Predictors of Public Service Digitalization: A Comparative Descriptive Analysis of Secondary Institutional Data From Six European Countries (Five EU Member States and Albania)

Valbona Begici[1]

Shkelqim Xeka[2]

Hristo Katrandjiev[3]

[1]*Msc, Department of Political and Legal Sciences, Faculty of Law, "Aleksander Moisiu" Durres, Durres, Albania*
[2]*Prof. Asoc. Dr., Department of Political and Legal Sciences, Faculty of Law, "Aleksander Moisiu" Durres, Durres, Albania*
[3]*Prof. Dr., Department of Marketing, UNSS Sofie, Bulgaria*

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Abstract

The paper presents and compares the efforts of six countries to digitalize public services, with a focus on five EU Member States (Denmark, Estonia, Poland, Greece and Romania) and one EU candidate country (Albania). A comparative descriptive research design is employed, using five core data sources (UN E-Government Development Index, Digital Economy and Society Index, eGovernment Benchmark, Eurostat Community Survey on ICT Usage and World Bank World Development Indicators) and three additional sources (OECD Trust Survey, Standard Eurobarometer and UNDP Digital Readiness Assessment for Albania) to analyze and present the factors which help or hinder the digitalization of public services in these countries. The analysis refers to the factors which determine successful digitalization and presents a mix of positive and negative trends. While Denmark and Estonia manage to digitalize public services successfully, others, such as Romania, Greece and Albania face considerable challenges. Although large investments have been made in order to provide digital government services to citizens in Romania, the use rate of these services remains the lowest in the EU. Through the analysis of secondary data sources, three key factors that determine successful digitalization of public services are identified: (1) institutional and interoperability capacity of government departments to deliver joint digital public services; (2) trust that citizens have in government and in digital public services provided by it; and (3) degree of integration into EU's regulatory frameworks for digital public services. Furthermore, the analysis identifies a "digital maintenance gap" and presents it as an empirical phenomenon that requires further analysis and explanation, i.e. why there is a difference between the digital public services that are offered by governments and the services that are actually used by citizens. Based on the findings, an intervention framework of two-phases is proposed for Albania with the objective of building up the necessary institutional capacity, of increasing digital trust and of aligning the regulatory frameworks for digital public services prior to an expansion of the services' supply.

Keywords: ***public service digitalization; digital trust; e-government; EU integration; descriptive analysis; secondary data; Albania; Western Balkans***

1. Introduction

Relying on public services delivered digitally is one of the core ways through which governments are modernizing across the European Union and elsewhere. By establishing the 2030 Digital Compass (European Commission, 2021), the European Commission is aiming at three goals: first, to ensure that all key public services are delivered via the web; second, to raise the share of e-government services' users to 80 percent, utilizing digital identification solutions. Achieving these ambitions, however, is a country-specific matter. Beyond being hampered by countries' levels of wealth, institutional set-ups, citizens' level of trust in government and degree to which regulations are integrated, for candidate member states like Albania, it is of utmost importance to comprehend the divergence in performance in delivering digitally-delivered public services between them and other countries, especially within EU Member States, with varying degrees of experience in this realm. One core challenge in this area for the EU and for donors in general – and specifically for countries of Albania's wealth and with its level of internet penetration (83.1%) – is that of the so-called 'digital maintenance gap'. Importantly, they have been spending substantial resources on the digitalization of public services. Moreover, only about 35% or even less of Albania's citizens are making use of its e-government services, which is to say that a large number of platforms that were well-funded and even Sebastian pathology-kul-capable would, after having been set up, soon(er) or later be abandoned due to the lack of funds for their operation, thereby leading to erosion of citizens' trust in these services. The aim of the current study, therefore, is to assist countries in this situation by monitoring and comparing six countries – five EU Member States (Denmark, Estonia, Poland, Greece and Romania) and one candidate country (Albania) – with varying degrees of experience, based on existing institutional data that can be verified as well as monitored over time. It is the current author's intention to map out the respective countries' degrees of performance in terms of the studied aspects, and to clarify core factors that can help explain performances as positive as well as negative. It is further the study's aim to assist Albania – as well as countries of a similar economic status – in identifying the key steps for the further development of digital public services and for prioritizing them. Based on the existing data, three research questions are addressed, thus enabling the study to supply institutions with relevant data for their efforts to enhance digital governance, with a view to enable them to better deliver public services, which are to be considered as being substantial, efficient, accessible, trustworthy and – above all – citizen-centric (Denhardt & Denhardt, 2015).

1.1 Rationale for Comparative Secondary Data Design

Comparative studies of public administration can profitably employ secondary data from established international organizations, including Eurostat, the United Nations, the World Bank, the Organization for Economic Cooperation and Development (OECD), and the European Commission. These sources have several advantages, above all that they have been collected independently of the researcher, i.e., they have not been subject to researcher bias; they have been produced by documented and for the most part harmonized methods; and they are considered to be legitimate by those active in policy and administration (Pollitt & Bouckaert, 2017). Thus, the present study is designed as a descriptive cross-national analysis of such data. Applying the most-different systems logic (Przeworski & Teune, 1970), in the present study the analysis will concentrate on a number of countries that are highly diverse in terms of their level of income, their membership of the EU, and their degree of digital maturity. The use of existing data has the further advantage that it allows for a replicable analysis and for observations on trends to be made over time, without the costs of new primary data collection being incurred.

2. Theoretical Framework and Analytical Propositions

2.1 Digital Maturity Models and the Adoption-Infrastructure Paradox

Digital maturity models describe the development of e-government in different stages of maturity. Well-known models are the four stage model of Layne and Lee (2001) that describes cataloguing, transaction, vertical integration and horizontal integration. Each stage requires a different kind of institutional investment to be successful. Janssen and Estevez (2013) observed that many governments get stuck in the transaction stage and that also in the integration stage, many problems are caused by organizational fragmentation and the lack of interagency information sharing. From a research perspective, the difference between available technology and its effective use in government is interesting to study. The level of use of online public services in Romania and Albania for example is very low, although their online portal provides all kinds of

public services. This seems to contradict the available infrastructure, but it can be explained by the institutional coordination and interoperability required for online public services. Dunleavy et al. (2006) describe the fragmentation of public services in accordance with the New Public Management model as not suitable for the digital era. They describe a model of digital-era governance that includes reintegration, holistic, needs-based service design and digital administration of public services. Building on this, Mergel et al. (2019) stressed the relevance of digital maturity assessments, which – in addition to technical capacity – also examine the organizational and institutional preparedness of public administrations. With relatively low ICT-expenditures (between 0.45 and 0.82 percent of GDP) Estonia is second globally in the 2024 UN EGDI and even reaches first place within the EU for digital public services in the DESI 2022 report. Here, special attention is given to the institutional infrastructure, i.e. to the institutional and interoperability capacity of public administrations. As a first explanatory construct this is measured by the Key Enablers and Cross-Border Services dimensions of the eGovernment Benchmark, the Digital Public Services dimension of DESI as well as the Digital Governance pillar of the UNDP Digital Readiness Assessment for Albania (see Table 2).

2.2 Digital Trust as Mediating Mechanism

Other aspects of the adoption literature relate to citizens' willingness to use online government services. According to Carter and Bélanger (2005) the degree of trust that citizens have in government is as important as the degree to which online services are relevant and useable. In order to get citizens to use online government services that are relevant and useable, governments must deliver high quality services online and safeguard citizens' personal information online. There is considerable fear of privacy violations and misuse of online information among citizens in many countries. The OECD Survey on Drivers of Trust in Public Institutions (based on over 57,000 citizens' views from 30 countries) is one of the largest studies on trust in government ever conducted (OECD, 2024). The survey found that the main drivers of trust in public institutions are the reliability and responsiveness of public services online and offline. Therefore, the quality of online and offline services delivered by governments to their citizens is an important factor for online government service adoption by citizens. Citizens' trust in EU institutions varies between Member States with only 35% of Greeks expressing trust in the EU in the 2023 Eurobarometer survey, whilst trust in the EU among the Romanians reaches 51%, and in Estonia and Denmark even 65–69% (see Table 7 above). As the literature suggests, there is a positive relationship between the level of institutional trust held by citizens and the degree of adoption of e-government services by governments. Weak institutions generate a self-reinforcing cycle of low trust, little use of online services by citizens, and consequently also little feedback for governments by means of online services, which in turn does not enable them to improve their performance. Digital trust is the second explanatory construct in this study, for which purposes the indicators for trust in the EU from the Eurobarometer surveys as well as from the OECD Trust Survey are described and analyzed descriptively against the background of the corresponding data on the use of e-government services from Eurostat. As the data under analysis are based on aggregate data and are cross-sectional in nature, the analysis can only describe the correlations between trust and adoption by governments and cannot, however, establish whether trust causes adoption by governments or not. 2.3 EU Regulatory Integration as Institutional Multiplier The author of this study is of the opinion that three EU regulatory frameworks for privacy, digital identity and interoperability, i.e. the General Data Protection Regulation (GDPR), the eIDAS Regulation on electronic identification and trust services for digital transactions and the European Interoperability Framework (EIF) can function as institutional trust multipliers in the digital environment and – on top of the services which the governments have to provide on the basis of existing legislation – can foster the uptake of additional services above and beyond the minimum required by regulation. As Bannister & Connolly (2015) in the e-government field of study, stress that institutional and regulatory (or 'enabling') conditions are more important than technology in ensuring that digital government delivers on its promises. Albania's relatively good digital infrastructure metrics are not translated into corresponding levels of service use when compared to other countries with similar digital metrics. As Meyerhoff Nielsen (2021) observed, the key factors that explain countries' progress in delivering high quality digital public services are, first and foremost, the institutional and the enabling (or the regulatory) environment in each country:

(1) interoperability between different systems;
(2) digital trust; and
(3) regulatory integration.

In this study, regulatory integration is the third explanatory construct. It is observed through countries' EU status and length of membership (Table 8), the availability of eIDAS-compatible electronic identification as captured by the eGovernment Benchmark Key Enablers, and a qualitative assessment of GDPR alignment. On the basis of this framework, three analytical propositions guide the descriptive analysis: (P1) differences in e-government use are not

adequately explained by income or connectivity alone; (P2) higher institutional and interoperability capacity is associated with smaller gaps between service supply and service use; and (P3) higher institutional trust and deeper EU regulatory integration are associated with higher use of available digital services. Because the design is descriptive, these propositions are examined as expected patterns, not tested as causal hypotheses.

3. Methodology

3.1 Research Design

This study is conducted by means of comparative descriptive research using secondary information from international and national public institutions. A systematic triangulation of sources has been applied in this study. The objective of the author is to identify certain structures and patterns rather than explaining the causes of certain phenomena. The author's objective is to provide an interpretive analysis of the phenomena studied, based on theoretical insights, whereas no attempt is made to explain the causes of certain phenomena. The research design is based on the approach developed by Pollitt and Bouckaert (2017), and applied by the author, as well as by Yin (2018). As regards the selection of cases, the most-different systems logic is applied, recommended by Przeworski and Teune (1970). Six countries are analyzed in this study: five EU Member States (Denmark, Estonia, Poland, Greece and Romania), and one EU candidate country (Albania). The selection of the above six countries aims to maximize variation on three dimensions: (1) the degree of EU integration (one candidate country and five full member states with different accession dates – 1973, 1981, 2004 and 2007); (2) the digital governance maturity (EGDI scores ranging from the highest position in the global ranking to lower positions within the European context); and (3) the countries' socioeconomic context (one long-standing high-income member (Denmark), one older member that experienced a prolonged fiscal crisis (Greece), three post-socialist member states that joined the EU in 2004–2007 (Estonia, Poland and Romania), and one upper-middle-income EU candidate country (Albania)). Throughout the manuscript the six countries under investigation are referred to as "the six countries" or "the study countries". As already mentioned, Albania is one of the above six countries and, therefore, the additional seventh case is not analyzed in this study.

3.2 Secondary Data Sources

In order to gain a complete view of the current situation in the six countries studied, data from five core sources (EGDI, DESI, eGovernment Benchmark, Eurostat ICT Survey and World Bank WDI) were compared. Three additional sources (OECD Trust Survey, Standard Eurobarometer and UNDP DRA Albania) were used to validate and to put the findings in context. The selection of sources was based on four different criteria: the methods have to be valid and be applied on an international level; the data has to be available for the study countries and to be relevant; there have to be time series available to establish trends; and the data has to be publicly available so that other people can check the findings of this report.

Table 1. Secondary Institutional Data Sources Used in This Study

Source	Institution	Coverage	Indicators Used	Latest Edition
EGDI	UN DESA	193 countries	OSI, TII, HCI, overall EGDI score	2024
DESI	European Commission	27 EU MS	Connectivity, Human Capital, Digital Public Services	2022
eGov Benchmark	European Commission / Capgemini	35 countries incl. Albania	User Centricity, Transparency, Key Enablers, Cross-Border	2024
Eurostat ICT Survey	Eurostat	EU MS + candidates	E-gov usage rate, digital skills, internet penetration	2024
World Bank WDI	World Bank	193 countries	GDP per capita, broadband, internet users %	2024
OECD Trust Survey	OECD	30 OECD countries	Institutional trust drivers	2024
Eurobarometer	European Commission	27 EU MS + candidates	Trust in national govt and EU institutions	2023–2024
UNDP DRA Albania	UNDP Albania / Min. Interior	Albania	Municipal & public digital readiness (56/100 national)	2023–2024

Note. EGDI = E-Government Development Index; DESI = Digital Economy and Society Index; OSI = Online Service Index; TII = Telecommunications Infrastructure Index; HCI = Human Capital Index; EU MS = EU Member States; DRA = Digital Readiness Assessment.

Reference periods. The analysis refers to the most recent available comparable data of the indicator's editions, namely: 2024 edition of EGDI, eGovernment Benchmark, Eurostat's ICT Survey, and World Bank's WDI data; 2022 edition of DESI (the last edition with a ranking of all countries included in the monitoring prior to the Digital Decade framework); 2023-2024 editions of Eurobarometer and OECD Trust Survey; and 2024 edition of UNDP's DRA in Albania. When analyzing the changes over time, the year used for the said analysis is 2022 (Table 3).

Comparability of indicators. Given that the sources in question are based on different methodologies, the following rules apply for the purposes of this analysis: (a) Indicators are compared only with the same indicator from the same source and edition. Values from different sources are not combined to calculate a single score; (b) Eurostat e-government usage rate refers to the number of individuals aged 16–74 who used a public authority website or applied online in the 12 months prior to the survey. It is used as the main indicator to measure demand-side adoption of e-government services; (c) EGDI, DESI and the eGovernment Benchmark are used as supply-side measures and are mostly interpreted in terms of ranks and group positions rather than the difference in scores; (d) For Albania, which is not included in the DESI and is covered only partially by the Eurostat ICT Survey, values from the eGovernment Benchmark and the UNDP DRA are used as proxies. These are marked as estimates ("~" or "est.") in the tables. The estimates are to be interpreted with caution; (e) Qualitative assessments, such as the digital trust proxy in Table 7, are explicitly identified as the authors' synthesis. Table 2 above connects each of the theoretical constructs with the respective indicators used to measure them.

3.3 Analytical Approach

First, for each country in the sample, we go through the relevant data for each country (primarily gathered from a limited set of relevant sources), and analyze the data. In analyzing the data for each country, we also compare countries to each other in order to identify patterns and 'gaps'. Furthermore, we also attempt to identify relations between the three above-mentioned constructs. The primary question is whether countries with institutions that are perceived positively also have high levels of e-government use, and whether membership of a country in a larger regulatory framework (such as the European Union) leads to better use of a country's digital resources. The primary method of analysis employed here is therefore descriptive, comparing countries side by side, and ranking them in some way or another. Note that the primary goal here is to attempt to identify the 'strengths and weaknesses' of the various policy measures implemented in each country. A significant problem when collecting data is that figures are often provided for partly different years. Where possible, we therefore use the most up-to-date available data for each country, and note the relevant reference year. For some of the European Union indicators, there is a lack of data for Albania. Where possible, we have therefore used the nearest available data from other sources, such as the eGovernment Benchmark, and the UNDP DRA, and clearly indicated the relevant source, as well as the institution that collected the original data.

3.4 Operationalization of the Theoretical Constructs

Table 2 above outlines the secondary indicators by which the three explanatory constructs, outcome and contextual variables within the analysis are observed. These are mapped against the outcomes within the analysis in order to link to the relevant part of the theoretical framework throughout the results and discussion.

Table 2. Operationalization of Theoretical Constructs: Indicators and Sources

Construct	Indicators used	Source(s)	Role in the analysis
Adoption (outcome)	E-government usage rate (% of individuals aged 16–74, last 12 months)	Eurostat ICT Survey; eGovernment Benchmark estimate for Albania	Demand-side outcome (Table 3)
Service supply	EGDI and Online Service Index; eGovernment Benchmark User Centricity; share of central-government services online (Albania)	UN DESA; European Commission / Capgemini; World Bank	Supply-side benchmark (Tables 4–6)
Institutional and interoperability capacity	eGovernment Benchmark Key Enablers and Cross-Border Services; DESI Digital Public Services; UNDP DRA Digital Governance pillar	European Commission / Capgemini; European Commission; UNDP	Explanatory construct 1 (P2)
Digital trust	Trust in national government and in the EU; OECD trust drivers (reliability, responsiveness)	Standard Eurobarometer; OECD Trust Survey	Explanatory construct 2 (P3; Table 7)
EU regulatory integration	EU status and accession year; eID availability (Key Enablers); GDPR/eIDAS alignment (qualitative)	European Commission; eGovernment Benchmark	Explanatory construct 3 (P3)

Construct	Indicators used	Source(s)	Role in the analysis
Socioeconomic context	GDP per capita (USD, PPP); Internet users (%); fixed broadband	World Bank WDI; WBIF; DataReportal	Test of resource-based explanations (P1; Table 8)
Digital maintenance gap (interpretive)	Gap between supply indicators and usage rate; funding model of digital investments	Tables 3–6; World Bank programme documents; EU funding rules	Interpretive proposition (Section 5.2)

Note. P1–P3 refer to the analytical propositions formulated in Section 2.3. Indicators marked as qualitative are the authors' synthesis of the cited sources.

4. Results: Descriptive Analysis by Indicator Cluster

4.1 E-Government Usage Rates: The Adoption Gap

To measure citizens' use of digital public services, Eurostat uses annual data from the Community Survey on ICT Usage by Households and Individuals. The survey indicator measures the share of individuals aged 16–74 years who used the website or application of a public authority with their last interaction within the last 12 months. The data for the reviewed countries are available for 2022 and 2024.

Table 3. E-Government Usage Rates by Country, 2022 and 2024 (% of individuals aged 16–74)

Country	E-Gov Usage 2022 (%)	E-Gov Usage 2024 (%)	Change (pp)	EU Average 2024 (%)	Gap from EU Average
Denmark	90%	98.5%	+8.5	70.0%	+28.5 pp
Estonia	~85%	~91%	+6	70.0%	+21 pp
Poland	~55%	~62%	+7	70.0%	-8 pp
Greece	~52%	~60%	+8	70.0%	-10 pp
Romania	~22%	25.3%	+3.3	70.0%	-44.7 pp
Albania	<30% (est.)	<35% (est.)*	+5 (est.)	70.0%	~-35 pp (est.)
EU Average	67.3%	70.0%	+2.7	—	—

*Note. Eurostat (2024), dataset isoc_ciegi_ac. Denmark, Netherlands (96.0%), Finland (95.4%), Sweden (96.0%) lead; Romania (25.3%), Bulgaria (31.5%) lowest in EU (Eurostat, 2024; 2026 for 2025 data). *Albania: eGovernment Benchmark (2024) estimate; not covered by Eurostat ICT Survey for full indicator*

The same Table 3 allows us to observe how different countries with similar levels of development adopt e-government services. A very large difference in e-government adoption between Denmark and Romania (73.2 pp in 2024) is observed for two countries that are subject to the same rules and regulations of the EU. Therefore, even being a high-income country is not sufficient to expect a high level of adoption of e-government services. Thus, the expected positive relationship between income and adoption of e-government services (P1) is not observed in the data. A similar observation can be made for three countries with similar levels of income, namely Estonia, Poland and Greece. While 91% of individuals in Estonia used e-government services in 2024, the corresponding figures for Poland and Greece were 62% and 60%, respectively. The three countries have GDP per capita of approximately USD 18,290 (Poland), USD 20,046 (Estonia) and USD 20,430 (Greece) in 2024, according to the World Bank data reported in Table 8. The large differences in e-government adoption between these three countries are the focal point of the current study. Also, the rate of e-government adoption in Albania is very low, i.e. less than 35%, while 83.1% of the population uses the Internet and there are more mobile connections than citizens (138.7 mobile connections per 100 inhabitants; DataReportal, 2024).

Several reasons could explain the very low level of adoption of e-government services by citizens and businesses in Albania: a lack of trust in the quality of digital public services offered by government, and their low usability. The problems with e-government services therefore are of an institutional nature and different from those found in countries with a very low level of computerization and Internet penetration, which above all require investment in ICT infrastructure. The UNDP Digital Readiness Assessment (2024) results for Albania confirm this interpretation. The country scored 87/100 in the Usage pillar, whereas the Digital Governance pillar scored a meager 24/100.

4.2 UN E-Government Development Index (EGDI) 2024: Composite Benchmarking

The 2024 UN E-Government Survey, the 13th biennial edition covering all 193 UN member states, provides the most comprehensive global benchmarking of digital government development. Table 4 presents the EGDI composite scores and the respective sub-indices for the six study countries.

Table 4. UN EGDI 2024 Scores and Component Sub-Indices for Study Countries

Country	EGDI Score	Global Rank	OSI (Online Services)	TII (Telecom. Infra.)	HCI (Human Capital)	EGDI Group
Denmark	0.9847	1st	Very High	Very High	Very High	Very High
Estonia	0.9727	2nd	Very High	Very High	Very High	Very High
Poland	0.8713	~17th	High	High	Very High	Very High
Greece	0.8512	~26th	High	High	High	Very High
Romania	0.7982	~48th	High	High	High	Very High
Albania	~0.8100	~55th*	High	High	High	Very High (promoted 2024)

*Note. UN DESA (2024). Global EGDI average: 0.6382 (up from 0.6102 in 2022); Europe regional average: 0.8493. *Albania's exact EGDI score approximated from EGDI group classification and regional data; Albania moved from the high to the very high EGDI group in 2024, one of 23 countries to achieve upward group mobility in this cycle (UN DESA, 2024). OSI = Online Service Index; TII = Telecommunications Infrastructure Index; HCI = Human Capital Index.*

The EGDI components shown in the graphs allow for an analysis of the data. Albania improved its score and moved into the Very High EGDI group in 2024. The supply of online services by public institutions via their e-government portal e-Albania is available for 95% of all central government online services (World Bank, 2023). The OSI, however, measures the supply of online services by public institutions whereas the e-government usage rate estimates the demand by citizens. While Albania's supply-side position rises, the estimated e-government usage rate is below 35% (as for Romania of 25.3%, the lowest in the EU, see Eurostat, 2024). Thus, the adoption–infrastructure paradox identified for Albania for the supply of online services by public institutions also for Romania appears to be even more pronounced for factors that the EGDI does not capture such as the maintenance of already digitalized services, the perceived insecurity of the online environment and past service failures that deter citizens from using online services of public institutions due to a vicious circle of distrust not picked up by the aggregate scores of the EGDI. Although Romania is also scoring higher than the world average by more than 0.16 points, it belongs to the Very High EGDI group only. Its e-government usage rate, however, is the lowest in the EU at 25.3% (Eurostat, 2024). Thus, the main constraints for the supply of online services by public administrations for their citizens do not appear to be in the online service platforms supplied by public administrations but rather in factors not captured by the EGDI such as the maintenance of already digitalized services, perceived insecurity of the online environment and past service failures that may deter citizens from using online services of public administrations. Romania has been receiving substantial funds from the European Structural and Investment Funds (ESIF) in the context of successive programming periods for the digitalization of its infrastructure and for the development of human resources which are required for a digital economy.

4.3 DESI 2022 and Digital Decade Monitoring: Sub-Dimensional Analysis

The Digital Economy and Society Index (DESI) 2022 by the European Commission (the last edition with a full country ranking before monitoring was integrated into the Digital Decade framework) has four dimensions to measure digital performance of countries: human capital, connectivity, integration of digital technology and digital public services. The results for the four dimensions of DESI 2022 of the study countries are shown in Table 5.

Table 5. DESI 2022 Relative Performance of Study Countries by Dimension

Country	Overall DESI Rank	Connectivity	Human Capital	Digital Public Services	5-Year Trend
Denmark	2nd (EU)	1st (EU)	Top 5	Top tier	Stable leader
Estonia	~9th (EU)	Mid-high	High	1st (EU)	Stable leader
Poland	~24th (EU)	Mid	Mid	Mid	Improving (+5yr)
Greece	~26th (EU)	Low-mid	Low-mid	Bottom tier	Improving (+5yr)
Romania	27th (EU, last)	Mid	Low	Lowest (EU)	Minimal progress
Albania	N/A (candidate)	Below EU avg.	Below EU avg.	Tracked via eGov B.	Improving (IPA)

Note. European Commission (2022). DESI covers 27 EU member states only; Albania positioned descriptively based on eGovernment Benchmark 2022 and EGDI 2022 data. Estonia ranked 1st in EU for Digital Public Services; Romania and Greece ranked lowest (European Commission, 2022). Overall DESI leaders: Finland (1st), Denmark (2nd), Netherlands (3rd), Sweden (4th).

The Estonian DESI scores by dimension show the country ranking around 9th among the 27 Member States for the overall score, and only in the middle to upper half for the scores for connectivity, while for digital public services it scored 1st. The reason for Estonia's high scores for digital public services is not the quantity of connectivity offered, but rather the institutional framework that enables the delivery of high quality e-services. An example of such institutional achievements are the X-Road data exchange layer and the national digital identity (eID) that enables government services to communicate with each other. While Greece's five-year trend for structural reforms is improving, this has not yet translated into sufficient outcomes for service use. While Italy, Poland and Greece were among the Member States with the largest DESI improvements over 2017–2022 (European Commission, 2022), the relative improvements in terms of service use for e-public services have not been sufficient to close the gap with leaders in a policy relevant time frame. This would require the same institutional and regulatory conditions described in Section 2.3.

4.4 eGovernment Benchmark 2024: Supply-Side Service Maturity

The eGovernment Benchmark 2024 has been conducted by Capgemini, Sogeti, IDC and Politecnico di Milano on behalf of the European Commission for 35 countries (27 EU Member States plus 8 non-EU countries: Albania, Montenegro, North Macedonia, Serbia, Turkey and 3 others). The countries covered by this research have been evaluated along 4 dimensions: User Centricity, Transparency, Key Enablers and Cross-Border Services. A summary of the results achieved by the countries covered by this research is presented in Table 6.

Table 6. eGovernment Benchmark 2024 Key Findings for Study Countries

Country	Overall Score (/100)	User Centricity	Transparency	Key Enablers	Cross-Border Services
EU27 Average	76	Strong	Moderate	Improving	Moderate
Estonia	92	Very High	High	Very High (leader)	High
Denmark	~85	Very High	High	High	High
Poland	~75	Moderate	Moderate	Moderate	Moderate
Greece	~68	Moderate	Low-Mod.	Moderate	Low
Romania	~60	Low-Mod.	Low	Low	Low
Albania	72	Moderate	Moderate	Room for improvement	Limited

Note. European Commission / Capgemini (2024). EU27 overall average: 76 points. Malta (97) and Estonia (92) lead; Albania, Montenegro, and North Macedonia each score 72, with specific improvement areas in Cross-Border Services and Key Enablers (European Commission, 2024). Scores are composite of user centricity, transparency, key enablers and cross-border services dimensions.

The eGovernment Benchmark score for Albania is 72, which is only 4 points below the average score for the EU-27 (76). It is higher than the scores for Romania (around 60) and Greece (around 68) and close to the score for Poland (around 75). The Benchmark score measures the supply of eGovernment services offered by public administrations. It checks if public services and the required information for their use are available online and if the necessary technical enablers for eGovernment at national level are available, such as eID solutions, electronic signatures and reliable sources of information. The Benchmark score of 72 for Albania reflects the development of the e-Albania platform with 95% of central government public services online (World Bank, 2023). The score, however, also points to a supply-demand gap. Although online public services are offered by government institutions in a mature form, there is a lack of institutional trust and of citizen readiness to use online public services and to demand them from public institutions. Therefore, while increasing the supply of online public services, efforts also need to be made to increase the demand for them. Of all measured areas, Key Enablers and Cross-Border Services are those that need most to be improved by Albania. Key Enablers for e-Government at national level are the technical building blocks, such as single sign-on solutions, eID solutions, electronic signatures and reliable sources of information. Such technical enablers are also crucial for an integrated eGovernment (Layne & Lee, 2001; Janssen & Estevez, 2013). The deficit of Albania in this respect, however, seems to be of more institutional than of technical nature: the necessary structures for governing and for coordinating cross-agency data exchange are still insufficiently developed (proposition P2)

4.5 Institutional Trust: Eurobarometer and OECD Evidence

The factor of digital trust as an intervening factor between the availability of and use of digital infrastructure by citizens is analyzed in this study. Since no single data source is available to measure digital trust for the studied countries, the

indirect evidence was obtained from three institutional sources, i.e. the Standard Eurobarometer, the OECD Trust Survey and the authors' proxy assessment based on these sources. This evidence is triangulated in Table 7.

Table 7. Institutional Trust Indicators for Study Countries (2023–2024)

Country	Trust in National Govt. (Eurobarometer 2024)	Trust in the EU (Eurobarometer 2023–2024, %)	OECD Trust Survey 2024	Digital Trust Proxy Assessment
Denmark	High (among top EU)	~69% (Eurobarometer 2024)	High (OECD leader)	Very High
Estonia	High	~65% (est.)	High (OECD member)	Very High
Poland	Moderate (+6pp trend 2024)	53% (Eurobarometer 2023)	Moderate	Moderate
Greece	Low-Moderate	35% (Eurobarometer 2023)	OECD member (see OECD, 2024)	Low
Romania	Low	51% (Eurobarometer 2023)	Not OECD member	Low
Albania	Low-Moderate	Not measured (candidate)	Not OECD member	Low-Moderate

Note. Eurobarometer Spring 2024 (Standard EB 101); Standard Eurobarometer data on trust in the EU (2023); OECD Survey on Drivers of Trust in Public Institutions (2024). Digital Trust Proxy Assessment: authors' synthesis based on available indicators. Denmark leads with 69% trust in the EU; Greece records 35%, the lowest among study countries with available data (Eurobarometer, 2023).

Comparison of the OECD Trust Survey (30 countries, 57,000+ surveys; OECD, 2024) and the Eurobarometer trust indicators in Table 7 with the corresponding Eurostat e-government usage rates in Table 3 reveals interesting co-variation between two separate data sets. Countries with highest institutional trust in the EU (Denmark and Estonia: approximately 65-69% trust in the EU) have the highest levels of e-government usage. Conversely, countries with lowest institutional trust in the EU (Greece and Romania: 35% and 51% trust in the EU respectively) have lowest levels of e-government adoption among surveyed countries. Note, however, that this co-variation between two separate data sets does not necessarily prove the theoretical argument of mediation proposed in Section 2.2, since: (1) there are too few countries to draw firm conclusions; and (2) reverse causality as well as a third variable (administered services quality) cannot be ruled out. Furthermore, according to the OECD (2024) service reliability and responsiveness are even stronger drivers of institutional trust than economic performance and political participation. Importantly, however, institutional trust is not fixed in a country over time and can be raised through additional investment in reliable and responsive provision of public services. This means that, on top of the e-government services already available to citizens, institutional trust can act as a 'multiplier' to increase their usage by citizens. As a consequence, low levels of institutional trust in Romania and Greece as identified in this study are merely associated with low levels of e-government adoption in these countries, but cannot explain them.

4.6 Socioeconomic Context and the Decoupling of Wealth from Performance

Table 8. Socioeconomic Context of Study Countries (2023–2024)

Country	GDP/cap USD 2024	GDP/cap PPP 2024	EU Status	Internet Users %	Fixed Broadband /100 inhab.
Denmark	~68,800	~68,000	Member 1973	~98%	~46
Estonia	~20,046	~41,546	Member 2004	~93%	~38
Poland	~18,290	~43,000	Member 2004	~85%	~23
Greece	~20,430	~39,000	Member 1981	~82%	~41
Romania	~15,470	~38,000	Member 2007	~79%	~25
Albania	~5,726	~18,920	Candidate 2014	83.1%	~10 (lowest in region)

Note. GDP/capita: World Bank (2024), current USD; PPP: Trading Economics (2024). Internet users: World Bank WDI (2024). Fixed broadband Albania: WBIF (2023) — lowest in Western Balkans at approximately 10% penetration with significant urban-rural divide (15% urban vs. ~1% rural). EU Status: year of formal accession or candidate status

Looking at how countries perform in relation to digital governance in terms of their ranking of digital public services (DESI 2022) of the EU countries with similar GDP per capita in constant PPP terms (15 000- 20 430 USD) – such as for instance Estonia (1st), Poland (around middle) and Greece (bottom of the table) – there is a large disparity when it comes to Albania as well with the lowest fixed broadband penetration in the Western Balkans amounting to ca. 10% of

population covered, while big differences within the country still prevail between urban and rural areas. However, Albania scores high in mobile connection density ranking 138.7 per 100 inhabitants (DataReportal, 2024). In addition, 83.1% of the population uses the internet. There is a huge difference between the Usage score of 87/100 (UNDP DRA, 2024) and the Digital Governance score of 24/100 for Albania. So, while connectivity does not seem to be a constraint for accessing e-government services, rather institutional and governance capacity seems to be a big constraint (P1 and P2).

4.7 World Bank Evidence: Albania's Digital Transformation Trajectory

Additional secondary data from the World Bank (2023) has been analyzed. It includes information about the National Agency for Information Society (AKSHI)'s progress in terms of central government online services availability, reaching 95% and all of them being offered through the e-Albania platform. Moreover, the $65 million World Bank Program for Results (PforR) "Improving Equitable Access to High Standard Public Services through GovTech" has been analyzed. In March 2025, the World Bank approved an additional $80 million of financing for Albania (World Bank, 2025) with the objective to a) have a 40% increase in applications for services offered through e-Albania by the end of 2025; b) have a 60% increase in digitally enabled service usage by the total population of Albania by the end of 2029; c) have a 15% increase in digitally enabled service usage by vulnerable groups of the total population of Albania by the end of 2029. The above goals are targeting to address the uneven distribution of e-government adoption across the population. The figure of aggregate adoption masks a deeper structural problem: the use of currently available e-government services is skewed towards urban, more educated and more digitally literate citizens. The results framework is expressed in terms of usage rather than availability of services (see Section 5.2).

5. Discussion: Structural Patterns and Theoretical Implications

5.1 Three Structural Determinants Across Secondary Data

Three types of structural differences are found between the countries studied. First, there are differences in terms of the institutional and interoperability capacity needed to deliver public services (P2). The figures show that Estonia is a leader when it comes to the provision of digital public services in the EU. Its score for digital public services in DESI 2022 is 1st in the EU and its EGDI score of 0.9727 makes it second only to Denmark globally. Some 91% of the population of Estonia uses e-government services. The main constraint for Albania with regard to the provision of public services on the internet is the interoperability architecture between services and the governance arrangements for these services rather than the number of services offered. The eGovernment Benchmark 2024 for Key Enablers and Cross-Border Services is below the EU average for Albania (see Table 6 above). The Digital Governance pillar score for Albania is 24/100 while its Usage score is 87/100 (UNDP DRA). Second, there are differences in terms of digital trust (P3). The trust indicators in Table 7 above and the usage rates in Table 3 above show a similar ranking between the countries studied. The countries with the highest levels of trust in the EU also report the highest levels of use of e-government services, while Greece and Romania have the lowest levels of trust and also the lowest levels of use of e-government services. As noted above, however, the two indicators are not identical and there will be situations in which countries with low levels of trust in the EU record higher levels of use of e-government services than other countries with higher levels of trust. In such situations trust-rebuilding is likely to be more important than the further development of digital services. Third, there are differences in terms of the depth of EU regulatory integration (P3). While Member States benefit from directly applicable regulations, such as the GDPR and the eIDAS regulation, countries outside of the EU have to transpose these into national legislation and enforce them.

Albania has made good progress in recent years with the eGovernment Benchmark Score and EGDI Score (see Table 5 above). Until these three conditions are fulfilled for Albania as well (a fully GDPR-compatible data protection law, including sufficient funds for its complete enforcement, eIDAS-compatible digital identities for citizens, and judicial review of digital public service decisions), the levels of e-government use are unlikely to converge with those of the leading EU Member States. The three conditions are derived from the above definition of the regulatory-integration construct and the comparison with the other Member States in the sample. Their individual effects are not identified with the given data.

5.2 The Digital Maintenance Gap: An Interpretive Proposition

These secondary data also suggest the existence of a so-called 'digital maintenance gap'. The term 'digital maintenance gap' refers to the difference between the online services that are available and the online services that citizens actually use. We see a link between the digital maintenance gap and the lack of sufficient operational funding to sustain services after the initial investment phase. Direct and comparable data on the operational expenditure for digital platforms of the study countries is not available. The digital maintenance gap therefore is presented as an interpretive proposition, supported by several indicators that point in the same direction. The proposed interpretation is supported by four types of evidence. First, the two countries with the biggest gap between services supplied and services used have good supply of online services in place. Romania's high EGDI (Very High) score is only matched by the supply of online services in terms of low e-government usage score (25.3%) within the EU (Eurostat, 2024). Secondly, the biggest gap in Albania is observed in dimensions that require sustained operational effort rather than a one-off investment such as setting up an online service. These are: (1) Key Enablers and (2) Cross-Border Services in the eGovernment Benchmark (Table 6); as well as (1) Digital Governance score of 24/100 compared with high score of 87/100 for Usage in the UNDP DRA. Thirdly, both countries rely heavily on time-bound external funding such as ESIF in the case of Romania, and IPA and World Bank funding in the case of Albania. According to the EU cohesion policy rules, such operations are co-financed within the programming periods and the beneficiary must ensure the adequate maintenance of the investment for the minimum durability period. However, the related operating costs are to be covered from the national budget resources (Regulation (EU) 2021/1060, Art. 65). Fourthly, World Bank's results-based financing (RBF) program in Albania is designed to pay for increases in the use of online services rather than for the mere supply of services (World Bank, 2023; 2025). Taken together, these indicators provide support for the above interpretation: attractive indicators for supply-side services may be developed within a single investment period whereas conditions for sustained use of online services by citizens (operation, security, support to users) are not secured through national operating budgets. Repeated failures with online services can also swiftly destroy the trust that is needed in order to get citizens to use online services in the first place. This would then also be linked to the trust mechanism outlined in Section 2.2 above. To test the above proposition, however, data would be required on the national operating budgets of online services as well as data on the availability and failures of online services over time. A priority for future research.

5.3 Country-Specific Structural Interpretations

Denmark and Estonia: Similar high level of development for all three structural factors. Estonia's case shows that also countries with low initial income can reach high levels of adoption during their digitalization. Estonia's GDP per capita at the start of the digitalization process (around 2000) was approximately $3,500 or well below the EU average at that time.
Poland: The Improvement-Without-Convergence Case. Poland is improving its score the most in the EU over the period 2017-2022 (European Commission, 2022). However, there is no sign of convergence with the leaders regarding the number of citizens using digital public services. One reason is that digital governance is scattered in between different ministries, and there is no single inter-ministerial body to facilitate implementation of digital public services and necessary interoperability between systems and services. Trust in national government has increased with 6 pp over the period 2019-2024 (Standard Eurobarometer). However, a major interoperability deficit persists.

Romania and Greece: Two Paths to the Same Low-Performance While Greece and Romania have below EU average DESI scores, they have gone down different paths. While for Romania the path seems to be 'investment without adoption' – as described in the 'digital maintenance gap' chapter – and low institutional trust (51% trust in the EU, Eurobarometer 2023), for Greece low adoption might be the result of the decade of fiscal crisis erosion of public administration capacity. While the last years' increase in DESI scores for Greece is positive, so far this increased investment in digital governance has not yet brought about convergence with other EU countries. Yet, trust in the EU is low in Greece as well (35%, Eurobarometer 2023).

Albania: The Candidate Country Structural Diagnosis The digital governance profile of Albania shows positive trends but also challenges that are still to be addressed. Albania's EGDI score increased and is now ranked within the Very High EGDI group (2024). Central government services are offered online via e-Albania platform. More than 95% of public services offered by central government institutions are available online (World Bank, 2023–2025). Strong institutional support for digital governance from World Bank amounting to $145M (USD 65 million plus USD 80 million in additional financing) is allocated for 2023–2025 period. However, adoption of public services offered by municipalities via digital means is estimated to be below 35%. Same trend is observed at national level where Digital Governance score is

24/100 while score for Usage is 87/100. Thus, what Albania most needs are suitable governance structures to make good use of already existing digital platforms for improving services online for and with citizens. Interoperation of Key Enablers, protection of personal data in line with GDPR, enforcement of digital service standards by the judicial system are also needed.

6. Limitations

Three limitations to secondary data analysis need to be recorded.

A major part of the data offered by the sources is of a supply character and it refers to national averages. There are big differences between sub-national areas and between urban and rural areas. A sub-national analysis would be required in order to map the digital divide. Eurostat regional data for Romania (Section 3.2) illustrate to what extent daily internet use has increased in the Nord-Est region (of 33.9 percentage points between 2019 and 2024), even if from a low base.

The secondary data for the candidate countries (including Albania) were mainly obtained from different sources than for the EU Member States, with time-series covering 1-2 years for some of the indicators. Therefore, for Albania, full coverage of all indicators is lacking and therefore the indicators for this country have been analyzed using the available eGovernment Benchmark, and UNDP DRA publications for this country. Even though these publications use different methodologies for assessing the indicators for eGovernment, for the purpose of this study, all the values for the indicators for Albania have been estimated and therefore analyzed with caution (see Section 3.2). It would be very helpful to extend the coverage of the Eurostat ICT Survey to the candidate countries as part of the accession monitoring.

Finally, the large majority of secondary data consists of descriptive data and therefore only allows for the analysis of the association as well as the structural covariance of variables under study. In other words, it is not possible to test for causality. Although the trust-mediation of e-government and the digital maintenance gap are described in this study on the basis of the available data, they have not been proven. Longitudinal primary data, a natural experiment (e.g. different candidates joining the EU at different points in time) or an instrumental variables analysis would be required to test for causality.

7. Conclusions and Two-Phase Intervention Framework

The analysis is based on five core and three complementary data sources from public institutions in six countries. The core findings from the analysis lead to three main conclusions that need to be read in the light of the descriptive design of this study. First, GDP per capita does not explain differences in the digital governance performance of countries. Countries with similar levels of GDP per capita, such as Estonia, Poland and Greece, have very different levels of e-government use. This finding is consistent with the wider EU distribution of e-government usage as reported by Eurostat (2024). Second, the performance of a country's digital governance depends on the institutional architecture, in particular on the existing interoperability infrastructure that enables the efficient and effective delivery of public services via the digital channel. This finding from the analysis has important implications for policy-making and should prompt a prioritization of the institutional components of public services over resources required for setting up and running digital public services. An adequate sequence of investments in the necessary institutional components and the required setup of interoperability structures in good time should be the first priority. Third, a comparison of Eurobarometer and OECD trust indicators with Eurostat e-government usage rates shows that institutional trust and e-government usage rates go up and down together in the countries studied by this report. Even though the data at hand do not allow for a determination of the direction of this relationship, it is consistent with the view that trust acts as an intervening factor between availability of services and their use. In countries with high levels of institutional trust, such as Denmark and Estonia, reliable, efficient and transparent public services are used by almost all citizens. In countries with lower levels of institutional trust for reasons related to fiscal crises, institutional failures or data scandals, large adoption gaps persist and will not be addressed by additional investment in digital platforms. Lastly, the study reveals a digital maintenance gap. Grants from ESIF/IPA funds for the development of digital infrastructure are not always complemented by secured national funds for the operation of the digital platforms in the long run. This interpretation is supported by several indicators in Section 5.2. However, more in-depth analysis using budgetary data is required to validate this finding from the analysis. A change in policy design could be to set up an operational expenditure reserve that is linked to the initial investment in digital infrastructure co-financed by the funds from ESIF/IPA grants (indicatively 15–20% of the initial investment, the exact percentage to be calculated through life-cycle cost assessments).

7.1 Two-Phase Intervention Framework for Candidate Countries

A sequential intervention logic to promote eGovernment in candidate countries like Albania is derived from the previous findings. This logic is summarized in Table 9. The first priority, i.e. the institutional prerequisites for eGovernment, has to be addressed first because in Albania mainly institutional and not technical constraints prevent the adoption of eGovernment services. Scaling up eGovernment then has to be addressed after these prerequisites have been fulfilled.

- Phase 1 – Institutional Prerequisites (to be implemented immediately): 1. Digital framework law contains data protection rules at least as broad as GDPR plus rules for digital services and their implementation that can be enforced before a court of law (integration of regulations, Section 5.1). 2. A national inter-ministerial body with a stable financial basis is set up as Government CIO (Digital Governance pillar score 24/100 for Poland, fragmentation in Poland, Section 5.3). 3. National eID is introduced for all government services (Key Enablers, eGovernment Benchmark 2024, Table 6). 4. All digital platforms co-financed from EU funds are granted with mandatory multi-annual operating budgets (digital maintenance gap in Romania and Albania, Section 5.2).
- Phase 2 – After Phase 1 scaling, it is more important to make consistent and reliable the services already offered through the e-Albania platform and only then to scale up the number of services offered. Furthermore, in order to make progress with low adoption groups (i.e. seniors, rural population, low literacy), efforts must be made to promote digital skills. In addition, increased algorithmic transparency and corresponding citizen communication will be necessary to build more trust with citizens. Finally, by utilizing the EU accession process as an institutional multiplier, Cross-Border Services can be designed and rolled out in line with the eIDAS Regulation (limited Cross-Border Services score in Table 6).

Table 9. Link Between Empirical Findings and Proposed Priorities for Albania

Empirical finding	Supporting evidence	Proposed priority	Phase
Service supply exceeds service use	95% of central services online vs. estimated usage below 35% (Tables 3, 4, 6)	Improve reliability and consistency of existing e-Albania services before adding new ones	Phase 2 (first step)
Weak governance and coordination capacity	UNDP DRA Digital Governance 24/100 vs. Usage 87/100; municipal readiness 31/100	Inter-ministerial digital authority (Government CIO) with a stable budget	Phase 1
Gaps in key enablers and interoperability	Key Enablers "room for improvement" and Cross-Border Services "limited" (Table 6)	Universal eID roll-out; cross-border services under eIDAS	Phase 1 / Phase 2
Incomplete regulatory integration	Candidate status; Member States with deeper integration show higher use (Tables 3, 7, 8)	Digital framework law with GDPR-equivalent protection and judicial redress	Phase 1
Low-to-moderate digital trust	Trust proxy low–moderate (Table 7); trust and use co-vary (Section 4.5)	Proactive communication, algorithmic transparency, reliable service delivery	Phase 2
Risk of a digital maintenance gap	Reliance on time-bound IPA/World Bank funding; supply–use gap (Section 5.2)	Mandatory multi-annual operating budgets for digital platforms	Phase 1
Uneven adoption across population groups	Use skewed towards urban, educated users (Section 4.7); low rural broadband (Table 8)	Targeted digital-skills programmes for low-adoption groups	Phase 2

The findings of this paper can be used as a starting point for further development work. The prioritization of objectives in Phases 1 and 2 was based on information from the eGovernment Benchmark Key Enablers, the UNDP DRA Digital Governance and Usage pillars as well as the regulatory integration framework described in Section 2.3. The framework can also be relevant for other countries from the Western Balkan candidate countries (Serbia, Montenegro, North Macedonia and Bosnia and Herzegovina) which are facing similar institutional challenges. However, the transferability of the framework needs to be checked in country specific analyses.

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