Can Information Technology Increase Government Effectiveness?

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Abstract. The article deals with government effectiveness in central and eastern European countries. In 1990, eastern European countries began to transition from communism to free market capitalism. After more than twenty years of reform, central and eastern European countries are showing different results in economic development because of widely contrasting levels of government effectiveness. Recently government effectiveness was tied to e-governance services and their growth. The purpose of the article is to analyze how information technology can increase government effectiveness.
Firstly, the main ideas of government effectiveness and its indicators were described. Secondly, trends of government effectiveness in selected countries are analyzed using R. Thirdly, impact of e-governance on government effectiveness was analyzed. Fourthly, ideas to improve government effectiveness are proposed.
The methodology of research includes both qualitive and empirical methods. The data used was from World Bank sources.

Keywords: government bureaucracy, electronic governance, government bureaucracy effectiveness.

1 Introduction

The activity of government bureaucracy in many countries of Central and Eastern Europe is considered ineffective. Ineffectiveness has become almost synonymous with the concept of "government bureaucracy." The current situation is due to several factors. Firstly, the global economic situation is unstable, and this has a negative effect on the welfare of many citizens. Secondly, there was a change of political regimes and economic systems in many countries of central and eastern Europe at the end of the twentieth century. The population of these countries did not have an environment of political freedom, so personal involvement in which to give voice to their political aspirations was hindered. Moreover, public opinion could be easily manipulated using the methods of earlier days. The present-day expectations of these populations are, as a result, exaggerated concerning government bureaucratic effectiveness. Thirdly, the methodology of evaluating the effectiveness of government bureaucracy is controversial. It raises many questions. For example: What indicators can be used

and for which countries, how to consider the corruption component, and what methodology can be used for evaluation? It is impossible to investigate all the factors listed above in one article. Therefore, in this article we will focus only on the effectiveness of the activities of government bureaucracy regarding the economic condition of the country.

After the collapse of communism in 1989, all Central and Eastern Europe countries undertook reforms to transform a politicized and inefficient bureaucracy into modern professional bureaucracies. Efforts were directed towards making the government bureaucracy more efficient, effective, transparent and responsive to the needs of society. Despite this, it became apparent that in the context of political and economic change, the reform of government bureaucracy was postponed in many of these post-communist countries. In this case, for example, Meier, K. J., & O'Toole, L. J. [19], Meier, K. J. [20] raised the issue that institutional reform was made difficult by the lack of resources. Legislation to create a professional and depoliticized bureaucracy was introduced, but the legacy of the past gave rise to a reluctance to change. In addition, countries such as Hungary and Poland abolished the requirements of impartiality in their laws, thereby effectively allowing a return to politicization. As a result, it turned out that the vector of development of state bureaucracy in the countries of Central and Eastern Europe is different, and the economic results of the development of those countries are different from each other.

The importance of studying the relationship between the effectiveness of government bureaucracy and economic well-being can be explained by at least two factors. First, government bureaucracy is maintained by taxpayer money. A natural desire of taxpayers is to understand that the money paid by them is used efficiently. An additional natural desire of the taxpayers is improvement in their own welfare. This means that if a taxpayer agrees to pay taxes, he/she expects more benefit from the government. Secondly, government bureaucracy cannot be characterized as being either absolute evil nor absolute good. Its presence in the modern state is objective. However, the long-term success of the state's development depends, among other things, on how effectively its government bureaucracy manages the economy.

Starting at the end of the twentieth century, government services in many countries began moving to a more electronic format. This significantly simplifies the lives of customers of that services. As a result, it is widely believed that the introduction of electronic government services contributes to improving the effectiveness of government bureaucracy. In our opinion, such conclusions need to be confirmed by empirical results.

The purpose of the article is information technology can increase government effectiveness.

The paper is organized as following:

1. The second part is devoted to a literature review about government effectiveness in general, and the role of informational technologies (e-governance) at present.

2. The third part describes the methodology of the research and sources of data.

3. The results of the calculations and their discussions are presented in the fourth part.

2 Literature Review

Effectiveness is a multi-faceted concept, the various elements of which are not always consistent with each other. The complexity of assessing the effectiveness of government bureaucracy is due to at least two factors. First is the subjectivity of assessing the role and necessity of bureaucracy from the point of view of society. Secondly, the effectiveness of the bureaucracy is closely related to the effectiveness of its management. The effectiveness of management is associated with the behavioral aspects within the activities taken by the representatives of the government bureaucracy, which is difficult to assess using quantitative indicators. Therefore, publications devoted to problems of the functioning of government bureaucracy and its effectiveness take several forms.

Some publications are devoted to the historical aspect of bureaucracy development and its connection with the formation of modern models on the functioning of society (Monnier F., Thuillier, G. [21]; Ungureanu, D.M. [29]).

The turn of the twenty-first century was marked by an exacerbation of the problems of the effectiveness of bureaucracy. This led to a growing interest in the institutional approach, in which economists have paid increased attention to the principles of effective management. This concept is explored in the publications of Kaufmann D. [15] and Knack S. and Keefer P. [16]. Researchers have focused on the role of institutions in ensuring economic development, organizing effective management of institutions and preventing ineffective increases in their number.

Many studies over the past ten years have been devoted to the problems of political interference in the activities of bureaucracy (Nath, A. [22] and Rogger, D. [27]). Also, researchers are trying to assess how expensive it is for society to finance the activities of bureaucracy and how effective it is (Ravishankar, N. [26]). Also interesting are studies that are devoted to assessing the risks of the dominance of individual interests of bureaucracy over public ones (Lipsky, M. [17] and Mansuri, G. and Rao, V. [18], Fafchamps, M., and Labonne, J. [8]). The growing interest in the issues listed above is due to the increasing desire of large business representatives to engage in politics.

Ukrainian researchers are more interested in the role of bureaucracy in politics (O. Tsapko [28], O. Batrimenko [2]), the functions of modern bureaucracy and problems of its development in Ukraine (G. Yakovenko [30]), and the losses to society as a result of the low effectiveness of Ukrainian bureaucracy (Paientko and Fedosov [9]).

The politicization of government bureaucracy is not only a problem for the countries of Eastern and Central Europe. This is evidenced by studies by western researchers in assessing the performance of government bureaucracy (O'Toole, L. [23]), and assessing the impact of government bureaucracy on economic growth (Evans, P., and Rauch, J.E. [7]). Researchers are also trying to determine the best path for the development of state bureaucracies in post-communist and developing countries (Goetz, K.H. [11]; Rauch, J.E., and Evans, P.B. [7]).

Many researchers believe that the introduction of more online government services for citizens is one of the factors driving government effectiveness. This will reduce the direct contact with government officials, which means that the risk of corruption will decrease. As Gronlund, A. [13], points out, since e-government is citizen-

oriented, it will provide greater accountability for government operations and, as a result, will increase the confidence in a government by its citizens. Garson, D.G. believes that increasing the effectiveness of government bureaucracy as a result of the introduction of e-government will be due to improved interaction between different government structures, which will facilitate faster decision-making [10].

Kamarck, E.C. and Nye, J.S. believe that the spread of electronic government services contributes to reducing overhead costs, helps to avoid duplication of functions of various government structures, reduces the cost of providing public services and provides easy access for citizens to e-Government services. In addition, government services become accessible anytime and anywhere [14]. Paientko T. [24] proves that using GIS in public finance reforms can increase accountability and trust in government.

Currently, there are very few systematic studies that would show how the spread of electronic government services affects the effectiveness of the government bureaucracy. Most of the papers are aimed at assessing consumer satisfaction with e-government services (Bretschneider, S., Gant, J. and Ahn, M., Chen, Z. and Dubinsky A.J. [5], AJ, Criado, and Ramilo, M.C. [6]), or devoted to an assessment of the implications of e-government in certain countries (Beynon-Davies, P. and Williams, M.D. [4], Criado, J.I., and Ramilo, M.C. [6], Asgarkhani, M. [1])

3 Methodology

One of the first questions of methodology is to determine which countries indeed belong to the countries of Central and Eastern Europe. There are different opinions. We adhere to the approach that the United Nations uses, which includes Austria, Hungary, Germany, Liechtenstein, Poland, Slovakia, Slovenia, the Czech Republic, Switzerland, Belarus, Russia, Romania, Bulgaria, Moldova, Ukraine, Croatia, and Serbia. Liechtenstein was excluded from the sample, as all the necessary indicators for this country are not available.

A difficulty in assessing bureaucracy effectiveness is caused by the lack of a common approach to define the essence of bureaucratic effectiveness, and therefore the choice of indicators. Although many researchers consider that it is controversial to gauge the effectiveness of government bureaucracy quantitatively, we agree with Groeneveld, S., Tummers, LG, Bronkhorst, B., Ashikali, T., & Van Thiel, S. [12] that quantitatively assessing the effectiveness of the government bureaucracy is not only possible but necessary.

A comparative assessment of the effectiveness of government bureaucracy was carried out using the indicators of Governance and Institutional Quality, which are published by the World Bank. These indicators are publicly available and allow cross-country assessments.

Since the result of activity of government bureaucracy is the economic situation of the country, the indexes of economic freedom that characterize freedom from corruption, the protection of property rights, and the attractiveness of a country for invest-

ment and business are taken as the resulting indicators. This data is also publicly available and allows cross-comparisons.

GDP per capita was chosen as the indicator that shows the level of economic development of the country.

For evaluation of the impact of e-governance on government effectiveness, the government online service index was used (available from World Bank report). The calculations of the index were started from 2012, which is why the number of observations for this indicator is smaller. Also, Belarus was excluded from further calculations, because information about the government online service index is not available for this country.

The study states several hypotheses.

Hypothesis 1. Increasing the effectiveness of government bureaucracy has a positive effect on the dynamics of GDP per capita.

Hypothesis 2. Government effectiveness depends on control of corruption, political stability, regulation quality, rule of law and accountability.

Hypothesis 3. Government effectiveness, control of corruption, political stability, regulation quality, rule of law and accountability depends on government online service index.

The analysis was carried out using R software. Four models were used for the analysis, specifically: pooling, random, within, and between.

4 Results and Discussions

4.1 Testing the Impact of Government Effectiveness on GDP Growth

The study used panel data consisting of indicators for sixteen countries for the years 2002-2017. According to the first hypothesis economic growth (GDP per capita) depends on government bureaucracy effectiveness. The dependent variable is GDP growth per capita (GDPGROWTH). The independent variables are:

CONTROLCORRUPTION – control of corruption;
GOVERNEFF – government effectiveness;
POLISTAB – political stability;
REGQUALITY – quality of regulation;
RULELAW – rule of law;
ACCOUNTABILITY – accountability.

The results of testing the first hypothesis are presented in Table 1.

Table 1. Results of the Testing the First Hypothesis

	Dependent variable:			
	GDPGROWTH			
	Pooling	Random	Within	Between
CONTROLCORRUPTION	2.7***	2.7***	7.8***	0.8
	(0.9)	(0.9)	(2.0)	(0.8)
GOVERNEFF	-3.0***	-3.0***	-3.2	-3.1***

	(1.1)	(1.1)	(2.1)	(0.9)
POLISTAB	1.8*** (0.5)	1.8*** (0.5)	2.8*** (0.9)	1.3** (0.5)
REGQUALITY	2.5** (1.2)	2.5** (1.2)	-1.7 (2.2)	2.9** (1.0)
RULELAW	-4.7*** (1.4)	-4.7*** (1.4)	-9.6*** (2.5)	-1.8 (1.2)
ACCOUNTABILITY	0.4 (0.8)	0.4 (0.8)	-1.1 (1.9)	-0.6 (0.7)
Constant	3.0*** (0.3)	3.0*** (0.3)		3.0*** (0.3)
Observations	256	256	256	16
R2	0.2	0.2	0.2	0.9
Adjusted R2	0.2	0.2	0.1	0.8
F Statistic	9.2*** (df = 6; 249)	55.4***	8.6*** (df = 6; 234)	12.4*** (df = 6; 9)
Note:			*p<0.1; **p<0.05; ***p<0.01	

Source: calculated by authors, based on World Bank Data

The models are statistically significant, and the hypothesis was confirmed. This means that GDP per capita growth depends on the performance indicators of state bureaucracy. Control of corruption, government effectiveness, political stability, and the rule of law have the greatest impact on GDP per capita growth.

A comparison of the performance of the four models follows. R-sq "between" reflects the quality of the fit regression and is quite high (0.9). This means that a change in the time averages for each country has a more significant effect on each variable than the temporal variations of these indicators relative to the average.

The "within" regression allows the elimination of unobservable individual effects from the model. R^2 is 0.2. It can be concluded that within our model, individual differences are more pronounced than dynamic ones. This argues in favor of individual effects being viewed against the end-to-end assessment model.

Models were tested using the Wald and Hausman tests. The results obtained allow that in our case a model with fixed individual effects is suitable to be concluded.

Since both developed and developing countries were included in the sample, similar calculations were made for these two groups. The models of the developed countries are statistically significant and reveal that the growth of GDP per capita is most affected by the effectiveness of the government. However, in the developing countries, it is political stability and the rule of law that have the greatest impact on the GDP per capita.

In most developed countries, democratic traditions are strong enough to allow a society to be confident in its elected government. Taxpayer confidence in government is one of the key factors for economic growth. The developing countries that are included in the sample have long been focused on the creation and/or maintenance of communist or socialist societies. In these countries, the effectiveness of the government is much lower due to a higher level of corruption, as well as an ineffective legal system. Consequently, the test of the second hypothesis is important.

4.2 Testing the Impact of Control of Corruption, Political Stability, Regulation Quality, Rule of Law and Accountability on Government Effectiveness

The second hypothesize is that government effectiveness depends on control of corruption, political stability, regulation quality, rule of law and accountability of government. The dependent variable is government effectiveness (GOVERNEFF). The independent variables are:

CONTROLCORRUPTION – control of corruption;
POLISTAB – political stability;
REGQUALITY – quality of regulation;
RULELAW – rule of law;
ACCOUNTABILITY – accountability.
The results of analysis are presented in Table 2.

Table 2. Results of the Testing the Second Hypothesis

	Dependent variable:		
	GOVERNEFF		
	Pooling	Random	Within
CONTROLCORRUPTION	0.3*** (0.05)	0.3*** (0.1)	0.3*** (0.1)
POLISTAB	-0.01 (0.03)	-0.03 (0.03)	-0.04 (0.03)
REGQUALITY	0.3*** (0.1)	0.1* (0.1)	0.1 (0.1)
RULELAW	0.3*** (0.1)	0.5*** (0.1)	0.5*** (0.1)
ACCOUNTABILITY	-0.005 (0.05)	-0.01 (0.1)	-0.01 (0.1)
Constant	0.1*** (0.02)	0.2*** (0.01)	
Observations	256	256	256
R2	0.9	0.6	0.5
Adjusted R2	0.9	0.6	0.4
F Statistic	891.9*** (df = 5; 250)	449.3***	40.5*** (df = 5; 235)
Note:	*p<0.1; **p<0.05; ***p<0.01		

Source: calculated by authors, based on World Bank Data

The results of the analysis show that the first model is the most significant. As can be seen from Table 2, the control of corruption, the quality of regulation and the rule of law have the greatest impacts on the effectiveness of the government. The same calculations were done for developed and developing countries separately. Developed and developing countries were identified according to World Bank approach. The same sample was used.

The results of the analysis showed that in developed countries, corruption control has the greatest impact on the effectiveness of the government. In these countries, an

effective system of law has already been created, so for the model, the indicator "Rule of Law" is actually a constant. Similarly, the impact of accountability on government effectiveness can be described. Since the accountability system has long been developed and functions effectively, it can be considered constant throughout the study period. It can be concluded that it is important for the governments of developed countries to continue following their democratic traditions, to maintain a high level of accountability, rule of law, and regulatory effectiveness.

In developing countries, the greatest influence on the government effectiveness is exerted by the control of corruption, the effectiveness of regulation, and the rule of law. There is also the influence of political stability (Table 3).

Table 3. Results of the Testing the Second Hypothesis (for Developing Countries)

	Dependent variable:		
	GOVERNEFF		
	Pooling	Random	Within
CONTROLCORRUPTION	0.4*** (0.1)	0.2*** (0.1)	0.2*** (0.1)
POLISTAB	-0.01* (0.04)	-0.04 (0.03)	-0.04 (0.03)
REGQUALITY	0.3*** (0.1)	0.1* (0.1)	0.1 (0.1)
RULELAW	0.4*** (0.1)	0.6*** (0.1)	0.6*** (0.1)
ACCOUNTABILITY	-0.05 (0.1)	-0.04 (0.1)	-0.1 (0.1)
Constant	0.1*** (0.03)	0.1** (0.01)	
Observations	208	208	208
R2	0.9	0.6	0.5
Adjusted R2	0.9	0.6	0.4
F Statistic	346.7*** (df = 5; 202)	260.3***	35.3*** (df = 5; 190)
Note:	*p<0.1; **p<0.05; ***p<0.01		

Source: calculated by authors, based on World Bank Data

It should be noted that in developing countries the legal system is in a state of transformation. Some countries have achieved significant success in ensuring the rule of law, notably the Czech Republic, and Poland, and some, such as Ukraine, have provided only a formal framework for the rule of law.

For many developing countries, the factor of political stability is important. Political stability ensures the constancy of the political and economic development of the country. This allows society to see more realistic results of the work of the government bureaucracy. For developing countries, an important indicator of government performance is the quality of regulation. The quality of regulation provides positive conditions for economic development, which is a very important fact for developing countries, since they have yet to overcome the gap in economic development with the

developed countries. As can be seen from the Table 4, control of corruption depends on rule of law and accountability.

Table 4. Regression Statistic for the Indicator "Control Corruption"

	Dependent variable:
	CONTROLCORRUPTION
	Pooling
RULELAW	1.2***
	(0.04)
ACCOUNTABILITY	-0.3***
	(0.05)
Constant	-0.03*
	(0.02)
Observations	256
R2	0.9
Adjusted R2	0.9
F Statistic	1,504.0*** (df = 2; 253)
Note:	*p<0.1; **p<0.05; ***p<0.01

Source: calculated by authors, based on World Bank Data

Therefore, for developing countries in which corruption is one of the obstacles to business development and the emergence of democracy, it is important to ensure that rule of law and government accountability are foundational, guarded, and encouraged by the developed countries.

It should be noted that most countries with low GDP per capita, including Ukraine, Belarus, and Bulgaria, need large amounts of investment for the development of the economy, especially for business infrastructure. Most countries cannot cover the need for investment through domestic resources, so they expect to attract funds from foreign investors. In this regard, the question arises of how difficult it is to attract investments in countries with a high level of corruption, a lack of rule of law, and low effectiveness of regulation. It is obvious that investors will more willingly invest in countries where the effectiveness of the government is higher, and the rights of the investor will be guaranteed due to a low level of corruption and a functioning judicial system. This fact partly explains the fact that some post-socialist countries have achieved greater success in economic development in comparison to those countries where the effectiveness of the government remains low.

4.3 Testing the Impact of Informational Technology (E-Governance) Implementations on Government Effectiveness

The third hypothesis is that government effectiveness, control of corruption, political stability, regulation quality, rule of law and accountability depend on government online service index (GOVONLINESER). Some research states that e-governance helps to reduce corruption, especially in developing countries. When citizens communicate with government officials, the risk of corruption is higher. E-governance

decreases the need for direct communication and, therefore, decreases risk of corruption. The results of the analysis are presented in Table 5.

Table 5. Results of the Testing the Third Hypothesis

	Dependent variable:			
	CONTROLCORRUPTION			
	Pooling	Random	Within	Between
REGQUALITY	0.2 (0.1)	0.1 (0.1)	-0.02 (0.1)	0.2 (0.4)
RULELAW	0.9*** (0.1)	0.5*** (0.1)	0.1 (0.1)	0.8* (0.4)
ACCOUNTABILITY	0.2 (0.1)	0.4*** (0.1)	0.4** (0.1)	0.1 (0.4)
GOVONLINESER	0.2 (0.1)	0.05 (0.1)	-0.02 (0.1)	0.6 (0.1)
Constant	-0.4*** (0.02)	-0.3*** (0.01)		
Observations	90	90	90	15
R2	0.9	0.6	0.2	1
Adjusted R2	0.9	0.6	0.1	0.9
F Statistic	333.9*** (df = 5; 250)	152.7***	3.4** (df = 4; 71)	48.3*** (df = 4; 10)
Note:	*p<0.1; **p<0.05; ***p<0.01			

Source: calculated by authors, based on World Bank Data

The obtained dependencies are statistically significant, and the determination coefficient shows that the first three models describe the studied dependence well. As can be seen from the results of the calculations, the government online service index does not affect corruption control.

In the next stages of the study, we tested how the government online service index affects accountability, rule of law, regulatory quality, and government effectiveness in general. For these indicators, except for accountability, the government online service index has no affect. The results of calculations on the degree of influence of the government online service index on accountability are given in Table 6.

Table 6. Results of the Testing the Impact of Government Online Service Index on Accountability

	Dependent variable:			
	ACCOUNTABILITY			
	Pooling	Random	Within	Between
REGQUALITY	0.3*** (0.1)	0.3*** (0.1)	0.2** (0.1)	0.2 (0.2)
RULELAW	0.6*** (0.1)	0.3*** (0.1)	0.3** (0.1)	0.7** (0.3)
CONTROLCORRUPTION	0.2 (0.1)	0.2*** (0.1)	0.2** (0.1)	0.04 (0.2)
GOVONLINESER	-1.0***	-0.1*	-0.1	- 2.1***

	(0.2)	(0.1)	(0.1)	(0.5)
Constant	0.7*** (0.1)	0.3*** (0.1)		
Observations	90	90	90	15
R2	0.9	0.7	0.3	1
Adjusted R2	0.9	0.7	0.2	0.9
F Statistic	231.5*** (df = 4; 85)	203.3***	9.2*** (df = 4; 71)	52.2*** (df = 4; 10)
Note:		*p<0.1; **p<0.05; ***p<0.01		

Source: calculated by authors, based on World Bank Data

As can be seen from the calculations, the impact of the introduction of e-government services on accountability is negative. The result can be explained by two main reasons. First, when a study is conducted over a short period of time, the calculations should be repeated after a certain time, that is, when the government online service index will have at least seven points. The second is the calculations were made without considering time lag, which should be addressed in further research.

Although the third hypothesis has not been confirmed on the investigated period of time, this does not mean that the introduction of e-government will not have a positive effect on the effectiveness of government bureaucracy. However, such an estimate could be made when the indicators are studied for a longer period of time.

5 Conclusions

The transformation of the public sector after 1989 was aimed at consolidating the democratic process and accelerating economic development. However, administrative reforms in the countries of Central and Eastern Europe face serious problems in the context of economic liberalization, including insufficient opportunities for modernization and the cultural heritage of the past. Therefore, it is necessary to assess the impact of reform of government bureaucracy by examining government transparency and economic growth.

The results of the empirical analysis show that the effectiveness of the government in the countries of Central and Eastern Europe is one of the key factors of economic development. It is a more significant factor for developing countries than for developed, because developed counties have a high level of government effectiveness. The threat for government effectiveness in developed countries is the level of control of corruption.

Government effectiveness in developing countries is lower according to World Bank data, and it highly depends on the control of corruption, rule of law, and quality of regulation. The economic growth in those countries is also slow. Those countries need to attract external investments. It would be much easier to do so if investors are confident in government effectiveness. This means a low level of corruption, effective rule of law, and effective government regulation.

The results of the empirical research have subsequently confirmed that after the adoption of civil transformation, public administration becomes more effective in

fighting corruption, as well as ensuring economic growth. Fighting corruption is one of the weak spots of developing countries. The empirical results showed that the control of corruption depends on rule of law and government accountability. The introduction of e-government at the time of the evaluation has had no effect on the effectiveness of the government seen in its entirety, and on the control of corruption specifically. Therefore, countries with low government effectiveness should not have great expectations for e-government, but they should work more on the implementation of rule of law and increase quality of regulation.

Consequently, despite delays and difficulties, the transformation of government bureaucracy is vitally important, and democratic countries can truly expect more positive results sooner than countries that are slowly moving along the path of democratization.

This research has several limitations. Firstly, the sample is limited by Eastern and Central European countries. Secondly, the time length for e-governance study is limited to the years 2012-2017, because a government online service index is only available for this period. Thirdly, there is only one indicator of economic development that was tested. The research will be continued in the future to eliminate mentioned limitations.

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