СТРАТЕГІЯ ЕКОНОМІЧНОГО РОЗВИТКУ РЕГІОНІВ ТА ПІДПРИЄМСТВ УКРАЇНИ

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THE FORMATION OF INFORMATION TECHNOLOGY FOUNDATIONS IN UKRAINE IN THE CONTEXT OF THE GLOBAL ECONOMY

Розглянуто стан та перспективи формування інформаційно-технологічних засад розвитку нанотехнологій в Україні у контексті світової економіки.

Ключові слова: інформаційна технологія, нанотехнологія, економічний розвиток.

The statement of the problem. The world development of the late XX – early XXI centuries is marked by an accelerated pace of economic growth whose ultimate objective is to produce competitive products to reduce costs and the determining factors of its development are the latest information and innovative processes.

Today it is well-known that the acceleration of economic growth of a country mainly depends on the latest information resources related to the creation, accumulation, processing of information and its transformation into specific innovations that are suitable for direct use for industrial purposes. This is confirmed by the situation of the dynamic development of key areas of economic search – microeconomics: complexity and volume of integrated circuit (with 30% reduction in costs and prices) annually doubled. The technical characteristics of very large integrated circuits are improved every two years by four times. For comparison, it took Japan 95 years to release the first million of patents, and only 15 years – to release the second million. Most of them are actually basic innovations, which are accompanied by a number of improving product and process innovations [1].

The world economy in the current conditions of the global economy places new demands on models of economic development, which aims at ensuring further development of civilization and requires knowledge and ability to use global processes. It is essential for the humanity to understand and use new information and innovative technologies in the prospects of scientific and technological progress.

The state of knowledge of the problem. Our modern society is in a period of information explosion, especially nowadays, when the time is rapidly reduced for doubling the amount of accumulation of scientific knowledge. From the beginning of our era 1750 years were necessary to double the knowledge, the second doubling was in 1900, the third – in 1950, that is 50 years later, with increasing amounts of information by 8–10 times over the half of the century [2]. New human knowledge has lately doubled very fast. It is doubled every 1,0–1,5 years, so modern economy in the Information Society is called knowledge economy. However, in practical terms according to the principle of Pareto 80% of acquired knowledge is needed only in 20% of cases and, conversely, only 20% of gained knowledge is necessary to solve 80% of problems.

The intensive converting of scientific knowledge into new technologies creates opportunities to ensure sustainable economic growth paths, and the focus of their efforts on the priority areas of social-economic development promotes the competitiveness growth in world markets.

It should be mentioned that the research work of the following scientists contributed to the development of science and technology, economy and society in the modern information technology principles: V. M. Glushkov, K. Adelman, T. Allen, M. Morton, N. Tanyhuchy, R. Feynman, L. Pasteur, P. Berg, R. Kohler, C. Milstein, A. Spirin, L. Bost, B. Bainbridge, D. Efremenko, P. Bardar, G. Malinowski, G. Borner, R. Lanhakker, B. Velichkovsky and others.

The aim of the study is to determine the strategic foundations of the global economic development based on the latest information technology principles.

The main material. The objects of advanced information technologies design are subsystems that provide and implement procedures for the collection, transferring, stockpiling and storage of information, their processing and providing calculation results in the form desired for a customer. New information technologies are information-technological basis for information systems functioning, for solving functional tasks and for systems managing solutions.

According to the research Ukraine is among the five world leaders in software exports, behind India, China, Russia and ahead of Brazil. According to the Stockholm International Research Institute of the World Problems Ukrainian defense industry in 2012 sent to the foreign customers basic weapons for $ 1.3 billion U.S., and the market for software products was valued at 1.5 billion US dollars. The market of information technologies is predicted to reach $ 10 billion U.S. by 2020. [3]. As regards the territorial and geographic areas of information technologies (IT) only 9 out of 24 administrative regions of Ukraine and the Crimea regions have agencies of the largest IT companies (Kyiv – 18, Kharkiv – 10, Dnepropetrovsk – 7, Lviv – 6, Odessa – 6; Vinnitsa – 5 , Sevastopol – 2, Donetsk – 1, Mariupol – 1).

Scientific and technological progress is probably the only real basis for effective social and economic changes both on the macro and micro levels. However, in Ukraine nowadays there is a chronic lack of science and research confidence, which logically leads to the stagnation in the development and sometimes counterproductive processes in science and technology, to the loss of authority of science, which consequently leads to the slow-down of scientific and technological progress and to the lack of demand generated by scientific and technical products.

The study of socio-economic situation in Ukraine indicates that according to the technological ways the structural dynamics of the state industry in recent years have undergone almost no changes, the fifth technological paradigm is about 3%, the third – went down from 51% to 46%, the fourth – 50 %. The state's share in the global market of high-tech products was and still remains strikingly low – 0.1%. The limited choice of funding (the major part of investments into innovative projects was carried out at the business entities' own expense, the minor part of investments belonged to the resources involved in the financial market and to the expenditures of state and local budgets, including government trust funds and foreign investors) restrains the processes generating financial resources at technologically-active enterprises whose aim is to introduce technical and technological innovations.

The results of A. Zakharova's research proved the following: «the share of the fifth technological structure in Russia only in 1990–2005 reduced from 6 to 1.2%, of the fourth one – from 51 to 39%, while the share of the third structure increased from 37 to 47%, and the share of the relict structures based on the energy of humans and animals and a typical pre-industrial era doubled (increased from 6 to 12.7%). These changes were particularly negative for the Russian agriculture: agrarian reform did not even modernize agriculture, but truly led it to archaism» [4].

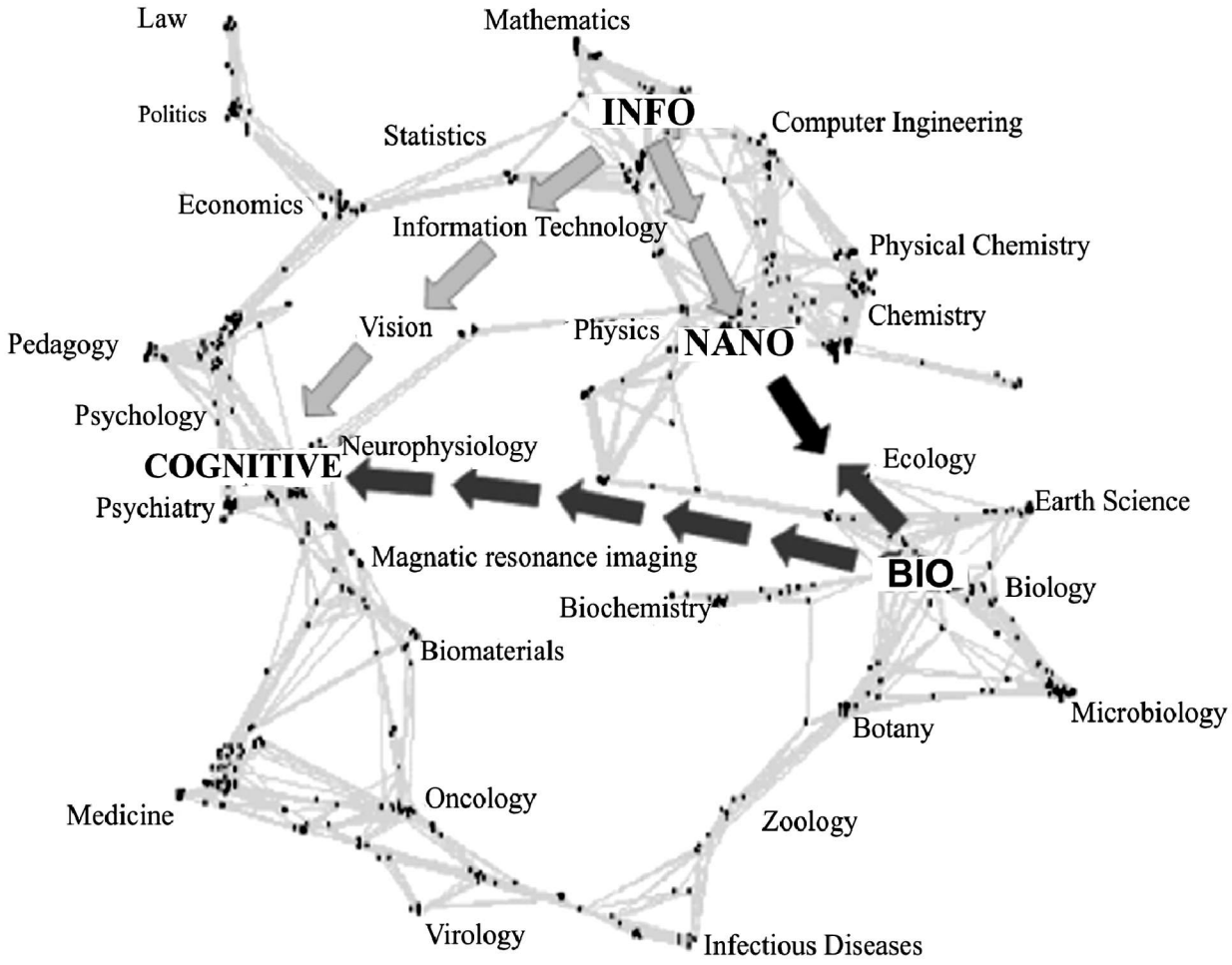
From the economic point of view, if we compare the rate of technological progress, it appears that one-year development of cybernetics equals nearly fifty-year development in other fields of science which facilitates industrial progress and it equals nearly eighty-year development in the field of agriculture (crops, livestock). The latter regards, for example, the automated high-quality translation of texts with the help of computer programs, because a language is a living structure that cannot be fully algorithmic, so the mankind

has not, but probably will gradually come to a full automation of the semantic burden of the text translation. The logical issue is that in economically-developed countries the industries that have low growth rates due to their specificity are supported financially by profitable industries that have high growth rates [5].

In 1900, a Serbian scientist Nikolai Tesla (1856–1943) predicted a significant impact of information technology on the future of the global economic system and society. In his project «World Systems» the scientist proved the possibility of creating a dense communication network with the quality, level characteristics and existence prospects of a global information-based society. The results of the research were the basis for the World system of wireless transmission of energy and information that is used for conducting business [6]. The current state of the economy and society technocratic development confirms the hypothesis put forward by the scientist.

Today, thanks to the acceleration of scientific and technical progress a number of waves of scientific and technological revolution can be observed. In particular, the following revolutions can be distinguished: the revolution in the field of information and communication technologies that took place the 80s of the XXth century, the biotech revolution that followed it, and the revolution in the field of nanotechnology that has recently started. In the last decade there has been rapid development of cognitive science [7]. The interdependence of information technology, biotechnology, nanotechnology and cognitive science plays rather a significant role. This phenomenon is called NBIC-convergence (according to the first letters of spheres: N-nano; B-bio; I-info; C-cognitive). The visualization of NBIC-convergence became possible due to the analysis of scientific publications and a method of visualization that is based on mutual quoting and cluster analysis. Here the diagram of new technologies interconnection is constructed (Scheme 1).

K. Borner, a research scientist, grouped by similar topics the journals due to the cluster analysis based on the relative frequency of cita-



Scheme 1. Map of the interconnection of new technologies

tion (links between intimate journals are gray lines in the diagram). The research was made on the basis of several thousand scientific journals (black dots in the diagram), which investigated more than one million articles. The whole picture of modern science, which reflects the nature of NBIC-convergence is reflected in the scheme. The analysis of the diagram of new technologies intersection defines local economic relationship in the development of science and technology [8].

The development of science and technology is formed on the results of scientific research and investigations in all areas of economic activity and human life.

The main thing that attracts attention today is ignoring the country's technological stratification economy. As it is known, the fifth technological structure dominant in the developed countries and based on electronics and computer technology is substituted by the sixth technological structure. If the previous modes were based on material, nowadays the basis is information , to be exact – the possibility to recognize the meaning of information, with a shift from «info» to «cognitive» (perception and information processing) (NBIC – convergence). For a country the adoption of the sixth technological structure means the transition of its economy to knowledge economics, where there is a substitution of labour with knowledge which is involved in the direct processing of resources, and it is knowledge, not labour, that is the source of inexhaustible value. A key component of the sixth technological structure is a fusion of technologies with bio- and nanotechnology. The sixth technological structure is to be substituted by the seventh technological structure with bioenergetics and psy-technologies as the key components based on the power of thought and consciousness. Its technology will be related to morality, it is intended to harmonize and neutralize all threats in the world, created in the sixth structure. In the seventh structure there will be created new forms of life, social and cultural formations, specially organized environments [9, 10].

As far as we are aware, it will be implemented on the basis of the psycho information approach to the study of both human relationship and civilized processes of science. The approach explores birth, growth, transformation and interaction of psycho information systems – people, organizations, nations, races. The defining feature of such systems is an informative interaction with the environment (metabolic information) and the presence of mind (soul).

The definite research areas for 2013 were foregrounded at the reporting session of the General Assembly of the National Academy of Sciences of Ukraine (18 April 2013). They are the study of nanomaterials and nanotechnology, the development of robots in molecular and cellular biology and biotechnology, the complex studies on the structure and evolution of the universe, the strategies of the human development, etc. [11].

The term «nanotechnology» was introduced in 1974 by Norio Taniguchi, who defined it as «manufacturing technology that achieves ultra-high precision and ultra-size ... about 1 nm ...» [12].

The term «nanotechnology» reflects the rates that are expected from the technological systems («nano» means «a dwarf» in Greek): one millionth of a meter is the rate an enterprise is to perform its production on. It practically determines that «an enterprise» should be the size of a cellular or even a molecule.

Influenced by the book by Eric Drexler «Molecular engineering» (1981) in the years 1980–1990 nanotechnology meant the creation of various devices with individual molecules. For example, tiny autonomous nanorobots were described as the prospects of nanotechnology. They were implemented into the human body and, having mixed in the circulatory system, they found the diseased organs and performed their «repair». The term «nanotechnology» always meant and still means a field of science. However, a more accurate definition of «nanotechnology» was given by Albert Franks in 1987: «Nanotechnology is a production with the size and accuracy within 0,1–100 nm.» [10].

Indeed, while E. Drexler's «molecular machines» were being created due to formulas and computer simulation, traditional technologies steadily progressed due to the development of precision characteristics that appeared in the field of nanotechnology. It is better seen in the development of microelectronics, whose production is connected with chips with characteristic dimensions of active electronic components below 100 nm and with subnanometre accuracy. Microelectronic technology served as the basis for creating microelectromechanical devices whose precision manufacturing requirements significantly surpassed the threshold of 100 nm.

First of all nanotechnology includes industries dealing with final or intermediate products: nanomaterials; nanostructures; nanodevices. In future these areas will produce the following products: nanotechnology facilities and nanotechnology instruments.

Specialists in nanotechnology operate dimensions of nearly a nanometer (i.e. one billionth of a meter). This dimension is a hundred times smaller than the wavelength of visible light and it can be compared with the size of an atom.

Looking at a separate atom as a building block or «a detail» they perform practical ways to design materials with desired characteristics from these parts. A number of high-tech firms and divisions of companies of the world recognition have reached a level of skills to recruit atoms and molecules as structures. To some extent it can be stated that in perspective the molecules will be collected like children's erector set. Nanorobots will be used to that effect. Any chemically stable structure that can be described, in fact, can be built. As nanorobots can be programmed for the construction of any structure, including the construction of other nanorobots, they will be low-cost. Working in large groups, nanorobots will create any objects at a low price and high accuracy. Molecular robot-doctors are expected to be created. They will be able to «live» inside the human body, to eliminate all injuries possible and to prevent diseases. By manipulating individual atoms and molecules nanorobots will «repair» the cells and restore their activity. The expected term for the creation of robots-doctors is the first half of the XXIst century. In Ray Kurzweil's opinion by 2020 billion of nanorobots size of a cell will have been placed in the middle of the circulatory system. Robert Fraytas, a leading scientist in the field of nanomedicine, states that it will happen not earlier than 2030–2035 years. These nanorobots will be able to slow down the aging processes, to treat individual cells and to interact with individual neurons [13].

In the near future, interplanetary spaceships and other vehicles will be built on the principles of nanotechnology, technology that can create objects and equipment, consisting of separate molecules or even atoms and manage these objects and use them for technical purposes.

All necessary things for a human life can be made by molecular robots directly from atoms and molecules of the environment (as plants are grown on clay and air). This provides unlimited effectiveness – a huge reduction of materials ratio. Humanity is expected to get only comfortable environment, where there will be no place for hunger, disease, hard labour. By introducing logical nanoelements into all the attributes of the environment in the second half of the XXIst century, it will be «reasonable» and comfortable for humans. It is caused by the fact that the terms for the introduction of nanotechnology tend to reduce: in 1960 the scientists predicted the appearance of nanotechnology in 300–500 years, in 2010 this period is only 50 years, i.e. the active period of one human generation [14].

Conclusions

The transition from «micro» to «nano» technology is not a quantitative but qualitative breakthrough: from the manipulation of things to the manipulation of separate atoms.

The need to take into account the phenomenon of NBIC-convergence is that it is a radically new stage of scientific progress and the most important evolutionary determinant with its possible consequences. Technological capabilities that are revealed during the development of this process will inevitably lead to significant changes in the structure of the world and to the revision of traditional notions of the fundamental concepts of today's civilization – such as life, mind, man, nature. NBIC-convergence is the source of power and material wealth in the new post-industrial society.

The problems of economic growth of any country in the world and the impact of innovative changes in its dynamics disturbed and disturb the whole humanity during its evolution. The undisputed fact is that the impact of production factors on economic growth remains crucial, and the research trends in this area serve as convenient tools for analysis of economic activities in the information based on the latest breakthrough information technology principles.

The prospects for further research. The need to identify strategic framework of Ukraine economic development is explained by the factors of dominance of low-technological third and fourth structures in the structure of reproduction, the part of which in industrial production now exceeds 95%. In addition, the fifth and sixth structures do not belong to the priorities of research and investment into technological modernization of the national economy.

Accordingly, a country needs making research of institutional and economic conditions for its technological breakthroughs in the areas and sectors of the sixth technological structure: bio- and nano-technology, aerospace, new materials, opto- and microelectronics, microsystem mechanics, software, molecular electronics and systems management.

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В статье показаны перспективные направления развития экономики базирующиеся на новейших информационно-технологических принципах.

Ключевые слова: информация, технология, нанотехнологии, экономическое развитие.

The article analyses the state and prospects of the formation of information technology base for the development of nanotechnology in Ukraine in the context of the global economy.

Key words: information technology, nanotechnology, economic development.

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ОРГАНІЗАЦІЯ АУДИТУ СУПУТНІХ ПОСЛУГ В УКРАЇНІ

У статті розглядаються питання організації аудиту супутніх послуг в Україні: статутної діяльності, аналізу чистих активів підприємства, організації маркетингу, конкурентоспроможності продукції та її оновлення, аналізу фінансової політики та перспектив економічного розвитку підприємства.

Ключові слова: Міжнародні стандарти аудиту, супутні послуги, аудит.

В сучасних умовах розвитку ринкових відносин в Україні взаємовідносини аудиторських фірм з підприємствами – клієнтами зазвичай не обмежуються аудиторськими перевірками фінансової звітності, а також оказуються і супутні послуги.

Надання різних видів послуг вимагає від аудиторів професійної компетентності і високого професійного рівня у сферах; бухгалтерського обліку та його підсистемах фінансового та податкового обліку; господарського права, сучасної системи оподаткування підприємств, фінансового та економічного аналізу та інших питань. При цьому згідно МСА аудитор при надання супутніх послуг також повинен дотримуватись етичних принципів: професійна незалежність, об'єктивність, чесність, професійна компетентність та належна ретельність, конфіденційність, професійна поведінка, дотримання технічних стандартів.

Метою статті є описання етапів перевірки (аудиту) окремих видів супутніх послуг аудиторів, наприклад, стратегії функціонування підприємств в сучасних умовах господарювання.

Використання законодавчо-нормативної бази організації обліку, оподаткування, право-