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# THE NECESSITY OF A COHERENT DIGITAL STRATEGY IN ROMANIA IN THE CONTEXT OF THE DIGITAL DECADE AND FOR ELIMINATING STRUCTURAL DISPARITIES COMPARED TO DIGITALLY DEVELOPED COUNTRIES

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**Abstract**
*This paper presents a comparative analysis of Romania's progress in the context of the Digital Decade compared to digitally advanced countries within the European Union. It highlights the necessity for a coherent digital strategy in Romania to eliminate structural disparities, as there is a noticeable gap between the development of digital infrastructure and the level of digitalization of public services, the economy, and society in general. Although Romania ranks among the top countries regarding coverage with high-capacity fixed networks, the digital transformation of public administration faces challenges related to digital skills, digital education, and the low level of digitalization of SMEs. Platforms like ROeID are a promising step toward digital identity, but their*

*impact is limited by poor interoperability between databases and the fragmented nature of government initiatives. Compared to the European average and leading digital nations, Romania is still far behind in e-government, data integration, and digital innovation. The analysis underlines the urgent need for coherent, cross-sector public policies aligned with European priorities for digital transformation in public administration. Achieving this will require a unified national strategy, backed by sufficient funding and effective e-governance mechanisms, so that Romania can capitalize on its structural advantages and meet the goals set out in the Digital Decade.*
**Keywords:** *digital decade; digitalization; DESI; public policies.*
**JEL Classification:** O38; R11; H11.

## 1. INTRODUCTION

Prospective public policies help anticipate changes, assess scenarios, and create proactive solutions for a modern public administration. Their innovative approach tackles challenges like digitalization and disruptive technologies. In Romania, these policies can boost institutional performance, cut bureaucracy, and strengthen ties between administration and citizens.

Our study presents a comparative analysis of Romania's progress within the framework of the Digital Decade, in relation to the standard of digitally advanced member states of the European Union (Grigorescu *et al.*, 2021; Sfetcu, 2024; Belciu and Miron, 2024). The analysis accents the urgent need for a coherent national digital strategy to address persistent structural disparities (Radu and Petcu, 2021; Lungu *et al*., 2025; Horobeț *et al.*, 2023). The analysis highlights the urgent need for a coherent national digital strategy to address persistent structural disparities. It shows a significant gap between the expansion of digital infrastructure and the relatively limited digitalization of public services, the economy and the broader social area.

While Romania ranks among the leading countries in terms of high-capacity fixed network coverage, the digital transformation within public administration is significantly constrained by structural challenges. These include persistent deficits in digital skills, systemic weaknesses in digital education, and the limited digitalization among small and medium-sized enterprises (SMEs), which together delay the digital innovation.

Platforms such as ROeID constitute an important step for the development of digital identity; however, their effectiveness is constrained by limited interoperability among databases and the fragmentation of governmental initiatives, which significantly reduces their overall impact (Bilouseac, 2025; Lungu, 2025; Haraguș *et al.*, 2024).

Relative to the European average and to digitally advanced member states, Romania manifests a pronounced lag in the areas of e-government, data integration, and digital innovation (Lobonț *et al.*, 2025; Vărzaru *et al.*, 2023).

Our analysis indicates a critical need for coherent, cross-sectoral public policies that reflect European priorities in the digital transformation of public

administration (Gherghin, 2025; Mariani and Bianchi, 2023; Tangi *et al.*, 2023; Di Giulio and Vecchi, 2025; Millard, 2023).

Achieving progress in this area necessitates a coherent national strategy, reinforced by sufficient budgetary commitments and robust e-governance mechanisms, to ensure that Romania effectively leverages its structural advantages and aligns with the objectives of the Digital Decade (Golea *et al.*, 2025; Kotnik, 2025).

## 2. LITERATURE REVIEW

### 2.1. The Concepts of Europe's Digital Decade

The Digital Decade policy programme (DDPP) is Europe's plan to shape its digital future by 2030 through shared goals and collaboration. The DDPP sets targets for digital skills, connectivity, and secure infrastructure, fostering teamwork between EU countries and the Commission. As the first joint digital strategy of the Commission, Parliament, and Council, it provides a clear vision and governance framework to drive Europe's digital transformation (European Commission, 2025).

The Digital Decade Programme (European Commission, 2025) centers on four key areas, with specific targets to drive Europe's digital transformation:

- A population with strong digital skills and expert digital professionals;
- Secure and sustainable digital infrastructure;
- Digitally transformed businesses;
- Digitized public services.

The Digital Decade policy programme 2030 establishes a system to monitor progress toward its 2030 goals at both national and EU levels. Through this framework, the Commission and Member States collaborate to evaluate advancements and adjust keep the EU on course to achieve its digital transformation targets (European Commission, 2025; Magoutas *et al.*, 2024; Bendiek and Stuerzer, 2023).

The Digital Decade monitoring system includes (European Commission, 2025; Torrecillas *et al.*, 2023; Laitsou *et al.*, 2025; Svennberg *et al.*, 2023): Key Performance Indicators, EU-level Trajectories, Annual Digital Decade Report and National Roadmaps.

### 2.2. Methods and techniques used in prospective planning

In the context of digital transformation that requires continuous adaptation, forward-looking public policies are particularly important for strategic planning and efficient resource management. They ensure the anticipation of economic, social and technological trends, and the development of coherent long-term strategies (Monteiro and Dal Borgo, 2023). These are based on analytical methods and techniques to forecast various possible scenarios, providing decision-makers with a framework for adopting proactive and adaptive measures

(Hakim *et al.*, 2024). Foresight policies are relying on a set of analytical tools combining quantitative and qualitative methods. Quantitative methods examine existing data, uncover emerging trends, and create predictive models. Qualitative methods, on the other hand, offer in-depth insights into factors shaping the future and actively involve stakeholders in decision-making. Prospective planning combines both approaches, providing a comprehensive and integrated perspective on potential future scenarios (Bugeau and Ligozat, 2023).

### 2.3. Relevance of prospective public policies in the context of digitalization

Digitalization represents a significant transformation of contemporary society, with a profound impact on how the economy, public administration and social relations function (Millard, 2023; Latupeirissa *et al.*, 2024; Omar *et al.*, 2024). In this context, prospective public policies play a crucial role in anticipating digitalization-driven changes, identifying opportunities and risks, and strategically guiding decisions to ensure a sustainable and equitable digital transition (Sun, 2025; Nyangon, 2025; Obasi and Benson, 2025).

Digitalization reshapes not only technology but also the fundamental processes and structures of public administration, changing how it functions, interacts with citizens, and provides services. Emerging technologies like AI, blockchain, IoT, and big data offer opportunities for efficiency, transparency, and automation while posing challenges like cybersecurity risks, digital exclusion, and resistance to change (Balaji, 2025; Latupeirissa *et al.*, 2024; Damar *et al.*, 2024).

Prospective public policies are key to navigating these challenges and maximizing digitalization's benefits. Tools like scenario analysis and predictive modeling help decision-makers craft flexible strategies that balance innovation, security, and inclusion (Ködding *et al.*, 2023; Akpe *et al.*, 2023). National digitalization strategies, investments in infrastructure, digital skills, and clear regulations, alongside collaboration with academia and the IT sector, are vital for an effective transition (Denysenko, 2024; Anas and Cahyawati, 2023; Szpor and Hajduk, 2024).

Digitalization is a tool, not an end, for improving public administration's efficiency, transparency, and service quality. Foresight policies can make it a driver of sustainable development, ensuring a balanced, inclusive digital future.

Prospective public policies provide a strategic framework for anticipating technological trends and integrating them into decision-making. This is crucial in the context of digitalization, were rapid changes demand constant adaptability (Monteiro and Dal Borgo, 2023; Vudugula *et al.*, 2023). Using methods like trend analysis, alternative scenarios, and forecasting, these policies help identify priority areas for investment and development, such as digital infrastructure, digital skills education, and cybersecurity. For example, in Romania, prospective policies can assess digitalization's impact on local public administration, pinpointing ways technology can enhance public services and citizen

engagement. They also support the creation of coherent, effective national digitalization strategies to ensure successful digital project implementation.

A key aspect of prospective public policies in the context of digitalization is integrating the citizen's perspective. Digitalizing public administration must focus on citizens' needs and expectations, and prospective policies provide tools to understand these needs. This involves creating continuous feedback mechanisms, actively involving citizens in decision-making about digital public services (Balaji, 2025; Latupeirissa *et al.*, 2024; Di Giulio and Vecchi, 2025). Public consultations, opinion surveys, and qualitative analyses are essential to identify priority areas where digitalization can deliver the greatest benefits. This ensures public administration responds quickly and effectively to citizens' demands, avoiding technological solutions that fail to meet user expectations.

A practical example is developing interactive digital platforms that allow citizens to offer suggestions, report issues, and access real-time information about public services. These platforms enhance interaction between citizens and state institutions, improve administrative transparency, and increase oversight of decision-making processes. By digitalizing bureaucratic processes and using AI to manage requests, document processing times are significantly reduced, providing citizens with more efficient and accessible services.

Foresight policies are vital for managing the shift to a digital society, providing a strategic framework to anticipate changes, seize opportunities, and mitigate risks. They enable a proactive approach to digitalization challenges, preventing delayed responses and poor transition management. Public administration must adopt forecasting and trend analysis to adapt to rapid digital changes.

These policies reduce uncertainty, integrate emerging technologies such as big data, AI, and blockchain into decision-making, and enable efficient adaptation to future demands, all while upholding ethical standards and protecting citizens' rights. Through collaboration between government, academia, and the technology sector, innovative solutions can be developed to support a digitally driven society.

Through these coherent digital strategies, public administration becomes more efficient, transparent, and responsive to a world in digital transformation (Akpobome, 2024; Jain *et al.*, 2024). Digitalization is more than just a technological change – it represents a shift in how citizens engage with government. Foresight policies sustained this transition by incorporating citizen perspectives, anticipating future trends, and promoting collaboration, positioning public administration as a model of efficiency and innovation in an evolving digital society (Balaji, 2025; Swasthaisong *et al.*, 2025).

## 3. MATERIALS AND METHODS

### 3.1. Study Design

This study conducts a comparative analysis of Romania's progress in digital transformation within the framework of the European Union's Digital Decade policy programme (2030), with particular attention to structural disparities compared to digitally advanced member states. Covering the period 2021–2025, it draws on data from the Digital Economy and Society Index (DESI) reports. The analysis integrates EU-wide quantitative indicators with qualitative insights from Romania's national digital initiatives to evaluate gaps in digital infrastructure, skills, public services, and innovation.

### 3.2. Data Sources

Statistical data were collected and recorded from official sources such as:

- *European Commission***:** Provided DESI data for period 2021–2025, covering indicators such as fixed very high-capacity networks, 5G coverage, digital skills, ICT specialists, digital public services, cloud adoption, AI integration, and SME digital intensity.
- *European Commission's Digital Decade Reports:* Offered insights into EU-level trajectories, KPIs, and national roadmaps for digital transformation.
- *Romanian National Authorities:* Supplied data on national digital initiatives, including the ROeID platform and other e-government efforts, sourced from government reports and policy documents.
- *Comparative Country Data:* Included case studies of digitally advanced EU countries (e.g., Estonia, Denmark, Finland) from Eurostat and DESI to benchmark Romania's performance.

All data were aggregated at the national level and standardized to allow meaningful comparison across countries with different economic and digital contexts.

### 3.3. Variables

The study focuses on the following variables:

- *Dependent Variable*: Romania's digital performance, measured through DESI rankings across key indicators (e.g. digital public services, digital skills, connectivity).
- *Independent Variables*:

- Digital infrastructure (e.g., fixed very high-capacity networks, fiber-to-the-premises coverage, 5G coverage).
- Digital skills and ICT specialist availability.
- Digital public services for citizens and businesses.
- SME digital intensity and adoption of emerging technologies (cloud, AI).

### 3.4. Methodology

The methodology integrates quantitative and qualitative approaches to provide a comprehensive assessment of Romania's digital transformation:

1. ***Descriptive Analysis***: we summarized Romania's performance in DESI indicators (2021–2025), highlighting strengths (e.g., fiber coverage) and weaknesses (e.g., 5G, digital skills). Comparative data from top-performing EU countries (e.g., Malta, Netherlands, Finland) were used to contextualize Romania's position.
2. ***Trend Analysis***: we analyzed temporal trends in DESI rankings to identify progress or stagnation in Romania's digital metrics, focusing on changes from 2023 to 2025.
3. ***Comparative Benchmarking***: we conducted a cross-country comparison of DESI indicators to assess Romania's gaps relative to digitally advanced EU states. Best practices from countries like Estonia (e-ID systems) and Denmark (centralized databases) were analyzed to propose actionable insights.
4. ***Qualitative Assessment***: we analyzed Romania's national digital initiatives (e.g., ROeID) through policy document analysis, focusing on challenges like interoperability and fragmentation. Stakeholder perspectives from government reports were incorporated to understand implementation barriers.
5. ***Scenario Analysis***: we used qualitative foresight techniques to explore the potential future trajectories of Romania's digital transformation, considering scenarios for enhanced e-government, digital skills training, and technology adoption.
6. ***Statistical Software***: we used SPSS for descriptive statistics and trend analysis of DESI data.

## 4. RESULTS

We conducted a comprehensive statistical analysis for all 12 indicators from the sub-components of DESI, and we obtained the descriptive statistics, rank changes and means. The analysis was based on ordinal ranks (1-27) corresponding to EU member states.

In the Table 1 we presented a summary of Romania's ranks and the top 3 countries for each sub-components of DESI and we can see that Romania excels in digital infrastructure (e.g., ranks 1-5 in high-capacity networks and fiber), but Romania consistently underperforms in advanced digital domains (e.g. ranks 25-27 in AI, unicorns, skills, and public services). Most of top 3 of DESI subcomponents are dominated by Nordic and Baltic countries (e.g., Finland, Denmark, Malta, Sweden), indicating successful digitalization models.

Then we proceeded to a nonparametric analysis of the mean ranks (see Table 2) and this indicate a generally weak position for Romania in the top DESI, who is in generaly closer to 27. There is a slight deterioration from 2023

to 2024, followed by a recovery in 2025. The consistent median of 26 suggests most indicators are near the bottom, with exceptions in infrastructure.

**Table 1. Performance Indicators DESI Romania**

| Performance Indicators Romania | DESI 2023 (Rank) | DESI 2024 (Rank) | DESI 2025 (Rank) | Top 3 DESI 202 Rank 1, 2 and 3 | Top 3 DESI 2025 Rank 1, 2 and 3 |
|---|---|---|---|---|---|
| Fixed very high-capacity networks | 4 | 5 | 4 | Malta, Netherlands, Denmark | Malta, Netherlands, Denmark |
| Fiber to the premises coverage | 1 | 2 | 1 | Spain, Romania, Portugal | Romania, Spain, Portugal |
| 5G coverage | 26 | 27 | 27 | Cyprus, Denmark, Malta | Cyprus, Denmark, Malta |
| SMEs with at least a basic level of digital i | 18 | 23 | 17 | Finland, Italy, Denmark | Netherlands, Italy, Slovenia |
| Cloud | 26 | 26 | NA | Finland, Denmark, Sweden | NA |
| Artificial Intelligence | 27 | 27 | 27 | Denmark, Finland, Luxembourg | Denmark, Sweden, Belgium |
| Unicorns | 25 | 25 | 25 | Germany, France, Sweden | Germany, France, Sweden |
| At least basic digital skills | 27 | 27 | 27 | Netherlands, Finland, Ireland | Netherlands, Finland, Ireland |
| ICT specialists | 26 | 26 | 26 | Sweden, Luxembourg, Finland | Sweden, Luxembourg, Finland |
| Digital public services for citizens | 27 | 27 | 27 | Malta, Estonia, Luxembourg | Malta, Luxembourg, Finland |
| Digital public services for businesses | 27 | 27 | 27 | Finland, Ireland, Malta | Ireland, Luxembourg, Malta |
| Access to E-health records | 23 | 25 | 23 | Belgium, Denmark, Estonia | Belgium, Estonia, Denmark |

Source: SPSS processing, own calculation

In Table 2, we can observe it the value for mean (21.42 in 2023; 22.25 in 2024 and 21.00 in 2025). That reflects for Romania a mid-to-low position, with minor variations. The improvement in 2025 shows certain progress, but not enough to significantly. We also performed a nonparametric test for differences in ranks from one year to another. Thus, a positive variation indicates a deterioration of the respective DESI subcomponent, and a negative variation indicates an improvement of the situation, which can be seen in Table 3.

**Table 2. Analysis of the mean ranks**

| Statistic | Rank 2023 | Rank 2024 | Rank 2025 (excl. NA) |
|---|---|---|---|
| Number of observations | 12 | 12 | 11 |
| Mean | 21.42 | 22.25 | 21.00 |
| Standard Deviation | 9.22 | 8.86 | 9.64 |
| Minimum | 1 | 2 | 1 |
| 25% (Q1) | 21.75 | 24.50 | 20.00 |
| Median (50%) | 26.00 | 26.00 | 26.00 |
| 75% (Q3) | 27.00 | 27.00 | 27.00 |
| Maximum | 27 | 27 | 27 |

Source: SPSS processing, own calculation

**Table 3. Variation ranks**

| Indicator | Variation rank 2024-2023 | Variation rank 2025-2024 | Variation rank 2025-2023 |
|---|---|---|---|
| Fixed very high-capacity networks | 1 | -1 | 0 |
| Fiber to the premises coverage | 1 | -1 | 0 |
| 5G coverage | 1 | 0 | 1 |
| SMEs with at least a basic level of digital intensity | 5 | -6 | -1 |
| Cloud | 0 | NA | NA |
| Artificial Intelligence | 0 | 0 | 0 |
| Unicorns | 0 | 0 | 0 |
| At least basic digital skills | 0 | 0 | 0 |
| ICT specialists | 0 | 0 | 0 |
| Digital public services for citizens | 0 | 0 | 0 |
| Digital public services for businesses | 0 | 0 | 0 |
| Access to E-health records | 2 | -2 | 0 |

Source: SPSS processing, own calculation

We can observe it in the Table 3 that 8 out of 12 sub-components of DESI for Romania shows stagnation. Some minor improvement is in the area of digitalization for SMEs (-1 overall), and one minor deteriorations for 5G coverage (+1). Weaknesses in critical areas such as artificial intelligence, digital public

services, and human capital persist without improvement. That's indicating insufficient targeted investments and policy prioritization to address these gaps.

We analyzed the evolution with non-parametric statistical tests for differences between ranks years:

- Friedman Test (overall differences between years, on 11 indicators excluding NA): Statistic: 7.63, p-value: 0.022 with statistically significant differences ($p < 0.05$), who indicating that rank changes are not random but follow a pattern over the years.
- Wilcoxon Signed-Rank Test (pairwise comparisons):

- 2023 vs. 2024: Statistic: 0.00, p-value: 0.039 shows a significant difference (deterioration).
- 2024 vs. 2025: Statistic: 0.00, p-value: 0.066 with marginal difference who shows a trend toward improvement, but not significant ($p<0.05$).
- 2023 vs. 2025: Statistic: 1.50, p-value: 1.000 with no significant difference (who indicates overall stability).

In this case, for Romania the analysis shows good positioning in infrastructure (e.g., fiber, networks) but chronic stagnation in human capital and digital services (e.g. digital skills, AI, digitalization of public services). The gap with leaders (e.g. Finland, Malta) is significant, highlighting the need for accelerated policies and the necessity of a coherent digital strategy in Romania in the context of the digital decade and for eliminating structural disparities compared to digitally developed countries. The data for 2025 indicate partial recovery, but no major improvements.

## 5. DISCUSSION AND CONCLUSIONS

Romania has made measurable progress toward the objectives of the Digital Decade 2030; nevertheless, persistent structural and institutional challenges continue to limit its competitive position within the European Union. Romania's digital performance presents a mixed picture. Its leadership in FTTP coverage and strong ranking in VHCN demonstrate a solid foundation in connectivity infrastructure, rivalling or surpassing many EU countries. However, its low rankings in digital skills, digital public services, cloud, AI, and unicorns place it at the bottom of the EU in these areas. Top performers like Malta, the Netherlands, Denmark and Finland consistently dominate across multiple indicators, highlighting the gap Romania must bridge to compete with Europe's digital leaders.

Thus, for Romania's strength in Fiber connectivity provides a strong platform for advancing digital services, supporting remote work, and fostering innovation. This infrastructure can be utilised to improve digital public services, e-health, and SME digitalization and could generate important benefits. The slight improvement in SME digital intensity by 2025 shows potential for growth if applied by coherent digital strategies. But ranking of the bottom of tops for digital skills, cloud, AI, and digital public services indicate systemic issues, including insufficient investment, educational gaps, and slow adoption of emerging technologies. To resolves these

systemic problems, coordinated efforts are needed in education, workforce training, regulatory reform, and public-private partnerships.

For Romania to advance meaningfully toward the objectives of the Digital Decade and consolidate its position within the European digital landscape, a set of concrete and well-structured measures is required. Accelerating the digitalization of public administration could reduce bureaucratic inefficiencies, streamline procedures, and enhance citizens' access to online services, thereby fostering institutional trust and promoting technology adoption. Expanding digital education at the pre-university level would cultivate a generation of professionals equipped to support the digital economy, helping to address existing skills gaps.

By promoting digital innovation and providing tax and financing incentives for startups, the emergence of unicorns and the development of a dynamic technological system can be supported and encouraged. A better strategy in the field of cybersecurity and AI and greater investment in a specialized infrastructure would support the protection of citizens and businesses, encouraging the adoption of digital technology. The digital divide between urban and rural areas can be reduced through inclusion programs - such as subsidized internet access and free digital literacy training, which would support balanced development and prevent the marginalization of rural areas.

In conclusion, Romania is at a critical point in its digital development. While it has a solid foundation and considerable opportunities, achieving the objectives of the Digital Decade depends on the timely and effective implementation of targeted measures. Without a proactive approach, Romania risks falling behind other European states, limiting both its economic and social potential. However, by strategically leveraging existing resources and prioritizing key interventions, the country can turn current challenges into long-term competitive advantages.

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