

Theoretical Basis of the Digital Economy Formation

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Abstract: In the study, the retrospective analysis of the neoclassical economic theories with comparison of economic definitions, such as “knowledge economy”, “innovative economy”, “new economy”, “intellectual economy”, “the sixth technological mode”, “digital economy” is given. The role of digital economy as a driver of innovation and inclusive growth is emphasized. Some aspects of digital economy in Russia are reviewed.

Key words: Digital economy, new economy, knowledge-based economy, innovative economy, Russia

INTRODUCTION

The tendency to increasing information value on the postindustrial stage of the economy development which is accompanied by the formation of the national innovative economy, the development of regional innovation systems and the emergence of new marketing of innovative territories, generates a lot of definitions in the framework of modern economic scientific concepts. Today, along with classical definitions of the neoclassical economic theory of 60-70-80-90's of the XX century, we use such concepts as “intellectual economy”, “new economy”, “advanced economy”, “digital economy”, “global digital economy”, “inclusive global digital economy”. Modern economic science identifies “knowledge economy” as a self-independent research object and its “pioneer” having been the professor of the Princeton University (Machlup, 1996), the researcher of “The Production and Distribution of Knowledge in the United States” and “The Economics of Information and Human Capital”, who was the first to use the term “knowledge economy” in 1962.

MATERIALS AND METHODS

Over view: Significant technical and production changes, shifts in the structure of economy with growth in the service sector up to 70% of GDP and more in the developed countries with a significant decline in the industrial sector led to the emergence of concepts of “the postindustrial society” and “the society of services”. The concept of postindustrial society is represented by such scholars as D. Bell, D. Risen, J. Galbraith and V. Inozemtsev. The founder of the theory of the postindustrial society is considered to be an American researcher Bell (2004), who published his work “The Coming of Post-Industrial Society” in 1973.

Originated in the early 60's, the information technology paradigm of the scientific and technological

revolution, with the concept of “the information society” being the central element, according to which information can affect the production process by means of the advanced production technology and management system, marked the beginning of the “information economy” theory. The analysts of the information society are M. Porat, I. Masuda. M. Porat introduced the term of “information economy” into scientific definitions in 1976. In the 70's of the XX century, the statement of Machlup (1996) on the nonidentity of “information” and “knowledge” categories became the key concept for the neoclassical economic theory. “The formation of new knowledge is not over until it is transferred to the other person and it belongs to more than one person. To inform means to transfer knowledge, knowledge can be produced by information”.

Intensification of macroeconomic dynamics research of the 70-80's of the XX century ensured wide distribution of the economic theory of a new “knowledge-based economy” an economy in which the main part of the Gross Domestic Product (GDP) is provided by the activity of producing, processing, storage and dissemination of information and knowledge (Anonymous, 2015). Peter Drucker defines new economy as the “knowledge economy”, the sphere of producing and distributing information as the “knowledge industry” and the society as the “knowledge society”. “Of all the scope of knowledge possessed by the humankind and measured in physical quantities, 90% has been received for the last 30 years, as well as 90% of the total number of scientists and engineers prepared during the whole period of civilization are our contemporaries. These are the most obvious signs of transition from the economy based on the use of capital and natural resources to the knowledge-based economy” (Tonn, 2004).

In the 80's of the last century, there was received a new scientific evidence of the theory of long or “Kondratieff” waves and their relationship with patterns

of global economic and technological development. It was shown, in particular, correlation between the wave length and innovation activity splash, new technological structure formation, structural shifts in energy and transport infrastructure.

Since, the 80's, there has been attached the term "innovation" to the concept of "information economy" as a multicomponent, multidisciplinary process. In the study, there have been actively involved different members, who constantly interact and exchange knowledge to produce a new product or process or other innovation with different competences and capabilities. That ultimately has led the scientific world to the understanding of the principle of innovation and developing a system of innovations innovative economy. The theory of Schumpeter (1939) about irregular character of economic growth and innovations being the factor of that irregularity, became super-urgent three decades after, its creation. According to this theory, the innovation disrupts the economic equilibrium which then is restored at a new level under the influence of processes of economic competition. J. Schumpeter defined the innovation as "a competition core of a new type" and he attributed economic success of national economy to its innovative nature even before the World War II.

Academic economists of three research centers in the United Kingdom, Sweden and the United States along with the criticism of neoclassical economic theory developed the concept of national innovation systems in the 1980's. Freeman (1982), Professor of Science Policy Center at the Sussex University (UK), B. Lundvall, the Professor of the Uppsala University (Sweden), R. Nelson, the Professor of the Columbia University (USA) are the recognized "pioneers" in this direction. For the first time, the term "national innovation system" was used by Freeman (1982) in his research "Technological Infrastructure and International Competitiveness".

About 6 years later, in 1988, the collective monograph "Technical progress and economic theory" was published and the concept of "national innovation system" came into use in academic and practical circles. Recognition of the crucial importance of knowledge and innovation for the economy modernization, the involvement of national economy into the world economy is a key point and one of the main advantages of the economic theory of NIS. In 1992, the qualitative changes happened in the academic world of Sweden and the USA, demonstrating transition from theory to practical implementation of the concept, the Academy of Sciences of the United States introduced the term "national innovation system" to assess the academic and technological policy of the country, the Swedish Government established a specialized institute to

provide innovative strategy of the country. At present time, the OECD, the European Union, UNCTAD, the World Bank, the IMF and other supranational organizations successfully use the concept of national innovation systems to produce country rankings. Russian researchers, generally define NIS as a set of economic entities that interact in the process of creating and implementing innovative products (services) and operating within relevant normative-legal base in the framework of government policy.

The concept of national innovation systems is also associated with M. Abramovitz, who defined "social capability" of states, i.e., their original possibilities to build economic and technological potential, listing the key factors: stability of state power, existence of advanced financial institutes and markets, level of education, experience in organizing and managing largescale governmental industries and projects, etc. in his study, "Catching Up, Forging Ahead and Falling Behind" in 1986. Cooke (1992) gave the first definition of "regional innovation system" as "the set of nodes in the innovation chain including knowledge-generating firms as well as organizations, enterprises using (applying) this knowledge and a variety of structures that perform specialized intermediary functions: infrastructure support, funding innovative projects, their market expertise and political support" in 1992.

Under the influence of two revolutions, scientific-technical and information, there appeared a fundamentally different economy in which knowledge, information, innovative mindset and behavior of a person creating "know-how" rather than material factors play a key role (Ivanov *et al.*, 2002).

In the last decade, the term "intellectual economy" has appeared in the Russian academic economy, under which in broad public interpretation, it is understood that the unique skills of the academic knowledge carriers are the key factors in the development of tangible and intangible production and they directly affect sustainable economic development. However, some researchers believe there is a direct correlation between the knowledge-based economy and theories of sustainable and controlled development. For example, Naumov *et al.* (2013) notes: "Knowledge-based economy is a reasonable economy focused not only on the satisfaction of material human needs, but also on the moral and spiritual needs of the people, ensuring sustainable development and social partnership".

Western economists usually approach the concept of "smart economy" through the prism of the concept of "intellectual production", i.e., by the human activity itself, implying the higher proportion of actual intellectual work

compared to manual labor. Currently, the world's academic society introduced an economic neologism-brainfacturing which is interpreted as "production by the human intellect" by the researchers. A number of academicians focus on the increasing role of human characteristics or "human capital" (Necker).

Modern academic schools, developing research of N.D. Kondratev and J. Schumpeter, formed a new paradigm of economic science in the last decade, whose representatives were united in the international research network globelics. Thanks to the works of academician Glazyev (1993), the concept of "Technological Pattern" (TP) came into Russian and world economics. A distinctive feature of that scientific paradigm is an evolutionary approach to the study of the processes of economic development in a real system of technological, industrial, financial, commercial, social interactions and interdependencies, involving penetration into their internal logic, rhythm and interaction mechanisms of the driving factors.

Works of the US Economist Rifkin (2009) introduced the term "Third Industrial Revolution" (TIR) into academic and practical use. The new theory of TIR is associated with the prevalence of a fundamentally new technology of 3D products printed with the help of 3D printers. "The 3rd phase of industrial revolution", according to Rifkin, is caused by such factors as automation and robotics in industrial production, introduction of computer technology in manufacturing, service sector and in particular, management and the overall computerization and cybernation.

The term "new economy" which appeared after the US president speech in 2000, was perceived in academic and political circles as the economy based on information technology, combined with skillful macroeconomic policies, it could grow steadily at a time, when rates of inflation and unemployment are low. Later, the concept of "new economy" or "neo-economy" has evolved and is still very uncertain. The imbalance of economic growth in practice became the basis for the emergence of a new theory of the inclusive global economy. According to Ricardo Hausmann, inclusive economic growth provides stable and long-term improvement in the lives of all sectors of the people which stimulates the GDP growth acceleration.

RESULTS AND DISCUSSION

The concepts of "informational economics", "network economy" are introduced into academic and practical usage to fix the contemporary processes of technological changes in social production, resources and products of these processes as well as some economic and social processes. At the present stage of economic thought development under the concept of "digital

economy", the economy carried out by means of information and communication technologies is understood (Anonymous, 2007). The key means of data "production", storage and processing become personal computers and digital communication tools on the Internet that make, it possible for scholars to talk about the "internet economy" or "computer" economy.

Digital economy is estimated by experts as a driver of innovation and inclusive growth. Companies' expenditure on R&D and recent increase in the number of patents related to Information and communication technologies indicate that this sector plays a key role in the innovations. Global trade in ICT products and services continues to grow universally. Broadband communication markets grow, the number of wireless broadband subscriptions increases with almost 1 billion subscriptions in the OECD area compensating the decline in fixed telephone lines. The quality of communication networks improves with the introduction of optical fiber and 4G and prices drop, particularly in the mobile services (OECD, 2015). Such tendency is observed in Russia, too.

Digital economy is one of the growing segments of the Russian economy amid the general stagnation. Thus, the volume of Internet-dependent markets, according to the Russian Association of Electronic Communications (RAEC) in the study "Economics of the Russian Internet (Runet)" was estimated as more than 7 trillion rub. in 2014 or exactly 10% of Russia's GDP. In companies and organizations related to the internet market, including self-employed population, there are over 1.2 million people, while labor productivity in IT exceeds the average for Russia (Anonymous, 2014).

The Russian audience continues to grow at nearly 10% per year⁻¹. The Runet adult audience is 74 million people today, 60.8 million of them go online every day, it is 52% of the adult population of Russia. In 2015, the proportion of the active Internet audience people going online at least once per day is 53% (61.5 million people) (Bulletin, 2015).

Russia is ranked first in Europe in the number of users. In 2014, the audience and the internet penetration in Russia continued to grow, with the growth rate at the level of 2013. During the year, almost 6 million new users appeared. The daily audience grew even more for 6.7 million people. The internet penetration in Russia is the highest in the CIS and the BRICS countries. Anticipating further development, RAEC expect average market growth of 8-10% through 2018.

In addition to consistent growth of communication volume and dynamics, there has been a quantitative leap in social integration. The Runet plays the role of social integrator in Eurasia. According to the information of the analytical agency W3Tech of 2013, the internet domain

“.ru” has become the most popular top-level domain among national domains being inferior only to the supranational domains “.com” and “.net”.

The Russian social networks are among 5 top world's largest networks, bringing together hundreds of millions of people in Eurasia. W3Tech investigations indicate that the Russian language is not only used on 89.8% of “.ru” zone but also on 88.7% of “.su” domain portals. Analysts have concluded that the Russian language is the most common language spoken on the websites of the Customs Union: Belarus (86.9%), Kazakhstan (84.0%) and the countries of the former Soviet Union Ukraine (79.0%), Uzbekistan (79.6%), Kyrgyzstan (75.9%) and Tajikistan (81.8%). In 2013, it was the first time when the Russian language outranked the German language on the web and became the second most popular language on the internet, it is used by 5.9% of all existing sites.

CONCLUSION

Development of new technologies and economic processes as their result brings changes into management: networks replace market and vertically organized corporate structures. At present, information and communication technologies already transform ways of social interaction and personal relationships. The convergence of fixed, mobile and broadcast networks, devices and objects, being more and more interconnected to form the Internet of Things, takes place. Definitely, digital economy characteristics must be taken into account by states when selecting development strategies. Top-supranational institutions such as OECD, European Union, UNCTAD, the World Bank and the IMF, affiliated economies, try not only to assess the potential of digital economy but also emphasize the necessity to develop digital economy in the strategic way, so that the internet strategies could be a response to possible threats.

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REFERENCES

- Anonymouse, 2007. Explanatory Dictionary on the Information Society and New Economy. <http://vocable.ru/dictionary/1127>.
- Anonymous, 2014. (NPRAEK) Russian Association of Electronic Communications. <http://raec.ru/analytics/>.
- Anonymous, 2015. National Encyclopedic Service. <http://vocable.ru/dictionary/1127/word/yekonomika-osnovanaja-na-znaniyah-knowledge-economy>.
- Bell, D., 2004. *The Coming of Post-Industrial Society: A Venture of Social Forecasting*. Moscow, Academia, C. CLII.
- Bulletin, 2015. “The Internet of Russia: Dynamics of Penetration. http://fom.ru/uploads/files/Bulletin_Internet_v_Russia_Release_49_Spring_2015_dem.pdf.
- Cooke, P., 1992. Regional Innovation Systems: Competitive Regulations in the New Europe. *Geoforum*, 23: 365-382. DOI: 10.1016/0016-7185(92)90048-9.
- Freeman, C., 1982. Technological Infrastructure and International Competitiveness. Draft paper submitted to the OECD ad hoc group on science, technology and competitiveness. http://redesist.ie.ufrj.br/globelics/pdfs/GLOBELICS_0079_Freeman.pdf.
- Glazyev, S.Yu., 1993. *Teoriya Dolgosrochnogo Tekhniko-Ekonomicheskogo Razvitiya [Theory of Long-Term Technical and Economic Development]*. Moscow, VIdar.
- Ivanov, V.N., A.V. Ivanov and A.O. Doronin, 2002. *Upravlencheskaya Paradigma XXI veka (Management Paradigm of the XXI century)*. Vol. 1, Moscow, MGIU.
- Machlup, F., 1996. *The Production and Distribution of Knowledge in the United States*, Moscow, Progress.
- Naumov, E.A., A.A. Ponukalin and A.E. Benua, 2013. *The International Electric Journal. Sustainable Development: Science and Practice*, 1 (10): 72.
- OECD, 2015. *Digital Economy Outlook*. <http://www.oecd-ilibrary.org/docserver/download/9789264232440-sum-ru.pdf?expires=1444570417&id=id&accname=guest&checksum=A1AB3E02E8689D2002C99C1F16D9F2E3>.
- Rifkin, J., 2009. *The Empathic Civilization: The Race to Global Consciousness in a World in Crisis*, Penguin Group (USA), pp: 688.
- Schumpeter, J., 1939. *The Theory of Economic Development*, Moscow, Progress, 1982; Schumpeter J.A. *Business Cycles*. N. Y.
- Tonn, B.E., 2004. *Research Society: Science and Technology for the Ages, Futures*, 36 (3): 335-346.