

## Parameters for Estimate the Digital National Economy in the EAEU Member Countries\*

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**Abstract.** This paper corroborates the role and importance of the ICT sector and connected industries in the creation of added value, the development of reproduction processes in EAEU member countries, and the global economic system. The digital economy, as a result of the development of ICT sectors in the EAEU, is built on cross-border social-economic processes. Therefore, the authors emphasize that for the successful and even development of national economies, the EAEU states will need the consistency of national digital programs. This will speed up the convergence processes in the EAEU, create an active environment for the implementation of joint projects, and lead to a multiplier effect of obtaining benefits. The modern period of development of regional integration processes is characterized by going beyond the frame of separate industries, crossing and establishing new opportunities for building services for consumers and businesses through digital technologies. The main condition for the success of these processes is the unification or compatibility of digital standards, principles, and rules and the formation of a common culture of digital consortia of the EAEU. This paper draws attention to the lack of estimate digital economy parameters in the methodology for the general assessment of the integration processes development level within the EAEU. The comparative characteristic of the digital economy definitions which makes it possible to single out its main components and, as a result, highlight the assessing parameters of the level digital economy development has been provided in this paper. The authors present a critical analysis of indicators that allow assessing the level of the national digital economies development as one of the significant elements of the convergence of the EAEU member states; a list of parameters for comparing and the estimate of the EAEU member states national digital economics is determined as an element of assessing method the level of the EAEU countries integration in general. This paper substantiates the need to group the assessing parameters of the digital economy following the main areas of implementation of the EAEU Digital Agenda until 2025, and to form a methodology of their determination and computation in

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agreement with the international standards of the International Telecommunication Union and the European Commission.

**Keywords:** Digital Economy, Digital Economy Estimate Parameters, the Level of EAEU Integration, Assessing Indicators of the EAEU, ITU, EU Digital Economy.

## 1 Introduction

Regional integration within the framework of the Eurasian Economic Union (EAEU), based on the unification and interpenetration of various mechanisms of the national economic functioning is a dynamic socio-economic process. It requires regular monitoring of both the state and development trends of its key economic parameters. Digital transformation, being a new way of the economic development model as well as a significant global trend of virtualization of the cross-border movement of goods, capital, labor, is seen as one of the key tasks of the Eurasian Economic Union in the process of the digital economy building. These tasks are reflected in the decision of the Supreme Eurasian Economic Council No. 12 of 10/11/2017, "Main directions for the implementation of the digital agenda of the Eurasian Economic Union until 2025."

The main tasks of the EAEU digital agenda are determined by the digitalization processes of the leading economic sectors in the global economic system. So, the telecommunication sector plays an important role in the global economy, with global retail telecommunication revenues reaching USD 1.7 trillion in 2016, representing 2.3 percent of global GDP. At the regional level, the importance of the sector in driving economic growth is noticeable, especially in the developing world. Telecommunication revenues in 2016 represented on average 3 percent of GDP in Africa and the Arab States, compared to 2 percent in Asia and the Pacific and the Americas (excluding the United States and Canada), and less than 2 percent in the CIS and Europe. [1]

In this regard, the need to take into account an element of the level of digitalization of the economy in the process of monitoring the state of parameters and development of the trends of the integration group as a whole is being actualized.

The purpose of this paper is to determine the parameters that will allow a comprehensive assessment of the level of mutual integration of the EAEU member countries taking into account the indicators of the digital economy.

## 2 The concept of the digital economy as an economic category

Monitoring of the integration group should include observation, assessment, and forecast of changes in the studied parameters. It is important that these parameters reflect both the content of the complex state of the economy of the integration grouping of member countries in all areas of their interaction and taking into account modern global trends of digital transformation. The category of the digital economy is a reflection of these modern trends and challenges should be presented for monitoring by appropriate parameters which directly depends on the very definition of this category (Table 1).

**Table 1.** Definitions of the digital economy applied by international government organizations (IGOs)

Definitions	Title of the IGO / Authors	The main components of the digital economy according to the definition
That part of economic output is derived solely or primarily from digital technologies with a business model based on digital goods or services. [3, 5]	OECD, UNCTAD / R. Bukht, R. Heeks	1) fundamental innovations, core technologies, and enabling infrastructures; 2) digital and information technology (IT) sectors, digital platforms, mobile applications, and payment services which are making a growing contribution to economies, as well as enabling potential spillover effects to other sectors; 3) sectors of the economy, business models with digital support; digitized sectors which includes digital products and services (e.g. for e-commerce). [ 5]
The share of total economic output is derived from several broad “digital” inputs. These digital inputs include digital skills, digital equipment (hardware, software, and communications equipment), and the intermediate digital goods and services used in production. Such broad measures reflect the foundations of the digital economy. [4, 5]	E. Brynjolfsson, B. Kahin.	1) digital skills, 2) digital equipment (hardware, software, and communications equipment), 3) the intermediate digital goods and services used in production. [5]
Economic activity based on digital processes, models, technologies, digital goods (services), incl. produced by electronic business. [6]	EAEU	1) the environment of digital innovation, digitized assets, digital platforms and ecosystems, digital models and data; 2) digital components of industries and cross-industry digitalization, digital markets; 3) digital management processes and integration processes, project implementation, interstate services; 4) digital infrastructure and means of protecting digital processes [7]

All the summarized definitions (Table 1) reflect the applicability of digital technologies in economic transactions and the digital economy is presented as an inseparable part of either the economy as a whole or the mechanism of its functioning. The definitions adopted by UNCTAD and the EAEU (Table 1) are formulated with an emphasis on the process of creating and generating added value, which, in turn, is the potential or resource for the functioning of the digital economy and changes occurring in it. As for the definition of E. Brynjolfsson and B. Kahin (Table 1), the emphasis is directly on the results of the digital economy. All of the above-listed specifics of definitions are important for the formation of the types of necessary policies to create the conditions

of the regulation and support the development of digitalization of the economy as an element of transformation into a more progressive economic order.

There is currently a lack of an internationally agreed definition of the digital economy and standardized methodologies for measuring it. This is because the valuation of this economy should be based on national and sectoral statistics, taking into account the wide coverage of digitalization data and the scale of the digital and national economy as a whole. Such an assessment requires a systematic analysis of many digital parameters and associated variables. The speed of implementation of such parameters and the standardization of assessment methods are inferior to the rapid development and global consequences of the digitalization of the economy. Also, a significant reason for the absence at this stage of generally accepted metrics and definitions for digital economies is the unevenness in the levels of digitization of national economies of different countries of the world. Namely, the list and quality of parameterization of the digital economy and indicators for monitoring it, either as part of the national economy or as part of the aggregate economic space of an integration group, depend on this level.

One of the tools for monitoring and assessing regional integration processes in the EAEU space is the official system of indicators of Eurasian integration (SIEI), developed by the Eurasian Development Bank (EDB). Considering the official EDB methodology for estimating the economic integration of the EAEU member states, it should be noted that the essence of this methodology consists in a quantitative analysis of both short, medium, and long-term trends and dynamics and vectors of Eurasian regional integration based on specific indicators. The calculation of integration indicators is based on data from national and international statistical services, and the entire analysis is based on a study of the interaction of countries, from macroeconomic policy to academic mobility.

The SIEI EDB includes two blocks of indicators that correspond with the main aspects of regional interaction [8]:

1. market integration (indices of mutual trade; migration; mutual investment, electricity; agriculture; education);
2. the convergence of economic systems (indices of macroeconomic, financial, fiscal, monetary policies). The calculation of generalized indices is carried out to assess the overall vision of regional integration processes in the post-Soviet space.

The above list does not include the parameters of the level of development of the digital economy of the EAEU integration grouping, although the official reports of the EAEU Economic Commission [7] note that the potential economic effect of the implementation of the digital agenda will increase the total GDP of the EAEU by 2025 by about 11% of the total expected growth. According to the commission's calculations, it will almost double the digital development of the EAEU member states, and the implementation of a joint digital agenda may become a potential for the EAEU countries to increase employment in the ICT industry by 66.4% and increase total employment by 2.46%, and additional growth in export of the ICT services up to 74%.

The absence of a list of variables in the system of indicators of the Eurasian integration of the SIEI, reflecting the development of the digital economy in the EAEU member states, is explained by the almost complete incomparability of data on the state of

the national digital economies of these countries [9]. As a consequence, it does not allow a full assessment of the level of digital convergence of member countries.

So, as of February 2019, the Russian Federation (RF) and the Republic of Belarus (RB) have the largest number of indicators reflecting the level of digitalization of the economy: 115 and 43 indicators, respectively. Kazakhstan and Kyrgyzstan have only 5 indicators in statistical reporting. The level of digitalization in Armenia cannot be estimated due to the lack of data in Russian or English. The indicators of the digital economies of the Republic of Belarus and the Russian Federation reflect the level of ICT use by households and organizations; the availability of electronic government services; infrastructural electronic security; electronic economic environment and resource potential for further development of the digital economy. The statistics of Kazakhstan and Kyrgyzstan make it possible to assess only the level of ICT provision of the population. [2]

Only three digital economy indicators of the entire list used in the EAEU member states can be distinguished which meet the standards of the International Telecommunication Union (ITU), of which these countries are members. These indicators of digitalization of the economy include [13]: the number of organizations in the ICT sector, the number of employees in the ICT sector, and the number of organizations with a website. Belonging to one international organization obliges these countries to adopt standards approved by the ITU. Therefore it makes the standardized parameters comparable for their cross-country assessment. The value of the indicators of the development of the EAEU member states digital economy for 2015 and 2018 which match both the ITU and the national economies of the EAEU member states are reflected in Table 2.

**Table 2.** Values of comparable indicators of the development of the digital economy for the EAEU member countries for 2015, 2018 (of units)\*

Indicators / Country	RB	Kazakhstan	Kyrgyzstan	RF (of a thousand units)
2015:				
Number of ICT sector organizations	4536	4125	1140	115,2
Number of workers in the ICT sector	93276	63502	18116	1011
Number of organizations with a website	3765	2891	1478	48,96
2018:				
Number of ICT sector organizations	4996	4382	1192	119,5
Number of workers in the ICT sector	100655	66434	17837	1219
Number of organizations with a website	5433	3455	1734	60,83
Growth rates from 2018 to 2015,%:				
Number of ICT sector organizations	110,14	106,23	104,56	103,73
Number of workers in the ICT sector	107,91	104,62	98,46	120,57
Number of organizations with a website	144,30	119,51	117,32	124,23

\*Compiled according to [9-12]; no data from Armenia

The data in Table 2 allow us to conclude that Russia occupies a leading position in terms of the development of the digital economy of the EAEU member states. In 2018, the number of organizations in the ICT sector in Russia amounted to 119.5 thousand, which is more by 25.5 organizations than average their quantity in RB and Kazakhstan. The number of employees in the ICT sector reached 1.2 million in 2018 or 20.6% growth. From 2015 to 2018, the number of organizations with a website increased from 48.9 thousand up to 60.8 thousand units in RF (an increase of 24.23% over three years).

Belarus has the second rank of the development indicators of the digital economy, followed by Kazakhstan and Kyrgyzstan. Kyrgyzstan is significantly inferior to all three EAEU member countries in terms of these indicators (Table 2). In terms of the number of organizations in the ICT sector and the indicator of the number of organizations with a website, the increase in Belarus for the three years under study exceeded the increase in the values of these indicators of the Russian Federation and amounted to 10.14% and 44.3%, respectively. However, the number of organizations in the ICT sector and the number of organizations with a website in the Republic of Belarus are still less than in the Russian Federation respectively by 23.9 and 11.2.

There was a decrease in the number of workers in the ICT sector by 1.5% in Kyrgyzstan during the study period. All four member countries have the highest growth rates precisely in terms of the number of organizations with a website, namely 44.3% in the RB, 24.23% in the RF, 19.51% in Kazakhstan, and 17.32% in Kyrgyzstan.

The indicators presented in Table 2 are a mandatory list of parameters for assessing the digital economy, but they are not sufficient. These are indicators that are currently used to assess the digitalization of the integration group as a whole, but they concern only to the second block of parameters of the EDB EIEI methodology (namely, the block of the convergent of the economic system).

To determine a full list of estimated parameters of the digital economy, it is advisable to explore in more detail the directions of development of the digital economy that was pointed to in the Digital Agenda EAEU of the until 2025 presented in [7]. The agenda defines the general framework for the implementation of projects of interaction between the Member States EAEU for the implementation of digital transformations, therefore, it allows distinguishing the parameters of the results of the digital transformation necessary for monitoring. Each direction has a specific task of which could be assessed by parameters of the digital economy. So, the parameters of the digital economy can be grouped according to these Digital Agenda EAEU directions, namely:

1. Digital transformation of industries and cross-industry transformation: indicators of digitalization of physical assets; the amount of added value received due to digital models, end-to-end processes and useful data; the volume of the data industry; the number of digital platforms and ecosystems; the effectiveness of the environment for digital innovation;
2. Digital transformation of markets of goods, services, capital, and labor: the volume of cross-border e-commerce; the number of intellectual property patents and digital market consumer rights; the number (volumes) of financial and technical innovations, joint mechanisms of risk, alternative and venture financing of digital innovations; labor productivity indicators, number of tell-hiring and employment;

3. Digital transformation of management processes and integration processes: the number of created digital mechanisms for developing initiatives and implementing projects; launched EAEU digital platforms based on an integrated information system, interstate services, digital ecosystems;
4. Digital infrastructure and ensuring the security of digital processes: the number of implemented networks of the latest generation that provide the functioning of the EAEU infrastructure, and systems for protecting digital processes and infrastructure.

As can be seen from the list above, the ICT sector parameters are key, and they have been at the center of economic change for over two decades. The ICT sector acts as the determinant of competitive power in the knowledge economy, innovation and attracting investments, and creating new technologies that can be applied to a wide range of other sectors. Therefore, the sector of Information and Communication Technologies (ICT) plays a strategic role in the promotion of growth, innovation, and competitiveness of the national economies and is crucial for increased productivity and efficiency.

### **3 Parameters for assessing the digital economy by international institutions**

A developed ICT sector is essential for capitalizing on digitalization, keeping up with competitors in globalized markets, and establishing technological leadership in the world economic system. ICT data collection, the assessment of the digital economy parameters is important for benchmarking and monitoring developments in the ICT sector according to policymakers' point of view, data needs being policy-driven and contextualized for national or integrative economic policy purposes. [14]

A comparative analysis of the parameters of the digital economy as one of the monitoring objectives needs the determination of these parameters, taking into account their comparability with the metadata of the ITU and the EU member states which are both ITU members and the main competitors in the ICT sector market and other related sectors of the digital economy. Therefore, it is advisable to present the main components of metadata that experts use for regional analysis of the EU digital economy and ITU global analysis (Table 3).

The digital parameters of more than 230 economies worldwide [1] are explored in the ITU reports but only common world trends of the ICT sector are made freely available for the public. According to ITU, the digital economy parameters include almost 200 telecommunications / ICT statistics [1] which were presented by the fourth generalized group in Table 3. As can be seen in Table 3 data, both frameworks are built considering the current trends in the digital economy and focus on the following broad themes:

- The ICT sector as a supplier of general-purpose technologies;
- Broadband as a key infrastructure;
- The digitization of the economy;
- eCommerce at the core of the Digital Single Market;
- Trust, Security, Data Protection and Privacy;

- Internet Usage by Citizens;
- Consumption of Online Content;
- Digital Skills and ICT Occupations;
- Online Public Services [15].

**Table 3.** The Structure of the Digital Economy Indicators according to the ITU norms, the EU Metadata

Indicators ITU [1]	Indicators EU [14, 15, 16, 17, 18, 19]
<p>1. The Current State of ICTs:</p> <ul style="list-style-type: none"> <li>– Individuals use the Internet;</li> <li>– Mobile access to basic telecommunication services;</li> <li>– Fixed-broadband subscriptions;</li> <li>– range of a mobile-cellular network signal;</li> <li>– Internet access at home;</li> <li>– International bandwidth and Internet traffic.</li> </ul>	<p>1). ICT usage in households and by individuals:</p> <ul style="list-style-type: none"> <li>– Connection to the internet and computer use;</li> <li>– Internet use;</li> <li>– E-commerce;</li> <li>– E-government ;</li> <li>– ICT trust, security, and privacy;</li> <li>– ICT usage at work;</li> <li>– Regional ICT statistics: Households with access to the internet at home; Households with broadband access; Individuals who have never used a computer; Individuals who used the internet, frequency of use and activities; Individuals who used the internet for interaction with public authorities; Individuals who ordered goods or services over the internet for private use; Individuals who accessed the internet away from home or work.</li> </ul> <p>2).ICT usage in enterprises:</p> <ul style="list-style-type: none"> <li>– E-commerce;</li> <li>– Connection to the internet;</li> <li>– Websites and use of social media;</li> <li>– E-business;</li> <li>– ICT security;</li> </ul>
<p>2. ICT Skills for the Future:</p> <ul style="list-style-type: none"> <li>– A breadth of skills (a technical operational, information management, social and content-creation skills, algorithms, the proliferation of bots, and a shift to the Internet of Things and Artificial Intelligence, augment the need for critical information and advanced content-creation skills);</li> <li>– ITU data and other cross-nationally comparative data;</li> <li>– Survey measures.</li> </ul>	<p>3).Digital skills:</p> <ul style="list-style-type: none"> <li>– ICT users;</li> <li>– ICT specialists;</li> <li>– ICT training: Persons with ICT education by labor status, Employed persons with ICT education by sex, Employed persons with ICT education by educational, Employed persons with ICT education by age;</li> </ul>



Indicators ITU [1]	Indicators EU [14, 15, 16, 17, 18, 19]
<p>3. ICT Revenue and Investment Trends:</p> <ul style="list-style-type: none"> <li>- Telecommunication revenues;</li> <li>- Fixed-line revenue;</li> <li>- mobile revenues;</li> <li>- The infrastructure investments of the ICT sector;</li> <li>- The transformation of the business models (the Internet</li> <li>- Internet of Things (IoT), machine-to-machine (M2M) communications, Artificial Intelligence, big data analytics (BDA), and Blockchain).</li> </ul>	<p>4).ICT sector :</p> <ul style="list-style-type: none"> <li>- Percentage of the ICT sector in GDP;</li> <li>- Percentage of the ICT personnel in total employment;</li> <li>- Percentage change of value added by the ICT sector at current prices;</li> <li>- Business expenditure on R&amp;D (BERD) in the ICT sector as % of total R&amp;D expenditure by NACE Rev. 2 activity ;</li> <li>- R&amp;D personnel in the ICT sector as % of total R&amp;D personnel by NACE Rev. 2 activity;</li> <li>- Annual enterprise statistics for special aggregates of activities;</li> <li>- Business demography by legal form (from 2004 onwards, NACE Rev. 2);</li> <li>- Employer business demography by legal form (from 2004 onwards, NACE Rev. 2);</li> <li>- Employer business demography by size class;</li> <li>- Business demography by size class;</li> <li>- Indicators with growth by 20% or more;</li> <li>- Cross-classification of fixed assets by industry and by asset;</li> </ul>
<p>4. ICT Price Trends:</p> <ul style="list-style-type: none"> <li>- Information and communication technology (ICT) prices;</li> <li>- Mobile-cellular prices;</li> <li>- The price of a handset-based mobile-broadband basket including 500 MB per month;</li> <li>- the computer-based mobile-broadband prices in the gross national income (GNI) per capita (p.c.);</li> <li>- The prices of an entry-level fixed-broadband.</li> </ul>	<p>5). Digital economy and society - historical data:</p> <ul style="list-style-type: none"> <li>- ICT usage in households and by individuals (Individuals - use of cloud computing services; Individuals - mobile use of the internet (Individuals - places of computer use, Consumers' behavior related to online purchases, the most recent training course on computer use, Reasons for not having taken a computer course));</li> <li>- Benchmarking indicators 2011-2015: (Benchmarking digital Europe: key performance indicators (Digital single market - promoting e-commerce for individuals, Digital single market - promoting e-commerce for businesses, Digital inclusion – individuals, Public services – individuals); Benchmarking digital Europe: 2011-2015 indicators ( Broadband and connectivity; ICT usage by individuals; ICT usage by enterprises; E-public services (Individuals using the internet for interacting with public authorities, Enterprises using the internet for interacting with public authorities))).</li> </ul>

The comparison of indicators for digital economy assessing according to ITU and EU standards in Table 3 showed a lack of identity regarding definitions of key variables, the scope of coverage, methodology for collecting and calculating metadata. So, for example, the variables of the first group "The Current State of ICTs" according to the ITU assessment methodology are presented less extensively against EU standards which are divided into two groups including ICT usage in households, by individuals, and ICT usage in enterprises. The remaining groups of EU indicators are also more widely represented. This is because, on the 6th of May 2015, the European Commission

unveiled its renewed Strategy for the creation of a Digital Single Market<sup>2</sup>. It envisages the free movement of goods and services without barriers in the offline as well as the online world, offering the same level of consumer protection. The Digital Single Market Strategy is based on three pillars [15]:

- a) Better access for consumers and businesses to online goods and services across Europe;
- b) Creating the right conditions for digital networks and services to flourish;
- c) Maximising the growth potential of the European Digital Economy.

The forthcoming actions under the three pillars will jointly address several issues to enable better access to goods and services, as well as content online. Assessment and removal of barriers to online trade, such as unjustified geo-blocking, stepped-up enforcement of consumer protection laws, and simplification of the application of VAT regimes are some of the actions proposed. Legislative reviews to reflect the developments in the telecommunications and media sectors will be undertaken to ensure access to networks, fair competition, and a safe online environment. With the Digital Single Market Strategy, the European Commission acknowledges the "high demand from policymakers for reliable evidence to support better decision-making, monitor policy implementation, as well as to measure new economic and social phenomena". [15, 17]

EU digital standardization aims to improve the quality of the data and analysis needed to underpin the Digital Single Market by pooling the relevant knowledge, making it easily accessible to the public and consequently expanding the scope of research on the application of the ICT sector and its impact on the creation of added value.

The results of evaluating the data in Table 3 also mean that building a common system for assessing the EAEU digital economy only in accordance to the development directions of the digital economy of the EAEU Digital Agenda will not lead to sufficiently effective inform content. This is since if it does not take into account the methodological experience of collecting and calculating metadata on the state of the digital economy of the main competitors, then digital estimated parameters will be able to compare indicators only for the EAEU member states. Although this is a fairly large market of the ICT sector with a significant reproduction scale, it does not reflect the possibility of realizing the full potential of the EAEU digital economy. Therefore, it is advisable to develop a methodology for assessing the digital economy of the EAEU taking into account the methods and norms of the EU. This expediency is also maintained by the fact that the European Commission already has a working system which is represented by an extended list of evaluation criteria, includes a methodology for their calculation and comparison for various countries of integration, and takes into account the standards of the international community within the ITU. Given the focus on value creation and capture in the EU list of the digital economy parameters, the emphasis is given to the processes and changes in the digital (or overall) economy, rather than to the outcomes of activities. This has implications for the types of policies needed concerning how the digital economy operates and less on the requisite conditions for the emergence of such an economy. It is necessary to focus on broader trends, such as platformization, digital data, and e-commerce [14]. This will enable an analysis

of changes in the digital economy while acknowledging that such changes might happen in different ways.

## 4 Conclusions

The definitions of the digital economy which are used in the OECD, UNCTAD, EAEU have similar contents and highlight the basic structural elements of economic activity, resources for obtaining added value, and the number of broad “digital” inputs.

Currently, the assessment of the level of integration of the EAEU member states according to the official EBR methodology, taking into account the parameters of the digital economy, is possible only by three indicators:

1. The number of organizations in the ICT sector,
2. The number of organizations with a website,
3. The number of employees in the ICT sector.

The list of parameters that allow for a comprehensive assessment of the level of integration of the EAEU member states, taking into account the indicators of the digital economy, is advisable to form following the main directions of the digital transformation of the EAEU economic space, namely, grouping parameters into indicators: digital transformation of economic sectors and cross-sectoral transformation; the digital transformation of markets for goods, services, capital, and labor resources; the digital transformation of management processes and integration processes; digital infrastructure and ensuring the security of digital processes.

A system for assessing the EAEU digital economy should be formed under the standards of the International Telecommunication Union, the methodology for calculating EU metadata which will ensure regional and international comparability of the estimated results and adequate positioning of the estimate subjects of the EAEU member countries in the rating of indicators of the international ICT market and parameters of digital economies of the world community.

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