of thermal power plant units requires significant funds (e.g., retrofitting of one unit at Starobeshevsk Thermal Power Plant with the so-called circulating boiling layer (modern western technology) have cost about 100 million euros, with a payback period 10-12 years). Losses on electricity transportation in Ukraine remain excessive: in 2006 they amounted to 23.9 billion kWh or 12.4% of the output (compare the USA in 2006, with 4,065 billion kWh produced and 3,817 billion kWh sold, i.e. a mere 6.5% losses).

Ukraine's thermal power industry, predominantly running on imported natural gas, is also known for considerable losses which corrupt its domestic competitiveness (it is common knowledge that today a good share of urban residents fit their dwellings with individual heaters that is a lot cheaper than the offer from municipal utilities companies which include all the losses of over 30% in their price). In 2006, for example, non-productive losses of gas during heat generation came up to 7.9 billion cubic meters, of which 2.3 billion were caused by obsolete equipment in private buildings; 1.9 billion – by worn and torn boiler house equipment; 0.9 – by heat supply network in buildings; and 2.8 billion cubic meters – by main heat supply systems. In the then prices the amount of losses was almost UAH 5.5 billion. The explanation to the current situation in thermal power industry, along with the unsatisfactory state of fixed production assets and backward technologies (as even progressive domestic solutions are not utilized), should also include lack of motivation on the part of utilities companies to enhance their energy efficiency due to guaranteed state-sponsored income regardless of the cost of services (e.g., in the effective budget for 2008, the difference between the price at which NaftoGaz of Ukraine buys gas and the one offered to utilities companies was estimated at UAH 8 billion or over USD 1.5 billion), with the population getting subsidies to cover the cost. A reliable system of accounting for consumed heat has remained unattended for years. The price of gas for population remains unjustifiably low. The still existing so-called cross-subsidies at the expense of the industry, naturally, show in its product prices, thus damaging its competitiveness.

Competitiveness of the goods and services produced by the domestic power industry directly relates to the efficiency of Ukraine's coal sector, which has been operating here since 1795. Coal is the only energy source, whose reserves are potentially sufficient to virtually completely provide for the national economy's needs. Unfortunately, during independence years the branch has lost a lot of achievements inherited from the previous years (see Table).

Development of Major Coal Industry Indicators in Ukraine during 1991-2007*

Indicator	1991	1996	2000	2007
Coal production, million tons	135,6	74.8	80.3	75.3
incl. power-generating, million tons	80.3	44.3	41.8	47.1
coking, million tons	55.3	30.5	38.5	28.5
Ash content of produced coal, %	29.8	33.8	36.5	38.8
Production capacity, million tons/year	192.8	129.0	111.2	134.9
Capacity utilization level, %	70.3	58.0	72.2	56.0
Number of employees	870	671	520	230
incl. miners, thousand	511	395	293	160
Productivity of miners, tons/month	22.1	15.8	22.8	29.4

* see Zerkalo Nedeli, 2008, No. 14, p. 8

The analyzed period witnessed a major reduction in production facilities, a higher average ash content of the produced coal, a double drop in production of the most valuable coking coal, part of which is currently imported for the needs of the domestic metals industry. Labor productivity grows very slowly and is at least three times lower than in the EU countries. On-the-job injury rate is too high. The analysis has shown that the primary cause is the technical and technological backwardness of the sector. Today 96% of the operating mines have not seen any reconstruction for 20 years; two thirds of the main stationary equipment have exhausted their useful life and require urgent replacement; modern powered mining complexes and tunnel boring machines make only one third, whereas modern loaders and conveyor belts account for only 15%. In steep-seam mines, almost 60% of the total coal output is produced using air hammers. By the main indicators, coal industry significantly lags behind the tasks prescribed by the Action Plan for 2006-2010 to implement the Energy Strategy of Ukraine for the Period until 2030, approved by the Cabinet of Ministers' Resolution No. 436-r of July 27, 2006. Experience shows that further efficient, i.e. competitive, sector development is held back by the imperfect financial mechanism of government support targeting cost reduction, production development, and increased coal production; absence of draft legislative acts accounting for the experience acquired by advanced countries and targeting proper privatization of the sector's enterprises. The country needs a Law of Ukraine "On Peculiarities of Privatizing Coal Industry Enterprises"; it is necessary to form a single wholesale coal market and liberalize coal prices to meet its true user value (these action items are provided for in a Resolution by the Cabinet of Ministers of Ukraine adopted in 2000 "On Establishing Auctions to Sell Oil, Gas Condensate, Natural, Liquefied Gas, and Coal"). A good part of state-owned mines are subsidized (for example, "Donbasantratsyt" alone annually gets UAH 320 million in state allowance, with the planned anthracite production of 99 thousand tons). In the second half of 2008 (provided changes to the budget get adopted) the sector's enterprises will receive some UAH 3.1 billion for infrastructure to increase production by 10 million tons already in 2009. All-in-all, in the past 6 years over UAH 22 billion have been channeled to the industry, but with little effect. Some experts see a solution in expedited privatization of the sector, others – in intensified setting up of vertically integrated companies for producing electricity and metal with the involvement of coal-mining enterprises. There is also a need to elaborate the mechanism of price pegging for power-generating coal used by thermal power plants.

An equally large number of unresolved challenges is experienced by another power engineering sector – oil refinement, where not more than 30% of plant capacities are currently used (with the capacity of about 51 million tons/year and 13.9 million tons actually refined in 2007, of which only 9.8 million tons were Russian). Refinery products are uncompetitive; therefore, today's import exceeds 50% of consumed resources, while as recently as in 2004 it was about 10%. Oil processing at Ukraine's refineries is economically unappealing today, since their technological level is low (the processing depth is on the average only 70%, with over 90% in the USA and EU countries. No Ukrainian refinery processes petroleum products to meet the Euro 5 standard (only Lysychansk Oil Refinery qualifies for Euro 4, Odessa – for Euro 3, while the rest do not qualify even for Euro 2). At the same time, we believe that the future of oil refinement in Ukraine and meeting the world standards call for bold actions, such as imposing a legislative ban on operation of oil refineries incapable of producing modern goods, shaping a domestic owner (by converting inoperable plants to government ownership, their revamping and selling), or constructing a new high-tech refinery. Also, it is necessary to weigh the feasibility and practicability of producing engine oils from domestic coal and other available sources pursuant to "On Alternative Types of Liquid and Gas Fuel". It will imply new jobs and solutions to other economic problems faced by the country.

The bottom line is that higher competitiveness and cheaper electricity may be achieved through a radical upgrade of power generating facilities and optimization of their balance.