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Socio-Cultural Factors and Components of the Digital Economy in Ethnic Minority Regions

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Abstract: We define the digital economy as all economic activities conducted through the use of information technologies, including activities to create new markets, expand old ones, and produce digital goods and services. The digital economy has become a major driver of sustainable development and the transition towards a greener economy. However, studies show an unequal level of progress among cities, regions, and countries. Consequently, this paper explores the associations between socio-cultural factors (such as attitudes towards marriage/raising a family) and components of the digital economy (such as expenses/investment in ICT and the proportion of personal computers and the Internet in households). This study specifically examines twenty-two ethnic minority regions in Russia with data covering a five-year period. Using the Pearson correlation coefficient, the results show that socio-cultural factors including a large urban population and high divorce rates were positively associated with the digital economy, whereas a large rural population, higher birth rates, and higher natural population growth were negatively correlated with the digital economy.

Keywords: digital economy; ethnic minority; sustainable development; socio-cultural; digital divide; multi-ethnic society; rural-urban; internet; ICT



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1. Introduction

Information technology has become a feature of modern societies, leading to the transformation of all aspects of the lives of people [1]. Due to the existential threat of climate change [2], IT has also become the main driver of the sustainable development of economic systems, innovation within economic systems, and acceleration of economic growth [1,3,4]. This phenomenon is conceptualised as the ‘digital economy’ and is increasingly widespread throughout the world [5–7]. Studies show that the digital economy can lead to inclusive and sustainable growth, increase total factor productivity, improve consumer experiences, reduce carbon emissions, promote a greener economy, increase profit for firms, and extend government services to people who need them [8–10].

Furthermore, research has demonstrated that social and cultural factors can influence the use of digital technologies in societies, particularly among ethnic minority groups [11,12]. A survey of the Scopus citation database of studies between 2015 and 2017 shows a sharp increase in publications on the digital economy (from 509 to 3585) and socio-cultural factors (from 540 to 1030). However, while a few studies have attempted to connect both research streams [12], studies intersecting these two areas have remained very limited. Socio-cultural factors include various informal institutions associated with values, norms, traditions, customs and behavioural attitudes shared by a society [13,14]. Because socio-cultural factors can be slow to change and inspire approaches to life, a growing body of evidence suggests that they can play a significant role in shaping both economic and

political outcomes, particularly in areas with deep-seated social or ethnic diversity [15]. Moreover, in recent years, a rising number of studies on development economics have begun to investigate how socio-cultural divisions in multi-ethnic societies intensify economic and social challenges [15–17]. Research also shows that socio-cultural factors impact other areas of economic activity such as tax compliance, financial market development, and economic integration [18–21].

These issues are prominent in Russia, a country with several ethnic minority nationalities, where regions are strongly differentiated in terms of their socio-cultural background, leading to inequalities in regional development [22,23]. Moreover, these factors, reflected by findings in studies on overall economic development, have motivated the need to investigate how socio-cultural factors can influence the development of the digital economy. Recent studies have highlighted the urgency of this issue by explaining that the influence of digitalisation—and the rise of the information society and industry 4.0—will not only influence economic output but also significantly rebuild the entire socio-cultural reality of societies [24]. In addition, studies on the impact of socio-cultural factors on digitalisation, innovation and sustainable development have largely confirmed their influence. For example, an extensive study of 47 countries over 14 years revealed that cultural factors significantly impact the adoption of disruptive innovation in the agricultural biotech sector [25]. A similar conclusion was reached in a study showing that socio-cultural factors influence the level of digitalisation in companies within the 27 countries of the European Union [26]. Moreover, social/cultural factors also influence environmental performance and are connected to all 17 United Nations Sustainable Development Goals (UNSDGs) [27,28].

The precise reasons for the influence of socio-cultural factors on the digital economy remain inconclusive. However, there is some evidence that the disproportionate level of economic and infrastructural inequality faced by ethnic minorities—often influenced by a history of subjugation and a lower interest in and greater distrust of new technologies—may contribute to this [29,30]. We therefore hypothesise that regions with stronger adherence to socio-cultural practices might be slower in adopting/growing the digital economy. Consequently, the goal of this research is to examine whether socio-cultural factors are associated with the development of the digital economy in multi-ethnic regions of a post-communist society. To achieve this research goal, we used Pearson correlation coefficients and interpreted the results using the Chaddock scale [31]. Data were retrieved from the Russian State Statistical Service, Rosstat, and covered a five-year period from 2015 to 2021. Our study makes some important contributions. First, to the best of our knowledge, this research represents the first in-depth examination of the influence of socio-cultural factors on the digital economy in former Soviet Union countries. Second, unlike previous studies that have largely examined the influence of social-cultural factors on firms or countries [25,26], this paper analyses the phenomenon within meso- or sub-national political units. Third, this paper makes a significant contribution to the topic by specifically focussing on the plight of regions with a large ethnic minority population and provides crucial implications for the development of the digital economy in diverse societies around the world.

Research shows that Russia has a diverse ethnic minority population of about 180 different nationalities, comprising 20% of the population [22]. These nationalities are spread across a large breadth of Russia, from the Arctic to the Caucasus regions of the South. Although prior studies have revealed the disadvantages that ethnic minority nationalities face in the digital economy of Russia [32], the precise antecedents of this phenomenon have yet to be fully examined. Therefore, we postulate that having a large share of rural population in ethnic minority regions and adherence to traditional cultural practices in raising a family might impact the development of aspects of the digital economy in these regions. Our theoretical background and results are presented in the following sections.

2. Literature Review and Hypotheses Development

2.1. Digital Economy

The concept of a ‘digital economy’ can be traced back to the seminal work of Tapscott [33] several decades ago. However, there is little consensus on what precisely constitutes the digital economy or how to define it. A significant reason for this lack of consensus is the ever-changing nature of information technologies. Nevertheless, most studies have highlighted the role of the Internet in shaping the digital economy, but have debated the precise scope of this phenomenon. For instance, Tapscott [33] defined the digital economy as encompassing the networking of technology, the networking of humans through technology, and the creation of wealth and social development. Meanwhile, according to the Bureau of Economic Affairs of the U.S. Department of Commerce, the digital economy includes three main constructs: first, “the digital-enabling infrastructure needed for a computer network to exist and operate”; second, “the digital transactions that occur using that system (“e-commerce”)”; and third, “the content that digital economy users create and access (“digital media”)” [34] (p. 7). Additionally, according to the OECD, the digital economy comprises the physical infrastructure on which digital technologies are based, the devices that are used for access (computers, smartphones), the applications they power, and the functionality they provide (IoT, data analytics, cloud computing) [8].

In recent years, many scholars have attempted to integrate prior definitions of the digital economy into a more holistic framework. Among them, the definition by Bukht and Heeks [5] is one of the most notable. They define it as “that part of economic output derived solely or primarily from digital technologies with a business model based on digital goods or services” [5] (p. 13). Following this, for the purpose of this research, we define the digital economy as follows:

The digital economy includes all economic activities conducted through the use of information technologies, including activities to create new markets, expand old ones, and produce digital goods and services.

Although this definition might not cover all aspects of the changing nature of the digital economy, it provides a working definition for this paper and covers a broad but limited scope of the concept. In addition, this paper takes the position that individuals and households are crucial to the growth of the digital economy. Therefore, factors such as the amount of spending on or investment in information and communication technologies, the quality, speed, and availability of the Internet and communications technology (ICT), the proportion of households with personal computers, the share of households with access to the internet, the share of households with broadband access to the internet, the number of connected mobile communication devices per 1000 people, and the cost of ICT can all influence the growth of the digital economy.

Furthermore, although there is a widespread consensus on the positive impact of the digital economy [8–10,35], numerous studies have highlighted its negative influence on issues such as labour relations and electronic waste. For example, scholars have revealed the massive exploitation of labour and the rise of ‘net slaves’ in the digital economy [36]. Others have pointed to the rise of companies such as Uber and gig economy workers within the digital economy, which has led to the destruction of occupational identities and the end of traditional employment and employment protections [37,38]. The rise of the digital economy has also been linked to an increase in electronic waste, threatening efforts towards attaining a sustainable future [39]. Nonetheless, scholars argue that digitalisation and the digital economy can provide solutions to the complex and urgent problems facing modern societies [40] and accelerate the transition towards a greener economy [41].

2.2. Socio-Cultural Factors and the Digital Economy

Socio-cultural factors are well-established traditional values and norms of behaviour among members of a particular community [42]. They include a range of cultural and/or social practices which communities prioritise in their daily lives. Studies have shown that socio-cultural factors can influence learning and mental development, entrepreneurship

and economic growth, and cross-national assimilation [43–45]. Similar analogies can be found in the corporate environment with organisational culture [46]. Some scholars have sought to differentiate which aspects of socio-cultural factors influence economic activities. For example, in a study of underground or informal economic activity across several countries, Berdiev et al. [47] examined the influence of a range of factors, including ethnic income inequality, ethnic–linguistic fragmentation, cultural fragmentation, ethnolinguistic polarisation and ethnic–linguistic segregation, and found that ethnic income inequality was the most influential.

However, other studies have pointed out that ethnic or national culture can significantly influence economic activity at the individual, organisational, regional and national levels. For instance, following a panel-data analysis over an eleven-year period, El-Helaly et al. [48] revealed that cultural factors could explain a country’s adoption of International Financial Reporting Standards (IFRS). In a study of 42 countries over a 20-year period, Thanetsunthorn [49] found that culture influenced trust in organisational development. Furthermore, research on 976 companies in 22 countries showed that culture influenced quality management and performance [50], whereas research on 191 international firms in 29 countries and five continents found that cultural factors can influence ethical issues [51]. In addition, socio-cultural factors can influence public investment [17], civil unrest [52], labour productivity [16], digitalisation [26], tax compliance [20] and high-tech innovation [25], among others. Furthermore, studies on sustainability have revealed the influence of socio-cultural factors on the environment. For instance, in a panel study of 57 countries, Roy and Goll [27] showed that cultural factors such as gender egalitarianism and a performance-based culture significantly influenced the environmental performance of countries. In addition, in a review study of 300 publications, Zheng et al. [28] found that cultural factors influenced the attainment of all 17 UNSDGs and explained as much as 26% of the variation in meeting the UNSDGs.

In addition, unlike prior studies that have largely used either the World Values Survey or the Hofstede dimensions of cultural values to research socio-cultural influences [20,25,26], this paper takes a different approach by focussing exclusively on values that can be described as rather traditional within a Russian context. Therefore, the goal of this research is to examine the role of traditional cultural practices, particularly when it comes to raising a family, in rural, minority, and ethnically diverse regions within Russia. As such, we examine cultural traditions associated with marriage, such as the rate of divorce and the number of children in a family. Prior studies have shown that the cultural values of rural communities tend to prioritise having more children and maintaining a close-knit family unit, which are necessary for cultural preservation, economic resilience, and survival [53,54]. Finally, extensive studies on Russia have shown the presence of digital inequality in access to and usage of digital technologies in rural and ethnic minority communities [32,55]. In addition, recent studies have emphasised the persistence of the digital divide for rural communities [56,57], the negative influence of larger household sizes on the digital economy [58,59], and the inequality in digital access for ethnic minority groups [32,60,61]. As a result, we hypothesise the following:

Hypothesis 1(a): *The higher the proportion of the rural population in a region, the slower the growth of the digital economy.*

Hypothesis 1(b): *The higher the proportion of the urban population in a region, the faster the growth of the digital economy.*

Hypothesis 2(a): *The higher the number of children per household, the higher the importance of socio-cultural factors in the economic behaviour of the region, and the slower the growth of the digital economy.*

Hypothesis 2(b): *The fewer cases of divorce there are, the higher the importance of socio-cultural factors in the economic behaviour of the region, and the slower the growth of the digital economy.*

3. Materials and Methods

The goal of this research was to explore whether a large rural population and stronger adherence to traditional cultural practices can influence the level of development of the digital economy in ethnic minority regions. To examine which regions qualified as ethnic minorities to be included in our research, we decided that the population of the regions must be composed of at least 50% ethnic minority nationalities. According to data from Russia's official statistical agency [62], these regions are as follows: the Leningrad Region, the Republic of Adygea, the Republic of Kalmykia, the Republic of Dagestan, the Republic of Ingushetia, the Kabardino-Balkarian Republic, the Karachay-Cherkess Republic, the Republic of North Ossetia-Alania, the Chechen Republic, the Republic of Bashkortostan, the Republic of Mari El, the Republic of Mordovia, the Republic of Tatarstan, the Udmurt Republic, the Chuvash Republic, the Republic of Altai, the Republic of Tyva, the Republic of Khakassia, the Republic of Buryatia, the Republic of Sakha (Yakutia), the Jewish Autonomous Region, and the Chukotka Autonomous Area. As such, twenty-two regions of Russia were included in this study. Furthermore, the socio-cultural factors examined in this study are presented in Table 1.

Table 1. Socio-cultural factors.

Socio-Cultural Factor	Parameters *	Elaboration
Rural population	Percentage of the rural population in the region	A digital divide exists between rural and urban areas. Therefore, having a higher share of the rural population could reduce the performance of the digital economy.
Urban population	Percentage of the urban population in the region	A digital divide exists between rural and urban areas. Having a higher share of the urban population could increase the performance of the digital economy.
Number of children in the family	Natural increase in population per 1000 people	Does not include local or international migration. Traditional customs encourage having more children and larger families. Therefore, having more children could signify stronger adherence to local customs.
	Number of births per 1000 people	Traditional customs encourage having more children and larger families. Therefore, having more children could signify stronger adherence to cultural customs.
Marital status	Number of divorces per 1000 marriages	Having fewer divorces could signify stronger adherence to traditional customs.

Note: * Data were obtained from the Russian State Statistical Service [62].

Table 1 shows the socio-cultural factors included in this study. These factors in Table 1 represent the explanatory variables for three main outcome variables of the digital economy: the number of connected mobile subscriber devices per 1000 people, the expenses on ICT in the regions, and the use of personal computers and internet in households. For the latter variable, regional household data on personal computers, Internet access, and broadband internet access were used to calculate it. Also, for expenses on ICT, we postulate, based on the results of prior studies, that regions with higher ICT expenses perform better in the digital economy [63]. This study followed the recommendations for using the Pearson correlation coefficient by Benesty et al. [64] and the recent practices of Vlasov et al. [12] on a similar research area. The analysis can be statistically explained as follows:

The first outcome variable on ICT expenses can be analysed as follows:

$$KICICT = 0.036 \times KSUP - 0.19 \times KNPG - 0.29 \times KNB + 0.46 \times KND + 0.0248 \quad (1)$$

where $KICT$ is the change in the coefficient of influence of socio-cultural factors on the expenses on ICT; $KSUP$ is the coefficient of change in the normalised indicator, the share of urban population; $KNPG$ is the coefficient of change in the normalised indicator, the natural population growth per 1000 people; KNB is the coefficient of change in the normalised indicator, the number of births per 1000 people; and KND is the coefficient of change in the normalised indicator, the number of divorces per 1000 marriages.

The value of the coefficient of determination during regression analysis was 0.81 ($R^2 = 0.81$), allowing us to confirm the high accuracy of the model. As a result of the F-test, the constructed regression model was recognised as significant (F-statistics = 1.9×10^{-7}). Also, the null hypothesis on the absence of a relationship between the analysed data was refuted, indicating the reliability and significance of the conducted correlation and regression analysis. Based on the results of the Durbin–Watson test for the presence of autocorrelation of residues (DW = 0.525), it was concluded that there was no autocorrelation.

The second outcome variable on the number of connected mobile subscriber devices per 1000 people can be calculated as follows:

$$KINCSMD = 0.039 \times KSUP - 0.2 \times KNPG - 0.3 \times KNB + 0.45 \times KND + 0.011 \quad (2)$$

where $KINCSMD$ is the change in the coefficient of influence of socio-cultural factors on the number of connected subscriber mobile communication devices per 1000 people.

The value of the coefficient of determination during regression analysis was 0.83 ($R^2 = 0.83$), allowing us to confirm the high accuracy of the model. As a result of the F-test, the constructed regression model was recognised as significant (F-statistics = 3.45×10^{-5}).

Also, the null hypothesis on the absence of a relationship between the analysed data was refuted, indicating the reliability and significance of the correlation and regression analyses. Based on the results of the Durbin–Watson test for the presence of autocorrelation of residues (DW = 0.341), it is concluded that there is no autocorrelation.

The third outcome variable on the use of personal computers and the Internet in households can be calculated as follows:

$$KISHPC = 0.13 \times KSUP - 0.16 \times KNPG - 0.14 \times KNB + 0.26 \times KND + 0.31 \quad (3)$$

$$KISHI = 0.05 \times KSUP + 0.02 \times KSUP - 0.05 \times KNPG - 0.28 \times KNB + 0.33 \times KND + 0.27 \quad (4)$$

where $KISHPC$ is the change in the coefficient of influence of socio-cultural factors on the share of households with a personal computer, and $KISHI$ is the change in the coefficient of influence of socio-cultural factors on the share of households with internet access).

The datasets covered the period from 2015 to 2021, and Pearson correlation coefficients were used to analyse the data. The Pearson correlation coefficient takes a value between -1 and 1 . A coefficient with a value of -1 indicates the existence of a perfect negative relationship, whereas a correlation coefficient with a value of 0 indicates no relationship, and a coefficient with a value of 1 indicates a perfect positive relationship [65]. In addition, the results of the analysis were interpreted using the Chaddock scale [31]. The results of the analysis are presented in the following section.

4. Results

4.1. Descriptive Data

Table 2 shows the share of the urban and rural populations in the twenty-two examined regions. While there were significant changes in the population share of both rural and urban areas from 2015 to 2022, the rural–urban populations mostly held steady during the years 2020–2022. Furthermore, Table 2 also reveals that the Republic of Tatarstan had the highest urban population and the lowest rural population for all the years examined. On the other hand, the Altai Republic had the highest share of the rural population and the lowest share of the urban population among all twenty-two regions.

Table 2. Rural–urban population.

	2015		2020		2021		2022	
	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
Leningrad region	65.3	34.7	66.8	33.2	67.1	32.9	67.1	32.9
Republic of Adygea	50.6	49.4	49.6	50.4	49.5	50.5	49	51
Republic of Kalmykia	45.4	54.6	46.5	53.5	46.8	53.2	47	53
The Republic of Dagestan	45.1	54.9	45.3	54.7	45.2	54.8	45.2	54.8
The Republic of Ingushetia	47.6	52.4	53.8	46.2	54.8	45.2	54.8	45.2
Kabardino-Balkarian Republic	53.1	46.9	52	48	51.9	48.1	51.8	48.2
Karachay-Cherkess Republic	42.1	57.9	41.4	58.6	41.3	58.7	41.4	58.6
Republic of North Ossetia–Alania	63.7	36.3	63.4	36.6	63.2	36.8	63.2	36.8
Chechen Republic	36.2	63.8	37.9	62.1	38.1	61.9	38.1	61.9
Republic of Bashkortostan	61.4	38.6	61.8	38.2	62.1	37.9	62.3	37.7
Mari El Republic	65.8	34.2	67.9	32.1	68.5	31.5	68.8	31.2
The Republic of Mordovia	62	38	63.2	36.8	63.4	36.6	63.6	36.4
Republic of Tatarstan	76.4	23.6	76.8	23.2	76.8	23.2	76.8	23.2
Udmurt Republic	65.1	34.9	65.7	34.3	65.7	34.3	65.8	34.2
Chuvash Republic	61.2	38.8	63.5	36.5	64	36	64.3	35.7
Altai Republic	30.1	69.9	30.9	69.1	31	69	30.8	69.2
Tyva Republic	54.7	45.3	54.5	45.5	54.8	45.2	55.3	44.7
The Republic of Khakassia	68.1	31.9	68.5	31.5	68.5	31.5	68.7	31.3
The Republic of Buryatia	59.3	40.7	59.2	40.8	59.2	40.8	59.1	40.9
The Republic of Sakha (Yakutia)	65.5	34.5	66.3	33.7	67	33	67.2	32.8
Jewish Autonomous Region	69.8	30.2	70.7	29.3	70.8	29.2	70.8	29.2
Chukotka Autonomous Okrug	67.8	32.2	68.3	31.7	68.8	31.2	69.1	30.9

Note: Data were obtained from the Russian State Statistical Service [62].

Figure 1 shows the proportion of people with personal computers and Internet access at home in the twenty-two regions. The results show that more people had Internet access than personal computers in most of the regions. We also found that for some regions, such as the Chechen Republic and the Republic of Mordovia, the share of people with personal computers reduced from 2015 to 2022, whereas for most regions, the share of people with Internet access increased.

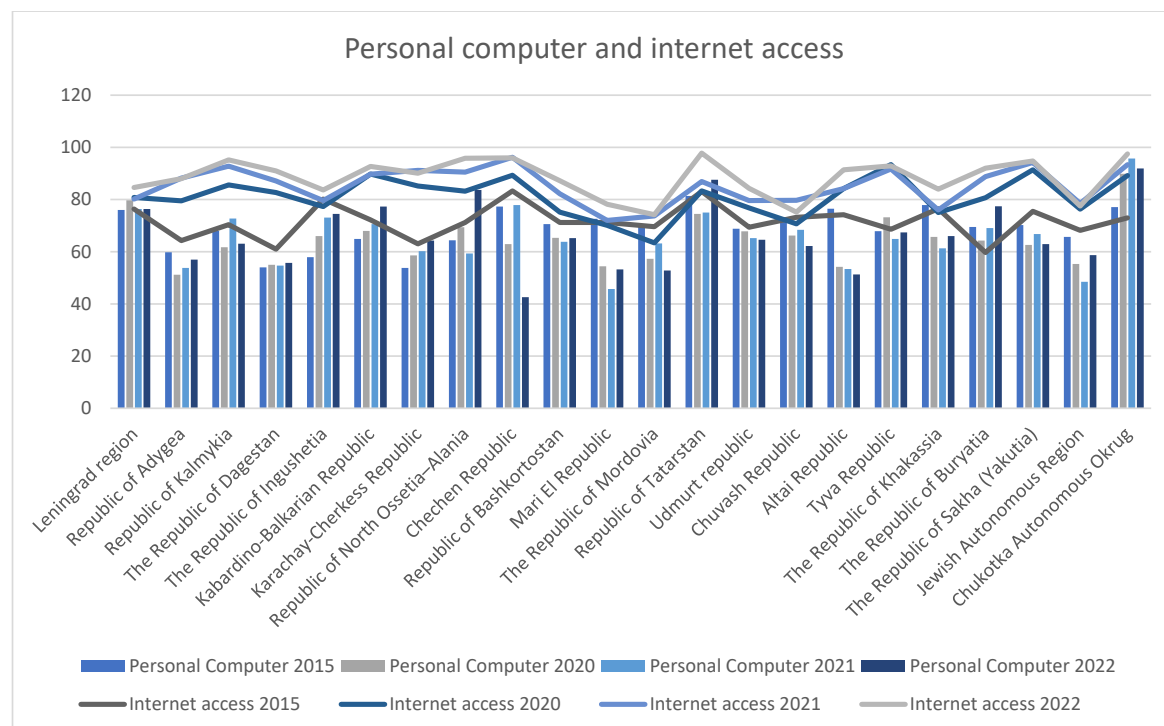


Figure 1. Use of personal computers and access to the Internet in households.

Figure 2 shows the rate of fertility and the rate of divorce in all twenty-two regions over the four observed years. The results show that the fertility rate, measured by the number of births per 1000 people, exceeded the rate of divorce in all regions. While the highest fertility rates were observed in the Chechen and Tyva Republics, the lowest divorce rates were observed in the Mordovia and Tyva Republics. Tyva Republic ranked among the highest for fertility and the lowest for divorces.

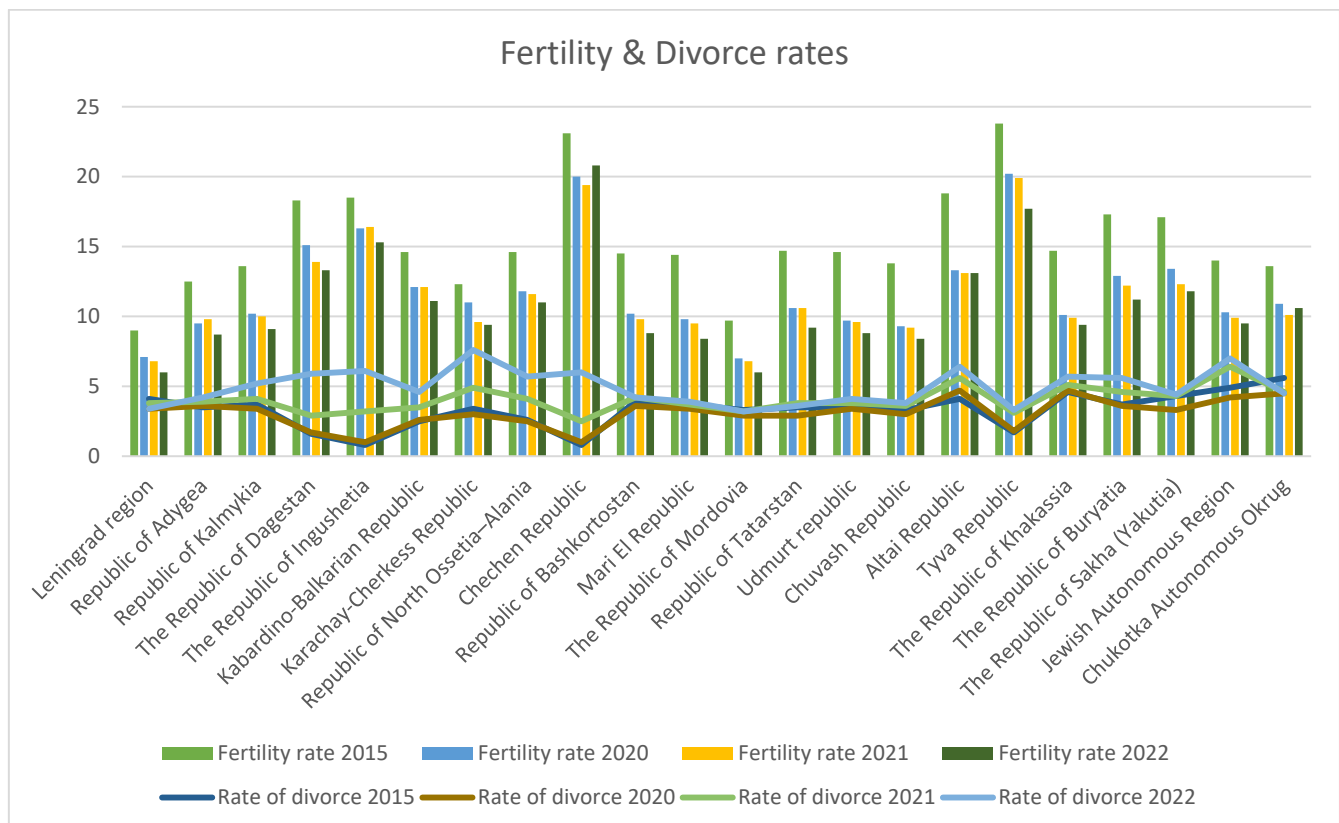


Figure 2. Rate of fertility and divorce.

4.2. Correlation Analyses

The results of the Pearson correlation coefficient analysis are presented in the following tables.

Table 3 reveals the results of the analysis of the relationship between the five main socio-cultural factors examined in this study and the cost of ICT, an outcome variable of the digital economy. This result partially confirms our first hypothesis. Table 3 shows that an increase in the share of the urban population leads to an increase in ICT expenses, and accordingly ensures the development of the digital economy (correlation coefficient: 0.76). In turn, the increase in the share of the rural population reduces the expenses related to ICT and therefore hinders the development of digitalisation (correlation coefficient: -0.38).

The results in Table 3 also show that our second hypothesis was fully confirmed. The coefficients of paired correlations between expenses on information and communication technologies and divorce rate show a high level of influence with a correlation coefficient of 0.77. This means that the higher the level of divorce in a region, which we believe shows less attachment to cultural traditions, the higher the expenses related to the digital economy. Moreover, high population growth and birth rates negatively impact ICT expenses, with correlation coefficients of -0.75 and -0.77 , respectively.

Table 4 reveals the results of our analysis of the association between sociocultural factors and mobile subscriber devices per 1000 people. Similar to the results on expenses related to ICT, the results in Table 4 show that while a higher proportion of the rural

population has a limited negative association with connected mobile subscribers in ethnic minority regions, having a higher urban population leads to a highly positive association with connected mobile subscribers (correlation coefficient: 0.82).

Table 3. Socio-cultural factors and expenses on ICT.

Indicators of Socio-Cultural Factors	Correlation Coefficient	Connection Strength
Share of rural population in the region	−0.38	Moderate
Share of urban population in the region	0.76	High
Natural population growth per 1000 people	−0.75	High
Number of births per 1000 people	−0.77	High
Number of divorces per 1000 marriages	0.77	High

Table 4. Socio-cultural factors and the number of connected mobile subscriber devices per 1000 people.

Indicators of Socio-Cultural Factors	Correlation Coefficient	Connection Strength
Share of rural population in the region	−0.54	Noticeable
Share of urban population in the region	0.82	High
Natural population growth per 1000 people	−0.76	High
Number of births per 1000 people	−0.78	High
Number of divorces per 1000 marriages	0.87	High

Meanwhile, while the results in Table 4 partially confirm our first hypothesis, they fully confirm the second hypothesis. The results show that having a higher rate of divorce in a multi-ethnic region is significantly associated with a higher number of connected mobile subscribers (correlation coefficient: 0.87), whereas higher natural population growth and birth rates show a high inverse association (correlation coefficient: −0.76 and −0.78, respectively).

Table 5 shows the results of the analysis of the association between socio-cultural factors and the use of personal computers and the Internet in households. The results reveal data on three main constructs: personal computer usage in households, Internet access in households, and broadband Internet access in households. Again, the results partially confirm Hypotheses 1(a) and 1(b), with various degrees of a negative relationship in regions with personal computer usage (correlation coefficient: −0.47), Internet access (correlation coefficient: −0.76), and broadband access (correlation coefficient −0.55) in regions with a higher share of the rural population. In contrast, a higher share of the urban population is positively associated with personal computer usage (correlation coefficient: 0.75) and Internet access (correlation coefficient: 0.76), but is negligible for broadband access (correlation coefficient 0.09).

Table 5. Socio-cultural factors and use of personal computers and the Internet in households.

Indicators of Socio-Cultural Factors	Correlation Coefficient and Strength		
	Personal Computer	Internet Access	Broadband Internet Access
Share of rural population in the region	−0.47 Moderate	−0.76 High	−0.55 Noticeable
Share of urban population in the region	0.75 High	0.76 High	0.09 None
Natural population growth per 1000 people	−0.81 High	−0.79 High	−0.27 Weak

Table 5. Cont.

Indicators of Socio-Cultural Factors	Correlation Coefficient and Strength		
	Personal Computer	Internet Access	Broadband Internet Access
Number of births per 1000 people	−0.83 High	−0.75 High	0.48 Moderate
Number of divorces per 1000 marriages	0.89 High	0.75 High	0.19 Weak

Furthermore, the results from Table 5 fully confirm our second hypothesis. They reveal that a higher divorce rate has a positive correlation with personal computer (correlation coefficient: 0.89) and Internet access (correlation coefficient: 0.75) but a weak correlation with broadband access (correlation coefficient: 0.19). On the other hand, a higher natural population growth and birth rate has a high negative relationship with personal computers (correlation coefficient: −0.81 and −0.83, respectively) and Internet access (correlation coefficient: −0.79 and −0.75, respectively), but a weak negative to moderate relationship with broadband access (correlation coefficient: −0.27 and 0.48, respectively).

5. Discussion

This paper analyses the association between socio-cultural factors and practices in ethnic minority regions and the development of some crucial aspects of the digital economy. The analysis covers twenty-two regions of Russia dominated by ethnic minority nationalities over a five-year period. Due to the rather broad concept of what constitutes the digital economy and the lack of consensus in prior studies [5,34], it was impossible to examine every aspect of it. This research was therefore focussed on three main components: expenses on ICT, connected mobile subscriber devices, and household use of personal computers and access to the Internet. On the other hand, because socio-cultural factors can relate to a wide range of factors, this research chose to concentrate on the share of the rural and urban population, and attitude towards raising a family. For the latter factor, the rate of divorce, birth rate, and natural population growth rate were used as indicators.

Following our analysis using a Pearson correlation coefficient, we found that having a higher share of the rural population was negatively correlated with all components of the digital economy, whereas regions with a higher urban population were more likely to perform better. This finding is consistent with previous revelations on several aspects of the digital economy, including digital healthcare provision [56], broadband access [66], and digital education [67]. This divide has substantial implications for poverty, inequality, entrepreneurship development, and business performance [57,68,69]. Nevertheless, although some recent studies have contested that rural areas are actually more likely to engage in aspects of the digital economy such as online shopping [70], other studies, including most studies on Russia, have largely contradicted this [29,32,55]. To address this rural–urban divide, policymakers should create a more supportive digital environment in rural communities, particularly via a supportive online infrastructure. Studies show that while crucial factors such as broadband quality and online delivery infrastructure have improved to some extent in rural areas, they still significantly lag behind those of urban areas [29,56,57].

Furthermore, our results show that while some attitudes towards raising a family were mostly positively associated with components of the digital economy, others were negatively associated. For example, we found a positive correlation between the divorce rate in ethnic minority regions and increases in expenses related to ICT, connected mobile subscriber devices, and household use of personal computers. Conversely, we found a negative association between most components of the digital economy and high natural population growth and birth rates. This finding supports the conclusions of many prior studies showing that families with larger household sizes tend to be less engaged with the digital economy [58,59]. Household size also moderates the influence of other factors in the digital economy [71], and in fact, studies appear to show a negative effect of larger

household sizes on other areas of the new economy, such as practices related to sustainable economic behaviour [72,73].

6. Conclusions and Limitations

The goal of this study is to bring social and cultural factors into academic discourse on the overall digital economy. We found that some socio-cultural factors, such as the rate of divorce, positively influence the growth of the digital economy in ethnic minority regions, whereas large household sizes and a high share of rural population negatively influence it. This study is exploratory in nature and should not be considered definitive on the topic. This study uses a correlation coefficient analysis that does not establish the direction of causation. Furthermore, the scope of this study is narrow, with a limited number of variables, and should be interpreted to reflect this narrow scope. It does not include the myriad of other factors that could influence the digital economy in the regions included in this research. For example, minority regions and communities face structural challenges such as poverty, inequality, discrimination, health disparities, and a history of subjugation, which might influence both social practices and economic outcomes [29,74,75].

In addition, while the socio-cultural factors examined in this study provide additional perspectives for understanding parts of the digital economy, they should not be taken as a replacement for the influence of economic and other factors. This is particularly important because poverty remains rife in rural areas compared to urban ones, and issues such as the rural–urban divide and the negative effect of larger household sizes are influenced by poverty and infrastructural challenges [76,77]. As such, future studies should consider additional factors and more advanced statistical methods such as causal analysis. Moreover, since participating in the digital economy requires the purchase of a smartphone or personal computer and regular subscription payments, people experiencing poverty might find this particularly challenging. Therefore, future studies should consider connecting issues such as poverty and economic inequality with socio-cultural factors in ethnic minority regions.

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