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## TECHNOLOGICAL INTEGRATED INSTRUMENTS AND TRENDS OF DIGITAL ECONOMIC TRANSFORMATION

### **Annotation**

**Introduction.** Modern society is developing taking into account global long-term trends: digitalization, population growth, urbanization, environmental pollution, called megatrends. Currently, the global economy is developing rapidly in the light of information and industrial technologies. Production systems change the state of industry, so there is a transition to industrial mode, where production is managed as a single organism, in which technological and organizational elements are interconnected. Moreover, each element optimizes its activities taking into account changes in the external environment. Integration into the global economy requires the development of long-term strategies.

**Methods.** The methodological basis of the study is the methods of scientific analysis, including the methods of the logical approach, comparative analysis and generalization. The conducted studies were carried out in order to study the essence of the ongoing technological transformations, the pace of their development, as well as the consequences of the human exposure to the emerging global digital ecosystem.

**Results.** The article presents the spatio - temporal and institutional parameters, technological drivers of the fourth industrial revolution (physical, digital, biological megatrend blocks), tipping points, technological changes until 2025, basic technologies for digital transformation of industry. The article analyzes the main technological trends in the field of digital transformation of industry.

**Discussion.** The results of studies of key relevant megatrends show that profitability remains the main criterion for digitalization efficiency for business entities, and economic efficiency indicators are the basic criteria.

**Keywords:** world technological trends, digital transformation, industry.

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### **Introduction.**

The goal of the economic development of the Union in the framework of integration cooperation until 2030 was defined as the achievement and maintenance of high-quality and sustainable economic growth. A number of tasks were set to achieve this goal. These tasks were determined taking into account medium- and long-term challenges and trends [1].

Studying global trends is a guideline for evaluating long-term alternatives. Trends help to pay more attention to changes in the external environment and understand what to do. The industry of the countries of the Eurasian Economic Union should develop in the trend of the global process of industrialization. An analysis of the results of the 18th session of the United Nations General Conference on Industrial Cooperation (UNIDO) shows that the share of manufacturing in real GDP is about 16%, and only 12% in the EAEU countries [2].

Currently, when integrating various factors into the global economy, it is necessary to develop long-term strategies. A global long-term strategy depends on the correct identification of future-defining parameters.

Therefore, it is necessary: to identify the etymological concept of a trend, which can be explained as a "trend" - the direction of a phenomenon that assumes a generalized multidimensional process, including changes in the technical, economic, social and political sphere [3, p. 11].

Using the prefix "mega" (translated from Greek - large), you can use the trends that have formed and manifest themselves for a long time, the dynamics of economic indicators in a large economic space, covering the entire world economy.

Thus, megatrends are "the main directions of movement that determine the appearance and essence" of a changing society [4, p. 9], therefore, their thoughtful analysis can bring tangible benefits.

The Republic of Belarus is developing in the context of the transition to a highly efficient economy, which is based on innovation, while preserving the environment for future generations.

At the first stage (from 2016 to 2020), a transition to economic growth is planned, taking into account the principles of a green economy and the priorities of high-tech industries.

The goal of the second stage (2021-2030) is the formation of human development, the acceleration of high-tech industries and services, the formation of a "green economy".

The above goals are realized using the following tasks: increasing human potential; creation of a state for the people; the formation of a socially oriented and competitive economy; preservation of the environment, which provides living conditions for present and future generations.

### **Analysis of recent research and publications.**

In the scientific literature, the problems of world technological trends are actively discussed. The interest of a general methodological and theoretical nature for understanding the problem under study was made by the fundamental works of such foreign authors as M. Castells, S. Kuznets, E. Lemberg, J. Lichtheim, G. McLuhan, R. Makridis, A. Pshevorsky, D. Rismen, E. Toffler, M. Frieden, F. Fukuyama, K. Schwab, J. Schumpeter and others. Based on their study, a theoretical and methodological research concept was formed.

The concept of the digital economy was studied in the works of such authors as S.Yu. Glazyev, F.I. Ereshko, L. V. Nekhorosheva, M.N. Rudenko, T.O. E.V. Shkarupeta, A.A. Engovatova et al. An analysis of the results set forth in the works of the above authors allowed us to create applied tools for studying digital transformation.

The work of many famous scientists, such as D. Naysbit [5], L. V. Nekhorosheva [6], E.S. Pankratova [7; 8], K. Schwab [9] and others are devoted to the study of world technological trends.

Existing studies of domestic and foreign scientists confirm the importance of analyzing global megatrends of the fourth industrial revolution.

### Purpose.

The purpose of the study is to research the initial technological trends in the digital transformation of industry.

### Research methodology.

The basic methodological principles underlying the research are based on the fundamental principles of domestic and foreign researchers and specialists in the field of institutional transformation theory, the theory of digital economy, innovative management, the theory of socio-economic systems development management, as well as scientific and practical developments in the field of innovative development of social -economic systems based on digital technology.

The methodological basis of the study is formed by the general scientific principles of a systematic approach; analysis methods - logical, comparative, strategic, managerial, etc .; quantitative and qualitative research of the main trends and directions in the formation and development of the sphere of digital infrastructure.

### Results.

Megatrend - a concept that was proposed by John Naysbit in 1982, notes that these are global processes that determine the vector of world development, the appearance and essence of the new society [5].

L.V. Nekhorosheva analyzed the main global megatrends that were noted by John Naysbit (USA), HwC, the group "Strategy and Leadership" (USA), the European Commission, the report of the US National Security Council "Global Trends: Paradoxes of Progress - 2035" (GT - 2035) notes that the survey conducted by the HwC group showed that the main megatrends include technological breakthroughs of 77 %, redistribution of forces in the global economy - 60% and demographic changes - 43% [6, p. 97].

E.S. Pankratova in table 1 and table 2 gives the classifier of megatrends of world economic development within the framework of the spatio-temporal and organizational-institutional approach [7; 8, p. 11-12].

**Table 1. Space-time parameters\***

Spatio-temporal parameters	Megatrends
Coverage (extent)	Globalization
Relationship intensity	Internationalization, regional integration
The rate of change (development)	Cycling, strengthening international production cooperation
Primary impacts	Liberalization, increasing uneven development, the emergence of new centers of power, exacerbation of global problems

\*Source: systematization authors on the basis of [8, p. 11-12].

**Table 2. Organizational and institutional parameters\***

Organizational and institutional parameters	Megatrends
Dominant development factors	Change of technological patterns on the basis of technology updates, strengthening the role of human capital and knowledge
The structure of the economy and the system of interconnections	Post-industrial, innovative economy, open economy
Development Model	Modernization, diversification of forms of world economic interaction, "catching up" development
Institutionalization of global structures	Transnationalization, consolidation of the efforts of the world community, including within the framework of new and traditional international institutions

\*Source: systematization authors on the basis of [8, p. 11-12].

Based on the research, E. S. Pankratova notes globalization as the leading megatrend (as the leading megatrend formed by the development impulses of other megatrends in the process of their intersection and mutual influence).

To identify megatrends and reveal the technological drivers of the fourth industrial revolution, the President of the World Economic Forum in Davos, K. Schwab, in his work [9, p. 27] defines: physical, digital, biological blocks of megatrends of the fourth industrial revolution in table 3.

**Table 3. Megatrend Blocks of the Fourth Industrial Revolution\***

Blocks		
Physical block	Digital	Biological
Unmanned vehicles 3D printing Advanced robotics New materials	Internet of Things (IW)	Biological Innovation (genetics) Synthetic biology

\*Source: systematization authors based on the source [9, p. 27-38].

K. Schwab [9, p. 38] notes that the above megatrends are the basis of practical applications and developments.

The report of the World Economic Forum, published in September 2015, identified twenty-one turning points (the point at which a specific technological shift is accepted by the main part of society) and two turning points that were not included in the initial survey. According to a study by the International Expert Council of the World Economic Forum on the Future Software of the Society, in which eight hundred leaders and experts of the information and communication technology industry participated, the author notes the turning points that are expected in the next ten years, and they will clearly reflect the underlying changes. which will be triggered by the Fourth Industrial Revolution. The turning points provide an opportunity to work out the best answer, signaling the upcoming revolutionary changes. In more detail, the turning points and technological changes until 2025 are given in table 4.

**Table 4. Tipping points, technological changes and the percentage of respondents predicting this tipping point will be reached before 2025\***

Changes	Tipping Point	Percentage of respondents by 2025
1. Implantable technology	The first implantable mobile phone	82
2. Our digital presence	80% of people with a digital presence on the Internet	84
3. "Digital vision" as a new interface	10% of reading glasses are connected to the Internet	86
4. Wearable Internet	10% of people wear clothes connected to the Internet	91
5. Distributed computing	For 90% of the population access to the Internet is provided	79
6. Supercomputer in your pocket	90% use smartphones	81
7. Storage for all	90% of people have the ability to unlimited and free data storage	91
8. The Internet of things and for things	One trillion sensors that are connected to the Internet	89
9. Connected House	Over 50% of Internet traffic coming into the house falls on appliances and devices	70
10. "Smart" cities	The first city with a population of more than fifty thousand people and without traffic lights	64
11. Big Data	The first government to replace the census with big data sources	83
12. Cars without a driver	10% of the total number of cars on US roads	79

*Continuation of the table 4*

13. Artificial Intelligence	The first machine with elements of artificial intelligence (AI) on the company's board of directors	45
14. Artificial intelligence and white-collar jobs	30% of audits are conducted by AI	75
15. Robotics and services	Robot - pharmacist in the USA	86
16. Bitcoin and transaction blockchain	10% of the global gross domestic product (GDP) transaction blockchain are saved using blockchain technology	58
17. The economy of sharing	Increasing the number of trips on shared cars	67
18. Governments and the blockchain	For the first time, tax collection through the blockchain	73
19.3D - print, 3D - production	Production of the first car	84
20.3D - printing and Health	First Liver Transplant	76
21.3D - printing and consumer goods	5% of goods	81
Additional changes		
22. Projected creatures	Birth of the first person with a specially modified gene	
23 Neurotechnologies	The first person with artificial implantable memory	

*\*Source: systematization of the author based on the source [9, p. 146-197].*

In the analysis, K. Schwab also gives for each change a positive and negative effect, indefinite or at the same time positive and negative effects, and also notes a profound change in action.

The information and analytical report of the Department of Economic Policy of the Eurasian Economic Commission notes that the analysis of world experience in digital transformation of industry shows that the main ideologies in this direction were concepts such as Industry 4.0 (Industry 4.0), Smart Manufacturing, Digital Production (Digital Manufacturing), Internet in industry (Internet of Manufacturing), Open production (Open Manufacturing) [10, p. 15-16].

The following main technological trends are based on the above concepts in the field of digital transformation of industry:

- mass introduction of smart sensors in equipment and production lines (technologies of the industrial Internet of things);
- transition to unmanned production and mass introduction of robotic technologies;
- the transition to information storage and computing from own capacities to distributed resources ("cloud" technologies );
- end-to-end automation and integration of production and management processes into a single information system ("from equipment to the ministry");
- using the entire mass of data collected (structured and unstructured information) to form analytics (technology of "big" data);
- transition to mandatory digitized technical documentation and electronic document management ("paperless" technologies ");
- digital design and modeling of technological processes, objects, products throughout the life cycle from idea to operation (application of engineering software);
- the use of technology to build materials to replace the slice ("additive" technologies, 3D-printing);
- the use of services for the automatic ordering of consumables and raw materials for the production of goods and the automatic delivery of finished products to the consumer, bypassing intermediary chains;

- the use of unmanned technologies in transport systems, including for the delivery of industrial goods;
- the use of mobile technologies for monitoring, control and management of processes in life and in the workplace;
- transition to the sale of industrial goods over the Internet.

Moreover, it is noted that the above list can be continued and detailed according to the depth of each trend.

Basic technologies for digital transformation of the industry are given in table 5.

**Table 5. Core technologies for digital transformation of industry\***

Core technologies for digital transformation of industry	
Internet of things	Mobile
Industrial internet of things	Biometric
"Cloud" technologies	Quantum
Robotization	Supercomputer
Artificial intelligence	Identification
Big data	Mathematical modeling
Paperless technology	Blockchain technology
Additive technology	Cyber physical systems
Foggy computing	End-to-end technology
Unmanned technology	Open Source Technologies

\*Source: *systematization of the author based on the source [9].*

Other technological areas are also associated with the digital transformation of industry - Internet trading in industrial goods and industrial analytics, as well as other areas.

The Concept of the National Strategy for Sustainable Development of the Republic of Belarus until 2035 considers global development trends, external challenges and risks in the long term [11].

According to OECD forecasts, the global economy by the end of 2035 will grow by more than 1,7 times, or an average of 3,1% per year. Economic growth will be provided due to higher rates in developing countries (an average of 3.5% per year) with 1,6 – 2,1% of GDP growth in European developed countries. According to international organizations, the average annual growth rate of international trade will be 3 - 5%.

In recent years, the motives and nature of globalization are gradually changing, and geopolitical risks are growing. The real threat is the change in the policy of expanding the scale of regionalization with the strategy of curtailing the globalization project. There is a real risk that the integration agreements of the future will become less "deep" and include a narrow list of provisions beyond the scope of tariff preferences.

There is an increase in the level of geopolitical uncertainty, the confrontation between the United States, China and Russia is growing, and the confidence of the main world players in each other is falling. The practice of applying international sanctions is expanding; there is an escalation of protectionism and trade wars. International conflicts are intensifying and growing. All this I cannot but affect the sustainable development of the Republic of Belarus as one of the participants in the world community.

In the long term, the following global trends and challenges will have the greatest impact on sustainable development [11]:

- the aging of the population and the growing burden on the social system;
- acceleration of scientific and technological progress and the scale of digitalization of the economy;
- growing imbalances in the labor market and growing social inequality;
- aggravation of the ecological situation and transition to a circular economy.

The Republic of Belarus should also be included in the global process of transition to a circular economy in order to enter the trajectory of sustainable development.

### Conclusions and discussions.

In conclusion of the conducted research, it can rightly be argued that the set of digital technologies used in the global economy is quite extensive and reflects global trends for their implementation. Innovators in the field of digital technologies are large financial organizations, IT companies, industrial companies, and retail companies due to the availability of resources not only to adapt digital technologies to their needs and the needs of customers, but also due to the availability of skills and readiness for organizational changes.

The motivation of companies transitioning to digital technologies is explained by increasing competition in the markets, the need to provide customers with better digital services, and the desire of companies to reduce internal transaction costs. The application of this approach to digital transformation is determined by the ability to ensure the consistency and complexity of the processes of digitalization and digital transformation.

The possible effects of the digital transformation of social and economic systems have a wide range of positive effects, manifested in the strengthening of market positions, the expansion of market niches, and the achievement of new competitive advantages in the emerging digital economy. In most cases, companies evaluate the resulting effect from the implementation of projects as meeting their expectations or even exceeding them. The main effect is obtained in the simplification and acceleration of processes, as well as in improving the accuracy and quality of work.

Thus, the results of conducted studies of key relevant megatrends show that profitability remains the main criterion for digitalization efficiency for business entities, and economic efficiency indicators are the basic criteria.

### References

1. Osnovnyye napravleniya ekonomicheskogo razvitiya EAES do 2030 goda. *eurasianeconomic.org*. Retrieved from <http://eurasianeconomic.org/pdf/analiz02.pdf>.
2. Dolya obrabatyvayushchey promyshlennosti v EAES. *inbusiness.kz*. Retrieved from [https://inbusiness.kz/ru/last/dolya-obrabatyvayushej-promyshlennosti-v-eaes-sostavlyayet-12\\_](https://inbusiness.kz/ru/last/dolya-obrabatyvayushej-promyshlennosti-v-eaes-sostavlyayet-12_)
3. Martynova, T.M., Kotova, N.G. (Eds.). (2009). *Slovar inostrannykh slov : svyshe 6 000* [Dictionary of foreign words: over 6000 words]. Moscow, Russia: Alta-Print.
4. Nureyev, R.M. (2008). *Ekonomika razvitiya: modeli stanovleniya rynochnoy ekonomiki* [Economics of development: models of the formation of a market economy]. Moscow, Russia: Norma.
5. Nasbit, D. (2003). *Megatrendy* [Megatrends]. (M.B. Levina, Trans). Moscow, Russia AST: Ermak.
6. Nekhorosheva, L.N. (2017). *Izmeneniye innovatsionnogo landshafta v kontekste novykh megatrendov tekhnologicheskogo i ekonomicheskogo razvitiya: problemy i pervoocherednyye zadachi* [Changing the innovation landscape in the context of new megatrends of technological and economic development: problems and priorities ] Problems of the modern economy: global, national and regional context: collection of scientific articles. Grodno: State University named after Y. Kupala.
7. Ponkratova, E.S. (2012). K voprosu o sushchnosti i klassifikatsionnykh vidakh megatrendov mirokhozaystvennogo razvitiya [On the essence and classification types of megatrends of world economic development]. *Vestnik Rostovskogo gosudarstvennogo ekonomicheskogo universiteta (RINKh)* [Bulletin of the Rostov State Economic University], 3 (39), 31-36.
8. Pankratova, E. S. (2013). *Modernizatsiya vneshneekonomicheskogo kompleksa rossiyskikh regionov pod vozdeystviyem megatrendov razvitiya mirovogo khozyaystva*. Candidates thesis. RINH. Rostov-on-Don.
9. Schwab, K. (2019). *Chetvertaya promyshlennaya revolyutsiya* [Fourth Industrial Revolution]. Moscow, Russia: Eksmo.
10. *Analiz mirovogo opyta razvitiya promyshlennosti i podkhodov k tsifrovoy transformatsii promyshlennosti gosudarstv - chlenov Evraziyskogo ekonomicheskogo soyuza* [Analysis of world experience in the development of industry and approaches to the digital transformation of industry of the Member States of the Eurasian Economic Union]. (2017). Department of Economic Policy of the Eurasian Economic Commission. Moscow, Russia.
11. Kontseptsiya natsionalnoy strategii ustoychivogo razvitiya Respubliki Belarus do 2035 goda. *eurasianeconomic.org*. Retrieved from <http://eurasianeconomic.org/pdf/analiz02.pdf>.

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