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Evolution of the essence and prospects for digital economy development

Evolución de la esencia y perspectivas de desarrollo de la economía digital

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ABSTRACT

The development of the digital economy in Russia lags behind the world leaders in this process. However, to become competitive in the digital space of the global economy, it is necessary to overcome this lag. This requires generalizing theoretical approaches and concepts of the digital economy in Russia and the world, tracking the evolution of views, approaches, and development prospects, analyzing the level of digitalization, digital competitiveness rating, indicators of the development of the digital economy's development and digital government. This was done in the article since the purpose of the study is to generalize theoretical approaches to the essence of the digital economy and the prospects for its growth from the point of view of evolution. Concerning findings of the study, the evolutionary stages of the development of the digital economy have been identified, SWOT analysis of the evolution of the digital economy in Russia has been carried out, a conceptual scheme for the digital transformation of business has been devised. The paper defines the essential elements of digital transformation and their relationship.

Keywords: Digital Economy; New Technological Lifestyle; Digitalization; Digital Transformation.

RESUMEN

El desarrollo de la economía digital en Rusia va a la zaga de los líderes mundiales en este proceso. Sin embargo, para volverse competitivo en el espacio digital de la economía global, es necesario superar este retraso. Esto requiere generalizar enfoques teóricos y conceptos de la economía digital en Rusia y el mundo, rastrear la evolución de puntos de vista, enfoques y perspectivas de desarrollo, analizar el nivel de digitalización, calificación de competitividad digital, indicadores del desarrollo del desarrollo de la economía digital y digital. Gobierno. Esto se hizo en el artículo ya que el propósito del estudio es generalizar los enfoques teóricos sobre la esencia de la economía digital y las perspectivas de su crecimiento desde el punto de vista de la evolución. Con respecto a los hallazgos del estudio, se identificaron las etapas evolutivas del desarrollo de la economía digital, se llevó a cabo un análisis FODA de la evolución de la economía digital en Rusia, se ideó un esquema conceptual para la transformación digital de los negocios. El documento define los elementos esenciales de la transformación digital y su relación.

Palabras clave: Economía Digital; Nuevo Estilo De Vida Tecnológico; Digitalización; Transformación Digital.

1. INTRODUCTION

It is customary to associate a new technological lifestyle new technologies for obtaining and transmitting information, knowledge, services, and money with the digital economy in the modern world. It currently influences all areas of socio-economic activity and expands the possibilities for the development of states, businesses, social structures, people. Since the 90s of the last century, the digital economy in the world has evolved from digitalization of information to digital transformation and the creation of electronic network institutions: e-government, e-democracy, political crowdsourcing. Approaches to disclosing the conceptual fraeworks of the digital economy are outlined in the works by Tapscott (1996), Negroponte (1996), Brynjolfsson and Kahin (2000), Sharma (2006), Skilton (2015), Yudina (2016), Evtyanova and Tiranova (2017), Sudarushkina and Stefanova (2017), Petruk and Shashlo (2020). The rapid growth of digital transformations in the economy requires the generalization of theoretical concepts to increase the efficiency of digital technologies.

2. METHODS

The study was based on the use of predominantly theoretical scientific methods, including:
- analysis and synthesis, systematic approach, comparison – in classifying and generalizing the basic approaches to the definition of the digital economy, digitalization, its typology;
- abstraction - in defining the essence of the digital economy from the standpoint of various authors and highlighting the main features inherent in the digital economy, stages of development;
- historical method – in analyzing the evolution of the concept of “digital economy”;
- induction and deduction, generalization and formalization – in our own reasoning.

3. RESULTS

The beginning of theoretical developments in the field of the digital economy dates back to the 90s of the 20th century. This period was dominated by the views of Tapscott (1996) and Negroponte (1996), who understood the digital economy as an economy based on the use of digital technologies. This view was developed by American economists Brynjolfsson and Kahin (2000). At the same time, they were no longer limited to considering the digitalization of individual industries, but they believed that the digital economy provided for a change in all areas of activity through the introduction of information computer technologies in them. S. Sharma defines the digital economy as a transformational process within the framework of which new business models that change the functioning of individual enterprises and entire industries are formed (Sharma, 2006). Transformation becomes possible due to the intertwining and interpenetration of computers, communications, computer technologies, and information per se. In the mid2010s, digitalization rises to a new level – digital ecosystems begin to form. This is reflected in scientific research, a new definition of the digital economy as a component of the digital ecosystem appears. It was given by English scientist M. Skilton (Skilton, 2015).

Analyzing the works by Russian economists, one can note that their works mainly highlight the key points provide an evidential base that allows one to agree or disagree with a certain approach. So, T. N. Yudina believes that digital technologies reform the modern economic system, changing the functioning of all its branches (Yudina, 2016). D. V. Evtyanova and M.V. Tiranova give attention to the technological component, the processes of automation of management activities in order to increase its efficiency (Yevtyanova & Tiranova, 2017). I. V. Sudarushkina and N. A. Stefanova give their own definition of the digital economy, focusing on its impact on the daily life of people, emphasizing the social significance of digitalization (Sudarushkina & Stefanova, 2017). Ovcharenko et al. (2021) believe that public administration directly affects the level of innovative digital development of the economy (Ovcharenko et al., 2021). Thus, the understanding of the digital economy has been changing as the processes of introducing digital technolo-

gies develop and deepen. Its complication and clarification occur: if at the first stage of research attention is paid only to the digitalization of certain industries, then they move on to the processes of forming digital ecosystems that completely change both business models and the living conditions of the population.In recent years, three main approaches to the definition of the digital economy have been completed: reproduction, cybersystem and institutional (Levchenko and Levchenko, 2020).

In accordance with the traditional reproduction approach, the digital economy is the economy of a new technological order, it leads to a radical change in economic relations through the practical implementation of information technologies. The cybersystem approach focuses on the technological component, products that form cyberspace and the economic behavior of various economic entities in it. Within the framework of the cybersystem approach, methods of economic and mathematical modeling are widely used, due to which the quality of managerial decisions increases at micro and macro levels (Konvisarova & Hwan, 2017; Terenteva et al., 2018). The institutional approach points out the importance of the institutions of the digital economy, without the development of which effective digitalization is impossible.The listed approaches do not actually contradict each other, but complement, focusing on its various aspects.The level of digitalization is determined by a number of indicators that are systematized when compiling global rankings. One of them is the IMD World Digital Competitiveness Ranking, its results are presented in Table 1.

Table 1. World Digital Competitiveness Ranking in 2017-2020

Country	2017	2018	2019	2020	2020 to 2017 changes
The USA	3	1	1	1	+2
Singapore	1	2	2	2	-1
Denmark	5	4	4	3	+2
Sweden	2	3	3	4	-2
Hong Kong	7	11	8	5	+2
Switzerland	8	5	5	6	+2
The Netherlands	6	9	6	7	-1
The Republic of Korea	19	14	10	8	+11
Norway	10	6	9	9	+1
Finland	4	7	7	10	-6
Russia	42	40	38	43	-1

Based on (IMD World Digital Competitiveness Yearbook Ranking 2018; IMD World Digital Competitiveness Yearbook Ranking 2019; IMD World Digital Competitiveness Yearbook Ranking 2020)

Over the past four years, a dozen countries that have the highest achievements in digitalization and are ready for digital changes in the future have remained practically unchanged. They are the USA, the Nordic countries, Switzerland, the Netherlands, Singapore. Hong Kong and South Korea represent developing countries. Russia is in the top ten. Moreover, if in 2018 and 2019 it improved its position, then in 2020 it worsened significantly. This was due to the deterioration of estimates for such subfactors as “Personnel” (-12), “IT-Integration” (-8), “Normative and Legal Base” (-4), “Technological Base” (-4) ... According to the “Knowledge” factor, the lowest marks are given to the positions “International Experience” (61), “Foreign Highly Qualified Personnel” (55), “Training of Hired Personnel” (55).

The positions “Intellectual Property Rights” (58), “Venture Capital” (59) “Banking and Financial Services” (59) have the lowest scores in “Technologies”. According to “Readiness for the Future”, the positions “Attitude towards Globalization” (59), “Flexibility of Companies” (61), “Opportunities and Threats” (58), “Transfer of Knowledge” (58), “State -Private Partnership” (58) have received even lower ratings. Thus, the major deterrents to Russia are the insufficient level of interaction with the international envi-

ronment and entrepreneurial activity in the field of digital business, its support by the state, including in the legal field. Russia has the highest ratings in the personnel component for the subfactors "Women with an Academic Degree" (3), "Productivity of R&D by Publications" (4), "Achievement of Higher Education" (5). The dynamics of assessments is presented in Table 2.

Table 2. Russia in World Digital Competitiveness Ranking in 2017-2020

Factors / Subfactors	2017	2018	2019	2020
Knowledge				
Staff	35	40	45	47
Learning and education	14	12	9	13
Concentration of scientific knowledge	25	23	18	24
Technologies				
Legal framework	36	38	40	40
Capital	57	58	57	57
Technological base	37	38	39	41
Fit for the Future				
Adaptive approach	44	39	40	43
Business capacity for adaptation	59	62	54	60
IT-intergration	43	43	43	51

Based on (Terenteva et al., 2018; IMD World Digital Competitiveness Yearbook Ranking 2018; IMD World Digital Competitiveness Yearbook Ranking 2019)

Nevertheless, according to internal Russian studies, the digital economy has a positive trend: the number and proportion of the population regularly using the Internet for various purposes is growing, the number of organizations using cloud services, ERP-, CRM- and SCM-systems, internet for purchases and sales is increasing (Table 3).

Table 3. The Key Indicators of the Development of Digital Economy of the Russian Federation in 2017-2019

Indicator	2017	2018	2019	2019 to 2017 abs. changes
Gross value added of the ICT sector, % of GDP	2,7	2,6	2,8	0,1
The proportion of population using the Internet practically every day, in the total population aged 15-74, %	60,6	68,8	72,6	12,0
The proportion of population using the Internet to obtain state and municipal services in electronic form, in the total population aged 15-72 , obtained state and municipal services in the last 12 months, %	64,3	74,8	77,6	13,3
The proportion of population using the Internet to order goods and services in the last 12 months, in the total population aged 15-74, %	29,1	34,7	35,7	6,6
The proportion of business organizations using:				
broadband Internet, %	81,6	86,0	86,0	4,4
cloud services, %	22,6	27,1	29,1	6,5
the Internet for the purchase, %	18,5	19,9	20,1	1,6
the Internet for the sale, %	12,3	15,4	14,6	2,3
ERP-systems, %	19,2	25,5	23,3	4,1
CRM-systems, %	13,0	17,7	18,6	5,6
SCM-systems, %	7,1	9,2	10,6	3,5

Based on (IMD World Digital Competitiveness Yearbook Ranking 2020; Abdrakhmanova et al., 2019; Abdrakhmanova et al., 2020)

The leading industries in the use of ICT for various purposes are telecommunications, information technology, wholesale and retail trade, hotels and public catering. More than a third of organizations in these industries use cloud services, more than 40% - ERP- and CRM-systems, almost 24% - SCM-systems. Software tools are most often used for electronic financial calculations (58.1%), solving organizational, managerial and economic problems (57.2%), providing access to databases through global information networks (31.2%). The most active users of software are organizations of the processing industry, trade, energy supply.

Digitalization is increasingly embracing not only business but also government agencies. The level of digitalization in this area is assessed using the Electronic Government Development Index which is updated every 2 years. The corresponding data are presented in Table 4.

Table 4. Electronic Government Development Index for Countries in 2018-2020 (Digital Economy, 2021**;** E-Government Survey, 2018)

Country	2018		2020	
	Rank	Value	Rank	Value
Denmark	1	0,9150	1	0,9758
The Republic of Korea	3	0,9010	2	0,9560
Estonia	16	0,8486	3	0,9473
Finland	6	0,8815	4	0,9452
Australia	2	0,9053	5	0,9432
Switzerland	5	0,8882	6	0,9365
Great Britain	4	0,8999	7	0,9358
New Zealand	8	0,8806	8	0,9339
The USA	11	0,8769	9	0,9297
The Netherlands	13	0,8757	10	0,9228
Russia	32	0,7969	36	0,8244

According to Table 4, the top ten countries remain practically unchanged, Denmark has a stable leadership. The Republic of Korea is a world leader in online services and takes a leading position in Asia. Australia has the highest human capital development score.

In two years Russia has moved from 32 place to 36, having lost in all three subindices: the development of online state services – from 25 to 39, telecommunication infrastructure of ICT – from 45 to 49, human capital development – from 28 to 31. Most often, the authorities use the Internet for interaction by e-mail – 94.7%, professional training of personnel – 49%, videoconferencing – 47.1%. At the same time, for the population, the main direction of online interaction with authorities is obtaining information from the websites of state bodies (42% of the total number); for business – sending completed forms – 71.5%, downloading official forms – 70.7%, obtaining information from the websites of state bodies – 61.7%.

The digital economy in the process of its evolution has positive and negative trends which are summarized via SWOT analysis in Table 5. Strengths and weaknesses, opportunities for future growth and the presence of threats in each country and sphere of activity are different, therefore, in Table 5 provides information for Russia.

Table 5. SWOT-Analysis of the Evolution of Russian Digital Economy

Strengths	Weaknesses
Improving the efficiency of feedback mechanisms with consumers of goods and services, including government Customer-centric business models Shortened time period to select a provider and receive services High level of Internet penetration, the proportion of users in the total population Implementation of the national program "Digital Economy"	Low level of interaction with the international environment in the field of science and business Insufficient level of legal protection of intellectual property in the field of digital developments Low quality of the Internet in remote regions of the country Relatively low level of digital skills in the population Uneven digitalization across sectors of the economy, reluctance of many companies to digitalization Lack of scientifically grounded norms of service delivery time, which often makes digitalization formal Insufficient use of public-private partnership mechanisms in digital economy projects Insufficient use of venture capital in digital projects
Opportunities	**Threats**
Increase in the number of joint projects with foreign researchers and business partners Personalization of medicine, increasing the availability and quality of medical care in remote regions Improving competitiveness Increasing the availability and quality of education through the development of new technologies, the use of courses from leading universities Optimization of business processes, increasing flexibility and quality of management decisions development of digital ecosystems Increasing the comfort of living conditions for people Reducing the cost and improving the quality of public services Broad involvement of the public in the process of making government decisions Labor force structure changes	The emergence of new types of cyber threats Job losses Increasing digital divide among different population groups and different sectors of the economy Growth of competition and its globalization Ethical issues related to the protection of personal data Increased competition from international companies Halted business processes in case of technical, legal problems, application of international sanctions

Despite the presence of weaknesses and threats, the development of the digital economy is inevitable. But form and time frame it will be carried out in depend on the capabilities of the country, economy, industry, person (Konvisarova et al., 2020; Titova & Terentyeva, 2020; Koren et al., 2020; Andreev et al., 2019). An exemplary evolutionary process includes the following steps (Figure 1).

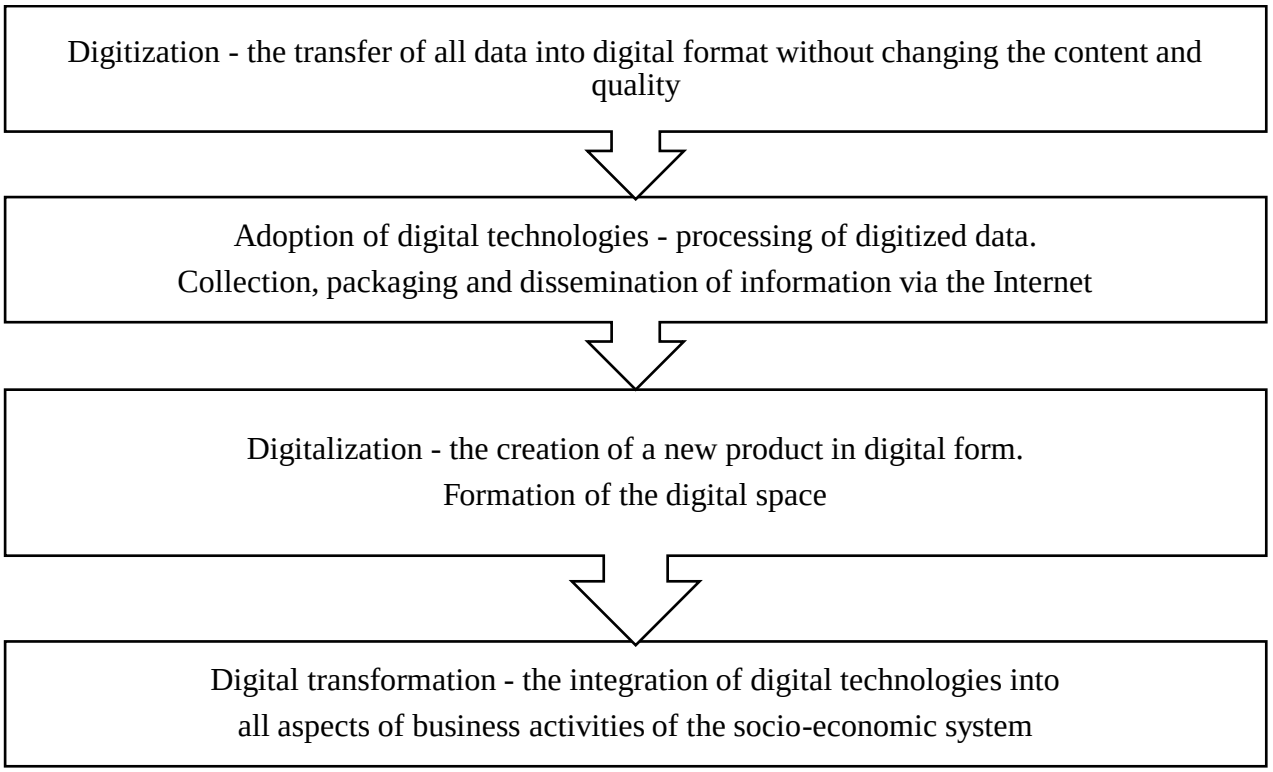

Figure 1. Evolutionary Stages of Digital Economy Development

4. DISCUSSION

After analyzing theoretical approaches to the essence of the digital economy and its evolution, the level of digitalization in the world and in Russia, positive and negative trends in digitalization by the case of Russia and summarizing the evolutionary stages of development of the digital economy, a conceptual scheme of digital transformation has been developed (Figure 2).

The current stage, the crown of the evolution of the digital economy, is digital transformation. It affects business and government. However, it is business where it is the most pronounced. Digital transformation is the integration of digital technologies into all aspects of the business activity of the socio-economic system (Sarirete et al., 2021). This is a process that requires fundamental changes in strategic and operational management, in the totality of business processes and the business model on the whole.

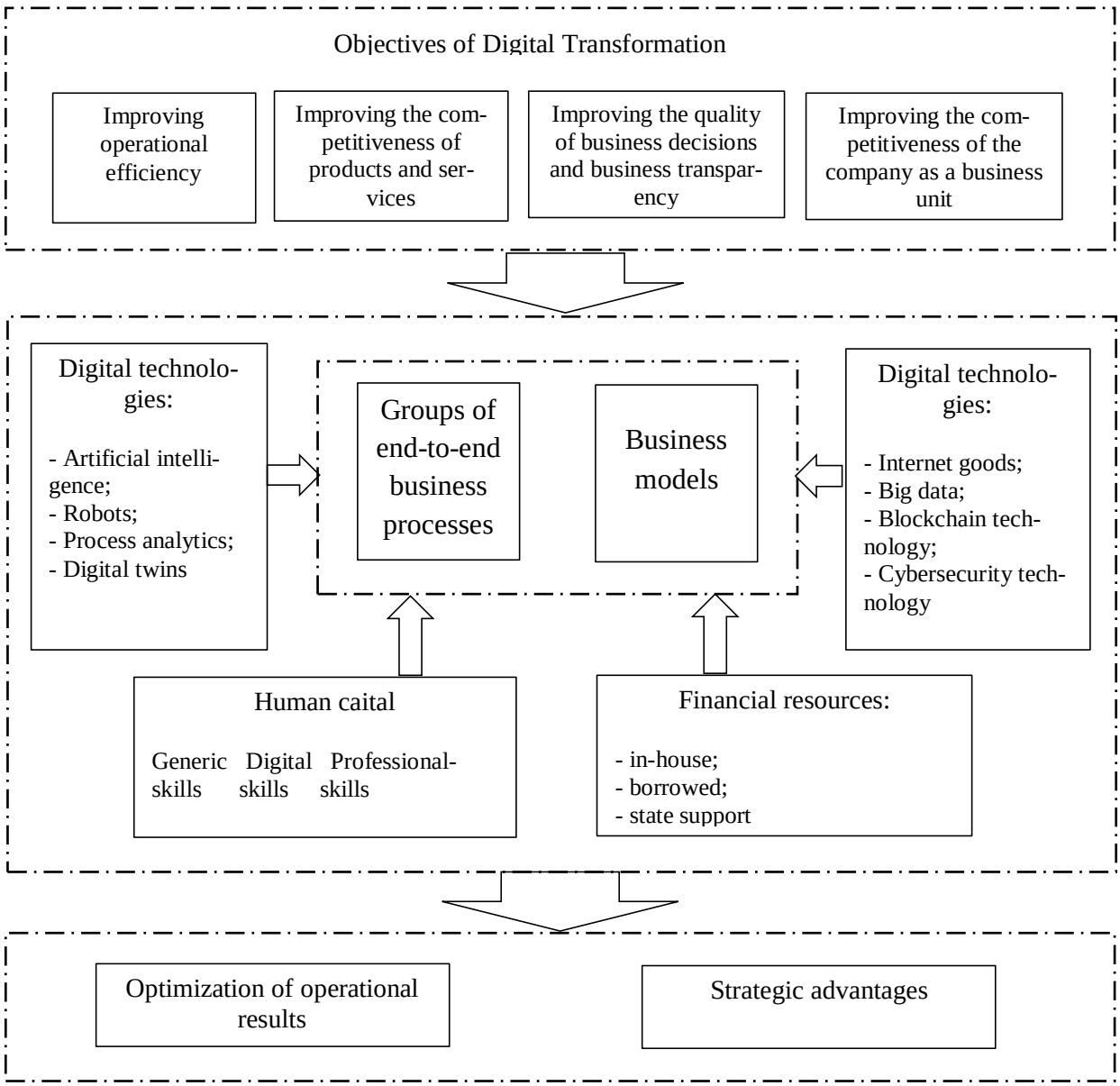

Figure 2. A Conceptual Framework of the Digital Transformation of Business

Digital transformation presupposes a strategic business transformation when the preferences and behavior of customers determine decisions in the field of corporate technologies, a change in the entire business strategy. The claimed goals of digital transformation of companies range from the implementation of individual digital solutions to the creation of ecosystems, largely determining the content of the digital transformation strategy, the portfolio of digital initiatives, the necessary investments and predicted effects.

5. CONCLUSION

Thus, the studies have revealed the following results:
1. The views on the conceptual foundations of the digital economy have been generalized and the evolutionary relationship of their development has been identified,

2. The analysis of the level of digitalization on the example of the rating of the world digital competitiveness, Russia's place in this rating in the context of factors and subfactors, dynamics and prospects has been carried out.
3. The index of e-government development for countries and Russia has been analyzed,
4. Positive and negative trends in the evolution of the digital economy in Russia by means of SWOT analysis have been identified,
5. Universal evolutionary stages of the development of the digital economy from digitalization to digital transformation have been generalized,
6. Conceptual scheme of digital transformation has been devised,
7. The key elements of digital transformation and the relationship between them have been identified.

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