“The impact of socio-economic and political factors on the development of e-government in developed and developing countries”

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THE IMPACT OF SOCIO-ECONOMIC AND POLITICAL FACTORS ON THE DEVELOPMENT OF E-GOVERNMENT IN DEVELOPED AND DEVELOPING COUNTRIES

Abstract

The current direction of state development is its focus on citizens (G2C). This transition is accompanied by digitalization, which enables the provision of services to citizens to reach a whole new level through e-government. The aim of this study is to identify the factors in the socio-economic and political environments that influence the formation of e-government across countries. Based on panel data (UN, World Bank, World Intellectual Property Organization, International Monetary Fund) for 48 countries for 2014–2024, regression and dynamic analyses were performed. It has been established that the main factors influencing the e-government index are the human development index (1.29–1.78), the ease of doing business index (–0.00069), the global innovation index (–0.0038), and gross domestic product per capita (4.47e-06). For developed countries, human development (1.9) and innovation (0.0081) are significant, while for developing countries, economic prosperity (1.62) and the business environment (1.61e-05) are significant. Dynamic models confirm the lag effect of the e-government rating (0.43), which indicates the stability of institutional factors. It has been found that the development of e-government is determined by the impact of the innovation economy, human capital, and the openness of state institutions, which form the cumulative effect of the digital transformation of governance.

Keywords government-to-citizen, digitalization, e-government, public administration, factors

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INTRODUCTION

The transition to the government-to-citizen (G2C) model is becoming one of the key trends in modern public administration. Under this model, government institutions strive not only to provide services but also to build a sustainable system of interaction with citizens based on trust, transparency, and technological openness. This process is accompanied by a digital transformation that affects not only the technical mechanisms of governance, but also the very concept of government activity.

In the context of accelerating technological development, it is the quality and adaptability of digital services that become an indicator of the state's effectiveness. E-government is not just automation tools, but signs of a transition to a new model of governance, where human capital is the key resource and digitalization is the key tool. However, deep inequality persists at the global level: some countries are demonstrating steady progress in the development of e-government, while others face institutional constraints that slow down digitalization.

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The reasons for the differences are not always obvious: they cannot be explained solely by the level of economic development or the degree of technology adoption. Political and socio-economic factors also affect the situation. Thus, in the scientific sphere, the problem of uncertainty arises regarding the factors that determine the level of development of e-government in the context of digital transformation and the increasing complexity of socio-economic relations.

1. LITERATURE REVIEW

Contemporary academic discourse on the transformation of public administration focuses on the transition from traditional administrative models to government-to-citizen (G2C). The increasing digitization of the public sector and the introduction of e-government technologies have necessitated a rethinking of the theoretical and methodological foundations of public authority. The scientific community has developed a variety of approaches to explaining the phenomenon of G2C, differing in both their subject focus and analytical tools. These approaches are united by the desire to identify patterns in the relationship between digital technologies, the innovation economy, and the quality of public administration.

An analysis of the scientific literature has enabled the grouping of existing studies on e-government. Aleisa (2024), Adnan et al. (2022), and Grigalashvili (2022) researched e-government. This area of the digital state was one of the first to be developed and is considered the fundamental framework of this form of government. In these works, e-government technologies are presented as an innovative approach to the management of state institutions, including functions to improve the quality of public services and ensure the transparency of management processes in order to increase citizens' trust in the political system. Sun et al. (2024), Prihatmanto et al. (2024), and Mazzetto (2024) analyzed the structure and models of digital government. G2C of public administration is characterized by accessibility and versatility, so the digital mechanisms used can work toward integration into regional and municipal systems. E-government is part of digital government, which has a broader meaning.

Some scholars view digital government as the result of the technological transformation of the previously existing e-government (Gaie & Mehta, 2024; Balaji, 2025; Alakash et al., 2024). The main distinguishing feature is the use of technologies that enable the processing of big data, which is used to make important management decisions. The development of digital government has been facilitated, among other things, by changes in the interactive design used in platforms and an increase in the proactivity of the management environment.

However, the research was conducted within a technocratic framework, outside the socio-political context of the topic. It should be noted that the process of developing e-government is nonlinear in nature, and in parallel with the introduction of new technologies, projects aimed at modernizing resource distribution systems are being implemented, resulting in a conflict in the area of control. The programs used today were developed based on the general principles of sustainable development and the formation of the framework of an innovative economy, but in modern realities, it is advisable to use models that include nonlinear management approaches.

The application of e-government technologies provides an opportunity to consider it a new management model, whose mechanisms will reduce the imbalance between the informational complexity of the state environment and the planning system. The implementation of this model contributes to the support of the state institution at a high organizational level by strengthening interaction with all management objects. Since the socio-political system is subject to the nonlinear impact of external factors, it can be assumed that e-government itself is also the result of the interaction of a whole range of different internal and external factors. These must be identified and studied in order to understand:

- key drivers of e-government technology development;
- key performance indicators that allow conclusions to be drawn about the effectiveness

of measures implemented in the field of its technologization;

- forecasting tools for identifying promising areas of development for social technologies in e-government.

At this stage, we can highlight the problematization of factors in the development of e-government, as a result:

- development of innovative technologies in the economy (Inshakova et al., 2024);
- beneficial effect of using the conventional state management tool (Shandryk et al., 2024);
- expanding the openness and accessibility of institutional infrastructure for representatives of the business community (Sunder & Modukuri, 2024);
- increasing human capital, improving quality of life, and increasing citizens' interest in joint decision-making (Johnston & Fenwick, 2025);
- strengthening democracy and a strong legislative framework (Asimakopoulos et al., 2025).

If we consider e-government as the result of the development of an innovative economy, we should highlight the main criteria for its formation. These criteria are not based on specific technologies; rather, the key factor for development is the creation of a favorable environment for the development and entry into the technology market of various types of innovations. An innovative economy is characterized by high patent activity, increased R&D, and interaction between business, science, and the state to stimulate the continuous generation and production of advanced technologies (Dadashzade, 2025). This approach allows for the creation of a strong competitive field and modern innovative ecosystems that include companies, technology parks, research institutes, and universities. The effectiveness of this interaction is evidenced by indicators of high-tech density, which have a significant impact on the added value of all goods and services produced within the state. The innovative economy and its development are closely linked to the expansion of technological infrastructure in the G2C area, which is the technological foundation of e-government.

An innovative economy cannot develop properly unless the mechanisms for generating and implementing ideas become a key aspect of its formation. These mechanisms manifest themselves in the creation of appropriate institutions, the development of a clear legislative framework, and the consolidation of the results of innovative projects. As a rule, the vast majority of e-government technologies belong to the field of open data management, the creation of digital registries, and multifunctional platforms (Sestino et al., 2025). Advanced solutions are a successful example of using elements of the innovative economy to increase public goods. Accordingly, the innovative economy and digital public administration share common features: transparency of management decision-making processes, legislative consolidation of norms, and control over their observance in the field of intellectual property. This allows us to conclude that it is the innovative economy that can be a factor in the development of e-government.

Conventional public administration can also act as a driver for the development of e-government. In this case, a management model is used whose mechanisms function with the aim of expanding the accessibility of existing infrastructure and increasing public services in various areas (education, transport, food, healthcare, etc.). Within the framework of the conventional public administration model, various infrastructure facilities are being actively built, a base is being formed to meet the current needs of the labor market, and financial analysis systems are being introduced (Sarfraz & Shah, 2024). As a result, the infrastructural integrity of the territory is formed, which makes some types of capital more mobile. In some scientific sources (Madan & Ashok, 2024; Krejnus et al., 2023; Chung et al., 2023), conventional governance is interpreted as a tool for assessing available resources and the degree of government presence in the daily life of the population through the use of special metrics. This issue remains controversial (Musso et al., 2024; Alon-Barkat & Busuioc, 2024; Kusumasari et al., 2023), but the use of the conventional public administration model and the results of its application can serve as criteria for assessing the effectiveness of government policies.

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In e-government, a measurable space is created, and a differentiated assessment of management objects is carried out (Sun et al., 2023). These criteria distinguish it from conventional management, the main feature of which is an emphasis on the infrastructural connectivity of the territory, while digital management technologies are only part of the infrastructure, ensuring its integration. This leads to the conclusion that the effective use of conventional management reduces the costs of implementing and maintaining technological infrastructure.

In addition, conventional management enables a complete analysis of the connections between objects, even after the implementation of digital management. The expected result of the development of e-government is the integration of digital technologies for effective public administration through the application of new advanced solutions in the field of digital platforms, corridors, and twins (Liu et al., 2023). All this allows us to include effective conventional public administration in the list of factors contributing to the development of e-government.

Another factor in the formation of e-government is the openness of the institutional infrastructure to the commercial sector and the minimization of bureaucracy. Entrepreneurs have to interact with the state more often and use its services at all stages of commercial activity, from business registration to company liquidation. In this context, the openness of the institutional infrastructure requires a centralized structure of power, since the state must act as a regulator of legal relations in conflicts and reduce administrative costs to increase efficiency in matters of interaction between business and government. As a result, a contract system is formed in which the state optimizes taxes and protects property rights, while the commercial sector pays tax obligations and co-finances promising projects at the national and regional levels, increasing economic value (Anggara et al., 2024; Queralt, 2025; Vatamanu & Tofan, 2025). Reducing administrative costs is becoming the basis for business decisions, including the introduction of new technologies into the service delivery system. The latter involves the use of new platform solutions and integrated communications, which can bring the processes of interaction between the state and legal entities to a higher level of quality. In this context, the openness of the institutional infrastructure contributes to the introduction of advanced technologies and, therefore, acts as a stimulating factor for the development of e-government.

Human capital development is also a driver of e-government development. Innovation contributes to the creation of new production methods and configurations of the division of labor, as well as the development of relevant knowledge and skills. This requires continuous education, as it provides the opportunity to upgrade qualifications in line with the innovations being introduced. The development of the latter leads to an improvement in the quality of life of the population, increased access to educational services, longer life expectancy, and minimization of social inequality (Erlyn et al., 2022; Rojas et al., 2021; Weerasinghe et al., 2024). This entails higher requirements for the quality and quantity of services provided by the state. The new priorities focus on increasing the transparency of government agencies. In today's reality, human capital development is not possible without the use of modern information systems that enable continuous interaction between individuals, legal entities, and government agencies. Accordingly, the openness of institutional infrastructure, which contributes to improving the quality of life and citizens, can be a factor in the development of e-government.

Its formation can also be facilitated by successful democratic decisions taken by the state to stabilize the political situation (Yesilkagit et al., 2024), increased transparency in the work of state authorities, and the rule of law (Fischli & Muldoon, 2024).

To increase public involvement in management decision-making processes and ensure transparency in government actions, a variety of tools are used, including technologies for tracking the implementation of measures and the results of reviewing draft legislation, as well as innovations in the control and distribution of financial resources from the state budget. E-government is seen as an opportunity to improve the effectiveness of the tools used, expand their functions, and ensure accessibility for end users of public services.

E-government is seen as an opportunity to improve the effectiveness of the tools used, expand their functions, ensure accessibility for end users of public services, and form the basis of services in G2C. Their development is linked to the following aspects:

- a targeted approach and adaptation of public services to the needs of individuals and legal entities (Latupeirissa et al., 2024);
- creation of a unified platform with further integration of the public services delivery system into it (Aristovnik et al., 2024).

These systems are characterized by a certain degree of openness of the public services system, taking into account the heterogeneity of external factors, which determines their central importance to G2C. It can be assumed that e-government is an effective tool for developing more complex models of reality in a virtual environment.

Thus, summarizing the literature review, e-government is an effective tool formed under conditions of social heterogeneity and influenced by a number of factors. These include an innovative economy, human capital development, improving citizens' living standards, effective public administration, implementing the principles of the rule of law and democratic governance, and ensuring the accessibility of institutional infrastructure. All these factors contain certain elements of the digitalization of the institution of public administration, with an emphasis on online services aggregated within the framework of e-government. In this regard, the aim of the study is to determine the influence of socio-economic and political factors on the formation of e-government. To identify universal factors, the study is conducted using data from different countries.

The aim of this study is to identify the factors in the socio-economic and political environments that influence the formation of e-government across countries.

2. METHODOLOGY

Data for variables are freely available in open databases maintained by the United Nations, the World Bank, the World Intellectual Property Organization, and the International Monetary Fund. The list of variables used in this study includes indicators reflecting the factors of e-government development identified in the literature review. These include:

- GII (Global Innovation Index);
- GDP (GDP in billion USD);
- EGDI (E-Government Development Index);
- GDPPC (GDP per capita, thousand USD);
- HDI (Human Development Index);
- VAI (Voting Rights and Accountability Index);
- EDBI (Ease of Doing Business Index);
- RQ (Regulatory Quality);
- WGI (World Governance Index).

The EGDI indicator allows for the most comprehensive assessment of the stage of development of e-government, unlike the other variables mentioned above, which are used to operationalize external and internal factors. Independent variables, presented as complex industry indices, combine multiple factors, enabling a thorough analysis of panel data.

To achieve this goal, we defined a panel sample of data covering 48 countries. The indicators, in accordance with the selected variables, cover the period from 2014 to 2024. This time period was chosen because the last decade saw the peak of the transition to digital technologies in public administration systems around the world. This is confirmed by the e-government rankings. The UN database only contains e-government ranking data for 2014, 2016, 2018, 2020, 2022, and 2024, which led to the exclusion of other periods.

The sample includes countries that are leaders in scientific and technological development in their region. These are primarily developed countries. They were the first to introduce and successfully implement e-government development programs in their territories and to approve institutional and methodological approaches to assessing the quality of public administration technologies.

For the sake of completeness, a separate sample was compiled, which included developing countries. Countries were selected that are considered role models in the development of the socio-economic sphere in specific regions and have above-average indicators of e-government in their region.

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Table 1. Implementation of the G2C concept in the context of digitalization of public services in the Republic of Kazakhstan

Concept of G2C	Digitalization
Improving the accessibility and quality of public services, public monitoring of the quality of public services	Big data management, eGov in a complex ecosystem (Aitu, eOtinish, eGov mobile, and banking apps) with feedback and citizen satisfaction ratings (70% by 2024), 93% of government services provided electronically
Building a public service based on the principles of service and customer focus	Radical transformation and digitization of administrative procedures
Building HR resources: proactive civil servants with a non-bureaucratic approach, simplifying HR processes in the civil service	External portal of the integrated information system "E-qyzmet", implementation of an automated personnel selection system

For example, the Republic of Kazakhstan is a leader in socio-economic development in Central Asia and is actively implementing the G2C concept in public administration (Table 1).

In addition, the selection of countries is based on the geographical coverage of the general population, as well as the availability of detailed statistics on the development of the socio-economic sphere in these countries over the last decade. The full list of countries in the sample is presented in Table 2.

Mathematical statistics and modeling models were used to test the hypothesized assumption about the factors of e-government development. A preliminary analysis to determine the degree of sample formation and the optimality of country grouping for further modeling was performed using Pearson's correlation coefficient (Tables 3 and 4).

The data presented in Table 3 indicate an insignificant variation in the values of the dependent variables, which confirms the informative nature of the sample mean. The data presented in Table 4 indicate that there is no high correlation between the specified variables, and therefore no multicollinearity.

Table 2. Sample of countries for the study

Developed		Developing	
Australia	Luxembourg	Algeria	Kazakhstan
Austria	The Netherlands	Argentina	Libya
Belgium	New Zealand	Armenia	Mexico
Canada	Norway	Bahrain	Moldova
Denmark	Poland	Bangladesh	Morocco
Finland	Singapore	Brazil	Peru
France	Slovakia	Bulgaria	The Philippines
Germany	South Korea	China	Saudi Arabia
Hong Kong	Sweden	Egypt	Tunisia
Ireland	Switzerland	Georgia	Uruguay
Japan	The United Kingdom	India	Uzbekistan
Lithuania	The USA	Iraq	Vietnam

Table 3. Descriptive statistics for selected variables

Variable	Number of observations	Mean value	Standard deviation	maximum	minimum
EGDI	278	0.751	0.12696	0.976	0.357
EPI	278	0.686	0.25515	1	0.0429
GDP	278	33871.9	24200.1	120449.8	1384.17
GDP_{PC}	278	1499.7	3116.53	20807.3	13.68
GII	278	49.025	10.0126	74.1	26.5
HDI	278	0.857	0.08148	0.96	0.55
EDBI	278	39.62	32.6206	142	1
WGI	278	1.049	0.70953	2.335	–0.46885
RQ	278	1.015	0.73077	2.23346	–1.0743
VAI	278	0.815	0.79464	1.72816	–1.882

Table 4. Correlation between selected variables

Variable	EGDI	EPI	GDP	GDP_{PC}	GII	HDI	EDBI	WGI	RQ	VAI
EGDI	1	–	–	–	–	–	–	–	–	–
EPI	0.712	1	–	–	–	–	–	–	–	–
GDP	0.584	0.2	1	–	–	–	–	–	–	–
GDP_{PC}	0.09	0.205	0.043	1	–	–	–	–	–	–
GII	0.582	0.19	0.752	0.17	1	–	–	–	–	–
HDI	0.84	0.406	0.715	–0.005	0.71	1	–	–	–	–
EDBI	–0.65	–0.344	–0.492	–0.049	–0.701	–0.664	1	–	–	–
WGI	0.681	0.289	0.792	0.008	0.876	0.78	–0.76	1	–	–
RQ	0.669	0.290	0.734	–0.072	0.812	0.77	–0.77	0.9	1	–
VAI	0.464	0.574	–0.183	–0.183	0.55	–0.59	–0.44	0.695	0.726	1

When summarizing the results, the heterogeneity of the sample objects was taken as a basis, as well as indicators such as geographical coverage, time period, and specified variables.

Thus, statistical analysis showed that the calculated coefficients are unbiased and effective. To analyze the factors of e-government development, it was decided to use statistical and dynamic panel data models that allow for determining the relationship between the variables used in the approved sample.

This approach will allow us to determine the presence of dependence for variables of the same level. Three basic panel models are used for the calculation: equation (1) – cross-sectional linear regression; equation (2) – regression with fixed effects; equation (3) – regression with random effects. In addition, dynamic panel data models are estimated using the GMM approach (Blundell & Bond, 2000), both in equations with levels – equation (4) – and for differences (Δ) – equation (5).

$$EGDI = a + bX_{it} + \varepsilon_{it}, \quad (1)$$

$$EGDI = a + bX_{it} + \mu_i + \varepsilon_{it} \quad (2)$$

$$EGDI = a + bX_{it} + u_i + \varepsilon_{it}, \quad (3)$$

$$EGDI = a + bEGDI_{it-1} + \delta X_{it} + \mu_i + \varepsilon_{it}, \quad (4)$$

$$EGDI = a + b(\Delta EGDI) + (\Delta X_{it}) + (\Delta \varepsilon_{it}), \quad (5)$$

where $EGDI$ – e-government rating; a – constant; b – coefficient for explanatory variables; X_{it} – vector of explanatory variables; μ_i – fixed effects (cross-country); u_i – between-entity error; ε_{it} – random statistical error.

The equations are arranged in this sequence due to the need to estimate the coefficients of regression models and interpret the results necessary for stable theoretical generalizations and forecasting the vectors of e-government formation. This allows us to expand the number of instrumental variables and obtain reliable estimates of the coefficients of the equations.

Three tests were performed to determine the most appropriate model (Breusch-Pagan test, Darbin-Wu-Hausman test, Wald test). The calculations were performed using the Statistica 13 automated program.

3. RESULTS

Within the framework of applying statistical panel data models, a regression analysis was conducted to identify the significance of the influence of explanatory variables on the development of e-government. Table 5 presents the results of the evaluation of these models within the general sample.

Table 5. Results of panel regression analysis (based on the total sample)

Variables/ regression	through–type linear	with fixed effects	with random effects
GII	–0.0038***	–0.0089***	–0.0069***
HDI	1.29***	1.78***	1.61***
GDP	2.43e-08	–1.97e-07	4.14e-07
GDP_{PC}	4.47e-06***	1.41e-05***	6.61e-06***
VAI	0.0083	–0.029	–0.00115
EDBI	–0.00069***	–0.00095***	–0.00091***
RQ	–0.0014	–0.018	0.002*
WGI	0.059***	–0.016	0.032
Constant	–0.19**	–0.25	–0.31***
R-squared	0,76	0.68	–
Observations	278	278	278

Note: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

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Table 6. Panel regression test results

Criteria/tests	Housman's test	Wald test	Breusch-Pagan test
Panel regression models	with random effects / with fixed effects	throughput linear / with fixed effects	throughput linear / with random effects
Null hypothesis	The difference in the coefficients of regression models with fixed effects and regression models with random effects is not systematic	Individual effects according to the fixed effects regression model = 0	Dispersion of random disturbance (error) of the model = 0
Test statistics			
by general sampling	–21.97***	7.7***	86.07***
by developed countries	16.48***	6.05***	66.45***
by developing countries	15.42***	6.76***	15.67***

Note: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

The comparison of the two models using panel regressions was carried out using tests. In particular, the Breusch-Pagan test (Breusch & Pagan, 1979) indicates the presence of regression with random effects, so it is reasonable to say that this test is more applicable than continuous linear regression. The Hausman test (Hausman, 1978) allows us to identify data for further analysis using fixed effects regression (Table 6).

The data presented (Table 6) revealed the influence of a number of fundamental factors on the e-government rating: the global innovation index, the ease of doing business index, the human development index, and GDP per capita. This leads to the conclusion that in developed and developing countries, the e-government rating depends on different factors.

Table 7. Panel regression analysis for developed countries

Variables/panel regression	through–type linear	with fixed effects	with random effects
GII	–0.0047***	–0.0081***	–0.065***
HDI	1.52***	1.9***	1.9***
GDP	–1.32e-07	1.46e-07	7.22e-08
GDP_{PC}	2.41e-06	3.36e-07	2.37e-06
VAI	–0.0012	0.022	–0.0029
EDBI	–0.0014***	–0.0014**	–0.0016***
RQ	0.35*	–0.0043	0.03
WGI	0.53**	0.0014	0.035
Constant	–0.36**	–0.45	–0.58***
R–squared	0.588	0.583	–
Observations	192	192	192

Note: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Table 8. Panel regression analysis for developing countries

Variables/panel regression	through-type linear	with fixed effects	with random effects
GII	–0.007***	–0.012***	–0.01***
HDI	1.4***	1.39***	1.62***
GDP	–1.34e-06	–3.68e-06	–1.16e-06
GDP_{PC}	1.61e-05***	3.67e-05***	2.29e-05***
VAI	0.021	–0.1*	0.028
EDBI	–0.001***	–0.009**	–0.0012***
RQ	0.0087	0.026	0.012
WGI	–0.05	–0.057	–0.072*
Constant	–0.1	0.077	–0.16
R-squared	0.78	0.83	–
Observations	86	86	86

Note: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Table 6 identifies the influence of a number of fundamental factors on the e-government rating. The results of modeling based on country grouping are presented in Tables 7 and 8.

The calculations (Tables 7 and 8) indicate that in countries with developed economies, there is a clear correlation between e-government ratings and human development indices, ease of doing business indices, and global innovation ratings. The only difference from the data for the overall sample is that the list of determining factors does not include the impact of GDP per capita. In developing economies, on the contrary, GDP per capita has a significant impact on e-government ratings, along with the ease of doing business index, the human development index, and the global innovation index. This result is fully consistent with the results for the overall sample.

In this context, it is advisable to add dynamic panel data models to the analysis, which require preliminary regression analysis taking into account the influence of variables calculated based on the previous year's results. This allows for assessment within time lags and variables that contribute to the identification of more complex factor matrices, and on which the level of development of e-government. There are indicators, in particular the public administration performance index, that affect only the indicators for the overall sample and the sample of countries with developed economies (Table 9).

Particular attention should be paid to the autoregressive coefficient, which has a positive value. It represents significant statistical significance – an indirect indicator confirming the correct specification of the model.

All models used indicate that variables directly related to innovation (openness of institutional infrastructure to the commercial sector, human capital development, and innovative economic development) have a significant impact on the object under study.

4. DISCUSSION

Based on the data obtained, in developed and developing countries, the factors influencing the e-government rating have insignificant differences. The following factors are decisive for all countries: improving living standards, an innovative economy, building human capital, and openness of institutional infrastructure to business representatives. However, the latter factor has a catch-up effect due to the path dependence effect (Penrose, 1959). According to the presented dynamic panel data models (Table 9), the indicators of the e-government rating (previous year of analysis), the human development index, GDP per capita, and the ease of doing business index have a statistically significant impact, taking into account time lags. It is worth noting the catch-up effect of institutional factors and their uneven nature in relation to the two groups of countries.

Summarizing the analysis of factors influencing the development of e-government, all models used indicate a significant impact on the object under study of variables directly related to innovation:

Table 9. Regression analysis based on the GMM approach

Variables/sample	Total sample	Developed countries	Developing countries
GII	–0.001	–0.0011	–0.0069***
HDI	0.65***	0.81***	0.4
GDP	–2.24e-07	–4.67e-07	2.27e-06
GDP_{PC}	1.41e-06**	1.08e-06**	1.35e-05***
VAI	–0.0042	0.0044	0.013
EDBI	–0.0004**	–0.00059**	–0.00075***
RQ	–0.014	0.007	0.00085
WGI	0.041***	0.053***	–0.034
Constant	–0.049	–0.14	0.24
EGDI	0.43***	0,32***	0.63***
Observations	230	160	70
Hansen	0.1	0.4	0.4
AB AR (2)	–0.70	–0.60	–0.67

Note: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

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openness of institutional infrastructure to the commercial sector, human capital development, and an innovative vector of economic development. These factors, combined with the well-being of the population, make it possible to assert that the institutional openness of public service and resource delivery systems is an important stimulating component necessary for the further development of online formats for interaction between the state and citizens. At the same time, there is no clear evidence of the role played by political mechanisms.

The study is consistent with other studies of factors influencing the development of e-government:

- the relationship between digitalization in G2C and human development factors (Cai, 2024);
- the relationship between institutional development and human capital factors and the level of digitalization of e-government in EU countries (Lobonț et al., 2025).

Unlike the aforementioned studies, this study includes a larger number of factors under investigation, as well as a broader sample of countries differentiated into developed and developing subsamples, which provides more reliable and specific results.

CONCLUSION

The purpose of this study is to determine the nature of the influence of socio-economic and political factors on the formation of e-government in different countries. Using statistical and dynamic panel data models, it has been determined that the same factors have a significant impact on the key component of e-government. This assumption is also supported by calculations obtained separately for developed and developing countries.

Based on the calculations, factors that have a stable and variable impact on the development of e-government were identified. The first group includes human development and ease of doing business, while the second group includes the development of the institutional environment and improving the efficiency of public administration, as well as an innovative economy and GDP per capita.

The generalized explanatory model of factors influencing the level of development of e-government consists of multiple levels and is characterized by a cumulative effect, as the system develops in a heterogeneous and constantly changing environment. Together, the above factors create a demand for the formation of new management models that will contribute to strengthening interaction with a heterogeneous environment.

Given that the above factors exert varying degrees of influence on e-government development, it cannot be unequivocally attributed to hypotheses about improving living standards, increasing human capital, or opening institutional infrastructure to entrepreneurs. This is because the resulting matrix has a more complex composition, which indicates the need to take into account the demonstrative absence or insignificance of the influence of certain factors. However, the practical application of the research results for each country is possible if all the identified factors in the development of e-government are confirmed within a multilevel explanatory model that includes socio-political trends. This could be the prospect for future studies.

AUTHOR CONTRIBUTIONS

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