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## Mathematical and Quantitative Methods

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# Methodological approaches to assessing the digitalisation of public administration and public services

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**Subject.** Digitalisation is a global trend in the evolution and transformation of public administration systems. The developed methodological approaches, which allow assessing the effectiveness of this process and determining its impact on the socio-economic dynamics of states, strive to catch up with the rapid development of modern information and communication technologies. What is more, the government often acts as a driving force for the introduction of these technologies. The existing international, national, and regional methods of assessment are based on criteria and indicators which depend on the analytical purposes. Such criteria are developed within different databases and focus on different aspects of the digitalisation of public administration. It is important to analyse and monitor the outcomes and conditions of digital processes in public administration as well as the demand for them. Such analysis and motoring contribute to information management required for the implementation of other state functions.
**Objectives.** The research is aimed at achieving the following research objectives: to analyse the state of the existing system of assessment of digitalisation in the area of public administration with due account of current assessment trends, to determine the advantages and disadvantages of the existing methods, to develop an original approach to their classification, and to search for optimisation opportunities.
**Methodology.** The dialectical method and the methods of analysis and synthesis were used to achieve these objectives. The study is based on the contemporary achievements in the methods for assessing the digitalisation of public administration described in relevant research papers and regulations.
**Conclusions.** The peculiarities of existing methods for assessing the digitalisation of public administration are due to both the peculiarities of the analysed object and the needs of the users of the analytical information.
**In this regard,** we propose an original classification of assessment approaches, which consists of the following groups of methods: methods that assess the digitalisation conditions (group 1), the results of digitalisation in terms of available public services (group 2) and in terms of satisfaction of the main stakeholders: the public, businesses, state bodies, government agencies, and their employees (group 3). As a way of optimisation, it was considered whether it would be relevant to include indicators of the use of artificial intelligence technologies in public administration.

**Key words:** digital government, digitalisation of public administration, digitalisation of public services, methods of assessing the digitalisation of public administration.

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## Introduction

The digitalisation of public administration, which was stimulated by both the achievements of scientific and technological progress and the COVID-19 pandemic in 2020, provides great opportunities to improve the quality and effectiveness of the state's activities relating to the implementation of its main functions. The processes of digital transformation and digital evolution in different countries are the focus of research for many international organisations and integration associations. Consulting groups, research institutes, and teams of researchers are engaged in the development of digital maturity models.

The active study of digitalisation effects, conditions, and factors is associated not only with economic benefits, but also with conceptual changes in the mechanism of interaction between the state and the public. The concept of openness means that the public not only should be provided with unhindered access to information regarding the results of and plans for activities implemented by the authorities, but also that it should be able to participate actively in the implementation and development of the policy of public administration in various spheres of life. New technologies provide for remote access to key public services and secure a whole range of fundamental rights and freedoms (the right to healthcare, education, welfare and welfare services, etc.). The digitalisation of public administration reduces the risk of corruption and optimises control and regulatory procedures for businesses. Currently, one of the most important tasks of the system of public administration is to search for tools based on the system of appropriate and sufficient evaluation criteria which could be used to measure the effects that directly affect the dynamics of the country's social and economic development and the welfare of its citizens. Moreover, it is also necessary to remember that the goal of digital government is to create or achieve the maximum number of public goods and values, to ensure social justice, and provide the conditions for effective management of public budget expenditures and resources, and to maximise the economic effect of new technologies (Chu & Sun, 2013).

However, both internationally and at the level of individual states, there is no universal methodology for assessing the effectiveness of digitalisation today and due to the diversity of existing assessment approaches, various classifications of such approaches have been created.

For example, E. I. Dobrolyubova et al. (2021) studied existing methods for assessing the effectiveness of the digitalisation of public administration and divided them into three groups:

– methods based on quantitative and qualitative assessments of the digitalisation of public administration created to conduct international comparisons and to create international rankings. These methods involve assessing both the results of digitalisation and the factors that determine its speed and effectiveness;

– methods that involve the analysis and assessment of the effects and results of the digitalisation of public administration, in particular, indicators of the quality of public services, the level of information openness and performance of digital government, the growth of digital competencies of employees of state bodies and citizens, i.e. users of public services, etc.;

– methods of factor analysis that allow tracking the impact of the digitalisation in the area of public administration on various aspects of the socio-economic development of the state.

Another approach to the classification of methods for assessing digitalisation was proposed by S. N. Kostina et al. (2022). It is based on the levels of digitalisation of public administration and consists of groups of international, national, and local (regional) methods. Siskos et al. (2014) proposed to group existing methods by their developers: government methods (national, regional, cross-border), academic (methods and models of assessment proposed by the academic community, universities and research institutes), and independent (developed by private companies and consulting organisations).

A review of the specialised literature dedicated to the topic of the study revealed that the variety of methodological approaches to assessing the digitalisation of public administration is primarily due to different information needs of users of analytical information. International organisations are interested in a comprehensive study of the activities of the digital government, while state bodies and government agencies are interested in saving budget expenditures and developing electronic public services and platforms, as well as using international practice to determine the factors and conditions that contribute to achieving the highest level of digital maturity at a lower cost. The public, in its turn, is interested in convenient and quality interactions with the state, including when exercising their rights, in reducing the time they spend when obtaining services and information, and in the possibility of improving their digital competencies and information literacy. Consulting companies and universities are exploring various aspects of the digitalisation of public administration, including its comprehensive impact on the socio-economic development of the society, entrepreneurial activity, and e-commerce.

The purpose of this study is to analyse the state of the existing system of assessment of the digitalisation in the area of public administration with due account of current assessment trends, to determine the advantages and disadvantages of the existing methods, to develop an original approach to their classification, and to search for optimisation opportunities.

## Research materials and methods

The methods used during the research include the dialectical method and the general scientific methods of comparative analysis, synthesis, and grouping. The empirical basis included regulative documents of world organisations (the United Nations, the World Bank, and the Organisation for Economic Cooperation and Development) valid as of December 2023, regulations of the European Commission and the Russian Federation that describe methods for assessing the digitalisation in the area of public administration, and the results of contemporary studies presented in specialised literature and scientific magazines dedicated to the problem.

## Results

We started the study of the existing methods for assessing the digitalisation in the area of public administration with a study of the approaches used by international organisations, including for conducting cross-country comparisons.

The E-Government Development Index (EGDI) has been used by the United Nations since 2003 to assess the state of development of e-government in its member states. It reflects how the state bodies and government agencies use information technologies, infrastructure, and human resources for improved implementation of their functions. Mathematically, the index is composite and represents the arithmetic mean of three indices (E-Government Survey. The Future of Digital Government, 2022):

– Online Services Index (OSI), which characterises the quality of online public services provided to the public and businesses and the degree of state presence on the Internet. The index is determined by the method of expert assessments;

– Telecommunications Infrastructure Index (TII), which reflects the state of the telecommunications infrastructure in a particular state and is based on the official statistics (number of active Internet users, number of mobile subscribers, number of wireless broadband subscribers, and fixed broadband Internet subscribers per 100 residents);

– Human Capital Index (HCI) is an indicator of the development of human resources. This is the key digitalisation resource estimated based on the level of literacy of the adult population, the combined coefficient of population with primary, secondary, and higher education, the expected duration of education, and the average actual number of years of education.

It should be noted that although this index is commonly used as an indicator of the digitalisation of public administration in modern science and practice, its structure and calculation methodology have been criticised since they focus on the supply of digital services by the state and ignore the problem of digital equality, public demand for these services, digital involvement, and digital literacy (Macintosh & Whyte, 2008). However, the methodology for determining the index is constantly being improved and reflects the current trends in technological development. For example, in 2022, the three-component structure of the online services index was modified into a five-component one, and, as a result, this indicator was calculated with due account of the indicators of expert assessments in five thematic areas: institutional framework (with a weight of 0.1), service provision (with a weight of 0.45), content provision (with a weight of 0.05), technology (with a weight of 0.05), and e-participation (with a weight of 0.35)[1].

Additional indices determined by the UN to characterise the private aspects of the processes of the digitalisation of public administration in different countries have been less popular in international studies. For example, the E-Participation Index (EPI) allows assessing three aspects of the digitalisation of public administration: e-information (providing citizens with information related to the work of public administration bodies and state regulation without or upon demand and providing them with feedback); e-consultation (engaging citizens in contributions to and deliberation on public policies and services); e-decision-making (empowering citizens through co-design of policy options and co-development of solutions to public problems). The scores for each parameter are determined based on the answers of experts to the questions of a specially developed questionnaire assessing the services and opportunities for e-participation of citizens in different countries (E-Government Survey. The Future of Digital Government, 2022).

Since 2017, the World Bank has been assessing the level of the digitalisation of public administration based on the model of government technology maturity complemented and modified with the development of technologies used by the states (IMD World Digital Competitiveness: Ranking, 2023). The GovTech Maturity Index (GTMI) is a method based on the model of digital government maturity. It assesses technologies in four aspects: supporting core government systems, enhancing service delivery, mainstreaming citizen engagement, and fostering GovTech enablers. This method is not intended to create a ranking of countries by the level of the digitalisation of public administration; rather, it is intended to identify areas for improvement of technologies and enhancing their efficiency[2]. As of 2022, the GTMI is defined as the simple average of the normalised scores of four subindices:

– The Core Government Systems Index (CGSI) based on the assessments of public digital platforms, including cloud systems, and

[1] E-Government Development Index (EGDI). URL: https://publicadministration.un.org/egovkb/en-us/About/Overview/-E-Government-Development-Index

[2] GovTech Maturity Index. URL: https://www.worldbank.org/en/programs/govtech/gtmi

other key aspects of the digitalisation of public administration (17 indicators);

– The Public Service Delivery Index (PSDI) measures the convenience of online public services for the public and businesses in terms of the quality of the services, their convenience for users, and their accessibility (9 indicators);

– The Digital Citizen Engagement Index (DCEI) assesses public participation platforms, open data, and open government portals, and feedback mechanisms (6 indicators);

– The GovTech Enablers Index (GTEI) captures the development of legal regulation and institutional infrastructure, digital competencies of the public, the involvement of the government in the implementation of the policy intended to support innovations aimed at the digitalisation of public administration (15 indicators).

The GovTech Maturity Index determined by the method developed by the World Bank is also focused on the opportunities provided by public digital services and platforms: experts assess the availability of various components and resources in them, the user-friendliness of their interfaces, etc. However, it ignores the issues of ensuring equal access to these opportunities, their accessibility, demand, and digital literacy of various social categories of citizens.

Another index of the digitalisation of public administration is the Digital Government Index developed by the Organisation for Economic Co-operation and Development. This indicator is used to track the implementation of the OECD Recommendations on Digital Government Strategies of 2014[3]. The Digital Government Index is a composite index that is defined as the simple average of assessments of six dimensions of the government digital maturity:

– digital government by design: active use of digital technologies by the state to reorganise and reconsider public processes by simplifying communication and interaction procedures and building effective communication channels with stakeholders;

– data-driven public sector: using big data as a strategic management asset, the regulation of the mechanism for using, collecting, processing, ensuring the security of big data to optimise the decision-making process in the area of public administration and the development and provision of public services;

– government as a platform: a system of digital platforms, regulations, and standards promoting digital integration and ensuring consistency in public administration and public interaction; focus on public needs when developing and providing public services;

– government open by default: maximum disclosure of information in the area of public administration while ensuring the balance of public and national interests;

– user-driven: the demand for and convenience of digital services and platforms for citizens play the key role during the formation of public policy, its implementation, provision of public services, and the introduction of inclusive mechanisms;

– proactiveness and responsiveness: preventive actions of the government, anticipation of public needs and rapid response in order to meet them without the need to collect additional data by users[4].

In addition, there is a cross-cutting assessment of four more aspects of digitalisation: a strategic approach, the use of political leverage, the implementation of reforms, and monitoring of results[5]. The index is scored on a scale from 0 to 1, where 1 is the maximum level of digital government maturity.

Regional integration associations also use indicators of the digitalisation of public administration to optimise the management of the process in different member countries and ensure equal level of digitalisation. They also use relevant digital technologies of

[3] OECD Recommendation on Digital Government Strategies. Paris: OECD, 2014. URL: https://shorturl.at/mpuwG

[4] The OECD Digital Government Policy Framework : Six Dimensions of a Digital Government // OECD Public Governance Policy Papers. 2020. No. 2. URL: https://doi.org/10.1787/f64fed2a-en

[5] Methodology for the OECD Digital Government Index. URL: https://www.oecd-ilibrary.org/sites/314681ea-en/index.html?itemId=/content/component/314681ea-en#sect-136

public administration to improve integration and standardisation. For example, the Digital Economy and Society Index (DESI) of the European Commission has been calculated annually since 2014. The indicator allows assessing the use of digital technologies in the area of public administration in four key dimensions: connectivity, human capital; digital public services; and the integration of digital technologies (Digital Economy and Society Index, 2022). Unlike methods based on expert assessments, the DESI method is based on official statistics generated in the national statistical systems of the countries in the European Union. For example, it includes the number of organisations that train information technology skills, the number of IT women specialists, broadband Internet prices, e-commerce turnover, etc. Compliance with the requirements for the formation of the necessary data by the countries of the European Union allows performing dynamic monitoring of the situation and making cross-country comparisons. It also allows expanding the analytical use of the results of annual monitoring for political decision-making within integration associations, it allows proposing point recommendations for each country considering the experience of other countries.

The statistical measurements required to calculate the DESI index correspond to the four main areas of the Digital Compass 2030 policy, which are not isolated, but interrelated. For example, at the level of political goals, it is declared that the digital development of society and the economy directly depends on the comprehensive digitalisation of public administration through coordinated improvements in various areas.

It should be noted that the indicators of the digitalisation of public administration are structural components for determining a number of international development indicators. For example, the structure of the international Network Readiness Index (NRI) (the method to determine which was developed jointly by the Portulans Institute (USA) and the University of Oxford (UK)) consists of four indicators of the digitalisation in the area of public administration used to assess the component "Subjects of Digitalisation": the level of development of public online services, the publication and use of open data by public authorities, government incentives for investment in new technologies, and government spending on R&D and higher education (Dutta & Lanvin, 2023).

Another digitalisation index whose components include indicators of the digitalisation of public administration is the World Digital Competitiveness Ranking by the Swiss IMD Business School. This ranking is based on the assessment of three factors of digital competitiveness: knowledge, technology, and future readiness (IMD World Digital Competitiveness: Ranking, 2023). The range of indicators which are used to calculate the index and which characterise the effectiveness of the digitalisation of public administration includes the level of development of digital skills of the public, public spending on education, regulation of scientific research and protection of intellectual property rights, indicators of the development of digital infrastructure (usage of the Internet and mobile communications, intensity of using the Internet by the public, Internet connection speed, etc.). It is significant that two blocks of the system of indicators for assessing future readiness are fully represented by indicators of the digitalisation of public administration: "Adaptive attitudes" (e-participation, digital trade, the share of households owning tablet computers and smartphones, the attitude of the population to globalisation) and "IT integration" (the level of development of e-government, public-private partnership in the area of technology, cybersecurity and government efforts to ensure it, the prevalence of pirated software, and Internet privacy laws).

Traditionally, the ICT Development Index published by the International Telecommunication Union is also referred to as an index of the digitalisation of public administration. It reflects such aspects as the availability

of digital technologies, their use, and the development of necessary skills. The index allows assessing not so much the digitalisation of public administration as the digitalisation of society. It was calculated between 2009 and 2017 using 11 indicators, however, in 2018 the expert community agreed that the composition of the index was outdated and did not fully reflect the state of ICT due to the rapid development of new technologies. The problem was aggravated by differences in the methods and systems of ICT development indicators in national statistical systems of different countries, which did not allow creating a qualitative database to calculate the index and ensure the possibility of cross-border comparison and creation of a unified ranking. Between 2018 and mid-2023, there were active discussions regarding the composition of the new ICT Development Index. In 2023, a new method for calculating the Index was adopted, which is based on a system of universal and significant indicators. The first group includes indicators of the proportion of the population regularly using the Internet, the proportion of households connected to the Internet, and the number of broadband subscriptions per 100 people. Significant indicators include 3G and 4G coverage rates, mobile and fixed broadband Internet traffic, the proportion of citizens owning mobile phones, and the cost of mobile and fixed broadband Internet[6]. As a result, the current composition of the ICT Development Index does not directly reflect the processes of the digitalisation in the area of public administration, however, it gives an idea of the effectiveness of the government efforts to develop mass ICT. It characterises the results of regulatory efforts, economic and innovation policies, and other conditions that ensure the availability of modern technologies (primarily the Internet and mobile communications) for the population of the country.

Thus, indicators of the digitalisation of public administration are studied not only to assess the electronic (digital) government and the level of its "digital maturity", but also as structural components of indicators of the digital economy, digital society, and digital competitiveness of states.

In Russia, the digitalisation of public administration is part of the Strategy for the Development of the Information Society until 2030. Among the national interests provided for by the Strategy are the development of safe, free, and sustainable interaction between citizens, enterprises, organisations, and government and local authorities, and improving the efficiency of public management[7]. Digital transformation is declared as the national objective of the country's development in the strategic perspective[8], hence the federal project "Digital Public Administration" is being implemented in Russia. The main indicator of the project implementation is the conversion into electronic form 95 % of mass socially significant services (alongside with their traditional form which is still preserved). In addition, the assessment of the level of the digitalisation of public administration is part of the assessment of the indicator "Achieving "digital maturity" of key sectors of the economy and social sphere, including healthcare, education, and public administration"[9]. The "digital maturity" of public administration was initially assessed by seven indicators:

– the amount of data contained in federal information systems and mass socially significant state and municipal services which need to be provided (in % of the total amount of necessary information; 100 % in 2030);

[6] The ICT Development Index. URL: https://shorturl.at/cPTX6

[7] On the Strategy for the Development of the Information Society in the Russian Federation for 2017-2030 : Decree of the President of the Russian Federation of 9.05.2017 No. 203 // Collected Legislation of the Russian Federation. 15.05.2017. No. 20. Art. 2901.

[8] On the National Objectives for the Development of the Russian Federation until 2030 : Decree of the President of the Russian Federation of 21.07.2020 No. 474 // Collected Legislation of the Russian Federation. 27.07.2020. No. 30. Art. 4884.

[9] On Approval of Methods for Calculating Target Indicators of the Objectives for the National Development of the Russian Federation "Digital Transformation" : Order of the Ministry of Digital Development, Communications, and Mass Media of the Russian Federation of 18.11.2020. No. 600. Access from the reference and legal system "ConsultantPlus".

– the volume of electronic legally significant document flow in federal authorities, subordinate institutions, and extra-budgetary funds (in % of the total volume of legally significant document flow; 100 % in 2030);

– reduction in the time required to provide state and municipal services (in 2030 this indicator is planned to have been reduced by 3 times as compared to 2019/2020);

– the share of state and municipal services provided within the regulatory deadlines (in % of the total number of services provided; 98 % in 2030);

– the share of remote inspections conducted by regulatory authorities, including using electronic checklists (in % of the total number of inspections; 50 % in 2030);

– the share of electronic applications for state and municipal services (in % of the number of services that do not require a personal visit to authorities and subordinate institutions; 90 % in 2030);

– the share of mass socially significant services available in the electronic form (in % of the total number of such services; 95 % in 2030)[10].

In 2022, two more indicators were added: the number of services provided proactively in the electronic form on the Gosuslugi portal (target value 195) and the level of user satisfaction with mass socially significant public services received electronically (4.7 points)[11].

Another method for assessing the digitalisation in Russia is used to assess the level of digital maturity of public administration at the regional level. It consists of 11 basic indicators, including:

– the share of users of the Gosuslugi platform using services to obtain state and municipal services in the electronic form in the total number of users registered on the platform (the target value in 2030 is 65 %);

– the share of legally significant document flow between the executive authorities of the region, local authorities, and institutions subordinate to them (the target value for 2030 is 100 %);

– the number of types of information provided online by the regional state administrative bodies involving interaction between departments in order to implement their functions and provide their services, including to commercial organisations (the target value of the indicator is 6);

– the share of regional authorities that use the state information infrastructure and cloud services in their work (the target value of the indicator in 2030 is 100 %);

– the share of remote inspections conducted by regulatory authorities, including using electronic checklists (85 %);

– the number of public e-services which can be provided proactively and whose result can be received on the Gosuslugi portal (the target value of the indicator in 2030 is 95 %);

– satisfaction of users with the quality of provided mass and socially significant state and municipal services (the target value of the indicator in 2030 is 4.7);

– the share of applications for mass socially significant state and municipal services in the electronic form in the total number of such applications that do not require a personal visit to state and municipal authorities and multifunctional centres (the target value of the indicator in 2030 is 80 %);

– the share of mass socially significant state and municipal services available in the electronic form in the total number of such services (the target value of the indicator in 2030 is 95 %);

– the number of services implemented using a unified platform of services ensuring the functions of public administration and local self-government (target value in 2030 is 95 %);

[10] On Approval of Methods for Calculating Predicted Values of Target Indicators of the Objectives for the National Development of the Russian Federation "Digital Transformation" : Order of the Ministry of Digital Development, Communications, and Mass Media of the Russian Federation of 18.11.2020 No. 601. Access from the reference and legal system "ConsultantPlus".

[11] On Updating the Method for Calculating the Sector Indices of the "Public Administration" Industry Characterising the Level of Achievement of the Target Indicator "Digital Maturity…" : Letter of the Ministry of Digital Development, Communications, and Mass Media of the Russian Federation. URL: https://shorturl.at/EHW59

– the share of expenses for the purchase and/or lease of Russian software, electronic platforms in the total amount of expenses in this area (85 %)[12].

A comparative analysis of the indicators of the digitalisation of public administration used to assess the achievement of the national development objective "Digital Transformation" and to assess the level of digital maturity of public administration in the regions allows us to make a conclusion about their differences both in terms of the composition of the applied assessment indicators and in terms of their quantitative target value. For example, only 7 indicators are used to achieve the national objective for digital transformation in the area of public administration, while 11 indicators are used to assess the level of digital maturity of public administration in the regions, including indicators of the activity of users on the Gosuslugi platform related to obtaining e-services, the number of types of information available online, and the users' satisfaction with the quality of state and municipal services provided in the electronic form. What is more, the indicators of time spent to provide mass socially significant services in the electronic form are excluded from the "regional" coefficients. There are differences in the target values for the indicators of remote inspections by regulatory authorities (50 % for the federal level and 85 % for the regional level), and the share of applications for state and municipal services in the electronic form (90 % and 80 %, respectively).

Thus, the assessment of the digital transformation or digital maturity of public administration in Russia is based on traditional methods of socio-economic analysis, primarily the method of using absolute and relative values and considering them in dynamics and in comparison with target and planned values. It is significant that different systems of digital maturity indicators and different control values for 2030 are used for the federal and regional levels. On the one hand, such approach allows comparing different aspects characterising digitalisation processes in relation to different items at the same level (for example, comparing the subjects of the Russian Federation). On the other hand, the absence of a unified integrated indicator makes the results of such an analysis fragmentary and makes it impossible, for example, to create rankings.

The studied method allows determining the demand and supply of state and municipal electronic services. However, it ignores the assessment of their accessibility (the number of users of electronic services is estimated as a percentage of the number of registered users of the platform, and not as of the total adult population of Russia), the level of the information infrastructure development, and the issues of information security. The Ministry of Digital Development considers the criticism related to ignoring the assessment of the quality of state and municipal services in electronic form by their main beneficiaries. As a result, for example, the indicator of citizens' satisfaction with the quality of mass socially significant electronic services was added to the list of indicators in 2022. Importantly, the beneficiaries of digitalisation processes are not only ordinary citizens, but also employees of state bodies and government agencies (in terms of using state digital services and platforms in their professional activities), business representatives, researchers, and personnel in the social sphere (science, healthcare, and education).

It is noteworthy that most of the indicators of the digitalisation of public administration used in Russia are represented by structural indicators, which do not always allow us to draw an objective conclusion about the vector of digitalisation. For example, in the context of sanctions and their impact, the indicator of the share of expenses for the purchase and lease of software and electronic platforms may increase, however, the total

[12] On Approval of Methods for Calculating Indicators for Assessing the Effectiveness of the Activities of Principal Officers of the Constituent Entities of the Russian Federation and the Activities of the Executive Bodies of the Constituent Entities of the Russian Federation, as well as on the Annulment of Certain Provisions of Decree of the Government of the Russian Federation No. 915 of 17.07.2019 : Decree of the Government of the Russian Federation No. 542 of 3.04.2021 // Collected Legislation of the Russian Federation. 19.04.2021. No. 16 (Part 3). Art. 2770.

amount of investment in this area in absolute value and in dynamics may decrease.

Overall, it can be concluded that, in contrast to foreign methods of assessing the digitalisation of public administration, the traditional method used in Russia is represented by a set of mainly structural indicators. This method focuses on the results of digitalisation and ignores the assessment of resources and the satisfaction of the main groups of beneficiaries (population of various categories, employees of state bodies and businesses).

It should be noted that the Ministry of Digital Development of Russia and scientific institutions have made numerous attempts to create a unified index which would characterise the processes of digital transformation in the area of public administration in Russia.

For example, in 2018, Skolkovo experts, proposed a method for calculating the Digital Russia composite index, an analogue of international digitalisation indices of society. This index is based on seven subindices, which allow assessing the following factors and effects of digitalisation: the regulatory framework and administrative indicators of digitalisation; availability and efforts to train IT personnel; scientific and technical achievements and progress; information infrastructure and connectivity; information security; economic effects of digitalisation; and social effects of digitalisation (Digital Russia Index, 2018).

As of 2023, the Ministry of Digital Development, Communications, and Mass Media has been publishing a consolidated ranking of the digital maturity of regions based on a composite "digital maturity" index. With regard to the area of public administration, the value of the index was determined by the level (in %) of achievement of the target value for each of the above-mentioned 9 indicators of the digitalisation of public administration. Then the levels were summed up to find the arithmetic mean value which expressed the quantitative assessment of the general index (Abramov & Andreev, 2023). Such "normalisation" of indicators that make up the index does not correspond to the global practice of determining composite indices. Internationally, the index is calculated based on the ratio of the actual value of the index for a particular item of assessment and the maximum value among the compared items, rather than the planned value.

In 2023, the Index of Intellectual Maturity of Russian Regions was developed and tested for the first time. Its objective was to assess the level of readiness of regional executive authorities to the active introduction of artificial intelligence technologies. The idea of developing the index was proposed in November 2022 by V. V. Putin at the conference "Artificial Intelligence Journey-2022"[13]. The index is composite and is based on an assessment of the intellectual maturity of its 4 components: the use of artificial intelligence technologies in the economy and social sphere, in federal, regional, and municipal executive bodies.

A system of 41 indicators is used to assess the intellectual maturity of federal executive bodies. This system consists of several blocks: production of technologies, use of technologies, effect (not specified), regulation (compliance with legislative requirements), strategic development and planning (availability of strategic plans), organisation of work (regulation of processes, special organisational structures), personnel and leadership, data management and use, tools and analytics, infrastructure, trust and security. For regional executive bodies, the system does not include blocks for the production of technologies and organisation of work. What is more, the effect of using artificial intelligence is specified and includes the assessment of economy, speed, quality, objectivity, and personalisation, as well as the effect on the key supporting and management processes (assumably, these indicators are to be assessed qualitatively). The system of indicators for this level of public administration includes 59 indicators of intellectual maturity. A similar method is used to assess the intellectual maturity of local governments.

[13] Transcript of the discussion "Artificial Intelligence Technologies for Economic Growth" at the conference "Artificial Intelligence Journey – 2022" (24.11.2022). URL: https://shorturl.at/dADZ6

Importantly, expert questionnaires or the algorithm for determining the value of a particular indicator in the system of composite components of the index were not provided in the description of the method. The procedure for the formation of an expert group of assessment officers was not provided either. What is more, self-assessment used in the method raises doubts about the objectivity of the calculated intellectual maturity index. Despite the importance of assessing the conditions, results, and factors of using artificial intelligence in the processes of the digitalisation of public administration, the index is not integrated into the state strategy and is not an indicator of achieving the national objective for the digital transformation of the public sector.

The systemised results of a comparative analysis of the considered methodological approaches to assessing the digitalisation of public administration are presented in Table.

Researchers have been searching for optimal models for assessing the digitalisation of public administration (Kuznetsova, 2021; Sidorenko et al., 2019; Yuzhakov et al., 2023; Lindquist, 2022). One of such attempts was an attempt to create models of digital maturity of the state. For example, Meuche (2022) studied the experience of Germany and proposed to use five key criteria to assess digital maturity: employees' competence and readiness, technologies flexibility and integration, big data integration and use, simplification and automation of process management, strategic goals and objectives, cooperation, and leadership. However, so far, the results of scientific research have not been widely used in empirical practice.

## Results and discussion

As a result of the study, it can be concluded that the most common method for assessing the digitalisation in the area of public administration is the index method, which allows gradually selecting the necessary and sufficient indicators to characterise the processes and results with no loss in quality of the analysis results, using intermediate results to identify growth points, strengths and weaknesses, and identifying best practices. This method also makes it possible to conduct a comparative analysis over time and by analysis items (countries, regions, municipalities) and provides for simple and accessible visualisation of the results. The risks related to the use of the index method to assess the digitalisation of the public sphere are associated with the need to update the composition of indicators in a timely manner as information and communication technologies develop. It can also encourage unhealthy competition between the items of analysis aimed at achieving the target quantitative values of the index rather than improving the efficiency of digital processes.

With rare exceptions, methodological models for assessing the digitalisation of public administration are characterised by two main drawbacks:

– they are based on declarative methods and subjective assessments of experts, which reduces the objectivity of the conclusions and recommendations and provides distorted interpretation of the processes of the digitalisation of public administration;

– they allow assessing and identifying best practices or weaknesses of digitalisation in the area of public administration, but do not allow assessing its results;

– they focus on the state's supply of digital services and platforms and ignore the problems related to ensuring equality of the population in terms of their accessibility, digital illiteracy, and other aspects that affect the population's demand for digital services and hamper the digitalisation processes.

As a result of research, we propose to group all methods for assessing digitalisation by the information needs of the main stakeholders interested in the effective introduction of digital technologies in public administration:

Group 1: methods that allow assessing the conditions and factors affecting the digitalisation intensity (methods based on assessing the level of infrastructure development, availability to the population of technologies, software, mobile and Internet communications, etc.).

Table

*Comparative analysis of methodological approaches to assessing the digitalisation of public administration*

| Method/ Organisation | Assessment Components | Advantages | Disadvantages |
|---|---|---|---|
| 1. E-Government Development Index (EGDI) / UN | Public online services for the public and businesses; telecommunications infrastructure; human capital | Transparent assessment procedure with the involvement of experts; systematic updating of components; a comprehensive combination of assessment methods; conducting cross-border and interregional comparisons, searching for growth points, and proposing recommendations | Focus on the supply of digital services by the state as a result of digitalisation while ignoring the characteristics of demand (availability, equality, needs, e-participation, and quality of services) |
| 2. GovTech Maturity Index (GTMI) / World Bank | Digital support for public systems, quality of public services, engagement of citizens, and promotion of public digital technologies | | Ignores indicators of equality, accessibility, needs, and digital literacy of the population |
| 3. Digital Government Index (DGI) / OECD | Focus on digitalisation, users, using big data, digital platforms and integration, information openness, and proactivity | | Issues related to ensuring the quality and availability of initial data, complex calculations, and a large volume of initial data |
| 4. Digital Economy and Society Index (DESI) / European Commission | Digital infrastructure, digital skills and human capital, digital integration, active use of digital services and technologies, and the digitalisation of public services | Comprehensive nature; objectivity of quantitative statistical data; assessment of the socio-economic consequences of digitalisation; cross-country comparisons and recommendations, interrelation with the regional digitalisation strategy | Ignores the possibilities of sociological research methods that allow assessing the level of satisfaction of the population, businesses, employees of state bodies, and systems with digitalisation processes |
| 5. Level of "digital maturity" of public administration / Government of the Russian Federation | Engagement of registered users in using digital services, the prevalence of electronic document management by state bodies and government agencies, remote regulation activities, reduction in the time required to obtain public services | Systematic revision and addition of assessment indicators, including quality and proactivity indicators | Focus on the characteristics of supply of digital services and public services, differences in methods for assessing federal and regional levels, ignores international practices, demand characteristics (needs, quality), unfit for comparisons and integrated assessment of the effectiveness of digitalisation |
| 6. Intellectual Maturity Index / Institute for Development of Information Society (RF) | Production and use of technologies, effect, regulation, strategic planning, organisation of work, personnel and leadership, data management and use, tools and analytics, infrastructure, trust, and security | Comprehensive nature, allows comparing the maturity of bodies and authorities of the same management level and identifying weaknesses and strengths | Non-transparent procedure of component assessment and formation of expert groups, subjective self-assessment as a form of data collection, disconnection from digitalisation strategies in the public sector, different compositions of components for different levels |

Group 2: methods that allow assessing the results of digitalisation characterising the supply of digital services by the state (assessment of the number of digital services, electronic document management, reduction in budget costs).

Group 3: methods that allow assessing the results of digitalisation in terms of satisfaction of the main stakeholders: the public, businesses, state bodies and government agencies, and their employees (assessment of accessibility, quality, level of satisfaction, need for digital services, and socio-economic effects).

In our opinion. the development of the methods within the latter group appears to be especially important for Russia. According to the value of the E-Government Development Index, Russia is traditionally included by the UN in the group of countries with a very high level of digitalisation (the value of the index at the end of 2022 was 0.8162 out of 1, 42nd position in the overall ranking) (E-Government Survey 2022. The Future of Digital Government, 2022). However, the digital literacy index, for example, for retired employees over the age of 65 who belong to socially vulnerable categories of the population and often use state and municipal services, is 65 (71 in Russia as a whole), which is relatively low. It is obvious that the availability of digital public services for the poor is limited.

The accessibility of the Internet across the Russian population is uneven: for example, in the Yamalo-Nenets Autonomous Okrug only 1.5 % of households are not connected to the Internet, while in the Republics of Mari El and Mordovia, the Novgorod Region and the Orel Regions, it is over 25 %. According to 2021 data, the gap in Internet connectivity between urban and rural areas is almost 8 %. The main obstacles to connecting to the Internet (respondents had to choose from several reasons) are their own reluctance (72 %), lack of skills to work with network resources (36 %), financial reasons (32 %), and only 5 % indicate a lack of technical ability to connect to the Internet. Importantly, 12 % of the population of Russia over the age of 15 have never used the Internet, over 90 % of them are citizens over the age of 55 (Kuzina, 2023).

The lack of methods used to assess the results of digitalisation in the public sphere led to the development of an analytical approach in modern science. It focuses on determining the impact of digital public technologies on indicators of socio-economic development. For example, Abu Shanab & Osmani (2019) revealed a statistically significant correlation between the level of e-government development and entrepreneurial activity. Zhao et al. (2015) provide evidence of a positive relationship between the digitalisation of public administration and the development of the digital economy.

Russian methods of assessing digitalisation studied in this article also ignore the public needs for equality and integration. This problem is partially solved in the method used to determine intellectual maturity, however, the lack of transparency related to obtaining data for assessing such components as “personnel and leadership” and “trust and security” raise questions about their objectivity. Therefore, it seems reasonable to shift the focus of the method for assessing the level of the digitalisation of public administration from the dynamics of the supply of electronic services, information, etc. by the state to ensuring the satisfied demand for digital services from the main beneficiaries of digitalisation: the public, businesses, state bodies, and government authorities.

## Conclusions

The development of methodological approaches to assessing the digitalisation of public administration is one of the priorities of researchers and state bodies, and government authorities involved in developing and implementing policies for the digital transformation of society and the economy. The main disadvantage of the considered international, regional, and

national methods is that they ignore the needs of various public groups who are the main beneficiaries of the discussed changes: first of all, citizens, representatives of businesses, and employees of state bodies and government authorities. They also ignore the issues of economic feasibility and efficiency. To intensify scientific research and systematise existing methods, it was proposed to divide all the approaches to assessing digitalisation into three groups:

– methods that assess the conditions and factors of digitalisation in public administration;

– methods that allow assessing the development of the supply of public services;

– methods that allow assessing the satisfaction of the needs of the main stakeholders, primarily citizens, businesses, state bodies and government agencies, including in the context of the effectiveness of budget expenditures on digitalisation.

In the future, special attention should be paid to the assessment approaches in the third group, which are currently based on selected sociological surveys and expert assessments. It is necessary to increase the objectivity of the data and analytic assessments derived from them. A prerequisite for using the method for assessing digital processes in the area of public administration is their integration into national strategic plans for the development of a digital society and the digital economy. It also appears to be promising to continue efforts to develop criteria for assessing the use of artificial intelligence in the public sphere.

## Conflict of Interest

The author declares the absence of obvious and potential conflicts of interest related to the publication of this article.

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# Методические подходы к оценке цифровизации публичного управления и государственных услуг

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**Предмет.** Цифровизация является общемировой тенденцией эволюции и трансформации систем публичного управления. Разработка методических подходов к оценке эффективности данного процесса, определению его влияния на социально-экономическую динамику государств носит «догоняющий» характер вследствие бурного развития современных информационных и коммуникационных технологий, в ходе внедрения которых правительство часто исполняет роль инновационного «локомотива». Критерии и показатели, лежащие в основе существующих оценочных методов международного, национального и регионального уровней, в зависимости от аналитических целей основываются на различных базах исходных данных, акцентируют внимание на разных аспектах цифровизации публичного управления. Функция анализа и мониторинга результатов, условий и востребованности цифровых процессов является важной в государственной сфере, от качества ее реализации зависит информационное обеспечение выполнения прочих государственных функций.
**Цель.** Авторское исследование направлено на достижение следующей исследовательской цели: проанализировать состояние современной системы оценки цифровизации в сфере публичного управления с учетом современных тенденций оценочной деятельности для определения преимуществ и недостатков существующих методик, разработки авторского подхода к их классификации и поиска направлений их оптимизации.
**Методология.** Для достижения обозначенной цели использовался диалектический способ научного познания и методы анализа и синтеза. Базой для проведения исследования являются современные достижения методологии оценки цифровизации публичного управления, изложенные в актуальной научной, периодической литературе, в документах нормативного и инструктивного характера.
**Выводы.** Особенности существующих методик оценки цифровизации публичного управления обусловлены как объектом анализа, так и потребностями субъектов – пользователей аналитической информации. В этой связи предлагается авторская классификация оценочных подходов, предусматривающая выделение групп методов, оценивающих условия цифровизации (1 группа), а также результаты цифровизации с позиции предложения государственных сервисов и услуг (2 группа) и с позиции удовлетворенности основных заинтересованных субъектов их использования: населения, бизнеса, государственных органов, структур и их сотрудников (3 группа). В качестве направления оптимизации рассматривается целесообразность включения показателей использования технологий искусственного интеллекта в публичном управлении.

**Ключевые слова:** цифровое правительство, цифровизация публичного управления, цифровизация государственных услуг, методы оценки цифровизации публичного управления.

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**Конфликт интересов**

Автор декларирует отсутствие явных и потенциальных конфликтов интересов, связанных с публикацией настоящей статьи.

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