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BRIDGING DIGITAL SKILLS AND SUSTAINABLE DEVELOPMENT GOALS: AN ANALYSIS IN THE CONTEXT OF THE 2030 DIGITAL DECADE

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Abstract:
The Digital Decade Policy Programme 2030 establishes a comprehensive framework for monitoring and cooperation among Member States to achieve the European Union's shared objectives for digital transformation. The programme focuses on four main pillars: enhancing digital skills, developing digital infrastructures, fostering the digital transformation of businesses, and advancing the digitalisation of public services. Progress towards these targets is assessed using the Digital Economy and Society Index. According to the 2024 State of the Digital Decade Report, Romania achieved notable progress in 2023 in the digitalisation of public services and in the integration of digital technologies by small and medium-sized enterprises, while maintaining strong performance in Fiber to the Premises coverage. However, despite these improvements, Romania continues to face substantial challenges in enhancing basic digital skills among the general population. The country's share of individuals with at least basic digital skills remains significantly below both the EU average and the 2030 Digital Decade target of 80%.
This paper aims to analyse Romania's position relative to other EU Member States with respect to the proportion of the population possessing at least basic digital skills, based on DESI 2024 data. The analysis is disaggregated by age, educational attainment, and gender to identify key disparities and challenges. The findings emphasize that investing in basic and advanced digital skills is not merely a social or educational initiative but a strategic investment in an economy's technological future and a key driver of progress towards the Digital Decade 2030 objectives.

Key words: digital skills; digital transformation; digital economy, digital divide; DESI; sustainable development;

JEL classification: O00, O11, O14, O31 și O33

1. INTRODUCTION

To evaluate and monitor the digital progress of EU Member States, the European Commission introduced the Digital Economy and Society Index (DESI) in 2014 — a composite index that synthesizes key indicators relevant to the European Union's digital performance and tracks the evolution of each Member State's digital competitiveness. DESI encompasses four main dimensions:

- Human capital — measuring digital skills at both basic and advanced levels, as well as the availability of ICT specialists within the economy.
- Connectivity — assessing the coverage and quality of broadband infrastructure (fixed and mobile) and its accessibility for citizens and businesses.
- Integration of digital technology — analyzing the extent to which enterprises adopt and use digital technologies (such as cloud computing, AI, and big data) to enhance competitiveness.
- Digital public services — reflecting the level of digitalization in public administration, the availability and use of online services, and system interoperability.

The 2022 DESI results indicate that Finland, Denmark, the Netherlands, and Sweden are the top performers, exhibiting consistently high and well-balanced outcomes across all dimensions of digitalisation. These countries' achievements are attributed to coherent national policies, strategic investments, and robust public-private partnerships. In contrast, Romania ranks at the bottom of the DESI ranking, demonstrating substantial shortcomings in human capital, the adoption of digital technologies by small and medium-sized enterprises (SMEs), and the availability of digital public

services. These findings are illustrated in Figure no. 1, which presents the comparative results across countries.

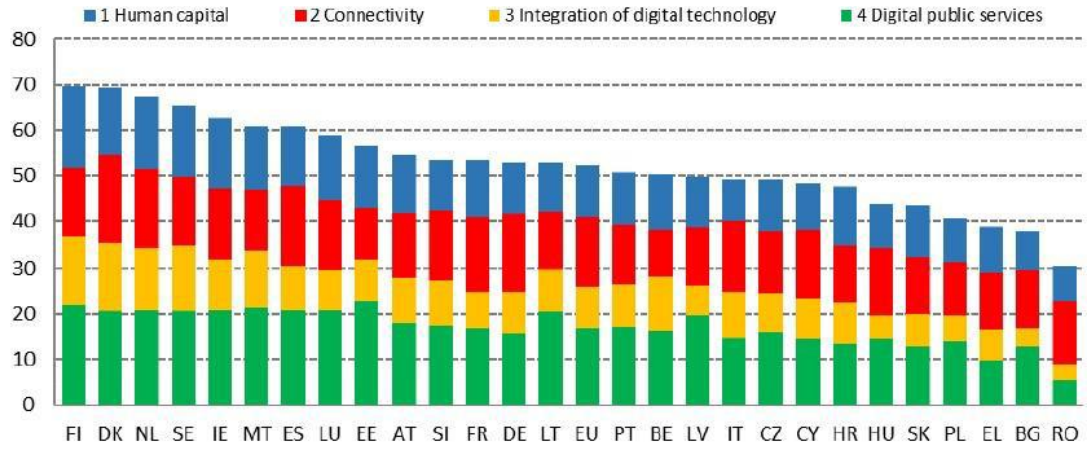

Figure no. 1. The 2022 DESI Index: A Comparative Analysis of EU Member States
Source: https://digital-strategy.ec.europa.eu/en/policies/desi

This positioning highlights not only technological gaps but also the lack of a coherent digital strategy and persistent difficulties in efficiently absorbing European funds dedicated to digital transformation. Without systemic interventions and accelerated reforms, Romania risks falling further behind the EU's Digital Decade 2030 targets.

2. DIGITAL SKILLS OF INDIVIDUALS, KEY PERFORMANCE INDICATOR FOR 2030

Beginning in 2023, following the adoption of the Digital Decade Policy Programme 2030, the DESI Index was integrated into State of the Digital Decade Report, where it serves as a key monitoring tool for tracking progress towards the digital targets set for 2030. The reporting methodology was revised, shifting the focus away from an aggregated composite score towards tracking the evolution of each thematic pillar individually. Progress is now monitored based on clearly defined objectives aligned with the strategic targets at the EU level.

Indicators are now reported individually to provide a more detailed and transparent picture of progress in each domain, avoiding the risk of masking deficiencies in one area with strong performance in another. The DESI 2024 Dashboard includes a total of 36 indicators, of which 15 are designated as Key Performance Indicators (KPIs) for the Digital Decade. Among these, the indicator measuring the share of the population with at least basic digital skills is particularly relevant, as it reflects the essential foundation for citizens to participate effectively in the digital society and economy. This indicator is crucial for assessing Member States' capacity to bridge the digital divide and fully leverage the opportunities offered by the Digital Decade.

An individual is considered to possess basic or above basic digital skills if demonstrate proficiency in all five of the following competence areas:

- Information and Data Literacy: The ability to search for information related to goods or services; seek health-related information; read online news platforms, newspapers, or news magazines; and engage in activities related to verifying the accuracy of online content and its sources.
- Communication and Collaboration: Proficiency in sending and receiving emails; making voice or video calls via the internet; using instant messaging; participating in social networks; expressing opinions on civic or political matters through websites or social media; and engaging in online consultations or voting on civic or political issues.
- Digital Content Creation: Skills in using word processing and spreadsheet software; editing photos, videos, or audio files; transferring files across folders, devices, or cloud platforms;

creating documents that integrate text, images, tables, charts, animations, or sound; and applying advanced spreadsheet functions (e.g., formulas, macros) or writing code in a programming language.
- Safety: Competence in managing personal data privacy by checking website security, reading privacy statements, restricting location access, managing profile visibility on social networks or shared platforms, refusing the use of personal data for advertising, and adjusting browser settings to control cookies.
- Problem Solving: The ability to download and install software or applications; configure settings of software, apps, or devices; engage in online purchasing or selling; use online learning platforms; perform internet banking; and search or apply for jobs online.

Table no. 1 provides a comparative overview of the percentage of individuals aged 16-74 with at least basic digital skills in the European Union and Romania, as reported in DESI 2023 (year 2022) and DESI 2024 (year 2023). The table includes annual growth rates, the Digital Decade 2030 targets, and the corresponding value gaps, as well as the annual growth required to meet the 2030 objectives. The table's primary aim is to assess progress toward achieving the EU's strategic digital targets by highlighting both current performance and future requirements. According to DESI 2024 data, the share of individuals with at least basic digital skills in Romania is 27.7%, far below the EU average of 55.6%.

Table no. 1. Percentage of individuals with at least basic digital skills

Percentage of all individuals, aged 16-74, with basic digital skills	DESI 2023 (year 2022)	DESI 2024 (year 2023)	Annual growth	2030 digital decade target	2030 value gap	Annual growth needed by 2030
European Union	53.9	55.6	1.6	80.0	24.4	3.5
Romania	27.8	27.7	-0.3	50.0	22.3	3.2

Source: Own elaboration using data from https://digital-strategy.ec.europa.eu/en/policies/desi

By presenting individual growth rates and comparing them to the annual growth rates needed to meet the 2030 targets, the table highlights the extent of progress and the scale of the challenge in closing the digital skills gap. This analysis is crucial for informing comprehensive policy planning and effective implementation strategies, supporting the achievement of the Digital Decade 2030 objectives across all EU member states.

Figure no. 2 complements Table no. 1 and illustrates the percentage of individuals aged 16-74 possessing at least basic digital skills across EU Member States, based on the DESI 2024. A notable pattern emerges: while the EU average stands at 55.6%, substantial disparities exist between member states. Romania remains at the bottom of the ranking, with only 27.7% of individuals reporting at least basic digital skills, closely followed by Bulgaria (35.5%). These figures reflect the stagnation highlighted in Table 1, where Romania recorded a negative annual growth rate (-0.3%) and a significant gap (22.3%) from its 2030 target.

As of 2023, 55.6% of individuals in the European Union aged 16 to 74 possessed at least basic digital skills, up from 53.9% in 2024. This figure remains 24.4% below the EU's 2030 target of 80% as outlined in the Digital Decade Policy Programme.

In the recent year, the EU has experienced a mere 1.5% annual progression, far below the necessary average annual growth of over 3.5% to meet the 2030 target. Recent trends underscore the urgent need for significant and immediate efforts to bridge the gap towards the 2030 target on at least basic digital skills.

The distribution of digital skills varies significantly across EU member states. The highest proportions were observed in the Netherlands (83%) and Finland (82%), while the lowest were in Romania (28%) and Bulgaria (36%).

Recent developments highlight the pressing necessity for substantial and immediate action to close the gap towards achieving the 2030 target for basic digital skills.

A digitally skilled population serves as the foundational layer for the development of highly skilled digital professionals. Without a digitally literate population, there can be no sustainable pipeline of advanced digital professionals.

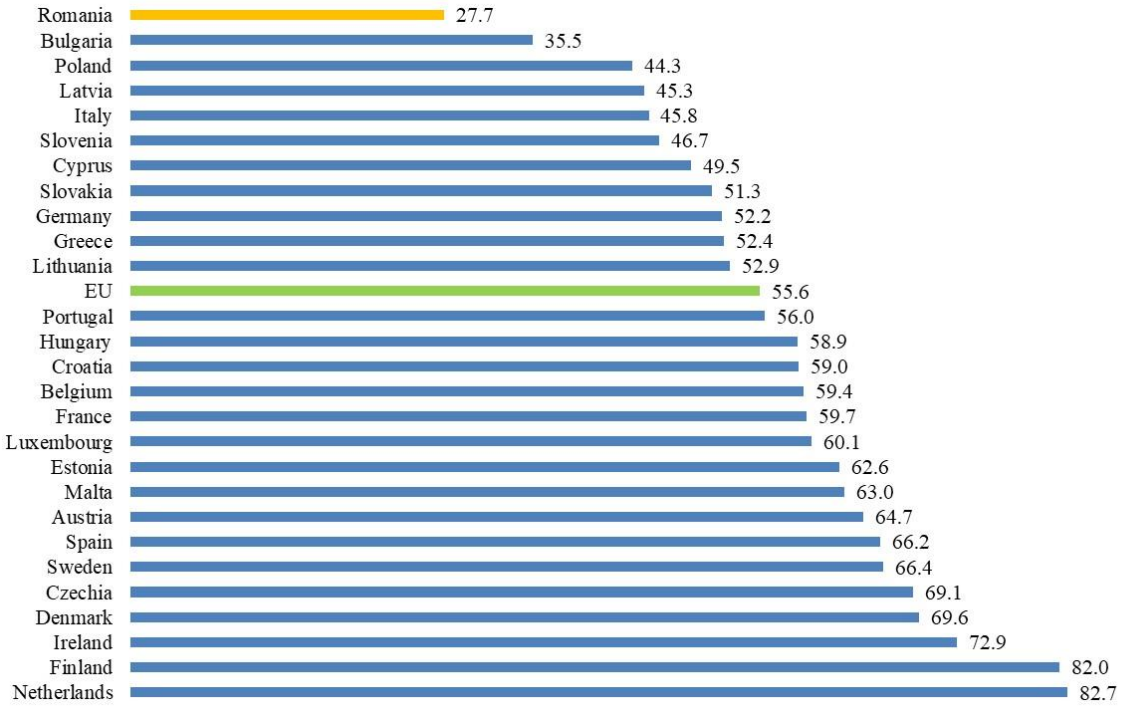

Figure no 2. Percentage of individuals in EU contries with at least basic digital skills (16-74 years old)

Source: Own elaboration using data from https://digital-strategy.ec.europa.eu/en/policies/desi

Table no. 2. Percentage of Individuals of at least basic digital skills by structural characteristics:

Percentage of all individuals with basic digital skils	ROMANIA			EUROPEAN UNION		
	DESI 2023 (year 2022)	DESI 2024 (year 2023)	2030 value gap (50% target)	DESI 2023 (year 2022)	DESI 2024 (year 2023)	2030 value gap (80% target)
All Individuals (aged 16-74)	27.8	27.7	22.3	53.9	55.6	24.4
Individuals, 16 to 24 years old	47.5	47.2	2.8	71.2	70.0	10.0
Individuals, 25 to 54 years old	33.7	33.5	16.5	62.1	64.0	16.0
Individuals, 55 to 74 years old	8.9	10.6	39.4	34.6	37.1	43.0
Individuals with no or low formal education	13.3	12.6	37.4	31.9	33.6	46.4
Individuals with medium formal education	22.4	23.9	26.1	49.7	51.1	28.9
Individuals with high formal education	67.3	63.9	-13.9	79.0	79.8	0.2
Females, 16 to 74 years old	25.7	26.5	23.5	52.3	54.5	25.5
Males, 16 to 74 years old	30.0	29.1	20.9	55.6	56.7	23.3

Source: Own elaboration using data from https://digital-strategy.ec.europa.eu/en/policies/desi

Digital proficiency is also influenced by socio-demographic factors:

- Age: Younger age groups exhibit higher digital proficiency. For instance, 70% of individuals aged 16–24 possess at least basic digital skills, whereas only 37% of those aged 55–74 do, highlighting the persistent generational digital divide.
- Education Level: 80% of individuals with higher education have at least basic digital skills, compared to 34% among those with no or low formal education. This disparity underscores the role of formal education in facilitating digital inclusion.

- Gender: Overall, men slightly outperform women in digital skills (57% vs. 55%). However, among younger age groups (16–44), women tend to have higher digital proficiency, while in older age groups (45+), men have the advantage.

Key Insights on Digital Skills in Romania:

- Age: Approx. 47% of Romania young population (16–24 years) has at least basic digital skills, compared to the EU average of 70% . This gap suggests that even among digital natives, Romania faces structural challenges in digital education and access. Regarding older adults, digital inclusion is particularly limited in this group, nevertheless a positive trend was recorded.
- Educational Level: One of the most critical disparities is observed across different education levels. Only 28% of Romanian individuals aged 16 to 74 possessed at least basic digital skills—substantially below the EU average of 56%. This gap becomes even more pronounced when disaggregated by level of educational attainment: only 12.6% for low level of education, while 63.9% of individuals with higher levels of education possess at least basic digital skills.
- Gender: There is no significant difference between sexes as regards share of people with at least basic digital skills, on average men tend to have better digital skills than women. Both figures are significantly lower than the EU average.

3. BASIC DIGITAL SKILLS OF INDIVIDUALS IN EUROPEAN UNION BY AGE

Figure no. 3 illustrates the percentage of individuals with at least basic digital skills across EU member states, segmented into three age groups and compared against the overall population and the EU's Digital Decade target of 80% digital proficiency by 2030.

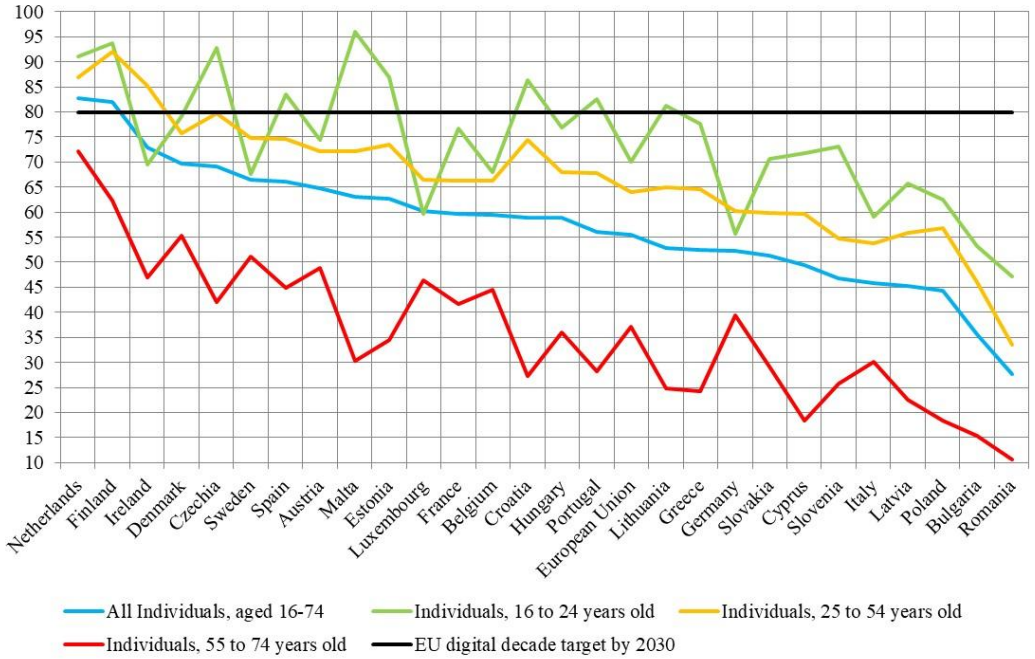

Figure no 3. Percentage of individuals in EU with at least basic digital skills by age

Source: Own elaboration using data from https://digital-strategy.ec.europa.eu/en/policies/desi

- Overall Population (16–74 years) – Blue Line

The EU average for the total population is 56%, well below the 80% 2030 target (marked by the black line). Only a few countries, such as the Netherlands, Finland, and Denmark, are on track to meet or have already exceeded this target. The steep drop observed in many countries indicates the need for accelerated policy action, particularly in digital inclusion and lifelong learning.

- Young Adults (16–24 years) – Green Line

This group consistently demonstrates the highest digital proficiency, with the majority of EU countries surpassing the 80% threshold. In countries like the Netherlands, Finland, Denmark, and Sweden, over 90% of young people have at least basic digital skills. However, there is considerable variability. In Romania, Bulgaria, and Poland, levels drop below 60%, revealing a substantial East-West divide in youth digital competence.

- Adults (25–54 years) – Yellow Line

Representing the core working-age population, digital skills in this group vary significantly. Countries such as Finland, Sweden, and the Netherlands show strong performance, close to or exceeding the EU 2030 target. In contrast, Romania, Bulgaria, and Latvia report basic digital skills for less than 50% of this cohort. The data highlight an urgent need for workforce upskilling, especially in countries with below-average performance.

- Older Adults (55–74 years) – Red Line

This demographic consistently exhibits the lowest digital skill levels across the EU. Even in leading digital nations like Finland and Sweden, rates hover around 60–70%, while in many Eastern and Southern countries—Romania, Bulgaria, Greece, and Italy—the percentage falls below 30%, in some cases under 20%. The findings reflect a critical generational digital divide, exacerbated by lower exposure to technology and fewer learning opportunities.

4. BASIC DIGITAL SKILLS OF INDIVIDUALS IN EUROPEAN UNION BY FORMAL EDUCATION

Figure no. 4 displays the percentage of individuals aged 16–74 with at least basic digital skills across EU countries, segmented by three levels of formal education and compared against the overall population and the EU's Digital Decade target of 80% digital proficiency by 2030.

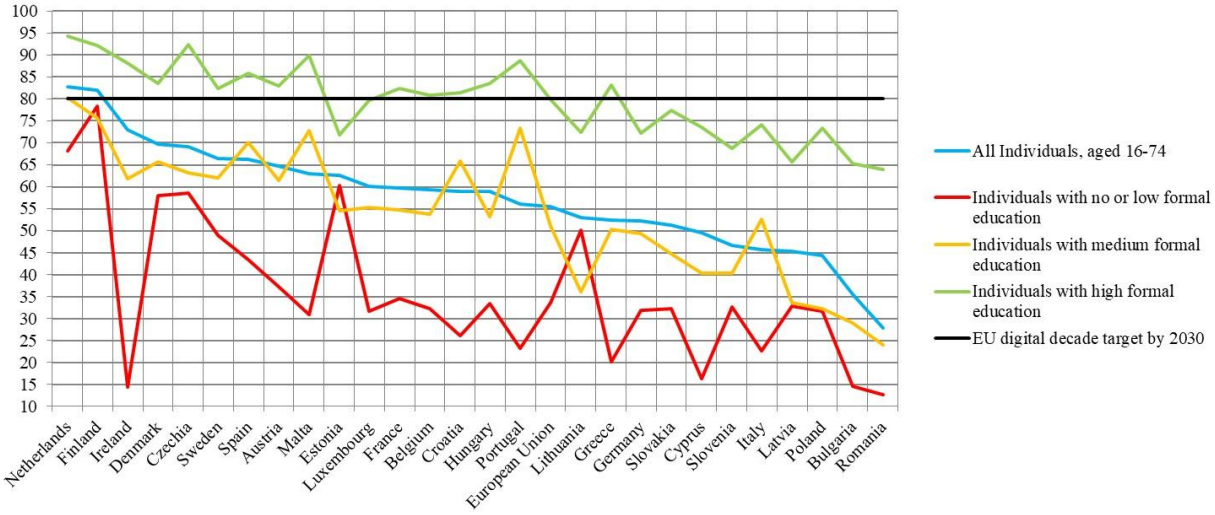

Figure no 4. Percentage of individuals in EU with at least basic digital skills by formal education

Source: Own elaboration using data from https://digital-strategy.ec.europa.eu/en/policies/desi

As Năstase and Hodoroaba (2010) assert, "education is a strategic area of development" and higher education serves as a vital mechanism that "can give to a society the resources necessary for its correlation with social and economic developments at global level" (pp. 53–54), illustrating how foundational digital skills and educational infrastructure underpin sustainable development goals within the 2030 Digital Decade framework .

- ✓ Overall Trend – Blue Line

The EU average for the general population (ages 16–74) remains well below the 2030 target, at approximately 56%. The overall line reflects the strong influence of educational attainment on

national averages and highlights the critical role of inclusive education policies in advancing digital skills for all.

- ✓ Individuals with High Formal Education – Green Line

This group consistently exhibits the highest levels of digital skills across all EU member states. In leading countries such as the Netherlands, Finland, and Denmark, over 90% of individuals with tertiary education possess at least basic digital skills. Even in lower-performing countries, such as Romania, Bulgaria, and Poland, this demographic achieves notably higher digital proficiency than other educational groups, typically exceeding 60%. These results reflect the strong positive correlation between educational attainment and digital competence.

- ✓ Individuals with Medium Formal Education – Yellow Line

This group—typically those with secondary education—shows moderate levels of digital skills, with clear variation across the EU. In digitally advanced nations, percentages range between 70–85%, approaching the EU target. In contrast, countries in Eastern and Southern Europe fall behind, with percentages ranging between 40–60%, highlighting persistent regional disparities. The data suggest that vocational and secondary-level education systems must strengthen digital literacy components to improve these outcomes.

- ✓ Individuals with No or Low Formal Education – Red Line

This group consistently records the lowest digital skill levels in every country. In many EU countries, fewer than 30% of individuals in this category possess basic digital skills. Particularly concerning are countries like Romania, Bulgaria, and Greece, where figures often drop below 20%, indicating a severe digital divide rooted in educational inequality. Even in high-performing countries such as Finland and Denmark, this group lags significantly behind, underscoring that formal education remains a key determinant of digital inclusion.

5. BASIC DIGITAL SKILLS OF INDIVIDUALS IN EUROPEAN UNION BY GENDER

According to the most recent DESI and Eurostat data, gender disparities in basic digital skills across the European Union are relatively narrow, yet they persist in certain countries and among older age groups or those with lower education levels.

Figure no. 5 illustrates the percentage of individuals with at least basic digital skills across EU member states, segmented by gender and compared against the overall population and the EU's Digital Decade target of 80% digital proficiency by 2030.

EU Averages all individuals (16–74):

- Men with at least basic digital skills: 57%
- Women with at least basic digital skills: 55%

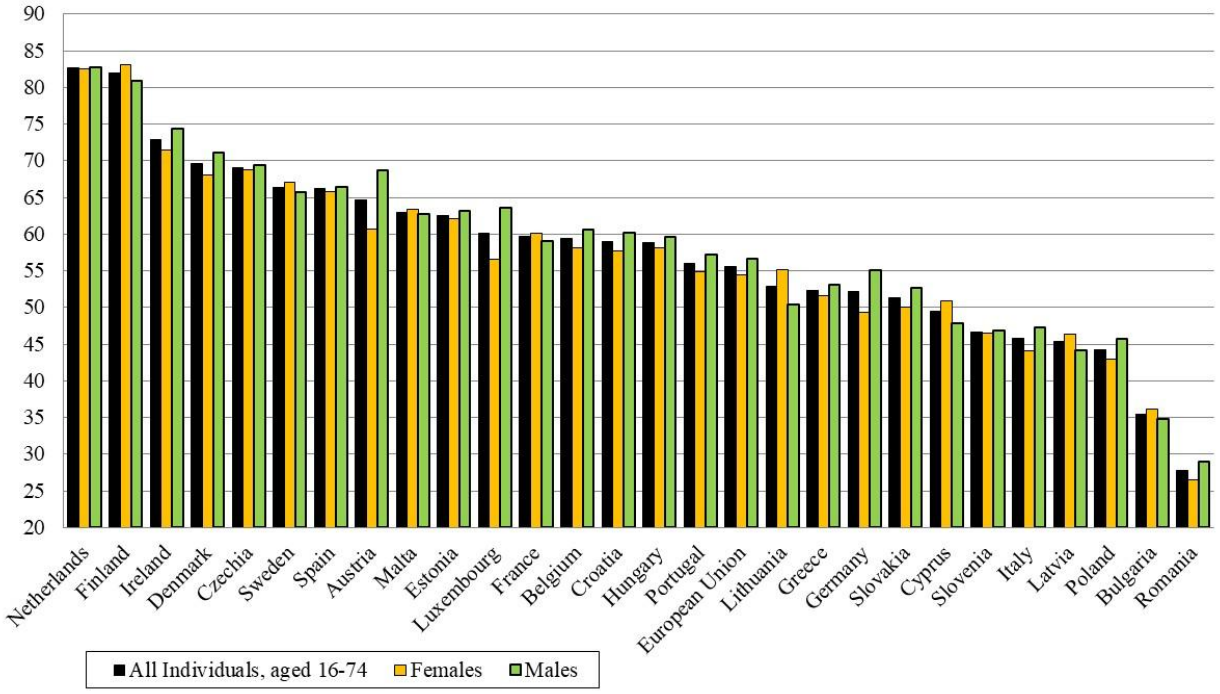

Figure no 5. Percentage of individuals in EU with at least basic digital skills by gender
Source: Own elaboration using data from https://digital-strategy.ec.europa.eu/en/policies/desi

Key Observations:

- Younger generations (16–24) show no significant gender gap, suggesting generational progress towards parity.
- In many northern and western EU countries (e.g. the Netherlands, Finland, Denmark), women slightly outperform or match men in basic digital skills.
- In contrast, in some eastern and southern EU countries (e.g. Romania, Bulgaria, and Italy), men tend to have higher rates of digital proficiency, particularly in older age groups.
- Overall, the gender gap in Romania is modest: both sexes are far below EU norms, but it appears younger women have a slight edge while older women fall behind men.

6. BASIC DIGITAL SKILLS AND FUTURE SUSTAINABLE DEVELOPMENT GOALS

Data from DESI and Eurostat show Romania far behind on basic digital skills. In 2023 only ~ 28% of Romanians aged 16–74 had at least basic digital skills, making it the lowest in the EU (EU average ~56%). Moreover, Romania's share (27.7% in 2024 vs 27.8% in 2023), has stagnated well below the EU's target by 2030 even as EU average slowly rises. *That means Romania lags the EU Digital Decade goals and will require massive upskilling efforts***.**

Skill levels correlate strongly with education. In Romania only 13% of people with low formal education have basic digital skills vs 67% for high-educated. This large gap underlies the country's low overall rate. Romania has adopted national strategies to close the gap. The Digital Agenda 2020 (national plan) and the newer SMART-Edu 2021–2027 strategy aim to integrate digital literacy into education. Established in 2015 as part of the European Digital Skills and Jobs Coalition, Skills4IT serves as an open platform that brings together a diverse range of stakeholders, including educational institutions, ICT companies, training providers, professional associations, and NGOs. Its primary focus is to enhance digital competencies across various sectors and demographics in Romania. The EU-backed Recovery & Resilience Plan for Romania includes dozens of measures and reforms to boost digital skills and infrastructure.

However, progress remains slow – Romania must accelerate training especially for disadvantaged groups. Analyses highlight that gaps are largest among the elderly, the low-educated

and rural populations. Policy recommendations emphasize the urgent need to prioritize digital skills training for older and low-educated adults as well as continuing to promote STEM education for girls (teaching and learning in the fields of Science, Technology, Engineering, Mathematics). Addressing these disparities is critical for Romania to converge with EU averages and meet future targets.

Basic digital skills are foundational to unlocking the full potential of sustainable development by empowering people, driving innovation, enhancing resource efficiency, and fostering inclusive governance. As Maksymova and Năstase (2024) emphasize, digitalization plays an important role in the sustainable transformation of SMEs in the European Union, highlighting how the development of digital skills intersects with environmental goals and broader societal transitions in the context of the 2030 Digital Decade. Furthermore, Zaharia, Gogonea, and Bălăcescu (2020) argue that education efficiency is a critical factor for sustainable development in Romania, underscoring the necessity of investing in foundational and advanced digital competencies to close existing gaps and support inclusive growth. Basic digital competencies are not only essential for navigating everyday life but also act as entry points into more advanced digital domains, including data science, cybersecurity, artificial intelligence, and software development. Without them, many sustainability initiatives risk exclusion and inefficiency, undermining long-term progress.

- Empowerment and Inclusion:

A population with strong basic digital skills can access information, services, and opportunities online, reducing social inequalities. This inclusion supports sustainable development by enabling all groups to participate in economic, educational, and civic activities.

- Economic Growth and Innovation**:**

Digital literacy fosters entrepreneurship and employment in new technology-driven sectors. This drives economic growth sustainably by encouraging innovation in clean technologies, efficient resource management, and new business models aligned with environmental goals.

- Environmental Awareness and Action:

Digitally skilled individuals can better access and understand environmental data, promoting awareness and informed decisions about sustainable practices such as energy conservation, waste reduction, and sustainable consumption.

- Efficient Resource Management:

Digital skills enable the use of smart technologies that optimize energy use, reduce waste, and improve infrastructure efficiency—key components of sustainable urban and transport development and climate resilience.

- Education and Lifelong Learning:

Basic digital skills provide access to ongoing education and upskilling, including in sustainability topics. This fosters a culture of continuous learning and empowers people to contribute to long-term environmental and societal well-being.

- Governance and Participation:

Digitally skilled citizens are more likely to engage with e-governance platforms, contributing to transparent, accountable, and inclusive decision-making processes that support sustainable policies.
Strengthening digital competencies among the population fosters innovation, inclusive growth, and environmental responsibility, and contributes meaningfully to both economic and sustainable development.

Investing in ensuring that individuals possess at least basic digital skills constitutes a direct investment in the future economic development of a country.

7. CONCLUSIONS

The analysis reveals a clear *age gradient* in digital skills acquisition, with younger cohorts consistently outperforming older generations. This finding underscores the need for targeted interventions focusing on older adults to bridge generational gaps in digital competence.

Significant *geographical disparities* persist across the European Union, with Northern and Western Member States demonstrating considerably higher levels of digital skills compared to their Eastern and Southern counterparts. This pattern highlights the necessity for region-specific strategies and policy measures, especially in low-performing Member States, to achieve convergence with the EU Digital Decade 2030 targets.

Moreover, the data consistently illustrate a strong *educational gradient* in digital competence: higher levels of formal education correlate with greater proficiency in digital skills. Achieving the Digital Decade 2030 objective of 80% of adults possessing at least basic digital skills will require Member States to:

- Integrate digital competencies systematically across all levels of formal education;
- Expand lifelong learning and upskilling opportunities, particularly for adults with lower educational attainment;
- Address regional disparities through tailored national strategies and targeted EU-level funding mechanisms.

Finally, bridging the *remaining gender gap* in digital skills is essential for achieving the EU's strategic goals. Member States should prioritize:

- Encouraging female participation in digital education and upskilling programs;
- Supporting inclusive digital literacy initiatives that specifically target women in rural areas, older age groups, and those with lower educational attainment;
- Promoting female role models and mentorship opportunities to foster greater representation of women in advanced digital professions.

These conclusions emphasize the urgency of coordinated and multi-level policy interventions to ensure equitable progress towards the Digital Decade 2030 objectives. Beyond these targets, digital skills themselves represent a transformative force that underpins the broader socio-economic transition towards a knowledge-based, innovation-driven economy. Investing in digital skills is therefore not only a means of achieving policy goals but also a foundational pillar for sustainable and inclusive economic growth, societal resilience, and global competitiveness in the digital era.

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