

STRATEGIES FOR DEVELOPING THE ICT ECOSYSTEM IN THE REPUBLIC OF MOLDOVA

Lilia SAVA ¹, Valentina TIRSU ², Dinu TURCANU ³, Elena PETREANU ⁴

In the abstract, the authors examine how the Republic of Moldova can strengthen its ICT ecosystem by leveraging AI, IoT, and 5G to modernize digital infrastructure and accelerate innovation. Using a mixed approach that combines policy review, analysis of official connectivity and sector indicators, and benchmarking against OECD and EU4Digital practices, the study highlights both progress and persistent gaps, especially between urban and rural areas. The paper proposes a strategic framework with actionable measures and KPIs to support digital governance, inclusive infrastructure expansion, cybersecurity resilience, innovation scaling, and digital skills development, positioning ICT as a pillar of sustainable socio-economic growth.

Keywords: ICT ecosystem, Republic of Moldova, artificial intelligence, digital infrastructure, innovation, strategy

1. Introduction

Rapid digital transformation has increased the strategic relevance of ICT ecosystem capacity for economic resilience, competitiveness, and European integration. In the Republic of Moldova, recent years have been characterized by the implementation of major digital initiatives, including the development of the MCloud platform, the expansion of the Moldova Innovation Technology Park, and the adoption of the *Digital Transformation Strategy 2023–2030*, which establishes the national framework for digital development [4].

In this study, the ICT ecosystem is conceptualized as a socio-technical system integrating digital infrastructure, institutional governance, economic actors, and users. It comprises public institutions, private enterprises, academia, and citizens interacting through technological platforms, regulatory structures, and innovation processes to generate economic and social value [11], [6]. Effective governance requires coordinated policies that balance regulation, innovation support, and digital inclusion.

¹ * Prof., PhD, Technical University of Moldova, Moldova, corresponding author: e-mail: lilia.sava@fet.utm.md

² Prof., PhD, Technical University of Moldova, Moldova, e-mail: valentina.tirsu@tse.utm.md

³ Prof., PhD, Technical University of Moldova, Moldova, e-mail: dinu.turcanu@adm.utm.md

⁴ Prof., PhD, Moldova State University, Moldova, e-mail: elena.petreanu@usm.md

The evolution of Moldova's ICT ecosystem is closely linked to developments in education, public administration, and entrepreneurship. University–industry partnerships and applied digital projects illustrate the gradual institutional embedding of digital transformation. Nevertheless, structural challenges persist, including urban–rural disparities in digital access, skills gaps, and increasing cybersecurity risks.

Addressing these constraints requires coherent strategic coordination among government, academia, the private sector, and civil society. Sustainable digital transition depends on the integrated advancement of infrastructure, human capital, and regulatory capacity.

This article provides an analytical assessment of Moldova's ICT ecosystem. It examines key structural indicators, evaluates the role of emerging technologies—artificial intelligence, the Internet of Things, and 5G—and formulates strategic directions aligned with national policy objectives and international digital governance frameworks [6].

2. Methodology

This study employs an integrated analytical framework combining the review of national digital strategies, official statistical data, and international policy benchmarks. The analysis covers the period 2023–2024 and relies on data accessed on 22 July 2025 from ANRCETI, the World Bank Open Data platform, and official government reports.

Indicator selection was guided by three inclusion criteria:

- (1) digital infrastructure capacity (broadband access, gigabit coverage, mobile penetration);
- (2) economic performance of the ICT sector (ICT service exports, number of MITP resident companies, contribution to GDP); and
- (3) digital usage and inclusion (internet usage rates and urban–rural disparities).

The comparative component consisted of mapping the objectives of Moldova's Digital Transformation Strategy (2023–2030) to OECD and EU4Digital policy domains. Each domain was subsequently operationalized into one to three measurable Key Performance Indicators (KPIs), derived from national targets or adapted from OECD digital governance measurement frameworks.

The resulting strategic framework was constructed through a policy-mapping and indicator translation approach, ensuring coherence between strategic objectives and quantifiable outcomes. While the study is primarily descriptive and policy-oriented, it aims to enhance analytical transparency by explicitly linking strategic priorities to measurable performance indicators. Limitations derive from

the availability of publicly reported data and the short observation period considered.

3. Current State and Development Trends of the ICT Ecosystem in the Republic of Moldova

A. Analysis of the ICT Ecosystem in the Republic of Moldova

Table 1 presents key indicators of digital connectivity in urban and rural areas of the Republic of Moldova for 2023–2024, based on official statistical data [1]. Although improvements are observed in both contexts, urban–rural disparities remain structurally significant, with annual reductions of approximately 2–3 percentage points, indicating a pace of convergence below national strategic objectives.

Household internet access reached 79% in urban areas and 60% in rural areas in 2024, maintaining a gap of nearly 19 percentage points. Fixed broadband coverage is close to saturation in cities (96.3%) but remains limited in rural regions (53.8%), underscoring unequal infrastructure distribution.

Internet usage increased to 86% in urban areas and 70% in rural areas, reflecting gradual digital inclusion. In contrast, mobile network coverage (3G/4G/5G) exceeds 95% nationwide, suggesting that mobile infrastructure has partially mitigated territorial disparities. The number of active mobile connections per capita surpasses 100% in both areas, indicating multiple subscriptions per user.

The most pronounced inequality concerns access to gigabit (FTTx) networks: 95% in urban areas compared to 56% in rural areas. This gap may constrain access to high-bandwidth services such as telemedicine, digital education, and advanced e-government applications.

Overall, while connectivity indicators show positive trends, structural asymmetries persist, requiring targeted infrastructure investment and complementary digital skills development to ensure balanced digital transformation [1].

Table 1

ICT Connectivity – Urban vs. Rural				
Indicator	Urban		Rural	
	2023	2024	2023	2024
Household internet access (%)	77.0	79.0	58.0	60.0
Fixed broadband internet access (%)	94.5	96.3	50.2	53.8
Internet usage among the population (%)	84.0	86.0	66.0	70.0
Mobile network coverage (3G/4G/5G) (%)	98.0	99.0	94.0	95.0
Active mobile connections per capita (%)	128.0	130.0	118.0	120.0
Access to gigabit networks (FTTx) (%)	92.0	95.0	52.0	56.0

Source: elaborated by the authors based on data from the [1]

Recent years have witnessed measurable progress in Moldova's digitalization process; however, access to digital infrastructure remains uneven across territories. While high-speed internet and advanced mobile networks are widely available in urban areas, rural regions continue to face structural connectivity constraints. Although rural indicators show gradual improvement, the urban–rural gap remains significant, as reflected in the connectivity data presented in Table 1 [1].

Mobile network coverage (3G/4G/5G) now extends to most rural localities, providing a baseline for the expansion of digital services. In contrast, disparities persist in high-capacity fixed infrastructure, particularly gigabit (FTTx) networks, which remain substantially less developed in rural areas. This limitation directly affects access to bandwidth-intensive services such as telemedicine, online education, and remote work.

These findings underline the need for targeted infrastructure investment and coordinated public policy interventions aimed at reducing territorial inequalities. Table 1 therefore not only documents recent progress but also highlights structural asymmetries requiring strategic attention [1].

The ICT ecosystem in the Republic of Moldova comprises interdependent components—hardware infrastructure, software systems, communication networks, online services, and human capital—operating within a defined regulatory framework (see Table 2). Each component fulfills a distinct functional role, supported by specific legislative and regulatory instruments that ensure operational stability, data protection, and interoperability.

Table 2 illustrates the institutional dimension of the ecosystem, where legal provisions act as governance mechanisms that structure technological development and enable coordinated digital transformation.

Table 2

Core Components of the ICT Ecosystem in the Republic of Moldova

ICT Ecosystem Component	Functional Description	Associated Legislative and Regulatory Framework
Hardware Infrastructure	Physical equipment supporting data processing, storage, and transmission, including servers, computers, mobile devices, network hardware (routers, switches), and data centers.	Law No. 241/2007 on Electronic Communications
Software Systems	Operating systems and applications running on hardware infrastructure, including database management systems, productivity software, e-commerce platforms, and cloud-based solutions.	Law No. 133/2011 on the Protection of Personal Data
Communication Networks	Telecommunications infrastructure enabling data exchange across local (LAN), metropolitan (MAN), and wide area networks (WAN), including Internet	Law No. 241/2007 on Electronic Communications

ICT Ecosystem Component	Functional Description	Associated Legislative and Regulatory Framework
	connectivity supported by 4G, 5G, and fiber-optic technologies.	
Digital Public and Private Services	Online platforms and services such as e-government systems, digital healthcare, distance learning, e-commerce, and interoperable digital identity solutions.	Law No. 142/2018 on Data Exchange and Interoperability
Human Capital and Digital Skills	ICT professionals (software developers, network engineers, cybersecurity specialists, data analysts) and broader digital literacy capacities developed through formal education and continuous training systems.	Digital Transformation Strategy 2023–2030; national education and digital skills policies

Source: elaborated by the authors

These legislative instruments constitute the institutional foundation governing the development and operation of the ICT sector in the Republic of Moldova. By ensuring regulatory clarity, data protection, and interoperability, they create a stable framework conducive to innovation, competitiveness, and sustainable economic growth.

In recent years, Moldova's ICT ecosystem has demonstrated consistent expansion. The increase in digital service exports, the extension of infrastructure networks, and the rising number of active firms reflect the sector's strengthening macroeconomic role. However, structural challenges persist. According to the *Global Innovation Index 2024*, Moldova ranks 68th out of 133 economies, declining from 60th position in the previous edition [9]. To contextualize these dynamics, Table 3 presents key economic and structural indicators illustrating the recent performance and development trajectory of the national ICT ecosystem.

Table 3

Key ICT Indicators for the Period 2023–2024

Indicator	2023	2024	Absolute, +/-	Relative, %	Reference
ICT service exports (BoP, current US\$, million)	603.1	721.4	+118.3	+19.6 %	[8]
Total number of MITP resident companies	~1,837	2,370	+533	+29.0 %	[5]
ICT sector contribution to GDP (%)	4.2 %	6.3 %	+2.1 pp	+50.0%	[4]

Source: elaborated by the authors based on the references provided.

The 50% increase in the ICT sector's contribution to GDP, together with the nearly one-third expansion in the number of resident companies within the Moldova Innovation Technology Park (MITP), indicates a structural shift toward a digitally driven economic model.

ICT service exports rose from USD 603.1 million in 2023 to USD 721.4 million in 2024, representing an absolute increase of USD 118.3 million, or 19.6%, according to World Bank data [8]. This growth reflects both quantitative expansion and improved international market positioning of Moldovan ICT companies.

The number of resident companies in MITP increased from approximately 1,837 in 2023 to 2,370 in 2024, marking a rise of 533 entities (29.0%). The MITP Annual Report 2024 confirms significant growth in turnover and membership, consolidating the Park's role as a central driver of the national ICT ecosystem [5].

The ICT sector's contribution to GDP expanded from 4.2% in 2023 to 6.3% in 2024, representing a 2.1 percentage point increase (50.0% relative growth). This trend underscores the sector's growing macroeconomic relevance and its contribution to digital transformation and economic modernization [4].

B. Emerging technologies and the transformation of digital infrastructure

Emerging technologies such as Artificial Intelligence (AI), the Internet of Things (IoT), and 5G networks increasingly shape the structural evolution of digital infrastructure. These technologies enhance data processing capacity, connectivity performance, and service integration, thereby supporting the transition toward a knowledge-based and innovation-driven economy.

1. ***Artificial Intelligence (AI)*** contributes to the optimization of administrative and business processes through predictive analytics and data-driven decision-making. International assessments emphasize its relevance for improving public sector efficiency and strengthening digital governance, particularly in emerging economies [6]. In the Republic of Moldova, the *Digital Transformation Strategy 2023–2030* identifies AI as a strategic enabler for modernizing public administration and digital service delivery [4].
2. ***The Internet of Things (IoT)*** integrates physical devices into digital communication networks, including agricultural sensors, smart metering systems, medical monitoring devices, and industrial control platforms. OECD analyses highlight IoT's role in increasing productivity and improving service delivery, especially in rural and peripheral regions [6]. In Moldova, such applications are particularly relevant for agricultural modernization and the expansion of smart public services in underserved areas.
3. ***5G Technology*** provides high-capacity, low-latency connectivity required for advanced digital applications and interconnected systems. According to national regulatory data, 5G deployment in Moldova has expanded

progressively since 2023, primarily in urban centers, under the regulatory supervision of ANRCETI [1]. Continued rollout is expected to support both enterprise digitalization and public service innovation.

The integration of these technologies requires coordinated action in four interconnected areas:

- strategic investment in broadband infrastructure, fiber optic networks, and data centers;
- development of digital human capital through formal education and continuous training;
- regulatory frameworks ensuring interoperability, cybersecurity, and data protection;
- structured collaboration between government, academia, and the private sector.

Effective digital transformation therefore depends not only on technological adoption but also on governance capacity, institutional coordination, and sustainable financing mechanisms.

Table 4

Strategic Framework for ICT in the Republic of Moldova (2024–2027)

Strategic Domain	Policy Basis	Proposed Measure	Time line	Monitoring Indicators (KPIs)	References
Digital Governance	DTSM Strategy 2023–2030 includes tripartite governance and interoperability	Establish a Digital Council integrating government, private sector, and academia	2025	≥4 formal meetings/year; annual public activity report; ≥70% implementation rate of approved digital policies	[4]
Integrated e-Government	Target: 100% of electronic services available by 2030	Develop the OneGov integrated platform (e-health, e-justice, e-signature, EU interoperability)	2025 – 2027	% public services fully digital; % interoperable services; annual growth rate of e-service usage	[4]
Digital Infrastructure	Broadband/data centers (2025–2027); 93% broadband coverage in 2023	Implement “Connect Rural 2027” program (5G expansion in rural areas; edge/cloud infrastructure for SMEs)	2025 – 2027	Rural 5G coverage (%); reduction of urban–rural gigabit gap (pp); number of regional edge nodes deployed	[1], [4]

Strategic Domain	Policy Basis	Proposed Measure	Time line	Monitoring Indicators (KPIs)	References
Cybersecurity	Establishment of CERT; GDPR alignment by 2025	Establish National Cyber Resilience Hub; integrate EU Cyber Rapid Response mechanisms	2025 – 2027	Average incident response time (hours); number of coordinated cyber exercises/year (≥ 2); % critical institutions covered	[10]
Startup & Innovation Ecosystem	EU4Digital Action Plan 2020; Tekwill centers	Launch Moldova Digital Scaleup Accelerator (seed funding EUR 100–200k; structured mentoring and demo days)	2025 – 2027	24-month startup survival rate (%); annual private investment attracted (EUR); number of scaleups supported	[2], [5]
Digital Education & Skills	Promotion of digital skills – OECD, DTSM	Expand Tekwill in Every School and adult digital training programs	2024 – 2027	% schools participating; number of certified digital training graduates; annual increase in advanced ICT specialists (%)	[6], [7]

Source: elaborated by the authors based on the references provided.

The alignment between strategic actions and corresponding KPIs indicates a structured planning framework; however, implementation effectiveness will depend on institutional coordination and the financial sustainability of the proposed Connect Rural and Digital ScaleUp programs.

The analysis of Table 4 demonstrates coherence between the objectives set out in the Digital Transformation Strategy of the Republic of Moldova 2023–2030 and the proposed operational measures [4]. Core priorities—digital infrastructure development, expansion of electronic public services, cybersecurity reinforcement, and digital skills enhancement—are translated into targeted initiatives such as OneGov, Connect Rural, Cyber Hub, and Digital ScaleUp. Each initiative is linked to measurable performance indicators, enabling systematic monitoring and evaluation.

The proposed Digital Council, conceived as a tripartite structure involving government, private sector, and academic representatives, is intended to ensure policy continuity and adaptive governance. Such a coordination mechanism would support responsiveness to both domestic structural developments and external

regulatory dynamics, including European interoperability requirements and cross-border cybersecurity risks.

The integrated approach—combining rural broadband expansion, cybersecurity capacity-building, digital education, and innovation support—provides a coherent foundation for the development of a resilient and inclusive ICT ecosystem. This framework aligns national digital transformation objectives with broader European integration priorities for the 2027–2030 horizon.

6. Conclusions

The findings indicate that the Republic of Moldova is transitioning from a digitally supported economy toward a more integrated innovation-driven ecosystem. The analysis shows measurable progress in digital infrastructure development, ICT service export growth, and sectoral expansion, providing a structural basis for continued digital advancement.

At the same time, structural constraints limit the full realization of this potential. Urban–rural disparities in high-capacity connectivity persist, the supply of advanced digital skills remains insufficient, and outward migration of qualified professionals affects long-term human capital formation. 5G deployment remains concentrated primarily in urban areas, high-performance data infrastructure is limited, and coordination and financing challenges continue to affect the scalability of startup and innovation initiatives.

Addressing these limitations requires coordinated action in several priority areas:

- acceleration of investments in broadband infrastructure, 5G networks, and data centers;
- strengthening digital human capital through formal education, lifelong learning, and retention-oriented policy measures;
- consolidation of public–private–academic partnerships following a triple helix governance model;
- development of sustainable financial mechanisms supporting startups and innovation ecosystems;
- targeted digital inclusion policies aimed at reducing territorial and socio-economic disparities.

If implemented coherently, these measures can enhance the resilience, competitiveness, and European integration capacity of Moldova’s ICT ecosystem.

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