MEASURING DIGITAL GOVERNMENT READINESS IN THE EU: CONSTRUCTION AND APPLICATION OF A DESI-BASED COMPOSITE INDEX

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Abstract: The article proposes a composite index of public sector readiness for digitization in EU countries. Based on selected DESI indicators—connectivity, digital skills and use, digital intensity of small and medium-sized enterprises, and quality and use of e-services—we compile comparative scores and country profiles with their strengths and weaknesses using min-max normalization according to two alternative weighting systems. Both specifications lead to a stable ranking of countries. The best results are achieved not only by robust networks with very high capacity (VHCN) and gigabit connectivity, but also by higher digital skills, greater use of e-government, and more advanced digitization of SMEs. In the context of the EU's Digital Decade policy, the index highlights differences between countries that may hinder the Europe-wide digitization of public services.

Keywords: digital government; DESI; composite index; connectivity; digital skills; e-government; SMEs; 5G; VHCN; Digital Decade.

JEL classifications: O33; O38; H83; C43; L86

1 INTRODUCTION

The digital transformation of the EU public sector is firmly anchored in the "Digital Decade 2030" policy agenda, which sets measurable targets for connectivity, skills, and the digitization of businesses and public services (European Union, 2022). This program complements the DESI assessment framework and international comparative studies such as the OECD *Digital Government Index* and the *eGovernment Benchmark*. Together, they suggest that success depends on a combination of infrastructure, skills, governance, and user experience (OECD, 2024; European Commission, 2024a). At the same time, the current literature recommends assessing not only hard inputs

(networks and technologies) but also the actual use and quality of services provided (Mergel, Edelmann & Haug, 2019; Janowski, 2015; Dunleavy, 2006; Vial, 2019). On this basis, we propose a targeted composite readiness index that selectively draws on DESI indicators and follows established guidelines for compiling composite indicators (OECD & JRC, 2008).

The digitization of the public sector in Europe is a major political priority, most clearly articulated in the Digital Decade, which sets measurable targets for connectivity, skills, digital services, and data (European Commission, 2025a). However, these targets are not achievable on their own: their achievement depends on preconditions arising from the external environment (regulation, technology markets, standards, cybersecurity, and trust), the internal environment of public organizations (administration, processes, capacities, and knowledge), and demand-side factors, specifically the readiness and behavior of users (citizens and businesses) (Vial, 2019; Klievink et al., 2017; Mergel, Edelmann & Haug, 2019). Digitization also means a shift towards greater integration of previously fragmented agendas, enabling more targeted and effective management (Dunleavy, 2006). Systematic reviews and case studies further show that the results of digital transformation are multidimensional and depend on a combination of infrastructure conditions, user readiness, and the organizational capacities of public institutions (Haug, Dan & Mergel, 2024; Andersson, Hallin & Ivory, 2022; Alvarenga et al., 2020). In the European context, this trajectory is complemented by an emphasis on digital sovereignty and the goals of the digital decade, which prioritize not only the expansion of digital services but also their quality, security, and acceptance throughout society (Burwell & Propp, 2020; European Commission, 2025b).

On this basis, the article draws on comparable DESI data to describe the current level of public sector digitization in EU Member States and identify differences between countries in key areas, namely infrastructure and connectivity, user (citizen) readiness and behavior, the readiness of small and medium-sized enterprises for digitization, and the provision and use of digital public services. DESI offers a reliable view not only of "hard" inputs (connectivity, network coverage, 5G), but also on demand-side factors (internet usage, basic digital skills) and service performance (use of e-government, quality and transparency of services), providing an overall view of readiness across the entire ecosystem,

including the public sector, citizens, and businesses (European Commission, 2025b; Dobrolyubova, 2021).

The aim of the article is (i) to define and theoretically substantiate the key dimensions of public sector readiness for digitization concerning all major stakeholders (public institutions, citizens, businesses) and basic infrastructure; (ii) to measure the current level of digitization in EU countries using DESI indicators and to compile a composite readiness index that will enable cross-country comparisons and the identification of profiles of strengths and weaknesses; and (iii) interpret the observed differences concerning institutional and organizational capacities, demand-side readiness, and infrastructure conditions, and derive recommendations for digital governance policy within the Digital Decade framework (Vial, 2019; Klievink et al., 2017; European Commission, 2025b).

2 THEORETICAL AND CONCEPTUAL FRAMEWORK

This chapter defines the theoretical basis and conceptual logic for measuring the readiness of the public sector for digitization in EU countries. First, we briefly characterize the Digital Economy and Society Index (DESI), its strengths and limitations in relation to our goal. Then we define the areas (indicators) that form the core of our indicator. Finally, we describe the normalization procedure and two weighting scenarios for constructing the composite index.

2.1 DESI: what it measures and why it is not sufficient for our purposes

DESI is the European Commission's framework for comparing the digital maturity of Member States. It integrates indicators in four pillars: connectivity, human capital, digital integration, and digital public services (European Commission, 2025b). Its strength lies in its comprehensiveness and comparability between countries and over time, capturing both supply-side factors (e.g., network coverage, 5G) and demand-side factors (e.g., digital skills, internet usage), as well as the performance of e-government (European Commission, 2025a; Vial, 2019).

However, for our specific research question—the readiness of the public sector for digitization—the overall DESI index has two limitations. First, DESI tracks the

broader digital economy and society; some areas (e.g., business digitization) are not a direct measure of public sector readiness, while key administrative prerequisites (e.g., interoperability, governance, trust) are relatively underrepresented (Mergel, Edelmann & Haug, 2019; Haug, Dan & Mergel, 2024). Second, the resulting scores combine availability with outcomes: supply-side indicators may suggest high readiness even when adoption and service quality remain low (Dobrolyubova, 2021). The literature consistently shows that the effects of digital transformation in the public sector are conditioned by institutional and organizational capacities, as well as user readiness on the demand side (Klievink et al., 2017; Andersson, Hallin & Ivory, 2022).

For these reasons, we propose a targeted composite readiness index composed of carefully selected DESI indicators that directly capture (i) infrastructure and connectivity, (ii) readiness and use by citizens, (iii) the digital intensity of businesses (as part of the broader ecosystem), and (iv) performance—and proxy indicators of trust—in the area of digital public services. This selection reflects an ecosystem view of digitalization and is consistent with the European Digital Decade framework (European Commission, 2025b; European Commission, 2024b).

2.2 Areas and their relevance to readiness

For clarity, the key indicators used in the composite index are summarized in Table 1. The table provides brief definitions, units, preferred interpretation, reference year of data, source, and weight of each indicator. In the following subchapters, we further elaborate on the individual items, justify their inclusion and weighting, and briefly discuss their limitations and interpretative nuances.

Table 1: Overview of indicators used in the composite readiness index

Area	Indicator	Definition	Unit	Weight
Infrastructure & connectivity	VHCN coverage (FTTH/B)	Coverage of households by very high-capacity networks (fiber/equivalent)	% of households	0.12
	Fixed ≥1 Gb/s	Share of fixed connections with speeds ≥1 Gb/s	% of connections	0.10

	Fixed ≥100 Mb/s	Share of fixed connections with speeds ≥100 Mb/s	% of connections	0.06
	5G coverage	Total outdoor 5G signal coverage	% of population/territory	0.08
	5G SIM share	Share of active 5G SIM cards in the population	% of population	0.05
Human capital & users	Basic digital skills	Percentage of the population with basic digital skills	% of people (16–74)	0.13
	Internet use (regular)	Percentage of the population regularly using the Internet	% of people (16–74)	0.10
Digitization of companies (SMEs)	SMEs ≥ basic DII (v4)	Share of SMEs using ≥4 of the 12 monitored digital technologies (DII v4)	% SME	0.11
Digital services & trust	E-government users	Percentage of citizens using online public administration services	% of people	0.06
	Digital public services – G2C	Scope and sophistication of services for citizens (end-to-end)	index (0–100)	0.07
	Digital public services – G2B	Scope and sophistication of services for businesses (end-to-end)	index (0–100)	0.07
	Transparency of service delivery, design & personal data	Transparency, user design, and working with personal data	index (0–100)	0.05

Source: own processing

2.2.1 Infrastructure and connectivity (network supply and capacity)

The basic prerequisite for readiness is the availability and capacity of fixed and mobile connections. The share of fixed connections with speeds ≥100 Mb/s reflects the spread of high-speed connections among the population, i.e., the ability of households and institutions to easily use audiovisual communication, online forms, and public administration transaction services. The ≥1 Gb/s indicator further distinguishes ultra-high-capacity connections (usually optical),

which are essential for data-intensive public sector agendas – from telemedicine and large file processing to cloud solutions for public administration. Very high capacity network (VHCN) coverage in the form of fiber to the home/building (FTTH/B) measures the availability of next-generation infrastructure regardless of its current use; it creates the technological foundation for a digital state and mitigates regional differences in access to services.

In the area of mobile networks, overall 5G coverage enables ubiquitous access to electronic services and supports the development of the Internet of Things (IoT) in public policies (e.g., transport, public safety, crisis management). While coverage captures supply, the share of 5G SIM cards in the population reflects the actual use of this connectivity by users. Together, these indicators measure both technical readiness and connectivity adoption (European Union, 2025; European Commission, 2025c; European Commission, 2024b).

2.2.2 Human capital and user readiness (demand)

Technical accessibility alone does not guarantee the use of digital services. Basic digital skills represent the minimum level of competence required to use electronic services and are therefore a prerequisite for inclusive digitization; without these skills, a digital divide arises between different groups of the population (Mergel, Edelmann & Haug, 2019). The internet usage indicator (regular internet usage) adds a behavioral dimension to competencies and signals the extent to which society is truly online and ready to communicate with the state digitally. Combined, these two indicators distinguish countries where the main limitation is competence from countries where the challenge is habit or motivation to interact online (Eurostat, 2024b; Dobrolyubova, 2021).

2.2.3 Digital intensity of businesses (ecosystem)

The public sector operates within a broader digital ecosystem, where small and medium-sized enterprises (SMEs) play a key role. The indicator "share of SMEs with at least a basic level of digital intensity" (Digital Intensity Index, DII v4) shows how many companies routinely use basic digital technologies – e.g., cloud services, enterprise resource planning (ERP) systems, customer relationship management (CRM), e-commerce, and data analysis (Eurostat, 2024a). DII v4 is a "broad" index from Eurostat: it monitors 12 technology areas (including high-speed internet, advanced web features, social networks, online

advertising, cloud, ERP/CRM, big data analytics, e-invoicing, cybersecurity, and e-commerce). A company has at least a basic level if it uses 4 or more of these technologies (Eurostat, 2024a).

Higher digitalization of companies also has a direct impact on public administration: it increases demand for G2B services, accelerates the standardization of data exchanges, and improves the ability of companies to use e-procurement and e-invoicing. At the same time, it acts as a multiplier of the effects of public digital investments—the more digitally advanced the business environment, the greater the benefits generated by public digital projects (Vial, 2019)

2.2.4 Digital public services and trust (performance and quality)

The mere availability of electronic services does not guarantee their use. Users of e-government measure the level of acceptance by citizens and thus provide a direct indicator of the actual impact of digitization. The indicators Digital Public Services for Citizens (G2C) and Digital Public Services for Businesses (G2B) assess the breadth and sophistication of the service portfolio, including the scope of complex online processes. Finally, Transparency of service delivery, design, and personal data captures quality and trustworthiness—it includes transparency, user-centered design, and personal data handling. This dimension is key to the legitimacy and sustainability of digital governance: without trust and positive user experiences, investments in e-services are unlikely to translate into their effective use (European Commission, 2025a; Burwell & Propp, 2020).

In summary, this selection of areas reflects the view that the digitization of the public sector is an ecosystem process: results depend simultaneously on technological capacity (fixed and mobile connectivity), user readiness (skills and actual online behavior), the digital maturity of the economy (small and medium-sized enterprises), and the quality and use of public e-services (Vial, 2019; Haug, Dan & Mergel, 2024). It is the combination of these dimensions that allows for a meaningful assessment of readiness—not only the state of the infrastructure, but also the ability of society and institutions to transform that infrastructure into trusted services in the real world.

2.3 Construction of a composite index of public sector readiness

In order to unify the indicators on a common scale and enable their aggregation, we convert all values to the interval ⟨0; 1⟩, where 1 corresponds to the best observed value and 0 to the worst. We use the standard min–max transformation:

$$x'_{i,k} = \frac{x_{i,k} - min_j\, x_{j,k}}{max_j\, x_{j,k} - min_j\, x_{j,k}}$$

Where $x_{i,k}$ is the original value of indicator *k* for country *i,* and $x'_{i,k}$ is its normalization. All our indicators have a positive orientation (higher = better), so there is no need for inversion. If $\max_j x_{j,k} = \min_j x_{j,k}$, we set $x'_{i,k} = 1$ for all countries for a given indicator. This procedure avoids mixing units of measurement and preserves the relative ranking of countries. Normalization was used not only for the index, but also for the indicator Share of fixed broadband subscriptions >= 1 Gbps (2024). As mentioned earlier, this indicator belongs to the infrastructure domain. By normalizing this indicator, we obtain a scale within countries that are best prepared in terms of high-speed connectivity and those that are worst prepared. In this indicator, 100 is the best-prepared country, which is France, considered the leader in this domain.

2.3.1 Equal weights in the index

Since we have chosen a total of 12 indicators, K=12 is and $x'_{i,k}$ are their normalized values. We calculate the resulting index for country *i* in two ways to test the robustness of the choice of weights:

$$Index_i^{(A)} = \frac{1}{K}\sum_{k=1}^{K} x'_{i,k}$$

2.3.2 Differentiated weights

Below, we present the rationale for the differentiated weighting coefficients used in the composite readiness index. The weighting system reflects the relative importance of each area for the public sector's ability to expand and maintain digital services within the ecosystem of citizens and businesses. It is based on consistent findings that the results of digital transformation are conditioned by the interaction of technical capacities, human capital, acceptance, and service quality/trust (Vial, 2019; Haug, Dan & Mergel, 2024).

Infrastructure and connectivity. In this area, VHCN coverage (0.12) carries the highest weight, as the availability of very high capacity networks (optical or equivalent) is a long-term structural condition for gigabit services and for reducing the regional digital divide; this is a "hard" condition that underpins the capacity of the entire digital administration (European Commission, 2025a). Furthermore, the share of gigabit (≥1 Gb/s) connections (0.10) captures the actual penetration of ultra-high-capacity access and thus the readiness of users for data-intensive agendas (eHealth, cloud in the public sector). This indicator is closer to actual usage than mere availability. As already mentioned, the values of this indicator are normalized for the purposes of our index, as we cannot define when a country is 100% connected. We can only monitor the status of this connectivity, as we are interested in how countries compare with each other. France achieved the highest value, with 58% of all connections, although we know that 100% is not achievable. For this reason, we normalized the data and stated that France is 100% ready, and we compared other European countries to this level. The share of fixed connections ≥100 Mb/s (0.06) is weighted lower because it reflects the increased current standard but no longer represents a forward-looking threshold; analytically, it serves as an intermediate step between the basic and gigabit classes. We assign a slightly higher weight to total 5G coverage (0.08) because 5G provides a mobile platform for accessing electronic services and for IoT in public policies (transport, public safety, crisis management), even though it does not in itself ensure the quality of end-to-end fixed services. Finally, the share of 5G SIM cards in the population (0.05) has the lowest weight in the infrastructure group: it is a proxy indicator of adoption that complements coverage, but its contribution depends on tariff structures and service offerings; therefore, we use it primarily as a calibration indicator of usage rather than as a structural pillar (European Commission, 2025a). The data for this indicator has been adjusted because two countries lacked information, and the absence of a rating would have affected the overall index result. For this reason, values equal to the average of the other countries were added to these countries. This procedure is based on methodological recommendations for data cleaning. Another adjustment to this indicator was to set an upper limit of 100%, as the indicator focuses on the number of 5G SIM cards in the population, and it is quite common for users to have more than one mobile phone. For this reason, some countries had indicator values of more than 100%. For this reason, we

will consider this limit to be the maximum, and values above this limit will not be counted. This procedure is in line with data winsorization.

Human capital and user readiness. We assign the highest weight in the index to basic digital skills (0.13), as the literature consistently shows that without a minimum level of skills in the population, there is insufficient demand for electronic services and investments in technology do not yield results (Mergel, Edelmann & Haug, 2019; Vial, 2019). We also assign relatively high weight to internet usage (0.10): regular internet usage is a behavioral indicator of adoption, which, together with skills, forms the basis of demand for digital interactions with the state (Dobrolyubova, 2021). Together, this pair receives a combined weight that exceeds any single infrastructure item, reflecting the assumption that readiness on the demand side ultimately determines the actual impact of public digital services (Haug, Dan & Mergel, 2024).

Digital intensity of businesses. The indicator " SMEs with at least a basic level of digital intensity" (0.11) has a relatively high weighting because small and medium-sized enterprises dominate the business sphere and supply chains, and their digital practices create constant pressure on the quality of interactions between government and businesses (electronic public procurement, electronic invoicing, data interfaces). The literature also emphasizes that organizations—both public and private—must align technology with strategy and capabilities; in a more digitally intensive business environment, public digital investments exhibit stronger multiplier effects and increased requirements for interoperability, standardization, and data exchange with the state (Vial, 2019; Guenduez et al., 2025).

Digital public services and trust. In this area, we distinguish between acceptance, supply/maturity, and trust/quality. E-government users (0.06) capture the outcome—the actual use of e-services by citizens—and are therefore included as an outcome indicator, albeit with a lower weight than the skills that are a prerequisite for adoption (Dobrolyubova, 2021). Digital public services for citizens (0.07) and ...for businesses (0.07) have the same medium weight: the supply and maturity of G2C and G2B agendas form the backbone of digital administration, and parity reflects the need for balanced development of services for both citizens and businesses (European Commission, 2025a). Transparency of service delivery, design, and personal data (0.05) adds the dimension of trust and legitimacy to these functional indicators—including

transparent processes, user-centered design, and personal data handling. Although this is a prerequisite for sustainable development, it is relatively difficult to make comparisons between countries; therefore, we assign it a balancing rather than a dominant weight.

Overall, the weights (sum = 1.00) create a balanced profile: the highest contribution comes from basic digital skills (0.13) and VHCN (0.12) as a pair of key conditions of demand and supply; followed by SME digital intensity (0.11) and internet use (0.10), which capture ecosystem effects and actual online behavior. Gigabit penetration (0.10), 5G coverage (0.08), and G2C/G2B maturity (0.07 + 0.07) support scaling and service quality, while ≥100 Mb/s (0.06) and e-Government users (0.06) act as stabilizing elements between structure and results. 5G SIM (0.05) and transparency (0.05) add an adoption and trust dimension to the index. This weighting structure is consistent with the literature, which recommends strengthening the structural capacity of the network, human skills, and ecosystem interoperability, while monitoring the adoption and quality of the resulting services. Aggregation is performed using a weighted sum:

$$Index_i^{(B)} = \frac{1}{K}\sum_{k=1}^{K} w_k x'_{i,k}$$

This dual weighting allows us to assess whether the ranking of countries is primarily influenced by balanced performance across all areas or whether it is sensitive to critical factors (infrastructure, skills, acceptance, and quality of services). In alignment with the academic literature, we also distinguish between "hard" prerequisites and "soft" capacities and outcomes, which together influence the public sector's ability to expand digitization (Klievink et al., 2017; Haug, Dan & Mergel, 2024).

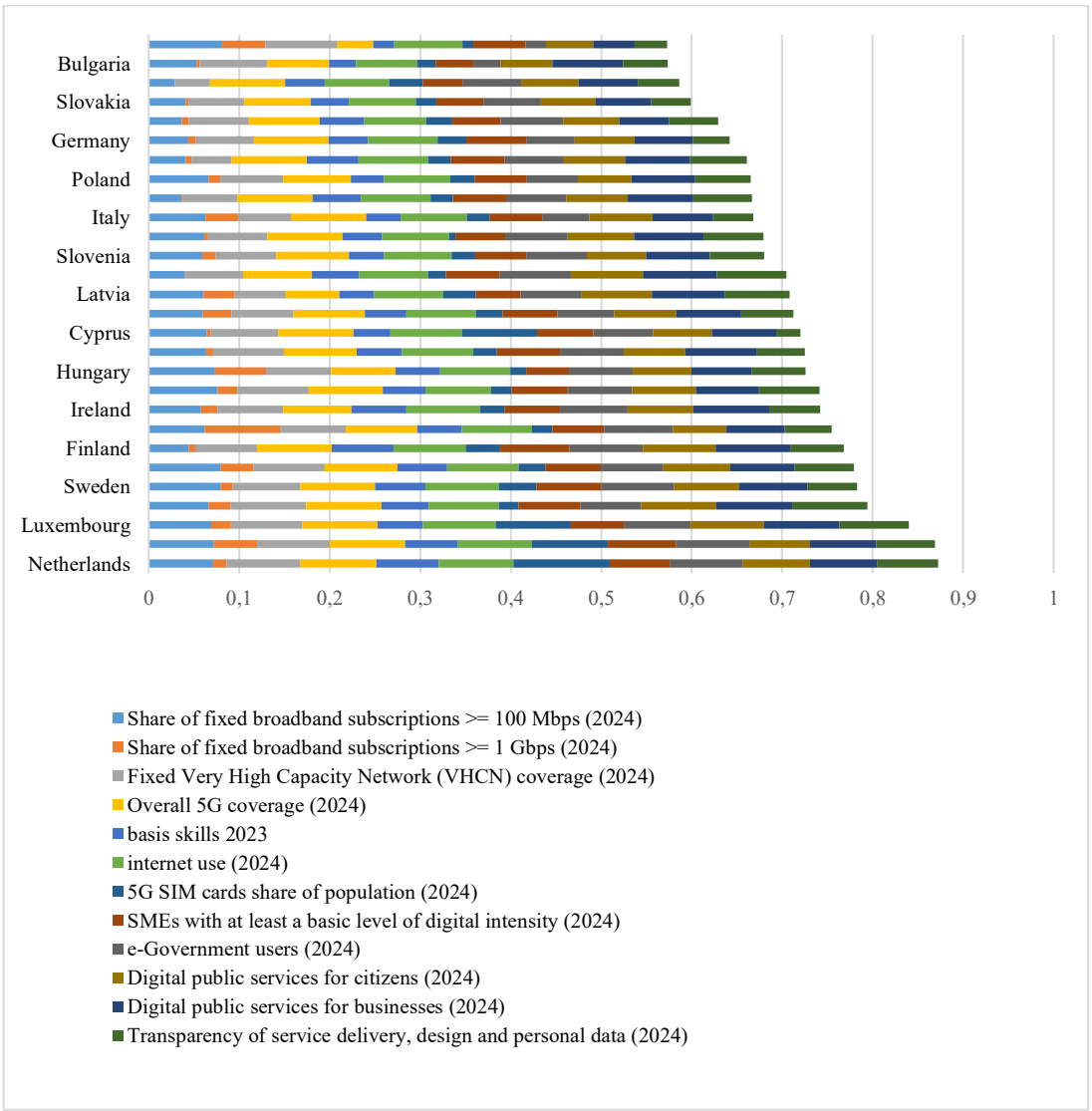
To measure the impact of weighting schemes, we calculate the Pearson correlation (sensitivity of continuous scores) and Spearman rank correlation (stability of ordinal rankings) between the two versions of the index. High correlations would indicate that alternative weights only marginally adjust the results; low correlations would indicate that weighting has a significant impact on scores and/or rankings.

3 RESULTS AND INTERPRETATION

We understand digital readiness in the context of public services as the ability of the state to design, operate, and scale user-friendly, secure, and interoperable digital services that citizens and businesses actually use in the long term. It is therefore not just a matter of "supply" in the form of infrastructure or a portal, but of the entire chain from available high-capacity connectivity, through the skills and willingness to use the service, to institutional quality and impact (time savings, lower administrative burden, better accessibility). The structure of the index reflects this: it combines connectivity (≥100 Mb/s, ≥1 Gb/s, VHCN, 5G), the demand side (5G SIM, internet usage, basic digital skills), business readiness (digital intensity of SMEs), and e-government maturity (share of users, services for citizens and businesses, transparency of services, and data management). The results of both variants show a very high stability of the ranking (Spearman ρ = 0,995; Pearson r = 0,9896), meaning that the choice of weights only slightly adjusts the ranking. Despite the fact that the results are very similar, we will present both the index with equal weights and the index with differentiated weights separately.

Figure 1 ranks EU countries (plus the EU aggregate) according to a composite digital readiness index on a scale of 0–1, with all indicators weighted equally. Scores range from 0.57 (Romania, Bulgaria) to 0.87 (Netherlands), with the EU aggregate at 0.71. This confirms a relatively smooth but marked differentiation between a small group of leading countries, a compact middle group, and a clearly identifiable group of lagging countries. At the top of the ranking are long-standing leaders in digitization, such as the Netherlands (0.87), Denmark (0.87), and Luxembourg (0.84), followed by Malta (0.79) and Sweden (0.78). These countries combine robust networks with very high capacity (VHCN), a large share of fast broadband connections (≥100 Mbps and often ≥1 Gbps), and strong 5G coverage with high mobile network penetration. At the same time, they achieve above-average results in digital skills, the digitization of small and medium-sized enterprises, and the provision and use of digital public services. Their advantage is clearly visible in the graph as a slight "bounce" from the rest of the sample: they are approximately 0.15–0.20 points above the EU level.

Figure 1: Composite index of readiness for digitization—version with equal weights



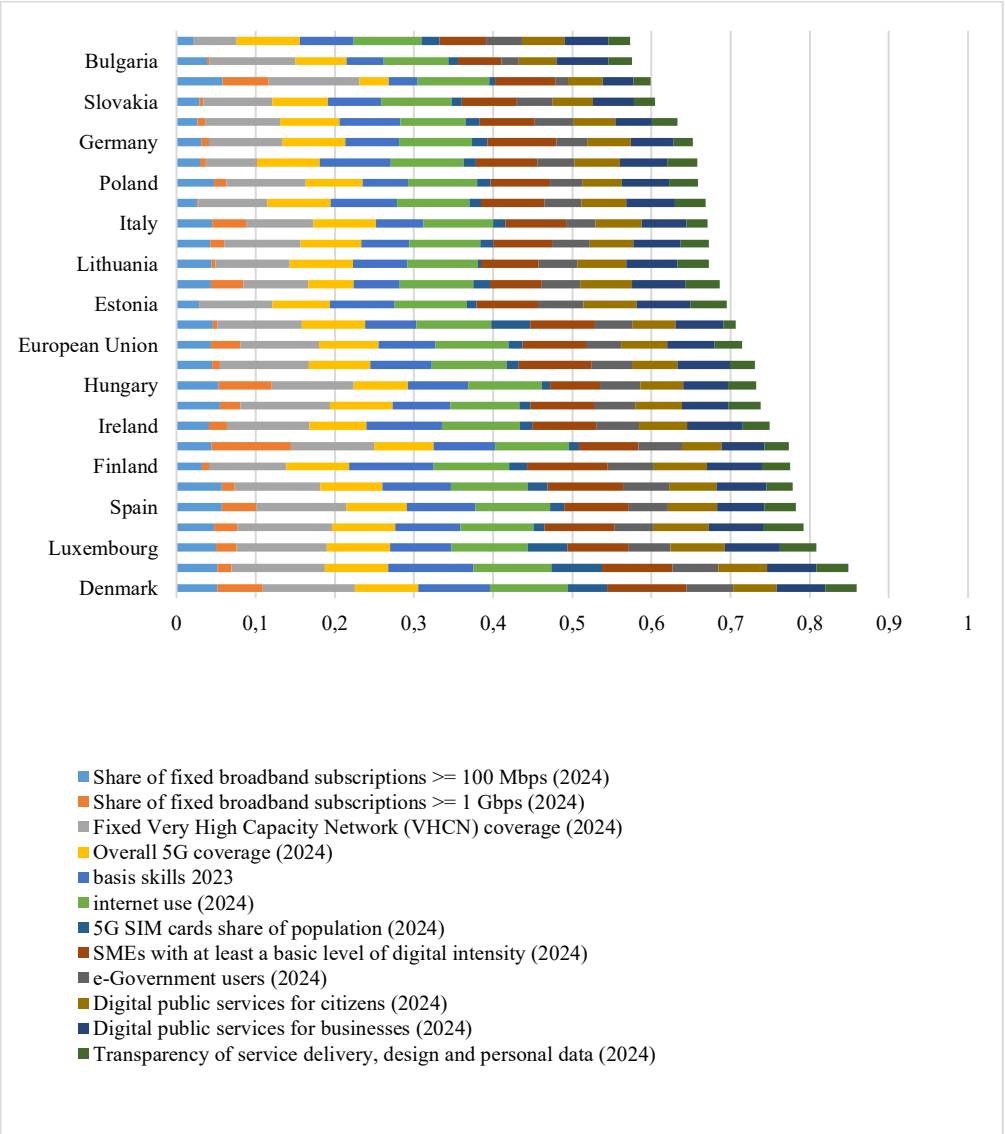
Source: own processing

The middle of the distribution is dense and compact. Countries such as Spain (0.78), Finland (0.77), and France (0.75) are closely followed by Ireland and Portugal (both around 0.74), Hungary (0.73), Belgium (0.72), Cyprus (0.72), and the EU aggregate (0.71), closely followed by Latvia (0.71) and Estonia (0.70). The differences between these countries are small – in many cases, only a few hundredths of a point – so even a slight improvement or deterioration in one dimension (such as the digital intensity of small and medium-sized enterprises

or the use of e-government services) could change their relative position. Further down the ranking are Slovenia (0.68) and Lithuania (0.68), followed by Italy (0.67), Austria (0.67), and Poland (0.67). Czechia scored 0.66, which is approximately 0.05 points below the EU average, but still ahead of Germany (0.64), Croatia (0.63), and Slovakia (0.60). This suggests that Czechia's basic prerequisites for digitization—infrastructure, skills, business digitization, and e-services—are solid but not outstanding: while the country is not among those lagging, it still falls significantly short of the performance of the leading countries.

At the bottom of the ranking are several countries with scores significantly lower than the EU average. Greece (0.59), Bulgaria (0.57), and Romania (0.57) are at the very bottom, with Slovakia (0.60) and Croatia (0.63) only slightly above them. Their gap with the leading countries is approximately 0.25–0.30 points on a 0–1 scale, pointing to deeper structural differences in digital readiness. These lower scores can be explained more by other dimensions of the index than by the mere availability of technology. These countries generally have lower levels of digital skills among the population and parts of the workforce, which limits the ability of citizens and employees to take full advantage of digital tools and services. At the same time, the digitization of businesses—especially small and medium-sized enterprises—is weaker, with lower use of advanced solutions such as cloud services, data analytics, or online sales channels. The development and use of e-government is also progressing more slowly: a smaller proportion of citizens communicate with public authorities online, comprehensive digital services are less common, interoperability between registries remains limited, and the user experience is often suboptimal. The bottom of the ranking thus reflects not only technological gaps, but above all organizational, skill-related, and institutional shortcomings that prevent these countries from exploiting the potential of digitization to the same extent as northern and western Member States.

Figure 2: Composite index of readiness for digitization—version using different weights



Source: own processing

The results of the composite digital readiness index with differentiated weights are shown in Figure 2. The weights assess indicators according to their importance, and as a result, the overall ranking has changed for half of the countries. The top of the ranking remains very similar, with the two leading countries swapping places: Denmark (0.859) moves into first place ahead of the Netherlands (0.849), followed by Luxembourg (0.809) and Malta (0.792). Spain (0.782) now rounds out the top five, slightly ahead of Sweden (0.779) and

Finland (0.775), while France (0.774) remains firmly among the top-ranked countries. All of these countries score between 0.14 and 0.18 points higher than the EU average (0.715) on a scale of 0 to 1.

The middle of the ranking can be described as relatively compact. Ireland (0.749), Portugal (0.738), Hungary (0.732), and Belgium (0.731), together with Cyprus, Estonia, Latvia, Lithuania, and Slovenia, cluster close to the EU average. Compared to the version with equal weighting, most of these countries have shifted up or down by at most one position: for example, Spain and Denmark move up one place, Estonia and Lithuania improve slightly, while the Netherlands, Sweden, Cyprus, and Latvia fall by one place. These changes are small in absolute terms, but they show that when greater weight is given to actual usage and the quality of services, countries with more connected users and more digitally intensive SMEs gain a slight advantage over countries whose strengths lie more in infrastructure.

Czechia scores 0.658 and remains in 22nd place, approximately 0.06 points below the EU average, but still ahead of Germany (0.653), Croatia (0.633), and Slovakia (0.604). Unlike in the evenly weighted index, its position does not change, but the weighted variant highlights an important nuance: Czechia performs relatively well in several “soft” dimensions (e.g., e-government users, the digital intensity of small and medium-sized enterprises), but not well enough to close the gap with the leading group. The country thus remains in the lower half of the ranking, with solid but not outstanding performance when greater emphasis is placed on the adoption and quality of services.

At the bottom of the ranking, we again find a group of countries with scores significantly lower than the EU average. Romania (0.599), Bulgaria (0.575), and Greece (0.573) occupy the last three positions, with Slovakia (0.604) and Croatia (0.633) only slightly above them. The gap between these countries and the leading countries is approximately 0.25–0.29 index points, indicating deeper structural differences. In the weighted version, Romania improves slightly compared to the equally weighted index, while Greece falls to last place. This suggests that the main obstacles at the bottom of the ranking are not only related to connectivity, but also to basic digital skills, the digital intensity of small and medium-sized enterprises, and the regular use of e-government services. In practice, fewer citizens and businesses have integrated

digital tools into their daily behaviour, and public services are less often provided in a seamless, user-oriented digital form.

Overall, the weighted index highlights the “usage gap”. It shows that the real difference between the “Top 5” and the “Bottom 5” is not only the availability of fast networks, but above all, how intensively citizens, businesses, and public institutions actually use digital channels.

4 RECOMMENDATIONS AND IMPLICATIONS

The results suggest that true readiness is not determined solely by network availability, but also by the widespread and trusted use of digital services among the population and businesses. This conclusion is in line with international standards and guidelines that emphasize human-centered design, interoperability, and quality of service (OECD, 2024; European Commission, 2024a), as well as with the Digital Decade 2030 policy, which sets targets for connectivity, skills, and the digitization of businesses and public services (European Union, 2022). Particular emphasis should be placed on trust and digital skills, which have a significant impact on the willingness to use services (Bélanger & Carter, 2008; van Deursen & van Dijk, 2014).

Based on the index results, EU countries can be divided into four groups with generally similar characteristics.

4.1 Group I – Leaders (score > 0.8)

Countries in this group typically combine strong connectivity, relatively advanced digital skills, and high levels of use of digital public services and business digitization. High-quality fixed and mobile networks are available, e-government services are integrated into everyday life and used by a large proportion of the population, and many small and medium-sized enterprises achieve at least a basic level of digital intensity. Governance and management systems tend to support common standards, interoperability, and the monitoring of user experience. The main challenges in this group often relate to the inclusion of remaining non-users, further improving the quality and resilience of services, and making better use of data and new technologies.

4.2 Group II – Strong performers (0.7–0.8)

In this group, the overall level of digital readiness is above the EU average, but certain gaps and inconsistencies remain. Connectivity is generally good, and there is a wide range of e-government services, but their uptake can vary between regions and population groups, and some key life events may still involve administrative barriers. Digital skills are relatively strong but unevenly distributed; small and medium-sized enterprises are progressing in their digitalization, although integration with public digital services is not always seamless. Public administration is functional but may be less consistent in enforcing common standards across sectors. Typical priorities include reducing differences in usage, simplifying user procedures, and strengthening the links between infrastructure, skills, and service usage.

4.3 Group III – Catching up (0.6–0.7)

Countries in this group often show mixed results: basic connectivity is available, but the use of advanced networks and digital services lags behind. Barriers on the demand side—such as lower digital skills among certain groups, limited trust, or low perceived usefulness—may limit the uptake of e-government and digital tools for business. Digital public services may exist but remain fragmented across institutions, with problems of interoperability and data quality. Small and medium-sized enterprises have lower digital intensity on average. Typical areas for improvement include increasing the actual use of existing services, strengthening skills in low-usage groups, and gradually improving the cohesion and reliability of the digital public sector.

4.4 Group IV – Basic development (< 0.6)

In this group, several key elements of digital readiness are still at an early stage of development. High-quality fixed and mobile connectivity may be limited or unevenly distributed, affordability may be an issue, and the overall level of digital skills and service usage is relatively low. Digital public services and interoperability frameworks are often at an early rather than an advanced stage, and governance structures may be fragmented. In these countries, the main focus is usually on building and stabilizing the basic “foundation layer”: improving access to reliable connectivity, strengthening basic digital skills,

introducing robust digital identity and basic e-government services, and gradually developing common standards and data infrastructure.

Overall, the composite index provides a comparative overview of these four profiles and highlights relative strengths and weaknesses, but it does not capture all institutional, legal, or socioeconomic aspects of digital transformation. Any policy conclusions should therefore be complemented by more detailed country-specific analyses and qualitative evidence.

5 CONCLUSION

The analysis shows that cutting-edge connectivity is necessary but not sufficient; the real differentiator in readiness is the transformation of infrastructure into mass and trusted use. This conclusion is consistent with international benchmarks and academic literature, which emphasize the interconnection of networks, skills, governance, and user experience (OECD, 2024; European Commission, 2024a; Bélanger & Carter, 2008; van Deursen & van Dijk, 2014). Both variants of our composite indicator (equal vs. weighted weights) give a stable picture of the ranking of countries, with the weighted version—which takes into account the greater importance of basic digital skills, e-government adoption, and service quality—slightly favoring countries that are able to translate connectivity into actual use. A group interpretation of the results confirms that leaders (score > 0.8) accumulate strong VHCN/gigabit, high skills, and widespread adoption of e-services; the middle (0.7–0.8) tends to encounter friction in life situations and uneven adoption; catching up (0.6–0.7) address demand barriers and weaker interoperability; and lagging (< 0.6) lack basic layers of readiness (skills, eID, quality registries). Politically, this implies a shift from "digital-by-default" to usage-by-design: targeting skills and motivation to use, increasing trust through transparent data handling and secure identity, redesigning key life situations (mobile-first, once-only), and connecting SMEs to state data flows – in line with the Digital Decade 2030 Policy Program (European Union, 2022). Methodologically, the benefits of transparent min-max normalization and working with sub-indices are confirmed; given the limitations of available indicators (mixing inputs and outputs in DESI), we recommend sensitivity analyses, dual reporting (equal vs. weighted weights), and deeper interpretation of sub-indices as recommended by the OECD & JRC Handbook (OECD & JRC, 2008).

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