Big Data in Public Administration

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Abstract—**Digital transformation affects all spheres of the modern economy. It also influenced the public administration system, where big data gained special importance. Modern technologies make it possible to collect huge amounts of information from various sources, both official and private. By processing and using big data at all levels of public administration, one can maximize the efficiency of public service delivery to society. In this article, the authors analyze the world experience and results of using big data in the system of state administration. The authors examine the successes in the use of big data in the public administration system in countries such as the PRC, USA, Great Britain, Korea, and in the EU. Particular attention is paid to Russia. The past three years have seen a significant leap forward in the use of big data at the federal and regional levels of government. In Russia, several Government decrees have been adopted aimed at maximizing the use of big data in the activities of state bodies, which will improve the quality of territorial management. The article provides examples of the use of big data in the activities of regional government bodies. The option of using big data in controlling the COVID-19 situation is being considered. The authors note the need for cooperation of big data obtained from government agencies, for example Federal State Statistic Service, with big data received from private structures, for example, from Sberbank.**

Keywords—*Big Data, digital transformation, National Data Management System, public administration*

I. INTRODUCTION

The digital economy is rapidly spreading around the world: now it is worth more than 15.5% of world GDP. In developed countries, the digital economy is worth an average of 18.4% of GDP (from 10 to 35%), and in developing countries - from 2 to 18% [1]. The share of the digital economy in Russia, according to the latest data, is about 3% of GDP [16]. The world of the digital economy is a world of data, a world of information.

Back in 1815, Nathan Rothschild uttered his legendary phrase "Who owns information owns the world." Information is generated through data that are being collected, processed, analyzed and interpreted by some system, living or automated, human or robot.

Since the beginning of the 21st century, the world has experienced an explosive growth in the amount of information. According to the data of the analytical agency IDC, published in the report "Data Age 2025", by 2018 about 33 zettabytes (ZB) of information had been accumulated in the world, while in 2006 this volume was estimated at 0.16 ZB (an increase of over than 200 times). According to the forecast, by 2025, the amount of information will already be around 175 ZB or $175*1021$ bytes. Already, more than 5 billion consumers (65% of the world's population) interact with data every day; by 2025, it is expected that every person with Internet access will be in contact with data every 18 seconds.

Big data is a major technology trend that is revolutionizing the way businesses can use information to improve customer satisfaction and transform business models. But in the first decade of the 21st century, big data became a technological trend not only of business, but also of government.

In a dynamic digital world, state institutions of the federal, regional and local levels, as the main guarantors of safety and high quality of life of every citizen, must undergo digital transformation.

Digital transformation is a process of transition to a digital economy, which includes a transition to new technologies, restructuring of traditional management principles and a change in approaches to data and human resource management.

II. PROBLEM STATEMENT

The digital transformation of government bodies is a

global trend in the state administration system and in the provision of public services. Big data is a potential tool for transforming traditional governance into smart governance. The use of big data for intelligent management in the public sector can increase the efficiency of public institutions, speed up the provision of public services, increase transparency, and reduce the number of problems in society [2, 3]. At the same time, one should consider the fact that all traditional systems of public administration, including e-government, are based on structured data. All information united by the definition of "big data" refers to unstructured information. As a consequence, difficulties arise in the exchange of data between these systems [4].

The transformation of public services is on the rise in many countries. The state, being the largest owner of information resources, effectively controls, develops and uses big data to predict the directions of the country's development.

During the research, scientific publications were analyzed regarding the world experience of using big data in the public administration system.

The process of integrating big data into the public administration system is actively taking place in the PRC. Since October 2015, the PRC has been running the Action plan for Promoting the Development of Big Data, the main goal of which is to promote big data in China and build a single open data portal of the national government for open and joint use of information resources of the government and the public sector of the economy [5]. Due to the increasing complexity of public administration and the reduction of financial resources, the government increasingly provides public services in conjunction with citizens and other interested organizations. In 2015, the PRC government initiated a program aimed at involving citizens in identifying errors on government websites [6]. Big data (online data) obtained from government organizations is widely used in China to forecast foreign direct investment [7].

Back in March 2012, the US government released the Big Data Research and Development Agenda to raise the relevance and expand the application of big data to a national strategic level. Big data collected by government agencies is an important strategic asset for the US business sector. Such data is used by many companies in various sectors of the economy, from car manufacturers to companies engaged in digital platforms. Big data is used in solving production and investment problems, in marketing and inventory management, as well as in long-term strategic planning. It is also extremely important for assessing the financial condition of banks and the overall stability of the US financial system [8].

In the UK, big data is being used by the public and private sectors, but its widespread adoption is hampered by the lack of proper big data analytics and, as a result, the skills to harness the full potential of big data. The development of methods for analyzing big data has improved the decision-making process in the procurement of IT services in the public sector [9], and using a conceptual model of the value chain, the role of big data in creating value in public services is investigated, as well as the participation of various government institutions in this process [10].

Analyzing the level of development of e-government in Korea, experts came to the conclusion that today we can and should talk about a new model for the development of e-government, called the E-Government Maturity Model based on Socio-political Development, which includes the level of social maturity based on e-democracy and the level maturity of civil society [11]. Maturity of e-government is the subject of research by Indonesian scientists [12], who use big data of e-government to develop social policy of the state.

Increasingly, big data is being used to solve problems at the municipal level. The SmartGov project (Austria) uses digital technologies by integrating data from open sources and social networks into fuzzy cognitive maps to simulate real life problems and various scenarios leading to more effective decision-making [13].

III. RESEARCH QUESTIONS

The digital transformation of public administration is actively developing in the Russian Federation.

In 2017, the Strategy for the Development of the Information Society in the Russian Federation for 2017 - 2030, which was approved by Decree of the President of the Russian Federation No. 20 dated 09.05.2017, stated that one of the strategic national interests of the Russian Federation is the formation of the digital economy. This document determines that the digital economy is an economic activity in which the key factor of production is digital data, the processing of large volumes and the use of the analysis results of which, in comparison with traditional forms of management, can significantly increase the efficiency of various types of production, technologies, equipment, storage, sales, delivery of goods and services.

In 2018, the digital economy became a national project in accordance with the Decree of the President of the Russian Federation dated 07.05.2018 No. 204 "On national goals and strategic objectives for the development of the Russian Federation until 2024". One of the most important components of this project was the federal project "Digital Public Administration", which envisages a number of serious changes to simplify the interaction of the state with citizens and business and to optimize the interaction of authorities at different levels. An important part of this project was the activities for the unification and standardization of management based on big data.

IV. PURPOSE OF THE STUDY

The main goal of digital government in Russia is to move to data-driven governance. At the same time, we are talking about big data, which is called the "new oil" or "oxygen" of digitalization.

Big data is specially processed or raw data that is collected in large volumes from different sources for further analysis. The following characteristics can be distinguished: the volume, variety, speed, and accuracy that differentiate big data from the data used in traditional data management tools.

The use of "big data" implies working with information of a huge volume, diverse composition and disorganized structure, often coming in real time and from different (most often private) sources.

In 2018, the Analytical Center for the Government of the Russian Federation conducted a survey of the executive authorities of the Russian Federation on the use of data for making management decisions. The survey participants were representatives of 707 executive bodies (including 49 federal and 658 regional authorities from 77 constituent entities of the Russian Federation). The survey showed that 80% of government departments used mainly spreadsheets (created via Microsoft Excel or its analogues) for data analysis. Only 33.5% of organizations had access to industrial analytics platforms: 15% used Russian systems, 18.5% - foreign ones. 45% of regional organizations used only spreadsheets for data analysis. 80% of the authorities collected data for making reports. Data-based forecasts were made by 45% of organizations, and only 11.5% of state authorities simulated scenarios of different possible situations. Study results are pessimistic. Therefore, it is necessary not only to collect and deliver information based on big data to the structure of public administration, but also to develop modern platforms for using this unique information in forecasting and planning the development of regions, obtaining reliable data on the demographic situation, on population employment, on the quality of life of citizens in the whole country and its regions.

V. RESEARCH METHODS

In the process of research, such scientific methods as analysis, comparison and generalization were used.

First of all, it is necessary to analyze the main events related to digital transformation and the use of big data in public administration.

In 2019, the Government of the Russian Federation (order dated 03.06.2019 No. 1189-p) adopted the concept of creating and operating a national data management system NSUD (National Data Management System, NDMS).

The main goal of creating and ensuring the functioning of the NDMS is to increase the efficiency of creation, collection and use of state data both for the provision of state and municipal services and for the implementation of state and municipal functions, and to meet the needs of individuals and legal entities for access to information.

State data within the framework of the NDMS is information obtained from the resources of public sector bodies and organizations, as well as from resources created to exercise the powers of public sector bodies and organizations.

The structure of the NDMS includes the following interrelated elements:
- a set of regulatory legal, organizational, methodological rules and procedures that govern the relations between bodies and organizations of the public sector, legal entities and individuals in the field of government data management;
- federal state information system "Unified information platform of the national data management system" and other information and technology elements;
- digital analytical platform for providing statistical data.

At the same time, when creating a digital analytical platform for providing statistical data by the Federal State Statistics Service (Rosstat), it is possible to use alternative data sources for making managerial decisions.

In 2019, the Concept for the creation of a digital analytical platform for the provision of statistical data was adopted (Government order dated 17.12.2019 No. 3074-r), which enshrines the concept of "big data" as structured and unstructured data of huge volumes and significant diversity, efficiently processed by horizontally scalable software tools.

As alternative data sources, one can use the data of the GLONASS global navigation satellite system, ATMs, various scanning devices, sensor networks, mobile telephony, satellites, social networks, and the Internet.

It is planned that in state statistics, big data will be used most effectively in the following areas: price formation, employment, demographics, trade, services, transport and agriculture. Big data can be used as a replacement for the existing practice of statistical observations or as an additional source of statistical information, a tool for improving its quality and efficiency of formation.

During 2020, Rosstat is analyzing the possibility of using big data collected from government and alternative sources on the formation of consumer prices. In February 2020, Rosstat collected the data of cash registers from the Federal Tax Service and performed experimental calculations based on it. By the end of 2020, Rosstat will form a regulatory and methodological basis for conducting an experiment on the use of alternative data of cash register terminals for calculating the consumer price index.

Another sign of the integration of big data technologies into the system of state statistics of Russia is the development and approval of the federal statistical observation form No. 3-inform "Information on the use of digital technologies and the production of related goods and services" (Rosstat order No. 424 of July 30, 2020), which includes a section on the sources and purposes of using technologies for collecting, processing and analyzing big data for the reporting period. For the first time, reporting data on this form of observation for the 2020 reporting period will be presented in March 2021.

A little earlier, the use of big data, namely the data of mobile operators, was applied in certain regions of the Russian Federation for making managerial decisions.

The first constituent entity of the Russian Federation that began to introduce big data technologies into the sphere of public administration is Moscow. Since 2015, the Department of Information Technologies of Moscow has been analyzing non-personalized data of mobile operators on the number and dynamics of population movements in the region to improve urban infrastructure and spatial planning schemes. As part of this project, operators provide data:

- on changes in the resident population;
- on labor migration (internal commuting, international);
- on seasonal population migration;
- on tourist flow.

In 2019, several more constituent entities of the Russian Federation began to use the data of mobile operators.

In Leningrad Oblast, two pilot projects on using the data of mobile operators to estimate the population and labor migration in the agglomeration zone of St. Petersburg were implemented.

Tyumen Oblast used these data to estimate the size and density of the region's population to increase the efficiency of the implementation of urban planning activities.

In 2019, Yamalo-Nenets Autonomous Okrug and Perm Krai implemented such projects using the information of mobile operators.

At the beginning of 2020, a project to assess and analyze the labor market of St. Petersburg was implemented. The project is based on data from mobile operators.

The coronavirus pandemic that spread in Russia in the second quarter of 2020 has generated new requirements related to information on tracking the virus.

The Information Center for Monitoring the Situation with Coronavirus (rus. ICC) was established on-line at the federal level. When establishing the ICC, the experts tested the rules of the Unified Regulation for the Management of State Data, which were developed as part of the creation of the NDMS. Alexander Malakhov, Head of the Department of Methodological Support for Working with Data of the Analytical Center under the Government of the Russian Federation, during the videoconference "The Practice of Implementing the Methodology and Tools of the National Data Management System", said that the experts had worked out the skill of converting disparate data into a single array of harmonized, high-quality and comparable data, based on which one can form management decisions. At the same time, the monitoring of the situation with COVID-19 at the federal level was not limited to healthcare data. It included a large layer of data related to the economic situation, tourists and security. The monitoring consisted not only of government data, but also included an analysis of the business activity of organizations during the quarantine period based on Sberbank transaction data.

A similar project on analyzing the business activity of organizations based on transactional data during the period of strict quarantine was implemented in Leningrad Oblast. The results of the analysis were used to make decisions on the implementation of regional support measures for certain sectors of the economy that were most affected by the imposed quarantine restrictions.

VI.   FINDINGS

Thus, big data is not the technology of the future. It is the current reality of digital government that makes data-driven management decisions.

The key issue that prevents large-scale decision making based on big data is the quality of the data. Often, data simply become outdated, and as a result, one has to deal with irrelevant information. To solve this problem, the Federal State Information System for the Coordination of Informatization has been created in the Russian Federation. It unites several state information systems to support the adoption of managerial decisions in the field of public administration.

After analyzing the experience of using big data in public administration, we can draw the following conclusion.

The government uses big data for two main purposes.

The first purpose of using big data is to make management decisions based on it. Data analysis and data modeling enable data-driven decision making. It can be as simple as a few Excel operations or as complex as machine learning algorithms.

The second goal is to create super-services based on data for the most efficient and high-quality delivery of services to citizens. Super-services are one of the first steps towards the implementation of the "State as a platform concept.

But a significant problem remains unresolved. There are no regulatory and methodological foundations for using big data, which does not allow legalizing and officially applying big data as an independent resource for decision-making.

In this regard, within the framework of the project for digital transformation of public administration, we will single out two main areas of work with data:

1. Improving the quality of government data by creating a register of data types, an institute of reference data, which will eliminate contradictions in data, and a register of information interactions, where all information exchange will be recorded. This will create the conditions for working out quality incidents and increase the frequency of data use;

2. Legalization of big data by creating a regulatory and methodological framework for the use of big data and embedding this data into the system of state statistics of the Russian Federation.

VII.   CONCLUSION

Thus, the analysis of the use of big data in public administration carried out on the basis of scientific publications in the open press revealed the following trends.

The world experience of using big data has proven its ability to increase the efficiency of the public administration system.

The existence of state programs for the digital transformation of the public administration system in China, the United States, Great Britain and the European Union proves that the governments are interested in this process. As the analysis shows, the creation of a big data system from public and private sources of information, solving the arising problems of its structuring, unification and standardization are one of the most important problems of using big data in public administration. Many specialists in the field of digital transformation are currently working on the solutions.

In many countries, one can find examples of the successful solution of local problems in the public administration system.

In Russia, great attention is paid to digital transformation in public administration. This is confirmed by the following facts:

−   the creation of special state organizations, the main purposes of which are collection, storage, processing, updating and provision of big data arrays for state and private structures;

– the creation of a storage system for big data obtained from private organizations in an unsystematic form, its structuring and cooperation with big data received from government authorities;

– the use of big data from mobile operators for making management decisions in certain regions of the Russian Federation;

– the creation of an online Federal Information Center for monitoring the situation with COVID-19, which uses information from various sources. The Center's employees develop methods for transforming disparate data into a single array of structured and comparable data, on the basis of which management decisions can be made

Further development of the use of big data will be aimed at finding new, more effective methods of structuring, improving the quality of the information provided from the big data storage system, building platforms based on big data for making optimal decisions in the public administration system.

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