Analysis of Digital Transformation Programs in Regional and Municipal Economic Systems of the Russian Federation

Andrey Vershitsky[1][1], Anastasia Samokhina[2][2], Andrey Pereladov[2][3]
[1]*PhD in Economics, Assosiate professor, Department of State and Municipal Management, V.I. Vernadsky Crimean Federal University, Russian Federation*
[2]*Postgraduate student of the Department of State and Municipal Management, V.I. Vernadsky Crimean Federal University, Simferopol, Russian Federation*
vershitsky@gmail.com, samokhina.ae@yandex.ru, pereladovad@list.ru

Keywords: Digital transformation, Digitalization of regional systems, Municipal economic systems, Digital Economy.

Annotation: In the modern world, digital technologies (DT) are one of the key factors in the development of the state's economy. The process of digital transformation of the Russian Federation, due to a large number of specific factors, cannot occur alone in all regions and levels of government, and therefore, differentiation of regional economic systems can be observed. For this reason, digital transformation is currently one of the priorities of the state's development. The authors attempted to form a general picture of the implementation of digital transformation by combining its private elements into a single whole. The relevance of this analysis lies in the need for a comprehensive understanding of the effectiveness of the introduction of information technologies in public administration, as well as the degree of influence of the digitalization process on the level of development of a state / region / city. The article considers the main indicators characterizing the effectiveness of digital transformation at various levels, namely international, regional and municipal. The authors also compiled a brief description of all the elements of the national project "Digital Economy", analyzed their actual implementation at various levels and identified a number of problems hindering the more effective implementation of digital technologies.

1 INTRODUCTION

One of the most important factors of the competitiveness of the state and the effectiveness of its external and internal activities is the digital strategy of the state and support for strategic planning at all levels of government.

The development of digital technologies has a key impact not only on the economy of the region, therefore, on the economy of the whole country, but also on the development of society as a whole. Such dependence consists, first of all, in attracting investments to the region (municipality), introducing the latest technologies into production and management, creating new high-tech jobs, etc.

In the Russian Federation, the issues of digital transformation began to be studied in the early 2000s. An example of this is the research of Yu.E. Khokhlov in 2006, in which the researcher established an index of readiness of Russian regions for the information society, and also ranked regions based on development factors and the degree of use of information and communication technologies (Khokhlov, 2006). From the research conducted in 2006, it can be seen that the leaders in all three indices under consideration were Moscow, St. Petersburg, Khanty-Mansiysk Autonomous Okrug, Yamalo-Nenets Autonomous Okrug, Tomsk Region and a number of others. At the moment, only Moscow and St. Petersburg have retained their leading positions (according to the digital maturity index), the other regions are not ranked among the leaders, but they retain quite positive indicators.

Among the latest scientific research in the field under consideration , research can be distinguished:

[1] https://orcid.org/0000-0001-6271-0321
[2] https://orcid.org/0009-0008-4390-7389
[3] https://orcid.org/0009-0006-3367-9197

- D'ortona C., Tarchi D., Raffaelli C., who in their work studied aspects of regions social development through the use of municipal digital technologies "Smart City" (D'ortona, 2022);

- Ganchenko D.N. in her research determined the vectors of development of cluster technologies through the integration of the digital economy into them and its transformation (Ganchenko, 2021);

- V.I. Abramov and V.D. Andreev conducted a number of studies over the past 2 years, in which the current indices of digital maturity of regions were analyzed, taking into account the development of regional digital transformation strategies, the processes of digitalization of various spheres of life in the aspect of creating and transforming goods through digital systems, and the impact on the economic and social development of regions (Abramov, 2022);

- Y.S. Pinkovetskaya conducted an economic and empirical modeling, based on empirical data from 2020, on the use of information technologies in the regions of Russia by analyzing the share of organizations implementing digital technologies in their activities. According to the results of the study, a rating was compiled by regions of Russia. The leaders were such regions as Nizhny Novgorod, Tambov, Chelyabinsk, Vladimir, Lipetsk and a number of others. The outsider regions were the Volgograd Region, the Chechen Republic, the Republic of Crimea, Karachay-Cherkess Republic, Ulyanovsk region, etc. (Pinkovetskaya, 2022);

- M. J. Ahn and Y.-K. Chen provided the influence of civil servants, their attitudes and behavior in the digital space on the introduction of digital technologies in public administration. According to the results of the study, the relationship between the perception of civil servants on the formation of readiness to use digital technologies and artificial intelligence technologies in government was analyzed. It was also established the need in training civil servants in artificial intelligence technologies and improve their digital literacy. (Ahn, 2021);

- a special place in modern research of digital technologies in public administration is belong to state digital platforms. Thus, in his research, E.M. Styrin established the importance and necessity of developing digital platforms of state and municipal administration as the basis for an effective mechanism of interaction between the state and society by strengthening the network interaction of the state, companies and citizens (Styrin, 2020);

- another important research conducted is the introduction of digital technologies "Smart City" in the municipal administration of A. Vershitsky. The study deals with a SWOT analysis of the concept of a smart city in the Russian Federation, identified problems and proposed prospects for the development of such digital technologies in municipal management (Vershitsky, 2021).

At the moment, the national program "Digital Economy" refuse to an important place in the list of regulatory and legal documents in the field of information technologies of the Russian Federation.

To analyze and monitor the development of digital transformation of regions and municipalities of the Russian Federation, a quite large list of indicators and ratings is used, for example, the digital Russia index; the rating of digital development of subjects of the Russian Federation; the index of digital life of the region; the index of digital activity of the population; the digital profile of the region; the index of digitalization of interaction between citizens and the state; the rating of the use of e-government technologies in the executive authorities of the subjects of the Russian Federation; rating of heads of digital transformation of federal executive authorities and regions; IQ index of cities; rating of digital transformation of the region and many others.

In general, the formation of the digital space in the public administration of the Russian Federation can be represented in the form of three stages, namely: automation (i.e. transformation of repetitive processes using IT technologies); digitalization (includes improvement of previously developed processes using IT technologies, analysis of a large amount of data, process reengineering, etc.); digital transformation (the main essence lies in the combination of technological capabilities and the traditional sphere of activity of the state / organization, and the emergence of qualitatively new products / processes).

The President of the Russian Federation has fixed 5 key national development goals of the state for the period up to 2030 (Decree of the President of the Russian Federation No. 474 of 21.07.2020) (Fig. 1.), one of which is the digital transformation of the state. In accordance with it, it is necessary to analyze the effectiveness of achieving the set goals in the digital transformation of regions and municipalities, as well as to identify problem points of the most effective implementation of the national program and achievement of the set goals.

The purpose of this work is to examining the effectiveness of the executed programs of digital transformation of the Russian Federation at the levels of regions and municipalities in modern conditions. The study was based on the ratings of regional digital transformation and IQ-city indices for the last 3 years

of program implementation. The projects implemented within the framework of the Digital Economy program, the effectiveness and problems of their implementation were also analyzed.

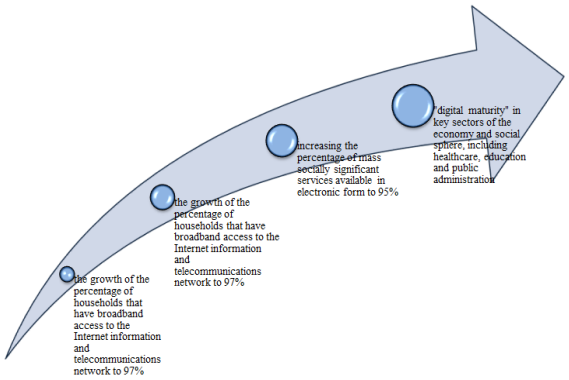

Figure 1: Targets of the Digital Transformation program of the National Development Goal by 2030.

2 RESULTS

One of the key ratings in the field of digitalization at the country level is the annual IMD rating "World Ranking of Digital Competitiveness".

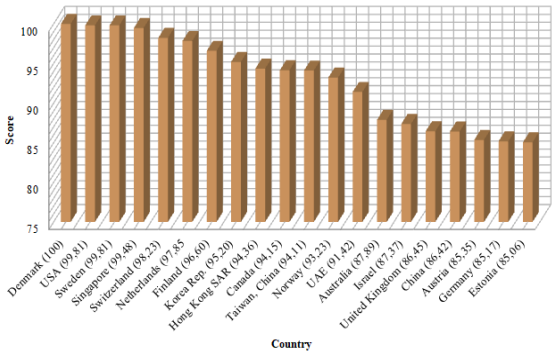

Figure 2: TOP 20 in the IMD World Digital Competitiveness Ranking 2022.

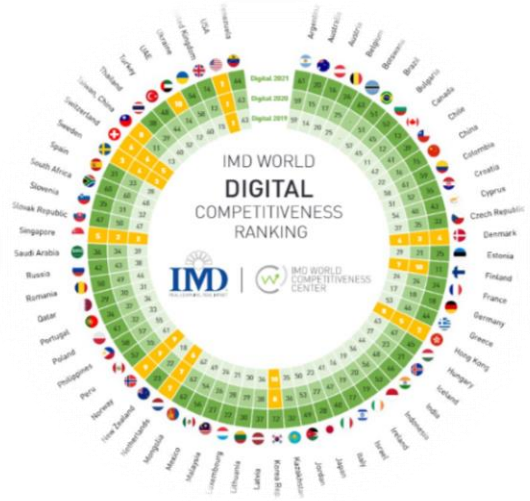

Figure 3: Dynamics of changes in country indices in the IMD World Digital Competitiveness Ranking for 2019-2021.

Table 1: Dynamics of changes in IMD indicators "World Ranking of Digital Competitiveness" 2019-2022.

Country	2019	Ranking Change (2019 to 2020)	2020	Ranking Change (2020 to 2021)	2021	Ranking Change (2021 to 2022)	2022	Score 2022
Denmark	4	+1	3	-1	4	+3	1	100.00
USA	1	0	1	0	1	-1	2	99.81
Sweden	3	-1	4	+1	3	0	3	99.81
Singapore	2	0	2	-3	5	+1	4	99.48
Switzerland	5	-1	6	0	6	+1	5	98.23
Netherlands	6	-1	7	0	7	+1	6	97.85
Finland	7	-3	10	-1	11	+4	7	96.60
Korea Rep.	10	2	8	-4	12	+4	8	95.20
Hong Kong SAR	8	+3	5	+3	2	-7	9	94.36
Canada	11	-1	12	-1	13	+3	10	94.15
Taiwan, China	13	+2	11	+3	8	-3	11	94.11
Norway	9	0	9	0	9	-3	12	93.23
UAE	12	-2	14	+4	10	-3	13	91.42

Australia	14	-1	15	-5	20	+6	14	87.89
Israel	16	-3	19	2	17	+2	15	87.37
United Kingdom	15	+2	13	-1	14	-2	16	86.45
China	22	+6	16	+1	15	-2	17	86.42
Austria	20	+3	17	+1	16	-2	18	85.35
Germany	17	-1	18	0	18	-2	19	85.17
Estonia	29	+8	21	-4	25	+5	20	85.06
Russia	38	-5	43	+1	42	-	-	-

At the regional level, one of the main ratings compiled by the Ministry of Digital Development, Communications and Mass Media is the rating of leaders of digital transformation in the Russian Federation. Today, this indicator is considered as popular and resulted as the digital maturity index.

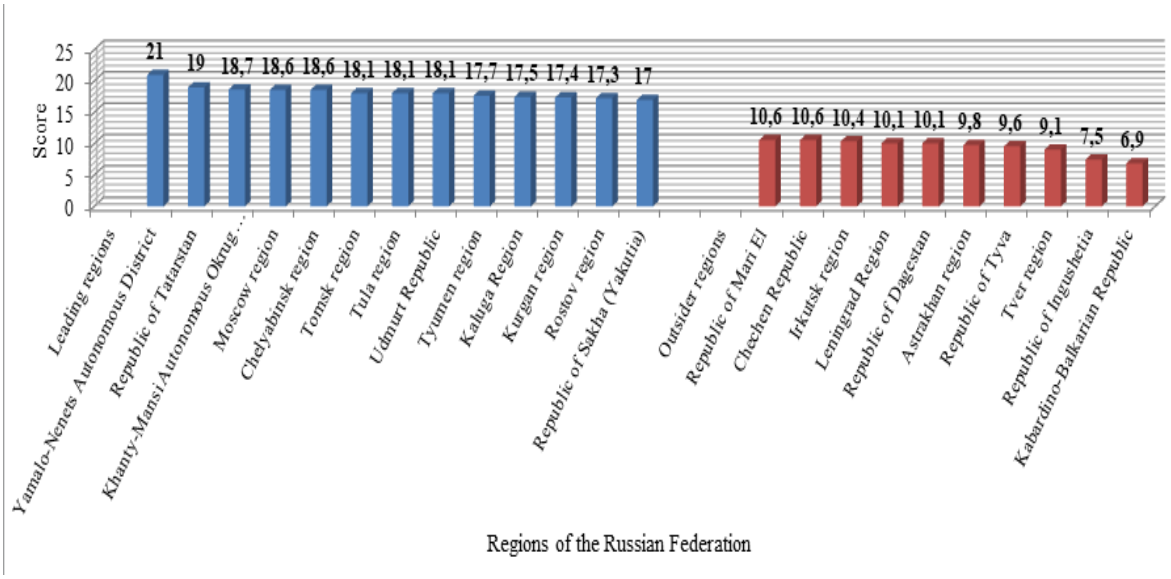

Figure 4: Rating of the leaders of the digital transformation of the regions of the Russian Federation in 2022.

At the municipal level, in the Russian Federation, the most indicative index is the IQ index of the city. In calculating this index, a significant number of indicators of various spheres of municipal activity are used, and municipalities are divided into 4 categories depending on their size.

Table 2: Dynamics of changes in the IQ index of cities of the Russian Federation for 2020-2022.

№	Municipalities	IQ 2020	Ranking Change (2020 to 2021)	IQ 2021	Ranking Change (2021 to 2022)	IQ 2022
Largest city						
1	Moscow	103,25	+13,91	117,16	+2,84	120
2	Saint-Petersburg	55,81	+42,32	98,13	-9,7	88,43
3	Kazan	60,93	+24,07	85	+3,33	88,33
4	Ufa	55,99	+30,71	86,7	-6,93	79,77
5	Krasnoyarsk	40,84	+35,13	75,97	-0,75	75,22
6	Nizhniy Novgorod	51,09	+37,17	88,26	-15,04	73,22

7	Perm	50,25	+17,46	67,71	-2,95	64,76
8	Novosibirsk	49,32	-14,67	34,65	+27,11	61,76
9	Ekaterinburg	56,55	+3,67	60,22	+0,25	60,47
10	Samara	49,98	+7,33	57,31	+2,14	59,45
Major cities						
1	Sochi	36	+13,65	49,65	+65,55	115,2
2	Tyumen	67,01	+33,74	100,75	+9,97	110,72
3	Smolensk	35,77	+9,12	44,89	+61,53	106,42
4	Belgorod	75,75	+0,18	75,93	+12,35	88,28
5	Kaliningrad	50,71	-0,05	50,66	+35,91	86,57
6	Saransk	46,85	+5,9	52,75	+32,96	85,71
7	Sterlitamak	41,5	+21,25	62,75	+15,1	77,85
8	Lipetsk	43,35	+17,98	61,33	+10,55	71,88
9	Vladivostok	35,95	+22,33	58,28	+12,22	70,5
10	Kurgan	31,13	+13,92	45,05	+24,68	69,73
22	Simferopol	33,49	-10,81	22,68	+34,8	57,48
30	Sevastopol	38,3	+21,04	59,34	-5,3	54,04
Big cities						
1	Reutov	68,92	+16,77	85,69	+32,88	118,57
2	Domodedovo	72,74	-7,86	64,88	+43,09	107,97
3	Ussuriysk	22,48	+53,2	75,68	+9,56	85,24
4	Berdsk	39,72	-6,06	33,66	+51,57	85,23
5	Artemovsky city district	39,75	+8,84	48,59	+35,21	83,8
6	Khanty-Mansiysk	62,29	+29,56	91,85	-9,71	82,14
7	Pushkino	57,08	+1,42	58,5	+21,26	79,76
8	Blagoveshchensk	42,12	+10,41	52,53	+25,59	78,12
9	Stary Oskol	43,97	+12,56	56,53	+21,32	77,85
10	Ramenskoe	51,35	+28,38	79,73	-4,02	75,71
50	Kerch	31,99	+1,99	33,98	+24,83	58,81
88	Evpatoria	37,88	+9,43	47,31	-5,41	41,9
Administrative centers						
1	Yalta	33,53	+34,47	68	+27,67	95,67
2	Gorno-Altaysk	48,57	+7,15	55,72	+39,75	95,47
3	Yelabuga	43	+17,95	60,95	+21,91	82,86
4	Ivanteevka	64,46	+4,75	69,21	+7,93	77,14
5	Lysva	33,3	+12,68	45,98	+30,44	76,42

6	Koltsovo urban settlement	58,69	+13,03	71,72	+4,41	76,13
7	Solikamsk	46,64	+11,72	58,36	+14,49	72,85
8	Tchaikovsky	44	+5,32	49,32	+21,39	70,71
9	Sarov	42,18	+45,52	87,7	-19,13	68,57
10	Snezhinsk	25,07	+35,59	60,66	+7,67	68,33

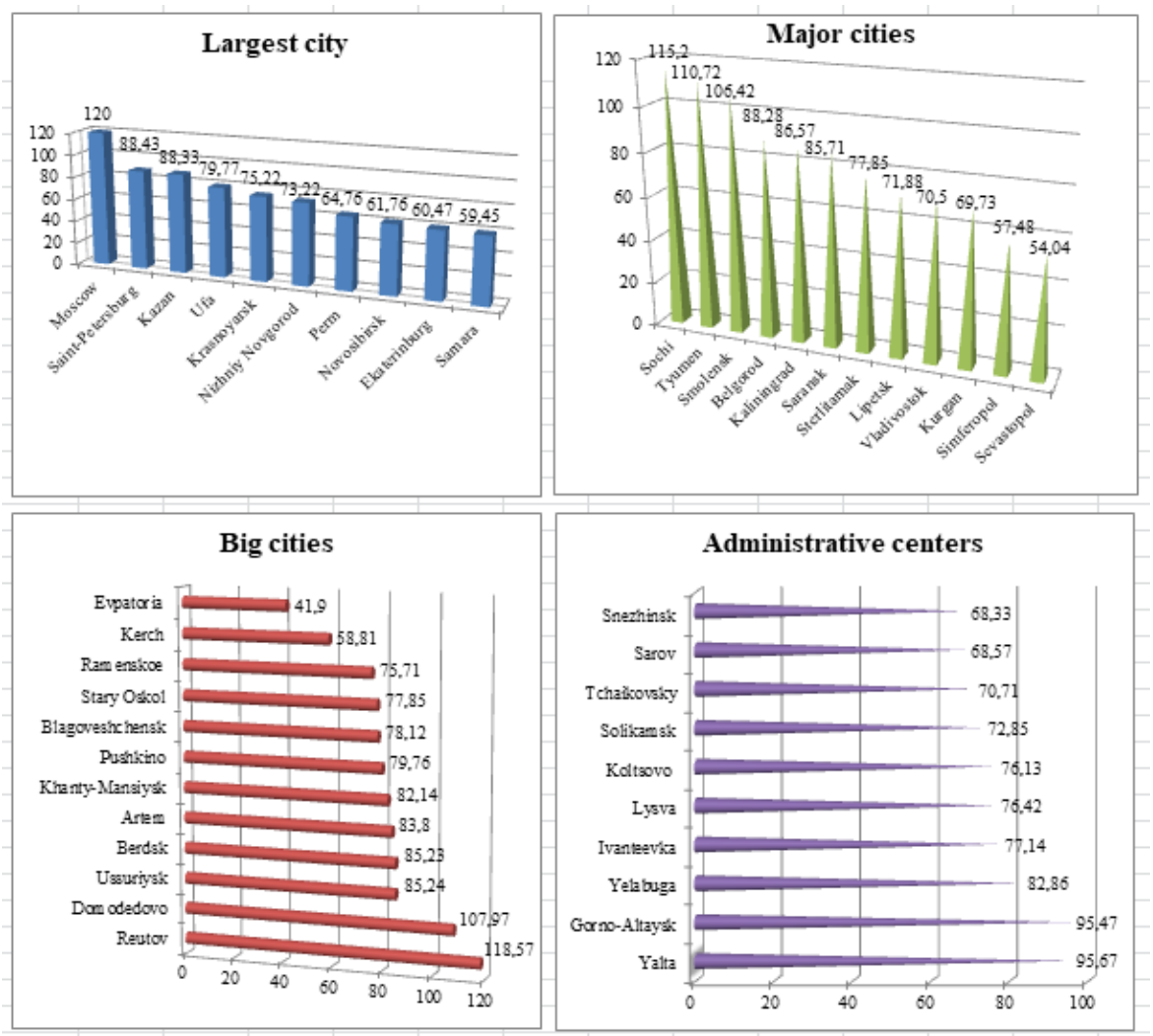

Figure 5: Ratings of leading cities in digital development in 2022.

Due to the fact that one of the main projects in the field of digital transformation in the Russian Federation is the "Digital Economy", it appears appropriate to study its main elements.

Table 3: Brief description of the programs implemented within the framework of the national project in the regions of the Russian Federation "Digital Economy".

Name of the program	The main task	Supervising state body	Financing for the project implementation period (million rubles)
"Regulatory regulation of the digital environment"	Development and improvement of the regulatory framework in order to overcome barriers to the development of the digital economy of the Russian Federation	Ministry of Economic Development of the Russian Federation	1 696,70
"Personnel for the digital economy"	Training of IT specialists. Attracting applicants to universities in the field of information technology and ensuring the availability of training	Ministry of Digital Development, Communications and Mass Communications of the Russian Federation	138 689,01
"Information infrastructure"	Creation of a stable, competitive and secure infrastructure for the availability of high-speed data transmission to citizens, businesses and authorities. Full-scale connection to the Internet, improvement of the quality of digital services	Ministry of Digital Development, Communications and Mass Communications of the Russian Federation	768 500,51
"Information security"	Increasing the level of development of information security technologies throughout the country, reducing the level of cybercrime, reducing the backlog of the Russian Federation in the development and use of domestic software	Ministry of Digital Development, Communications and Mass Communications of the Russian Federation	30 753,69
"Digital technologies"	Creating favorable conditions for the development of startups in the field of information technology, supporting domestic IT market leaders and stimulating demand for their developments, developing promising high–tech areas (for example, quantum communications, quantum computing, fifth-generation mobile communication networks (5G)	Ministry of Digital Development, Communications and Mass Communications of the Russian Federation	451 808,89
"Digital Public Administration"	Transformation of the public administration system by increasing the share of mass socially significant services that are available electronically to 95%	Ministry of Digital Development, Communications and Mass Communications of the Russian Federation	235 697,67
"Artificial intelligence"	Development of domestic artificial intelligence technologies and creation of conditions for their preferential use by citizens and enterprises	Ministry of Economic Development of the Russian Federation	36 313,00
"Providing Internet access through the development of satellite communications"	To provide citizens with the opportunity to use modern telecommunications services, including in remote and hard-to-reach areas where the construction of fiber-optic communication lines is highly expensive or impossible. Creation of satellite communication systems "Express" in geostationary orbit and "Express-RV" in highly elliptical orbits	Ministry of Digital Development, Communications and Mass Communications of the Russian Federation	63 856,03
"Development of human resources in the IT industry"	Formation of the necessary competencies among the young population (starting from high school) and minimize the gap between the level of candidates in the IT field and the requirements of employers	Ministry of Digital Development, Communications and Mass Communications of the Russian Federation	69 522,24

All programs implemented within the framework of the national project "Digital Economy" include not only realisation at the federal and regional levels of government, but also at the municipal level. However, approaches to the organization and implementation of planned activities to achieve the set results need to be changed in accordance with the level of management. Thus, when implementing programs at the municipal level, it is necessary to take into account the peculiarities of this level of organization and management. Therefore, it is necessary to study and determine not only the achievement of the indicators in the programs, but also to identify the actual state of project implementation in local self-government bodies.

Table 4: Implementation of the national project "Digital Economy" programs in the municipal administration of the Russian Federation.

Name of the program	Implementation of the tasks set at the regional and municipal levels	The actual state of the project implementation for local self-government bodies (LSGB)
"Regulatory regulation of the digital environment"	At the moment, about 26 federal laws and 8 resolutions have been adopted that consolidate and regulate the use of digital technologies in state and municipal administration	The regulatory legal acts do not disclose the specifics of the digital transformation of local self-government bodies (LSGB)
"Personnel for the digital economy"	Within the framework of the program, about 150 grants were provided to support supplementary education of children, the development of various training programs in priority areas; monitoring the quality of educational programs for students in the field of information technology; creation of experimental platforms for the development and dissemination of experience in the field of digital skills formation, etc.	The training programs are conducted taking into account general recommendations and elements of digital transformation, but the specifics LSGB are not taken into account
"Information infrastructure"	Not less than 50 tasks that relate to the field of activity LSGB are being implemented. These tasks include: a standardized digital platform Housing and communal services; development of the base and formation of the ecosystem of the digital project "Smart City"; development and implementation of a control system for the provision of communication services for socially significant objects	LSGB does not have the opportunity to make changes and finalize elements of the project, both free of charge and subject to co-financing
"Information security"	Information security tools and mechanisms are being developed and improved, the development of domestic Internet technology systems by technology, analysis and monitoring of existing information security tools	Nearly 10 educational programs have been developed in 4 areas in the field of information security, 10 training courses, and about 100 educational events have been held. All provisions and requirements within the framework of the NP are subject to mandatory implementation by LSGB
"Digital technologies"	More 75 thousand socially significant organizations received broadband access to the information and tele-communication network "Internet", about 14 thousand settlements provided universal communication services	The main obstacle to the effective implementation of the program is the lag in the resource provision of LSGB from the development of information and communication technologies
"Digital Public Administration"	Programs that solve the problems of citizens' interaction with municipal and regional authorities, the provision of municipal services through a "single window", the development of interdepartmental interaction using digital technologies continue to develop	LSGB does not have the ability to make changes and refine elements of the project. There are also problems related to the implementation of the tasks of other projects, namely the low level of competence of municipal employees, retarded resource availability, etc.

"Artificial intelligence"	Programs are being developed that can be applied in large municipalities. The most striking example is the development of an urban intelligent transport system	The vast majority of employees of municipal and regional authorities have a negative attitude to the introduction of artificial intelligence, as they do not expects prospects for its development in public administration
"Providing Internet access through the development of satellite communications"	The program creates satellite communication systems "Express" in geostationary orbit and "Express-RV" in highly elliptical orbits	LSGB are not involved at this stage of the program implementation
"Development of human resources in the IT industry"	The "Success Code" program is being implemented for schoolchildren, within the framework of which summer intensive courses are held. The aim of the project is to increase the digital literacy of schoolchildren in order for them to acquire the necessary competencies that are in demand in modern society by graduation	LSGB does not have the ability to make changes and refine elements of the project. All provisions and requirements within the framework of the NP are subject to mandatory implementation by LSGB

3 RESULTS

The need to introduce and develop digital transformation in public administration is explained by the country's position in the global digital ranking. One of such ratings is the IMD rating "World Digital Competitiveness Ranking", which is compiled on the basis of more than fifty criteria divided into three areas: knowledge (intangible infrastructure used for technology development); technology (the general situation in the country that ensures the development of digital technologies); adaptability for future (the level of readiness of the country's economic sector towards digital transformation). “This ranking describes the importance of national factors in explaining the digital transformation of companies and the adoption of digital practices by citizens. Digital nations result from a combination of digital talent, digital regulation, data governance, digital attitudes and the availability of capital,” says Arturo Bris, Director of the WCC.

Over the past 4 years, there have been no drastic changes in the ranking of countries (Table 1). The Russian Federation has not been represented in the World Digital Competitiveness Ranking for the last two years, however, if we look at previous indicators, we can see a decline of 4 positions in 2021 compared to 2019. So in 2021, Russia ranked 43rd, if we look at the places in key areas, we can see that Russia ranks 24th in the direction of "knowledge", 47th in the direction of "readiness for the future", and 48th in the direction of "technology". A similar trend was associated with the departure of a large number of IT specialists abroad. As for the other countries of the rating under consideration in 2022, it can be seen that Denmark came out on top, shifting the United States to second place for the first time in 6 years (Fig. 2.). The rest of the TOP 20 countries of the rating did not undergo significant changes, remaining within its limits.

Thus, Sweden remained in 3rd place, while Singapore and Switzerland rose one position, to 4th and 5th place, respectively. In the USA, which took 2nd place in 2022, there is a significant drop in all indicators, but the largest is in the technological direction. If we consider the full ratings of countries for three years (2019-2021), we can see uneven jumps of countries throughout the rating, while growth from 2019 to 2020 does not guarantee further successful growth next year (Fig. 3.). So many countries after a significant rise underwent a subsequent decline in the rating, such as Russia, Cyprus, Estonia, Peru, and many others.

In addition to international ratings, the Russian Federation has a number of its own ratings and indices that reflect the dynamics of the digitalization of the economy. One of such ratings is one of digital transformation leaders of regions published by the Ministry of Figures. In 2022, 84 regions were included in this rating. The overall rating score is calculated based on such indicators as follows: import substitution, the transfer of socially significant services to electronic form, digital maturity in 5 main sectors (public administration, urban economy and construction, healthcare, education and transport),

information security, the introduction of measures to support the IT industry, the work of the feedback platform. The maximum possible score in the aggregate for all criteria is 28 points. The leading regions are those that scored 17 points or more, and the laggards include regions that scored less than 11 points (Fig. 4.).

The most informative, at the moment, rating of digital transformation at the municipal level is the "IQ of the city" implemented within the framework of the Smart City project. There are 4 groups of municipalities in this rating, namely: the largest cities (more than 1 million people), large cities (250 thousand – 1 million people), large cities (100 – 250 thousand people), administrative centers (less than 100 thousand people). If we consider the dynamics of changes in the IQ of the Russian Federation municipalities over the last 3 years, we can see 2 main patterns. Firstly, in the vast majority of cities, the indicators demonstrate stable positive growth dynamics, and secondly, the selected TOP 10 cities, for each of the groups, remain within this list, but often change places. It should also be noted that the negative dynamics of some municipalities does not have a stable and permanent basis (Table 2.). As for the results of the rating for 2022, first of all, it worth do noting that the average IQ of cities has increased significantly since the beginning of this rating. The TOP 10 cities (for each of the groups) include not only the cities of central Russia, but also many cities scattered throughout the country (Fig. 5.), which indicates the success of the implementation of the national digital transformation project and the achievement of key indicators.

Having analyzed the tasks of the programs of the national project "Digital Economy" (Table 3.), it can be seen that some programs partially duplicate their tasks, such as the program for training digital economy personnel, which includes the development of programs for supplementary and main education of schoolchildren, and the program for the development of human resources approved later (for the same purpose) the potential of the IT sphere. At the same time, in the modern realities of the development of society and the state, there really was a need in developing a separate program for the development of human resources in the country, but the fact of duplication of tasks of these listed programs remains.

It worth also be noting that the structure of the program was developed taking into account the general features inherent in the Russian Federation and considered from all possible aspects (territorial, personnel, technological, legislative, etc.), which contributes to its effective implementation and the achievement of all planned prospective. The actual effectiveness of the measures being developed and implemented at the regional and municipal level realisation is reflected in the annual ratings, where in general you can see a stable planned dynamics of development and growth. However, there is a fairly large list of problems in this area. For the most part, difficulties with the effective implementation of the developed measures are associated with the municipal level (Table 4.). The most important problems are the following: ignoring the features of LSGB in the implementation of the developed programs; the inability to make changes and finalize elements of LSGB digital development projects; poor technical equipment of most of the country LSGB, etc.

4 CONCLUSIONS

The process of digital transformation has a key impact on the development of economic systems at any level by influencing the intensification of production and services, economic security and the reproductive process of a state/region/municipality. At the same time, the development of digital technologies entails rather large risks, and also requires significant financial investments. Taking into account all the above evidences, it can be argued that the effectiveness of the country's development in the digital space depends on the use of high-quality and correctly developed financial and economic instruments of digital solutions in regional and municipal economic systems.

Despite the fact that over the past few years of the implementation of national digitalization projects in the Russian Federation, a significant number of indicators have been achieved, more effective interaction of authorities, the development of social and economic systems of regions, in the large of problems still remains unresolved.

The development of regional systems in the context of digital transformation should take into account a number of fundamental factors, namely: the development of digital infrastructure through the formation of favorable innovation and information development of the region; acceleration of the introduction of digital technologies and innovations in all spheres of society and public administration; elimination of administrative barriers that hinder the process of digitalization of regional systems; adaptation of society to new economic conditions by increasing the digital literacy of the region's population.

In order to solve the above mentioned and further successful development of regional economic systems in the context of digital transformation, it is necessary to organize training in digital technologies for regional managers, form a single platform for the exchange of experience and best practices on digitalization of individual industries or authorities, regularly coordinate the process of digital transformation in the regions at the federal level, the development of standard GIS design solutions (including RIG and MIS), allowing for the operational interaction of authorities both vertically and horizontally.

Common problems of regional information systems that persist to this day include the following: inconsistency of the information base and actions of government bodies of different levels (this problem is monitored not only vertically, but also horizontally); lack of qualified personnel in the field of digitalization; the presence of digital differentiation of regions; insufficient level of digital security.

The process of digitalization at the municipal level is currently facing a fairly large list of problems. First of all, it should be pointed out that so far the list defined by Federal Law № 131 "On Local Self-Government" does not include the development and application of information technologies in the management of the municipality. The area of responsibility of municipalities does not include the formation and development of digital resources for more effective management at the municipal level, as well. The next problem is related to the qualification of personnel existed. Since there is a severe lack shortage of specialists in municipalities who obtained the necessary competencies and experience in the field of IT technologies, the digitalization process is significantly slowing down. It is also necessary to indicate the absence of methodological and/or standard design solutions for digitalization of municipalities. For the most part, this is due to the fact that all successful municipal information systems (MIS) were ordered by large cities that are not interested in bringing them to the standard level. At the same time, the existing state information systems (GIS), although they were established according to the standard principle and took into account the specifics of municipal management, but they are focused, for the most part, on transmitting and providing information to the municipal level of management of the corresponding GIS.

Despite all the problems, at the moment, MIS have already been created, maintained and are being developed in all priority areas of activity of local self-government bodies. However, since initially municipal information developed exclusively on an industry basis, dozens of industry-specific MIS were developed and implemented that were not consistent with each other. Despite the fact that many attempts have been made, a unified integration information system of the municipality based on them has not yet been created.

The decision to the existing problems of digitalization of municipalities can follows: the addition and improvement of normative legal acts relating to the municipal level of government and its powers in digital transformation; the development of standard design solutions to improve the efficiency of government bodies; the provision of organizational and methodological support to local governments on digitalization; the creation of a system of data processing centers at the regional level, the main task which will be the formation and provision of platforms for solving problems at the municipal level.

REFERENCES

Abramov, V.I. and Andreev, V.D., 2022. Digital transformation of state and municipal management: international experience and priorities in Russia. *Municipal Academy*, 1, pp. 54–63.

Abramov, V.I., Andreev, V.D., 2023. Analysis of strategies for digital transformation of Russian regions in the context of achieving national goals. *Public Administration Issues*, 1, pp. 89–119.

Ahn, M.J., Chen, Y.-C., 2022. Digital transformation toward AI-augmented public administration: Th e perception of government employees and the willingness to use AI in government. *Government Information Quarterly*, Vol. 39, no. 2, art. no. 101664.

D'ortona, C., Tarchi, D., Raffaelli, C., 2022. Open-Source MQTT-Based End-to-End IoT System for Smart City Scenarios. *Future Internet*, Vol. 14, no. 2, art. no. 57.

Decree of the President of the Russian Federation No. 474 dated 21.07.2020 "On the national development Goals of the Russian Federation for the period up to 2030". URL: https://translate.yandex.ru/?source_lang=ru&target_lang=en&text="О%20национальных%20целях%20развития%20Российской%20Федерации%20на%20период%20до%202030%20года"

Ganchenko, D.N., 2021. Features and vectors of cluster transformation in the digital economy. *Journal of Economics, Entrepreneurship and Law*, Vol. 11, no. 11. P. 2537–2550.

IMD World Digital Competitiveness Ranking. URL: https://www.imd.org/centers/wcc/world-competitiveness-center/rankings/world-digital-competitiveness-ranking/

Khokhlov, Yu.E., 2006. Readiness of Russian regions for information society. *Information Society*, 4, pp. 20–22.

Loginovskiy, O.V., Lyaskovskaya, E.A., Gabdulin, R.R., 2023. Problems of digital transformation of the subjects of the Russian Federation. Bulletin of the South Ural State University. Ser. Computer Technologies, Automatic Control, Radio Electronics, 23(3):76–92.

Vershitsky, A. V., Egorova, M., Platonova, S., 2021. Municipal infrastructure management using smart city technologies. *Theoretical and Empirical Researches in Urban Management*, Vol. 16, No. 1. P. 20-39.

Passport of the federal project "Development of human resources in the IT industry", Ministry of Economic Development of the Russian Federation. URL: https://digital.gov.ru/ru/activity/directions/1085/.

Passport of the federal project "Digital Public Administration", Ministry of Economic Development of the Russian Federation. URL: https://digital.gov.ru/uploaded/files/pasport-federalnogo-proekta-tsifrovoe-gosudarstvennoe-upravlenie.pdf?utm_referrer=https%3a%2f%2fya.ru%2f.

Passport of the federal project "Digital technologies", Ministry of Economic Development of the Russian Federation. URL: https://digital.gov.ru/uploaded/files/pasport-federalnogo-proekta-tsifrovyie-tehnologii.pdf?utm_referrer=https%3a%2f%2fya.ru%2f.

Passport of the federal project "Information Infrastructure", Ministry of Economic Development of the Russian Federation. URL: https://digital.gov.ru/uploaded/files/pasport-federalnogo-proekta-informatsionnaya-infrastruktura.pdf?utm_referrer=https%3a%2f%2fya.ru%2f.

Passport of the federal project "Information Security", Ministry of Economic Development of the Russian Federation. URL: https://digital.gov.ru/uploaded/files/pasport-federalnogo-proekta-informatsionnaya-bezopasnost.pdf.

Passport of the federal project "Personnel for the digital economy", Ministry of Economic Development of the Russian Federation. URL: https://digital.gov.ru/uploaded/files/pasport-federalnogo-proekta-kadryi-dlya-tsifrovoj-ekonomiki.pdf?utm_referrer=https%3a%2f%2fya.ru%2f.

Passport of the federal project "Providing Internet access through the development of satellite communications", Ministry of Economic Development of the Russian Federation. URL: https://digital.gov.ru/ru/activity/directions/1086/?utm_referrer=https%3a%2f%2fya.ru%2f.

Passport of the federal project "Regulatory regulation of the digital environment", Ministry of Economic Development of the Russian Federation. URL: https://www.economy.gov.ru/material/file/08f25bcd101aecc2ad6142099117dccd/pasport_fp_normativnoe_regulirovanie_cifrovoy_sredy.pdf?ysclid=lnkw07zfds955773096.

Pinkovetskaya, Y.S., 2022. Evaluation of digital and communication technologies in Russian organizations at the regional level. *E-Management*, 5(3), pp. 125–135.

Progress and effectiveness evaluation results digital transformation of the urban economy of the Russian Federation (IQ of CITIES) according to the results of 2020, Official website of the Ministry of Construction of the Russian Federation. URL: https://minstroyrf.gov.ru/press/minstroy-rossii-predstavil-rezultaty-tretego-indeksa-iq-gorodov/.

Progress and effectiveness evaluation results digital transformation of the urban economy of the Russian Federation (IQ of CITIES) according to the results of 2021, Official website of the Ministry of Construction of the Russian Federation. URL: https://minstroyrf.gov.ru/docs/133627/.

Progress and effectiveness evaluation results digital transformation of the urban economy of the Russian Federation (IQ of CITIES) according to the results of 2022, Official website of the Ministry of Construction of the Russian Federation. URL: https://minstroyrf.gov.ru/press/podvedeny-itogi-rascheta-indeksa-iq-gorodov-po-itogam-2022-goda/.

Rating of heads of digital transformation of federal agencies, Ministry of Digital Development, Communications and Mass Communications of the Russian Federation. URL: https://digital.gov.ru/ru/events/41694/.

Styrin, E.M., Rodionova, Yu.D., 2020. Unifi ed information system in the fi eld of procurement as a state digital platform: current state and prospects. *Public Administration Issues*, 3, pp. 49–70.