

MODERNIZATION OF PUBLIC ADMINISTRATION IN EASTERN EUROPE IN THE CONTEXT OF IMPLEMENTATION OF DIGITALIZATION

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The European Union is taking significant steps and supporting the efforts of member countries to improve the quality of public services. The requirements for the digitization of the latter, to improve communication links, highlight the relevance of the research topic by shifting the emphasis to the indirect assessment of the impact of technology transfer in the field of public administration on citizens' satisfaction with public services.

The object of research in this work is the public administration models of the selected countries. The research hypothesis assumes that membership in the EU has a significant impact on the efficiency of public services. Given this, there is an opportunity to transfer technologies, namely technologies of state management.

The countries of Eastern Europe were selected for the study. The work is based on the limitations inherent in the EU accession process.

For evaluation, three regression models were proposed for use in practice. These are a baseline model, a fixed-effects model to account for unobserved differences between countries, and a model with additional factors. The specified models were estimated using the least-square method (LSM). Based on the calculations of the first model, it was determined that the coefficient is statistically significant at the level of 1%, which explains 12.6% of the variation in the Index of Public Services (IPS). The results of the estimation of the second model make it possible to estimate IPS more accurately by 0.68. Based on the results of the calculation of the third model, the features of the influence of GDP and IPS were determined.

The results prove that the accession of Eastern European countries to the EU has a significant impact on the efficiency of public services. In this case, the possibility of technology transfer appears. Digitization of public administration is an innovative technology that allows bringing the citizen and the state closer together as efficiently as possible

Keywords: candidate country, membership in the European Union, Index of Public Services, benchmark model, Fragile States Rating

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1. Introduction

The provision of public services is one of the most important functions of the state, which ensures the development of society and contributes to the well-being of the population. State services are characterized by timeliness, quality, fairness, and the ability to solve citizens' problems during their provision. Empirical studies by scientists [1, 2] prove that the quality of government, administrative impartiality and institutional efficiency affect public services. This is especially important for vulnerable population groups, as well as for technology transfer. This contributes to the innovative development of the country as a whole. The provision of pub-

lic services is critical to the effective functioning of government and is extremely important for countries, regardless of their level of development or economic status. Since a large part of the population in most countries depends on the state and, accordingly, on public services [3], their effective and efficient provision is a sign of democracy [4].

The most probable sources of improvement of public services are additional resources and effective management [5]. At the same time, under conditions of crisis, uncertainty and instability, citizens' dissatisfaction with the activities of the authorities is growing, and unpopular decisions cause doubts in society, which negatively affects the development of democracy and requires urgent measures [6]. In this case,

the improvement of communications between the population and state administration bodies with the provision of feedback is possible precisely with the help of information and communication technologies (ICT) [7]. In this case, ICT becomes a certain “bridge” between a person, no matter where he is in the country, and the state, to meet public needs and communications.

The quality of public administration, according to European Commissioner for Cohesion and Reforms Eliza Ferreira, will soon be of crucial importance for the EU. That is why the task of state institutions of individual countries is to transform EU legislation and programs into concrete actions. High-quality, consistent, accessible public administration and services can and should be available to all European citizens, regardless of place of residence, age, or socio-economic status [8]. This approach is a positive factor for the development of public services in EU member states. This is also a significant challenge for candidate countries and potential candidates for membership. Such countries must carry out reforms and mobilize additional resources to meet the requirements for future EU membership. Digitization of this process [9] accelerates the process of passing information between key participants and allows the exchange of skills, knowledge, and technologies. The latter are signs of technology transfer [10] at a new level, which gives impetus to innovative development not only in the field of public administration, but also in the country as a whole. This proves the relevance of the research topic and opens up opportunities to develop new models of country management.

2. Literature review and problem statement

EU enlargement policy concerns potential accession candidates and those seeking to join the EU. The European Commission helps countries to achieve EU membership and supports them in implementing relevant economic and democratic reforms. For the candidate countries and potential candidates, the prospect of EU membership is a powerful incentive for carrying out democratic and economic reforms – a mandatory component of future EU membership. The results of such reforms should be strong, permanent, and irreversible [11].

Scientists consider the issue of significant benefits for countries from EU membership through a combination of economic and political aspects [12]. The main conclusion is the obtained convincing evidence of the positive impact of EU membership on GDP per capita and labor productivity based on the innovation approach, despite the significant heterogeneity between the studied countries. Other authors believe that one of the main reasons for the creation of the European Union and the Eurozone was the expected bonus of economic growth for member countries [13]. And this, again, emphasizes the transfer of technologies, because the results of the study prove the existence of a positive influence of EU membership on economic growth among its members.

On the example of the banking system, work [14] demonstrated the positive influence of EU membership on the efficiency of banking costs in comparison with countries outside the EU zone. The conclusion is based on the “catch-up” effect between EU and non-EU banking systems. The results of study [15] confirm this and prove that the use of “catch-up lag” is vital for achieving convergence between countries with different levels of development within the EU.

In work [16] it is assumed that a country’s long wait for EU membership may negatively affect public support for joining the Union. At the same time, in some countries, especially post-communist ones, the integration process into the EU involves the connection between citizens and state institutions. Researchers [17] emphasize the importance of the technology of social support and interaction between the state and citizens regarding the accession to the EU. The obtained results prove that the population of countries that benefit more from EU membership shows greater support for their country’s participation in the EU. The difference in the population’s reaction to the accession to the EU led to the revival of the study of the concept of “differentiated integration” in the European Union. The negative impact of the Eurozone crisis is the main reason for striking differences in support for European integration between different regions of Europe [18].

The author of work [19] claims that despite the cohesion policy that has been applied in the EU for many years, the impact of membership on individual countries is different. For example, in terms of GDP per capita, the Grand Duchy of Luxembourg and the Republic of Ireland are the countries that benefit the most from the integration process. At the same time, the Hellenic Republic received ten times less, and its indicators can be compared only with the similar indicator of the South African Republic. At the same time, in European countries that are not members of the EU, management technologies are of a much lower level.

Cohesion policy affects many areas in the EU and is currently the main policy for member states. It consists in promoting economic, social, and territorial unity and reducing regional differences [20]. Despite such steps, as shown in study [21], there are disparities in one crucial factor of socio-economic development – the technology of government activity. It is this, in the end, that leads to the ability to implement policies impartially, non-corruptly and efficiently, as well as to provide public services. The above is essential, both in EU countries and in individual regions.

Cohesion, a unified approach in management and quality communications are the basis for combating corruption and the way to increase satisfaction with the quality of public services in the country is a requirement for joining the EU. It is for this reason that emphasis is placed on the transfer of management technologies in e-government [7]. At the same time, as it follows, again, from work [7], the transfer mechanism is provided by the EU member state, which is close to the candidate country in terms of the structure of state administration. The basis for such an approach is the minimization of implementation and maintenance costs, as well as easier adaptation of already existing management models.

Public service means activities and services performed in engagement with any state capacity in the interests of society and for the benefit of the general public [22]. According to the OECD definition, public services are services provided for the benefit of the public or its institutions [6]. The European Parliament defines a public service as “an economic activity of general interest defined, created and managed by public authorities”. This service should be subject to a special legal regime, regardless of whether it is provided by a public or private body” [23]. Such services are provided by the governments of countries to their citizens directly (through public sector institutions) or by financing the provision of private services. The term “public services” is associated with the consensus that certain services should

be available to all, regardless of social status or income. Even where public services are not provided or financed by the state, for social and political reasons, they are usually subject to regulation that prevails over most economic sectors.

Special attention to the technology of providing public services is a crucial element for increasing the productivity and efficiency of the public sector in the EU. According to the results of study [24], most of the member states of the European Union take significant measures to reform the administrative system and improve the quality of public services. The EU supports such efforts by encouraging Member States to apply performance models in the public sector to improve the quality of business and public services.

Also, in work [25] it is stated that public services are identified as those provided by the government of a certain jurisdiction (country or local community) to ensure the welfare of citizens and social protection. In addition, the efficiency of public service delivery depends on many economic, social, and institutional factors. In turn, there are countless scientific discussions about the optimization of taxation to increase the efficiency of the provision of public goods.

The instability of economic and crisis situations has clearly led to an increase in demand for new technologies of social security and public services. At the same time, reforms were carried out in many EU countries aimed at reducing budget expenditures for social security, social expenditures, and payments [26]. Such steps harm and influence the attitude of the population of the countries towards the policy of the European Union and call into question the expediency of European integration. For example, according to a survey by the Institute of Public Finance and Accounting (CIPFA), in 2016, 36 % of respondents believed that the UK's stay in the EU harms the provision of public services [27].

However, after a partial exit from the crisis phenomena in the EU, some researchers are still skeptical about the reforms in the field of providing public services in European countries. Reforms to improve the productivity of public services can be an alternative to spending cuts or tax increases [28]. Nevertheless, it cannot be taken for granted that reformist rhetoric always outlines the content and essence of the reforms themselves. Reform activities are deeply rooted in bureaucratic incentives, problems with financial intermediaries, and political-economic balance.

The European Commission highlights systemic problems in EU countries, such as the inefficiency of public services, the existing inequality in access, as well as a decrease in trust and the perception of the legitimacy of the authorities [29]. The change in approaches to the management of the public sector covered not only individual states, but also the entire EU. This led to the strengthening of the influence of European institutions, sometimes in cooperation with the IMF, on the organization of the public sector of member states, which, as noted in [30], was called "the led reforms of the EU public sector." Such a reform involves conscious attempts to reconfigure the public sector to regulate the organization of public services in order to achieve specific efficiency criteria.

Using the example of developing countries, scientists prove the existence of inequality in the incomes of the population, as well as in the quality and availability of public services. It is argued [31] that the population with higher incomes is not satisfied with the quality of available public services and is looking for ways to improve with the help of private paid services. At the same time, this leads to a decrease in the quality of public services for the poor.

The quality of public services correlates with the level of trust in public administration, the ease of doing business, and the overall well-being of the country. The importance of public services for the development of trade and investment policy in the EU is emphasized [32]. It is also a good indicator of the general normal functioning of the state [33]. Public services also include the police, the defense sector, health care, education, etc. [22]. Thus, performance indicators in the field of health care, education, justice, and tax administration, where inputs and outputs are available, should be included in the performance indicators of the use of public services. Consensus between countries on the measurement of efficiency using an international comparative method is also important here [34]. Work [35] evaluates the effectiveness of public spending on five components of public services. They relate, in particular, to economic indicators (GDP per capita and employment in the service sector): general public services; health care; education; Social Protection; recreation, culture and religion. Investigating the effectiveness and efficiency of public spending and public services from the point of view of economic efficiency, some authors [36] believe that the efficiency of the public sector consists in improving social outcomes.

Despite extensive research into the topic, issues regarding the correlation between models and technologies of public administration remain unresolved. Especially, in terms of obtaining the maximum effect from the application of technology transfer in public administration.

Focusing on our review of sources, it is possible to determine the problem of the research. It consists in the need to study management technologies to improve the efficiency of public services, the possibility of sharing management technologies in order to "catch up" with more developed countries and improve life through public services.

3. The aim and objectives of the study

The purpose of this study is to identify the connection between changes in public administration technologies under modern conditions of digitalization and the process of accession to the EU (accession) in the candidate countries. This will provide an opportunity to improve public administration models through the use of technology transfer in public administration from member states to candidate countries in the EU. The countries of Eastern Europe were selected for the study.

To achieve the goal, the following tasks were set:

- to propose evaluation models of the selected candidate countries for obtaining the status of EU member and the status of the start of membership negotiations according to the Index of public services, as an indicator by which it is possible to evaluate the quality or availability of public services with an emphasis on changes in public administration;
- to analyze the impact of modernization of state management technology using additional means of control – GDP per capita and unemployment rate.

4. The study materials and methods

The object of research in our work is the public administration models of the selected countries.

The statement regarding EU membership is accepted as the main hypothesis of the study. In particular, the fact that it has a significant impact on the quality of public services,

because the possibility of technology transfer appears. Especially – technologies in the field of public administration, which have a significant impact on improving the standard of living in the country. Digitization of public administration is one of such innovative technologies, which allows bringing the citizen and the public administrator closer to establish communication links. The implementation of digital technologies in public administration is the main requirement for joining the EU.

The work is based on the limitations inherent in the process of the country’s accession to the EU.

The process of joining the EU (accession) generally consists of 3 stages [37]:

1) When a country is ready, it becomes an official candidate for membership, but this does not necessarily mean that formal negotiations have begun.

2) The candidate proceeds to official membership negotiations. This is a process that includes the adoption of established EU legislation, preparation for the possibility of its proper application and implementation. This process also includes the implementation of judicial, administrative, economic, and other reforms. All of this is necessary for a country to meet the conditions of entry, known as the accession criteria.

3) When the negotiations and accompanying reforms are completed with final agreement by both parties, the country can join the EU.

That is, the candidate country must take steps for the transition in accordance with the requirements for joining the EU, which, among other things, provide for the implementation of judicial, administrative, economic, and other reforms at the stage of official membership negotiations. Thus, the stage of “membership negotiations” is the starting point for analyzing the impact of EU membership on the efficiency of public service delivery.

The groups of countries that have already received the status of candidate for EU membership and for which the European Commission has started membership negotiations were selected for the study, namely:

1) The Republic of Albania applied for EU membership in April 2009 and received candidate status in June 2014. In April 2018, the European Commission issued an unconditional recommendation to start accession negotiations.

2) The Republic of North Macedonia received the status of a candidate country in December 2005. Since October 2009, the European Commission has consistently recommended the start of accession negotiations with the Republic of North Macedonia. In 2015 and 2016, the recommendation was conditional on continued reforms, and accession negotiations began in March 2020.

3) Montenegro applied for EU membership in December 2008. The candidate status was granted on December 17, 2010. The start of accession negotiations took place in June 2012.

4) The Republic of Serbia applied for candidate country status in December 2009. The status of a candidate country was granted in March 2012, and in January 2014 official negotiations on the accession of the Republic of Serbia began.

5) The Republic of Turkey was granted candidate status in December 1999, and accession negotiations began in October 2005.

Ukraine and the Republic of Moldova are not included in the study, as they were declared EU candidate countries only in June 2022.

To evaluate the efficiency of public services, the Index of Public Services (IPS) was chosen, which is a component of the Fragile States Rating (FSR) developed by the Peace Fund (PF). The FSR is published annually and allows for the identification of vulnerabilities that contribute to the risk of state instability and, as noted in study [37], allows for the assessment of trends and changes over time. The IPS determines the availability of public services, equality, and conditions of public access to basic state services [38] in recent years, when digitalization of public services began to be actively implemented. In particular, these are communal services, health care, education, transport and other infrastructure, housing, security, security, access to the Internet, etc. [39].

In the work, taking into account previous studies [40], the following regression models were used to determine the influence of the candidate’s status on the Public Services Index:

$$PSI_{i,t} = \alpha + \beta_1 \text{Membership}_{i,t} + \varepsilon_{i,t}, \tag{1}$$

$$PSI_{i,t} = \alpha_1 + \beta_1 \text{Membership}_{i,t} + \varepsilon_{i,t}, \tag{2}$$

$$PSI_{i,t} = \alpha_i + \beta_1 \text{Membership}_{i,t} + \beta_2 \text{GDP}_{i,t} + \beta_3 \text{Unemployment}_{i,t} + \varepsilon_{i,t}, \tag{3}$$

where $PSI_{i,t}$ is the Index of Public Services;

$\text{Membership}_{i,t}$ is a dummy variable that takes the value 0 before the European Commission has started formal EU membership negotiations with a candidate country and 1 after the start of membership negotiations;

$\text{GDP}_{i,t}$ gives the value per capita for the gross domestic product (GDP), expressed in current international dollars, converted by the purchasing power parity (PPP) conversion factor;

$\text{Unemployment}_{i,t}$ is the share of the labor force that does not have a job but is ready and looking for it. Indices i and t represent the country and year of observation, respectively;

$\varepsilon_{i,t}$ – error in the regression error;

α_i are country-specific fixed effects.

In order to evaluate (1) to (3), the data of indices and descriptive statistics were used, which characterizes the processes of modernization of public services in a number of Eastern European countries under modern conditions of digitalization and the ability to quickly exchange public administration technologies. It is worth noting that the Index of public services can be considered as an indicator that means the quality of public services or their availability to the population. This is due to the fact that GDP is included in the indices of the digital economy [41], to explain the level of digitization of public services and the introduction of the availability of electronic government communications for citizens of the country.

Table 1 gives information on the evaluation of the negotiations of the candidate countries regarding EU membership. One of the requirements on which attention was focused was the application of digital technologies for the accessibility of public administration. In fact, this was a characteristic of the availability of public services provided with the help of modern innovative technologies.

Table 2 provides information on the Index of Public Services. The data are obtained from the Fragile States Rating of the Peace Fund for 2007–2022 [42].

GDP per capita and Unemployment for 2007–2021 are shown in Table 3 according to the World Bank (World Development Indicators) for 2007–2022 [43].

Table 1

Membership negotiations of selected candidate countries

Year	Membership negotiations				
	Republic of Albania	Republic of North Macedonia	Montenegro	Republic of Serbia	Republic of Turkey
2007	0	0	0	0	0
2008	0	0	0	0	0
2009	0	1	0	0	1
2010	0	1	0	0	1
2011	0	1	0	0	1
2012	0	1	1	0	1
2013	0	1	1	0	1
2014	0	1	1	1	1
2015	0	1	1	1	1
2016	0	1	1	1	1
2017	0	1	1	1	1
2018	1	1	1	1	1
2019	1	1	1	1	1
2020	1	1	1	1	1
2021	1	1	1	1	1
2022	1	1	1	1	1

Table 2

Index of Public Services for selected candidate countries

Year	Index of public services, IPS				
	Republic of Albania	Republic of North Macedonia	Montenegro	Republic of Serbia	Republic of Turkey
2007	6.2	5.1	3.6	5	5.4
2008	5.9	5.1	3.6	5	5.5
2009	5.8	4.8	4	5.2	5.3
2010	5.6	4.6	3.8	5.2	5.4
2011	5	4.2	3.6	4.9	5.7
2012	4.9	4.2	3.9	4.6	6
2013	4.8	3.9	3.6	4.7	5.5
2014	4.8	4.1	3.9	4.4	5.2
2015	4.5	4.4	3.6	4.7	4.9
2016	4.2	4.1	3.3	4.4	4.6
2017	4	3.9	3.1	4.2	4.4
2018	3.8	3.8	3.2	3.9	4.9
2019	3.8	3.9	3.3	3.6	4.6
2020	3.9	3.8	3.4	3.4	4.4
2021	4.4	4.8	4.4	3.9	5.4
2022	4.1	4.5	4.1	4.2	5.1

Data on unemployment (% of the total labor force) in the selected candidate countries are given in Table 4. The decrease in unemployment is an indicator of the improvement of the government’s activity and can indirectly be considered as an increase in the effectiveness of communications between the authorities and the country’s population.

The selection of information about the EU enlargement process and candidate countries (Table 5) is based on data from the official website of the European Commission [10, 36].

Table 3

GDP per capita, PPP (current international dollar) of selected candidate countries

Year	GDP per capita, PPP (current international dollar)				
	Republic of Albania	Republic of North Macedonia	Montenegro	Republic of Serbia	Republic of Turkey
2007	7283.343	9350.91	12459.32	11236.23	14986.15
2008	8228.348	10521.90	13816.57	12632.08	16182.48
2009	8813.029	11009.99	13022.15	12533.97	15598.00
2010	9628.722	11361.01	13636.02	12798.27	17542.20
2011	10207.77	11689.91	14472.48	13746.93	19799.12
2012	10526.26	11915.69	13863.89	13933.84	20772.50
2013	10570.96	12727.34	14870.15	14629.01	22438.71
2014	11259.27	13434.84	15371.14	14659.58	24090.24
2015	11658.91	13888.30	16332.85	14928.47	25753.39
2016	12078.84	15138.00	18199.38	15858.10	26512.02
2017	12770.96	15706.44	19682.27	16611.02	27913.82
2018	13498.14	16796.27	21513.30	17717.91	27960.98
2019	13999.42	17546.42	23072.58	18822.36	26867.47
2020	13632.19	16719.69	19989.65	19093.96	27235.43
2021	15646.04	17918.08	22795.41	21432.41	30472.38
2022	–	–	–	–	–

Table 4

Unemployment

Year	Unemployment (% of total labor force)				
	Republic of Albania	Republic of North Macedonia	Montenegro	Republic of Serbia	Republic of Turkey
2007	15.97	34.93	19.40	18.06	8.87
2008	13.06	33.76	17.15	13.70	9.71
2009	13.67	32.18	19.09	16.14	12.55
2010	14.09	32.02	19.65	19.22	10.66
2011	13.48	31.38	19.76	22.97	8.80
2012	13.38	31.02	19.81	24.00	8.15
2013	15.87	29.00	19.59	22.15	8.73
2014	18.05	28.03	18.05	19.22	9.88
2015	17.19	26.07	17.55	17.66	10.24
2016	15.42	23.72	17.73	15.26	10.84
2017	13.62	22.38	16.08	13.48	10.82
2018	12.30	20.74	15.19	12.73	10.89
2019	11.47	17.26	15.13	10.39	13.67
2020	13.33	16.55	17.88	9.01	13.11
2021	11.82	15.78	18.49	10.06	13.39
2022	–	–	–	–	–

The models proposed in the work with the appropriate additions allow a meaningful assessment to confirm the stated hypothesis.

Table 5
Descriptive statistics for study countries

Indicator	Average value	Standard deviation	Minimum	Maximum
Republic of Albania				
IPS	4.77	0.80	3.80	6.20
GDP	11320.15	2333.15	7283.34	15646.04
Unemployment	14.18	1.92	11.47	18.05
Montenegro				
IPS	3.62	0.34	3.10	4.40
GDP	16873.14	3683.09	12459.32	23072.58
Unemployment	18.04	1.60	15.13	19.81
Republic of North Macedonia				
IPS	4.31	0.46	3.80	5.10
GDP	13714.99	2769.49	9350.91	17918.08
Unemployment	26.32	6.53	15.78	34.93
Republic of Serbia				
IPS	4.47	0.57	3.40	5.20
GDP	15375.61	2866.27	11236.23	21432.41
Unemployment	16.27	4.75	9.01	24.00
Republic of Turkey				
IPS	5.15	0.49	4.40	6.00
GDP	22941.66	5136.30	14986.15	30472.38
Unemployment	10.69	1.78	8.15	13.67

The main coefficient of interest is β_1 , which will estimate changes in IPS after a country becomes a member.

5. Results of the study of models for evaluating changes in public administration

5.1. Models for evaluating selected candidate countries with an emphasis on changes in public administration

If we consider the proposed model (1), it can be transformed into a benchmark model using the least-square method (LSM). Equation (2) is an LSM with country fixed effects to account for unobserved differences between countries. Model (3) adds gross domestic product and the unemployment rate to account for the total income level in each country. Also, this model captures changes in economic production and unemployment, helps to reflect the state of the economy over time. LSM allows the estimation of dependent variables with effects and controls, which ultimately allows for meaningful estimates.

The results of the evaluation of the candidate country for obtaining the status of a member of the EU and the status of the start of

membership negotiations according to the index of PS are given in Table 6. The first column of Table 6 shows the estimates of the model in equation (1), and columns 2 and 3 show the estimates of models (2–3), respectively.

The results of the first (benchmark) model assessment show that after the candidate country has received the status of a participant in EU membership negotiations, the IPS decreases, which indicates an improvement in the efficiency of public services.

Table 6

Evaluation results

Analysis data	Dependent variables, IPS		
	LSM	Fixed-effect LSM	LSM with fixed effects and controls
	Model 1	Model 2	Model 3
Membership	-0.546***	-0.680***	-0.317***
GDP	-	-	-0.0001***
Unemployment	-	-	0.010
$\alpha_{\text{Republic of Albania}}$	-	4.955***	5.465***
$\alpha_{\text{Montenegro}}$	-	4.073***	4.767***
$\alpha_{\text{Republic of North Macedonia}}$	-	4.903***	5.233***
$\alpha_{\text{Republic of Serbia}}$	-	4.836***	5.496***
$\alpha_{\text{Republic of Turkey}}$	-	5.736***	6.830***
Constant	4.815***	-	-
Observation	75	75	75
R^2	0.126	0.990	0.992
Adjusted R^2	0.114	0.989	0.991

Note: *indicates a ratio significant at 10%; **at 5%; ***at 1%

5.2. The impact of modernization of public administration technology through additional controls

Model 3 (Table 6) includes additional controls - GDP per capita and the unemployment rate. The estimates of this model show that membership still affects IPS, but it is not as significant as predicted by models 1 and 2. To complement the results of model 3, Fig. 1 shows the ratio between IPS and GDP per capita by country.

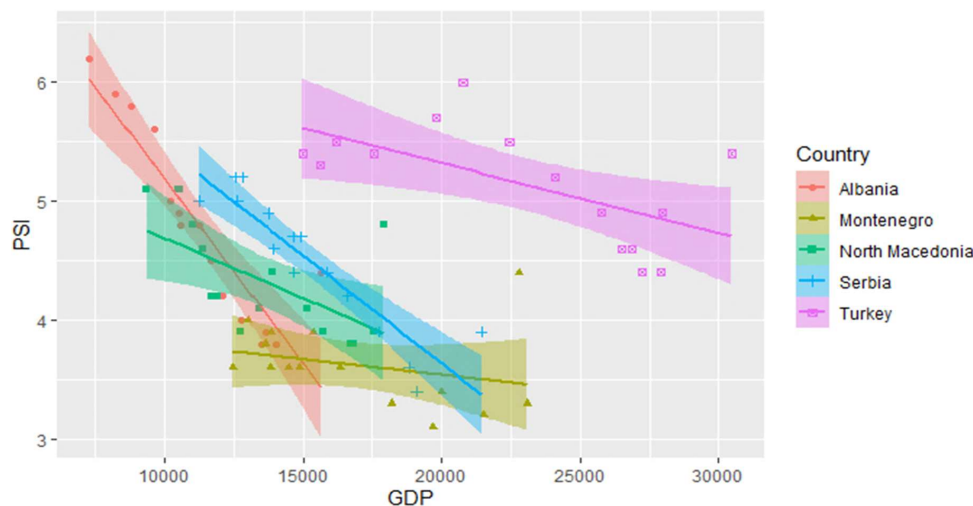


Fig. 1. The ratio between the Public Services Index and per capita gross domestic product in EU candidate countries

The same pattern can be observed in all countries, showing that higher levels of GDP are associated with lower levels of IPS. Fig. 1 shows a scatterplot of IPS versus GDP, and the lines represent the regression determined separately for each country. Since all lines have a negative slope, we can conclude that higher GDP improves public services (lowers IPS).

6. Discussion of research results regarding models for assessing changes in public administration

Public services represent the mechanism of the country's government through which public policy is developed and implemented. Public services do this by turning public policies and programs into tangible goods and services for citizens to consume [22]. The regression models given in the paper for determining the impact of the status of a candidate country for joining the EU on the index of public services make it possible to assess the transfer processes of technologies for the implementation of public services. Of course, these processes are evaluated indirectly, thanks to the study of trends in the improvement of public administration, by assessing the availability of services for citizens, in the conditions of digitalization. Each of the above models proves that EU membership leads to an improvement in the efficiency of public services, and the demand for digitization of public administration is one of the priorities.

Analyzing the models (Table 6), certain generalizations can be made.

Thus, the estimates of the first model indicate that when a country reaches the status of a candidate for EU membership and conducts membership negotiations, IPS decreases by 0.564 points, which means an improvement in the level of public services. At the same time, under the terms of the EU [37], there is an active process of exchange of experience and implementation of digital technologies in the activities of public administration bodies. Moreover, this process is both the adoption of experience from the EU member state and the study of advanced assets of the candidate country [16, 17]. In the first model, the coefficient is statistically significant at the 1 % level. This simple model explains 12.6 % of the variation in IPS across countries and over time. Despite this, such a model does not take into account the inherent differences between the countries in the sample. To control for cross-country differences, model 2 includes country-specific fixed effects to control for unobserved differences. Based on these differences, it is possible to assess the impact of new technologies on the development of public administration and citizens' satisfaction with the level of public administration [11]. The estimation results for model 2 show that after controlling for differences in fixed effects, the effect of membership on IPS is estimated to be even higher than in the first model. In particular, achieving membership reduces the index by 0.68 points, and the effect is still statistically significant. That is, the rapid introduction of new management technologies into the life of the country makes it possible to make effective changes in the management of the state and obtain a sustainable effect of satisfaction with the state management among citizens. The results of the second model, which includes fixed effects for each country to control for unobserved differences, show an even more significant effect of EU membership on the performance of public services.

These results are consistent with research by the Institute of Public Finance and Accountancy (CIPFA). Using the

example of Great Britain, CIPFA proves that the advantages for the public sector in general and public services in particular outweigh the disadvantages of the negative impact of leaving the EU. Therefore, the country's population should receive from the state more convincing arguments demonstrating the positive impact of EU membership on public services [27]. This is especially true of the candidate countries, whose population not only supports the government's actions regarding EU membership.

The results of the third model prove that GDP per capita affects IPS in the same way as membership: when GDP increases by USD 1,000, the index decreases by about 0.1 on average. Thus, just as membership status correlates with an improvement in the public service index, greater economic output also correlates with higher levels of public service. This is the expected result - countries with a higher level of income can afford better public services based on the most modern technologies with the prospect of continuous development. It should be noted that the level of unemployment does not affect the level of provision of public services. This is probably because higher unemployment in the economy does not usually affect public sector workers.

Analyzing the third model, it is worth agreeing with the opinion from [12], where the authors believe that institutional adjustments, even in non-EU countries, should be carried out according to EU standards. And one of the standards is the digitization of public administration and the provision of effective communications [37]. This conclusion is based on the presence of a "catch-up" effect between EU member states and non-EU countries [15]. Also, the obtained results correlate with the results reported in [24], which show that uniform rules in the EU neutralize potential legal obstacles and create equal rights for EU citizens in access to social security and public services. The latter, once again, emphasizes the importance of digitalization in this process. Exceptions remain only in certain countries where there is no full harmonization of legislation with EU requirements.

The limitations of this study can be taken into account when making analogies between individual EU member states. This will make it possible to identify certain common features between countries in the field of public administration and to propose a basic model for the implementation of changes.

Disadvantages of the study are the generalized data by country. The more detailed the data, the more accurate the results obtained from the models.

The results of the analysis and the presented models give an opportunity to agree with work [28] because the transfer of technologies in the field of public sector management, initiated by the EU, is unique because it goes beyond the borders of one country and affects countries that are not part of the EU [7]. Study [29] emphasized the problem of inequality in access to public digital services of the population with different income levels. This situation will also be inherent in all candidate countries (Republic of Albania, Republic of Moldova, Republic of North Macedonia, Montenegro, Republic of Serbia, Republic of Turkey, and Ukraine). The same will be observed in potential candidates (Bosnia and Herzegovina, Republic of Kosovo), as they belong to developing countries.

The results of the above analysis and the application of the proposed models can be used not only at the level of state or municipal administration, which significantly deepens the results obtained in work [40]. These models can be used by individual enterprises, corporations, banks, and financial com-

panies to substantiate partnership agreements and create programs for technology transfer, implementation of innovative projects, joint scientific and applied research in various fields of business. The development of the research can be seen in the expansion of the models, by introducing additional factors for comparison, as well as the segmentation of countries by IPS.

The practical significance of our results is the identification of the relationship between EU membership and the effectiveness of the provision of public services based on the transfer of digital technologies. This is an additional incentive for governments and populations of countries to consider the possibility of joining the European community. The models presented in the work can be used not only by state bodies, but also by individual enterprises, corporations, banks, and financial companies to expand international cooperation with an innovative direction. Prospects for further research may include expanding the study of potential candidate countries for EU accession and countries that have recently received candidate status.

7. Conclusions

1. The proposed assessment models of the selected candidate countries for obtaining the status of a member of the EU and the status of the start of negotiations on membership according to the Index of public services with an emphasis on changes in public administration confirm their effectiveness. Thus, based on the estimates of the first model, when the country is still negotiating for EU membership, IPS decreases by 0.564 points. It is not just about improving the level of public services. This is a confirmation of the process of introducing digital technologies into the activities of the state. The coefficient is statistically significant at the 1% level. And the model itself explains 12.6% of the variation in IPS between countries over time. The second model al-

lows estimation of fixed effects on unobserved differences. According to the given initial data, taking into account the second model, IPS is estimated to be even higher than in the first model. The index drops by 0.68 points and the effect is still statistically significant.

2. Analysis of the impact of modernization of public administration technology with the help of additional controls, such as GDP per capita and the unemployment rate, makes it possible to prove the established assumption somewhat indirectly, but reasonably. Some analogy is drawn between the improvement of life and satisfaction with public services due to the increase in the level of accessibility to them. IPS decreases by 0.1 on average. According to the third model, it is possible to draw conclusions about institutional adjustments. That is, approximation to EU standards. And one of the requirements of the EU to the member states is the digitization of public administration, which is monitored with the help of IPS.

Conflicts of interest

The authors declare that they have no conflicts of interest in relation to the current study, including financial, personal, authorship, or any other, that could affect the study and the results reported in this paper.

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Data availability

All data are available in the main text of the manuscript.

References

- Mungiu-Pippidi, A. (2020). The Quality of Government and Public Administration. Oxford Research Encyclopedia of Politics. doi: <https://doi.org/10.1093/acrefore/9780190228637.013.1405>
- Ramasamy, R. (2020). Quality of government, public service delivery and institutional impartiality in ethnically polarised societies: evidence for policy makers. *Asia Pacific Journal of Public Administration*, 42 (1), 46–60. doi: <https://doi.org/10.1080/23276665.2020.1731246>
- Afridi, F. (2017). Governance and public service delivery in India. London: INTERNATIONAL GROWTH CENTRE. Available at: <https://www.theigc.org/wp-content/uploads/2017/05/Afridi-2017-Synthesis-paper.pdf>
- Pareek, U., Sole, N. A. (2022). Quality of Public Services in the Era of Guaranteed Public Service Delivery. *Indian Journal of Public Administration*, 68 (2), 160–173. doi: <https://doi.org/10.1177/001955612111072575>
- Boyne, G. A. (2003). Sources of Public Service Improvement: A Critical Review and Research Agenda. *Journal of Public Administration Research and Theory*, 13 (3), 367–394. doi: <https://doi.org/10.1093/jopart/mug027>
- Government at a Glance 2019 (2019). Government at a Glance. doi: <https://doi.org/10.1787/8ccf5c38-en>
- Baran, L., Vishnevskiy, V., Gulyaev, K., Hulianytskyi, L., Dovhyi, S., Zgurovskiy, M. et al. (2015). E-Parliament of Ukraine: experience of creation. Kyiv: LOGOS, 452. Available at: <https://www.researchgate.net/publication/301347715>
- Supporting public administrations in EU Member States to deliver reforms and prepare for the future (2021). European Commission. doi: <https://doi.org/10.2887/931658>
- Lee, K. H., Slattery, O., Lu, R., Tang, X., McCrary, V. (2002). The state of the art and practice in digital preservation. *Journal of Research of the National Institute of Standards and Technology*, 107 (1), 93. doi: <https://doi.org/10.6028/jres.107.010>
- Bozeman, B. (2000). Technology transfer and public policy: a review of research and theory. *Research Policy*, 29 (4-5), 627–655. doi: [https://doi.org/10.1016/s0048-7333\(99\)00093-1](https://doi.org/10.1016/s0048-7333(99)00093-1)
- EU enlargement. European Commission. Available at: https://commission.europa.eu/strategy-and-policy/policies/eu-enlargement_en
- Campos, N. F., Coricelli, F., Moretti, L. (2014). Economic Growth and Political Integration: Estimating the Benefits from Membership in the European Union Using the Synthetic Counterfactuals Method. *SSRN Electronic Journal*. doi: <https://doi.org/10.2139/ssrn.2432446>

13. Dreyer, J. K., Schmid, P. A. (2017). Growth effects of EU and EZ memberships: Empirical findings from the first 15 years of the Euro. *Economic Modelling*, 67, 45–54. doi: <https://doi.org/10.1016/j.econmod.2016.09.007>
14. Nurboja, B., Kořak, M. (2017). Banking efficiency in South East Europe: Evidence for financial crises and the gap between new EU members and candidate countries. *Economic Systems*, 41 (1), 122–138. doi: <https://doi.org/10.1016/j.ecosys.2016.05.006>
15. Papava, V. (2018). Catching Up and Catch-Up Effect: Economic Growth in Post-Communist Europe (Lessons from the European Union and the Eastern Partnership States). *SSRN Electronic Journal*. doi: <https://doi.org/10.2139/ssrn.3253236>
16. Guerra, S. (2016). Distrust unbound: What next after joining the EU. *Communist and Post-Communist Studies*, 49 (3), 233–241. doi: <https://doi.org/10.1016/j.postcomstud.2016.06.007>
17. Anderson, C. J., Reichert, M. S. (1995). Economic Benefits and Support for Membership in the E.U.: A Cross-National Analysis. *Journal of Public Policy*, 15 (3), 231–249. doi: <https://doi.org/10.1017/s0143814x00010035>
18. Leuffen, D., Schuessler, J., Gómez Díaz, J. (2020). Public support for differentiated integration: individual liberal values and concerns about member state discrimination. *Journal of European Public Policy*, 29 (2), 218–237. doi: <https://doi.org/10.1080/13501763.2020.1829005>
19. Ikonou, C. (2018). The great Greek crisis. *Funding the Greek Crisis*, 1–71. doi: <https://doi.org/10.1016/b978-0-12-814566-1.00001-x>
20. Promoting development and good governance in EU regions and cities: sixth report on economic, social and territorial cohesion. European Commission. doi: <https://doi.org/10.2776/15327>
21. Charron, N., Lapuente, V. (2018). Quality of government in EU regions: Spatial and temporal patterns. Göteborg: DEPARTMENT OF POLITICAL SCIENCE, UNIVERSITY OF GOTHENBURG. Available at: https://www.gu.se/sites/default/files/2020-05/2018_1_Charron_Lapuente.pdf
22. Shittu, A. K. (2020). Public Service and Service Delivery. *Global Encyclopedia of Public Administration, Public Policy, and Governance*, 1–8. doi: https://doi.org/10.1007/978-3-319-31816-5_4005-1
23. Public undertakings and services in the European Union. economic series W–21. Summary. European Parliament. Available at: https://www.europarl.europa.eu/workingpapers/econ/w21/sum-2_en.htm
24. Dragomir, C. (2019). Quality of public services and promotion of quality management in public institutions in EU member states. *Review of General Management*, 30 (2), 43–54. Available at: <http://www.managementgeneral.ro/pdf/2-2019-3.pdf>
25. Molotok, I. F. (2020). Does Taxation Influence Efficiency of Public Services Provision: Case of European Countries. *Mechanism of an Economic Regulation*, 1, 152–158. doi: <https://doi.org/10.21272/mer.2020.87.14>
26. Vintila, D., Lafleur, J.-M. (2020). Migration and Access to Welfare Benefits in the EU: The Interplay between Residence and Nationality. *IMISCOE Research Series*, 1–32. doi: https://doi.org/10.1007/978-3-030-51241-5_1
27. EU referendum: The influence of EU membership on UK public services (2016). Chartered Institute of Public Finance and Accountancy (CIPFA). Available at: <https://www.cipfa.org/cipfa-thinks/eu-referendum>
28. Asatryan, Z., Heinemann, F., Pitlik, H. (2017). Reforming the public administration: The role of crisis and the power of bureaucracy. *European Journal of Political Economy*, 48, 128–143. doi: <https://doi.org/10.1016/j.ejpoleco.2016.08.004>
29. Exploring digital government transformation in the EU: Understanding public sector innovation in a data-driven society. European Commission. doi: <https://doi.org/10.2760/480377>
30. Ongaro, E., Kickert, W. (2019). EU-driven public sector reforms. *Public Policy and Administration*, 35 (2), 117–134. doi: <https://doi.org/10.1177/0952076719827624>
31. Bhattacharya, S., Saha, S., Banerjee, S. (2016). Income inequality and the quality of public services: A developing country perspective. *Journal of Development Economics*, 123, 1–17. doi: <https://doi.org/10.1016/j.jdeveco.2016.07.003>
32. Pedreschi, L. F. (2020). EU Trade and Investment Policy: The Role of Public Services. *Public Services in EU Trade and Investment Agreements*, 65–89. doi: https://doi.org/10.1007/978-94-6265-383-2_3
33. European semester thematic factsheet: Quality of public administration. European Commission. Available at: https://commission.europa.eu/system/files/2018-06/european-semester_thematic-factsheet_quality-public-administration_en_0.pdf
34. Government at a Glance 2013 (2013). Government at a Glance. doi: https://doi.org/10.1787/gov_glance-2013-en
35. Halaskova, M., Halaskova, R., Prokop, V. (2018). Evaluation of Efficiency in Selected Areas of Public Services in European Union Countries. *Sustainability*, 10 (12), 4592. doi: <https://doi.org/10.3390/su10124592>
36. Acosta, P. A., Almeida, R., Gindling, T., Peña, C. L. (2017). Effectiveness and Efficiency of Public Social Services. *Toward More Efficient and Effective Public Social Spending in Central America*, 69–98. doi: https://doi.org/10.1596/978-1-4648-1060-2_ch5
37. Steps towards joining. European Commission. Available at: https://neighbourhood-enlargement.ec.europa.eu/enlargement-policy/steps-towards-joining_en
38. Carlsen, L., Bruggemann, R. (2016). Fragile State Index: Trends and Developments. A Partial Order Data Analysis. *Social Indicators Research*, 133 (1), 1–14. doi: <https://doi.org/10.1007/s11205-016-1353-y>
39. P2: Public Services. Fragile States Index. Available at: <https://fragilestatesindex.org/indicators/p2/>
40. Shashyna, M., Solosich, O., Misyaylo, O., Ocheretiana, O. (2021). Analysis of regional development strategies in the context of implementation basic aspects of smart specialization concept in the national policy of regional development. *Efektivna Ekonomika*, 5. doi: <https://doi.org/10.32702/2307-2105-2021.5.71>
41. Digital Economy Indices 2022: Report of European Commission (2022). National Agency Qualifications. Available at: <https://nqa.gov.ua/news/indeks-cifrovoi-ekonomiki-2022-zvit-evropejskoi-komisii/>
42. Global Data. Fragile States Index. Available at: <https://fragilestatesindex.org/global-data/>
43. DataBank: World development indicators. The World Bank. Available at: <https://databank.worldbank.org/source/world-development-indicators#>