On the transition to a digital economy in the context of integration and globalization

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Abstract. In this article, the transition to a digital economy is considered both in terms of integration within the framework of the Eurasian Economic Union, in which the Russian Federation is the system integrator, and in the context of globalization, when there is a competition between the two global digital giants: China and the US. At the same time, along with a general assessment of the transition to a digital economy in Russian agriculture, both Russia's place in the global digital transformation and the preliminary results of monitoring the global technological trends in the agricultural sector of the Russian Federation in the “great digital revolution” phase, which is noted by S. Yu. Glazyev.

At present, the transition to a digital economy in the context of integration is often considered in previously formed regional economic units, in particular, within the framework of the Eurasian Economic Union.

At the same time, the digital giant China, which is a member of many integration groups (BRICS, SCO, and others), is considered an example and standard of transition to a digital economy in the context of globalization.

In the overall assessment of the situation of an intensive transition in the Russian agriculture to the digital economy, one should also touch upon the preliminary results of monitoring global technological trends in the agricultural sector of the Russian Federation, developed and published by the research team of the Higher School of Economics [7].

Of course, the current situation in Russia during the transition to a digital economy should be viewed as a phase of the “great digital revolution,” as is considered by S. Yu. Glazyev, an academician of the Russian Academy of Sciences [1].

Features of the great digital revolution

The features of the great digital revolution, noted by S. Yu. Glazyev, allow us to state that by now the digital revolution has embraced almost all types of activity and has involved most of humanity in its orbit. Since the first computers appeared, it has gone through three major stages. During this time, in the world technical and economic development, two technological structures have changed.

By his definition, technological orders are the groups of technological aggregates distinguished in the technological structure of the economy, connected to each other by the same type of technological chains and forming reproducible integrity. At the same time, the phase of rapid growth of the
technological structure is accompanied by a cyclical increase in the production and consumption of GDP, as well as its energy intensity compared with the long-term trend (Figure 1).

From the point of view of S. Yu. Glazyev, lamp computers appeared and spread in the final phase III of the technological order as part of the formation of the electrical industry; and in the new IV technological order, in the phase of its growth, from the beginning of the 80s, microelectronics with the promising emergence of the Internet and fiber optic cables, connecting billions of computers to global information and communication networks, which became the basis of the V technological order, were formed.

![Figure 1](image-url)

**Figure 1.** The change of technological structures in the course of modern economic development, indicating their key technologies of energy conversion into work.

Source: [1].

In the process of changing technological structures, from his point of view, the structure of demand for scientific discoveries and inventions is changing. Many of them remain unclaimed for a long time, since they do “not fit” into the production and technological systems of the dominant technological structure. Only with the exhaustion of the possibilities of its growth there is a need for fundamentally new technologies, the competitive selection of which forms the basis of new technological trajectories.

Many experts support the position of S. Yu. Glazyev, according to which (a) there is a continuity between the V and VI technological structures; (b) the VI technological structure is based on the application of nanotechnology; (c) with a qualitatively higher power of computing technology, nanotechnology can create new structures of living and nonliving matter. S. Yu. Glazyev notes that the VI technological pattern emerges from the embryonic phase of development, at which its expansion is constrained by the insignificant scale and lack of development of relevant technologies, although the costs of mastering nanotechnology and the scale of their use are growing exponentially and the share of the VI technological pattern in the structure of modern the economy is increasing rapidly.

Comparison of the share of technological orders in the economies of the USA and Russia, according to E. A. Sobolev, differs significantly from the third technological order (15% against 30%) and including the VI technological way (5% against 0%). The data presented for all technological structures in Table 1 show that the Russian economy is lagging behind the US economy by almost a whole cycle of technological structure [12].
### Table 1. Shares of technological structures in the economies of the USA and Russia.

| State | III t.s., % | IV t.s., % | V t.s., % | VI t.s., % |
|-------|------------|------------|-----------|------------|
| USA   | 15         | 20         | 60        | 5          |
| Russia| 30         | 50         | 20        | -          |

Source: E. A. Sobolev [12].

**Transition to a digital economy in the EAEU**

If one resorts to the markets of the national technology initiative in relation to the agro-industrial complex, one should refer to the following markets with their identification:
- FoodNet: a market for the production and sale of nutrients and final types of food, as well as personal production and delivery of food and water.
- HealthNet: a market for personalized medical services and medicines that ensures a longer life expectancy.
- MariNet: an intellectual system of sea transport management and world ocean exploration technology.

Having considered the stages of development of information technologies, known as automation, electronization, informatization, digitization, S. B. Ognivtsev justified the need to create at the moment a digital platform of agro-industrial complex as an important component of the modern digital economy. More precisely, we should talk about the need to create Digital Agrobioeconomics [8].

Based on the study of the program “Digital Economy of the Russian Federation,” approved by order of the Government of the Russian Federation No. 1632 (July 28, 2017), S. B. Ognivtsev proposed the composition and architecture of the digital agro-industrial complex platform (AIC DP), in which he singled out 4 spheres:
- Industries that specialize in providing agriculture with the necessary material resources: agricultural machinery, equipment, mineral fertilizers, etc. (about 1.7% of GDP);
- Agriculture, which occupies a central place in the agro-industrial complex and is divided into branches of plant growing and animal husbandry (about 4.2% of GDP);
- Food and processing industries that produce food and other products from agricultural raw materials (approximately 2.4% of GDP);
- Sectors of the economy that ensure the promotion of food and agricultural products to consumers (wholesale and retail trade, transportation and storage of products, consulting, marketing and advertising services, which is about 7.8% of GDP).

In fact, for implementing the AIC DP of the Ministry of Agriculture of the Russian Federation, it was decided to strengthen the functionality of the Ministry. Consequently, the Order No 204-u was adopted, leading to the creation of the Federal State Institution “The Analytical Center of the Ministry of Agriculture of Russia” as a tool for managing the AIC digital economy.

During the year, the system of indicators controlled by the Analytical Center of the AIC included more than 96 thousand indicators used in the work of the AIC management bodies. The mission of the system being created is to increase the competitiveness of the Russian agro-industrial complex through the use of IT-advanced tools in the management of the Russian agro-industrial complex.

According to experts, the construction of a digital economy in Russia will require more than 100 billion rubles annually, including 1 million specialists to be trained annually and about 5 billion rubles a year to be spent on providing them.

Preliminary results of the monitoring of global technological trends (trendletters) for the agricultural sector of Russia covered the following issues:
- “Smart” agriculture for a circular economy;
- Biopesticides for integrated pest control;
- Nanobiotechnological remediation of water and soil;
Integrated control systems of agricultural production.

“Smart” agriculture for circular economy provides for “intelligent” agriculture based on the use of automated decision-making systems, integrated automation and production robotization, and technologies for designing and modeling ecosystems. It involves minimizing the use of external resources (fuel, fertilizers, and agrochemicals) while maximizing the use of local production factors (renewable energy sources, biofuels, organic fertilizers, etc.) [7].

An important role is played by biopesticides – highly specific, non-adverse toxins that are harmful only to a small number of species of living organisms, including the latest advances in biotechnology, which constitute an alternative to traditional chemicalization.

In some cases, convergent nanotechnological solutions will be able to solve the problems of water and soil remediation by delivering and distributing reacting nanoparticles by microorganisms, or by microorganisms processing the results of reacting nanoparticles with contaminants or adhesion to nanoparticles of intermediate toxic products of bioprocessing of dangerous pollutants.

The integration of monitoring data and the use of data mining algorithms will identify additional risks of environmental violations.

The Eurasian Economic Commission (EEC) has prepared proposals for the governments of the countries of the Eurasian Economic Union (EAEU), which indicate a number of rules on digitizing their economies.

According to analysts of the EEC, the share of the economy based on digital technologies in the territory of the EAEU is $85 billion (2.8%) to the total GDP of all participating countries. By 2025, the contribution of the digital economy of the countries of the Union to GDP growth should be 20% per year. The efficiency of economic processes should increase by about the same amount due to the digital transformation of infrastructures and control systems. It is noted that the EAEU states already have experience in joint projects in the field of the digital economy, including the creation of the Eurasian Industrial Cooperation Network and the Eurasian Technology Transfer Network.

The World Bank offered Central Asian countries the development and implementation of programs on the digital economy as part of the Digital CASA project, in which the Republic of Tajikistan takes the lead, although at present even the Internet penetration rate in Tajikistan is only 19%, and, for example, it is 73% in Kazakhstan. The “Digital Kazakhstan” program, designed for the digitalization of Kazakhstan until 2015, including improving the quality of life of the population and the competitiveness of the economy, will bring the state revenue in excess of 2 trillion tenge ($5.5 billion).

The World Bank supports the digital transformation program in Kyrgyzstan and the “Taza Koom” government program, since digital technologies can be a powerful incentive for comprehensive and sustainable economic growth and development. The project “Digital CASA - Kyrgyz Republic” will contribute to the development of national and regional ICT infrastructure, the promotion of reforms in the public sector, the development of the country’s export potential, as well as the creation of new investment opportunities for business and the creation of new jobs.

The project “Digital CASA - Kyrgyz Republic” includes four main components:

- Regional digital connectivity infrastructure;
- Regional data centers, digital platforms and intelligent solutions;
- Creating an enabling environment for the digital economy;
- Project management.

The Digital CASA project meets the goals and objectives of the National “Taza Koom” Digital Transformation Program of Kyrgyzstan, which envisages the creation of a transparent and efficient public administration system based on digital infrastructure.

Digital Giant – People's Republic of China
China has firmly established itself. This is the world's largest e-commerce market, accounting for more than 40% of global transactions, one of the top three countries for venture capital investments in autonomous vehicles, three-dimensional printing, robotics, drones and artificial intelligence (AI).

Experiencing a trade deficit of services in general, China has recently registered a positive balance of trade in digital services of up to $15 billion a year.

China has chosen a planned approach to building a digital economy, which involves the gradual development of infrastructure under the leadership of the state and the targeted “filling” of the relevant sector with various economic actors. The strategy involves the following 4 main components:

- Total digitization of production and logistics;
- Development of a regulatory framework;
- Digitalization of control systems, the creation of digital platforms;
- Integration of digital platforms and economic systems into a single space.

Currently, the China platform for monitoring via remote sensing in agriculture provides information services to 147 countries and regions of the world. The platform called CropWatch was created at the initiative of the Institute of Aerospace Information of the Chinese Academy of Sciences (IAI) in 1998. Based on remote sensing and ground-based observations, the system is able to independently assess crop growth and crop yields, as well as collect relevant information on a global and national scale. The platform is one of the three main international remote sensing systems for agriculture [4].

Today, China has favorable conditions for developing the digital economy, which allows it to compete with advanced countries.

Advance deployment of the state information infrastructure system contributes to strengthening the foundation for the development of China’s digital economy and the development trend of the global digital economy. For China, the digital economy is not only a new variable in the growth of economic transformation, but also a means of improving quality and improving efficiency.

China has the largest population of Internet users in the world, but this is not enough for the country's government. Investments in broadband Internet will help tens of millions of rural people in the country to become a middle class. The number of Internet users in China is approximately 22% of all users in the world. The United States, India and Japan are next, but even these three countries, of taken together, cannot surpass China. At the same time, a significant digital divide remains in China.

In 2013, the State Council of China adopted and launched the implementation of a national plan, planned until 2020, for the introduction of broadband Internet. According to the latest data, the Government plans to send $22 billion to connect 50,000 villages across the country to high-speed Internet. In general, by this time, the State Council of China plans to provide access to the network of 98% of rural residents. Investing $22 billion in telecommunications services for rural areas should attract additional internal and external investments in these areas and help develop trade and the local communities.

The next stage is the development of e-commerce in the villages, which should increase the level of competition throughout the country and bring benefits to local farmers. The program also provides for testing electronic trading services in the villages of the poorest regions of the country. Access to broadband high-speed Internet, according to the government, will turn rural residents into regular customers. They will be able to use e-commerce services and reduce their costs in the same way as city dwellers. In addition, high-speed Internet will allow to conduct distance learning online. Mention should also be made of mobile and electronic health services, which the villagers could not use before.

It is assumed that local companies will begin to expand their activities thanks to connections with large urban markets in China itself and, possibly, around the world. In addition, Chinese government’s investment in broadband Internet in villages will support a global network of equipment manufacturers, as new users will need devices to connect to the network.

A prime example of such innovation is the development of the Sunqiao agricultural area in Shanghai. According to the project developed by the architectural bureau Sasaki, gardens will be
planted on an area of 100 hectares, which will be able to provide the population of 24 million people with food.

The transition to the digital economy stage in the agriculture of the Russian Federation consists in a gradual transition to the digital platform technology of the agro-industrial complex, using the perspectives and capabilities of several sub-platforms proposed by scientists.

The digital economy of the agro-industrial complex will re-evaluate the security levels of the Doctrine of Food Security of the Russian Federation, the Union State, the Eurasian Economic Union, and the CIS as a whole, as well as the reassessment of the role of prospects for organic products in general.

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