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The Role of Big Data in the Implementation of Regional Governments' Policies to Support Small and Medium Businesses during the COVID-19 Pandemic

SUMMARY OF THE DISSERTATION
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Statement of research problem and research design

The advent of «big data» has responded positively in the public sector: it has become "a watershed moment for modern public administration in the areas where they (big data) are used"[1]. Studies on the importance of «big data» in decision-making agree that the advent and use of «big data» in public administration brings "surprisingly positive results for public administration in terms of its efficiency, effectiveness and overall client satisfaction[2]". Public authorities are developing development strategies for «big data» (including Russia), as they are fully aware of the benefits of its implementation at all levels. Public administration, in turn, is undergoing transformation through the automation of routine processes that change the system of public service provision[3]: new technologies are indispensable, the infrastructure of the digital world is developing, resources appear to obtain all kinds of data, and the costs associated with these processes are reduced[4].

«Big data» is becoming an important additional tool for public administration. Leaving aside cases when «big data» is used directly in the political process, let us focus on its application in the decision-making process in public administration - by decision-making we mean a set of actions of certain persons who have the authority to set goals and act to achieve them in the sphere of state power. «Big data» can guide decision-making to a different extent - depending on the sphere in which these decisions are made. In the case of infrastructure decisions (e.g., construction and repair of infrastructure facilities), «big data» serves as the basis for decision making because without it, the decision cannot be implemented. However, in the case of political decisions, big data is partly placed at the disposal of the political actors responsible for making the decision, and in such situations, how the data will be used depends on the political will and motivation of the actor. The motivation of political actors can also vary: positive, where the actor seeks to make the best decision based

[1] Maciejewski, M., To do more, better, faster and more cheaply: using big data in public administration / M. Maciejewski // International Review of Administrative Sciences – 2017 – №83(1S) – P. 120–135.
[2] Ibid.
[3] Pencheva, I., Esteve, M., Mikhaylov, S. J. Big Data and AI – A transformational shift for government: So, what next for research? / I. Pencheva, M. Esteve, S. J. Mikhaylov // Public Policy and Administration, SAGE Publications. – 2018. – №35 (1). – P. 24-44.
[4] Maciejewski, M., To do more, better, faster and more cheaply: using big data in public administration. P. 120–135.

on real data; neutral, where the actor is unable to make a decision without the data; and negative, in cases where «big data» is used to justify decisions already made of the actor's own free will.

It is important to note the differences between «big data» research at the federal and regional levels. The federal level is characterized primarily by the implementation of the political process, while at the regional level we are talking about operational public administration: regional governments are focused on more "down-to-earth" aspects, such as regional infrastructure, housing and utilities, or the organization of education. In this case, «big data» will serve as a management tool rather than a way to implement the political process.

The vast majority of studies in their conclusions agree that there are many positive effects from the use of «big data» in the decision-making process: greater coverage of the studied audience and indicators; facilitation of methods for collecting the necessary information, economic benefits from the «big data» application. One can also note the agreement on a large number of potential threats, such as: confidentiality, lack of objectivity in the processing of data by analysts and further decision-making based on the data obtained (attempts to adapt the results of the data to “own interests”), as well as economic difficulties for the state when using «big data» (large financial burden on government institutions, bureaucracy at the stage of approving plans to introduce the use of «big data»). The main problem for analyzing the degree and level of influence of «big data» on the decision-making process in research is the lack of a unified methodology for measuring the influence of one variable on another: the impossibility of a unified method for assessing the interaction of analysts processing «big data» with decision makers makes it much more difficult to understand and comprehend these relationships. This can be explained by the "human factor", as both analysts and decision makers are, in one way or another, individuals who make decisions based on their empirical judgments, cultural code, and self-interest. Research, in turn, assesses the impact of «big data» on decision-making in different ways.

In addition, the study is based on an analytical distinction between digitalization and big data-governance. If in the first case we are talking about the automation of the control system and its integration with existing information systems, then in the second case we are talking about “changeable, diverse and constantly incoming”[5] data that allow for a comprehensive analysis in time and space. Big data-based governance is distinguished by such features as a focus on dynamic changes, the ability to take into account the spatial dimension and cross-sectoral interaction and represents a qualitative breakthrough in the provision of digital services to the population and business.

Furthermore, the study is based on an analytical distinction between digitalization and management based on «big data». While the former refers to the automation of the management system and its integration with existing information systems, the latter refers to changeable, diverse and continuously available data that allow for complex analysis in time and space. Management based on «big data» is characterized by a focus on dynamic changes, the ability to take into account the spatial dimension and cross-sectoral interaction, and represents a qualitative leap in the provision of digital services to people and businesses, as this technology is close to the use of artificial intelligence for decision-making.

Digitalization is defined in this study as a prior stage to big data-based governance, the main content of which is the need to convert analogue services into digital ones. This stage is dominated by "static" data from sample surveys, and the data itself tends to be structured by sector and/or region.[6] Digitalization is preceded by the automatization phase, which replaces manual processes with mechanical or electronic ones, improving efficiency and reducing manual errors. The introduction of software, machines and mechanisms at this stage enables the next stages: digitalization and data-based governance.

[5] Fadler M., Legner C. Toward big data and analytics governance: redefining structural governance mechanisms / M. Falder, C. Legner [Electronic resource] // Proceedings of the 54th Hawaii International Conference on System Sciences. – 2021. Access: https://scholarspace.manoa.hawaii.edu/items/c23878e3-463d-4eac-92da 64261e8766a4

[6] Shcherbak A.N., Shmeleva S.A. Regional business support programs in COVID-19 as an example of big data implementation in public administration // Issues of state and municipal administration. 2022. № 4. pp. 156-157.

For the purpose of this research, «big data» refers to structured or unstructured information resources of large volume, high collection rate and wide variety that require efficient forms of processing with specialized technologies for decision making.

Big data-based management focuses on utilizing virtually limitless amounts of data collected in real time, offering solutions that take into account the spatial and temporal variation of a facility. Although the adoption of big data-based management is gradual, old and new management approaches can coexist. This analytical distinction allows focusing on the qualitative change in the use of approaches. Thus, the transition to decisions made on the basis of «big data» is a kind of "leap" in public administration.

Digital transformation in this case is an integral part for the possibility of transition to management based on «big data». Digitization in public administration is generally understood as a way to increase the efficiency of existing public administration, digitize existing documents, facilitate the dissemination of information, and improve interaction with citizens. At the same time, the task is always to move to a new quality of management based on building processes for working with the data that governments face[7][8][9].

In the author's opinion, the transition from digitalization to management based on «big data» requires the fulfillment of several conditions. First, policy makers must be willing to use «big data» in governance. They should be willing to partner with technology companies and adopt «big data» practices in government. Second, governments must have large databases of accumulated data. As a rule, «big data» is initially collected by companies from the private sector (cellular communications, finance, social networks). Accordingly, governments should have access to them. Thirdly, IT specialists of the required level should work in the public

[7] Řepa, V., Digital Transformation of Public Administration / V. Řepa // Architecting the Digital Transformation. Intelligent Systems Reference Library. – 2020 – vol 188 – P. 99–117.
[8] Shmeleva S.A. The influence of big data on decision-making on business support measures during the Covid-19 pandemic: the case of St. Petersburg // Bulletin of Tomsk State University. 2022. No. 482. pp. 8-9.
[9] Shcherbak A.N., Shmeleva S.A. Op. cit. P.158.

sector. This condition assumes both the existence of competitive, as compared with private sector, salaries, and the recruitment base (for example, the presence of the best universities in computer science, a competitive labor market in the IT field). Fourthly, the relevant government structures should have a successful experience in implementing digital projects. In other words, the expertise gained at the stage of digitalization is also in demand during the transition to management based on «big data».[10]

These conditions reflect the **author's hypotheses** on what factors influence the successful implementation of «big data» in the decision-making process and the transition from digitalization to management based on «big data». Based on this difference between the two stages of the same process, the author is conducting a comparative analysis of «big data» use cases for working with entrepreneurs during the COVID-19 pandemic in several regions of Russia.

Contribution to the discussion of the problem

The scientific novelty of this study lies, first of all, in the proposal of an integrated analytical approach based on the political cycle model[11] and the theory of multiple flows[12], supplemented by the Van der Voort methodology[13]. This approach, which combines the models of the political cycle and multiple flows, makes it possible to take into account the actors and their models of behavior in the political process and explain the logic of transitions between the phases of the cycle.

In addition, the authors of the work see their contribution to this problematic field in clarifying the difference between approaches to digital and big data-based management and in explaining the transition from one to another. The practical relevance of the study lies in determining the "success" factors for the transition

[10] Ibid.
[11] Jann W., Wegrich K. Theories of the policy cycle / W. Jann, K. Wegrich // Handbook of public policy analysis: Routledge. - 2017. - P. 43-62.
[12] Béland D., Howlett M. The role and impact of the multiple-streams approach in comparative policy analysis D. Béland, M. Howlett // Journal of Comparative Policy Analysis: Research and Practice. – 2016. – 18. - №3. - P. 221-227.
[13] Van der Voort, H. G. et al. Rationality and politics of algorithms. Will the promise of big data survive the dynamics of public decision-making? / H. G. Van der Voort // Government Information Quarterly. – 2019. – №36 (1).

from digitalization to management based on «big data», which will allow adjusting the regional policy regarding the use of «big data» in public administration.

Literature review

In the scientific literature, «big data» has become a hot topic for research not only in applied and exact sciences, but also in the social ones and humanities, including political science. A quantitative analysis of recent academic literature shows an increased interest in understanding the concept of «big data» and the importance of their relationship with political processes. Since 2008, the number of papers on the topic of «big data» in politics and decision-making has increased to 2388 studies. Since 2011, there has been an annual increase in publications from general conceptual (theoretical approaches to understanding concepts (for example, the 7V theory for defining «big data»)) to more applied ones based on the analysis of real cases about the relationship between «big data» and the decision-making process.

Period 2012-2014 characterized to a greater extent by a theoretical approach to the study of «big data» and from the relationship with public administration: the study of the problems and prospects of «big data» in decision-making, the definition and potential of their development[14]. Publications of recent years (2017-2023), on the contrary, have a more pronounced specialization, rely on case analysis, applied research, and expansion of topics in various areas of the economy and business. In particular, the research is devoted to the use of «big data» in smart city management[15], the use of «big data» technologies in supply chain management[16], and mechanisms for combating DDoS attacks[17]. In recent years, a large number of

[14] Boyd, D., Crawford, K. Critical Questions for Big Data/ D. Boyd, K. Crawford // Information, Communication & Society. – 2012 – №15(5). – P. 662–679.
[15] Laney, D., 3D Data Management: Controlling Data Volume, Velocity and Variety / D. Laney // META Group Research Note –2001– №6. – P. 86-99.
[16] Hazen, B. T., Skipper, J. B., Boone, C. A. and Hill, R. R. Back in business: Operations research in support of big data analytics for operations and supply chain management / B. T. Hazen // Annals of Operations Research – 2018 – №270(1–2) – P. 201–211.
[17] Chaudhary, D., Bhushan, K., Gupta, B. B. Survey on DDoS Attacks and Defense Mechanisms in Cloud and Fog Computing / D. Chaudhary, K. Bhushan, B. B. Gupta // International Journal of E-Services and Mobile Applications (IJESMA) – 2018 – №10(3) – P. 61–83.

articles have appeared highlighting the possibilities of using «big data» to make better policy decisions[18].[19]

The discussion about «big data» in the public sector often focuses only on technical data and analytical results, with much less attention to their interaction with the decision-making process in public administrations. Transforming «big data» into insights is also no longer a politically neutral process: different stakeholders can use the insights from this «big data» in different ways, depending on broader strategic goals.

The number of domestic scientific literature is much lower: over the past 5 years, only 39 studies have appeared on topics of interest to us. Due to the small number of publications, it can be assumed that Russian science is less involved in understanding the problems, opportunities and threats of «big data» in the decision-making process. The main "concern" is questions about potential threats to the protection of confidentiality of information and questions of legislation[20], forecasting of crime in certain territories[21].

In addition, the research examines the evolution of the modern state in the context of the development of new digital technologies in conjunction with e-government[22], analysis of changes in socio-economic processes, data analysis methodologies by decision makers. In the past, there were difficulties in the analysis and application of data: official statistics were late, the amount of information grew exponentially, and it was not possible to cover everything with the help of

[18] Mian, A., Rosenthal, H., Introduction: Big data in political economy / A. Mian, H. Rosenthal // The Russell Sage Foundation Journal of the Social Science – 2016. – № 2(7). – P. 1-10.
Pencheva, I., et.al. Big Data and AI – A transformational shift for government: So, what next for research? P. 24-44.
Motupalli V. How Big Data is Changing Democracy / V. Motupalli // Journal of International Affairs – 2017. – №71(1). – P. 71-80.

[19] Shmeleva S.A. Big data in the process of political decision-making: from the analysis of theories to the evaluation of the effectiveness of practices // Bulletin of Perm University. Political science. 2023. No. 15(3). pp. 41.

[20] Savelyev A. Problems of application of legislation on personal data in the era of "Big Data" / A. Savelyev // Pravo. Journal of the Higher School of Economics – 2015 – No. 1 – pp. 43-66.

[21] Bulgakova E.V. The use of "big data" in the system of public administration: conditions, opportunities, prospects / E. V. Bulgakova // Legal science and practice: Bulletin of the Nizhny Novgorod Academy of the Ministry of Internal Affairs of Russia, Nizhny Novgorod Academy of the Ministry of Internal Affairs of the Russian Federation - 2015. – p. 10-14; Avdeeva I.A. Analysis of foreign experience in the use of global technologies "BigData" / I. A. Avdeeva // Bulletin of Eurasian Science – 2016. – №6 (37) – Pp. 1-11.

[22] Sidorova A. Electronic Government: increasing public Participation in Government / A. Sidorova // Public Administration. Electronic Bulletin – 2017 – No.62(3) – pp. 87-103.

observation in the required mode. Also, the low frequency of measurement of indicators and the lack of the possibility of verifying the data were present. With the advent of «big data», it became possible not to focus on official data collected by statistical services, not to wait for their results, but to process data online and use those indicators that the researcher needs[23]. However, all decisions made require legal regulation, the creation of a legal framework in order to avoid the risks of data circulation in public administration[24]. It should be noted that the focus of modern research conducted on the topic of «big data» and "public administration" has shifted to the plane of jurisprudence, practically without touching on the issues of understanding concepts, the formation of theoretical concepts or questions about the relationship of «big data» with public administration.

Research Question

The research question of the dissertation is: "How do infrastructural and political factors contribute to the transition from digitalization to the implementation of «big data» solutions in regional public administration in Russia?" This issue is considered on the example of supporting small and medium-sized businesses during the COVID-19 pandemic.

Aims and objectives

The **aim** of the study is to describe the process of transition from digitalization to implementation of solutions based on «big data» at the regional level of public administration in Russia on the example of measures supporting small and medium-sized businesses during the COVID-19 pandemic.

Objectives:

1) Defining the concept of «big data».

At the moment, «big data» is defined through seven parameters (the 7V[25] theory): variety, velocity, volume, value, veracity, variability and visualization.

[23] Polyakova A. et al. Network analysis of the organization of the socio-economic process / A. Polyakova // Journal of St. Petersburg State Polytechnic University. Economics – 2019 – No.12 (3) – pp. 60-73.
[24] Dvinskikh D.Y., Talapina E. Risks of the development of data turnover in public administration / D. Y. Dvinskikh, E. Talapina // Issues of state and municipal administration – 2019 – No.3 – pp. 7-30.
[25] Rijmenam, M., Why The 3V's Are Not Sufficient To Describe Big Data [Electronic resource] / M. Rijmenam // Datafloq. – 2013. – Access: https://datafloq.com/read/3vs-sufficient-describe-big-data/166.

Within the framework of this study, for the operationalization of the concept, it is proposed to understand «big data» as information resources of large volume, high speed and diversity, which require effective forms of processing for decision making[26].

2) Conducting a literature review in order to identify key areas of research on the selected topic in Russian and foreign literature, and the development stage of the research field.

3) Description of the theoretical approaches used to assess the impact of the use of «big data» on political decision-making: Van der Voort methodology, multiple flows theory, political cycle model.

4) Formation of one's own explanatory model, inclusion in the model of descriptions of key actors: "politicians" (give instructions on solving problems using big data), "entrepreneurs" (mid-level actors who have the competencies to use big data), "analysts" (ordinary employees, programmers, experts in the field of big data (IT).

5) Determining the analytical difference between digitalization and management based on «big data».

6) Description of the context of the COVID-19 pandemic through the prism of the theory of multiple flows.

7) Selection of cases for the implementation of digital services to help small and medium-sized businesses in a number of Russian regions: Moscow, Moscow region, Saint Petersburg, and the Novgorod region.

8) Data collection for empirical analysis.

9) Carrying out a comparative analysis of cases using the case study method.

10) A more detailed analysis of the case of implementing a QR code system for legal entities in St. Petersburg during the COVID-19 pandemic from April 2020 to November 2021.

[26] Kitchin, R., The real-time city? Big data and smart urbanism / R. Kitchin // GeoJournal – 2014 – №79(1) – P. 1–14.

11) Formulation of conclusions and recommendations for further research.

Methodology

To establish the reasons for the transition to the use of the «big data» at the regional level in Russia, we turn to the theory of multiple flows, developed for the analysis of political courses. D. Kingdon's theory of multiple flows was originally created for a deeper analysis of the first stage of the political cycle - setting the agenda (Kingdon, 1984).

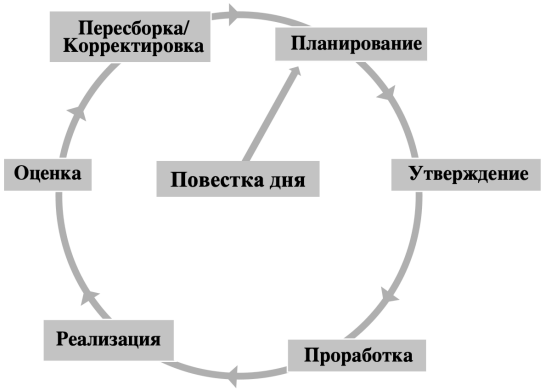
D. Kingdon distinguishes three independent streams: a stream of problems (problem stream), a stream of decisions (policy stream) and a policy stream (politics stream). The flow of problems includes the opinions of members of the public and political community about various kinds of problems and the need for state intervention to solve them. The decision flow contains recommendations from researchers, analysts and other members of the political community on how to solve existing problems. The flow of politics is the political and institutional context, which is characterized by national sentiment, election results, government reshuffles, and other factors. Under certain circumstances (focus events), these three streams merge and a “window of opportunity” (policy window) opens, during which political entrepreneurs (policy entrepreneurs) can initiate the inclusion of issues of interest to them and their preferred solutions to the agenda of the government[27]. The COVID-19 pandemic has turned out to be just such a “window of opportunity” for entrepreneurs in the use of «big data», including at the regional level.[28]

The term "policy entrepreneurs" is defined by D. Kingdon as "persons promoting certain proposals or ideas that should significantly change the current political course"[29], and M. Mintrom defines the same term as "politicians promoting political ideas"[30].

[27] Béland D., Howlett M. The role and impact of the multiple-streams approach in comparative policy analysis D. Béland, M. Howlett // Journal of Comparative Policy Analysis: Research and Practice. – 2016. – 18. - №3. - P. 221-227.
[28] Shmeleva S.A. The influence of big data on decision-making on business support measures during the Covid-19 pandemic: the case of St. Petersburg. P. 10
[29] K Kingdon, W. John. Agendas, Alternatives, and Public Policies / W. John Kingdon – Boston: Little Brown, 1984.
[30] Mintrom, M. Policy Entrepreneurs and the Diffusion of Innovation / M. Mintrom. // American Journal of Political Science. — 1997. — 41 — No 3, — P. 738-770.

The political cycle in various interpretations has from five to seven discrete stages: from agenda setting and policy development (policy) through decision making to its implementation and evaluation. As part of the assessment phase, a rebuild or adjustment of the decision made may be required, as a result of which a new cycle is started[31].[32]

Picture 1. Cycle of political decisions [33]



The political cycle model has its own criticism and is recognized as simplified: in reality, the decision-making process often does not correspond to a strict sequence of phases. Also, this model does not provide causal explanations for the transitions between stages and does not consider the participants of the process[34]. To eliminate these limitations, M. Howlett proposes to combine the political cycle model with the theory of multiple flows[35] in the following way.

After setting the agenda, the synergy of the three streams is complemented by the policy process stream, which indicates the transition to the next phase of the political process - the formulation of alternative solutions. Next, the policy flow (politics) is separated from the overall process and the decision phase occurs, where the decision flow (policy) plays the main role. In the implementation phase, on the

[31] Jann W., Wegrich K. Theories of the policy cycle / W. Jann, K. Wegrich // Handbook of public policy analysis: Routledge. - 2017. - P. 43-62.
[32] Shmeleva S.A. The influence of big data on decision-making on business support measures during the Covid-19 pandemic: the case of St. Petersburg. pp. 9-10.
[33] Béland D., Howlett M. The role and impact of the multiple-streams approach in comparative policy analysis D. Béland, M. Howlett // Journal of Comparative Policy Analysis: Research and Practice. – 2016. – 18. - №3. - P. 221-227.
[34] Hofmann E. T. et al. Policy streams and immigration to Russia: Competing and complementary interests at the federal and local levels / E. T. Hofmann et al. // International Migration. - 2016.
[35] Howlett M., McConnell A., Perl A. Moving policy theory forward: connecting multiple stream and advocacy coalition frameworks to policy cycle models of analysis / M. Howlett, A. McConnel, A. Perl // Australian Journal of Public Administration. - 2017. - 76. - № 1. - P. 65-79.

contrary, the decision stream is separated, and the policy stream enters, supplemented by a new program stream, which most closely links the problem and solution. Finally, in the evaluation phase, all threads are rejoined again[36]. [37]

As a result of the analysis of approaches to the definition of «big data», we propose a model for the difference between digitalization and management based on «big data», presented in *Table 1*. [38]

Table 1. Comparison of digitalization and management based on big data.[39]

Criteria	Digitalization	Big Data-based management
Data Volume	Limited selective data	Data close to general population
Type of Data Collection	• Analogue and digital methods • Recurrent sample surveys	• Only digital method • In real time
Working with Data	• Converting analog data and services to digital services • Increasing openness and accessibility of public services, including in terms of speed and user friendliness	• Providing only digital services • Growth of information about the control object • Usage in making more accurate decisions, taking into account temporal and spatial dynamics
Data Characteristics	Structured static data, only on the necessary industries, territories	Unstructured complex data

In addition, based on the synthesis of multiple flow theories and the political cycle model, as well as taking into account the analytical approach to distinguishing between digitalization and big data-based solutions and applying the Wurth methodology, we include the following actors in our own explanatory model for the successful use of «big data» in public administration[40]:

• "politicians" that provide guidance on how to solve problems through the use of «big data». As a rule, they determine the contours and directions for solving all social problems. It is they who express the "desire" to use «big data» in management. Examples of these actors are governors of subjects, mayors of cities,

[36] Kingdon, W. John. Alternatives, and Public Policies / W. John Kingdon – Boston: Little Brown, 1984.
[37] Shmeleva S.A. The influence of big data on decision-making on business support measures during the Covid-19 pandemic: the case of St. Petersburg. P. 10
[38] Ibid.
[39] Ibid.
[40] Shcherbak A.N., Shmeleva S.A. Op.cit. P.160.

heads of committees and ministries, as well as other representatives of public authorities;

• “entrepreneurs”, i.e. middle-level actors who have the competence to use «big data»: leaders and managers in organizations and structures responsible for the implementation of «big data» in public administration. "Entrepreneurs" prepare in advance technological solutions for a large number of social problems: organize the collection, storage and processing of data, develop information and analytical systems used in public administration. For example, "entrepreneurs" are top managers and heads of IT companies, heads of technology companies and departments;

• "analysts" - ordinary employees, programmers, experts in the field of «big data» (IT), working in structures and organizations created by politicians.[41]

Therefore, in the theoretical model under consideration, "politicians" are the party that initiates and decides on the changes to be introduced. The whole process is carried out according to their instructions. The role of "politicians" can be played by officials who have sufficient power to make decisions. Business representatives can be "entrepreneurs", who can also be considered as beneficiaries.

This model is used to assess measures to support small and medium-sized businesses in the regions of the Russian Federation.

The model assumes the presence of two modes: "calm" and "shock". In a calm mode, “politicians” have the opportunity to invest in the development of the «big data» infrastructure, create structures and organizations that accumulate competencies in this area. In these organizations, "entrepreneurs" appear who follow the instructions of "politicians". The staff of "analysts" is growing, the technological infrastructure is developing. In the shock mode, “politicians” urgently need solutions to emerging problems, including those based on the «big data». Then the "entrepreneurs" get the opportunity to present their achievements and competencies.[42]

[41] Ibid.
[42] Ibid.

The COVID-19 pandemic has become a “shock” situation, when politicians urgently needed the competencies of “entrepreneurs” to fight the disease. Entrepreneurs have taken advantage of the “window of opportunity” and proposed various types of digital solutions, from real-time disease monitoring and the creation of specialized applications to the mass adoption of QR codes and covid passports[43].[44]

The success of the implementation of big data-based solutions is highly dependent on the potential accumulated in the quiet mode. Analytically descending to the regional level, the model becomes somewhat more complex, taking into account regional variation and relations between the center and regions. Obviously, the degree of centralization in the state will have a rather strong influence on the incentives and capabilities of regional governments in the development of the «big data».[45]

The hypothesis of the thesis author is as follows. After the COVID-19 pandemic became a window of opportunity for "entrepreneurs" in the field of offering «big data» solutions, these solutions began to appear only in those regions where there was already sufficient potential developed in the "quiet" mode. The regions that were able to offer «big data» solutions were characterized by the following characteristics: high income, developed technological infrastructure, availability of a large number of IT specialists, successful experience in implementing digital projects, as well as the presence of political actors responsible for deciding on the implementation of big data-based systems and willing to implement these solutions. The other regions were only able to offer simple digital solutions, largely imposed by the Center.[46]

It is also important to note that almost all federal agencies often do not have information systems with API service (an interface that allows data processing and integration between different systems), which creates the impossibility of quick

[43] Pertseva E. I. To drive into the injection: vaccination from COVID-19 was proposed to be mandatory for everyone" [Electronic resource] / E. I. Pertseva // News. – 2021. (In Russian) Access mode: https://iz.ru/1241174/evgeniia-pertceva/zagnat-v-ukol-vaktcinatciiu-ot-covid-19-predlozhili-sdelat-obiazatelnoi-dlia-vsekh.
[44] Shcherbak A.N., Shmeleva S.A. Op.cit. P.161.
[45] Ibid.
[46] Ibid.

interactions with each other and an excess of different information systems, which often duplicate each other in terms of data.

Methods and data respondents selection criteria

The data collection method is conducting **expert interviews** of persons implementing the selected projects in the regions, **studying open data** and testing the publicly available functionality of the personal account of a legal entity. The respondents were persons directly involved in the implementation of information systems (heads of executive authorities and subordinate institutions). The selection of respondents was formed by the snowball method, as the respondents belong to a rather closed social group of representatives of public authorities. The questions covered the history of project implementation, the model of system construction, functionality and its development. In order to protect confidentiality, the list of respondents is given in an anonymized format, interview data were recorded only in the format of written notes, and the interview process was organized both in the format of personal conversation offline (6 respondents - from Moscow, Moscow region and St. Petersburg) and online by video call (2 respondents - from Novgorod region). A total of 8 interviews were conducted: 2 representatives of public authorities from each region, who had direct experience of working on the digital service projects considered in the paper.

The method of analyzing the results of the obtained data is case study. The comparison was made taking into account the following parameters identified as possible factors of (non)success of «big data» implementation in the considered projects:

1) infrastructural factors, including a) availability of previous experience in implementing «big data» solutions and projects; b) availability of financial and economic resources for implementing «big data» solutions;

2) political factors: c) availability of a "window of opportunity" for the implementation of such solutions and projects; d) political will - the desire of political actors to implement new solutions in situations that do not yet or already require urgent implementation of these solutions.

To analyze the case of implementing a QR code system for legal entities in St. Petersburg during the COVID-19 pandemic from April 2020 to November 2021, the **participant observation** method was used. This method implied participation in monthly meetings to develop measures to support enterprises in the period April-October 2020, held within the framework of the working groups of the Operational Headquarters for the Prevention and Control of the Spread of Coronavirus Infection in St. Petersburg, as well as the study of documents - decrees of the Government of St. Petersburg, internal reporting documents and official websites from April 2020 to November 2021.

Summary of findings and statements to be defended

The theoretical model proposed by the author of this study, based on the combination of the theory of multiple flows and the model of the political cycle, with the inclusion of the actors "politicians", "analysts" and "entrepreneurs", allows us to take into account the peculiarities of delegation of authority from the Center to the regions in the Russian Federation. In addition, the author's approach to the distinction between the phenomena of digitalization and governance based on «big data» makes it possible to analyze both the stages of development of the studied regions in the sphere of digital services and the factors contributing to the transition to state governance based on «big data».

The author's theoretical approach based on the synthesis of the theories of multiple flows, political cycle and inverted Ackoff pyramid, which takes into account the distinction between the stages of digitalization and management decisions based on «big data», allows not only to determine the stage of development of digital technologies in the studied regions, but also to identify the reasons for the success or failure of the transition to the stage of public administration based on «big data». The actors ("politicians", "entrepreneurs" and "analysts") added by the author to the theoretical model have shown themselves to be important participants in the political process, influencing the possibility and speed of implementing «big data» in management processes in the sphere of work with legal entities at the regional level.

The COVID-19 pandemic showed that not all regions had sufficient capacity to capitalize on the window of opportunity opened by the quarantine and other restrictive measures imposed during the pandemic. As quarantine was a stressful situation not only for ordinary citizens, but also for businesses and public authorities, the opportunity and often the need to accelerate the development of digital services was created. That is why the COVID-19 pandemic period turned out to be an important aspect of analyzing the process of implementing «big data» into the processes of public administration.

The reviewed cases of Moscow, Moscow region, St. Petersburg and Novgorod region show that the transition to «big data» management in the sphere of business support was fully realized only in the case of Moscow, because all the necessary conditions for this were created there: the region not only possesses the necessary economic resources, but also politicians focused on the implementation of innovative digital solutions. Regions that do not have the financial prerequisites for implementing «big data», of which there are more in Russia, also do not show political will to develop their own solutions, focusing only on the use of federal projects and acting as their operators, and thus did not use the "window of opportunity" during the COVID-19 pandemic.

However, it is important to study the experience of other regions that use the systems developed by the federal center in order to identify the factors and distinctive features of the regions that hinder the implementation of big data-based management. For example, the case of St. Petersburg showed that despite the prevalence of solutions related to digitalization, this region has the ability to consolidate digital solutions introduced during the pandemic period, which will potentially allow the region to successfully transition to the stage of «big data» governance.

It can also be argued that the COVID-19 pandemic showed how things are with the implementation of «big data» solutions at the regional level. A certain digital divide was demonstrated - a situation where only regions with sufficient funding, the ability to invest in advance in digital infrastructure development,

training and original management solutions can implement original solutions. During the pandemic period, as the period of the opened "window of opportunity", it was in such regions that "entrepreneurs" had the opportunity to offer "politicians" solutions that utilize «big data», and the availability of the necessary resources formed the interest of "politicians" in the development of «big data» in public administration.[47] However, such regions are few and mostly dominated by non-wealthy regions that prefer to use federal systems, as the resources to develop their own are insufficient. The alternative to the use of big data-based policies turns out to be simple digitalization, by which we mean either imitation solutions, or blind copying of technological solutions offered by the federal Center, or simpler solutions developed in the regions that do not yet meet the attributes of big data-based solutions. [48]

At the moment, the development of big data-based management is seen in combining the skills of private sector IT specialists and the capabilities of government agencies. This problem seems to be especially acute in the conditions of sanctions against technological equipment, statements about the withdrawal of global technology companies from the Russian market and relocation of some IT specialists. From the point of view of the theory proposed by the authors, the current situation has the potential to become another "window of opportunity", but it is too early to draw conclusions as to whether Russian public administration will be able to use this opportunity.

Scope and limitations of research

The application of the model proposed in this study can only be generalized to other states in a limited way. Since Russia has a specific process of delegation of powers from the Center to the regions, this model may not be correctly applicable to federal states with a more delimited system of jurisdiction between the Center and territorial units. However, this model can be used in a limited way for states with a form of federalism different from Russia, since the COVID-19 pandemic has been

[47] Shcherbak A.N., Shmeleva S.A. Op.cit. P.170.
[48] Ibid.

widespread in many countries and, as a stressful situation, is a window of opportunity.

Approbation of the thesis.

The report "Factors of Big Data implementation in the decision-making process in public administration: on the example of regional business support programs in the COVID-19 pandemic", reflecting the results of the study, was presented at the XXIV Yasinskaya (April) International Scientific Conference (April 4-14, 2023, Moscow, Russia).

The key results of the proposed dissertation research were published in the leading international peer-reviewed scientific journals, including those recommended by the National Research University «Higher School of Economics»:

1. Shcherbak A.N., Shmeleva S.A. Regional business support programs in COVID-19 as an example of big data implementation in public administration // Issues of state and municipal administration. 2022. № 4. (In Russian) C. 154-175. DOI: 10.17323/1999-5431-2022-0-4-154-175.
2. Shmeleva S.A. The influence of big data on decision-making on business support measures during the Covid-19 pandemic: the case of St. Petersburg // Bulletin of Tomsk State University. 2022. No. 482. pp. 5-17. (In Russian) DOI: 10.17223/15617793/482/1.
3. Shmeleva S.A. Big data in the process of political decision-making: from the analysis of theories to the evaluation of the effectiveness of practices // Bulletin of Perm University. Political science. 2023. No. 15(3). pp. 40-51. (In Russian) DOI: 10.17072/2218-1067-2021-3-40-51.

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