THE EFFECTS AND CHALLENGES OF COVID-19 ON DIGITAL TRANSFORMATION IN THE DEMOGRAPHIC AND ECONOMIC SECTOR

UDC: 616-036.22:[004.7:338.05](478)
DOI: https://doi.org/10.53486/tids2025.23

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Abstract. The digital transformation, in the demographic and economic sectors, has been accelerated by the COVID-19 pandemic, and has led to the rapid adoption of digital technologies, which have increased productivity and operational resilience. The COVID-19 pandemic has highlighted significant digital divergences, driven by age, education, income and location-based gaps, affecting access to remote work and digital services. Workers in digital area or with digital roles have been relatively protected, while employees in the traditional sector have faced increased vulnerability. In addition, the shift to remote work has raised challenges in terms of workforce management, cybersecurity and infrastructure. While digital technology adoption has increased, ***evidence of lasting structural changes in labor demand remains limited, indicating that the pandemic has acted more as a catalyst than a transformer.*** Addressing the digital differences and investing in skills and infrastructure are essential to ensure an inclusive and sustainable economic recovery.

Keywords: Covid-19, digital transformation, digital services, statistical analysis.

JEL Classification: C10, C46, C51.

INTRODUCTION

The COVID-19 pandemic has had a propound impact on societies and economies around the world, accelerating the already underway process of digitalization and all the proceses connected eith, and requiring sharply adaptation in numerous areas. In the case of the Republic of Moldova, a country on the way to be aligning with European standards, the health crisis has represented a major test for its digital capabilities and level of strategic preparedness. This research examines the multifaceted effects and challenges of COVID-19 on digital transformation within Moldova's demographic and economic sectors, analyzing how the crisis accelerated the journey towards a comprehensive digital future.

Digital transformation is understood as a fundamental process involving the adoption and integration of digital technologies to create new or modify existing products, services, and operations by translating business processes into a digital format. Digital transformation is not limited to digitizing existing functions but involves a profound rethinking of the way how the organizations

interact with their customers, employees and partners. This leads to the development of new business models and a more efficient use of internal resources. The change is driven by advanced technologies that allow for the optimization of the processes, the analyses of data in the way to obtain relevant insights and delivery of innovative products and services. However, all these developments crucially depend on reliable and equitable access to the internet — the basic infrastructure that connects people, devices and systems. Without widespread connectivity, the benefits of digitalization remain inaccessible to a large part of the population, increasing digital disparities and hindering inclusive economic and social progress. In this context, ensuring universal access to the internet is not only a technological challenge, but also an essential condition for equity in the digital age, facilitating innovation, education and sustainable development at a global level.

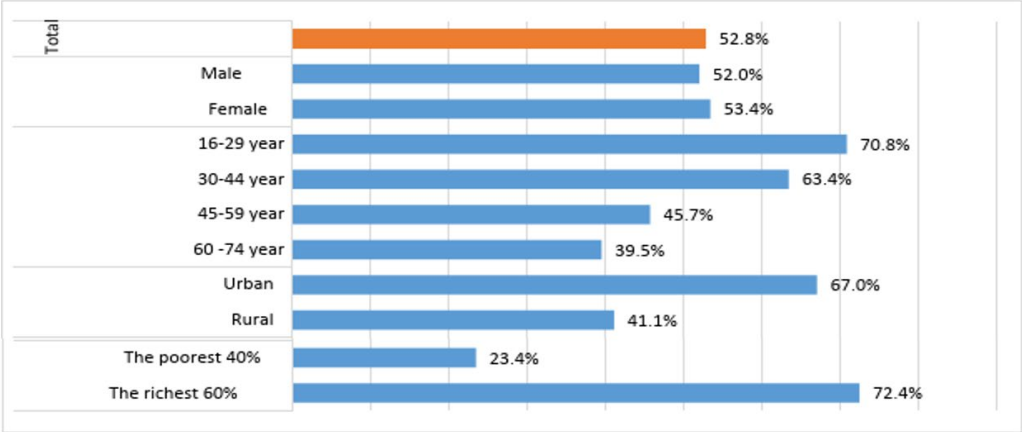


Figure 1. Household computer ownership rate.
Source: *E-governance Agency, World Bank.*

Digital transformation opens up vast prospects for economic development and social progress, influencing all areas – from health and education to energy and agriculture. This comprehensive approach highlights that digitalization is not limited to technological updates but involves a profound reconfiguration of economic and social structures. In this context, the success of the transformation process does not depend exclusively on the technical infrastructure, but also on the existence of sound public policies, the capacity of organizations to adapt, widespread digital skills and an effective governance system.

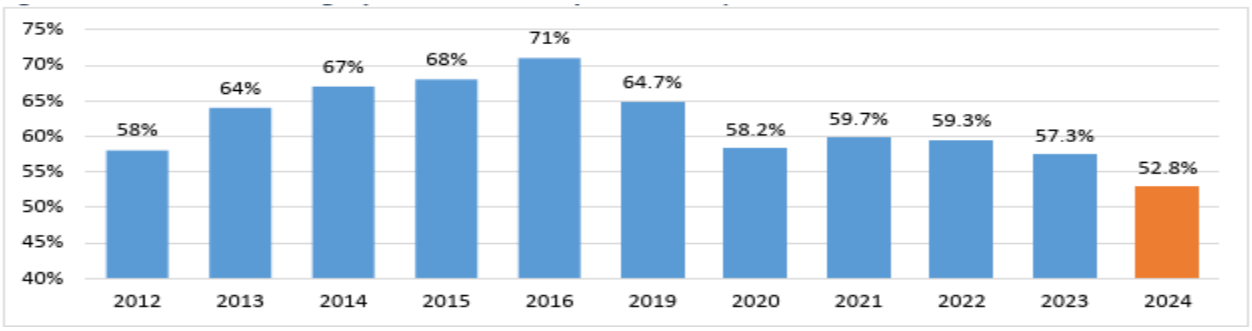


Figure 2. Trends in household computer ownership.
Source: *E-governance Agency, World Bank.*

In Republic of Moldova, according to the National Survey 2024 of *"The perception, adoption, and support of e-Government and the modernization of government services by the population"*, in

recent decades, has been a rapid process of computerization of households, along with an increase in internet access levels. At the same time, other processes have unfolded that have further driven digitalization. Over time, the previously rising trend of computerization shifted to a decline, influenced by the widespread availability of smartphones among the population. The internet has taken on an increasingly important role as a source of information, surpassing television, which has traditionally represented the main means of information for decades.

Over half of households in the Republic of Moldova (52.8%) have a computer at home (Figure 1). However, the indicator of computer ownership has registered a constant downward trend during the COVID-19 pandemic and in the post-crisis period: 52.8% in 2024, compared to 57.3% in 2023, 59.3% in 2022, 59.7% in 2021 and 58.2% in 2020. This decrease is significant compared to the maximum level of 71% reached in 2016 (Figure 2).

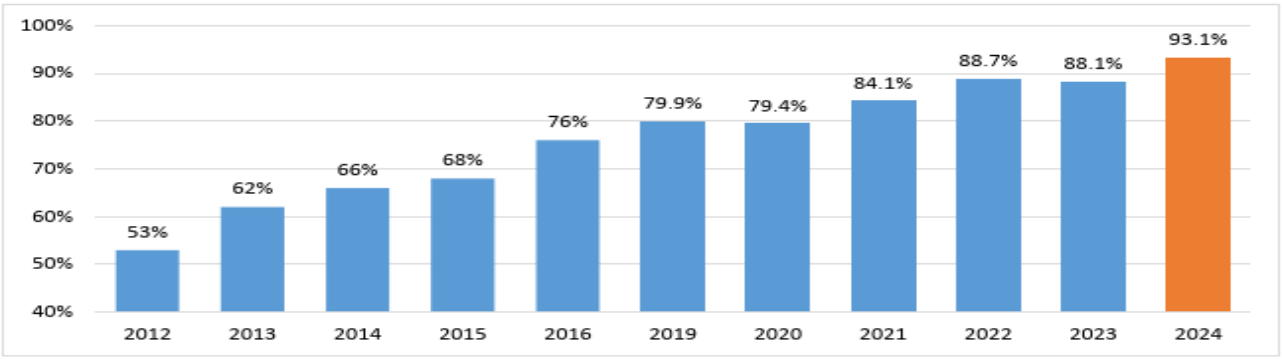


Figure 3. Trends in household internet access.
Source: *E-governance Agency, World Bank.*

This trend can be explained by changing preferences in terms of ways of accessing the internet – an increasing number of people use other types of devices, especially mobile phones. This change is supported by data from the same study, which shows that the majority of households without a computer (85.8%) are nevertheless connected to the internet. In fact, the overall rate of internet connection (93.1%) significantly exceeds the rate of computer ownership (Figure 3).

COVID-19 as a Catalyst for Digital Acceleration. The COVID-19 pandemic has undeniably accelerated the digital transformation process, both globally and in the Republic of Moldova. Mobility restrictions and the urgent need for remote access to services in all areas of life have driven a rapid transition to digital solutions. Areas such as online education, e-commerce and e-health services have seen rapid and significant growth in demand. This crisis has clearly highlighted the need for enhanced support and substantial investments in digital transformation, as well as the importance of effective digital governance – essential for ensuring the continuity of basic public services and strengthening the resilience of the private sector (Figure 4).

In recent years, the internet has increasingly become the main source of information for the population. According to the 2024 study *"Perception, Adoption and Support of e-Government and the Modernization of Government Services by the Population"*, three quarters of respondents (75%) consider the internet to be the most important channel for accessing information. This trend reflects the changing way people consume news and information, increasingly turning to the digital environment at the expense of traditional sources.

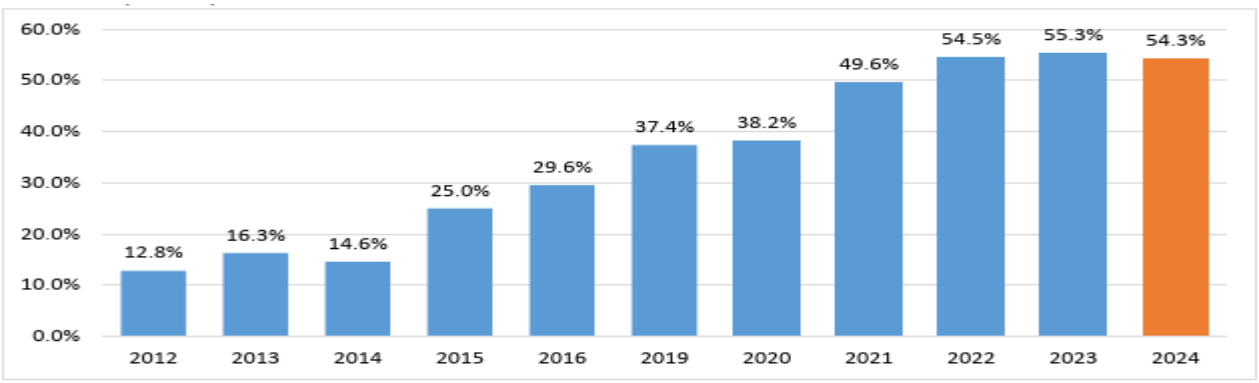


Figure 4. Access of the electronic public services over the past 12 months.
Source: *E-governance Agency, World Bank.*

The COVID-19 pandemic period has shown that the adoption of digital technologies was initially carried out in a reactive manner, driven by immediate needs rather than long-term strategic planning. While the crisis undoubtedly accelerated the rapid use of digital solutions, it also highlighted systemic vulnerabilities that, in a more gradual and well-structured process, could have been addressed more effectively and comprehensively. In the context of an immediate emergency, the priorities were survival and ensuring the continuity of services, which led to the rapid implementation of already existing digital tools. Thus, the challenge for the Republic of Moldova in the post-pandemic period is to transform this accelerated and temporary reaction into a strategic, sustainable and coherent digital transformation process that integrates the solutions adopted in the emergency into a solid and long-term national digital agenda.

EFFECTS ON THE DEMOGRAPHIC SECTOR

The COVID-19 crisis has had a profound impact on the demographic sector in the Republic of Moldova, highlighting and, in many cases, exacerbating existing inequalities related to access to technology and digital skills. At the same time, this situation has spurred initiatives to reduce these disparities by accelerating the digitalization of public services and the education system.

1. Exacerbation and Bridging of the Digital Divide (Urban-Rural, Age, Income)

Although the pandemic has accelerated internet use in the Republic of Moldova, it has simultaneously accentuated the already existing digital gaps between various segments of the population. (Figure 5) In the Republic of Moldova, **significant disparities persist in access to connectivity between urban and rural areas**, and socio-economic inequalities are evident in the ownership of digital equipment, with rates of 60-70% recorded for the wealthiest households, compared to only 20-35% for the most financially vulnerable. *This disparity meant that access to essential digital tools was largely a function of economic status.*

Older populations, particularly people aged 60 and above, faced substantial difficulties due to a pervasive lack of digital skills and limited internet access. This technological barrier led to increased social isolation and considerable struggles in accessing online social services (Goharik, 2024).

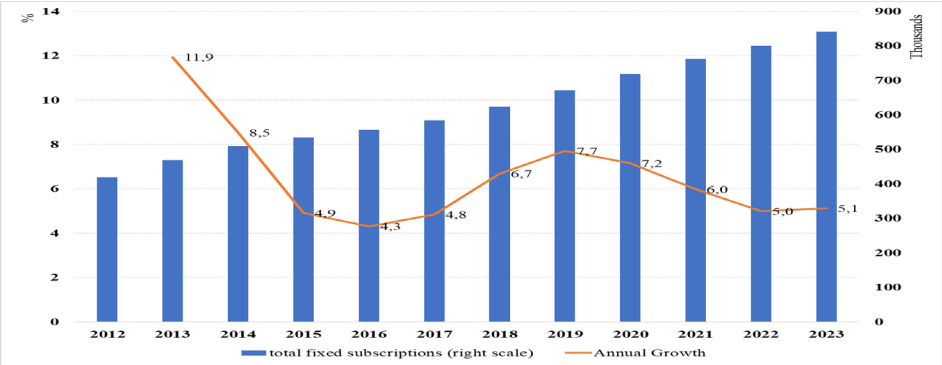


Figure 5. Moldova - Fixed Broadband Internet Subscribers.
Source: *World Bank.*

For example, in July 2020, at the peak of COVID-19 infections, many older adults who lacked access to online social services were forced to queue in person at the National Social Insurance House to request pension recalculations. Often without adequate personal protective equipment, they faced significant exposure to health risks. This situation clearly illustrates how the crisis, by forcing a digital shift, disproportionately benefited those already digitally capable or resourced, effectively widening the gap for vulnerable and underserved populations, *Bringing generations together for change. Case study: Moldova*, (2022). The crisis-driven demand for digital services, without sufficient pre-existing digital literacy and equitable access mechanisms, directly led to the increased isolation and exclusion of these vulnerable groups, amplifying pre-existing inequalities.

In response to these challenges, concerted efforts were made to bridge these divides. Initiatives and programs that connected youth with seniors, provided mobile phones and comprehensive training in basic digital skills, including the use of communication and messaging apps, social networks, and online payments.

These efforts were specifically designed to combat the isolation experienced by older people and improve their access to essential services, simultaneously fostering intergenerational dialogue and understanding. Furthermore, the authorities, mostly with international support, have assisted educational institutions by equipping schools across the country with modern technology such as computers, smartboards, projectors, aiming to narrow the digital gap in education (Botezatu, 2021).

2. Digitalization of Public and Social Services: Continuity and Challenges

The COVID-19 pandemic has exposed Moldova's major vulnerabilities, stemming from its traditional reliance on offline and paper-based government processes, which have severely disrupted the continuity of public services and exposed government employees to increased risks of contamination. In response, the authorities have significantly stepped-up efforts to implement digital governance, focusing on the digital inclusion of vulnerable groups and stimulating the development of participatory digital solutions, achieved through innovative collaborations with the private sector.

Significant progress has been made in the digitalization of public services. By 2024, 54% of public services were digitalized, and an impressive 86.1% of government-to-business service requests were conducted online. The variations in the indicator regarding access to electronic public services across socio-demographic categories are very pronounced. Young people aged 18–29 have used electronic services nearly six times more often than individuals aged 60–74 (Figure 6).

The discrepancy among population categories from different residential environments is nearly 30%. There is a huge difference in the same indicator when comparing individuals with incomplete

secondary education to those with higher education. Household internet connection is a variable that significantly influences access to electronic public services, increasing the likelihood by 2-3 times.

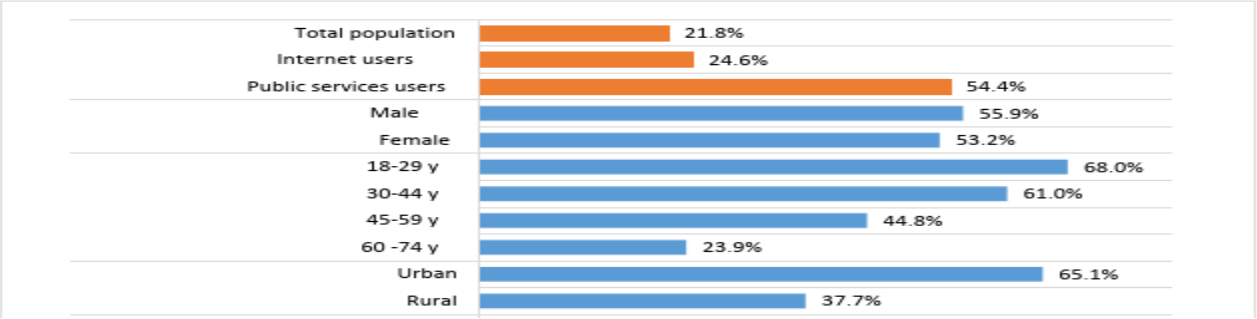


Figure 6. The profile of electronic service users.
Source: *E-governance Agency, World Bank.*

3. Shifts in Social Interactions, Digital Skills and Literacy Gaps: A Critical Barrier

The COVID-19 pandemic, with its stringent mobility restrictions, significantly increased the demand for digital services, implicitly driving a notable shift in social interactions from physical to online spaces. This forced transition, however, also led to heightened isolation for those segments of the population lacking adequate digital access and skills, particularly the elderly. For instance, older individuals, already prone to isolation, found their limited social contact further constrained by the inability to communicate with family and friends through digital means.

Conversely, the crisis also spurred governmental and organizational shifts towards leveraging data for better understanding and managing population behavior, *Socio-economic impact assessment of COVID-19 in the Republic of Moldova* (2020).

Despite the overall acceleration in internet use during the COVID-19 pandemic, Moldova faced significant and pervasive digital literacy gaps across various societal segments, including the general population, government officials, and Small and Medium-sized Enterprises (SMEs). A notable absence of systematic assessments of digital skills further compounded this issue, making it challenging to precisely identify and address specific deficiencies.

This situation underscores that while Moldova possessed a decent digital infrastructure, its human capital, in terms of digital skills and literacy, lagged significantly. This gap became a major impediment to the effective and equitable adoption of digital transformation across critical sectors. The digital divide is not merely a singular problem of “access” but a complex interplay of infrastructure availability, affordability, equipment ownership, and, crucially, digital literacy and trust. Addressing one component in isolation, such as merely expanding infrastructure, will not resolve the overall challenge of digital exclusion. The pre-existing lack of systematic digital skills assessment and targeted training directly resulted in widespread digital literacy gaps, which in turn limited the effective adoption of digital services during the pandemic, particularly for vulnerable groups and in essential sectors like education and public services. Therefore, policies must adopt a multi-pronged approach, simultaneously targeting infrastructure expansion, affordability, provision of devices, and comprehensive, tailored digital skills training programs that build confidence and address specific user needs and fears related to online payments and government services.

EFFECTS ON THE ECONOMIC SECTOR

The economic landscape of the Republic of Moldova underwent significant changes due to the pandemic, with digital transformation playing a dual role as both a driver of adaptation and a source of new disparities.

Business Adaptation, E-commerce Growth, and Digital Adoption Patterns. The COVID-19 pandemic compelled local businesses to rapidly adapt their operational models, with approximately one-third initiating or significantly increasing their online business activities. Notably, firms that had a pre-existing history of innovation demonstrated greater resilience in sustaining the economic shock induced by the crisis. This surge highlighted the critical need for developing online payment and banking systems. The government has since responded by developing a national digitalization roadmap specifically focused on e-commerce development, the promotion of online stores, attracting international e-commerce actors, and facilitating cashless payments.

However, while the pandemic undeniably accelerated digital adoption in the private sector, this acceleration was not uniform across all businesses. Evidence suggests that the digital divide among firms increased, with substantial gaps persisting between small and large enterprises, and across different sectors, particularly concerning new investments in digital solutions. Many small and medium-sized enterprises (SMEs) were notably unprepared for the sudden shift to online sales, leading to the cessation of their activities and contributing to an overall economic downturn, with Moldova's GDP decreasing by 8.3% in 2020. The sudden shift to digital channels during the pandemic, coupled with pre-existing disparities in digital readiness and access to resources, directly led to an increased digital divide among firms and a concentration of online sales supported by the online transactions with payment cards (Figure 7).

1. Labor Market Dynamics: Remote Work, Employment, and Skills Demand

The COVID-19 pandemic instigated a rapid and widespread adoption of remote work practices in Moldova. In response to this shift, the Moldovan parliament swiftly adopted regulations concerning telework in May 2020, just two months after the declaration of a national state of emergency. By 2020, an estimated 24,500 individuals were working from home or remotely (NBS, 2021). This transition, while offering significant benefits such as increased flexibility for employees and potential cost savings for businesses (e.g., optimized office spaces and reduced maintenance costs), also introduced a new set of challenges (Cebotari, 2022). These included maintaining employee engagement, ensuring effective communication, and helping individuals achieve a healthy work-life balance amidst the blurring lines between professional and personal spheres.

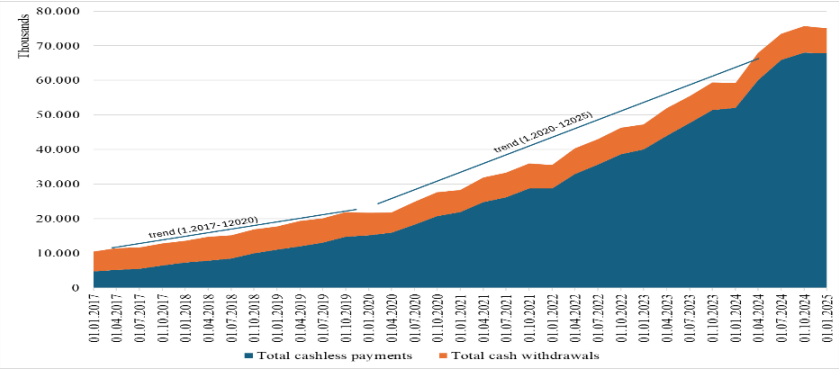


Figure 7. The number of transactions with payment cards issued in the Republic of Moldova.
Source: *National Bank of Moldova.*

The advance of digitalization of the economy has generated a growing demand for specialists with advanced technical skills. However, the persistent skills shortage within the Moldovan workforce risks slowing down the pace and limiting the large-scale impact of the digitalization process. The COVID-19 pandemic has accelerated a profound transformation of the labor market, consecrating remote work as an increasingly common practice. This evolution has highlighted the need to develop not only classic technical digital skills, but also an expanded set of essential digital skills, such as self-management, virtual collaboration and digital communication ethics. The forced adoption of remote work has amplified the demand for such skills, but has also revealed significant gaps in the current training of employees, accentuating the gap between available skills and market requirements, especially in areas that go beyond strictly technical aspects. Consequently, preparing the workforce for the future requires the implementation of continuous improvement and retraining programs, which include the development of both technical expertise and indispensable non-technical digital skills.

upply chain digitization and digital transformation of SMEs

The COVID-19 pandemic has sent a strong signal globally about the crucial importance of supply chain resilience, accelerating the adoption of digital technologies in their management. Digitalization has been shown to significantly contribute to increasing the integration and efficiency of supply chains. In the Republic of Moldova, companies are increasingly active in exploring and implementing logistics innovations, adopting modern technologies and methods aimed at reducing costs, optimizing operations, improving service quality and strengthening their competitive position in the market.

The COVID-19 pandemic has deeply affected SMEs in the Republic of Moldova, which have faced significant difficulties on both the demand and supply sides. The impact has been particularly severe given that SMEs represent approximately 98% of all enterprises, and around 75% of them are micro-enterprises, often lacking the necessary resources — including knowledge and financing — to respond quickly to new market challenges.

At the same time, recent data indicate that less than 17% of SMEs have managed to integrate digital technologies into their activities, highlighting both a considerable untapped potential and a pressing need to accelerate the digitalization process in this sector.

CONCLUSIONS

The COVID-19 pandemic served as a stark and undeniable reminder of the critical importance of digital transformation for national resilience and continuity in the Republic of Moldova. The crisis significantly accelerated the adoption of digital technologies across public services, education, and the economy, compelling rapid shifts that might otherwise have taken years. However, this accelerated shift simultaneously highlighted and exacerbated deep-seated digital divides across various demographic groups and between firms, exposing critical gaps in digital literacy, cybersecurity preparedness, and the “soft infrastructure” of institutional coordination and leadership.

The digitalization during the pandemic simultaneously enabled continued interaction for some while deepening social isolation for others, particularly vulnerable groups. This creates a paradox where technology can both connect and disconnect, depending on equitable access and digital literacy.

In this context, future digital transformation strategies must explicitly integrate the objective of social cohesion, ensuring that the digital solutions developed do not contribute to the involuntary

marginalization of certain segments of the population, but on the contrary – facilitate active inclusion, equal participation and intergenerational connectivity. Initiatives such as the "Digital Skills Connect Generations" project, which provides training to seniors in the use of smartphones and social networks, represent concrete steps in this direction, helping them to maintain their social connections and access essential information in the digital environment.

ACKNOWLEDGEMENTS: *Ion Pârțachi, Simion Mija and Claudiu Herțeliu are partially supported by a project "Analysis of the impact of Covid-19 on the main demographic indicators in Romania and the Republic of Moldova by using econometric modeling" code PN-IV-P8-8.3-ROMD-2023-0208 funded by the Romanian Ministry of Research, Innovation and Digitalization (MCID) through UEFISCDI.*

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