

Digital Inequality between Urban and Rural Population



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Abstract. Digitalization can transform social inequality between urban and rural population into a digital divide. This issue in the “city–village” context is not given due attention by scholars and is mainly limited to the country level. Interregional inequality in scientific publications is considered, as a rule, outside of this context. The study seeks to eliminate this gap. The aim is to identify features, trends and quantitative parameters of digital inequality (divide) between urban and rural population at the national and interregional level and identify ways to address the issues that arise. The tasks are to establish trends in the formation of a digital divide in the levels of Internet access and digital competence of users, in obtaining state and municipal services and ordering goods/services; to assess the reasons for the rural population’s refusal to use the Internet and identify ways to solve this problem. The study was based on a combination of calculation of coefficients of variation and grouping of regions. We used the data of the federal statistical observation. Results: the hypothesis was confirmed that there are trends at the national level to reduce the gap in Internet access, the growth of the gap in the level of users’ digital competence and the use of digital technology; we found out the presence of a positive trend toward reducing the interregional gap in obtaining public and municipal services via the Internet and its growth in the implementation of orders of goods/services; we put forward measures to fulfill the needs of the rural population in using the Internet, increase the level of their digital skills; we conclude that it is necessary to provide budget support for socially vulnerable families when connecting to the Internet, to establish social tariffs for low-income households; mechanisms of public–private partnership and support for initiatives of local communities are proposed aimed at increasing high-speed Internet coverage in rural areas. Further study

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of the digital divide requires in-depth sociological research and taking into consideration the data from mobile operators and Internet service providers.

Key words: digitalization, digital divide, type of settlement, region, Internet, households, users' digital competencies.

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Introduction

The Internet is increasingly being used by organizations and households in urban and rural areas of various Russian regions, which leads to the inclusion of digital technologies in the production process and daily life of the country's population. The pace of digitalization, the level and depth of penetration of digital technologies into urban and rural areas, as well as between regions of the country, differ significantly.

With the expansion of digitalization, urban areas and regions possessing high socio-economic potential receive a new impetus for their development, and rural areas and regions with depressed economies become digitally vulnerable. This problem is global and it affects all countries of the world.

Even Europe has marginal rural areas with socio-economic and cultural decline, characterized by unemployment, emigration, population aging, depopulation, poverty and social isolation (Wiesinger, 2007; Chatzichristos et al., 2021). As a result, there is a problem of digital inequality (gap) between urban and rural areas, between regions of the country with different development potential, which is also due to differences in technical connection conditions, economic opportunities for network access, and demographic factors (Salemink et al., 2017; Haefner, Sternberg, 2020).

In the Russian Federation, in the process of digitalization of society, "with the exception of quite rare cases when indicators stabilize (sometimes at marginally low borders), the village

lags behind the city by 5–6 years" (Salnikov, 2021, p. 129). Digital inequality between cities and villages is becoming a barrier to their further balanced development and overcoming the existing social distance between urban and rural population. Digital inequality between urban and rural residents has a slightly different content than the digital gap between individuals or their groups, which is determined by one or another attribute (income level, education, age, etc.) in urban or rural areas. The digital divide between urban and rural population is formed under the influence of a combination of factors. These are inequalities in social status and access to power, income and education, age structure, Internet accessibility and the possibility of using digital technologies in the fields of public and municipal services, education, medicine, trade, etc. At the same time, it is not the digital inequality between individuals that is important, but the digital gap between the urban and rural population as a whole, as well as between regions.

Interregional digital inequality creates prerequisites for further strengthening the process of socio-economic differentiation of regions, exacerbating the existing unevenness of spatial development, since digitalization creates many opportunities for innovation, which are still used predominantly by urban regions with higher innovation potential, thanks to a wide variety of specialized companies and supporting stakeholders (Haefner, Sternberg, 2020).

Despite the severity of the problems of digital inequality between cities and villages and the digital divide between regions, these issues have not been studied enough, and “identifying the essence and causes of the digital divide in Russian regions is a poorly developed and debatable problem” (Selishcheva, Asalkhanova, 2019, p. 232).

The severity of the problem of digital inequality between urban and rural areas and the insufficient level of its knowledge regarding the situation in the Russian Federation determine the relevance, aim and objectives of the study.

The aim of this study is to identify features, trends and quantitative parameters of the formation of digital inequality (gap) between urban and rural residents at the national and interregional levels and identify ways to solve the problems that arise. The study aims to confirm or refute the hypothesis of reducing the gap in the level of Internet access, the growth of the gap in the level of user’s digital competence, their digital literacy and the use of digital technologies in people’s lives by the example of obtaining state and municipal services and online ordering of goods/services.

Thus, based on the analysis of the dynamics of indicators for 2014–2022, the following tasks were formulated and addressed.

1. Trends in the formation of the digital divide have been identified in: a) the level of access to the Internet and information and communication technologies (ICT) in quantitative parameters and ways of accessing the network; b) the involvement of rural and urban residents in obtaining state and municipal services and ordering goods/services online.

2. Trends in the formation of a digital divide in the level of users’ digital competence and their digital literacy, including the presence of Internet user skills, and the use of the Internet in obtaining state and municipal services and ordering goods / services, have been established.

3. We assess reasons why rural residents refuse to use the Internet, which cause the growth of the digital divide with the urban population, and we propose ways to solve this problem.

Scientific novelty of the research findings lies in establishing the features, trends and quantitative parameters of the formation of the digital divide in the “city–village” context at the level of the Russian Federation, its regions and in the interregional context, confirming the hypothesis of reducing the gap in the level of Internet access and its growth, both in digital competence and digital literacy of users, and in their use of digital technologies in their daily activities. For the first time, the results of grouping regions by the digital gap between urban and rural residents were obtained, and RF constituent entities with a gap in favor of the village were identified.

An interdisciplinary scientific contribution consists in the results of projecting existing theoretical views on the problem of digital inequality on a global scale onto the digital divide in the “city–village” context at the national and interregional levels.

Proposals to eliminate the identified causes of rural households’ refusal to use the Internet and digital technologies and to bridge the digital divide are of practical importance.

Theoretical background of the study

In English, digital inequality is denoted by the terms “digital divide” and “digital gap”. “Digital divide” is interpreted by the Organization for Economic Cooperation and Development (OECD) as the gap between individuals, households, businesses and geographic areas at different socio-economic levels with regard both to their opportunities to access information and communication technologies (ICTs) and to their use of the Internet for a wide variety of activities¹.

¹ OECD (2001). Understanding the Digital Divide. In: *OECD Digital Economy Papers*, 49, OECD Publishing, Paris. Available at: <http://dx.doi.org/10.1787/236405667766>

There is no generally accepted definition of the term “digital inequality”, most often it is used as a synonym for “digital divide” (Revenko, Revenko, 2022). At the same time, there are attempts in the scientific literature to distinguish them, while the difference between digital divide and digital inequality is seen as the difference between a form of differentiation and a new form of social inequality (Social Inequality..., 2021).

We note that it would be more reasonable to talk not about digital, but about the social inequality that the digital divide leads to. L.S. Revenko and N.S. Revenko (Revenko, Revenko, 2022, p. 376) note that the terms “digital divide” and “digital inequality” are quite close, but they only make some distinction between them, saying that “digital inequality” is unequal access to economic and social benefits due to the inability to adequately use the achievements of digital technologies. However, according to the concept of three levels of digitalization (Salemink et al., 2017; Gruzdeva, 2020; Korovkin et al., 2020; Yanovskaya et al., 2022; Vlasjuk, 2023), this is the third level of the digital divide.

Given the methodological incompleteness in distinguishing the terms “digital divide” and “digital inequality”, the lack of a generally accepted interpretation of the latter, in our study we take the side of the majority and use these two concepts as synonyms, recognizing that their negative dynamics “do not lead to the elimination of the problem of social inequality, but strengthen it and develops new forms (Dobrinskaya, Martynenko, 2019).

Officially, the problem of bridging the digital divide was reflected in the Okinawa Charter on Global Information Society, adopted by the Heads of State and Government of the Group of Eight on July 22, 2000: “Everyone should have the opportunity to access information and communication networks... We also welcome the fact that both industry and civil society are

increasingly inclined to recognize the need to bridge this gap”².

Formulated in the late 1990s, the concept of digital divide was understood as unequal access to the Internet (Castells, 1996), as inequality in access to digital information channels by various social groups (Korovkin et al., 2020).

From the very beginning of the emergence of the term “digital divide” and to the present time, it has been used mainly in the sense of inequality of social groups of the population (strata), distinguished by various criteria (gender, age, income, education, etc.), in access to the Internet, ICT and the realization of opportunities to use them.

At the same time, it is indicated that rapid digital development negatively affects socially vulnerable groups (children, youth, women, the elderly, the sick, people living in remote areas), since poorly educated, illiterate people with little experience in using ICT are vulnerable to exclusion from digital developments, which further increases their isolation and marginalization in real life (Salemink et al., 2017).

Many authors note the growing inequality between people who can access the Internet and those who cannot (Holmes, Burgess, 2022); between those who are included in digital systems as consumers of information and services provided by these systems and those who are excluded – do not have access to them (Heeks, 2022, p. 697); and between those who can easily use and access digital technologies and those who cannot (Sanders, Scanlon, 2021, p. 131).

The emergence of the Internet in the consumer space has aroused great interest in studying the causes and implications of the digital divide between urban and rural areas by researchers from various disciplines (Salemink et al., 2017).

² Okinawa Charter on Global Information Society. Available at: <http://www.kremlin.ru/supplement/3170>

Studying digital inequality is a starting point for understanding the essence of the social landscape of the 21st century (Robinson et al., 2015). The presence of a certain level of digital divide is an objective factor, but with the achievement of a certain value “it becomes socially and politically unacceptable”. At the same time, “a situation is unacceptable when the digital divide becomes fundamentally insurmountable so that representatives of information-poor regions or social groups find themselves in a “different universe” in terms of their economic and social opportunities” (Korovkin et al., 2020, p. 12). The paradox of digitalization arises when rural regions, most in need of improved digital connectivity, are least connected to the Internet and least involved in the use of digital technologies to improve life (Salemink et al., 2017).

Most countries are concerned about the digital divide between urban and rural residents, and this is a global problem. The article by the authors from the UK, in particular, notes that though digitalization opens up numerous opportunities for rural areas, they still lag behind cities in terms of access to Internet services and their implementation. As of September 2020, 96% of residential premises in urban areas of the UK were provided with broadband, compared with 81% in rural areas, where 10% of users could not access the Internet even with low download speeds. According to the European Commission, at the beginning of 2019, 10% of rural settlements in the European Union did not have access to any fixed broadband network, and the gap in the use of this network between rural and urban settlements was 15% (Gerli, Whalley, 2021).

Various approaches to the study of the digital divide are found in publications that fit into the concept of three levels of digitalization (Salemink et al., 2017; Gruzdeva, 2020; Korovkin et al., 2020; Yanovskaya et al., 2022; Vlasyuk, 2023):

1) level of access to the Internet and ICT;

2) level of digital competence of users and their digital literacy;

3) level of social benefits that users receive from the correct and sufficient use of digital technologies in their professional and private lives.

According to representatives of the Skolkovo Innovation Center, researchers generally note that the digital gap of the first level is shrinking, while the gap of the second level may grow. As a result, there is a possibility of a catastrophic increase in the gap of the third level and it is quite possible that a vicious circle may emerge when “the rich get richer and the poor get poorer” (Korovkin et al., 2020, p. 13).

The first-level digital inequality still exists even in developed countries such as the United States, where as of 2014 about 14% of American adults still did not use the Internet. The second-level digital inequality related to skills, participation and efficiency, and affects an even larger portion of the American population, even those who are nominally considered “users” (Robinson et al., 2015). In 2015, 69% of rural residents reported using the Internet, compared with 75% of urban residents. This gap is 6–9 percentage points (p.p.), it is quite constant and persists for a long time³. The level of broadband access in urban areas of the United States in 2020 reached almost 98%, while in rural areas only two thirds of residents had it⁴.

Russian authors’ articles on the digital divide in the “city–village” context consider various issues: reasons for digital inequality at the regional level due to differences in its shaping factors (Bannikov et al., 2020); impact on digital

³ Carlson E., Goss J. (2016). The State of the Urban/Rural Digital Divide. *An official website of the United States government*. Available at: https://www-ntia-gov.translate.goog/blog/2016/state-urbanrural-digital-divide?_x_tr_sl=en&_x_tr_tl=ru&_x_tr_hl=ru&_x_tr_pto=sc (accessed: April 17, 2024).

⁴ Cooper L. (2023). The stakes are too high to not solve the rural digital divide. *Human-I-T*. Available at: https://www-human--i--t-org.translate.goog/why-bridge-rural-digital-divide/?_x_tr_sl=en&_x_tr_tl=ru&_x_tr_hl=ru&_x_tr_pto=sc (accessed: April 17, 2024).

inequality of the availability of ICT tools and the possibilities of their effective use depending on population density and population concentration (Bylina, 2019). At the same time, the digital divide is considered at the national level, while the spatial aspect is not affected.

The article (Kirilova et al., 2021) attempts to assess the contribution of three factors (availability of broadband services, affordable Internet prices, ICT skills) to the reduction in the digital gap between urban and rural residents differentially across three classes of small settlements in the Nizhny Novgorod Region. But the authors do not address the issues of the digital divide between regions in the “city–village” context, but explore the problem within their region.

D.A. Gainanov and T.F. Sharifyanov consider overcoming digital inequality between urban and rural settlements conceptually by creating a differentiated network infrastructure at different network localities in the settlement system, without reference to any region (Gainanov, Sharifyanov, 2015).

A typical approach to studying the digital divide between urban and rural residents is to compare quantitative indicators reflecting the penetration and use of ICT by the corresponding types of settlements in the Russian Federation as a whole (Safiullin, Kuksin, 2022).

T.D. Sannikova considers digital inequality from the standpoint of its negative impact on the well-being of rural residents, including the availability and quality of services received in electronic form: educational, banking, government services, etc. (Sannikova, 2018).

The problems of an interregional digital divide between urban and rural residents in the level of access to the Internet and ICT, as well as their application in human life, are practically not considered in the scientific literature. Research papers deal with the digital divide between regions, without taking into account the division of the population by type of settlement.

Most of the Russian scientific publications consider the first or the first and second levels of digital inequality. Thus, M.A. Gruzdeva considers the digital inequality between Russia’s regions in terms of differences in the penetration and use of the Internet by residents (Gruzdeva, 2020). Besides, attempts are being made to study the gap at all three levels of digital inequality, when, in addition to considering accessibility of the Internet and digital technologies, scholars investigate the effectiveness of their use in the economy (Vlasyuk, 2023, p. 61).

Some publications study the factors contributing to the digital divide: uneven socio-economic development of regions (Selishcheva, Asalkhanova, 2019; Dudin et al., 2021; Kostyaev, 2023); high cost of deploying infrastructure in rural areas; level of education of Internet users and the experience of using ICT; difference between regions in the ratio of urban and rural population, its density; population density in rural settlements and the distance between them (Salemink et al., 2017); differences in age and gender structure, income, and education (Vallušová et al., 2022).

Many publications present a quantitative assessment of the degree of digital inequality in terms of digital divide between regions (Kuznetsov, Markova, 2014; Bakhtizin et al., 2017; Gubanova, Klesch, 2018; Batrakova, 2021; Shatalova, Kasatkina, 2022; Vallušová et al., 2022).

Upon reviewing publications on digital inequality in urban and rural areas, we have revealed that researchers have not yet engaged in studying this problem in an interregional aspect, identifying groups of RF constituent entities with different levels of the digital divide. To a large extent, this is explained by the scarcity of differentiated statistical indicators on the digitalization of urban and rural settlements by region, as well as by the fact that different authors methodologically consider “the need to identify three types of digital divide: global, national and individual” (Social Inequality..., 2021, p. 155); as for interregional digital divide, it is not touched upon, as well.

Methodology, methods and materials

The key element in the methodology of the digital divide research in the context of the formulated goal and highlighted tasks is a multidimensional concept of “differentiation”, used in almost all branches of science with appropriate content. In our case, we are talking about social and territorial (spatial, interregional) differentiation.

Social differentiation is of particular importance in studying stratification in general, and it becomes a critical methodological problem (Robinson et al., 2015). According to P. Sorokin’s definition, the basis and very essence of social stratification “consists in the uneven distribution of rights and privileges, duties and responsibilities, social benefits and deprivations, social power and influence among members of a particular community” (Sorokin, 1927, p. 9). These attributes of social distance, formed by social differentiation, are fully inherent in the relations between urban and rural communities. Social inequality manifests itself to varying degrees in different regions of the country due to the heterogeneity of the demographic situation in them, people’s living standards and educational and professional qualities; all this in the context of digitalization becomes a prerequisite for the formation of a digital divide between RF constituent entities.

Thus, there is a territorial differentiation of social inequality, hence digital inequality. In this case, we consider the essence of the concept of “differentiation” in two aspects: “as a process contributing to the division of socio-economic space and as a result of this process, expressed by the heterogeneity of rural areas” (Kostyaev, Nikonova, 2021, p. 153). Moreover, “differentiation as a process” is a cause, and “differentiation as a result” is a consequence, which should be considered in dialectical unity, when one consequence can become the cause that entails another consequence. As a result, there emerges a “vicious circle”, when digital inequality slows down regions’ deve-

lopment; and “depressed regions lag behind in the development of ICT due to insufficient rates of economic growth and socio-economic development in general” (Dudin et al., 2021, p. 964).

To determine the degree of interregional heterogeneity, various statistical indicators are used: range of variation, polar values discontinuity coefficient, decile coefficient, variation coefficient, oscillation coefficient, Gini coefficient, Theil index, etc. (Bakhtizin et al., 2017; Gubanova, Klesch, 2018; Batrakova, 2021; Shatalova, Kasatkina, 2022).

To study inequality ($X_1 < X_2$) in the “city–village” context within one socio-economic unit (country, region, district, etc.), the gap indicators ($R_{1,2}$) between them are defined as the difference between higher and lower values for each of the considered indicators ($R_{1,2} = R_2 - R_1$).

When studying inequalities between regions, they are distributed in an ordinal sequence according to the considered indicators in the direction from the minimum to the maximum value:

$$X_1 < X_2 < X_3 < X_4 < X_5 < X_6 < X_7 < X_8 \dots < X_n.$$

Based on the obtained ordinal scales, we determined the gap between the regions within the whole population using statistical indicators: range of variation (K_1), polar values discontinuity coefficient (K_2), oscillation coefficient (K_3), decile coefficient (K_4):

$$K_1 = X_n - X_1; K_2 = X_n / X_1; K_3 = \frac{X_n - X_1}{\bar{X}}; K_4 = \frac{\sum_{n-10}^n X}{\sum_1^{10} X}.$$

The variation coefficient, the Gini coefficient, and the Theil index are more effective for studying the degree of heterogeneity of a particular population as a whole; as for determining the digital divide within the framework of the tasks at hand, they were redundant and were not used in this work. Instead, to identify trends in interregional inequality in dynamics, along with the calculation and analysis

of the proposed statistical coefficients K_1 , K_2 , K_3 and K_4 , we used the grouping method: RF constituent entities were grouped depending on the size of digital divide.

We used data from Federal Statistical Observation 1-IT “Questionnaire of a selective federal statistical observation on the use of information technologies and information and telecommunication networks by the population”, available at the Rosstat website⁵.

When researching the digital divide in the “city–village” context we carried out calculations at the national level, at the regional level and at the interregional level.

Research results

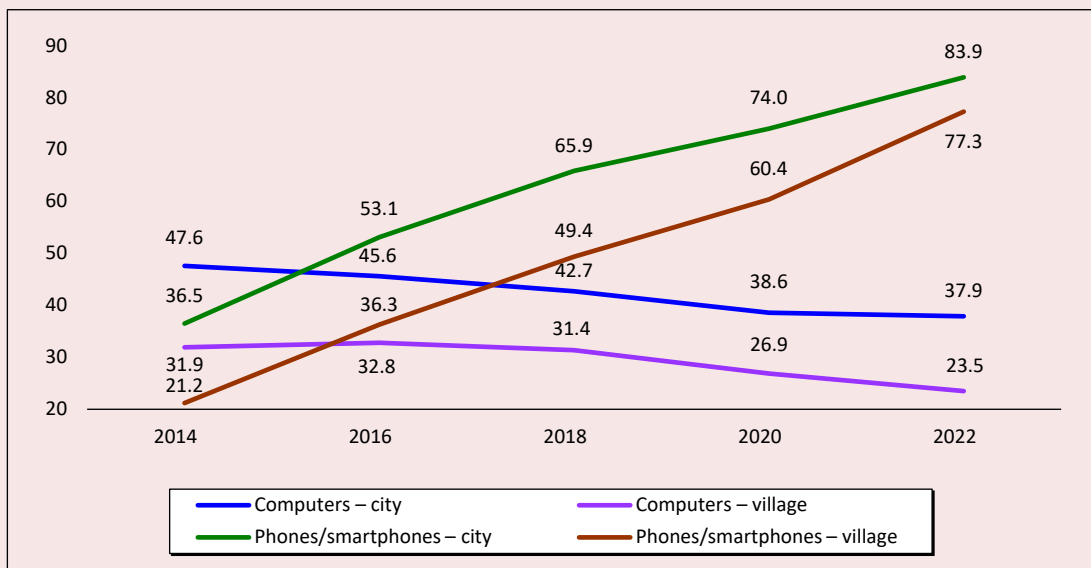
Digital urban–rural inequality at the national level

Urban and rural households use three main groups of devices to access the Internet: desktop

(stationary) computers; tablet computers and other mobile devices (phones, smartphones, e-book readers, etc.). Stationary computers and mobile phones/smartphones are used more often. At the same time, the trends of their use for Internet connection differ significantly. The trajectory of the use of desktop computers is downward with the growth of the digital divide between urban and rural areas since 2018, which reached 14.4 percentage points by 2022. At the same time, the use of mobile phones/smartphones for these purposes is increasing rapidly, and the digital gap between urban and rural areas is decreasing (2014 – 15.3 percentage points; 2022 – 6.6 percentage points; *Fig. 1*).

The reasons for the above dynamics are obvious: mobile devices have clear competitive advantages over desktop computers both in terms of price and the ability to connect to the network everywhere, where cellular communication is available.

Figure 1. Proportion of Russian households with Internet access using desktop computers and mobile phones / smartphones, % of all households



Compiled according to: Federal Statistical Observation 1-IT.

⁵ Data from Federal Statistical Observation 1-IT “Questionnaire of a selective federal statistical observation on the use of information technologies and information and telecommunication networks by the population”. Available at: https://rosstat.gov.ru/free_doc/new_site/business/it/ikt22/index.html

Probably, this explains a reduction in the digital gap in terms of the frequency of Internet use: in terms of daily Internet use (2014 – 17 percentage points, 2022 – 7.8 percentage points), as well as a decrease in the share of the rural population who have never used it (from 39.6% in 2014 to 10.6% in 2022). Broadband access is of particular importance for the penetration of digital technologies into rural areas, which, due to the implementation of the federal project “Eliminating digital inequality”⁶, is rapidly spreading across Russia’s rural areas.

The implementation of the first stage of the project (2014–2020) made it possible to establish Internet access points at a speed of at least 10 Mbit/second in settlements with a population of 250–500 people, and at the second stage (2021–2030) it is planned to provide mobile communications and Internet to settlements with a population of at least 100 people.

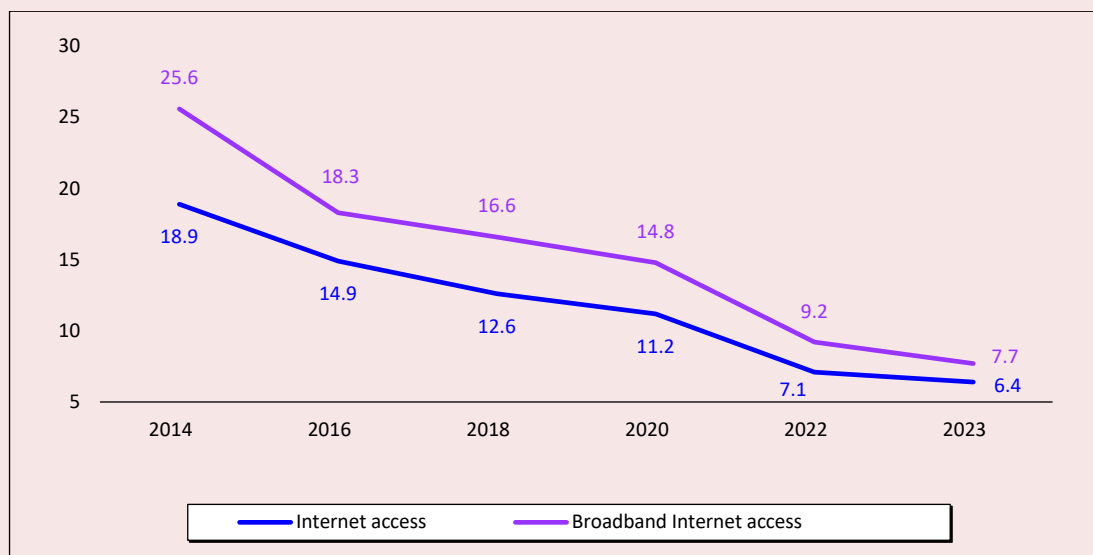
The rate of reduction of the digital gap between urban and rural areas in terms of broadband Internet access is higher than in terms of Internet access in general (*Fig. 2*).

The reserve for reducing the digital divide is found in eliminating the reasons why rural households and rural populations refuse to use the Internet. At the same time, the directions and rates of dynamics of the indicators of the reasons for rural households’ refusal to use the Internet, presented in the Federal Statistical Observation data, are fundamentally different from those for the rural population.

However, among the reasons for refusal in both cases, the main ones are the lack of need, desire and interest in using the Internet; lack of skills to work on the Internet.

The share of rural households that do not use the Internet due to the “lack of need, desire and

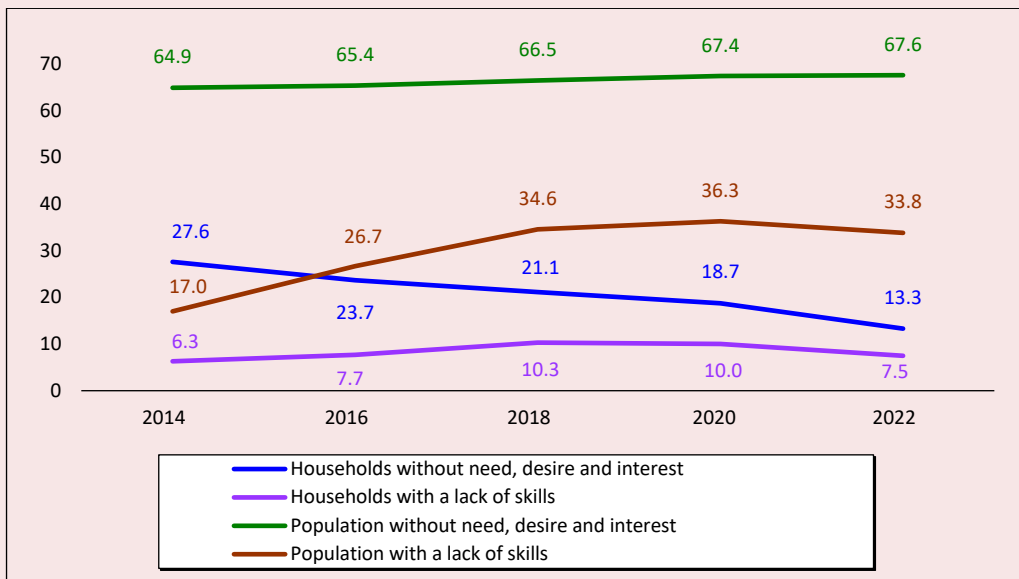
Figure 2. Dynamics of reduction in the digital gap between urban and rural households in Russia in access to the Internet, p.p.



Compiled according to: Federal Statistical Observation 1-IT.

⁶ Adopted and implemented in accordance with Federal Law 9, dated February 3, 2014. Available at: https://www.consultant.ru/law/podborki/federalnyj_proekt_ustranenie_cifrovogo_neravenstva/

Figure 3. Proportion of households in rural areas and the share of the rural population in Russia who do not use the Internet, broken down by main reasons of non-use*, %



* The proportion of households in rural areas is given as % of all households, and the proportion of the rural population as % of the population that did not use the Internet or used it more than a year ago. The age was taken in 2014 and 2016 in the range of 15–72 years, and in 2018, 2020 and 2022 – 15–74 years.

Compiled according to: Federal Statistical Observation 1-IT.

interest” has been steadily declining since 2014; and since 2018 it has also begun to decline due to the “lack of skills”. For the rural population, the former indicator was very high in 2014 and increased slightly by 2022, while the latter increased very significantly during this period, although a downward trend has been observed since 2020 (Fig. 3).

In our opinion, the indicators for the rural population are more informative, since they are correlated with the number of people who did not use the Internet, while households are correlated with the total number of households.

In 2022, 51.2% of the rural population aged 15 and over had a low level of digital skills and only 6.5% had a level above basic. The interconnection and interdependence of these causes should be noted: rural residents with a lack of skills do not have the desire and interest to use the Internet, and if there is no need and desire, there is no need to acquire appropriate skills.

Thus, the problems under consideration should be solved comprehensively, while conducting educational activities for the rural population regarding the possibilities of using digital technologies and large-scale work to improve Internet skills.

Other reasons hindering the promotion of digital technologies in rural areas and the use of the Internet by the rural population are very significant, but the positive trend in their solution inspires some optimism (Tab. 1).

When digitalizing rural areas, undoubtedly, economic and technical problems should be solved, but, as the data in Figure 3 and Table 1 show, they are not the most important in this matter, given their high resource intensity.

When working to improve the Internet skills of rural residents, it is important to pay attention to the fact that the digital gap between urban and rural Internet users in 2014–2022 increased in percentage

Table 1. Proportion of the rural population of Russia who named economic and technical reasons for refusing to use the Internet, in 2014–2022, % of the total rural population who did not use the Internet

Reasons for not using the Internet	2014	2016	2018	2020	2022	2022/2014, p.p.
High Internet connection costs	11.5	12.3	16.1	16.0	6.8	-4.7
Lack of technical connectivity to the Internet	8.5	8.6	9.5	9.1	6.4	-2.1

Compiled according to: Federal Statistical Observation 1-IT.

points in all major positions: working with a word processor – from 16.8 to 18.4; copying or moving a file – from 13.2 to 16.2; working with spreadsheets – from 11.9 to 13.5; file transfer between a computer and peripheral devices – from 12.7 to 13.2.

People’s skills and capabilities in using the Internet to obtain state and municipal services and ordering goods and/or services are very important, as well as reducing the digital gap in these indicators in the “city–village” context. During the period from 2014 to 2022, the share of the population receiving state and municipal services via the Internet, as well as ordering goods and services online, has increased significantly. However, the growth rates of these indicators for the rural population were noticeably lower, which led to an increase in the digital divide in both cases (*Tab. 2*).

The data in Table 2 confirm the thesis that the digital divide is growing between those who have more opportunities to access to the Internet and those who have fewer such opportunities.

The main directions of using the Internet to receive state and municipal services in 2022 were as follows:

- 1) getting information (62.4%);
- 2) making mandatory payments online (53.6%);
- 3) obtaining the results of state and municipal services in electronic form (45%)⁷.

When ordering goods online, rural residents prefer three main groups of goods: a) clothing, shoes, sporting goods (69%); b) household items (41.9%); c) cosmetics and perfumes (33.4%). At the same time, a significant proportion of Russia’s rural residents do not use the Internet for obtaining public services (about 40%) and ordering goods (almost 54%).

To manage the process of including rural residents in receiving state and municipal services and ordering goods and/or services online, it is necessary to eliminate the reasons for refusing to do so.

Table 2. Involvement of the Russian population in obtaining state and municipal services and ordering goods and/or services online in 2014–2022

Indicator	2014	201	2018	2020	2022	2022/2014, p.p.
Proportion of the population receiving state and municipal services, % of the total population surveyed						
Urban population	12.7	32.1	58.3	63.5	74.5	61.8
Rural population	4.0	18.8	43.1	44.3	60.1	56.1
Digital divide, p.p.	8.7	13.3	15.2	19.2	14.4	5.7
Proportion of the population who ordered goods and/or services out of the total population who used the Internet during the last 12 months						
Urban population	28.0	33.1	44.5	50.4	62.0	34.0
Rural population	14.4	19.7	30.9	32.2	46.1	31.7
Digital divide, p.p.	13.6	13.4	13.6	18.2	15.9	2.3

Compiled according to: Federal Statistical Observation 1-IT.

⁷ Percentage of the total rural population aged 15–72 years who used the Internet to receive state and municipal services.

Analyzing the data of the Federal Statistical Observation 1-IT, we see that the reasons for not using the Internet for contacting state and municipal authorities, as well as making online purchases, are motivational factors. Thus, respondents choose a personal visit and personal contacts with representatives of state and municipal authorities (55.8%); and online orders are not popular because residents prefer to make purchases themselves (54.5%) or they do not have the need (desire, interest) (35.3%) or trust (9.9%) in such kind of shopping.

Another group of problems is the lack of skills or knowledge to use the Internet to obtain services (20.1%), as well as to order goods online (7.4%). In this regard, 19.3% of respondents turned to other people (friends, relatives) to receive state and municipal services.

Thus, in order to reduce the growing digital gap between urban and rural areas at the level of the Russian Federation, it is necessary to solve the following problems:

– motivational, aimed at promoting people’s needs in using the Internet, including for obtaining

state and municipal services, as well as ordering goods and/or services; to increase confidence in online transactions;

– educational, aimed at improving rural residents’ digital skills for working on a computer and surfing the Internet, teaching methods for obtaining state and municipal services, and implementing online trading opportunities;

– economic, such as reducing the cost of users’ connecting to the Internet;

– technical, aimed at expanding the coverage area of rural areas with cellular communications and high-speed wireless Internet.

Interregional digital divide

Due to the fact that the Rosstat website lacks data on Internet access for rural households, the assessment of the digital gap between Russia’s regions according to this indicator was carried out without identifying the type of settlement. Calculating the indicators showing an interregional gap in household access to the Internet in dynamics from 2014 to 2022, we conclude that it shows a general downward trend (*Tab. 3*).

Table 3. Digital divide indicators for Russia’s regions in terms of household access to the Internet in dynamics from 2014 to 2022

Digital divide indicator	2014	2016	2018	2020	2022
Range of variation	39.2	29.9	36.0	32.0	25.2
Polar values discontinuity coefficient	1.75	1.49	1.58	1.50	1.34
Oscillation coefficient	0.56	0.40	0.47	0.40	0.29
Decile coefficient	1.75	0.84	0.60	1.00	1.22
Compiled according to: Federal Statistical Observation 1-IT.					

Table 4. Grouping of Russian regions by indicators of the share of household access to the Internet in dynamics from 2014 to 2022, % of all households

Group of regions		201	2016	2018	2020	2022
1.	Under 70	53	26	17	7	-
2.	70–80	23	46	44	42	16
3.	80.1–85	2	5	14	19	26
4.	85.1–90	2	4	4	8	20
5.	Over 90	1	1	3	6	20
Total		81	82	82	82	82
Compiled according to: Federal Statistical Observation 1-IT.						

The grouping of Russian regions by this indicator confirms this conclusion: in 2014–2022 their number in the groups with household access to the Internet up to 80% had a steady downward trend, and with access above 80% – upward trend (Tab. 4).

The division between urban and rural areas regarding the indicators of public and municipal services received by residents and ordering goods/services via the Internet allows us to determine trends in the interregional digital divide for rural residents.

Having calculated statistical coefficients, we revealed that the scope of variation in both cases increased in 2022 relative to 2014, but the remaining

indicators of the digital divide between regions had a general downward trend, although their values fluctuated over the years (Tab. 5).

These conclusions are confirmed by the results of grouping Russia's regions according to the digital gap in the receipt of state and municipal services by rural residents (Tab. 6).

It is noteworthy that the number of regions with a negative digital divide (0) has changed slightly; the number of regions with a small gap (up to 20 percentage points) has increased sharply, and the number of regions with a gap of more than 20 percentage points have significantly decreased, which indicates a positive trend in reducing an interregional digital divide.

Table 5. Digital gap between Russia's regions for the rural population receiving state and municipal services and ordering goods/services via the Internet, in dynamics from 2014 to 2022

Indicator	2014	201	2018	2020	2022
State and municipal services					
Range of variation	61.1	73.4	62.1	67.4	68.5
Polar values discontinuity coefficient	77.38	50.33	3.19	3.46	3.48
Oscillation coefficient	3.92	2.01	0.95	0.95	0.86
Decile coefficient	21.13	23.58	6.10	4.99	4.87
Ordering goods and services					
Range of variation	34.0	46.8	67.8	66.4	62.7
Polar values discontinuity coefficient	19.89	12.14	29.25	12.45	7.21
Oscillation coefficient	4.10	3.63	3.11	2.77	1.67
Decile coefficient	8.82	4.63	4.08	4.37	3.72

Compiled according to: Federal Statistical Observation 1-IT.

Table 6. Grouping of Russia's regions according to the digital gap in the use of the Internet by rural residents when obtaining state and municipal services in dynamics from 2014 to 2022, p.p.

Divide, p.p.	2014	2016	2018	2020	2022
Number of regions with a gap in favor of the village*					
< 0	7	3	9	9	5
Number of regions with a gap in favor of the city					
0.1–10.0	14	15	20	29	40
10.1–20.0	19	22	25	28	29
20.1–30.0	19	24	23	8	4
30.1–40.0	11	15	4	5	3
Over 40	11	3	1	3	1
Total	81	82	82	82	82

* In 2022, this group included the Bryansk and Sakhalin regions, Kabardino-Balkarian Republic, Republic of North Ossetia–Alania, and Khanty-Mansi Autonomous Area.
Compiled according to: Federal Statistical Observation 1-IT.

Table 7. Grouping of Russian regions by digital gap in the use of the Internet for ordering goods/services in the “city – village” context from 2014 to 2022

Divide, p.p.	2014	2016	2018	2020	2022
Number of regions with a gap in favor of the village					
< 0	5	9	7	3	10
Number of regions with a gap in favor of the city*					
0.1–5.0	19	11	16	9	10
5.1–10.0	31	18	12	13	8
10.1–15.0	11	21	20	13	12
15. –20.0	12	14	15	19	15
Over 20.0	3	9	12	25	27
Total	81	82	82	82	82
* This group in 2022 included the Ryazan, Voronezh, Kaliningrad and Murmansk regions, republics of Mordovia, North Ossetia–Alania and Crimea, Khanty-Mansi and Chukotka autonomous areas. Compiled according to: Federal Statistical Observation 1-IT.					

Regarding the digital gap in ordering goods/services, the situation is ambiguous among regions. Despite the relatively favorable overall dynamics of changes in the coefficients of variation reflecting a decrease in the digital divide of Russia’s regions, their grouping reveals a slightly different picture (Tab. 7). From 2014 to 2022, the number of regions in the group with a digital gap in favor of the village doubled, in the group with the maximum gap (more than 20 percentage points) – by 9 times, and in groups with a gap of up to 10 percentage points – decreased by 2.8 times. The number of intermediate groups of regions has remained virtually the same.

The share of regions with a gap of more than 20 percentage points in the use of the Internet for ordering goods/services by rural residents increased from 3.7 to 30%, and in receiving state and municipal services, these values were 50.6 and about 10 %, respectively.

This situation directly affected the indicators of the general level of involvement of Russia’s population in ordering goods/services and receiving state and municipal services online. In 2022, online orders for goods/services were carried out by 53.7%; and 86.6% of all residents of the country received state and municipal services online.

Thus, at the interregional level, the digital gap in ordering goods and services online tends to grow, and in receiving state and municipal services online it tends to decrease.

Discussion

The digital divide in any of its manifestations in the era of digitalization of the economy and households creates prerequisites for increasing socio-economic inequality. A special place is occupied by the gap between urban and rural areas. The programmatic task of overcoming significant differences between city and village was laid down in the works of the classics of Marxism–Leninism, and then it was addressed during 13 five-year plans in the USSR. The processes that took place in the national economy since 1991 have exacerbated the gap in the socio-economic development of urban and rural areas.

In the context of the digital transformation of the entire Russian society and under its influence the existing socio-economic differences between urban and rural areas can either be smoothed out or intensified. Unfortunately, there is still no consensus among scientists on the trend of the impact of digitalization on regional socio-economic development. According to M.N. Dudin and co-authors, some researchers “note the positive impact of ICT on economic growth and economic

efficiency, while others believe that digital inequality leads to a deterioration in the regions' socio-economic development" (Dudin et al., 2021, p. 963).

In any case, the growing digital inequality between urban and rural areas, both at the national level and between regions, creates problems for nationwide socio-economic development. Evaluating the findings of our research from these positions, we should note ambiguous dynamics of the digital divide indicators. A positive trend is characterized by the reduction of the digital gap between urban and rural areas in terms of Internet access and broadband Internet access, especially with the use of mobile phones/smartphones for these purposes; and a negative trend is manifested in the growth of inequality regarding the level of digital competence of users and their digital literacy. This confirms the conclusions that have been made by other researchers regarding the first and second levels of digitalization (Korovkin et al., 2020, p. 13).

The digital gap between the skills of urban and rural Internet users in 2014–2022 increased in all major positions: more than half of the rural population aged 15 years and older had a low level of digital skills, and therefore 67.6% of rural residents did not have the need, desire and interest to use the Internet.

To solve these problems, it is necessary to implement a number of measures:

- promote people's needs to use the Internet through various kinds of PR companies, psychological trainings, online seminars, etc.;
- improve the level of digital skills in users by conducting training seminars, master classes aimed at certain age, gender, professional groups, etc.

System-wide work to improve the digital skills and competencies of rural residents, along with solving a set of motivational problems, will contribute to reversing the trend of the growing digital gap between city and village in obtaining state and municipal services and ordering goods/services online.

The combination of the use of variation coefficients and the grouping method revealed a steady tendency toward reducing the digital gap between regions in terms of household access to the Internet and in the use of the Internet for the rural population to receive state and municipal services. Applying the grouping method, we revealed that using only the coefficients of variation in conditions of insufficient development of the system of ordering goods/services via the Internet does not allow us to make an unambiguous conclusion about the trend of changing the interregional digital divide. Grouping regions depending on the level of the digital divide in Internet usage between urban and rural areas made it possible to draw a final conclusion about the growth of the digital divide.

Along with the above, in order to reduce the digital divide, it is necessary to solve a number of economic and technical problems.

Reducing the cost of connecting to the Internet can be achieved by providing budget targeted subsidies to low-income and large or single-parent families, using social tariffs for broadband and data transmission for low-income households.

In order to expand the coverage area of rural areas with cellular communications and high-speed wireless Internet in such socially problematic regions as the Non-Chernozem region, the lower limit for connecting settlements within the framework of the federal project "Eliminating digital inequality in Russia" should be set to 50 people; moreover, public-private partnership mechanisms should be used, as well as support for local communities' initiatives.

Conclusion

The digital divide in any of its manifestations, between social and age groups, between urban and rural areas, and between regions negatively affects socio-economic development in any country; this requires more attention to its study on the part of researchers of various profiles. Such studies on

identifying trends in the “city–village” context are especially relevant, since the traditionally existing socio-economic inequality between urban and rural areas can significantly increase with the formation of a trend with a growing digital divide.

Research on digital inequality is in its infancy, but is rapidly developing along with its subject, especially in foreign countries. At the same time, it is not yet clear which inequalities will increase, what new inequalities will arise and which forms of inequality will be mitigated in the era of the digital economy (Robinson et al., 2015). This requires significant comprehensive research.

Few scientific works on the digital divide in the “city–village” context are carried out in Russia under an acute shortage of official statistics, especially in the context of the country’s regions; this fact makes it difficult to identify the problems of digital transformation for rural areas. In this regard, it seems necessary to identify indicators for village in all positions of the “Federal statistical observation on the use of information technologies and information and telecommunication networks by the population” and present them in full to the scientific community for research.

To expand the information base, it is advisable to use not only the indicators of official statistics, but also the results of sociological research, data from mobile operators (2G–5G mobile network coverage areas), Internet service providers, etc. For example, our analysis of “Coverage Area Maps” by Megafon, MTS, Beeline and Tele-2 operators for the Vologda, Leningrad and Novgorod regions revealed a significant gap in the density of the cellular network between urban and rural settlements and its decrease with the remoteness of the districts from the center of the regions.

There is also a need for sociological research (questionnaires, interviews) to identify and study in more depth the reasons for people’s distrusting online operations and the peculiarities of motivational behavior of users who refuse to receive state and municipal services online, order goods/services online and perform other online operations.

Quantifying the factors that determine the digital divide and the degree of influence of the digital divide on the socio-economic development of regions is very important for future researchers, since currently the majority of studies present only theoretical approaches to this issue.

References

- Bakhtizin A.R., Bukhval’d E.M., Kol’chugina A.V. (2017). Economic differentiation of Russian regions: New estimates and patterns. *ETAP: ekonomicheskaya teoriya, analiz, praktika*, 1, 41–56 (in Russian).
- Bannikov S.A., Zhil’tsov S.A., Kazakova N.V. (2020). Digitalization trends and the causes of the digital divide in rural areas. *Vestnik NGIEI*, 11(114), 137–149. DOI: 10.24411/2227-9407-2020-10112 (in Russian).
- Batrakova L.G. (2021). Regional inequality in the socio-economic development of Russia. *Sotsial’no-politicheskie issledovaniya*, 4(13), 61–84 (in Russian).
- Bylina S.G. (2019). Digital inequality of the rural population: Settlement differences. *Regional’nye agrosistemy: ekonomika i sotsiologiya=Regional Agricultural Systems: Economics and Sociology*, 2, 107–113 (in Russian).
- Castells M. (1996). *The Rise of the Network Society: The Information Age: Economy, Society and Culture: Volume I*. Massachusetts and Oxford: Blackwell.
- Chatzichristos G., Nagopoulos N., Poulimas M. (2021). Neo-endogenous rural development: A path toward reviving rural Europe. *Sociologia Ruralis*, 86(4), 911–937. DOI: 10.1111/ruso.12380
- Dobrinskaya D.E., Martynenko T.S. (2019). Perspectives of the Russian information society: Digital divide levels. *Vestnik RUDN. Seriya: Sotsiologiya=RUDN Journal of Sociology*, 19(1), 108–120. DOI: 10.22363/2313-2272-2019-19-1-108-120 (in Russian).

- Dudin M.N., Shkodinskii S.V., Usmanov D.I. (2021). Assessment of the digital inequality impact on socio-economic development of the regions of the Russian Federation. *Voprosy innovatsionnoi ekonomiki=Russian Journal of Innovation Economics*, 11(3), 961–984. DOI: 10.18334/vinec.11.3.113452 (in Russian).
- Gainanov D.A., Sharif'yanov T.F. (2015). Transformation of the model of overcoming digital inequality in rural areas. *Upravlenie ekonomicheskimi sistemami: elektronnyi nauchnyi zhurnal=Management of Economic Systems: Electronic Scientific Journal*, 12(84), 24 (in Russian).
- Gerli P., Whalley J. (2021). Fibre to the countryside: A comparison of public and community initiatives tackling the rural digital divide in the UK. *Telecommunications Policy*, 45(10), 102222. DOI: 10.1016/j.telpol.2021.102222
- Gruzdeva M.A. (2020). Inclusion of population in digital space: Global trends and inequality of Russian regions. *Ekonomicheskie i sotsial'nye peremeny: fakty, tendentsii, prognoz=Economic and Social Changes: Facts, Trends, Forecast*, 13(5), 90–104. DOI: 10.15838/esc.2020.5.71.5 (in Russian).
- Gubanova E.S., Kleshch V.S. (2018). Methods to evaluate uneven socio-economic development of a region. *Problemy razvitiya territorii=Problems of Territory's Development*, 6(98), 30–41. DOI: 10.15838/ptd.2018.6.98.2 (in Russian).
- Haefner L., Sternberg R. (2020). Spatial implications of digitization: State of the field and research agenda. *Geography Compass*, 14(12), 1–16. DOI: 10.1111/gec3.12544
- Heeks R. (2022) Digital inequality beyond the digital divide: Conceptualizing adverse digital incorporation in the global South. *Information Technology for Development*, 28(4), 688–704. DOI: 10.1080/02681102.2022.2068492
- Holmes H., Burgess G. (2022). Digital exclusion and poverty in the UK: How structural inequality shapes experiences of getting online. *Digital Geography and Society*, 3. DOI: <https://doi.org/10.1016/j.diggeo.2022.100041>
- Kirilova D.A., Maslov N.S., Rein A.D. (2021). Overcoming digital inequality in rural areas. *International Journal of Open Information Technologies*, 9(9), 21–26 (in Russian).
- Korovkin V., Kaganer E., Kalinin A., Nureev B. (2020). *Tsifrovaya zhizn' rossiiskikh regionov. Chto opredelyaet tsifrovoy razryv?* [The Digital Life of Russian Regions. What Defines the Digital Divide?]. Moscow: Institut issledovaniy razvivayushchikhsya rynkov biznes-shkoly SKOLKOVO (IEMS). DOI: 10.13140/RG.2.2.17835.26400
- Kostyaev A.I. (2023). Rural digitalisation in the context of European approaches and practices: Scoping review. *Ekonomika regiona=Economy of Regions*, 19(4), 964–984. DOI: 10.17059/ekon.reg.2023-4-3 (in Russian).
- Kostyaev A.I., Nikonova G.N. (2021). Developing territorial differentiation processes of agricultural production in the Non-Black Earth Region and their current trends. *Ekonomicheskie i sotsial'nye peremeny: fakty, tendentsii, prognoz=Economic and Social Changes: Facts, Trends, Forecast*, 14(4), 150–168. DOI: 10.15838/esc.2021.4.76.9 (in Russian).
- Kuznetsov Yu.A., Markova S.E. (2014). Some aspects of quantifying the level of digital inequality in the regions of the Russian Federation. *Ekonomicheskii analiz: teoriya i praktika=Economic Analysis: Theory and Practice*, 32(383), 2–13. DOI: 10.33051/2500-2325-2021-4-50-71 (in Russian).
- Osipova N.G. (Ed.). (2021). *Sotsial'noe neravenstvo v sovremennom mire: novye formy i osobennosti ikh proyavleniya v Rossii: monografiya* [Social Inequality in the Modern World: New Forms and Features of Their Manifestation in Russia: Monograph]. Moscow: Perspektiva.
- Revenko L.S., Revenko N.S. (2022). Digital divide and digital inequality in global food systems. *Vestnik Rossiiskogo universiteta družby narodov. Seriya: Mezhdunarodnye otnosheniya=Vestnik RUDN. International Relations*, 22(2), 372–384. DOI: 10.22363/2313-0660-2022-22-2-372-384 (in Russian).
- Robinson L., Ono H., Cotten S.R., Quan-Haase A. et al. (2015). Digital inequalities and why they matter. *Information, Communication & Society*, 18(5), 569–582. DOI: 10.1080/1369118X.2015.1012532
- Safiullin N.A., Kuksin S.V. (2022). Investigation into the causes of the digital divide between urban and rural population of Russia. *Vestnik Voronezhskogo gosudarstvennogo agrarnogo universiteta=Vestnik of Voronezh State Agrarian University*, 15(3)(74), 163–172. DOI: 10.53914/issn2071-2243_2022_3_163 (in Russian).
- Salemink K., Strijker D., Bosworth G. (2017). Rural development in the digital age: A systematic literature review on unequal ICT availability, adoption, and use in rural areas. *Journal of Rural Studies*, 54(8), 360–371. DOI: 10.1016/j.jrurstud.2015.09.001

- Salnikov S.G. (2021). Digital inequality between the city and the countryside: Catching up or falling behind. *Nikonovskie chteniya*, 26, 125–129 (in Russian).
- Sanders C.K., Scanlon E. (2021). The digital divide is a human rights issue: Advancing social inclusion through social work advocacy. *Journal of Human Rights and Social Work*, 6, 130–143. DOI: 10.1007/s41134-020-00147-9
- Sannikova T.D. (2018). Digital inequality as a negative factor for the well-being of the rural population. *Vestnik nauki*, 6(6)(1), 21–27. Available at: <https://www.vestnik-nauki.rf/article/112> (accessed: February 27, 2024; in Russian).
- Selishcheva T.A., Asalkhanova S.A. (2019). Problems of digital inequality in the regions of Russia. *Problemy sovremennoi ekonomiki*, 3(71), 230–234 (in Russian).
- Shatalova O.M., Kasatkina E.V. (2022). Socio-economic inequality of regions in the Russian Federation: Measurement issues and long-term evaluation. *Ekonomicheskie i sotsial'nye peremeny: fakty, tendentsii, prognoz*=*Economic and Social Changes: Facts, Trends, Forecast*, 15(4), 74–87. DOI: 10.15838/esc.2022.4.82.5 (in Russian).
- Sorokin P.A. (2005). *Sotsial'naya mobil'nost'* [Social Mobility]. Moscow: Academia.
- Vallušová A., Kuráková I., Lacová Ž. (2022). Digital inequality and usage gap in the V4 region. *Economics and Management*, 25(4), 161–179. DOI: 10.15240/tul/001/2022-4-011.
- Vlasyuk L.I. (2023). Digital inequality of the Russian regions: strategic opportunities and threats. *Ekonomika promyshlennosti*=*Russian Journal of Industrial Economics*, 1(16), 59–68. DOI: 10.17073/2072-1633-2023-1-59-68 (in Russian).
- Wiesinger G. (2007). The importance of social capital in rural development, net-working and decision-making in rural areas. *Journal of Alpine Research*, 95(4), 43–56. DOI: 10.4000/rga.354
- Yanovskaya O., Kulagina N., Logacheva N. (2022). Digital inequality of Russian regions. *Sustainable Development and Engineering Economics*, 1(5), 77–98. DOI: 10.48554/SDEE.2022.1.5

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