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Exploring Digital Inequalities in Russia: an interregional comparative analysis

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Structured abstract

Purpose (limit 100 words)

This paper contributes to the literature by proposing an analysis of digital inequalities in Russia that focuses on two aspects hitherto under explored: the inter-regionality (by comparing and contrasting eight federal districts) and the multidimensionality of digital inequalities (by taking into account the three levels of digital divide). Therefore, the aim is to address the phenomenon of digital divide in Russia by discussing the three levels of the digital divide (access / skills / benefits) in a comparative and interregional perspective.

Design/methodology/approach

This paper uses secondary data for its analysis, including both national (e.g. the total number of daily Internet users in Russia) and more regionalized data (related to particular federal districts of Russia). The choice of data sources was determined by an attempt to provide a detailed and multifaceted coverage of all three levels of the digital divide in Russia, which is not limited to the access problem only. For this purpose, we are using and re-elaborating various reports about the development of the Internet and ICTs in Russia prepared by national and international organizations to cover the first level of the digital divide. To shed light upon the second and third levels of the digital divide, we discuss digital literacy report (2018), the report on Internet openness index of Russian regions (2017), and the report on the digital life index of the Russian regions (2016). Finally, in the attempt to map out the key directions of the state policy aimed at decreasing digital inequality in Russia, on both federal and regional levels, we analyze the most important regional and national policy measures to foster digitalization such as the Digital Russia program, the Digital Government program, the Program of Eliminating Digital Inequality in Russia.

Findings

We consider this study to be both a first exploration and a baseline of the three level digital divides in Russia. The paper shows how the level of socioeconomic development of the federal districts, as well as a number of objective factors (distance/isolation, urbanization level, availability of infrastructure and costs for building new infrastructure, etc.) have impact upon digitalization of the regions. As a result, several federal districts of Russia (Central, Northwestern, and, in a number of cases, Ural and Volga federal districts) more often than others take leading positions in rankings, in terms of degree of Internet penetration, audience numbers, use of e-services, etc. This correlation however is not universal as we will show, and some regions lacking behind in terms of access can be booming in terms of digital literacy or other factors, like it happened with Far Eastern federal district for example. All in all, our research showed that digital inequality in Russia is still on place and will require more time for complete elimination, even though current state and public initiatives are being actively developed.

Originality/value (limit 100 words)

This paper brings to light meaningful insights into the three levels of digital divides in Russia. Based on a multilevel (three levels of digital divide) and multi-sectional approach (the interplay of different types of inequalities), this paper contributes to overall better understanding of the digital inequalities phenomenon in Russia. It also allows for a comparative interregional perspective, which has been missing in most papers on digital inequalities in Russia so far.

1. Introduction

The problem of digital divide in different national contexts has been thoroughly analyzed by researchers across the world (e.g. Chipeva, et al. 2018; Dilmaghani, 2018; Ragnedda, & Kreitem, 2018; Vartanova, 2013a, 2013b). However, little attention has been given to the problem of digital inequalities in Russia, specifically in an interregional perspective. This is quite

surprising given the peculiar character of Russia that is reflected in the way federal districts – while being parts of the same country – differ from each other economically (e.g. average salaries rate, GDP, size and efficiency of economy, etc.), geographically (e.g. territorial differences, distance from the large cities and the two main megapolises, Moscow and St. Petersburg, etc.), technologically (uneven connection of Russia by transportation and ICT infrastructures, first and foremost due to the unprecedented scale of the country), socially (population density, size of urban/rural population, differences in education, opportunities on labor market, etc.), as well as ethnically and linguistically (e.g. the number of smaller ethnic and cultural groups residing in particular districts of Russia).

Due to its complex and immense territory, its socio-economic and historical development, professional journalistic practices and other factors (Vartanova, 2019; Vyrkovsky et al, 2019), Russia represents an interesting case study for the analysis of different kinds of inequalities. This topic has, indeed, attracted the attention of numerous scholars that, over the years, have focused on inequalities in socioeconomic development of the Russian regions (Kolomak, 2010); inequalities in access to the higher education (Mikheeva, 2004); and inequalities in the quality of life in Russia (Bobkov, Gulyugina, & Odintsova, 2009). Fewer research, however, has been conducted to investigate the development of *digital inequalities* in Russia (e.g. Deviatko, 2013; Nagirnaya, 2015; Volchenko, 2016), despite the fact that the problem of digital divide 'plays an important role for hindering the development of the civil society' (Rykov, Nagornyy, & Koltsova 2017: 70).

Most publications on the digital divide in Russia (e.g. Vartanova, 2013, 2018; Volchenko, 2016; Bykov, & Hall, 2011; Delitsyn, 2006; Deviatko, 2013; Rykov, Nagornyy, & Koltsova, 2017) have rather general character. They discuss digital inequalities in regard to digital economy and/or information society issues, aim to conceptualize the notion of the digital divide and classify theoretical approaches to it, from pure access problem to a broader social one (Vartanova, 2018: 8-11). Despite current federal and regional programs aimed at overcoming

digital divide in Russia (including the all-Russia target program started in 2014), digital inequalities are still present in Russia (e.g. Vartanova, & Gladkova, 2019; Bykov, & Hall, 2011; Volchenko, 2016). Furthermore, the majority of papers on the digital divide in Russia approach it mostly from a technological point of view, i.e. a divide between those who access and those who are excluded from the digital world and discuss a multitude of factors that can influence that divide. In this vein, for instance, Bykov, & Hall (2011) discuss how the age and education level influence the access to the Internet in Russia, while Brodovskaya, & Shumilova (2013) note correlation between the region of living, the distance from the city centre and the intensity of Internet use. Volchenko (2016) underlines correlations between age, gender, level of income and education, region of living and overall involvement of respondents into digital environment. Zherebin & Makhrova (2015) show that the time people spend online varies depending on their age. A number of papers approach digital inequalities in a broader inter-regional perspective, analyzing and comparing regions of Russia by the level of Internet penetration, speed, cost, etc. (Deviatko, 2013; Nagirnaya, 2015), while – again – mostly discussing the problem of access/lack of such and factors that can influence it.

What is missing is an exploratory analysis of the second (inequalities in uses) and third (inequalities in tangible outcomes) levels of digital divide in Russia. This paper contributes to the literature by proposing an analysis of digital inequalities in Russia that focuses on two aspects hitherto under explored: the inter-regionality (by comparing and contrasting eight federal districts) and the multidimensionality of digital inequalities (by taking into account the three levels of digital divide). Therefore, the aim is to address the phenomenon of digital divide in Russia by discussing the three levels of the digital divide (access / skills / benefits) in a comparative and interregional perspective.

For this purpose, we will first briefly overview Russia's regional disparities and the country's specifics (*Section 2*), to show that Russian federal districts, despite being parts of the same county, considerably differ from each other. Then we will comment on the data used

(*Section 3*) and dig deeper into the so-called first level of digital divide (Attewell, 2001), comparing and contrasting inequalities in access between different federal districts (*Section 4*). In *Section 5*, we will move beyond the access issue and shed light upon the second level of the digital divide (Hargittai, 2002), by analyzing inequalities in terms of Internet usage and digital competences amongst the eight federal districts of Russia. We will briefly touch also on the third level of digital divide, namely the inequalities in the benefits users get from different accesses and uses of ICTs (Ragnedda, 2017) and examine level of digital engagement between state authorities and public society, as well as state authorities and local businesses in particular regions, to unpack the consequences of inequalities in capitalizing the use of ICTs. Finally, we will briefly discuss current policy measures aimed at overcoming digital inequalities in Russia (*Section 6*).

2. Russia's regional disparities: a brief background

Russia is a huge territory with tremendous cultural, lingual, ethnic and socio-economic differences. In a country consisting of eight federal districts (see *Figure 1*) divided into 85 federal subjects (i.e. constituent units), 22 out of which are national republics, having a territory of over 17 100 000 square km and population of 146 million people, including over 190 ethnic groups, the problem of different types of inequality between – as well as within – different parts of the country remains exceedingly important.

Figure 1. Federal districts of Russia (1 – Central; 2 – Northwestern; 3 – Volga; 4 – Southern; 5 – North Caucasus; 6 – Ural; 7 – Siberian; 8 – Far Eastern). Our elaboration

Central federal district where Moscow is located is the biggest federal district by *population* (39.2 mln people). It is followed by the Volga federal district (29.6 mln people); Siberian (19.3 mln people); Southern (16.4 mln people); Northwestern (13.8 mln people), where the second biggest city in Russia, St. Petersburg is located; Ural (12.3 mln people; North Caucasus (9.7 mln people); and Far Eastern (6.1 mln people) (Chislennost naseleniya, 2017) are the least populated regions of Russia.

Central and Northwestern federal districts are absolute leaders in terms of urban population numbers (81,3% urban vs. 18,7% rural in the Central federal district; 83,5% urban vs. 16,5% rural in the Northwestern federal district), which can be probably explained by the proximity of these areas to the two biggest megapolises in the country, overall economic and infrastructure development of these federal districts, and other factors. Southern (62,4% vs. 37,6%) and North Caucasus (49,2% vs. 50,8%) federal districts have on the contrary bigger rural population numbers.

As Vartanova (2013b) argues, geographical differences in Russia are closely intertwined with economic, social and cultural differences, with the country itself being 'an illustrative example of social, cultural and technological complexity within Europe' (Vartanova, & Gladkova, 2019: 202). These inequalities, in their turn, have a clear impact upon digitalization process and the way people access and use ICTs in those areas. More specifically, the *socioeconomic state* and the *educational level* have a strong impact on the digitalization level in Russian regions. In the first case, recent ranking of Russian regions by their *socioeconomic state* (Reiting, 2018) showed that the two leaders are Moscow (located in Central federal district) and St. Petersburg (located in Northwestern federal district). This point is further reinforced by looking at the *size of economy,* that shows that Central federal district, Ural federal district and Northwestern federal district are the leading districts. The same goes for the *GDP per capita rates,* where Central (616 366 rubles) and Ural (758 885 rubles) federal districts again take the leading role.

Regarding the educational level, the *Russian regions' innovative educational ecosystem's index* developed by the Higher School of Economics (2017) examines a number of parameters to evaluate the level of Russian secondary schools and training institutions' innovative character (including access of schools to the high-speed Internet, availability of ICTs in schools etc.). According to this study the top-three are again Central federal district, Ural, and Northwestern.

This brief overview paints a portrait of Russia as a vast and complex society, where the eight districts differ in terms of size, population, socioeconomic and educational level, geography and other factors. These aspects, as we are going to see, have impact on the three levels of digital divide in Russia. In what follows, we will explain the secondary data we are using in this research.

3. Data used

In this paper, we use data of both national (e.g. the total number of daily Internet users in Russia) and more regionalized character (related to particular federal districts of Russia). More specifically, to introduce the socio-economic and educational inequalities in Russia we used some data from the Federal State Statistics Service (2018) and reports prepared by Rossiya Segodnya as part of the RIA Reiting project (2017, 2018). In regard to the Internet penetration and spread of technologies in the eight districts, we are using and re-elaborating various reports about the development of the Internet and ICTs in Russia prepared by the World Bank Group (Rossotto, et al., 2015), GfK (2018), Mediascope (2018), Public Opinion Fund (2017-2018), Yandex (2016) and We Are Social/Hootsuite (2018). Furthermore, to shed light upon the second and third levels of digital divide, we will discuss the digital literacy report (2017), the report on Internet openness index of Russian regions (2017), and the report on the digital life index of the Russian regions (Korovkin, & Kaganer, 2016). Finally, in the attempt to map out the key directions of the state policy aimed at decreasing digital inequality in Russia, on both federal and regional levels, we will analyze the most important regional and national policy measures to foster digitalization such as the Digital Russia program, the Digital Government program, the Program of Eliminating Digital Inequality in Russia. All data used in this paper were originally collected through national or regional surveys, including all-Russia state census in 2010, representative polls and public opinion surveys, data provided by regional ministries/departments to federal state authorities including Ministry of Finance, Federal Treasury in their official reports, etc. Although some of these data sources were earlier used for the study of digital inequalities in Russia (e.g. Kolomak, 2010; Deviatko, 2013; Volchenko, 2016), they have not been so far analyzed all together, as parts of a bigger picture, helping to understand all three levels of the digital divide in Russia. This paper therefore puts together, analyses and discusses statistics of different kinds and levels in order to provide deep analysis of all manifestations of the digital divide in Russia, not being limited to access only but encompassing many other aspects too.

4. First level of digital divide: access problem still on place

The total number of worldwide Internet users has dramatically increased almost everywhere in the world. However, the growth did not happen homogeneously. Some countries, more than others, have increased the numbers of users, while others grew up really slowly, giving the rise to Global Digital Divide (Norris, 2001). The spread of technologies in a given country is due to different historical, cultural and economic reasons. However, even within some countries the inequalities in terms of access are evident. This is particularly true in some huge and fast developing countries, such as Russia, where the first level of digital divide is far away to be bridged, since around 30% of the Russian population do not access the Internet at all (see *Figure 2*).

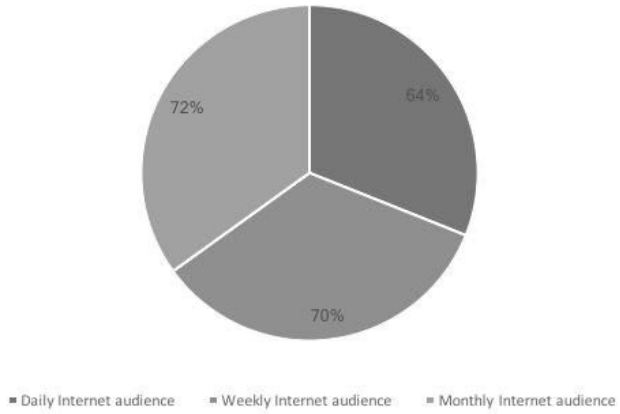

Figure 2. Daily, weekly and monthly Internet audience numbers in Russia (% of the total population), winter 2017/2018). Source: Internet v Rossii: 2017-2018. Our elaboration

Here we can continue the discussion about correlation between *objective factors* (distance/isolation, urbanization level, availability of infrastructure and costs for building new infrastructure, etc.) and digitalization of the regions and mention a few more things. In a huge country like Russia, climatic and geographical conditions play an important role when it comes to bridging digital divide. In Northern and Far Eastern regions for example, harsh climate, combination of different natural zones (tundra, taiga, mountain and water zones, etc.), location of some territories, including for instance the city of Norilsk, the northernmost city in Siberia, in the

continuous permafrost zone make it technically difficult and financially challenging to build optic fiber lines. Just for comparison: building 7,2 thousand km optic fiber cable lines in Nizhny Novgorod oblast (Volga federal district) would cost around 1,95 billion rubles (Rostelekom vlozhit 13,5 mlrd rublei v stroitelstvo linii svyazi v PFO, 2019) while building 1,7 thousand km lines in Kamchatka-Sakhalin-Magadan areas (Far Eastern federal district) cost 5 billion rubles (Rostelekom zavershila sozdanie VOLS Kamchatka-Sakhalin-Magadan, 2016). In some places, for example Chukotka authonomous okrug in the Far East, people still have to use satellite Internet connection (quite low-speed and expensive) due to lack of alternative options. Access problem however is being successfully solved through various state programs aimed at eliminating digital inequality in Russia. This includes building kilometers of optic fiber cables, installing free WI-FI spots in settlements with over 250 inhabitants and other projects that we will discuss in the paper.

In order to provide a deeper picture of the first level of digital divide in Russia, we will first focus on the a) inequalities in accessing to and the speed of adoption of the Internet between the eight districts in Russia. Then, we will look, in a comparative way, at the inequalities in terms of b) cost to connect, and c) the type and number of devices used to connect.

4.1 Urban/rural Digital Divide

The distinctive position of Moscow as Russia's governmental, business, educational, and cultural capital with the most extensive and reliable communications infrastructure is still visible. 'In Moscow and St. Petersburg, for instance, Internet penetration is around 1.5 times higher than the average in other cities (50 users per 100 inhabitants) and 2.5 times higher than in rural areas' (30 users per 100 inhabitants) (Nagirnaya, 2015: 130). Among all federal districts of Russia, Northwestern federal district is the leader in terms of daily Internet audience (71%) while Volga federal district has the lowest score in this category (60%) (Internet v Rossii, 2017-2018).

These data capture very well a digital regional divide existing in Russia. While the urban-rural digital divide, namely the inequalities in the network coverage, affordable high-speed

Internet services and quality of telecommunications infrastructure at different spatial scales, is a well known phenomenon present also in the Global North, such as Europe (Răileanu Szelesab, 2018) and North America (Silva et al., 2018), it seems more accentuated in the Global South or BRICS countries. In fact, within vast territories, such as Russia (Vartanova, 2019), India (Kumara, & Kumara, 2018), Brazil (Nishijimaa, Ivanauskasb, & Sarti, 2017) China (Jianbin Jin et al., 2018), the rural-urban disparity is further exacerbated on the regional basis. In these countries, there is a clear gap in terms of Internet penetration, whereby cities have a higher number of Internet users compared to rural areas.

These inequalities are often difficult to bridge because it is more expensive and complicated to deploy technologies in rural and remote area. However, the link between economic development of Russian regions and the level of Internet penetration is not always so evident. Sometimes territorial formations within particular districts are very well developed in terms of digital technologies and innovations, while the federal districts where they are located lack behind according to some key parameters. To illustrate this: although the Republic of Tatarstan (located in the Volga federal district) is one of the Russian leaders by socioeconomic development (number 4 in the 2017 ranking) (Reiting 2018), the district itself still lacks behind by the number of daily Internet users for example (see *Figure 3* and *Table 3*). Again, this illustrates how complex (and often geographically determined) the problem of the digital divide in Russia is.

In terms of Internet penetration, Northwestern federal district holds the leading position, while the lowest rate is found in the North Caucasian republics, because of the low level of urbanization (Nagirnaya, 2015: 130). Furthermore, in terms of speed of Internet diffusion and adoption of technologies, in the period 2016-2018 all federal districts of Russia (see *Figure 3*), with an exception of Ural federal district, increased the amount of their daily Internet audience, roughly by 4-5%, with a peak of 7% in Far Eastern federal district. This is due to the active implementation of the state program aimed at eliminating digital inequality in Russia, which was

launched in 2014. Although the program has all-Russia coverage, less developed in technological sense regions have been receiving special attention and support in that program. Due to the increase in Internet coverage of remote areas, the number of Internet users grew too, contributing to overall positive dynamics in the regions (*Figure 3*).

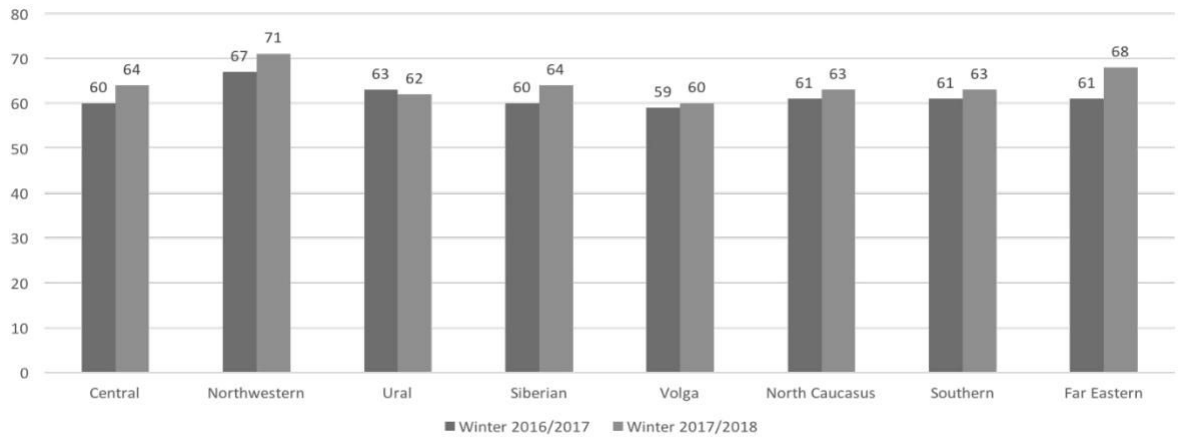

Figure 3. Daily Internet users in Russian regions (% of the total Internet users in particular federal districts) Source: Public Opinion Fund. Our elaboration

4.2. Cost to connect

Several research have underlined how the cost of connection to ICTs may limit the access to it. In fact, a cheaper cost of connection increases the probability of using ICTs, thus reducing the first level of digital divide (Engelbrecht, 2008). In Russia, as *Table 1* shows, the differences between regions in terms of costs are still noticeable (sometimes in two times), and this may influence the first level of digital divide between the federal districts. More specifically, *Table 1* shows four main features that might influence both access to and the quality of internet experience, namely: cost of unlimited fixed Internet access at speed over 3 Mbit/sec; speed (Mbit/sec); cost of mobile Internet access with free traffic provided; and amount of free mobile traffic provided (GB).

Federal district of Russia	**Cost of unlimited fixed Internet access at speed over 3 Mbit/sec**	**Speed (Mbit/sec)**	**Cost of mobile Internet access with free traffic provided (rubles**	**Amount of free mobile traffic provided (GB)**

	(rubles per month)		per month)	
Central	367	40	296	4,8
Northwestern	419	28	254	3,6
Ural	414	26	291	4,1
Siberian	427	27	290	3,7
Volga	365	29	241	4,8
North Caucasus	503	27	300	5,1
Southern	402	24	252	4,6
Far Eastern	624	19	454	3,8

Table 1. Cost of fixed and mobile Internet access in Russian regions (spring 2016). Source: Yandex

By looking at these data we can observe that in terms of cost of fixed Internet access the Far East has the highest (624 rubles per month for unlimited Internet access) while the lowest is the Central federal district (367 rubles per month). Mobile Internet cost rates show similar trend: the highest cost is again in the Far East (454 rubles per month), while the lowest is in Volga federal district (241 rubles per month). The average cost of fixed Internet access in Russia is 404 rubles per month, and the average cost of mobile Internet access is 281 rubles (ibid). The different price to access to the Internet access fees 'is due to the remoteness of regions from the federal center and, therefore, the more expensive backbone traffic; differences in the transmission channels of Internet traffic (in the Far East and Siberia the Internet is provided mainly through more expensive satellite links); and the low level of competition at regional markets' (Nagirnaya, 2015: 130).

Comparing general Internet penetration rate in the country (72% in 2018) and mobile Internet penetration rate (56% in 2018) (GfK, 2018), the growth becomes clear. In fact, general penetration rate increased in 2018 by 3% since 2015/2016, while mobile Internet penetration rate grew much more rapidly – by 20% for the same period (ibid). In 2013, only 12% of Russians used smartphones to go online, while in 2018 this number reached 51.5%. More specifically, in 2018, 13% of Russians access Internet via their mobile devices only. However, this data is much higher with young people under 30 years (18.4% of Russians in that age group go online using mobile devices only) and by people living in rural areas (16.4% of Russians living there access Internet via mobile devices only) (ibid).

The latter trend may be again explained by affordability and availability of mobile Internet compared to fixed one, particularly when it comes to remote and rural areas of the country. In Chukotka autonomous okrug that we have already mentioned earlier, mobile Internet is the only alternative to Internet connection through satellite (quite expensive and slow). For comparison, monthly payment for unlimited satellite Internet connection through Anadyr.net costs in 2019 1990 rubles, while unlimited mobile connection through MTS in the same Anadyr (Chukotka) region costs 950 rubles a month. Finally, we may notice inequalities also in terms of the speed rate of fixed Internet connection. The Far East has the lowest speed rate in the country – 19 Mbit/sec only, while the average speed rate in Russia in general is 30 Mbit/sec.

4.3 Type and number of the devices used

If we look at the type of the devices Russians use to go online, as well as the number of devices they use for that purpose, we will note several clear trends. First, as we have already noted, smartphones are becoming more and more popular for Internet use, while popularity of desktop Internet use is gradually decreasing. Mobile Internet audience constitutes 59% of the total Russian Internet audience compared to 54% of desktop Internet audience (Mediascope, 2018). 'Desktop only' audience showed a decrease by 20% in 2017/2018, while 'mobile only' audience (here the main groups are students, non-office workers and housewives) on the contrary grew by 20% in the same period. This is an interesting fact in exploring digital inequalities, since mobile users tend to have a less rich Internet experience than that of Personal Computers (Napoli, & Obar, 2014).

Digging deeper into geographical differences, we can observe that mobile Internet audience prevails over desktop one everywhere in the country. The difference between the number of mobile and desktop Internet users is more noticeable in smaller Russian cities and villages: 66% (desktop) vs. 78% (mobile), compared to bigger cities of 100 000 + inhabitants: 79% vs. 81% (Mediascope, 2018). The reasons for that can be manifold: better penetration rate in bigger cities allowing for more or less equal use of both types of Internet access; availability

of technical affordances and actually a need for using desktop Internet, which is usually a case in bigger cities where offices are usually located. Cheaper mobile access in remote and less populated areas of Russia and the fact that Wi-Fi access in Russian settlements with over 250 people provided within the state Program of Eliminating Digital Inequality became free since August 2017, has positively influenced the spread of the Internet, therefore reducing the first level of digital divide.

Furthermore, in bigger cities with 100 000 + inhabitants, people more often possess more than one device for Internet access, while those living in smaller cities in the countryside usually have just one device (cf. 29% of users possessing one device only in bigger cities vs. 44% of users in smaller ones) (*Figure 4*). The number of those having four and more devices for accessing the Internet (PC, laptop, smartphone, tablet, Smart TV, etc.), is noticeably higher in bigger cities (18%) compared to smaller ones (8%), which can possibly be related to differences in income rates in these cities and other factors. Differences in device opportunities and in devices used in Russia is evident based on the type / size of settlement people live in (see *Figure 4*). These differences are known as material access inequalities (van Deursen, & van Dijk, 2018) and are part of the first level of the digital divide.

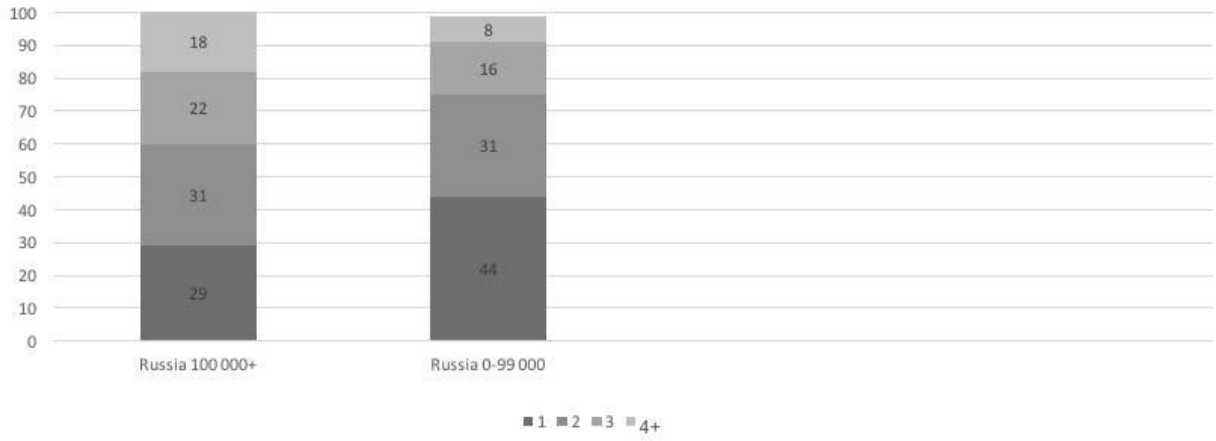

Figure 4. Number of devices used for Internet access in Russian cities (2018, % of users having particular number of devices). Source: Mediascope

Furthermore, differentiation of regions in terms of penetration of mobile broadband is smaller than in the case of fixed connections. Moscow and St. Petersburg are again the leaders, with 61% and 56% of Internet audience there using mobile devices for Internet access at least once per month (according to data of 2015. Yandex stopped putting up together this report after 2016). North Caucasus and Far Eastern federal districts demonstrate highest numbers of mobile Internet users among all federal districts (excluding Moscow and St. Petersburg), which can be explained by affordability of mobile Internet connection in those areas compared to wired connection, also in terms of infrastructure availability and costs (*Table 2*). All Russian mobile operators give their subscribers access to mobile Internet at different rates, depending on the tariff they choose (speed, amount of Internet traffic included, etc.), which makes mobile Internet use available to a majority of mobile users in Russia, and sometimes the only feasible option.

Federal district of Russia	**2015**
Central	46
Northwestern	43
Ural	48
Siberian	44
Volga	45
North Caucasus	52
Southern	45
Far Eastern	53

Table 2. Monthly mobile Internet audience in Russian regions (% of the total population in a particular federal district). Source: Yandex

We may thus conclude that the first level of the digital divide, namely access problem is still present in Russia, regardless of many positive changes in the past years (growth of Internet penetration rate, increase of daily Internet audience numbers and mobile users, straightforward state policy aimed at bridging digital divide in the country, etc.). We believe that this situation can be to a large extent determined by a set of 'objective factors', including size of the country, different types of relief and natural zones, climatic conditions, distances, urbanization level, different socioeconomic state as well as location of regions and many other things. As a result, these factors lead to a situation when some regions/federal districts may be less developed and advantageous than others in terms of broadband Internet penetration, infrastructure availability,

Wi-Fi coverage, spread of online services, etc. As we have seen, some regions including for example Northwestern or Central federal districts show better results by most parameters we analyzed, while others, including Far Eastern federal district or North Caucasus noticeably lack behind. We are not saying that those 'objective factors' are the only reason why digital divide of the first level (overall access, cost, speed, availability and use of ICTs and services etc.) still exists in Russia but we believe that they play an important role in the process too. However, as we will show in the next section these 'objective factors' and second/third levels of the digital divide are not always related to each other in Russia.

5. Second and third levels of the digital divide: Digital literacy and digitalization of the Russian regions

Although the first level of digital divide has not been fully bridged in Russia yet, there is a need to move beyond inequalities in access. While historically simple access and possession of ICTs were seen as the main feature to understand the digital divide (Hoffman, & Novak, 1998), researchers soon started focusing on other dimensions, such as digital literacy (Buckingham, 2007), digital skills (Litt, 2013), and internet usage among different groups (van Deursen, & van Dijk, 2013).

In this vein, several scholars have shown that socio-demographic variables, including employment status, income and education have significant impact not only on the access to ICTs, but also on the way the Internet is used (Ragnedda, & Muschert, 2013), emphasizing how social privileged groups with higher socioeconomic status uses ICTs more productively and efficiently (DiMaggio et al., 2001). By consequences, benefits achieved from digital access, uses and engagement are not distributed equally among and within countries. This sounds particularly true in a huge country such as Russia, where disparities in terms of access, uses of ICTs and also the level of digital literacy significantly vary depending on the region. To dig deeper into these inequalities, we looked at the survey conducted by ROCIT (Indeks tsifrovoi gramotnosti, 2018)

together with a number of partner organizations since 2015, that measures the level of Russian users' digital literacy. More specifically, the *'digital literacy index'* includes three main sub-indexes: digital consumption sub-index (broadband and mobile Internet penetration rates, number of Internet users per region per capita, etc.), digital competence sub-index (competence in searching for information online, using social networks, producing multimedia content for online, etc.), and digital safety sub-index (ability to protect personal data, users' attitude towards illegal media content online etc.).

In 2018, the overall index of digital literacy in Russia reached 4.52 points out of 10, with digital competence sub-index estimated at 5.44 points, digital consumption sub-index 4.49 points, and digital safety sub-index 3.29 points (ibid). The leaders among Russian federal districts in terms of digital literacy among 18+ population are Northwestern (7.99) and Far Eastern (7.32) federal districts. North Caucasus (1.42) and Volga (2.31) federal districts considerably lack behind (*Table 3*).

Federal district of Russia	Digital literacy index	Digital consumption sub-index	Digital competence sub-index	Digital safety sub-index
Central	5.67	6.68	6.66	3.42
Northwestern	7.99	9.93	8.94	5.34
Ural	4.69	5.1	4.31	4.83
Siberian	4.14	3.38	5.15	3.47
Volga	2.31	3.13	3.19	0.37
North Caucasus	1.42	0.5	0.86	3.03
Southern	3.52	1.41	5.88	2.25
Far Eastern	7.32	5.56	7.06	9.29

Table 3. Digital literacy in Russian regions (2018). Source: Regional Nongovernmental Centre for Internet Technologies

The inequalities between districts are visible in all sub-indexes, being particularly evident in the digital consumption and digital safety ones. The former (inequalities in accessing) have been already discussed in the previous section. Here we are focusing on the last two sub-indexes, since they allow us to shed light upon the second level of digital divide, by looking at the inequalities in skills and competences between the eight federal districts. More particularly, the digital competence sub-index analyzes not only the technical skills, but also cognitive and social

dimensions of living and working in a digital environment. Within this sub-index, the gap between the lowest region in the country (North Caucasus federal district: 0.86 points), and the leading region (Northwestern: 8.94) is impressive and difficult to explain using only one factor, rather as an interplay of different types of inequalities. Furthermore, Volga federal district considerably lacks behind in terms of digital safety sub-index (0.37 points) (ibid).

These inequalities can be partially explained by the overall better digital development of some regions of Russia, where in addition to building and/or developing already existing infrastructure and access abilities, much attention is being paid to the digital literacy programs. These include, for instance, special learning courses and public centers for children, elderly people or persons with disabilities. Although the leaders, in terms of digital competencies and literacy, remain more or less the same (Northwestern and Central federal districts), the situation is not that simple. In fact, Far Eastern federal district has been developing in terms of digitalization quite rapidly in the past years too. In addition to overall high development of this district in terms of socioeconomic development or innovative educational ecosystem's development, Far Eastern federal district is becoming one of country's leaders in other fields too, including digital literacy index (second place in the overall ranking and by the digital competence sub-index, first place in the country by the digital safety sub-index) (*Table 3*).

Evidently, these data reveal a tendency, and do not imply that all Internet users based in particular federal districts are less qualified or less careful when it comes to fact-checking, following norms of ethics, etc. Indeed, digital inequalities are the fruit of a combination of multiple and different types of inequality (Anthias, 2013), and, therefore, to fully understand this digital competence inequalities between regions, it would be necessary to look at the interplay of these variables and dimensions and to reject any simplistic and decontextualized explanation. In fact, research on inequalities in digital competences suggest to include socio-economic patterns such as income and wealth (van Dijk, 2012), education (Rice & Katz, 2008), availability of infrastructure (Avila 2009), and family context (Paus-Hasebrink et al. 2014).

For this reason, we analyzed the *Russian regional digital life index,* that aims to study the level of digitalization of the key aspects of everyday urban life: transport, finance, retail, education, healthcare, media, and public administration in major Russian cities (those with populations above one million), as well as correlation between supply and demand for e-services from the local citizens. Surprisingly, neither Moscow nor St. Petersburg is the most digital city in Russia. The highest index was achieved by the city of Ekaterinburg (Ural federal district), arguably due to its entrepreneurial culture, innovative administration and large student population. Perm (Volga federal district), which came fourth on the list, has been a booming centre of high-tech industry since Soviet times. Predictably, the cities of Southern Russia came bottom of the list, due to their more agrarian culture and tendency to be more conservative in both community life and consumer preferences (Korovkin, 2016). Interestingly, there is no direct link between Russian regional digital life index and Internet penetration. The reason for this is probably that Russia is moving from the stage of digitalization – the establishment of reasonable technical connectivity – to the second phase – generating results from this connectivity.

Finally, in this section is worth mentioning a pilot research, related to the *'Internet openness index'* and measured in Russia since 2017 (ROCIT), whose key idea is to check the level of digital interaction between state authorities and public society, as well as state authorities and local businesses in particular regions. Since the pilot research project was carried out only in Tatarstan (the index comprised 4.53 points out of 10 maximum in 2017), inter-regional comparative analysis is not possible at this stage. Still, this index is useful because it sheds light also on the tangible benefits Internet users can obtain due to digital inclusion (third level of the digital divide). This index measures whether individuals make use of the state services online (like paying taxes, scheduling appointments at the doctor's, filling in application forms, etc.) both for personal and professional reasons. It also checks whether users are generally satisfied with e-services provided (i.e. how handy and easy to use they are, how clear the instructions are, whether websites providing such services are well-structured, etc.).

Among the most popular state websites providing e-services to common citizens and business communities in Tatarstan are websites of the Federal Tax Service (48% of the respondents stated that they visit it regularly), Pension Fund (44%) and State Road Traffic Safety Inspection (36%) (Indeks Internet, 2017). However, within this district, inequalities in terms of digital participation and engagement of users with public institutions online are evident. In fact, 72% of the respondents do not check out websites of regional and local state authorities and are, therefore, excluded from this wide array of opportunities. This uneven capacities and possibilities to capitalize the access and use of ICTs, and transform it into tangible and concrete outcomes (e.g. scheduling appointments at the doctor's, filling in application forms, etc) is part of the third level of digital divide.

Summing up, we would like to underline a few things. First, the overall level of digital literacy in Russia at the moment is not really high and is estimated at less than 5 points out of 10. It is therefore clear that the digital divide of the second level, just like digital divide of the first level is still an issue in Russia – both on a country-wide level and on regional levels. Second, a correlation between access and digital literacy is not always the case in Russia: despite problems with accessing Internet, its high cost, lack of infrastructure and broadband Internet connection in some parts of the Far East, Far Eastern federal district is one of the Russian leaders by digital literacy. What also comes as a surprise here is that Volga federal district where access problem is being successfully solved, also in regard to the Internet cost and availability of e-services (related to the third level of the digital divide), digital literacy level is one of the lowest in the country. Other regions have shown more or less predictable results, with Northwestern and Central federal districts taking good positions in the digital literacy ranking due to their socioeconomic development, state investments into infrastructure development, location of Moscow and St. Petersburg in these districts, etc., and North Caucasus region where many settlements are located in remote mountainous rural areas lacking behind in ranking. Therefore we may conclude that the first and the second levels of the digital divide in Russia are not always interrelated when it

comes to particular federal districts of the country. Furthermore, comparing several indexes, we can see that 'Internet openness index' in Tatarstan (4.53 points out of 10) and digital literacy index in the Volga federal district where Tatarstan is located (4.42 points out of 10 in 2017 – we are comparing here data from the same year to ensure objectivity) are in some way related to each other. This suggests a relation between the second level of digital divide (inequalities in Internet usages and digital skills) and the third level of digital divide (inequalities in getting tangible outcomes from the access and use of ICTs). In this vein, we may assume that since the level of digital literacy is remarkably different at the inter-district levels (e.g. North Caucasus federal district 1.42 vs. Northwestern federal district 7.99 points), there may be also inequalities in capitalizing the use of the Internet are, which in their turn are enlarging social inequalities. In fact, 'those who are already socio-economically advantaged not only use the Internet differently than less advantaged counterparts, but they also get the most from its usage' (Ragnedda, 2018).

However, as the next section shows, a lot is being done at the moment to tackle digital, and therefore social inequalities.

6. Policy measure to tackle digital inequalities in Russia

Along with developing various indexes to measure the level of digital inequalities between different parts of Russia, a number of policy measures aimed at promoting wider Internet use in the country have recently been launched. Among such programs is the state *Program of Eliminating Digital Inequality in Russia* started in 2014. The aims are to establish broadband connection in remote areas of Russia, making wireless connection available to Russians living in rural areas, and increasing the level of digital literacy of the local population. Since its launch five years ago, the program has proved to be very efficient: over 5600 (out of estimated 14 thousand by the end of 2024) cities and villages in Russia were connected to the Internet through state sponsored Wi-Fi spots, and 46 thousand km of fiber optic cables have been laid (Programma po ustraneniu tsifrovogo neravensta v Rossii, 2018). Remote regions with harsh climatic conditions that were using satellite Internet connection earlier – very expensive and low-

speed – finally received access to broadband Internet, including for example the city of Norilsk in Siberian federal district (2017), multiple areas in the Far East and other regions.

Another federal program that focuses on the development of e-government and e-services in the country is *Digital Russia.* This program puts particular emphasis on the development of state service online (Federal Tax Service, Pension Fund, etc.) and ministries. The aim is to increase overall use of online services, for better and more balanced digital development of the regions. In fall 2018, it was publicly announced that the Russian Ministry of Labor will launch a new training program for 'digital curators', i.e. specialists who will be advising people on the use of digital technologies and particularly state e-services as part of the bigger *'Digital Economics'* program (Tsifrovoi kurator, 2018). Creating such an occupation in Russia, which did not really exist there formally before, is another sign of the state's interest in increasing digital competences of citizens and encouraging them to use ICTs.

Similarly to the state *Digital Russia* program, one of the results of the *Digital Government* state program (from 2008 on) was launching the Public Services Portal (Gosuslugi, 2018), which allows citizens to receive the majority of public services in healthcare, tax-paying, document-processing, education and other areas quickly and efficiently online. A good illustration of how *Digital Russia* and *Digital Government* programs operate today is recently established *Digital Territory Michurinskoe*, the first 'digital village' in the Khabarovsk region of the Far East where the majority of services are provided online (e-government services, online consultations with medical staff, online learning courses, etc.)[1]. It has been reported that since the start of its development as a digital territory in 2017/2018, Michurinskoe has been attracting people willing to live in a modern digital environment. This fact illustrates the importance of digital services for population, sometimes being in fact more important than the size of the settlement (3600 inhabitants dispersed across eight settlements, some of them counting less than 50 people) or its location in a region with rather harsh climatic conditions.

[1] http://michurinskoe.khb.ru/

In sum, these programs show how the Russian government is introducing policy measures to enhance Internet penetration (tackling the first level of digital divide), and promoting digital competences, skill and digital literacy among citizens (tackling the second level of the digital divide). The main aim is to push towards the second phase of the digital revolution: generating tangible outcomes from the Internet infrastructures and giving to everyone possibilities to get benefits from using ICTs (tackling the third level of the digital divide). Given that digital divide is still a serious issue in Russia, we believe such straightforward policy measures, on both federal and local levels are much needed today to ensure digital inequalities in Russia are approached as a complex problem – both technological and social one.

7. Conclusions

In this paper we brought to light meaningful insights into the three levels of digital divides in Russia. Based on a multilevel (three levels of digital divide) and multi-sectional approach (the interplay of different types of inequalities), this paper contributed to overall better understanding of the digital inequalities phenomenon in Russia. It also allowed for a comparative interregional perspective, which has been missing in most papers on digital inequalities in Russia so far.

Given significant differences in geographic, economic, cultural and societal terms typical for Russia, the problem of the 'digital divide' itself was expected to be present in the country. Previous research in this field articulated an important role of policy-making mechanisms in building a sustainable and efficiently developing society (Vartanova, 2019), which is particularly important given the specific character of Russia. However, as we show, despite state involvement on both federal and regional levels aimed at minimizing digital inequality in the country, federal districts still differ from each other significantly when it comes to the spread and availability of ICTs, access to the Internet, equal opportunities for citizens regardless their region of living, sociodemographic factors, income level, etc.

More specifically, in regard to the first level of the digital divide, we have seen that inequalities in accessing ICTs, although reduced over the years, are still a problem in Russia where Internet penetration is much lower than in many other countries of the world (cf. Northern Europe and Northern America 95%, Southern Europe 88% (Digital 2019, 2019). There exist considerable differences between federal districts not only in terms of technological development, but also in terms of Internet penetration rate, daily audience numbers, the cost and speed of connection, etc. Digging deeper into these differences, we argue in this paper that a set of 'objective factors' related to the specific character of Russia (distances, climatic and geographical conditions, urbanization level, etc.) may influence the first level of the digital divide in the country. This can be illustrated by comparing Northwestern or Central federal districts to the North Caucasus or Far Eastern for example: as we have shown in *Section 2*, urbanization level, socioeconomic conditions, location of the regions, cost of laying optic fibre cables in remote parts of the country, and other factors that we consider among 'objective' may indeed create a situation when some regions are more technologically advanced than others.

However, as our study showed, a correlation between the first and the second levels of the digital divide is not always the case in Russia. Some regions (for instance Far Eastern federal district) lacking behind by access can be the country's leaders by digital literacy, and visa versa – regions with good access and infrastructure availability can come at the bottom of the list by digital literacy index (for instance Volga federal district). We can also conclude that there is no direct correlation between population density and digital literacy, or between location and digital literacy either, again as the case of the Far Eastern federal district shows. Since this paper is based on exploring secondary datasets, we cannot offer a solid explanation of this phenomenon. Still, our guess is that it may be related to particular regional programs aimed at eliminating digital inequality, their overall implementation on practice and reach, maybe also audience behavior and specific audience characteristics, and a whole list of other factors that require a separate study based on primary data.

Finally, to shed light upon the third level of digital divide, we analyzed the index of Internet 'openness' attempting to find out inequalities in the way citizens and business communities interact, via digital communication, with the state and public society. The pilot project implementation in Tatarstan shows inequalities in how citizens engage with government institutions online and how ICTs are used to get some tangible outcomes. This pilot program indicates that there is a lot to be developed to ensure that Internet users receive full benefits of digital inclusion. Just a brief illustration of this point: according to the study, one fourth of the respondents from Tatarstan have never used Internet in their life; around 40% have not used e-services in the past year; and 63% of the respondents representing business circles said they had never heard about informational support of businesses online, provided by the state authorities in the republic (Indeks Internet otkrytosti Respubliki Tatarstan sostavil 4,53 iz 10 punktov, 2017). Given that the first level of the digital divide has been successfully bridged in Tatarstan, we may assume that these results are related to low digital skills of users and not to availability of technological affordances and Internet access. This is also in some way proved by the low ranking of the Volga federal district in terms of the digital competence sub-index compared to other federal districts of Russia.

Another important thing to understand about Russia is that federal districts are not 'monolithic': there may exist tremendous differences within one federal district, across different territorial formations (republics, krais, okrugs, oblasts, etc.) located in that district. A good illustration of this point is the Republic of Tatarstan (Volga federal district). While the republic is one of the Russian leaders by the development of the information society (4th place after Moscow, Tyumen oblast and Khanty-Mansi autonomous okrug (Minkomsvyaz predstavila reiting informatizatsii regionov-2017, 2017), as well as by the level of socioeconomic development, GDP rate, size of economy, and other factors, Volga federal district is at the bottom of the digital literacy ranking. Therefore, when discussing how particular federal districts of Russia do in terms of access to broadband and mobile Internet, penetration rate, digital

literacy, use of e-services, etc. we should keep in mind that those numbers and rankings reflect a general trend and not always speak about 'inner' differences within each of the federal districts.

Summing up, we consider this study to be both the first exploration and a baseline of the three level digital divides in Russia. We have seen how the level of socioeconomic development of the federal districts, as well as a number of objective factors (distance/isolation, urbanization level, availability of infrastructure and costs for building new infrastructure, even climatic conditions, etc.) have impact upon digitalization of the regions. As a result, several federal districts of Russia (Central, Northwestern, in a number of cases, Volga, Ural and Far Eastern federal district) more often than others take leading positions in rankings, in terms of degree of Internet penetration, digital literacy, use of e-services, etc. Therefore, digital inequality in Russia is still on place and will require more time for complete elimination, even though current state and public initiatives, aimed at creating a more balanced digital environment across federal districts and territorial formations, are being actively developed.

Evidently, there are many limitations in this study, first and foremost, the fact that we used secondary data that allowed only macro-comparison between regions, without giving us the possibilities to analyses the interpersonal differences. Future research might even go one step further and, by using primary data, focus on the interplay between socio-economic background, digital skills and the outcomes that individuals achieve by using ICTs.

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