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The Effect of E-Government on Corruption-International Evidence

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ABSTRACT
This study aims to prove the relationship between E-Government (E-Gov) and Corruption. GONE Theory is a theory that underlies someone committing corruption. The population is all countries in the world. The study periods are 2012, 2014, 2016, 2018, 2020, and 2022. The samples are selected using purposive sampling. The final observation amounts to 1026 (Unbalanced Firm-Year) consisting of 174 countries. Simple linear regression analysis is used with Stata. The results find that E-Gov has a significant effect in reducing corruption. Then, each EGDI element is used as an independent variable for robustness testing and show that each element has a significant effect on corruption. The higher EGDI score, the higher CPI score. A higher CPI score means that the country is cleaner from corruption, and vice versa. The results of the study can be generalized, but for better results it is necessary to add elements of citizens' perceptions of E-Gov and corruption. Further research also needs to add control variables to avoid bias in research results.

Keyword: E-Gov, Corruption.

1. INTRODUCTION

Corruption is a problem that has attracted a lot of attention throughout the world because its existence can disrupt economic stability and productivity and can paralyze a country's economy (Erum & Hussain, 2019). Corruption is the abuse of trust that has been given to obtain personal gain. The negative effect of corruption on the national economic has been widely recognized (Anh et al., 2016). Corruption can reduce the level of public trust, prevent national development, and increase inequality and increase poverty. There are various types of corruption carried out, for example misuse of budgets, permits, levies and bribery. Transparency International stated that corruption consists of 3 types, which are grand, medium, and piety corruption. First, grand corruption is corruption carried out by high-level officials with the aim of benefiting certain parties and causing serious state losses. Medium corruption is corruption that involves government and/or private institutions taking advantage of their colleagues to

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gain personal incentives. Piety corruption is corruption that involves private people or individuals who use their power for personal gain (Uroos et al., 2022).

The facts show that corruption has become rampant in various countries without distinguishing between developed and developing countries. Survey result of Transparency International's Global Corruption Barometer in 2017 show that 1 in 4 people in the world say that they must pay bribes when utilizing public services. The survey also revealed that most people in the world think that the government is not fighting corruption, and only 30% of governments are doing their functions well. Apart from that, many officials in various countries often use their power to gain profits for their own interests (Pring, 2017). The biggest corruption cases have occurred in several countries, for example in 2006 there was a case of corruption by the Siemens company (United States) which bribed civil servants and governments across continents, in 2014 corruption was carried out by Viktor Yanukovych (Ukraine) and Sani Abacha (Nigeria) who embezzled state money for his personal interests, and in 2016 the dark secrets of the financial industry were revealed, namely Mossack Fonseca, which created hundreds of thousands of shell companies to protect individuals who wanted to evade taxes (UMSU, 2023). From this case, it can be concluded that corruption can occur anywhere, both in developed and developing countries.

State finances essentially aim to finance sectors supporting development, but with the existence of corrupt practices this aim cannot be achieved (Nayabarani, 2018). Of course, this not only harms the state but also further oppresses the people because the rights they should receive are being corrupted. So, the government needs to do various things to combat corruption, for example by utilizing technology.

Information and Communication Technology (ICT) becomes an important part of human life. Most people in the world have access to ICT because it cannot be denied that almost all forms of activity are carried out using technology. ICT can be used as a tool in preventing, detecting, and prosecuting corruption (I. Adam & Fazekas, 2018). ICT can also increase transparency, accountability, public participation, and facilitate better communication between government and citizens. ICT can be used as a tools in fighting corruption, this is because ICT increases ease of access to information, monitors official performance, digitizes public services, and enables reporting of corruption (Adam & Fazekas, 2018).

The development of ICT in the world inspires various parties to take advantage of ICT in improving economic growth, for example the use of the internet by many governments in the world by establishing E-Government services in public administration (Sassi & Ali, 2017). Abu-Shanab et al. (2013) stated that technology has changed the way government works so that it can provide better services. E-Gov is government communication with the public by utilizing the internet and digital technology. It aims to improve quality of efficient and transparent public services (Adam, 2020). E-Gov can be used as an alternative to provide better services and governance, more effective communication between citizens and the government (Abu-Shanab et al., 2013).

Several research have tested the effect of ICT on corruption. Mistry & Jalal (2012) found that the use of ICT related to E-Gov can increase the reduction in corrupt practices, and the effect is greater in developing countries which is compared to developed countries. Elbahnasawy (2014) state that E-Gov can be a tool for eradicating corruption. However, the use of e-gov is still minimal. This is due to inequality in the use of public services. In some countries, some service systems can be done online but do not work well because it still requires users to come directly to government offices to complete services. For example, in Indonesia, currently the Driver's License renewal service can be done online using the "Digital Korlantas

Polri" application since 2021. However, until now these public services have not run optimally because there are several obstacles experienced by the community when using them, for example, an unstable internet connection, especially causing the application to be difficult to access, coupled with the need for the public to upload other data such as psychological and physical test results which are considered difficult (Prinada, 2024). Therefore, the laws and statutes must be reviewed to make E-Gov more effective. Increasingly effective e-gov makes it possible to reduce levels of corruption better. So that the regulations and laws that are made must really ensure that the government applies the principle of openness so that the public can participate in monitoring government activities

Bhattacherjee & Shrivastava (2018) proves that the ICT Law can strengthen the impact of ICT on corruption and ICT is an important element in fighting corruption. Adam (2020) proves that ICT plays an important role in in ensuring transparency and justice, however theories explaining how ICT relates to corruption are still very limited, especially the impact of E-Gov on corruption. (Sadik-Zada et al., 2022) found that the better the level of E-Gov, the lower the level of corruption. Other research was conducted by Sriyakul et al. (2022) found that the use of E-Government can reduce corruption, but this study only took samples for four countries. Then, several researchers suggested to expand the research area Abu-Shanab et al., (2013); Sriyakul et al., (2022); Talab et al., (2019). Adam (2020) stated that further research is needed to ensure a stronger influence of E-Gov on corruption. This research aims to prove empirically the effect of implementing E-Gov on corruption by taking a wider sample. GONE Theory which underlies someone to commit fraud, including corruption. The research sample used countries throughout the world that were included in the research criteria (purposive sampling) for the years 2012, 2014, 2016, 2018, 2020, and 2022. Simple linear regression analysis and robustness testing were carried out. The research results show that E-Government can reduce the level of corruption.

2. LITERATURE REVIEW AND HYPOTHESIS

Greed, Opportunity, Needs, Exposes (GONE) Theory

The GONE theory is one of the theories that is often used as the basis for someone to commit fraud, including corruption. This theory was introduced by Jack Bologne in (1993). GONE is an abbreviation for Greed, Opportunity, Needs, and Expose. These four things are factors that encourage someone to commit acts of fraud, including corruption.

Isgiyata et al. (2018) greed is a trait of avarice and greed of corrupt actors that potentially exists in everyone. Basically, humans have a nature that is never satisfied. Corrupt perpetrators will never feel satisfied with what they have, they will continue to try to increase their wealth (Purwanto et al., 2021). This trait can cause a person to commit corruption in order to satisfy their satisfaction. Opportunity is related to a condition in an organizational system or organization that provides an opportunity for someone to commit fraud (Lailatuddzikriyyah, 2021; Mohamed et al., 2021; Fakhroni & Setiawan, 2024). A weak internal control system causes a person to act as he pleases and is free to commit fraud so that corrupt behavior will be wide open. Needs are the things that are needed of individuals to support their lives. According to Gossen's Law, in addition to having the trait of never feeling satisfied, basically humans have unlimited needs. According to Naya & Yanti (2020) a person's behavior is initially driven by a need which then gives rise to an urge to cheat in order to meet these unlimited needs. Purwanto et al. (2021)Expose relates to the actions or consequences that an individual will receive if revealed to have cheated on them. The low deterrent effect and punishment given to cheaters can open a gap for others to commit fraudulent acts.

These four things can also encourage a person to practice corruption. With the existence of E-Government, it is hoped that it can prevent someone from committing acts of corruption because every behavior they do can be directly supervised by the public. Some researchers use GONE Theory as a basic theory in looking at the impact of e-gov on corruption (Fakhroni & Setiawan, 2024; Isgiyata et al., 2018; Junus et al., 2023; Sinuraya & Rachmawati, 2017). Junus et al. (2023) stated that the GONE Theory can explain that the scope of fraud can be narrowed by the application of e-government.

Corruption

The World Bank (2000) defined corruption as an act of abuse of power to gain personal interests. Meanwhile, according to the Asian Development Bank, corruption is inappropriate and unlawful behavior carried out by both public and private sector employees with the aim of enriching themselves. Corruption is a crime that can cause many problems in a country (Khan et al., 2021). Based on this definition, corruption can be interpreted as negative behavior and contrary to the law carried out by a person where the impact can cause losses to a country. Research has proven that corruption can damage citizens' trust in government, reduce economic growth, hinder investment, and create political instability (Arayankalam et al., 2021)and grounding our discussion on three theoretical perspectives, namely, (1. Corruption can occur at the village and city levels or both. Corruption that occurs can contribute to the assessment of the level of corruption in a country. In this study, corruption is measured at the global level using corruption perception index data.

E-Government

E-Gov is the use of ICT in government agencies so that it can improve relations between the government and related parties. According to Thoppae & Praneetpolgrang (2021) E-Gov is a change in the government administration system by utilizing technology in providing public services with the aim of making government performance more optimal. E-gov can make public service more transparent because every citizen can access the service. Mouna et al. (2020) stated that with the use of E-Gov, the services and activities provided by the government to its citizens can be more transparent and accountable. E-Government can be used to improve better governance. By implementing e-gov, government can establish relations with the community and business partners (Laming et al., 2023). Some researchers have proven that egovernment can be an effective tool in reducing corruption (e.g. Junus et al., 2023; Laming et al., 2023; Sriyakul et al., 2022; Adam, 2020).

E-Government and Corruption

E-Gov defines as the utilization of technology by the government in the government system with the aim of providing better public services (UNDP, 2006). Mouna et al. (2020) stated that E-Gov can reduce the level of corruption because it reduces interactions between government officials who carry out corrupt practices and their citizens, thereby reducing discretionary power.

One of the benefits of E-gov is that it can be used as a tool to monitor unreasonable government policies and decisions. This is because E-Gov can increase government transparency and accountability. Sheryazdanova et al. (2020) (2017) stated that with E-Gov, the implementation of government work can be tracked and make it easier for citizens to report their complaints thereby increasing law enforcement. A less open decision-making process allows corruption to occur, so that the existence of E-Gov makes access to information open and citizens can monitor the decision-making process.

Previous study has proved the relationship between of E-Gov and corruption. Several studies have found that E-Gov can be used as an alternative tool to combat corruption (for example Andersen (2009); Mistry & Jalal (2012); Elbahnasawy (2014); Kim (2014); Zhao

& Xu (2015); Sassi & Ben Ali (2017); Bhattacherjee & Shrivastava (2018); Talab et al., (2019); Adam (2020); Park & Kim (2020); Sadik-Zada et al. (2022); Sriyakul et al. (2022). However, Basyal et al. (2018) and Mouna et al. (2020) found no evidence of the effect of E-Gov on corruption. Nevertheless, the majority of research that has been conducted finds that e-gov plays an important role in reducing corruption level. So that:

H1: E-Government has a negative effect on Corruption

3. METHODS

Population and Sample

The population is all countries throughout the world that are included in the Corruption Perception Index (CPI) list by Transparency International. The research sample was selected using purposive sampling to determine which countries could be used as samples. Some countries cannot be used as research samples because they do not have the data needed. The research years used were 2012, 2014, 2016, 2018, 2020, and 2022. This is because data on the corruption variable using the Corruption Perception Index measurement is only available every 2 years.

Data Types and Analysis

This study is quantitative research and uses secondary data obtained from the United Nations and Transparency International reports. E-Government data is obtained from reports published by the United Nation every 2 years, while corruption data uses the CPI list published by Transparency International. Data analysis uses simple linear regression. STATA software is used as a tool that helps in processing research data. The statistical testing carried out consisted of descriptions of research variables, testing estimation models for panel data consisting of Chow Testing, Hausman Testing, and Lagrange Multiplier Testing, and testing research hypotheses and also conducting Robustness Tests to strengthen the research results.

Research Model

Proving the research hypothesis uses model 1. The model was chosen because the study only used one dependent variable and one independent variable.

$$\mathbf{CPI_{it} = \alpha_0 + \beta_1 EGDI_{it} + \varepsilon_{it}}$$

Information:
CPI : Corruption
EGDI : *E-Government*
ε : Error
it : firm i, year t

Variable Operationalization

Corruption

The corruption variable is measured using the CPI obtained by Transparency International every year. CPI is an indicator to measure perceptions of public sector corruption. The CPI has a scale of zero (very corrupt) to 100 (very clean). CPI data can be accessed directly on the official website of Transparency International.

E-Government

The E-Government variable is measured using the E-Government Development Index (EGDI). EGDI is obtained from the E-Government Survey conducted by the Department of Economics and Social Affairs, United Nations every two years. EGDI consists of 3 dimensions, namely Online Service Index (OSI), Telecommunication Infrastructure Index (TII), and Human Capital Index (HCI). OSI is online services quality, TII is the level of telecommunications infrastructure development, and HCI is the inherent human capital index. The EGDI value itself is the average score of these 3 dimensions.

4. RESULTS AND DISCUSSION

Determining the Research Sample

The population is all countries in the world i.e. 195 countries. After data collection, several countries were excluded because the required data was not available. The number of countries that can be sampled is 174 countries. The research years used were 6 years with a gap of 1 year, which are 2012, 2014, 2016, 2018, 2020, and 2022. This is because E-Government variable

data is only available once every two years. Thus, the final sample used was 1026 (Firm-Year) with unbalanced panel data. After the sample is determined, the research data is processed.

Descriptive Statistics

Before carrying out statistical testing, it is necessary to first see how the research data used is distributed. Table 1 contains descriptive statistics on the variable data used in this research.

Table 1 contains descriptive statistics for each research variable. The CPI has a mean value of 42.9172, which means that the average country gets a medium CPI score. Meanwhile, EGDI is 0.5410, which shows the index for the use of ICT in middle government because the value is only slightly higher than half of the total score, namely 100 scores for CPI and 100% for EGDI. The CPI standard deviation is 19.2440 while the EGDI is 0.2233, which shows that the variability of the data used in this study is quite good, because the closer the standard deviation value is to zero, the lower the data variability. The minimum CPI value is 0 and the maximum value is 92, this shows that there are still countries that get a score of 0 regarding the level of corruption in that country. Meanwhile, EGDI has a minimum value of 0.0139 and a maximum value of 0.9748, which shows that there is quite a gap because there are countries where the use of ICT in government is only 1% while in other countries it reaches almost 98%.

Selection of Estimation Model

In selecting the most appropriate estimation model, several tests need to be carried out, namely the Chow Test to determine whether the model is a Common Effect Model (CEM/PLS) or a Fixed Effect Model (FEM). If the Chow Test result is FEM, it is necessary to carry out the Hausman Test to determine whether it is FEM or Random Effect Model (REM). If the Chow Test result is CEM or the Hausman Test result is REM, it is necessary to carry out a Lagrange Multiplier test, namely to determine whether the model is REM or CEM. The test results to determine the estimation model in this research are as follows (Table 2).

Based on the table 2, it can be concluded that the best estimation model that can be used for analysis in this research is the Random Effect Model (REM), in line with research conducted by (Sadik-Zada et al., 2022).

Tabel 1. **Descriptive Statistics**

Variable	Mean	Std. Dev.	Min	Max	N
CPI	42,9172	19,2440	0	92	1026
EGDI	0,5410	0,2233	0,0139	0,9758	1026

Source: Data Processed

Tabel 2. **Estimation Model Test Results**

Testing	Hypothesis	Results
Test Chow	Ho: Choose CEM Ha: Own FEM	Value Prob > F = 0,0000 (greater than 0,05), so Ho is rejected. Which means the best estimation model is FEM
Test Hausman	Ho: Choose REM Ha: Choose FEM	Value Prob>Chi2 = 0,1420 (greater than 0,05) thus Ho accepeted. Which means the best estimation model is REM.
Test Lagrange Multiplier	Ho: Choose CEM Ha: Me Choose milih REM	Value Prob > Chibar2 = 0,0000 (greater than 0,05), thus Ho rejected. Which means the best estimation model is REM

Source: Data Processed

Tabel 3. **Hypothesis Testing Results**

Variable	Prediction	Coefficient	Significance
C		36,7973	0,0000
EGDI	(-)	11,1681	0,0000
Prob F	= 0,0000		
Adjusted R-Square	= 0,5354		

Source: Data Processed

Hypothesis Testing Results

Table 3 shows that the significance value is 0.0000 and coefficient is 11.1681 which means that e-gov is proved to have a negative impact on corruption. The point is that every time there is an increase in e-government score, the CPI score will increase or it can be said that the country's corruption level is decreasing. This is because the larger the CPI score of a country, the "cleaner" the country is free of corruption. On the other hand, if a country's CPI score decreases, then the country is getting more corrupt (corruption level is getting bigger). The value of the EGDI variable coefficient is 11.1681 which means that if there is an increase of 1 EGDI score, then the corruption level in a country will increase by 11.1681. So, this study proves that the implementation of E-Gov can reduce the corruption level. Then, the R-Square value of 0.5354 shows that the EGDI variable can affect corruption by 53.54% while the remaining 46.46% came from other variables not tested in this study, for example, weak laws and light sanctions do not prevent someone from committing corruption. A country with a weak legal system can cause corruptors not to feel afraid to commit corrupt acts, and they may even feel that the actions they take are natural and not violate the law. Light sanctions make corruptors not deterred from committing corruption and they will easily repeat the incident, especially if the sanctions given are "negotiable" then they will without hesitation abuse their power and ability to enrich themselves.

DISCUSSION

Based on the statistical tests results, this research can provide empirical evidence for the hypothesis that is built that E-Gov variables can reduce the corruption level and that are in line with previous research (e.g. Andersen, 2009; Mistry & Jalal, 2012; Choi, 2014; Elbahnasawy, 2014; Zhao & Xu, 2015; Ben Ali & Gasmi, 2017; Sassi & Ben Ali, 2017; Bhattacherjee & Shrivastava, 2018; Talab et al., (2019); Adam, 2020; Park & Kim, 2020; Sadik-Zada et, al., 2022; Sheryazdanova et al., 2020; Sriyakul et al., 2022)2006.

E-gov a critical factor in determining corruption because e-gov can be used as a strategy and tool to reduce the corruption level. With the implementation of E-Gov, it can improve the public services quality, for example, increasing service accuracy and shorting waiting times. In addition, the implementation of E-Gov can increase transparency and accountability related to public services. This can certainly make it easier for the public to obtain the information they need. E-Government can be used as an important tool used to reduce corruption level because it can increase transparency, reduce the power of government discretion and minimize the chance of corruption (Castro & Lopes, 2022),.

The development of E-Gov can improve corruption control and assess the effectiveness and quality of government performance (Dhaoui, 2022). Sriyakul et al. (2022) found that E-Gov can increase the government activities more effective and efficient as well as provide better services to the community. (Rustiarini, 2019) revealed that the involvement of ICT in the government allows citizens to monitor government actions so that corruption becomes a risky action because it will be easier to detect. A government that has the power to manage public

Tabel 4. **Robustness Test Results**

Variable	Prediction	Coefficient	Significance
C			
OSI	-	12,7595	0,0000
TII	-	35,4663	0,0000
HCI	-	12,4326	0,0000
Prob F	= 0,0000		
Adjusted R-Square	= 0,5448		

Source: Data Processed, 2023

assets with a weak monitoring system is more likely to commit corruption (Lio et al., 2011). It can be concluded that the existence of E-Government can increase transparency which can later be used as a tool to prevent corruption. The public can access information more easily and quickly about government performance, including revenue and expenditure budgets for both central and regional governments. The community can function as a supervisor of government activities so that it can prevent corrupt behavior.

Robustness Test

Based on the United Nations surveys (2022), the EGDI is the main measurement of the E-Gov variable in this research. EGDI consists of three important elements, which OSI, TII, and HCI. Each of these elements can be extracted and analyzed independently. Therefore, this research carried out additional testing by using these three elements as independent variables. Table 4 presents the results of additional testing that was performed.

Table 4 shows the test results of each EGDI element consisting of OSI, TII, and HCI. These three elements are independently tested for corruption. The significance value of all EGDI elements was 0.0000 with an OSI coefficient value of 12.7595, TII 35.4663 and HCI 12.4326. If there is an increase of 1 OSI, the corruption level can decrease by 12.7595, an increase of 1 TII can reduce the corruption level by 35.4663 and an increase of 1 HCI can reduce the corruption level by 12.4326. This means that each of these elements has a negative effect on corruption. This supports the main test results, namely that the E-Gov implementation, both seen from OSI, TII, and HCI independently has an influence and plays an important role in reducing the corruption level. It can also be concluded that the EGDI element that has the most influence on corruption is TII.

In developing e-government, it is necessary to ensure in advance that the telecommunication infrastructure has been built properly. If TII has been developed, then OSI and HCI can be improved so that the implementation of e-government can provide maximum benefits, especially in fighting corruption. However, if a country only excels in one of the elements, e-gov can still have a good effect on reducing the corruption level. Moreover, if the country excels in all three elements, e-government can certainly be used as an tool and strategy to reduce the corruption level.

5. CONCLUSION

Based on the statistical testing results, this study provides empirical evidence that E-Gov has a negative significant influence on corruption. Robustness testing was also carried out by testing the elements of E-Gov as independent variables, the results showed that each element of E-gov had a significant effect on corruption. Even though a country is superior in only one element, they can still control corruption, especially if they excel in all three. This contributes to the literature on the influence of e-gov on corruption by using a sample of panel data from countries in the world, most researchers before only using certain countries as samples. However,

this study does not distinguish between developed and developing countries, this is important because they have different characteristics such as national income and poverty levels, which may affect the implementation of e-gov and its impact on corruption. Further research can examine how e-gov affects corruption in developed and developing countries to prove whether the results are the same or not for the two groups of countries. This research measures the variables of E-Gov and Corruption using the overall score of each country based on a survey conducted by an international institution but does not include how citizens assess the e-gov implementation and the corruption level in their countries. Future research can measure variables with surveys conducted directly to citizens (for example, the distribution of questionnaires for public service users, namely the community or in-depth interviews with officials who are closely related to public services) to find out in real terms how E-government is implemented and how much corruption is in their country. This is because the impact of corruption carried out by the government will be felt by its citizens both directly and indirectly, so it is necessary to include this element. The results of this study can be generalized because it uses all countries in the world that have the availability of data as a research sample. However, this study did not use any control variables. Subsequent research may include several control variables to avoid bias in research results (e.g. GDP, growth rate, and inflation).

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