

## DIGITAL DIVIDE AS A CONSTRAINT ON REGIONAL AND LOCAL DEVELOPMENT IN THE BOSNIA AND HERZEGOVINA, SERBIA AND CROATIA

Srećko Ilić

Faculty of Business Economics Bijeljina, University of East Sarajevo, Republic of Srpska, BiH  
srecko.ilic@fpe.ues.rs.ba  
ORCID: 0000-0002-4010-8847

**Abstract:** *Digital transformation represents a key factor of modern economic development. However, its effects are not evenly distributed for a number of reasons. In the countries of the Western Balkans, particularly in Bosnia and Herzegovina, Serbia and Croatia, various challenges are present that lead to differences in access to information and communication technologies, as well as in the level of digital skills, thereby deepening existing development inequalities. The aim of this paper is to examine the extent to which the digital divide represents a constraint on regional and local development in Bosnia and Herzegovina, Serbia and Croatia, as well as to analyze differences in terms of digital infrastructure, the level of digital competencies, and the existence of strategic frameworks for the development of artificial intelligence, which is becoming increasingly important in modern business. The empirical analysis is based on secondary data obtained from the Eurostat database, as well as from the national statistical offices of the observed countries. The study employs comparative analysis and descriptive statistical analysis of the level of digital development in these countries.*

*The contribution of this paper lies in identifying the key mechanisms through which the digital divide affects business performance and regional development in the observed countries..*

**Key words:** *Digital transformation, digital divide, information and communication technologies, artificial intelligence*

**JEL classification:** *O33, R11*

### 1. INTRODUCTION

Information and Communication Technologies (ICT), in addition to reshaping everyday human life, have also completely transformed the

economic structure itself. The traditional economy has had to enter a process of transition, leading to the emergence of the so-called new economy, or, as many authors refer to it, the digital economy or the internet economy. If we ask what led to these conditions requiring the traditional economy to undergo transition, two main reasons can certainly be identified: the development of information and communication technologies on the one hand, and globalization on the other.

Globalization represents the international exchange of goods, services, labor, and technologies, accompanied by the gradual reduction of trade and institutional barriers. The development of ICT was a prerequisite for the emergence and expansion of globalization. Due to the advancement of ICT, the world has become what many authors describe as a “global village.” ICT has enabled the almost instantaneous exchange of information between two computers located anywhere on the planet, provided they are connected to a computer network, i.e., the internet.

With the emergence of globalization, new modes of doing business have been imposed in order for companies to survive in today’s environment. Globalization has erased the boundaries between national markets and led to the creation of a single “global market.” This means that any modern enterprise has the potential to enter the global market, provided it utilizes modern technologies and knowledge that can make it competitive. Therefore, it is essential for enterprises to adapt to the constant changes occurring on a daily basis. If companies choose not to accept changes and new technologies, the consequences of such decisions could result in the cessation of their operations.

The new economy, and its development, is conditioned by the possession of ideas, knowledge, and information and communication technologies. The digital divide is defined as inequality in access

to information, and it manifests as informational discrimination against individuals, social groups, or entire societies. The term “digital divide” emerged at the end of the 20th century. Digital inequality is influenced by many factors, including socioeconomic status, level of literacy (especially digital literacy), cultural and psychological factors, as well as digital infrastructure and institutional frameworks.

For a company to survive under current conditions, it is necessary to strive to reduce this digital divide as much as possible, if it cannot be completely overcome. In Bosnia and Herzegovina, Serbia, and Croatia—countries that have undergone profound structural, institutional, and economic transformations during the transition process—the digital divide has a particular dimension. Significant differences exist both between the countries themselves—former Yugoslav republics—and within them, especially between urban and rural areas, which directly affects the course of regional and local development.

The aim of this paper is to analyze how the digital divide affects business operations, as well as regional and local development in Bosnia and Herzegovina, Serbia, and Croatia, with particular emphasis on limited access to digital technologies and tools. In what ways does the digital divide represent a constraint on successful business operations and regional and local development in these countries?

The contribution of this paper lies in a comparative analysis of the digital divide in Western Balkan countries, with a focus on Bosnia and Herzegovina, Serbia, and Croatia. The paper seeks to identify the key mechanisms through which the digital divide affects business operations and regional development, including limited access to digital infrastructure, insufficient levels of digital competencies, and the limited application of advanced technologies.

## 2. LITERATURE REVIEW

Lazović and Đuričković (2018) state that the internet, as well as other network technologies, enables people around the world to access information and knowledge without barriers. This assumption holds true in developed countries, where people, based on modern technologies, have access to both information and knowledge; however, this is not the case in underdeveloped and transition economies. These countries are not able to fully access and utilize all information resources that could improve their socio-economic status. Given that in the digital economy information is the key to the development of an economically sustainable society, transition and

underdeveloped countries find themselves in a particularly unfavorable position. The authors also add that differences between countries have always existed, but they have become more visible with the advancement of information and communication technologies. Developed countries dictate the pace of digital society development as well as ICT usage, leading to the conclusion that they increasingly deepen the digital divide between developed countries on the one hand and underdeveloped and transition countries on the other.

Krsmanović and Gavrilović (2020) note that the development of information and communication technologies has affected all spheres of human life, resulting in the formation of a new socio-economic structure known as the information society. Changes in the traditional economy, driven by ICT development, have led to the emergence of a new economy, also referred to as the digital economy, internet economy, or information economy. The digital economy has emerged under the influence of globalization and the rapid development of ICT. With the emergence of the digital economy, numerous empirical studies have shown that investment in ICT leads to economic growth. The same authors argue that the digital divide represents an obstacle to the development of the digital economy and identify four areas in which limiting factors exist: lack of digital experience due to insufficient interest in new technologies; lack of physical access due to the absence of computers and network connectivity; insufficient education leading to a lack of digital skills and capabilities; and limited opportunities to use technology. They also argue that efforts to prevent and overcome the digital divide must be globally oriented. The digital divide is also viewed as a disparity or division among countries, caused by various socio-economic factors such as differences in income and education, as well as among groups and individuals. At the core of this divide are differences in literacy levels, income, unemployment, age, and many other characteristics that place individuals in a highly disadvantaged position.

Ndou et al. (2023) point out that developing countries face numerous challenges related to political, social, economic, and infrastructural factors, leading to the conclusion that a persistent digital divide exists between developed and developing countries. The authors further note that the digital divide became particularly evident during the COVID-19 pandemic, when many developing countries proved unprepared for remote work, online education, digital payments, e-services, and cybersecurity. Balkan countries record relatively low performance, although,

according to these authors, a 10% increase in the digitalization index leads to GDP growth of 0.63%, suggesting that digital transformation stimulates economic growth.

Kara et al. (2024) emphasize that governments should invest in infrastructure and technology in order to improve mobile and internet coverage, especially in rural areas. In this way, the authors argue, the digital divide between rural and urban populations could be reduced. Furthermore, they state that digital transformation fosters economic growth, innovation, inclusiveness, privacy protection, and adherence to ethical standards. For this reason, the European Union seeks to create a digital environment aimed at empowering individuals, improving democratic processes, and protecting personal data in all areas undergoing digital transformation. In this regard, the EU has set digital transformation as one of its key priorities and launched the Digital Decade initiative to build a digitally empowered society and economy.

Bergantino et al. (2026) highlight that various forms of digital inequality can deepen social disparities by affecting individuals' social and economic capital, as well as their ability to actively participate in social life. They further note that access to digital technologies and tools has become a decisive factor in development and territorial wealth. These authors also argue that the digital economy contributes to market expansion, increased productivity through the digitalization of business processes, and employment growth. The digital divide is not only a matter of access to the internet and digital technologies, but also of local capacity to convert inputs into inclusive growth.

The digital economy originated in the early 1990s. The term "digital economy" was first introduced by Tapscott in 1999 and referred to a set of economic activities based on knowledge and the use of digital tools and modern computer networks. In the digital economy, ICT serves as a key instrument for improving efficiency and optimization. It contributes to market expansion, employment growth, and increased productivity through the digitalization of business processes (Bergantino et al., 2026).

Numerous authors point to certain limitations and the heterogeneity of the effects of the digital economy. Compared to urban areas, rural areas generate significantly fewer digital dividends due to urban bias and the digital divide itself. Underdeveloped digital infrastructure in rural areas significantly limits entrepreneurial activity and employment, thereby deepening productivity differences and the urban–rural economic gap. On the other hand, numerous studies show that the

digital economy promotes balanced urban–rural development by enabling the two-way movement of production factors through the optimization of regional industrial structures and the improvement of the universality of public service provision (Liu et al., 2026).

The continuous development of the digital economy leads to industrial–agricultural integration, coordination of urban–rural resources, and overall population prosperity. However, since many regions still lack sufficiently developed digital infrastructure, they are unable to fully utilize the developmental potential of digital transformation, which further deepens the development gap between urban and rural areas. The digital divide represents differences between urban and rural areas in terms of access to digital technologies, the level of digital infrastructure development, and the capacity for their application. Reducing the digital divide implies increased network (internet) coverage in rural areas, the acquisition of digital skills by residents, and reliance on e-commerce platforms. The digital economy affects not only local development but also broader regions by stimulating international economic interactions (Liu et al., 2026).

Digital business extends as far as internet access reaches. As a result, boundaries are erased, and overcoming the digital divide cannot be limited to the national or local level. The causes of the digital divide are numerous, with the most significant being (Krsmanović & Gavrilović, 2020):

- technological factors
- economic resources
- geographical location
- social factors
- demographic factors.

Technology is continuously evolving through the updating and improvement of existing systems. The digital divide arising from technological factors occurs due to the existence of two groups: those who have access to technology and ICT, and those who do not. In addition to technological factors, financial resources also play a crucial role. Individuals and communities in underdeveloped and transition countries often lack access to computers and ICT due to economic constraints, particularly the high cost of technology. Geographical location is another important cause of the digital divide. There are still regions worldwide where people do not have access to the internet or ICT at all, often due to a lack of infrastructure, language barriers, or cultural factors (Lazović & Đuričković, 2018).

Seven components, or factors, contributing to digital inequality are (Krsmanović & Gavrilović, 2020):

- physical access
- financial access
- cognitive access
- content access
- political access
- interface access
- institutional access.

These factors often act together, further deepening the digital divide and making its resolution increasingly important. In developed countries, the causes of the digital divide are somewhat different. Internet penetration is high, and digital services are well developed. In such contexts, the digital divide is often explained by individual preferences regarding the acceptance and use of ICT (Krsmanović & Gavrilović, 2020).

Underdeveloped and developing countries may fall into a so-called “technological trap” if they lack adequate infrastructure for building a digital society and if their education systems are insufficiently developed. In these countries, forms of “traditional poverty” such as lack of food, clean water, and especially access to healthcare and education are still prevalent. This raises the question of whether these countries should allocate scarce resources to closing the digital divide or prioritize addressing basic living conditions (Lazović & Đuričković, 2018).

Although numerous studies highlight the importance of digital transformation for economic growth and development, relatively few papers examine the relationship between the digital divide and regional development in Western Balkan countries. For this reason, this paper seeks to fill this research gap through a comparative analysis of the observed countries.

### 3. RESEARCH METHODOLOGY

The study of the digital divide as a limiting factor of local and regional development in Bosnia and Herzegovina, Serbia, and Croatia is conducted based on the analysis of data collected from secondary sources. The secondary data sources used include the national statistical offices of Bosnia and Herzegovina, the Republic of Serbia, and the Republic of Croatia, as well as data from the Eurostat database. The analysis covers the period from 2020 to 2025, with the aim of tracking the dynamics of the digitalization process in the observed countries.

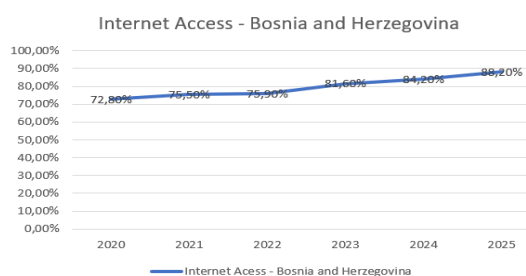
The digital divide is operationalized through the following indicators: the percentage of households with internet access, the frequency of internet use, and the level of digital skills of the population. The methods employed include descriptive statistical analysis and quantitative comparative analysis, as well as cross-country comparative analysis for the purpose of comparing these countries.

### 4. RESEARCH RESULTS

In Bosnia and Herzegovina, with regard to the level of education, the structure of internet users is as follows: 71,2% of respondents with primary education use the internet, 94,1% of respondents with secondary education, and 98,9% of individuals with higher education.

According to employment status, the structure of internet users is as follows: 76,9% of pensioners, 92,2% of unemployed individuals, 99,2% of employed persons, and 100% of students use the internet.

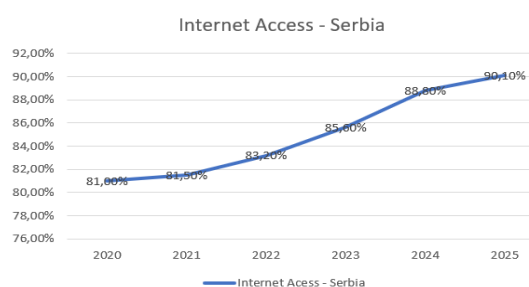
**Chart 1.** Household Internet Access in Bosnia and Herzegovina



**Source:** Author’s compilation based on data from Vesna Čužić & Fahir Kanlić (2025a)

According to data from the Agency for Statistics of Bosnia and Herzegovina, 99,9% of enterprises have access to the internet. Regarding the use of artificial intelligence, 10,78% of enterprises use this technology.

**Chart 2.** Household Internet Access in Serbia



**Source:** Author’s compilation based on data from Branko Josipović et al., 2025

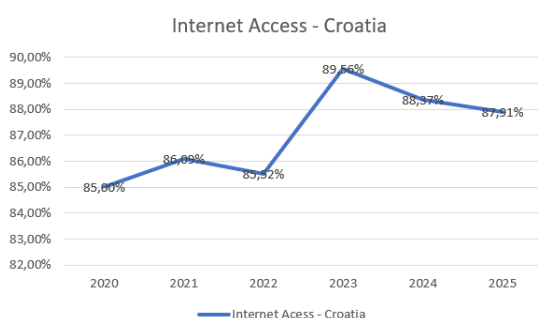
In Serbia, with regard to the level of education, the structure of internet users is as follows: 67,5% of respondents with primary education use the internet, 94,5% of respondents with secondary education, and 98,8% of individuals with higher education.

According to employment status, the structure of internet users is as follows: 76,0% of others, 94,9% of unemployed individuals, 98,0% of employed persons, and 100% of students use the internet.

According to data from the Statistical Office of the Republic of Serbia, 100% of enterprises have access to the internet, while 10,1% of enterprises use artificial intelligence technology.

In Croatia, with regard to the level of education, the structure of internet users is as follows: 74,0% of respondents with primary education use the internet, 91,0% of respondents with secondary education, and 99,0% of individuals with higher education.

**Chart 3.** Household Internet Access in Croatia



**Source:** Author's compilation based on data from Eurostat

According to employment status, the structure of internet users is as follows: 59,0% of pensioners, 88,0% of unemployed individuals, 96,0% of employed persons, and 100% of students use the internet.

According to Eurostat data, in the Republic of Croatia, 99% of enterprises have access to the internet, while 15,19% of enterprises use artificial intelligence technology (Eurostat, 2025).

## 5. DISCUSSION

The existence of the digital divide and the problems associated with it are closely linked to socio-economic development, which further implies that efforts aimed at overcoming these issues must simultaneously address poverty-related

challenges. Investment in information and communication technologies can stimulate economic growth, particularly in countries that lag behind developed economies in socio-economic terms. Data indicate that an increasing number of people are present online, with young people representing the largest share of internet users. Numerous discussions and studies have addressed the issue of the digital divide.

A significant body of research focuses on identifying key factors for the successful adoption of new technologies, including artificial intelligence (AI). However, the question arises whether the deepening digital divide itself represents a barrier to the adoption of such technologies, given that many citizens in the observed countries lack access to the internet and do not possess basic digital skills.

The comparative analysis of the observed countries confirms the existence of significant differences in their levels of digital development. European Union member states, such as the Republic of Croatia, record a consistently high level of household internet access—over 90%, while Bosnia and Herzegovina and the Republic of Serbia exhibit lower levels of digital inclusion, particularly in rural areas. Differences in internet access between urban and rural areas are evident, and in some countries these differences exceed 10 percentage points. This gap points to structural inequalities in the availability of digital infrastructure, which may further limit the development of local communities in less developed regions.

Further analysis reveals disparities in internet usage based on the level of education, indicating that individuals with lower levels of education use the internet significantly less frequently than those with higher education. This suggests the existence of a digital divide in terms of human capital, which may affect the ability of local labor markets to adopt technological innovations and attract knowledge-based investments characteristic of the digital economy. The results also show that the frequency of internet use is highest among employed individuals, while significantly lower among pensioners and the unemployed. Such patterns indicate potential digital exclusion of certain social groups, which may hinder their integration into the labor market and reduce the effectiveness of local economic development policies.

Regarding the digitalization of enterprises, there are notable differences in terms of internet access and the adoption of advanced digital technologies, indicating varying levels of technological readiness within the business sector. Limited

access to digital infrastructure reduces the ability of enterprises to participate in the digital economy, which directly affects their productivity and competitiveness. The lack of digital skills among the population also impacts the supply of qualified labor, making regions less attractive to potential investors. The limited adoption of advanced technologies, such as artificial intelligence, further contributes to technological lag. Based on the above, it can be concluded that the digital divide is not only a technological issue but also an economic and developmental challenge, both at the local and regional levels.

## CONCLUSION

The comparative analysis indicates that significant differences exist between Bosnia and Herzegovina, Serbia, and Croatia in terms of their levels of digital development, both in terms of household internet access and the digital transformation of business activities. The digital divide is most pronounced between rural and urban areas, across regions within individual countries, among users with different levels of education, and across groups defined by employment status.

Individuals with lower levels of education and older population groups use the internet significantly less frequently than highly educated and employed individuals. This suggests the existence of a digital divide in terms of human capital, which directly affects an economy's ability to absorb technological innovations, attract digital sector investments, and facilitate knowledge spillovers. The business sector in all observed countries reports internet access rates between 99% and 100%, indicating that the level of basic digital infrastructure is relatively satisfactory. On the other hand, artificial intelligence, as a highly advanced and valuable technology, remains insufficiently adopted in business operations across all observed countries. Croatia, as a member of the European Union, records a higher level of AI adoption compared to other Western Balkan countries. In addition, Croatia, along with Slovenia, adopted a national artificial intelligence development strategy in 2021, while Serbia adopted such a strategy in 2019 for the period 2020–2030. Other Western Balkan countries have not yet adopted such strategies. Therefore, internet access alone is no longer a sufficient indicator of a country's digital maturity. The key challenge lies in the transition from basic connectivity to the intensive use of advanced digital technologies that generate greater competitiveness, productivity, and sustainable economic growth. Digital infrastructure and digital skills represent essential preconditions for successful reindustrialization and the attraction of knowledge-based investments.

Reducing the digital divide, particularly in less developed regions, can contribute to greater economic inclusiveness and strengthen the competitive position of regions within the European economic space. Future policies should focus not only on the development of digital infrastructure but also on the development of human capital, particularly digital competencies, as well as on encouraging the adoption of advanced technologies in business in order to ensure long-term sustainability and regional development. Importantly, policy focus should extend beyond urban areas to include rural and less developed regions, in order to reduce regional disparities and enable inclusive economic growth.

## REFERENCES

- [1] Bergantino, A. S., Fusco, G., Intini, M., & Monturano, G. (2026). Digital divide and income inequality: Causal evidence from Italian provinces. *The Annals of Regional Science*, 75(1). <https://doi.org/10.1007/s00168-025-01440-z>
- [2] Eurostat. (2025a). Retrieved from <https://ec.europa.eu/eurostat>
- [3] Eurostat. (2025b, December 16). Retrieved from <https://ec.europa.eu/eurostat>
- [4] Kara, P. A., Ognjanovic, I., Hölscher, D., Šćekić, L., Kovacevic, P., Mantas, J., Šendelj, R., Laković, L., Maksimovic, A., Rakočević, N., Roganović, M., Reich, C., Simon, A., & Bokor, L. (2024). Human-centric digitization in Montenegro: Progress through 17 years of national independence and future trends. *Electronics*, 13(13). <https://doi.org/10.3390/electronics13132460>
- [5] Liu, P., Tang, W., Shao, Y., & Liu, L. (2026). The impact of the digital economy on new industrial-agricultural and urban–rural relations. *Frontiers in Sustainable Food Systems*, 9. <https://doi.org/10.3389/fsufs.2025.1747418>
- [6] Ndou, V., Hysa, E., Ratten, V., & Ndrecaj, V. (2023). Digital transformation experiences in the Balkan countries. *The Electronic Journal of Information Systems in Developing Countries*, 89(2). <https://doi.org/10.1002/isd2.12262>
- [7] Josipović, B., Šutić, V., Rajačević, U., Minaeva, I., & Marković, A. (2025). *Use of information and communication technologies in the Republic of Serbia, 2025*. Statistical Office of the Republic of Serbia. <https://www.stat.gov.rs/>

- [8] Čužić, V., & Kanlić, F. (2025a, October 31). *Use of information and communication technologies in households and by individuals, 2025*. Agency for Statistics of Bosnia and Herzegovina. <https://bhas.gov.ba/>
- [9] Čužić, V., & Kanlić, F. (2025b, October 31). *Use of information and communication technologies in enterprises, 2025*. Agency for Statistics of Bosnia and Herzegovina. <https://bhas.gov.ba/>
- [10] Lazović, V., & Đuričković, T. (2018). *Digital economy*.
- [11] Krsmanović, B., & Gavrilović, Z. (2020). The phenomenon of the digital divide. *Jahorina Business Forum 2020*, 121–129. [https://www.jbf.ekofis.ues.rs.ba/images/2020/sessions/session%20economics/13\\_Krasmanovic\\_Gavrilovic.pdf](https://www.jbf.ekofis.ues.rs.ba/images/2020/sessions/session%20economics/13_Krasmanovic_Gavrilovic.pdf)



This work is licensed under the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License