

THE IMPACT OF GOOD GOVERNANCE AND E-GOVERNMENT ON DIGITAL TRANSFORMATION AND ECONOMY

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Literature Review

The interdependent relationship between economic development and technological advancement is evident in the evolution of e-government, which has significantly improved the efficiency, transparency, and responsiveness of public services. E-government enhances interactions between government entities and various stakeholders, businesses, and other organizations by integrating information and communication technologies (ICTs) into public administration. This not only reduces time and cost but also increases labor productivity and public trust. Numerous studies highlight a positive correlation between e-government development and economic growth, as improved service delivery fosters citizen engagement and institutional effectiveness. However, realizing the full potential of e-government requires governments to manage complex challenges and ensure strategic integration of emerging technologies into existing platforms. This research explores such dynamics in the context of Azerbaijan by reviewing relevant indicators and literature to evaluate e-government's impact on the economy [1,7].

Chapter 1.

Definition and evolution of e-Government

1.1 Definition and Evolution of e-Government

The term "e-government," or "electronic government," refers to the use of data and ICT by governments to deliver digital services, enhance relationships with the public, businesses, and other stakeholders, and improve public administration. E-government has become an essential component of modern governance, offering significant benefits to economies and societies worldwide [6]. Its primary purpose is to utilize ICT to improve the efficacy, efficiency, transparency, and accessibility of government services and activities. E-government aims to enhance the experience of residents and businesses by streamlining bureaucratic processes, reducing administrative burdens, and simplifying procedures [1, 3].

Importance of e-Government for the Economy:

E-Government significantly impacts the economy by fostering sustainable growth through various positive effects. Key benefits include increased efficiency and cost savings. By digitizing government processes and automating administrative tasks, E-Government reduces bureaucracy, paperwork, and redundancies, saving time and money for both government and citizens/businesses. Online services such as business registration, licensing, and procurement also support businesses by lowering entry barriers, simplifying operations, and encouraging entrepreneurship and innovation. Furthermore, E-Government empowers citizens by providing access to information, services, and opportunities for engagement, promoting inclusivity and enhancing citizen participation in decision-making and policy formulation. This empowerment leads to more efficient public policies, social cohesion, and long-term economic growth [2].

1.2 Electronic Government in The World

Electronic government is a global phenomenon, with countries worldwide adopting digital technologies to transform public sector operations and services. It is now possible to examine the evolution and current state of e-government programs, highlighting key trends, challenges, and successes. Each nation has its unique context, challenges, and strategies, and studying these experiences provides valuable insights into the economic impact of e-government [3]. Estonia is widely recognized as a global leader in e-government, offering a range of digital services to enhance citizen engagement and streamline public administration. Notable initiatives include the "e-Residency" program, which allows non-residents to access Estonian e-services and establish businesses remotely, as well as online voting, digital health records, and an e-Tax system. These innovations have improved efficiency, transparency, and accessibility for both individuals and businesses [4]. Singapore is also recognized for its

successful e-government initiatives, particularly the "Smart Nation" plan, which aims to enhance residents' quality of life through technology. Key projects, such as "SingPass," provide a unified government portal for easy access to services, while digital solutions in areas like public transit, housing, healthcare, and education have increased efficiency and convenience for citizens [5].

1.3 Benefits and challenges of e-Government implementation

1.3.1 Benefits of e-Government implementation

E-government offers benefits by digitizing services, enhancing accessibility, improving efficiency, reducing costs, and promoting transparency, accountability, and public engagement. Automation boosts government efficiency, saving time, effort, and resources, while reducing expenses. By minimizing manual labor and physical infrastructure, e-government generates financial and time savings and strengthens governance transparency and accountability [7].

1.4.2 Challenges of e-Government implementation

Several challenges hinder e-government implementation, especially in developing countries and remote areas, where infrastructure such as reliable internet, electricity, and hardware may be lacking. Privacy and data security concerns also arise, requiring governments to protect personal information and comply with data protection regulations [7].

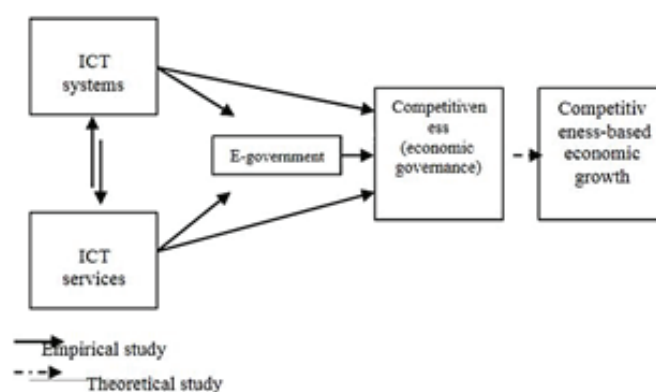
Chapter 2.

The impact of e-Government for economy

2.1 The Potential of E-Government for Economic Development

E-government has gained prominence in public administration, aiming to improve government operations, enhance public services, and promote economic growth. It targets citizens, businesses, employees, and government agencies. The theory of public goods is relevant, as it focuses on improving the provision and delivery of government services, a core state responsibility [2].

Figure 1. Modeling the impact of e-government on economic expansion



Source: United Nations (2010), Modelling E-Government.

According to the World Economic Forum, e-government can transform citizen-government interaction, fostering deeper engagement. Research shows a link between competitiveness, income levels, and e-government initiatives, which can boost economic growth and benefit society. As technology drives progress, e-government plays a key role in shaping a better future [2].

Chapter 3. Global Trends in E-Government

3.1 Measurement of e-government development: Opportunities and Challenges for countries

This study develops a model to assess the impact of e-government on economic activity using an econometric approach. E-government enhances government efficiency, transparency, and service delivery while promoting democracy [2]. The Electronic Government Development Index (EGDI) is used to measure e-government progress, considering various factors to evaluate a nation's use of information technology for access and inclusion [6].

3.2 Data analysis for EGDI indicators of Azerbaijan

Data and Methodology: This study utilizes 20 years of annual time series data for Azerbaijan on GDP, FDI, EGDI, and trade. A multiple linear regression model analyzes the impact of these variables on economic performance, with GDP as the dependent variable.

Data Collection: Data for Azerbaijan (2002–2021) was obtained from the State Statistical Committee (stat.gov.az) and the World Bank (world-bank.org).

Model Details: E-government infrastructure can enhance a nation's competitiveness and drive long-term economic growth by improving information access, reducing administrative burdens, promoting entrepreneurship, and fostering innovation. To assess its economic impact, the independent variables should be studied separately. The model is outlined as follows:

$$GDP = \beta_0 + \beta_1(FDI) + \beta_2(EGDI) + \beta_3(Trade) + \varepsilon$$

where:

GDP: Dependent variable representing the country's economic output. **FDI:** First independent variable, indicating foreign direct investment. **EGDI:** Second independent variable, representing the e-government development index. **Trade:** Third independent variable, referring to international trade. β_0 : Intercept, the constant term in the regression equation. $\beta_1, \beta_2, \beta_3$: Regression coefficients measuring the effect of each independent variable on GDP. ε : Error term capturing variation in GDP not explained by the independent variables.

Statistical analysis: The dataset contains 20 time-series observations of four economic indicators. Nominal GDP is the dependent variable, while EGDI, FDI, and Trade serve as independent variables. All variables are numerical. The analysis began with checking for missing and unique values using the command in STATA. No missing values were identified. All variables have 20 unique values, except EGDI. Figure 2 illustrates the descriptive statistics and the distribution of the variables included in the dataset.

Figure 2: Descriptive Statistics and Distribution of Variables

GDP					
type: numeric (double)					
range: [6235.9,75234.7]		units: .1			
unique values: 20		missing .: 0/20			
mean: 42254.5					
std. dev: 21718					
percentiles:	10%	25%	50%	75%	90%
	7978.2	27016.7	45704.9	53911.1	71924.1
EGDI					
type: numeric (double)					
range: [.36351,.71]		units: 1.000e-06			
unique values: 19		missing .: 0/20			
mean: .518618					
std. dev: .11788					
percentiles:	10%	25%	50%	75%	90%
	.37606	.419115	.48805	.634907	.692442

FDI					
type: numeric (double)					
range: [2025,8049]		units: .001			
unique values: 20		missing: 0/20			
mean: 4821.78					
std. dev: 1516.1					
percentiles:	10%	25%	50%	75%	90%
	3123.19	4045.5	4472.5	5502	7403.5

Trade							
type: numeric (double)							
range: [-35803.7,40586059]			units: .1				
unique values: 20			missing: 0/20				
mean: 8.3e+06							
std. dev: 9.4e+06							
percentiles:			10%	25%	50%	75%	90%
			117759	803669	6.3e+06	1.3e+07	1.6e+07

Source: Author, State Statistical Committee of the Republic of Azerbaijan.

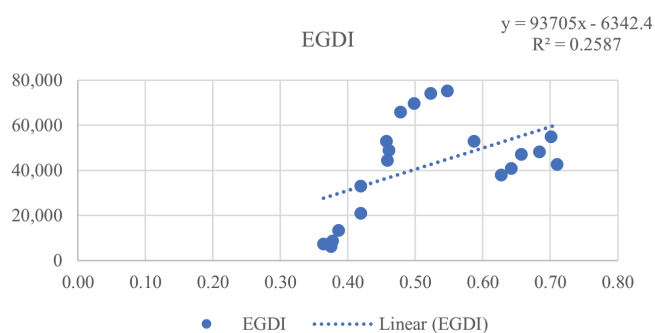
Figure 3 presents the results of the descriptive statistical analysis, including the mean, number of observations, standard deviation, minimum, and maximum values of the variables, obtained using the summarize command.

Figure 3. Statistical analysis result.

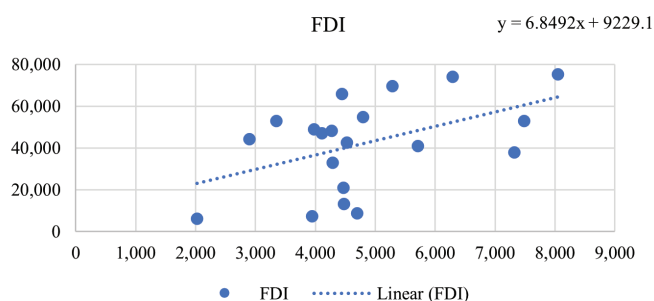
. sum					
Variable	Obs	Mean	Std. Dev.	Min	Max
GDP	20	42254.53	21717.96	6235.9	75234.7
EGDI	20	.5186183	.1178802	.36351	.71
FDI	20	4821.784	1516.098	2025	8049
Trade	20	8277974	9432422	-35803.7	4.06e+07

Source: Author, State Statistical Committee of the Republic of Azerbaijan.

Checking for a linear connection between dependent and independent variables is the next stage. It is one of the underlying hypotheses in multiple linear regression. I used Excel's Scatter plot to accomplish it. Scatter plot also shows us relationships among dependent and independent variables.

Figure 4. Scatter Plot of EGDI

Source: Author, State Statistical Committee of the Republic of Azerbaijan.

Figure 5. Scatter Plot of FDI

Source: Author, State Statistical Committee of the Republic of Azerbaijan.

As a result of analysis of the Scatter plot, we didn't find evidence of nonlinear connection between dependent and independent variables, so we can assume that our model is linear. Then we need to construct multiple linear regressions model. To do it we use Regressions command in STATA

Figure 6. Regression Output from STATA

. reg					
Source	SS	df	MS	Number of obs = 20	
Model	5.7605e+09	3	1.9202e+09	F(3, 16) =	9.60
Residual	3.2012e+09	16	200074314	Prob > F =	0.0007
Total	8.9617e+09	19	471669362	R-squared =	0.6428
				Adj R-squared =	0.5758
				Root MSE =	14145
	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
EGDI	61075.01	30143.79	2.03	0.060	-2826.976 124977
FDI	4.836745	2.337108	2.07	0.055	-1.177034 9.791194
Trade	.0012536	.0003451	3.63	0.002	.000522 .0019852
_cons	-23118.87	15569.27	-1.48	0.157	-56124.25 9886.508

Source: Author, State Statistical Committee of the Republic of Azerbaijan.

Based on the coefficients indicated in the table, we will write our regression equation:

$$GDP = -23,118.87 + 61,075.01 * EGDI + 4.83 * FDI + 0.0012 * Trade$$

According to our equation we see that EGDI has a positive effect on dependent variable. When EGDI increases for one unit, GDP increases by 61075.01 units. FDI has positive effect on GDP. When, FDI increases for one unit, GDP increases for 4.83 units. Trade has positive effect on GDP. When Trade increases for one unit, GDP increases by 0.0012 units.

Null Hypothesis: According to our null hypothesis the effects of independent variables on Net GDP to 0.

$$H_0: B_1 = B_2 = B_3 = 0$$

Alternative Hypothesis According to our alternative hypothesis, at least the value of one of the independent variables is different from 0.

$$H_1: B_1 = B_2 = B_3 \text{ are different than } 0$$

The study employs a two-sided alternative hypothesis and uses a joint F-test to assess the impact of independent variables on GDP. The F-statistic exceeds the critical value with a p-value of 0, leading to rejection of the null hypothesis and confirming joint significance. An R-squared of 0.6428 indicates that 64.28% of GDP variation is explained by the model. Individually, Trade is significant ($p = 0.002$), while EGDI is not ($p = 0.06$), though it may still affect GDP indirectly, implying possible multicollinearity. This is evaluated using a correlation matrix; values beyond ± 0.7 suggest multicollinearity, while values within the range indicate no concern.

Figure 7. Correlation Matrix

	GDP	EGDI	FDI	Trade
GDP	1.0000			
EGDI	0.5086	1.0000		
FDI	0.4781	0.4012	1.0000	
Trade	0.5744	0.0765	0.0137	1.0000

Source: Author

If there is an MC problem, we cannot measure the real impact of our independent variables on dependent variables. I will use the Variance Inflation Factor (VIF) method to check multicollinearity. In general, multicollinearity can develop when the VIF is higher than 4 or the tolerance is lower than 0.25.

To assess multicollinearity, the VIF command was employed in STATA, as illustrated below.

Figure 8: Variance Inflation Factor (VIF) Results for Multicollinearity Diagnostics

. vif		
Variable	VIF	1/VIF
EGDI	1.20	0.833989
FDI	1.19	0.838737
Trade	1.01	0.993810
Mean VIF	1.13	

Source: Author

As shown in the results, the VIF values for all variables are below the threshold of 4, indicating the absence of multicollinearity in the model.

Result for the regression analysis

This study empirically investigates the effects of EGDI, FDI, and trade on Azerbaijan's economic growth from 2002 to 2021, revealing their significant contribution to economic development. The results highlight these variables as key drivers of the country's economic expansion. Nonetheless, limitations such as a small number of EGDI observations and the absence of cross-country comparisons restrict the study's scope. Future research should expand the dataset and include comparable countries to improve the robustness and generalizability of the findings.

Conclusion

This study underscores the pivotal role of e-government in advancing efficient, transparent, and accessible public services. Empirical analysis confirms that e-government, together with FDI and trade, significantly contributes to Azerbaijan's economic growth by enhancing governance, reducing transaction costs, and promoting innovation and market efficiency. However, realizing its full potential requires addressing infrastructural limitations, digital accessibility, and cybersecurity concerns. Strengthening telecommunications infrastructure and investing in human capital are essential for sus-

taining the long-term benefits of e-government and supporting broader economic development.

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SUMMARY

The growing reliance on technology has led to the widespread adoption of digital procedures for administrative tasks. E-government services have expanded globally, offering citizens and businesses more efficient access to public services. This digital transformation, evolving in stages, reduces disruptions and boosts economic performance through improved efficiency, accessibility, and transparency.

Keywords: e-gov, digital shift, public services, efficiency

XÜLASƏ

Texnologiyalardan artan asılılıq müasir cəmiyyətdə inzibati tapşırıqlar üçün rəqəmsal prosedurlardan geniş istifadəyə səbəb olub. Son dövrlərdə, e-hökumət xidmətləri qlobal səviyyədə genişlənərək vətəndaşlara və bizneslərə dövlət xidmətlərinə daha səmərəli çıxış imkanı təqdim edir. Bu rəqəmsal transformasiya bir neçə mərhələdən keçərək pozuntuları azaldır və effektivlik, əlçatanlıq və şəffaflıqla iqtisadi performansını artırır.

Açar sözlər: *e-hökumət, rəqəmsal dəyişiklik, dövlət xidmətləri, effektivlik*

РЕЗЮМЕ

Растущая зависимость от технологий привела к широкому использованию цифровых процедур для административных задач. В последние годы услуги электронного правительства расширились по всему миру, предоставляя гражданам и бизнесу более эффективный доступ к государственным услугам. Эта цифровая трансформация развивалась в несколько этапов, помогая сократить disruptions и улучшить экономическую эффективность благодаря повышенной эффективности, доступности и прозрачности.

Ключевые слова: *электронное правительство, цифровая трансформация, государственные услуги, эффективность.*