Electronic Government as an Engine for Bulgaria's Digital Competitiveness

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Abstract: Today's world can be characterized by various characteristics - complex, dynamic, changeable. In the last two decades, however, another characteristic has come to the fore - digital. Having successfully passed through Toffler's third wave, economies are now moving on the crest of the fourth – a transition to a digital economy. A key element for this transformation is e-government. It integrates the achievements of digital technologies in the public sector, so as to increase efficiency, reduce bureaucratic burden and foster a competitive economic environment.

This study is carried out within the framework of the research project „UNWE Research Grant #6/2024 - Digital Competitiveness of the Socio-Economic System of Bulgaria". Through it (the present study) it aims to assess the degree of development of the electronic government in Bulgaria - as an objective state, and to what extent it is a prerequisite for increasing the digital competitiveness of the country's economy. The object of research is the electronic government in Bulgaria, and the subject - its distinctive characteristics and its transformation into a factor for the digital development of the socio-economic system.

Achieving the goal of the present study requires, first of all, to outline the key characteristics of digital competitiveness as a relatively new measure of the success of socio-economic systems in a global aspect. From a methodological point of view, the research is carried out by applying qualitative and quantitative analysis for the specific needs of the study. Through it, an analysis and evaluation of the electronic government in Bulgaria is carried out, as well as the level of digitization as a prerequisite for building and maintaining national competitiveness. Next, the methodology examines the relationship between the level of e-government and national competitiveness. The assessment is made through the presence (if a relationship exists), the strength and direction of interaction between the two studied categories in Bulgaria.

The study is based on secondary data collected and processed for the purposes of calculating global indices such as the UN e-Government Development Index (EGDI), the European Commission's Digital Economy and Society Index (DESI). An aspect of the study is also related to the qualitative assessment of the strategic documents developed in Bulgaria in the field of digitalization and the application of e-government. The results obtained give reason to conclude that Bulgaria is making significant progress in the development of e-government. According to the EDGI, the country is classified in the group of countries with a "very high level of development". At the same time, however, Bulgaria continues to be one of the last places in the EU in terms of DESI. The main areas in which lagging behind are: connectivity, digital skills and technological integration in business. As a result of the research, key obstacles to increasing the country's digital competitiveness based on e-governance have been identified - insufficient funding, lack of coordination between institutions, and low levels of digital literacy among the population.

Key words: *DESI, digital competitiveness, digital governance, digitalization, e-government, EDGI, public services.*

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Introduction

For a long time, the world we lived in was described as fast-changing or complex. Assessing them from today's perspective, the world is much more than fast-moving or technological – it is digital in nature. After the stage described by Alvin Toffler as the "third wave" of development – the information society, economies around the world are now moving in a new direction: towards a complete digital transformation. This change is not limited to the introduction of digital technologies but also affects the way we work, communicate, make decisions, and build our digital competitiveness. In this context, digital competitiveness is the ability of a country or economic system to use and integrate digital technologies in a way that increases its economic efficiency, innovation capacity and adaptability to global technological changes. Unlike traditional forms of competitiveness that focus on prices, productivity or access to markets, digital competitiveness encompasses a wider range of factors – including the degree of digitalisation of the public sector, the level of digital skills among the population, the presence of innovative ICT companies and the effective use of data in governance. In this sense, e-government plays a key role as a structural element that not only modernises public administration, but also creates an environment for digital inclusion and sustainable economic growth.

We should not view the e-government solely as a process of digitizing services. It should become a mechanism for a more efficient state, a more transparent administration, and better interaction with citizens. In countries like Bulgaria, where ambitions for economic growth and social modernization often clash with realities such as bureaucracy and lack of coordination, e-government can be not only an aid but a key tool for development.

This study focuses on the role of e-government as a driver of Bulgaria's digital competitiveness. Although the country has access to pan-European policies and resources, it continues to lag behind in areas such as digital skills, connectivity, and business digitization. And here the main question arises: can well-structured e-government compensate for these deficits and accelerate the transition to a modern, competitive economy? The aim of the study is to assess how far Bulgaria has come in the development of e-government and to what extent this development supports its digital competitiveness. The analysis is based on data from leading international indices – the UN EGDI, and the European Commission DESI indices. The methodology used combines conceptual analysis with empirical assessment and tracks both the current state and possible directions for improvement. Ultimately, the results of this article aim not only to offer yet another interpretation of the available digital data but to contribute to the formation of a broader understanding of the future of digitalization in Bulgaria – a conversation in which e-government is not a side-line but a major player.

Theoretical Overview

In the era of digital transformation, e-government is increasingly emerging as more than a technological convenience. Today, we must effectively use it as a strategic tool to enhance the competitiveness of entire economies. Created in a symbiosis between information technology, public administration, and the pursuit of greater transparency and participation, e-government is no longer just a matter of modernization but of sustainability and adaptability. E-government is usually defined as the process of governments using ICTs to provide services and information to citizens, businesses, and institutions (Howard, 2001) (Bannister and Walsh, 2002). In fact, it goes beyond its original purpose and becomes a mechanism for building trust, accelerating public processes, and involving society in real time.

Over the past two decades, public governance has undergone a number of metamorphoses – from classic bureaucratic models to the focus on efficiency in the new public management to the so-called "Digital Era Governance", which places digital technologies at the heart of reforms (Fang, 2002). In this context, e-government is not just a platform for online services – it is a way of interaction, with the potential to change both institutional structures and citizens' expectations. Different theoretical approaches consider e-government through the prism of efficiency, accountability, and transformation. Some emphasize its technocratic side – automation and optimization.

Others – on its democratic nature, which allows for greater participation and transparency. Still others see it as a platform for creating new public value. In fact, e-government is all of these – both a tool and an environment that requires new skills, new approaches, and a new type of leadership. Table 1 presents a brief overview of the main definitions for the nature of the phenomenon "electronic governance".

Table 1: Main definitions for electronic governance

Author/s	Definition
United Nations	„E-government is the use of ICT and its application by the government for the provision of information and public services to the people." (UNPAN, 2001)
Fountain	„E-government is the use of digital technologies to transform relations with citizens, businesses, and other arms of government." (Fountain, J.E., 2001)
Bannister & Walsh	„E-government is the use of technology to enhance the access to and delivery of government services to benefit citizens, business partners and employees." (Bannister, F. & Walsh, N., 2002)
OECD	„The use of ICTs, and particularly the internet, as a tool to achieve better government." (OECD, 2003)
Council of Europe	"E-governance is about the use of information technology to raise the quality of the services governments deliver to citizens and businesses. It is hoped that it will also reinforce the connection between public officials and communities thereby leading to a stronger, more accountable and inclusive democracy." (Council of Europe, 2004)
European Commission	„The use of information and communication technologies in public administrations combined with organisational change and new skills to improve public services and democratic processes." (EC, 2005)
World Bank	„E-government refers to the use by government agencies of information technologies (such as wide area networks, the Internet, and mobile computing) that have the ability to transform relations with citizens, businesses, and other arms of government." (The World Bank, 2009)
Bannister & Connolly	„E-government is the application of ICTs in public administration processes, aiming to enhance service delivery, transparency, efficiency and public value." (Bannister, F. & Connolly, R., 2012)
UN E-Government Survey	„The employment of the Internet and the world-wide-web for delivering government information and services to citizens." (UN DESA, 2016)
European Commission – Digital Compass	„A government that makes full use of digital technologies in public services and administration to improve citizen experience and transparency, reduce burdens, and enhance policy outcomes." (EC, 2021)
Sharma et al.	„E-government is not just a technological interface, but a governance ecosystem built on accountability, interoperability, transparency, and citizen-centered design." (Sharma et al., 2025)

Source: Author's table

Research shows that when e-government is built "by design" with accountability, transparency and security, it becomes not just a channel for communication, but the basis for a modern public culture. Since the beginning of the 21st century, the role of the state is no longer measured only by laws and regulations, but also by its ability to use technology to be more accessible, flexible and adequate. The new model of governance "Digital Era Governance" goes beyond the classic digitalization of processes. The model emphasizes on the connectivity between institutions, personalized services, and the active role of citizens in co-creating policies.

The theoretical framework around e-government includes different approaches, each of which has a specific focus. One emphasizes efficiency – how quickly, cheaply and reliably services are provided. The second – on the democratic dimension – how institutions are accountable to citizens and whether they have a voice. The third approach is innovation-oriented, where e-government is seen as a platform for building new public value – through open data, citizen hubs, even artificial intelligence.

According to Sharma et al. (2025), e-government should no longer be thought of as a "technological gimmick", but as an ecosystem where accountability, security and interoperability are inevitable rules of the game. They develop the concept of "accountability by design" – i.e. creating digital platforms in which accountability is not

added additionally, but is built into the architecture. In this context, it is not only the devices and applications that matter, but the way the state works. Their research shows that successful e-government cannot happen without six key elements: *transparency, controllability, responsibility, responsiveness, legal accountability, and data security and protection.* These are the factors that distinguish a truly digital administration from another "electronic portal with poor navigation and 404 errors".

- ***Transparency*** – citizens have access to information, but not just any information, but information that is understandable, up-to-date and relevant;
- ***Controllability*** – the ability to influence processes through participation, feedback and change mechanisms;
- ***Responsibility*** – clearly defined roles and responsibilities between institutions and individual employees;
- ***Responsiveness*** – timely responses and actions to problems, signals or complaints;
- ***Legal accountability (liability)*** – real consequences for administrative violations or mismanagement;
- ***Data security and protection*** – protection not only from hackers, but also from administrative negligence and lack of ethics in the processing of personal information.

According to Bannister and Connolly (2012), the power of e-government is that it can create public value – not only through time saved at the counter, but also through open processes, higher accountability and engaged citizens. This is where the connection with digital competitiveness lies: an economy with an efficient, adaptive and digitally oriented public administration has a significant advantage in the global competition for investment, talent and innovation. This process is two-way – e-government transforms not only the state from within, but also its relationship with business and society. Through better regulatory management, faster administrative procedures and open data, the public sector becomes a partner, not an obstacle. Research by Fountain (2001) and Pina et al. (2007) shows that when the administration speaks the language of technology, business responds with trust and society – with participation.

Accountability is central to the entire concept of e-government. And it is not just about traceability of actions or annual reports, but about building a mutual relationship between citizens and institutions. As Bovens (2007) emphasizes, accountability is not just a control mechanism, but a social contract – a two-sided expectation of clarity, responsibility and the ability to react. Especially in the digital environment, where information moves at high speed, the need for clear channels for feedback, sanctions for violations and public pressure is greater than ever. The European context provides a good background for analysis. According to Pina, Torres & Royo (2007) and Halachmi & Greiling (2013), interactivity – i.e. two-way communication between institutions and users – is the key to effective e-government. Countries with better developed digital services tend to demonstrate higher levels of trust in the public sector, more participation in policies and less administrative burden.

In summary, contemporary concepts of e-government outline its multi-layered role – from technological infrastructure to a strategic tool for sustainable development and digital competitiveness. Theoretical models emphasize not only the importance of efficiency and access, but also the need for accountability, transparency and participation. In this context, e-government cannot be considered in isolation – it is closely related to economic, social and institutional processes. That is why the next part of the study focuses on the methodology through which the interconnection is examined through the prism of the Bulgarian socio-economic system – with the help of international indices and a systematic analysis of available data.

Methodology

This study applies a mixed methods approach, combining quantitative and qualitative analysis. The choice of this approach is defined by the complex nature of the subject under consideration – e-government as a factor for digital competitiveness – which requires both objective measures and contextual understanding. The aim is not simply

to outline a picture of the "current state", but to reveal the mechanisms through which policies, infrastructure and institutional practices interact.

The qualitative analysis focuses on the content of key Bulgarian strategic documents, including the National Program "Digital Bulgaria", the e-Government Roadmap, as well as the related components of the Recovery and Resilience Plan. This analysis is complemented by a comparative review of good practices in different countries, with focus to the possibility of transferring effective models and solutions. The quantitative component is based on an analysis of data from three leading international indices: the UN EGDI, and the European Commission DESI. They were chosen for their international validity, publicity and possibility of comparability between countries, especially within the EU. These indices provide a rich basis for a quantitative assessment of Bulgaria's progress in the digitalization of the public sector, as well as in the context of its economic digital maturity.

The research focus is pragmatically oriented: the aim is not only to build a theoretical framework, but also to formulate realistic policy recommendations based on empirical data and identified gaps in practice. The study seeks answers to three main questions:

1. What is the current state of e-government in Bulgaria according to international indices?
2. To what extent does e-government contribute to increasing digital competitiveness in the country?
3. What are the leading factors – including barriers – that influence the effectiveness of e-government?

Methodologically, the analysis also draws on existing literature that emphasizes the relationship between digital transformation, the quality of public administration, and economic sustainability. The model is based on the concept of functional interaction between the two spheres and includes three key areas:

- Qualitative indicators extracted from strategic documents, which include: policy coherence, institutional coordination, citizen participation and financial sustainability.
- E-government indicators based on the three main components of the EGDI: online services, telecommunications infrastructure and human capital.
- Digital economy and society indicators adopted by DESI: the research is focused on the component "digital public services".

This model does not consider the components in isolation, but seeks to trace the interactions between them – for example, how the lack of digital skills limits the usability of online public services.

Sources of Information

The analysis uses three types of sources:

1. National strategic documents – including "Digital Bulgaria 2025", e-services roadmap 2021–2027 and Recovery and Resilience Plan.
2. UN EGDI – data for the period (2003-2024) in total from twelve editions (2003, 2004, 2005, 2008, 2010, 2012, 2014, 2016, 2018, 2020, 2022, 2024) were used, which show stable progress in Bulgaria.
3. European Commission DESI – especially in the reports for the period 2015-2024 Bulgaria continues to be among the last in the EU in digital skills and business digitalization.

Limitations of the Study

Despite the aim of a thorough and multifaceted analysis, this study carries with it a number of limitations that should be considered when interpreting the results. The first and most significant limitation is related to the secondary data sources used. International indices, although recognized as reliable and comparable, often work with a lag – for example, EGDI 2024 is based on data from the previous year. This means that the real development of e-government may not be reflected with full accuracy at the current moment. In addition, these indices rarely include local specifics

– such as internal coordination between institutions in Bulgaria, the digital culture in the administration or the real usability of e-services by businesses and citizens.

The second limitation stems from the time scope of the study – the analysed period (2002–2024) is long enough but analyses are difficult due to the lack of a consistent methodology for researching some of the indicators to derive sustainable long-term trends. Many of the strategies, including Digital Bulgaria 2025, are in the process of implementation and do not yet have final results or measurable indicators. Third, the study's approach is correlational, not causal. The identified links between the level of e-government and digital competitiveness show a dependence, but do not prove unequivocally which is cause and which is effect. Such an analysis would require additional econometric tools and a wider time span, as well as more comprehensive regional data.

Finally, the study does not include primary empirical data – such as surveys of citizens, administrative officials or business representatives. This is a potential weakness, especially when it comes to measuring subjective aspects such as satisfaction, trust, actual usability of e-services and barriers to their adoption. Such a step would enrich the analysis and is recommended in future studies.

Despite certain limitations the chosen approach provides a thorough and relevant basis for assessing Bulgaria's position in the digital context. The specific results of the analysis are to be presented, which will outline both the achievements and the challenges in the development of e-government in our country.

Results and Discussion

The qualitative analysis of digitalization in the public sector, and more specifically the development of e-government, begins with an overview of the evolution of this process.

Development of e-Government in Bulgaria: Dynamics and Stages (2014–2024)

Over the past decade, Bulgaria has witnessed a significant evolution in the development of e-Government, moving from isolated technological efforts to more integrated, institutionally supported digital initiatives. Although progress has been uneven and subject to political turbulence, three clearly distinct stages can be distinguished, reflecting the varying degrees of institutional maturity, technological development and strategic commitment.

The period 2014–2016 is marked the beginning of the systematic construction of e-Government through the development of key infrastructure platforms. The main emphasis was placed on the creation of centralized systems – such as the Register of Electronic Administrative Services (REAU), the electronic identification system (eID), as well as the Unified Portal for e-Services (www.egov.bg). The E-Government Development Strategy (2014–2020) forms the basis for future policy actions and defines the vision for the digital transformation of public administration.

The period 2017–2019 is characterized by the expansion of capacities and the technological transition from "availability of services" to "systems interconnection". The creation of platforms such as RegiX (for inter-registry exchange), the Secure Electronic Delivery System (SEPEED), as well as electronic forms, demonstrates a drive for interoperability and automation. The construction of a Government Hybrid Cloud complements the efforts for centralization and control over data, demonstrating increased attention to the security and efficiency of the public IT infrastructure.

The period 2020–2024 marks a strategic turn, dictated by both the effects of the pandemic and the opportunities provided by the European Recovery and Resilience Plan. The planned investments of over 400 million BGN are directed towards the digitalization of key services, the development of digital identity, the creation of digital files and automated administrative processes. The adoption of amendments to the E-Government Act in 2022 further strengthens the role of the state administration in the process through enhanced coordination and control mechanisms delegated to the Ministry of E-Government.

These three periods outline a trajectory in which the state gradually moves from the phase of technological experimentation to the stage of institutionally bound policies. Although the technical infrastructure is progressing, the main challenge remains the effective use of e-services by citizens and businesses. Persistent structural difficulties must also be added here, such as insufficient human capacity in the administration (lack of ICT specialists), limited digital literacy, as well as still fragmented information systems that prevent full integration and automation. Despite the existence of platforms such as RegiX, automatic data exchange between institutions remains limited and the "once-only" principle is often only partially applied.

National strategies and initiatives: direction, but not always movement

Over the past decades, the development of e-government in Bulgaria (presented with the three periods) has been supported (or at least that is the intention) by a series of strategic documents, roadmaps and regulations. They formulate an ambitious vision for the digital transformation of public administration, oriented towards modern, accessible and citizen-oriented services. However, implementation often encounters well-known problems: delays, inconsistency, and a cyclical lack of sustainability in institutional efforts.

One of the fundamental documents is the Strategy for the Development of e-Government (2014–2020). Adopted by Decision No. 163 of the Council of Ministers, it marks the beginning of a systematic approach to e-government in Bulgaria. The strategy introduces key objectives – *building a national electronic identity, developing secure electronic communication, and transitioning to interoperability between registers*. Although in theory it outlines a stable course, in practice the implementation turns out to be highly dependent on political support and institutional will, which in many cases diverge.

In 2020, the National Program "Digital Bulgaria 2025" was adopted, which broadens the horizon of digital transformation, including not only e-government, but also sectors such as education, innovation and cybersecurity. Particular emphasis is placed on the construction of the so-called "state cloud", the implementation of artificial intelligence in public services and the reduction of the administrative burden through automation. The program demonstrates a higher degree of ambition, but again - implementation is hampered by chronic structural problems, including a lack of qualified personnel and delayed technological implementation.

A significant change occurs after 2021 with the inclusion of e-government as a priority axis in the Recovery and Resilience Plan (2022–2026). The planned investments of over 400 million leva (approximately 200 million euro) are aimed at digital identity, automated administrative procedures, video consultations, digital files, as well as electronic services in sectors such as healthcare, transport, and social policy. In theory, this is perhaps the largest initiative to modernize the administration to date, but for the time being its implementation remains in the "structuring and initial launch" phase, with some of the measures not yet fully functional.

The Roadmap for e-Services (2021–2027) is also being developed as an operational tool to support the strategies. The document identifies over 250 administrative services that are subject to digitalization and introduces the concept of "life events" (e.g. birth of a child, starting a job), which should be serviced automatically, without additional administrative intervention. This represents an important step towards orienting the administration around the user, rather than around institutional logic.

Along with the strategies, a number of key technical initiatives form the core of the digital infrastructure:

- RegiX (inter-register exchange) – allows institutions to exchange data without the need for citizens to provide multiple documents. Although widely advertised, it does not yet capture the full potential of inter-agency integration.
- eID – electronic identity, developed in accordance with the eIDAS regulation, offers opportunities for access to services via a mobile application, electronic signature and other forms of authentication. However, its actual use remains limited.

- Secure Electronic Delivery System (SEPEED) – ensures official correspondence between the administration and citizens with legal validity. However, its integration with existing administrative processes remains partial.
- State Cloud (G-Cloud) – created for the purpose of centralized hosting and data protection, it allows institutions to use a common infrastructure, which leads to cost optimization and increased security.

Regardless of the steps taken, the actual implementation of strategic documents is subject to a number of challenges. Among the most significant are: the lack of consistent political support (frequent change of priorities under new governments), slow regulatory adaptation to technological changes, an acute shortage of IT personnel in the administration, and low awareness of the population about existing electronic services.

The institutional framework: between coordination and fragmentation

Effective e-governance requires a clear institutional framework combining strategic vision, technical capacity and interdepartmental coordination. In the Bulgarian context, such a framework exists – at least on paper. Over the past decade, a relatively stable system of responsible institutions has been formed, but the implementation of their functions often suffers from overlapping powers, lack of integrated systems and delayed operational interaction.

At the highest level, the Council of Ministers sets the strategic priorities in the field of digitalization. Its powers include the approval of key documents – such as the National Program "Digital Bulgaria" and the Recovery and Resilience Plan – as well as coordination between line ministries. Depending on the specific political configuration, the Prime Minister or a designated Deputy Prime Minister is responsible for e-governance policies (CoM, 2020; CoM, 2022).

The Ministry of e-Government (MEG), established in 2022 with the aim of centralizing responsibility for the digital transformation, plays a central role in day-to-day governance. The Ministry inherits the functions of the previous State Agency for Electronic Governance and brings together competencies in areas such as e-services, digital identity, cybersecurity and interoperability. Through the subordinate Institute of Public Administration (IPA), the MEG also coordinates training programs for civil servants in the field of digital skills (MEG, 2022).

The technical implementation of many of the systems is carried out by Information Services AD, a company with predominant state participation. It provides support for critical systems such as the national portal egov.bg, the platforms for electronic forms and public procurement, as well as the infrastructure for cryptographic services and authentication mechanisms (CA-Bulgaria). This institution functions as a kind of "backbone" of the digital state – with the corresponding advantages and risks associated with the concentration of technical expertise in one place.

In the area of security, the State Agency for National Security (SANS) – through its cybersecurity unit – monitors the implementation of the Cybersecurity Act and the protection of critical information infrastructure. The agency works in coordination with the Ministry of Internal Affairs and the Ministry of Internal Affairs, but has been repeatedly criticized for limited publicity and reactivity in the event of incidents. Personal data protection is entrusted to the Commission for Personal Data Protection (CPDP), which carries out supervision under the European Regulation GDPR. The Commission issues methodological guidelines and participates in the assessment of the compatibility of new e-services with confidentiality requirements (CPDP, 2018).

Although informally included, the National Statistical Institute (NSI) also contributes to the ecosystem through the digitalization of reports, the use of administrative registers and the introduction of electronic channels for censuses and surveys. This is a key step towards the so-called data-driven governance.

At the sectoral level, each individual ministry and department is responsible for digitalization within its competence. For example:

- The National Revenue Agency is implementing electronic tax services and personalized e-profiles;

- The Registry Agency maintains online access to the Commercial and Property Registers;
- The Ministry of Education is responsible for the National Electronic Training Platform;
- The Ministry of Health is developing the National Health Information System.

Although these institutions are key to policy implementation, practice shows that there is a lack of systematic integration between them. Often, the systems are compatible "in theory", but in practice they continue to function as digital islands with limited connectivity and weak standards coordination.

Bulgaria's Position in the e-Government Development Index (EGDI)

The development of e-government in Bulgaria over the last two decades can be most objectively tracked through the dynamics of indicators in the e-Government Development Index (EGDI), prepared by the UN. The e-Government Development Index (EGDI), published by the United Nations every two years, is one of the most widely recognized tools for comparing the digital maturity of the public sector worldwide (UN DESA, 2022). It combines three equally weighted components: Online Service Index (OSI), Telecommunication Infrastructure Index (TII) and Human Capital Index (HCI). Each of them offers a specific perspective on the digital progress of countries – from the accessibility of services to the level of digital culture and educational capacity. The analysis of the results for Bulgaria in the period 2003–2024 (see Table 2) reveals enduring structural characteristics and key challenges that are relevant to the considered interrelationship between e-government and digital competitiveness.

Table 2: E-Governance Digital Index and sub-indexes for Bulgaria in the period 2003-2024

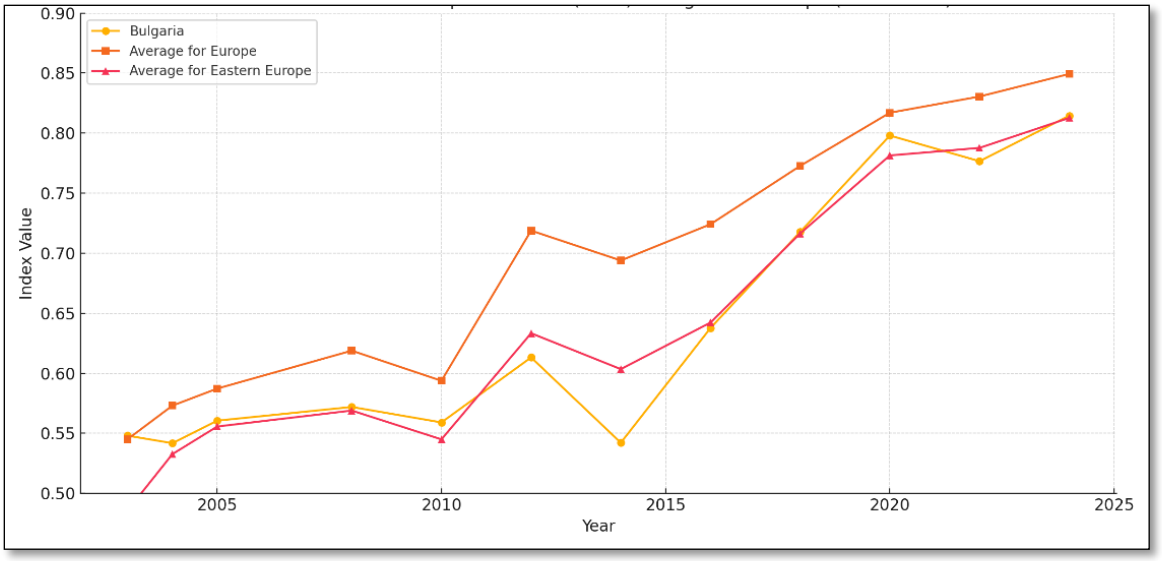
	2003	2004	2005	2008	2010	2012
Rank (# of 191)	**35**	**41**	**45**	**43**	**44**	**60**
E-Gov. Index	**0.5480**	**0.5417**	**0.5605**	**0.5719**	**0.5590**	**0.6132**
Leader in Europa	Sweden	Denmark	Denmark	Sweden	UK	Netherlands
Average for Europe	0.5450	0.5730	0.5872	0.6188	0.5937	0.7188
Leader in Eastern-Europe	Poland	Czech Rep.	Hungary	Czech Rep.	Hungary	Russian Feder.
Average for Eastern-Europe	0.4857	0.5326	0.5556	0.5689	0.5449	0.6333
Online service index	**0.5371**	**0.5058**	**0.5192**	**0.4849**	**0.4095**	**0.4902**
Leader in Europa	UK	UK	UK	Denmark	UK	UK
Average for Europe	0.4082	0.4927	0.5395	0.5375	0.4354	0.6189
Leader in Eastern-Europe	Poland	Romania	Hungary	Czech Rep.	Hungary	Hungary
Average for Eastern-Europe	0.3303	0.4683	0.5081	0.4684	0.3790	0.5288
Telecommunication infrastructure index	**0.20691**	**0.20938**	**0.25219**	**0.30707**	**0.33704**	**0.50062**
Leader in Europa	Sweden	Sweden	Sweden	Netherlands	Switzerland	Liechtenstein
Average for Europe	0.4117	0.4062	0.4116	0.4632	0.4844	0.6459
Leader in Eastern-Europe	Czech Rep.	Czech Rep.	Czech Rep.	Czech Rep.	Hungary	Russian Feder.
Average for Eastern-Europe	0.2158	0.2145	0.2348	0.3045	0.3191	0.4887
Human capital index	**0.9000**	**0.9100**	**0.9100**	**0.9262**	**0.9350**	**0.8486**
Leader in Europa	UK	UK	Belgium	Denmark	Denmark	Ireland
Average for Europe	0.8151	0.8201	0.8105	0.9001	0.9024	0.8916
Leader in Eastern-Europe	Poland	Poland	Poland	Hungary	Belarus	Ukraine
Average for Eastern-Europe	0.9110	0.9150	0.9240	0.9367	0.9417	0.8825

	2014	2016	2018	2020	2022	2024
Rank (# of 191)	**73**	**52**	**47**	**44**	**52**	**55**
E-Gov. Index	**0.5421**	**0.6376**	**0.7177**	**0.7980**	**0.7766**	**0.8145**
Leader in Europa	France	UK	Denmark	Denmark	Denmark	Denmark
Average for Europe	0.6939	0.7241	0.7727	0.8170	0.8305	0.8493
Leader in Eastern-Europe	Russian Feder.	Russian Feder.	Russian Feder.	Poland	Poland	Ukraine
Average for Eastern-Europe	0.6034	0.6422	0.7164	0.7814	0.7877	0.8127

	2014	2016	2018	2020	2022	2024
Online service index	**0.2362**	**0.5652**	**0.7639**	**0.7706**	**0.7092**	**0.7727**
Leader in Europa	France	UK	Denmark	Estonia	Estonia	Denmark
Average for Europe	0.5695	0.6926	0.7946	0.7655	0.7699	0.7836
Leader in Eastern-Europe	Russian Feder.	Russian Feder.	Poland	Poland	Ukraine	Ukraine
Average for Eastern-Europe	0.4465	0.5674	0.7472	0.7500	0.7145	0.7420
Telecommunication infrastructure index	**0.59406**	**0.56023**	**0.57850**	**0.78260**	**0.79840**	**0.91707**
Leader in Europa	Monaco	Monaco	Monaco	Liechtenstein	Liechtenstein	Iceland
Average for Europe	0.6678	0.6438	0.6765	0.8162	0.8392	0.9227
Leader in Eastern-Europe	Russian Feder.	Belarus	Belarus	Belarus	Czech Rep.	Poland
Average for Eastern-Europe	0.5317	0.5428	0.5732	0.7443	0.7825	0.8938
Human capital index	**0.7960**	**0.7875**	**0.8106**	**0.8408**	**0.8221**	**0.7538**
Leader in Europa	Ireland	Belgium	Belgium	Denmark	Iceland	Iceland
Average for Europe	0.8434	0.8360	0.8471	0.8691	0.8825	0.8418
Leader in Eastern-Europe	Belarus	Poland	Czech Rep.	Czech Rep.	Czech Rep.	Hungary
Average for Eastern-Europe	0.8321	0.8165	0.8289	0.8500	0.8660	0.8023

Source: United Nations, e-Government Knowledgebase (UNeGovKB)

For the period 2003–2024, Bulgaria recorded a steady increase in the total EGDI value – from 0.5480 to 0.8145 (see Fig. 1). Despite this growth, the country's position in the global ranking fluctuates, reaching 55th place in 2024, which is lower than the starting position in 2003 (35th place). This shows that the improvement in absolute values is not enough to improve the ranking, as other countries are progressing faster. This highlights the relative loss of competitive positions in an international context.



Source: Author's figure based on information from United Nations, e-Government Knowledgebase (UNeGovKB)

Figure 1*:* e-Government index – Bulgaria compared to the average values for Europe and Eastern Europe

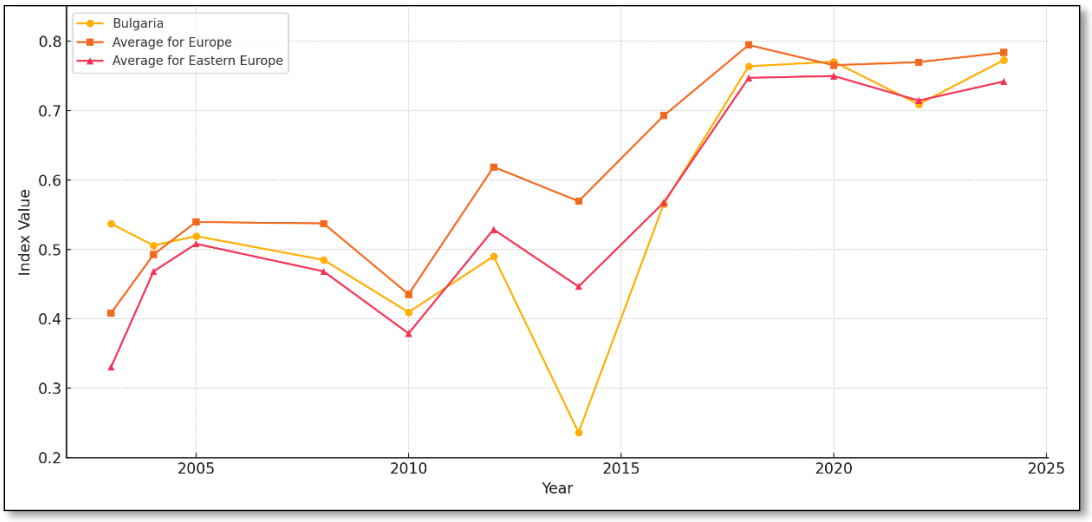
A comparison with the averages for Eastern Europe and the European Union reveals additional aspects of the situation. In 2024, Bulgaria is ahead of the regional average in terms of EGDI (0.8127), but behind the EU average (0.8493), as well as significantly lower than the leading countries in the region such as Denmark and Estonia. This confirms the conclusion that although the country has significantly improved its digital infrastructure and the scope of online services, the challenge of catching up with the leading digitally developed European countries remains.

Component Analysis

- *Online Services Index (OSI)*

The Online Service Index (OSI) is a key component of the E-Government Development Index (EGDI), measuring the availability, accessibility and functional maturity of digital administrative services. Analysis of data for Bulgaria in the period 2003–2024 reveals an uneven but generally upward trajectory, marked by distinct stages of stagnation and accelerated growth. During the first years of the observed period, Bulgaria was positioned above the average values for Europe and Eastern Europe. However, after 2008, a consistent decrease was observed, reaching the lowest value in 2014 (0.23622). This trend can be explained by the lack of a digital strategy, limited institutional capacity, as well as a lack of sufficient investment in building and maintaining digital infrastructure for public services. During this period, European averages continue to rise, deepening the gap between Bulgaria and the leading digitally developed countries.

The period after 2016 is characterized by a sharp improvement in the OSI, with the index increasing from 0.5652 in 2016 to 0.7727 in 2024. This progress is the result of an active digital policy, including the introduction of key platforms such as RegiX, eDelivery and egov.bg, as well as the mobilization of national and European funds through the Operational Program "Good Governance" and the National Recovery and Resilience Plan. The establishment of the Ministry of e-Government in 2022 also contributes to increased institutional coordination and efficiency of the digital transformation. By 2024, the value of the index in Bulgaria approaches the European average (0.7836) and surpasses the Eastern European average (0.7420), which indicates a significant improvement in the provision of digital public services.



Source: Author's figure based on information from United Nations, e-Government Knowledgebase (UNeGovKB)

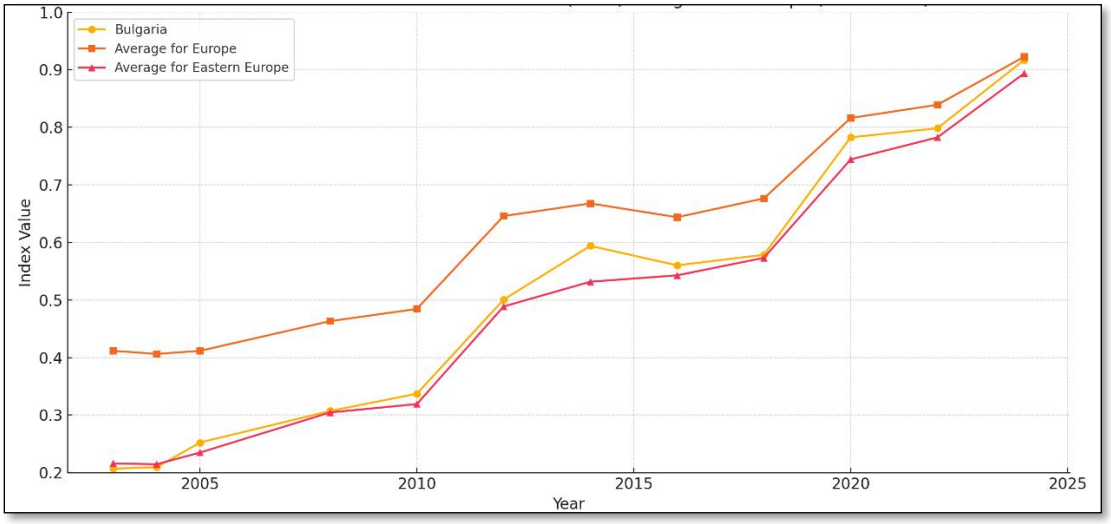
Figure 2: Online service index Bulgaria compared to the average values for Europe and Eastern Europe

The development of OSI in Bulgaria illustrates significant technological progress over the past decade. However, sustainable digital transformation requires not only the availability of digital platforms, but also adequate human capacity, institutional connectivity, and social readiness for change. Despite technological advances, the actual use of electronic services by citizens remains low. Therefore, strategic efforts should be directed towards increasing usability through education, cultural change and improving public service interfaces.

- *Telecommunications Infrastructure Index (TII)*

Over the past two decades, Bulgaria has made steady and significant progress in the development of telecommunications infrastructure – one of the three main components of the e-Government Development Index (EGDI) (see Fig.3). The index value increases from 0.2069 in 2003 to 0.9171 in 2024, which represents a more than fourfold increase over the analyzed period. This development is ahead of the average level for Eastern Europe (0.8938) and close to the average for the European Union (0.9227), positioning Bulgaria among the leading countries in the region in this component.

Particularly rapid growth has been observed after 2010, with the value of the indicator exceeding 0.78 in 2020 and reaching levels comparable to the leading ones in the EU by 2024. This positive dynamic coincides with the growth of public and European investments in connectivity, including the construction of broadband infrastructure, 4G/5G networks and the implementation of cloud services in the public sector. Programs such as the "Digital Connectivity" under the Recovery and Resilience Mechanism, as well as projects for the creation of state cloud infrastructure, have made a significant contribution to this progress.



Source: Author's figure based on information from United Nations, e-Government Knowledgebase (UNeGovKB)

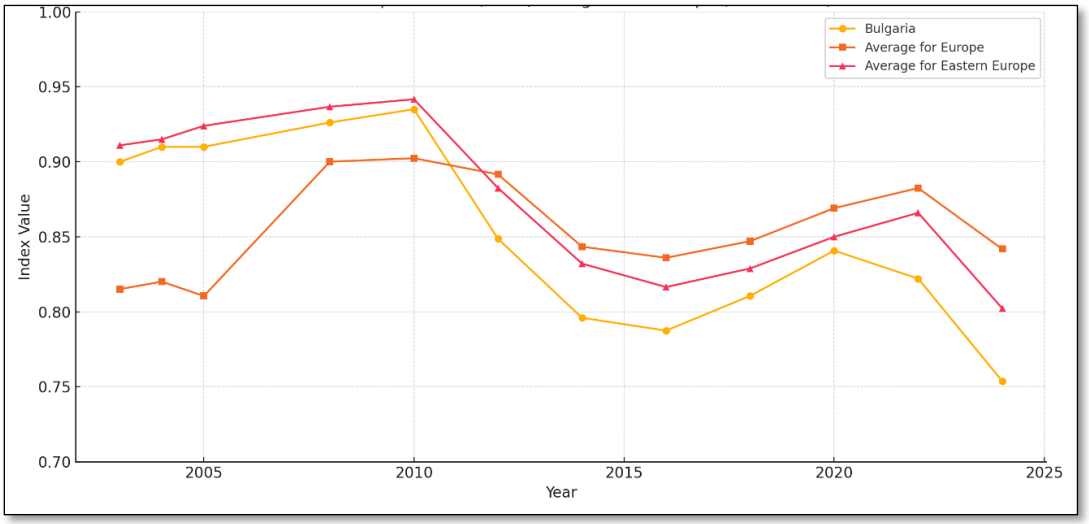
Figure 3: Telecommunication infrastructure index - Bulgaria compared to the average values for Europe and Eastern Europe

The comparison with the average values for Europe and Eastern Europe shows that until 2012 Bulgaria lagged behind the regional and continental values, but after 2014 it started to reduce the gap, and from 2022 it overtook them. This shows that the country has the necessary technical conditions for effective digitalization of the public sector. Despite the reported progress, the telecommunications infrastructure still does not lead to a proportional improvement in the overall digital competitiveness. The reasons are related to the slower development of other critical components such as human capital and institutional coordination. As a result, there is a discrepancy between the available technological infrastructure and the degree of its absorption by the administration and end users.

- *Human Capital Index (HCI)*

Despite progress in other components, the HCI shows a decline from the peak value of 0.9350 in 2010, reaching 0.7538 in 2024 (see Fig.4). Thus, the country lags behind both the EU average (0.8418) and the Eastern European average (0.8023). Although Bulgaria started the study period with values exceeding the EU and Eastern European average, this advantage has been lost since 2012, with the country lagging significantly behind both

comparison groups in recent years. According to Eurostat (2022) and IPA (2023), only 31% of the population has basic digital skills, and a significant part of the administration employees have difficulty working with electronic systems. This limits the effectiveness of the available platforms and creates a barrier to full digital transformation.



Source: Author's figure based on information from United Nations, e-Government Knowledgebase (UNeGovKB)

Figure 4: Human capital index - Bulgaria compared to the average values for Europe and Eastern Europe

The decline in HCI values coincides with observed structural difficulties in the development of digital skills, insufficient educational adaptation and weak institutional readiness for human resource transformation. This limits the impact of the other components of EGDI – especially in the area of online services – as the lack of capacity to use and create digital content leads to a low degree of real absorption of available electronic solutions. In the context of the study, this trend highlights the role of human capital as a key determinant of the effectiveness of e-government. Without strategic investments in digital skills, professional development in the public sector and the establishment of a culture of digital engagement, technological modernization remains insufficient to achieve sustainable progress in digital competitiveness.

The analysis of the EGDI and its subcomponents clearly shows that the digitalization of the public sector in Bulgaria is developing most successfully in technical terms – with progress in infrastructure and access to online services. However, insufficient investment in human capital and organizational difficulties hinder the effective use of available solutions. This confirms the conclusions of this study: e-government can contribute to digital competitiveness only if there is accompanying administrative capacity, user engagement and coordinated management efforts.

Bulgaria's Position in the Digital Economy and Society Index (DESI)

Bulgaria's digital competitiveness is measured by a number of international indices, but the one most directly related to e-government and the digitalization of public administration is the Digital Economy and Society Index (DESI). Although the index covers a wide range of components, the Digital Public Services component is of particular importance for this analysis, as well as the indicators related to the digital skills of public administration and citizens.

Data from the Digital Economy and Society Index (DESI) and the Digital Decade reports for the period 2015–2024, presented in Table 3, reveal significant dynamics in the development of electronic public services in

Bulgaria, especially in the part aimed at citizens. Despite the progress achieved in infrastructure and technical indicators, the actual usability of electronic services by citizens remains a serious problem, which calls into question the effectiveness of the digital transformation in the public sector.

Table 3: DESI index (focus on the Public services) for the period 2015-2024

	2015		2016		2017		2018		2019	
	BG	**EU**	**BG**	**EU**	**BG**	**EU**	**BG**	**EU**	**BG**	**EU**
e-Government users (%)	13%	33%	15%	32%	10%	34%	58%	58%	61%	64%
Digital public services for citizens (0-100)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Digital public services for businesses (0-100)	NA	NA	NA	NA	NA	NA	89	83	96	85
Pre-filled forms (0-100)	19	45	23	49	19	49	25	53	26	58
Transperency of service delivery, design and personal data (0-100)	61	75	64	81	76	59	76	73	66	64
User support (0-100)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mobile friendliness (0-100)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Access to e-heath records (0-100)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

	2020		2021		2022		2023		2024	
	BG	**EU**	**BG**	**EU**	**BG**	**EU**	**BG**	**EU**	**BG**	**EU**
e-Government users (%)	61%	67%	0,36	0,64	34%	65%	32%	74%	NA	NA
Digital public services for citizens (0-100)	55	75	57	75	59	75	60	77	68	80
Digital public services for businesses (0-100)	93	88	87	84	76	82	81	84	92	85
Pre-filled forms (0-100)	34	59	53	63	58	64	64	68	NA	NA
Transperency of service delivery, design and personal data (0-100)	57	66	78	78	51	NA	51	65	NA	NA
User support (0-100)	NA	NA	NA	NA	78	NA	82	84	NA	NA
Mobile friendliness (0-100)	NA	NA	NA	NA	94	NA	95	93	NA	NA
Access to e-heath records (0-100)	NA	NA	NA	NA	NA	NA	77	72	77	79

Source: DESI and Digital Decade web site (https://digital-decade-desi.digital-strategy.ec.europa.eu/)

The share of users of electronic public services in Bulgaria remains persistently below the EU average. After peaking in 2018–2020 (61%), this share falls to 32% in 2023, which represents an almost 50% drop in three years, although over the same period the values of the index for public e-services for citizens increase from 55 to 68 points. This is indicative of the so-called gap between availability and usability – technological platforms are available and functioning, but are not actively used by end users.

During the period 2020–2024, the quality indicators for digital public services in Bulgaria demonstrate uneven progress, reflecting efforts for technical modernization, but also existing structural challenges. The indicator for pre-filled forms increases from 19 to 64 points, but continues to lag behind the EU average. Mobile friendliness improves significantly, reaching 94–95 points, which indicates technological adaptation to modern user requirements. In the field of e-health, Bulgaria also makes progress - access to electronic health records reaches 77 points, a value close to the Union average. However, the indicator for transparency of services and personal data remains unstable, with a sharp decline after 2022 (from 78 to 51 points), which may be an indicator of erosion of trust among citizens in the management of personal information.

Against the background of these results, e-services for businesses stand out with higher and more sustainable efficiency. In the period 2018–2024, this component ranges between 87 and 96 points, with Bulgaria even exceeding the EU average in some years. This shows that digitalization has a higher impact in the context of clearly defined administrative processes and a structured user profile, such as that of small and medium-sized enterprises. The analysis of these data confirms that the digitalization of the public sector in Bulgaria is asymmetric – the presence of modern platforms and technological infrastructure does not automatically lead to a high level of usability by citizens. Among the main factors hindering this transition, the low level of digital skills stands out (only 31% of the population has basic skills), insufficient trust in institutions, as well as the orientation of e-services towards internal administrative

logic, rather than towards the real needs of users. In this context, a paradigm shift is needed: from a focus on technological provision to organizational and cultural transformation, including through training, development of administrative capacity, and introduction of principles for human-centered design of public services.

Although digital public services are one of Bulgaria's strongest achievements, their impact on digital competitiveness is limited by other components – especially human capital and a low culture of digital participation. Data from the IMD World Digital Competitiveness Ranking confirm this – adaptability to new technologies in the public sector is weak, and in the Future Readiness category Bulgaria remains in 48th place out of 64 economies. One of the most frequently mentioned challenges in the context of e-government is the lack of prepared human resources in the administration. Research by the Institute of Public Administration (IPA) from 2022 indicates that over 40% of employees do not feel confident in using new digital systems, despite their participation in training. This clearly highlights the need for a systematic policy for the development of digital competence in the public sector – not only as a technical skill, but also as a cultural transformation of the administrative mentality. Additionally, the lack of a comprehensive mechanism for citizen feedback and low participation in electronic consultations limits the possibility of public e-services being improved based on real needs. Thus, e-government risks remaining a showcase without content – seemingly modern, but poorly integrated into social and economic reality.

Despite progress in the development of digital public services, e-government in Bulgaria has not yet become a full-fledged driver of digital competitiveness. The reasons are not only in technology – they are in the people, processes and culture of public administration. The presence of e-services does not mean their usability, and a good portal does not mean a digital state. In order to realize the potential of e-government, deeper integration of technologies into governance processes, better coordination between institutions, systematic efforts to increase digital literacy in the public sector, and real inclusion of citizens in the process of co-creation of services are necessary.

Conclusion and Next Steps

The development of e-government in Bulgaria over the past decade has followed a clear trajectory of institutionalization and expansion of digital capabilities in the public sector. The analysis of strategic documents, the institutional framework and the results of international indices shows that the country has made significant progress – especially in building infrastructure, creating a regulatory framework and providing basic e-services. Strategies and programs – such as Digital Bulgaria 2025 and the Recovery and Resilience Plan – reveal a high level of political ambition, but implementation is often inconsistent, delayed or undermined by a lack of resources and expertise. These efforts have put e-government at the center of attempts to improve the country's digital competitiveness. But if we look more closely, we will see that technology alone is not enough. Progress is uneven and, in many places, – absent.

The data shows that Bulgaria is doing well on the technical aspects – the internet infrastructure is advanced, and many public services are now also offered online. Despite the institutions and platforms created, interdepartmental coordination remains limited, and many initiatives do not move from a conceptual level to effective integration into real administrative processes. However, the most significant problem is not whether the systems exist, but whether and how they are used. In other words – we have digital pathways, but not enough people ready to use them.

The study revealed a clear structural dilemma: e-government in Bulgaria is progressing in form but lagging in content. The data show the presence of digital public services (EGDI OSI: 0.9333; DESI: 72/100), but a lack of deep impact on the economy and innovation climate. The most persistent constraint is human capital – low levels of digital skills among the population and the administration create a gap between "delivery" and "use". The technology is there, but there is no one to carry it on their backs. Institutional fragmentation also remains a chronic problem. Independent systems, separate strategic documents and a lack of interdepartmental compatibility undermine the potential of public digitization. Funding exists, but is unsustainable, oriented towards hardware rather than people and processes. Without organizational culture and feedback, funds become digital monuments with limited public value.

Most importantly: there is no central mechanism for strategic digital governance that would unify, update, and guide the country's digital policies.

To overcome the structural constraints outlined in the analysis, Bulgaria needs to focus not only on the availability of technologies, but also on building the capacity for transformation – both in the administration and in society as a whole. First, investment in human capital must become a top priority. Without skilled personnel and digitally literate citizens, digital transformation risks remaining artificially imposed from the outside, without internal uptake. This includes not only training for civil servants, but also the systematic integration of digital skills into the education system – from the early stages of education. Small and medium-sized enterprises, as well as the non-governmental sector, need to be provided with access to retraining resources, through financial instruments such as vouchers and digital course programs. Similar approaches are already being successfully implemented in countries such as Estonia, where digital literacy is seen not as a technical asset but as a social necessity.

Second, a qualitative improvement in institutional coordination is needed. Currently, digital policies are distributed across different ministries and agencies, often without a common vision or compatible goals. The creation of an inter-sectoral council on digital transformation would provide a strategic hub to bring together the efforts of key institutions – the Ministry of e-Government, the Ministry of Economy, the Ministry of Education, non-governmental and business organizations. Such a body should not only coordinate, but also set standards, define success indicators and ensure monitoring of the implementation of digital policies. In the same spirit, the Ministry of e-Government should be established not only as a technology regulator, but also as a strategic architect of digital transformation. The development of a national interoperability framework – similar to the European ISA2 – would allow IT projects in public administration to be interconnected, compatible and built on common principles of openness and transparency.

The third important direction is monitoring and measuring impact. Although data on the number and type of e-services exist, there is still a lack of systematic measurement of their real effectiveness – such as usability, delivery time, user satisfaction or economic benefit. The introduction of standardized indicators, accompanied by an annual digital maturity report published by the Ministry of e-Government, would ensure transparency and accountability regarding progress. Furthermore, involving citizens in the feedback process – through surveys, public panels or online consultations – would provide a clearer picture of the real needs and problems in the use of e-services.

Last but not least, sustainable funding is a prerequisite for long-term success. Currently, many projects depend on European programs with a limited time scope. A structure is needed that ensures consistency beyond the horizon of a single programmatic funding. The creation of a national digital transformation fund – with the participation of state, European and private resources – could provide a solid basis for strategic development. Even more important is to link funding not only to the implementation of activities, but also to real results – through mechanisms that reward efficiency, innovation and the real use of integrated digital solutions.

The path that Bulgaria has taken in the last decade in the field of e-government is not insignificant. Key systems have been built, funding has been secured, strategic documents have been formulated. Yet, the structural gap between the availability of technologies and the ability to use them effectively remains significant. This gap is not only the result of technical difficulties or a lack of resources – it reflects deep deficits in digital culture, strategic policy integration and institutional coordination. The future transformation requires a change in the very thinking about digitalization – from a project activity to a process vision. This includes building a single strategic framework that unites education, the economy and public administration under a common digital horizon. Such a framework should include a clearly defined architecture of the public digital infrastructure – with common interfaces, shared data and integrated services. A mechanism for periodic strategic renewal is needed to ensure adaptation to new technologies and social realities, with the participation of independent experts and the academic community.

The long-term challenge for Bulgaria is not simply to implement more technology, but to create an environment in which digitalization generates trust, efficiency and innovation. This includes orienting services towards the real user, not just towards administrative processes; opening the public sector to cooperation with the

private and academic sectors; and building a culture of transparency, in which data is not simply collected, but used to make better decisions. E-government in this context is not a goal, but a tool – a tool through which a more connected, transparent and dynamic society can be realized. Therefore, the task is not only technical, but also deeply managerial and cultural. If Bulgaria manages to move from digitalization "on paper" to real digital statehood, it will not just catch up – it will be able to form its own digital face within Europe and beyond.

Acknowledgement

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References:

1) Bannister, F., & Connolly, R. (2012). The trouble with transparency: A critical review of openness in e-government. Policy & Internet, 3(1), 1–30. https://doi.org/10.2202/1944-2866.1076.
2) Bannister, F., & Walsh, N. (2002). The virtual public servant: Ireland's public services broker. Information Polity: The International Journal of Government & Democracy in the Information Age, 7(2/3), 115-127. https://doi.org/10.3233/IP-2002-0011.
3) Bovens, M. (2007). Analysing and assessing public accountability: A conceptual framework. European Law Journal, 13(4), 447–468. https://doi.org/10.1111/j.1468-0386.2007.00378.x.
4) Commission for Personal Data Protection. (2018). Annual Activity Report of the Commission for Personal Data Protection. Sofia: CPDP. [Online]. Available at: https://cpdp.bg/en/wp-content/uploads/sites/4/2023/08/Annual_report_2018_CPDP_En.pdf. [Accessed: Apr. 9, 2025].
5) Council of Europe. (2004). Good Governance in the Information Society. [Online]. Available at: https://www.coe.int/en/web/dpaer/good-governance-in-the-information-society. [Accessed: Apr. 8, 2025].
6) Council of Ministers of the Republic of Bulgaria. (2014). E-Governance Development Strategy – 2014-2020 in the Republic of Bulgaria. Adopted by Decision No. 163 of March 21, 2014. [Online]. Available at: https://www.mtc.government.bg/sites/default/files/uploads/pdf/e_governance_strategy.pdf. [Accessed: Apr. 9, 2025].
7) Council of Ministers of the Republic of Bulgaria. (2020). National Programme "Digital Bulgaria 2025". Sofia: Ministry of Transport, Information Technology and Communications. [Online]. Available at: https://www.mtc.government.bg/en/category/85/draft-national-program-digital-bulgaria-2025. [Accessed: Apr. 9, 2025].
8) Council of Ministers of the Republic of Bulgaria. (2021). National Recovery and Resilience Plan of the Republic of Bulgaria. Components 4 and 5. [Online]. Available at: https://nextgeneration.bg/upload/71/BG+RRP+EN.pdf. [Accessed: Apr. 9, 2025].
9) Dunleavy, P., Margetts, H., Bastow, S., & Tinkler, J. (2006). Digital Era Governance: IT Corporations, the State, and e-Government. Oxford University Press. [Online]. Available at: http://repo.darmajaya.ac.id/3926/1/Digital%20era%20governance%20IT%20corporations%2C%20the%20state%2C%20and%20e-government%20by%20Patrick%20Dunleavy%2C%20Helen%20Margetts%2C%20Simon%20Bastow%2C%20Jane%20Tinkler%20%28z-lib.org%29.pdf. [Accessed: Apr. 9, 2025].
10) European Commission. (2005). i2010 eGovernment Action Plan. [Online]. Available at: https://eur-lex.europa.eu/EN/legal-content/summary/i2010-egovernment-action-plan.html. [Accessed: Apr. 8, 2025].
11) European Commission. (2021). 2030 Digital Compass: the European way for the Digital Decade. [Online]. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52021DC0118. [Accessed: Apr. 8, 2025].

12) European Commission. (2024). Digital Economy and Society Index (DESI) 2015-2024 Reports. Brussels: European Commission. [Online]. Available at: https://digital-decade-desi.digital-strategy.ec.europa.eu/ [Accessed: Apr. 15, 2025].
13) Fang, Z. (2002). E-government in digital era: concept, practice, and development. International Journal of The Computer, The Internet and Management, 10(2), 1-22. [Online]. Available at: https://sahris.sahra.org.za/sites/default/files/additionaldocs/10.1.1.133.9080.pdf. [Accessed: Apr. 10, 2025].
14) Fountain, J. E. (2001). Building the virtual state: Information technology and institutional change. Brookings Institution Press. E-Book ISBN: 9780815798903.
15) Gupta, M. P., Dasgupta, S., & Gupta, A. (2008). Adoption of ICT in a government organization in a developing country: An empirical study. Journal of Strategic Information Systems, 17(2), 140–154. [Online]. Available at: https://socialserviceworkforce.org/wp-content/uploads/2024/03/Adoption-of-ICT.pdf. [Accessed: Apr. 10, 2025].
16) Halachmi, A., & Greiling, D. (2013). Accountability and organizational learning in the public sector. Public Performance & Management Review, 36(3), 380-406. http://dx.doi.org/10.2753/pmr1530-9576360301.
17) Heeks, R. (2006). Implementing and Managing eGovernment: An International Text. SAGE Publications. [Online]. Available at: https://api.pageplace.de/preview/DT0400.9781847877208_A23446125/preview-9781847877208_A23446125.pdf. [Accessed: Apr. 9, 2025].
18) Howard, M. (2001). E-Government across the globe: How will "e" change government? Government Finance Review, 17(4), 6-9. [Online]. Available at: https://d1wqtxts1xzle7.cloudfront.net/30927075/eGovGFRAug01-libre.pdf?1392087851=&response-content-disposition=inline%3B+filename%3De_Government_Across_the_Globe_How_Will_e.pdf&Expires=1744812086&Signature=N1TyGyFTTDfWDDFoDr4tT5wIRnW0WXqihfPW6o~K2WcyOhQi-bjNRXA91P66OVHKY94u9oSh20CCQlktprCPaFG6iYpTFhD2D2baIV6CLUjCvUHV-gG4MbGmdq4Px6fwDsYwXTDdDCRHccWRw~Fbu34qTiLcYWPmcC2yz4bjH9al~756YodvQxsNQA1mbRTrun1KVFhMSFoVXo3mFdjONjogcUaN5Is1jhAOP1BGMuxyxZwc-wx2GNtNYr8MNDB~ZsjEPMbHyW5xjAf063BwS9R2RaIb7HQopt6fRNlqk~jq~FAH8wUEqDpjCVncngrTjIAj6gQnyRTuOb3C~fY11g__&Key-Pair-Id=APKAJLOHF5GGSLRBV4ZA. [Accessed: Apr. 10, 2025].
19) IMD. (2023). World Digital Competitiveness Ranking 2023. Lausanne: International Institute for Management Development (IMD). [Online]. Available at: https://www.imd.org/centers/wcc/world-competitiveness-center/rankings/world-digital-competitiveness-ranking/. [Accessed: Apr. 10, 2025].
20) Institute of Public Administration. (2022). Annual Report on the State of Public Administration in the Republic of Bulgaria. Sofia: IPA. [Online]. Available at: https://www.ipa.government.bg/en. [Accessed: Apr. 10, 2025].
21) Janssen, M., & van der Voort, H. (2016). Adaptive governance: Towards a stable, accountable and responsive government. Government Information Quarterly, 33(1), 1–5. [Online]. Available at: https://pure.tudelft.nl/ws/portalfiles/portal/10678167/Post_published_version_Adaptive_governance.pdf. [Accessed: Apr. 11, 2025].
22) Lindgren, I., & Jansson, G. (2013). Electronic services in the public sector: A conceptual framework. Government Information Quarterly, 30(2), 163–172. [Online]. Available at: https://www.diva-portal.org/smash/get/diva2:608721/FULLTEXT01.pdf. [Accessed: Apr. 11, 2025].
23) Meijer, A. (2007). Publishing public performance results on the Internet: Do stakeholders use the Internet to hold Dutch public service organizations to account? Government Information Quarterly, 24(1), 165–185.
24) National Statistical Institute. (2023). Information Resources and Administrative Registers. Sofia: NSI. Retrieved at: https://www.nsi.bg.
25) OECD. (2003). The E-Government Imperative. OECD Publishing. https://doi.org/10.1787/9789264101197-en. [Online]. Available at: https://www.oecd.org/en/publications/the-e-government-imperative_9789264101197-en.html. [Accessed: Apr. 8, 2025].

26) OECD. (2019). Going Digital: Shaping Policies, Improving Lives. OECD Publishing. Paris. https://doi.org/10.1787/9789264312012-en. [Online]. Available at: https://www.oecd.org/content/dam/oecd/en/publications/reports/2019/03/going-digital-shaping-policies-improving-lives_g1g9f091/9789264312012-en.pdf. [Accessed: Apr. 11, 2025].
27) Pina, V., Torres, L., & Royo, S. (2007). Are ICTs promoting government accountability? A comparative analysis of e-governance developments in 19 OECD countries. Critical Perspectives on Accounting, 18(5), 583–602. https://doi.org/10.1016/j.cpa.2006.01.012.
28) Portulans Institute. (2022). Network Readiness Index 2022. Washington D.C.: Portulans Institute. [Online]. Available at: https://download.networkreadinessindex.org/reports/nri_2022.pdf. [Accessed: Apr. 12, 2025].
29) Sharma, R. S., Kar, A. K., & Gupta, M. P. (2025). Building Accountability in e-government Services: Inputs for Policy. Australian Journal of Information Systems, vol. 29. [Online]. Available at: https://ajis.aaisnet.org/index.php/ajis/article/download/5175/1505/19079. [Accessed: Apr. 9, 2025].
30) UN DESA. (2022). United Nations E-Government Survey 2022: The Future of Digital Government. New York: United Nations. [Online]. Available at: https://desapublications.un.org/sites/default/files/publications/2022-09/Web%20version%20E-Government%202022.pdf. [Accessed: Apr. 11, 2025].
31) United Nations. (2002). Benchmarking e-government: a global perspective: assessing the progress of the UN member states. United Nations Division for Public Economics and Public Administration (UNDPEPA) & American Society for Public Administration (ASPA). [Online]. Available at: https://digitallibrary.un.org/record/3868821?v=pdf. [Accessed: Apr. 8, 2025].
32) United Nations. (2024). e-Government Knowledgebase (UNeGovKB), E-Governance Digital Index. [Online]. Retrieved from: https://publicadministration.un.org/egovkb/en-us/. [Accessed: Apr. 14, 2025].
33) World Bank. (2009). E-Government Overview. In: Public-Private Partnership in E-Government: Knowledge Map. [Online]. Available at: https://documents1.worldbank.org/curated/en/233921468336842948/pdf/882330WP0Box380map0InfoDev0June2009.pdf. [Accessed: Apr. 8, 2025].