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# Digital Divide and Effectiveness of Digital Transformation Programs in Russia

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Abstract: Digital inequality is one of the major issues of the Industry 4.0 era. This problem requires the adoption and implementation of the digital economic development programs. Xi Jinping put forward the concept of the global digital economic development that is mutually beneficial for all nations and cultures. The implementation of this concept would reduce the global digital inequality and bring the world to a new development level. The digital inequality challenge is still burning in Russia, as well as throughout the world. Timely introduction of national projects and programs for the development of Russian economy digitalization should lead to a decrease in its digital inequality at all levels. The research objective is to determine some macroeconomic indicators that can influence Russian economic development. The proceedings of major world scientists, statistical data from official databases of HSE University, Rosstat were analyzed to conduct the study. Regression and variance analysis were conducted. An econometric model was constructed based on the statistical data obtained. It was found that this model is valid and can be used to study Russian digital development. The constructed model can be used by researchers to study the digital inequality, to conduct research on the economic development.

## 1 INTRODUCTION

"Scientia potentia est" or "The one who owns the information owns the world" said F. Bacon 400 years ago. N. Rothschild confirmed this theory in 1815, when he got rich on information about Napoleon's defeat. Today, humanity has accumulated enough knowledge and information. The main thing is to be able to navigate this dataflow and easily find what is needed. At the same time, the costs of searching for information should not exceed the economic benefit. It is obvious that only modern technologies can quickly search for the necessary information in the modern world, and those who own modern technologies have an advantage over others.

However, at the 75th UN General Assembly in 2020, V. Bozkir noted that almost 50% of the population does not have the opportunity to use the Internet, 40% does not receive the necessary digital services, does not take advantage of modern technologies. At the same time, the use of the Internet and digital services is biased towards developed countries and exceeds 93%. On the other hand, there are many countries whose economic conditions do not allow the creation of the necessary digital infrastructure, provide access to digital services. For example, only 43% of the population uses the Internet in some African or Latin American countries (Digital development strategy 2024 to 2030). This indicates a digital divide between these countries, which poses a serious threat to the development of the global community. Developing digital infrastructure, reducing the cost of connecting equipment, and training in digital skills will help to narrow this gap.

In Russia, the digitalization situation is also ambiguous. The distribution of digital services and technologies decreases with distance from the Central Federal District towards Kamchatka in the Far Eastern Federal District. This exacerbates the problem of digital inequality in these districts. If residents of densely populated districts receive a diverse range of digital services, then residents of sparsely populated areas are practically deprived of this opportunity. (Alexandrova, 2019; Basova, 2021; Derevtsova, 2021)

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Many countries have developed and gradually implemented digital economy development programs to reduce the digital divide of countries and districts and the digitalization of the economy: Digital Europe Programme (The Digital Europe Programme, 2025), Digital development strategy 2024 to 2030 (Digital development strategy 2024 to 2030, 2025), Digital Switzerland Strategy (Digital Switzerland Strategy, 2025), Digital China until 2025, Digital Economy of the Russian Federation 2017 to 2030 (Decree of the Russian President, 2017), etc.

These programs are similar in that modern technologies should become a tool for combating digital inequality, subject to their availability and professional use.

# 2 MATERIALS AND METHODS

However, the scientific literature presents the ambiguous attitude of major scientists to the development of economy digitalization and the associated socio-economic inequality.

Scientists from different countries have developed a three-level model of the digital divide, to the effect that unequal access to information and communication technologies (ICT) leads to inequality in the acquisition of certain competencies and skills in the field of ICT, and, consequently, to inequality in benefits when using digital technologies in their professional life.

“Globalization and digitalization are fundamentally changing the nature of social inequality” (Kholodenko, 2019). The level of digital development depends on the skills level, education and modern ICT proficiency.

Professor Jan A. G. M. van Dijk defines the “digital divide” as a form of reinforcing social inequality in a network society (Jan, 2012).

P. Norris defined that there is a “global digital divide” between “information-rich” and “information-poor” countries, “excluded/included in the process of technological development” (Norris, 2021). The global digital divide is based on economic inequality between countries. (World Internet Usage Statistics, 2025)

T. Piketty studied the economic inequality of countries around the world over the past 200 years (Piketty, 2022), and identified the cause-and-effect relations between the socio-economic and digital divides of some countries to others.

Jaron Lanier studied the problem of digital inequality and proved that only platform monopolists get rich using big data. The growth of market power of digital giants increases economic inequality due to “asymmetric access” to big data information (Lanier, 2020).

The International Labour Organization (ILO) states that 96% of investments in digital platforms come from countries in Asia, North America and Europe, with the remaining 4% fall at countries in Latin America, Africa and Arab nations.

At the same time, 70% of revenues from digital platforms are received by the United States and China (The Digital Advantage, 2025). The uneven digitalization of the economy between the countries of the North and the global South leads to a digital and socio-economic divide at the intercountry level (Lanier, 2020).

D. Moschella believes that inequality is an integral part of the digital economy. (Moshella, 2020)

This is confirmed by the fact that every year the 10 richest people in the world are ICT business owners (Moshella, 2020; Top-10 richest people in the world, 2025).

Martin Ford showed that the contradiction between labor and capital is intensifying in the digital economy and emphasized that the owners of digital technologies will own “enormous capital”. On the other hand, artificial intelligence (AI) will become a vital tool for reducing and eliminating poverty. The use of AI in R&D will bring “economic benefits and improve living standards”. (Ford, 2022)

R. Fuchs studied various types of digital labor and determined that labor in the digital economy benefits only ICT companies. At the same time, the worker quality of life changes for the worse, and the social disparity in society increases (Fuchs, 2014).

Researchers E. Brynjolfsson, E. McAfee (Brynjolfsson, 2017), Joseph E. Stiglitz (Stiglitz, 2019), D. Susskind (Susskind, 2020) noted that Industry 4.0 increases unemployment level and, consequently, economic inequality. Scientists Pötzsch Holger and Schamberger Kerem proved that the introduction of digital technologies into production can worsen social benefits and the staff working environment. (Pötzsch, 2022)

W. Beck believes that socio-economic inequality in the digital economy is explained by the transformation of the labor market with its flexible forms of employment, individualization of labor, in which the employee's level of social protection and labor guarantees decreases. Therefore, social instability and inequality are growing (Beck, 2000). Guy Standing suggested that at least a quarter of the adult population belongs to the “precariat” in many countries (Standing, 2020).

Scientists N.M. Baranova, S.N. Larin, O.Yu. Basharina (Baranova, 2023) have developed a model for timely investment in the required sectors of the economy, including the sector related to modern information technologies, to reduce the digital divide of various economic systems at the country and district level. In addition, N.M. Baranova in her study (Baranova, 2025) believes that digital inequality at the state-by-state basis can lead to economic dependence of the country.

Thus, it is the world scientist's opinion that there are processes of digital inequality of various economic systems at the country and district level, which must be resolved as quickly as possible in the modern world.

# 3 RESULTS

In 2024, the Russian project to eliminate digital inequality (EDI), implemented by the Digital Economy Program, turned 10 years old. In accordance with the Program, 97% of Russian population should have access to the Internet by 2030, even in remote areas and settlements with a population of 100 to 500 people, and thus be able to use the required online services. Currently, more than half of the planned settlements have been connected. (Decree of the Russian President, 2017)

Scientists T.V. Alexandrova, E.A. Basova, I.V. Derevtsova, Ya.A. Vnukova, E.A. Golovashchenko, D.D. Denisevich, T.A. Selishcheva, and others (Alexandrova, 2019; Basova, 2021; Derevtsova, 2021; Selishcheva, 2024) carried out the research of the digital inequality of Russian districts and determined how this divide affects their socio-economic and digital development.

Let us consider how modern technologies can influence Russian development to formulate the most effective socio-economic strategies. This requires determining some factors influencing this development and conducting an econometric study (Matyushok, 2020). The indicator that determines the development level of the country – real GDP (trillion rubles) – is selected as the regressand Y. Inflation ($X_1$), costs of innovative activities of companies ($X_2$), level of Internet penetration ($X_3$), research and development costs ($X_4$), import of ICT goods ($X_5$), export of ICT goods ($X_6$), export of ICT services ($X_7$) are major drivers influencing the digital and economic development. A correlation analysis was carried out and correlation matrices were constructed between the variables Y and $X_i$ ($i$=1,…,7). A close negative correlation was established between the indicators $RYX_1$ = -0.75 and a close positive correlation was established between the indicators $RYX_2$=0.74; $RYX_3$=0.93; $RYX_4$=0.83; $RYX_5$=0.75; $RYX_6$=0.93; $RYX_7$=0.7. If each regressors is included in the model, it turns out that the model has high multicollinearity. Therefore, the variables should first be eliminated sequentially. This results in a model with four regressors: $X_1$ – CPI (%), $X_2$ – costs on innovative activities of companies (billion rubles), $X_3$ – number of Internet users (% of population); $X_4$ – research and development costs (billion rubles).

The databases of HSE University (HSE University, 2025) and Rosstat (Rosstat, 2025) were chosen as the information base for the study. The regression and variance analysis were carried out within the framework of the modeling.

The regression and variance analysis of the dependence of Y on $X_1$, $X_2$, $X_3$, $X_4$ showed that the coefficients of the variables $X_1$, $X_2$, $X_3$, $X_4$ are significant, the determination coefficient tends to 1, the standard error of the equation tends to 0. Consequently, it is possible to construct an exponential model (1):

$$\ln Y = 0.03 \cdot X_1 + 0.0002 \cdot X_2 + 1.988 \cdot X_3 - 0.001 \cdot X_4 \quad (1)$$

Examining the estimates of equation (1), it was discovered that the indicators $X_2$ and $X_3$ have the greatest impact on Russian economic development.

Therefore, if $X_2$ grows by 1 billion rubles, Y will increase by an average of 0.2 billion rubles, and if $X_3$ grows by 1 percentage point (p.p.), Y will increase by an average of 2 p.p., if other factors remain constant.

Statistics (Rosstat, 2025) indicate that the percentage of Internet users in total Russian population in 2000 was 1.98%, but this percentage had increased to 90.4% by 2024. After the forecast of this indicator was built up to 2028, it should be noted that it should increase to 99.74% by 2028. This indicator corresponds to the optimistic scenario of Russian digital development according to the development program "Digital Economy" up to 2030 (Decree of the Russian President, 2017). However, it is not enough to be just an Internet user for the rapid development of the digital economy. It is necessary for citizens to acquire the necessary competencies and skills in a timely manner when using ICT, and, most importantly, use them in their professional life, including scientific one, and be able to benefit from digitization.

Despite the state and business support for science, Russian R&D expenditures annually amounted to within 1% of GDP until 2023 (43rd place in the world). Significant expenditures on science allowed it to take 9th place in the ranking of countries by absolute expenditures on science ($61.8 billion in PPP). A forecast was made up to 2028, and it was found that R&D expenditures will amount to 2% of GDP. This is confirmed by the state plan to increase R&D expenditures to 2% by 2030. Unfortunately, this figure is still significantly lower than the world's major economies for 2023: Israel (6%), the Republic of Korea (5.2%), Taiwan (4%), the USA (3.6%), Sweden (3.4%), Belgium (3.4%), Japan (3.4%).

Thus, the level of Internet penetration and expenditure on innovation and research and development indicate the involvement of citizens in the digital economy, and they are the key factor in Russian digital and economic development.

# 4 CONCLUSION

As far back as 2012, Xi Jinping, current General Secretary of the People's Republic of China, put forward the concept of “Community with a Shared Future for Mankind” at the 18th National Congress of the CMC (Chen, 2023). The idea of the concept was to develop mutually beneficial economic cooperation between countries. The concept implementation would reduce the level of global inequality and bring the world to a new level of development.

The digital inequality challenge remains burning in Russia, as well as throughout the world. Russian economic development shows good progress using digital technologies, although their share in GDP is lower than in the major world economies. The HSE data for 2022 show that ICT costs in GDP amounted to 3.1% against 6% in the US and EU. (HSE University, 2025)

The development and timely implementation of national projects and programs for the development of digitalization of the Russian economy (“Digital Economy” and “Digital Region” (Decree of the Russian President, 2017)) have led to a significant increase in digitalization and a decrease in digital inequality at the federal and regional levels. Many districts of the Russian Federation are implementing their own digital strategies geared to the district. This has led to the digital competence level among the Russian population increasing to 6.65 points (out of 10) by 2024, despite the digital divide of some eastern and southern districts. On the one hand, this indicates progress in the digital development of Russia, and on the other, notes the problems of digital inequality (HSE University, 2025).

State Digitalization Programs focused on people need to be further developed to reduce digital inequality, while the characteristics of each district should be taken into account: the project “Elimination of Digital Inequality” (EDI), the “Digital Educational Environment” platform; “University 2035”, the federal project “Personnel for the Digital Economy”, digital inclusive education programs for people with disabilities, pensioners, low-income people, etc. These programs should contribute to the development of digital literacy of citizens, form their digital competencies, reduce the number of territories with “informational isolation”.

There are various scenarios for Russian digitalization until 2030: basic, optimistic and pessimistic. The development of Russia should not follow the pessimistic scenario, despite all the challenges, the inertia of citizens and state structures, so as not to divide behind the advanced world in its development and not to lose its independence.

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# REFERENCES

Alexandrova, T.V., 2019. Digital divide regions of Russia: causes, score, ways of overcoming. *Journal of Economy and Business*, 8, 9-12.

Baranova, N.M., Larin, S.N., Basharina, O.Yu., 2023. Tools for studying the digital development rates of economic systems at country and region level. RUDN *Journal of Economics*, 31(4), 687–699

Baranova, N.M., 2025. Study of the level of economic inequality and sustainable development of economic systems, taking into account digital development. *Russian Journal of Innovation Economics*, 15(1), 57-68.

Basova, E.A., 2021. Digital Inequality in Russian Regions: Current Problems and Ways to Overcome. *Territorial development issues*, 9(4).

Beck, W., 2000. *Risk Society. Towards a New Modernity*. Translated by Ritter, Mark. Sage Publications, London.

Brynjolfsson, E., McAfee, E., 2017. *The Second Machine Age: Work, Progress, and Prosperity in the Age of Emerging Technologies*. Norton & Company, US.

Chen, Enfu, 2023. *World situation and Chinese economy in the new era*. Monograph. Ed. S.D. Bodrunov. INIR S.Yu. Witte: Centercatalog, Moscow.

Decree of the Russian President at 9.05.2017 No. 203 «On the Strategy for the Development of the Information Society in the Russian Federation at 2017–2030». Accessed 27 Feb 2025

Derevtsova, I.V., Vnukova, Ya.A., Golovashchenko, E.A., Denisevich, D.D., 2021. The problem of digital inequality in the regions of Russia as a threat to economic security. *Baikal Research Journal*. 12(2).

Digital development strategy 2024 to 2030. UK International Development. Accessed 27 Feb 2025

Digital Switzerland Strategy. Ordinance on the Coordination of the Digital Transformation and ICT Steering in the Federal Administration. Accessed 27 Feb 2025

Ford, Martin, 2022. *Robot Power: How to Prepare for the Inevitable*. Alpina non-fiction, Moscow.

Fuchs, R. (2014) *Digital labor and Karl Marx*. Routledge, New York.

Jan A.G.M. van Dijk, 2012. *The Network Society*. Sage Publications, London.

Kholodenko, Yu.A., 2019. Social risks of the digital revolution: the factor of globalization. Alma Mater. *Bulletin of Higher School*, 9, 88-93

Jaron, L., 2020. *Who Owns the Future? A World Where You Will Be Paid for Information*. Simon & Schuster, US.

Matyushok, V.M., Balashova, S.A., Lazanyuk, I.V., 2020. *Basics of econometric modeling using Eviews: tutorial; electronic text data.* RUND, Moscow.

Moshella, D., 2020. A *Guide to the Digital Future: Industries, Organizations, and Professions*. Alpina Publisher, Moscow.

HSE University. Information and analytical materials "Digital Economy". Accessed 24 March 2025

Norris, P., 2021. *The Digital Divide: Civic Engagement, Information Poverty, and the Internet Worldwide*. Cambridge University Press, Cambridge, UK.

Piketty, Th., 2022. *A Brief History of Equality*. Harvard University Press. Belknap Press.

Pötzsch, H., Schamberger K., 2022. Labour Struggles in Digital Capitalism: Challenges and Opportunities for Worker Organisation, Mobilisation, and Activism in Germany. TripleC: communication, capitalism & critique. *Journal for Global Sustainable Information Society*, 20(1).

Federal State Statistics Service (Russia). Rosstat. Accessed 27 March 2025

Selishcheva, T.A., 2024. Digital transformation of industrial capital in the information economy. *Problems of modern economics*, 2(90).

Standing, G., 2020. *Precariat: the new dangerous class*. Ad Marginem Press, museum of contemporary art “Garage”, Moscow.

Stiglitz, J. E., 2019. *People, Power, and Profits: Progressive Capitalism for an Age of Discontent*. USA: W.W. Norton & Company.

Susskind, D., 2020. *A World Without Work: Technology, Automation and How We Should Respond*. Allen Lane, London.

The Digital Advantage: How digital leaders outperform their peers in every industry. Capgemini Consulting. The MIT Centrel for Digital Business. Accessed 10 Jan 2025.

The Digital Europe Programme. Shaping Europe’s digital future. An official website of the European Union. Accessed 27 Feb 2025

The Top-10 richest people in the world (May 2025). Forbes. Accessed 10 May 2025

World Internet Usage Statistics News and World Population Stats. World Internet Stats. Accessed 27 March 2025