The role of e-government in reducing corruption: A systematic review

Ni Wayan Rustiarini

Accounting Department, Faculty of Economics and Business,
Universitas Mahasaraswati Denpasar, Indonesia

Correspondence author email: rusti_arini@unmas.ac.id

Abstract
A number of studies state that e-government is a "powerful" anti-corruption tool but other researchers still have doubts about the role of e-government. In fact, other researchers claim that e-government is not only a powerful weapon against corruption but also has the potential to create corruption opportunities. Starting from this phenomenon, this study aims to synthesize research results regarding the role of e-government in reducing corruption. This research systematized the results of research over the past 19 years using a systematic review method. This method provides a comprehensive review so it is expected to reduce the bias of literature. This paper reviews 16 articles published in reputable peer-reviewed journals. Most articles use macro-comparative data in all countries, while other articles use surveys, case studies, and conceptual papers. In general, the systematic review result show that e-government can reduce corruption. However, the success of e-government is not universally applicable. There are internal and external organizational factors that influence the effectiveness of e-government functions to againts corruption.

Keywords: *Corruption, E-government, Public sector*

JEL Classification: D73, H11, H83

INTRODUCTION

Corruption is a major threat to economic development in many countries (Fisman & Svensson, 2007; Welsch, 2008). Corruption is not only increase inflation, growth volatility, and budget inefficiency (Evrensel, 2010; Krishnan, Teo, & Lim, 2013), but also distorts the public services. The results of a survey conducted by Global Corruption Barometer on 1,000 people in 107 countries show that more than 27% of respondents bribed public officials to get public services (Bhattacherjee & Shrivastava, 2018). Even, foreign investors who want to invest in a relatively corrupt country must spend around 20% an increase in business costs to corruption (UNODC, 2005). The rise of corrupt in the public sector makes this topic still relevant for further study.

The phenomenon of corruption always has great attention from academics, government, business people, and social activists. At least, more than 4,000 book titles and journal articles have been published with the main theme of corruption over past 10 years (Iqbal & Seo, 2008). Academics and policy makers have also proposed various solutions to prevent corruption (Misangyi, Weaver, & Elms, 2008; Siddiquee, 2010). The most common approach used to tackle the corruption is to reform government

administration (Klitgaard, 1988; Rose-Ackerman, 1999), one of them through e-government.

Electronic government, next referred to e-government, is defined as a process to connect people and government digitally. So, each people can access information and services offered by the government every time (Lau, Aboulhoson, Lin, & Atkin, 2008). Theoretically, e-government is a compatible factor when discussing the determinants of corruption (Shim & Eom, 2008), and is considered as more effective in reducing corruption than traditional anti-corruption strategies (Shim & Eom, 2009). However, some empirical research results sometimes show that e-government does not have a substantial effect on reducing corruption (Basyal, Poudyal, & Seo, 2018; Sheryazdanova & Butterfield, 2017). Ironically, this system can create new ways and opportunities for corruption (Heeks, 1998; Wescott, 2001). The inequality in technology literacy and limited ability to access technology between the managing bureaucrats and citizens becomes a new opportunity to continue corrupt behavior, maybe even more aggressive (Bhatnagar, 2003; Kim, 2014). This knowledge gap is the source of e-government failure in combating corruption.

Based on a theoretical perspective, e-government is a manifestation of information and communication technology used to control corruption (Lio, Liu, & Ou, 2011; Nam, 2018). Several previous studies also proved that e-government could be an effective tool for curb public corruption (Choi, 2014; Elbahnasawy, 2014; Kim, 2014; Park & Kim, 2019). However, other researchers still have doubts about e-government's ability to reduce corruption (Basyal, Poudyal & Seo, 2018; Kim, Kim, & Lee, 2009; Sheryazdanova & Butterfield, 2017), especially in developing countries (Mahmood, 2004). Indeed, most countries in the Americas, Asia, and Europe claim e-government's role in reducing corruption (Bhatnagar, 2003; Shim & Eom, 2008), but other studies show the failure rate of e-government programs in developing countries reached 85 percent (Heeks, 2003). In shortly, the successfull of e-government in controlling corruption does not apply universally in all countries (Basyal, Poudyal & Seo, 2018; Bertot, Jaeger, & Grimes, 2010). The gap between normative conditions and the phenomena occur motivates researchers to reexamine the role of e-government to against the corruption. Hence, the main research question:

RQ1: Can the e-government reduce corruption?

This study aims to examine the effect of e-government implementation on controlling corruption using a systematic review. Although many researchers have focused attention on the relationship between e-government and corruption, based on the results of scientific search, there has been no research that systematically explored the causality relationship between e-government and corruption using a systematic review approach. This method provides strong evidence to identify knowledge gaps or inconsistent findings (Denyer & Tranfield, 2009). By synthesizing relevant research results, the systematic review method will present more comprehensive and balanced information (Siswanto, 2010). These results contribute to the theory, which supports the theoretical concept that e-government is an effective tool for controlling corruption at all levels of government. This result also contributes to the practice, which enhances the insight of policymakers that e-government implementation not only reduces corruption but also increases transparency, accountability, and public participation, while on the other hand can reduce transaction costs and abuse of public authority. However, to get more effective results, e-government implementation should be accompanied by increasing the quality of supporting factors both from internal and external

organizations.

The remainder of this article is organized as follows. This paper outlines a literature review on corruption in the public sector and e-government implementation. In the second part, the paper presents a methodological approach using a systematic literature review to find, select, and evaluate relevant studies. Third, it presents a descriptive analysis of the literature. Fourth, discuss the synthesis of research results. Finally, this article summarizes the results of a systematic review, limitations of the study, and recommendations for further research.

LITERATURE REVIEW

Corruption in the public sector

Corruption has become a major issue being discussed in the social and economic sciences. In general, corruption is defined as an act of abuse of public and/or private power that aims to obtain personal benefits, both directly and indirectly (World Bank, 2017). Klitgaard (1988) uses the principal-agent-client model to define corruption in a simple equation, that is:

Corruption = Monopoly + Discretion - Accountability

This equation model uses the premise that corruption occurs when public officials have access to monopoly, have the flexibility to regulate, and low accountability. Starting from this premise, Klitgaard (1988) assumes the principal is a civil servant who oversees other civil servants (agents). In working, agents interact with several clients, such as private parties, business people, and the community. Due to time constraints, the principal cannot control the work of the agent. When information asymmetry occurs, agents can abuse their monopoly power to commit corruption. The situation becomes unmanageable when the benefits of corruption exceed the punishment given (Mahmood, 2004).

The principal-agent-client equation model illustrates that corruption tends to occur in the government sector. It cannot be denied that most corruption involves public officials and institutions, although corruption also exists in the private sector (Tanzi, 1998). Based on the level, corruption happen both macro and micro (Bardhan, 2006). At macro-level (grand corruption), corruption usually distorts the expenditure or resources allocation which arranged by politicians or governments who have a higher authority to gain personal benefits (Rose-Ackerman, 2002). At micro-level (bureaucratic corruption), corruption committed by lower governmental authorities which are responsible for serving the public (Shleifer & Vishny, 1994). Since the public officials have authority to accept or refuse to provide public services, they often abuse their authority. This situation makes it possible to take bribes from the public (Mahmood, 2004).

E-government implementation

The United Nations Division for Public Economics and Public Administration (UNPA) and the American Society for Public Administration (ASPA) defines e-government as an effort to utilizing the internet and world-wide-web for delivering government information and services to citizens (UNPA, 2001). Basically e-government is an attempt to transform the internal government work processes, as well as improve external relations with citizens (Shim & Eom, 2008). A number of studies have identified four relationship interactions in e-government (Danila & Abdullah, 2014; Guha & Chakrabarti, 2014; Huang & Benyoucef, 2014), such as:

1) *Government to Citizens* (G2C)
   An online application that is designed to facilitate digital interaction between government and citizens or the government and consumers/customers of public services.
2) *Government to Business* (G2B)
   It is an online application designed to provide information services to business people. The government utilizing this application to provide responses to business needs, or online transactions specifically intended for businesses.
3) *Government to Government* (G2G)
   An online application that serves the exchange of information from government to government. This system allows the government to share and integrate resource data at various units, institutions, and levels of government (local, provincial, national), or intra-agency.
4) *Government to Employees* (G2E)
   It is an online application that facilitates interaction between government and employees and focuses on increasing internal efficiency and effectiveness of government operations by reducing redundancy.

METHODS

Search method

This study uses a systematic review approach to answer research questions. A systematic review is a methodology that specifically identifies existing studies, selects and evaluates contributions, analyzes and synthesizes data, and reports results to draw conclusions (Denyer & Tranfield, 2009). Methodologically, a systematic review is almost similar with content analysis which aims to observe qualitative and quantitative problems (Brewerton & Millward, 2001). This method provides strong evidence to identify knowledge gaps or inconsistent findings (Denyer & Tranfield, 2009). Therefore, a systematic review is seen to provide a comprehensive review serves to explain phenomena holistically, as well as reduce the possibility of literary bias (Denyer & Tranfield, 2009; Durach, Kembro, & Wieland, 2017).

This study review research papers published in peer-reviewed journals. Article searches are performed on various popular digital databases, such as Science Direct, Emerald, Springer, Sage, Taylor and Francis, Wiley Online Library, JSTOR, and Google Scholar. Referring to the research topic, the researcher uses four phrases to trace the articles, such as "e-government and corruption", "electronic Government and corruption", "ICT and corruption", "e-Governance and corruption". Next, the researcher conducted a screening process using four inclusion criteria to obtain articles that were relevant to the research question. The screening process is carried out to produce high-quality synthesis, not garbage in garbage out (Siswanto, 2010). The inclusion criteria are described in Table 1, and the screening process presented in Figure 1.

Search outcomes

This study focuses on the relationship between e-government and corruption. Initial search results for articles published in the 2001-2019 period, there were 110 articles relevant to the research question. Next, the researcher selected the paper based on the title and abstract, as well as ensured that the article was published in a peer-reviewed journal. This review was excluded articles published in conference proceedings and book chapters to avoid the threat of validity due to bias in the selection

of paper. In the last, the researcher ensures that the selected articles are published in reputable journals (indexed by Scopus). After going through a rigorous selection process, this study documents 16 papers that will be analyzed systematically. A complete list of selected articles is presented in Table 3. Before conducting a systematic review, the researcher describes the studies based on the year of publication (in Figure 2), the statistic of journal publication (in Figure 3), research method (in Figure 4), as well as unit analysis and frequency of level (in Table 2).

Table 1. Inclusion criteria of e-government-corruption systematic review

Inclusion criteria	Reasoning
Articles published in the 2001-2019 period	2001 was the first year that the United Nation E-Government Development Index was published (Adjei-Bamfo, Maloreh-Nyamekye, & Ahenkan, 2019; Walker & Brammer, 2012).
Articles only discuss about "electronic government" and "corruption"	This helps to utilize relevant themes to build relationships between e-government and corruption.
Articles published on peer-reviewed journals	Articles published in peer-reviewed journals are of high quality than non-peer reviewed articles (Adjei-Bamfo, Maloreh-Nyamekye, & Ahenkan, 2019).
Articles published in Scopus indexed journals	Scopus is more desirable, as well as covers a superior number of journals and broader journal ranges (Chadegani et al., 2013; Vieira & Gomes, 2009).

Data extraction

Articles selected as samples will be extracted to answer research questions. In general, researchers present selected sample information, such as author, publication year, research objectives, methodology, unit of analysis, and main finding (see Table 3).

Data synthesis

Data synthesis aims to gather empirical evidence from selected articles to answer research questions. Indeed the evidence collected is only a piece and may have little evidence strength, but if the evidence is gathered in the aggregate it certainly has a strong power (Wahono, 2015). In this review, researchers extracted quantitative and qualitative data using narrative synthesis methods. Furthermore, the data is presented in form of flow diagrams, bar charts, pie charts, and tables.

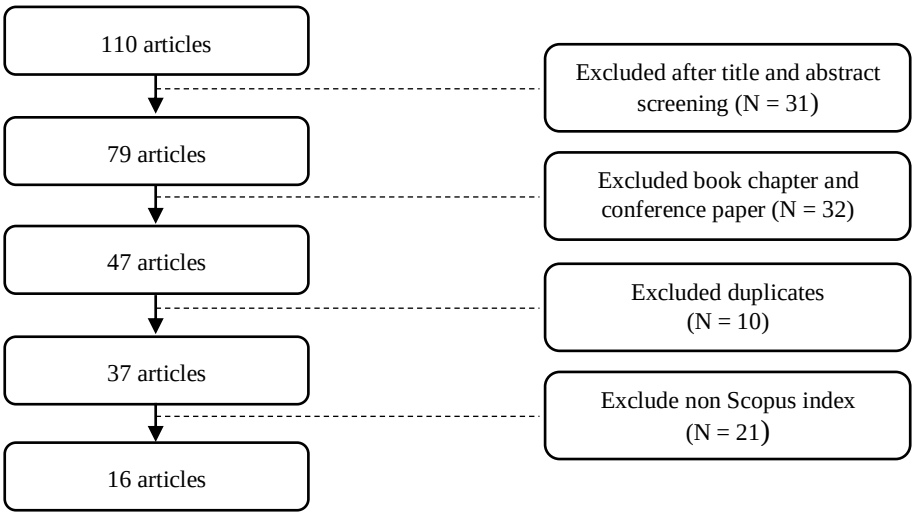

Figure 1. Flow diagram of screening process

DESCRIPTIVE ANALYSIS OF THE LITERATURE

Publication year

This review systematized the results of research on the role of e-government in reducing corruption during the last 19 years (2001-2019). The results of a systematic review indicate that there has been little research about the effects of e-government on corruption are 16 studies. Figure 2 shows the frequency of researchers' interest in this topic for 19 years.

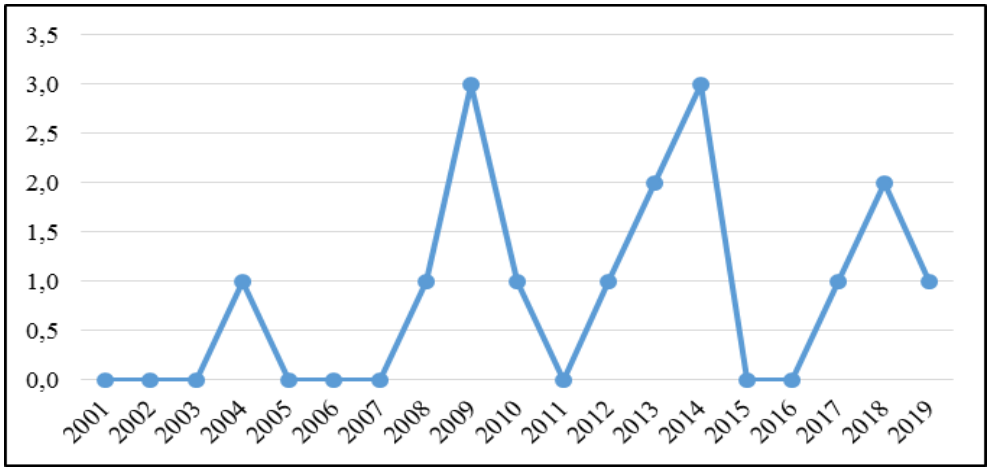

Figure 2. Publication year of synthesized articles based on focus from 2001 to 2019

Figure 1 shows that academic's interest to examine the role of e-government to reduce corruption is very volatile. Although e-government effectiveness has received great attention from academics and practitioners, there have been little researchers who are interested in examine e-government and corruption. This condition might be based on several reasons, as follows. First, corruption is illegal so it does not leave traces that can be found directly in document or computer records (Nam, 2018). Second, there are limitations to accessing or collecting information about corruption (Ades & Di Tella, 1999; Rajan & Wulf, 2006), Third, corruption is difficult to measure and difficult to develop an objective measure of corruption. There is no appropriate method to find out the amount of corruption's occurs (Nam, 2018). Empirical research often relies on perception data as indicators of corruption such as the Corruption Perception Index, as used the sample articles in this study (Basyal, Poudyal & Seo, 2018; Elbahnasawy, 2014; Kim, 2014; Shim & Eom, 2008, 2009). Although at the beginning of the research period there were still publication limitations, systematic review results showed the number of studies on this topic has increased since 2007. Thus, the relationship between e-government and corruption needs to be reviewed in the future.

Journal of the synthesis sample

After the screening process, there are 13 Scopus indexed journal names representing 16 articles selected for review. E-government can be seen as sitting at the cross-roads between a number of other research domains, such as information systems, business administration, political science, and economics. From 13 journal names, there are three journals that publish more than one article such as Government Information Quarterly, International Review of Administrative Sciences, and International Journal of Public Administration (in Figure 3).

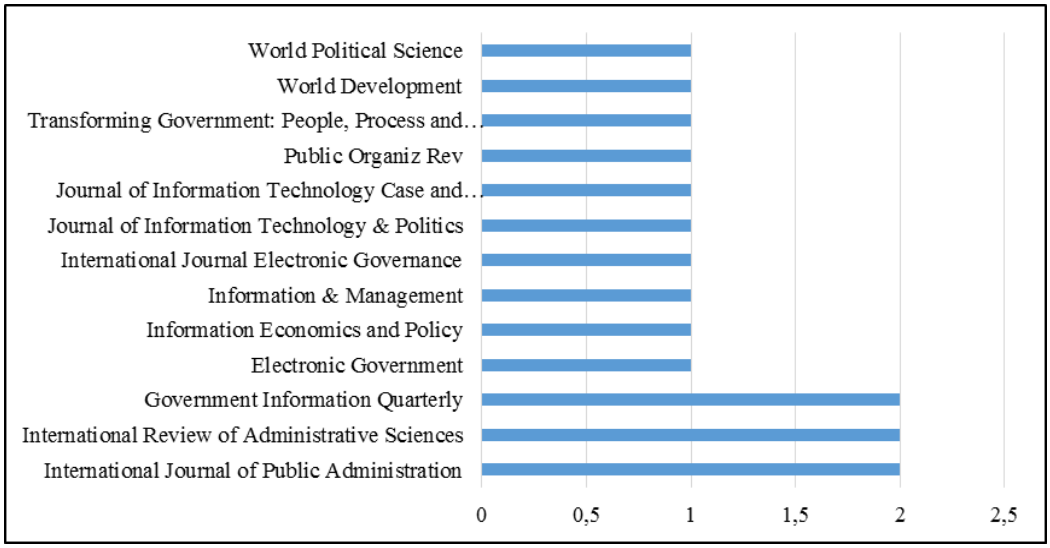

Figure 3. Statistic of journal publication

Research method

Based on the research method, most of the articles synthesized were archival research (62.50%). This study uses secondary data, namely analyzing panel data to compare e-government implementations and levels of corruption in several countries. In addition, there is around 18.75% of articles that use surveys to analyze the perceptions of government (public) officials, private officials, and citizens regarding the effectiveness of e-government in reducing corruption. Other articles use case studies (12.5%) and conceptual paper (6.25%) method.

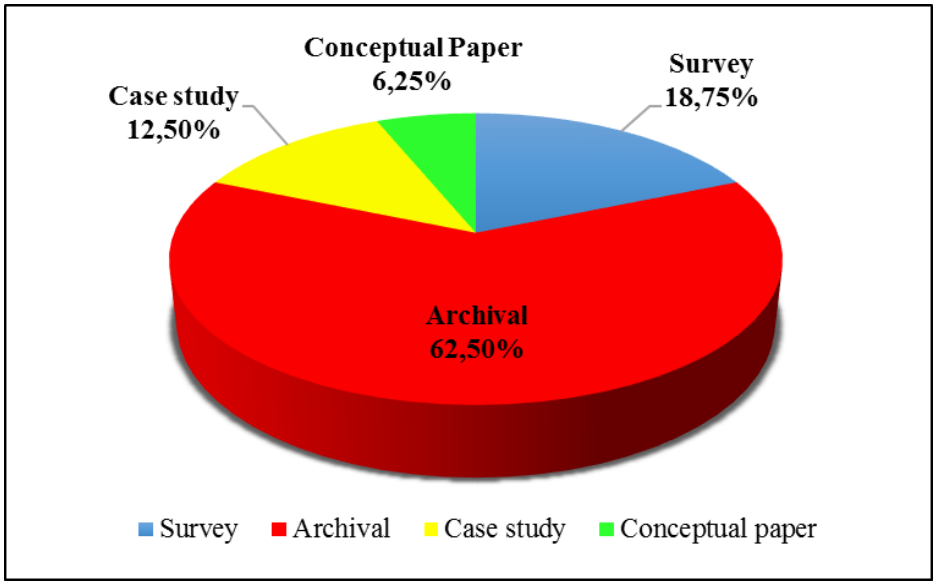

Figure 4. Proportion of methods used for e-government and corruption studies

Unit analysis and frequency of level

Table 2 shows the research analysis unit and the level of analysis, such as international, national, and local government levels. Based on the unit of analysis, the synthesis sample mostly analyzed macro panel data obtained from the organization's

website (62.50%), such as Transparency International (Basyal, Poudyal & Seo, 2018; Elbahnasawy, 2014; Kim, 2014; Shim & Eom, 2008, 2009) and World Governance Indicators (Krishnan, Teo & Lim, 2013; Nam, 2018; Park & Kim, 2019). There are 2 articles or 12.50% of the articles that analyze policies and practices. The remaining 4 articles analyze the perceptions and responses of citizens, public officials, and private officials selected for this study. In terms of frequency of level, most of the research is concentrated at the international level (62.50%), while other articles examine the national level (25%) and local government (12.5%).

Table 2. Unit analysis and level of analysis

Unit analysis	Quantity	Percentage (%)	Level of analysis	Quantity	Percentage (%)
Citizens	1	6.25	International	10	62.50
Public officials	1	6.25	National	4	25.00
Public and private officials	1	6.25	Local government	2	12.50
Citizens and public officials	1	6.25			
Policies and practices	2	12.50			
Websites	10	62.50			
Total	16	100.00	Total	16	100.00

Source: Data processed

RESULTS AND DISCUSSION

The role of e-government in reducing corruption

E-Government is a fundamental strategy that is widely used to modernize the public sector. The implementation of e-government is expected to help governments delivery services and transform relations with citizens, businesses and other arms of government (Guida & Crow, 2009). It is not less important that e-government is expected to reduce or eliminate the risk of corruption. To answer the research questions, Table 3 (in Appendix 1) presents the results of systematic reviews.

The role of e-government in reducing corruption has always been the focus attention of academic literature. Theoretically, e-government seems to be a useful tool for increasing efficiency, effectiveness, and transparency, which ultimately helps reduce corruption. However, the systematic review results in Table 3 show mixed findings. In many cases, e-government has indeed been able to eliminate or at least significantly reduce corruption (Abu–Shanab, Harb, & Al–Zoubi, 2013; Choi, 2014; Kim, Kim & Lee, 2009; Krishnan, Teo & Lim, 2013; Park & Kim, 2019; Shim & Eom, 2008, 2009) are even seen to have the same effectiveness as traditional anti-corruption strategies. However, some empirical research results have failed to prove e-government's "power" to against corruption (Basyal, Poudyal & Seo, 2018), especially in the state-owned business sector (Sheryazdanova & Butterfield, 2017). Thus, it should be noted that not all countries that adopt a digital government will successfully implement the system as an anti-corruption tool.

On the other hand, systematic review results show that some researchers still doubt the effectiveness of e-government in reducing corruption (Andersen, 2009; Cho & Choi, 2004; Hossan & Bartram, 2009; Ojha & Palvia, 2012). E-Government is seen as not yet fully able to carry out its main function as an anti-corruption strategy. This digital system can play a good role if it gets technical support, such as improving

telecommunications infrastructure, as well as the reach and quality of online services to public (Elbahnasawy, 2014), requires the rule of law supremacy (Kim, 2014), and increased political and economic capacity (Nam, 2018). This finding also confirms that e-government is not a single variable that determines the success of anti-corruption strategies. E-Government can be a "powerful" tool to curb corruption if there is good cooperation between the state and its government.

In order to understand the role of e-government in reducing corruption, the following is e-government roles discussion to improving the quality of public services, increasing transparency and accountability, reducing transaction costs, increasing citizen participation, reduced the abuse of public power, as well as improving law enforcement, which is explained as follows:

1. Increased public service quality

   In general, e-government is the utilizing of the internet and the world-wide-web to delivery information and services from the government to citizens. Indeed, the initial purpose of e-government implementation is to improve public service quality, not as an anti-corruption strategy as commonly found in developing countries (Mahmood, 2004). In this function, the government focuses on the administrative reformation to provide optimal services to citizens as the customer. To support this function, the government must provide standardized public services so that citizens gets the same quality of service. E-Government is considered to prevent corruption because of its success to eliminate decision making based on bureaucrats "wisdom" (Sheryazdanova & Butterfield, 2017; Shim & Eom, 2008). In addition, the digital government be able to increases service accuracy, reduces waiting times, and reduces citizens' dependence on government officials (Shim & Eom, 2008).

2. Increased transparency and accountability

   One of the main implications of implementing e-government is to create transparency in the administration of public services. It means that every citizen has access to public information, including budget data and government spending. Indirectly, e-government provides an opportunity for citizens to monitor the process of allocating public funds by politicians and government officials (Charoensukmongkol & Moqbel, 2014). Information technology allows every citizen to monitor the actions of government employees. As a result, corruption is the riskiest action because it is likely to be easily detected. Corruption opportunities are greater when public officials have the authority to conduct monopolies, have flexibility in managing public assets, and lack of accountability (Lio, Liu & Ou, 2011). Thus, transparency as a strong disinfectant to prevent corruption in government organizations (Cho & Choi, 2004).

3. Reduced transaction cost

   Interaction between officials and citizens is considered as one of the causes of corruption. When public service transactions are manual, personal interactions between government officials and citizens will create corruption opportunities. Personal contact allows citizens to offer bribes to government officials so they can ignore regulations or laws (Meon & Weill, 2010). For example, when applying for services, citizens can pay "express fee" or give gifts to speed up the service process and establish connections with public officials (Charoensukmongkol & Moqbel, 2014; Shim & Eom, 2008). Public officials will provide fast service to citizens who

pay "express fee" (Shim & Eom, 2008). The effectiveness of e-government will reduce operation cost, improved response time, quality and speed of service, and optimize public resources (Affisco & Soliman, 2006; Wong, Hideki, & George, 2011)

4. Increased citizen participation
   E-government provides opportunities for citizens to participate in the government system. In a traditional government system, citizen participation does not take place effectively because it requires a series of meetings, while public officials difficult to motivate the public to participate in the meeting. As a result, participatory processes require high commitment and extraordinary patience (Sandoval-Almazan & Gil-Garcia, 2012). In the digital government, technological sophistication will increase citizen involvement in government. Citizens have more opportunities to express their opinions through e-government websites, as well as get direct feedback from public officials as administrator. E-government can involve more participants because it requires lower coordination costs than traditional participation. The process of citizen engagement is also faster and simpler so that can voice their opinions at any time (Shim & Eom, 2008). Thus, citizen participation in the making process and policies implementation is expected to be a government partner in reducing corruption (Cho & Choi, 2004).
5. Reduced the abuse of public power
   The digitalization process is seen as being able to reduce the opportunities for bureaucrats to carry out arbitrary actions (Bhatnagar, 2003). Corrupt bureaucrats usually have discretionary power. This causes them unimpeded to accept or refuse to provide public services. Abuse of authority is their effort to accept bribes from citizens. In some cases, government officials deliberately extended transaction processing times so that citizens who needed services were willing to give bribes. Government officials will approach their citizens and negotiate to accept bribes (Kumar & Best, 2006), even asking for bribes directly and informing citizens of the nominal value of bribes needed to get a service (Charoensukmongkol & Moqbel, 2014). Therefore, e-government seeks to control corruption by reducing official opportunities to carry out arbitrary actions.
6. Improved law enforcement
   The digital government was able to strengthen the process of law enforcement to reduce the occurrence of corruption (Elbahnasawy, 2014). This system allows citizens to report corrupt activities anonymously. For example, government websites in India and China allow citizens to share their experiences anonymously when paying bribes to government officials. The authorities use this information to carry out legal proceedings and tighten law enforcement. Consistent law enforcement shows the government's seriousness in dealing with the problem of corruption (Charoensukmongkol & Moqbel, 2014; Sheryazdanova & Butterfield, 2017).

E-government challenges: e-government as corruption opportunity

Theoretically, the digital-government as a fundamental strategy to against corruption. Nevertheless, the results of a systematic review show that e-government was not always able to reduce corruption. In some cases, e-government as an effective tool to identify and reduce corruption, but on the other hand, it also creates new

opportunities for corruption (Heeks, 1998). Heeks & Bhatnagar (1999) state that the adoption of information, technology, and communication in developing countries shows the occurrence of "conception-reality gaps". As a result, e-government precisely creates new corruption opportunities. This study also outlines why the implementation of e-government can provide opportunities for public officials to commit corruption.

First, e-government creates a digital divide between bureaucrats themselves, or between bureaucrats and citizens. The problems that cause the digital divide such as: a) technology literacy, usability, accessibility, and functionality (Barzilai-Nahon, 2006; Bertot, 2003). The digital divide occurs when e-government implementation requires special knowledge of bureaucrats to operationalize this system. Competent bureaucrats can abuse their competence to deviant behavior. Inequality of literacy and access to technology enables corrupt bureaucrats to still continue corruption, or even take more aggressive actions (Bhatnagar, 2003). The citizen who has a better understanding of technology are also more likely to get better public services than those who do not understand technology at all. Therefore, digital divide creates new opportunities for corrupt bureaucrats to commit corruption.

Second, excessive investment in e-government infrastructure also provides opportunities for corruption. E-government implementation must to supported by adequate technological facilities and infrastructure. However, the bureaucrats often exploited this opportunity to mark-up budget allocation (Rustiarini, Sutrisno, Nurkholis, & Andayani, 2019), particularly for e-government projects. Previous research has shown that the relationship between infrastructure investment (technology) and corruption depicted using the letter U. This means that adequate investment in infrastructure provision can reduce corruption, but excessive investment actually increases the occurrence of corruption (Charoensukmongkol & Moqbel, 2014). Thus, excessive e-government investment actually thwarts the role of e-government in combating corruption.

Third, e-government does play a major role in controlling corruption but it is not the only effective strategy. Corruption is a multi-dimensional problem caused by various factors, such as political, social, institutional, and cultural (Bertot, John, Jaeger, & Grimes, 2010). The survey results conducted by Hossan & Bartram (2009) on government and private officials showed that respondents from private officials had positive perceptions and high expectations that e-government could reduce corruption. Private officials are more optimistic about the potential and role of e-government in realizing efficiency and reducing corruption, than government officials. Government officials consider corruption in government organizations to be endemic. The e-government initiative is only a small part of the government's efforts to reduce the possibility of corruption. The survey results also confirm previous findings that one of the most difficult challenges in implementing e-government is changing organizational culture, especially in the public sector (Al-Sebie & Irani, 2005).

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

The potential of e-government to eradicate corruption is increasingly popular among academics and practitioners. This potential has been realized in various works of

literature and studies, as well as implemented in public policies. In fact, almost most public organizations encourage the application of e-government as an anti-corruption strategy. Therefore, research on the relationship between e-government and corruption is still relevant until now.

This study seeks to re-examine the relationship between e-government and corruption using a systematic review. This paper systematizes research published over the past 19 years to present a synthesis of research results about the role of e-government in reducing corruption. Generally, the systematic review results show that e-government as a "powerful" anti-corruption tool, but this result is not entirely consistent. Given the success of e-government is not universally nature, this result must be considered as a preliminary review, not a definitive result. The synthesis results also note that there are other factors that influence e-government and corruption relationship. Thus, these results are expected to motivate other researchers to reexamine this topic by considering the role of other potential variables.

Recommendations

This study has several limitations. First, this paper only documents 16 articles that are relevant to the research question. This is due to the limited number of research results published in peer-reviewed journals, particularly indexed by Scopus. Future research can add Web of Science (WoS) indexed journals to enrich the literature. Secondly, the systematic review results provide evidence that previous results have not been to fully prove the role of e-government in against corruption. Heeks (1998) and Kim, Kim & Lee (2009) states that organizations need a holistic strategy to support e-government initiative. The successful of e-government implementation is inseparable from internal organizational factors, such as leadership, bureaucratic professionalism, bureaucratic quality, and adequate law enforcement. These internal factors as an organization's social capital to create a culture of transparency in organizational governance. The effectiveness of e-government is also determined by external factors, such as politics, economics, and social culture. Shortly, each organization should collaborate on internal and external factors of the organization to increase the effectiveness of e-government in reducing corruption.

REFERENCES

Abu–Shanab, E. A., Harb, Y. A., & Al–Zoubi, S. Y. (2013). E–government as an anti–corruption tool: citizens perceptions. *International Journal of Electronic Governance*, *6*(3), 232–248.

Ades, A., & Di Tella, R. (1999). Rents, competition, and corruption. *The American Economic Review*, *89*(4), 982–993.

Adjei-Bamfo, P., Maloreh-Nyamekye, T., & Ahenkan, A. (2019). The role of e-government in sustainable public procurement in developing countries: A systematic literature review. *Resources, Conservation and Recycling*, *142*, 189–203.

Affisco, J. F., & Soliman, K. S. (2006). E-government: a strategic operations management framework for service delivery. *Business Process Management Journal*, *12*(1), 13–21.

Al-Sebie, M., & Irani, Z. (2005). Technical and organisational challenges facing transactional e-government systems: an empirical study. *Electronic Government,*

an International Journal, *2*(3), 247–276.

Andersen, T. B. (2009). E-Government as an anti-corruption strategy. *Information Economics and Policy*, *21*(3), 201–210.

Bardhan, P. (2006). The economist's approach to the problem of corruption. *World Development*, *34*(2), 341–348.

Barzilai-Nahon, K. (2006). Gaps and bits: Conceptualizing measurements for digital divide/s. *The Information Society*, *22*(5), 269–278.

Basyal, D. K., Poudyal, N., & Seo, J.-W. (2018). Does E-government reduce corruption? Evidence from a heterogeneous panel data model. *Transforming Government: People, Process and Policy*, *12*(2), 134–154.

Bertot, J. C. (2003). The multiple dimensions of the digital divide: more than the technology'haves' and'have nots'. *Government Information Quarterly*, *2*(20), 185–191.

Bertot, John C, Jaeger, P. T., & Grimes, J. M. (2010). Using ICTs to create a culture of transparency: E-government and social media as openness and anti-corruption tools for societies. *Government Information Quarterly*, *27*(3), 264–271.

Bhatnagar, S. (2003). Transparency and corruption: Does e-government help. Retrieved July 1, 2010, from http://unpan1.un.org/intradoc/%0Agroups/public/documents/unpan/unpan035963.pdf

Bhattacherjee, A., & Shrivastava, U. (2018). The effects of ICT use and ICT Laws on corruption: a general deterrence theory perspective. *Government Information Quarterly*, *35*(4), 703–712.

Brewerton, P., & Millward, L. (2001). *Methods of data collection*. *Organizational Research Methods. Sage Publications, London*. London: Sage Publication.

Chadegani, A. A., Salehi, H., Yunus, M., Farhadi, H., Fooladi, M., Farhadi, M., & Ale Ebrahim, N. (2013). A comparison between two main academic literature collections: Web of Science and Scopus databases. *Asian Social Science*, *9*(5), 18–26.

Charoensukmongkol, P., & Moqbel, M. (2014). Does investment in ICT curb or create more corruption? A cross-country analysis. *Public Organization Review*, *14*(1), 51–63.

Cho, Y. H., & Choi, B.-D. (2004). E-government to combat corruption: The case of Seoul metropolitan government. *International Journal of Public Administration*, *27*(10), 719–735.

Choi, J.-W. (2014). E-government and corruption: A cross-country survey. *World Political Science*, *10*(2), 217–236.

Danila, R., & Abdullah, A. (2014). User's satisfaction on e-government services: An integrated model. *Procedia-Social and Behavioral Sciences*, *164*, 575–582.

Denyer, D., & Tranfield, D. (2009). *Producing a systematic review*. *The Sage Handbook of Organizational Research Methods*. London: Sage Publication.

Durach, C. F., Kembro, J., & Wieland, A. (2017). A new paradigm for systematic literature reviews in supply chain management. *Journal of Supply Chain Management*, *53*(4), 67–85.

Elbahnasawy, N. G. (2014). E-government, internet adoption, and corruption: an empirical investigation. *World Development*, *57*, 114–126.

Evrensel, A. Y. (2010). Corruption, growth, and growth volatility. *International Review of Economics & Finance*, *19*(3), 501–514.

Fisman, R., & Svensson, J. (2007). Are corruption and taxation really harmful to

growth? Firm level evidence. *Journal of Development Economics*, *83*(1), 63–75.
Guha, J., & Chakrabarti, B. (2014). Making e-government work: Adopting the network approach. *Government Information Quarterly*, *31*(2), 327–336.
Guida, J., & Crow, M. (2009). *E-government and e-governance*. *ICT4D: Information and Communication Technology for Development*. Cambridge: Cambridge University Press.
Heeks, R. (1998). *Information Technology and Public Sector Corruption. Information Systems for Public Sector Management Working Paper Series No. 4*. Manchester.
Heeks, R. (2003). *Most e-government-for-development projects fail: how can risks be reduced?* (Vol. 14). Manchester: Institute for Development Policy and Management,.
Heeks, R., & Bhatnagar, S. (1999). *Understanding success and failure in information age reform*. *Reinventing government in the information age: International practice in IT-enabled public sector reform* (Vol. 1). London: Routledge.
Hossan, C., & Bartram, T. (2009). The battle against corruption and inefficiency with the help of eGovernment in Bangladesh. *Electronic Government, An International Journal*, *7*(1), 89–100.
Huang, Z., & Benyoucef, M. (2014). Usability and credibility of e-government websites. *Government Information Quarterly*, *31*(4), 584–595.
Iqbal, M. S., & Seo, J.-W. (2008). E-governance as an anti corruption tool: Korean cases. *Journal of Korean Association for Regional Information Society*, *11*(2), 51–78.
Kim, C. (2014). Anti-corruption initiatives and e-government: a cross-national study. *Public Organization Review*, *14*(3), 385–396.
Kim, S., Kim, H. J., & Lee, H. (2009). An institutional analysis of an e-government system for anti-corruption: The case of OPEN. *Government Information Quarterly*, *26*(1), 42–50.
Klitgaard, R. (1988). *Controlling corruption*. Univ of California Press.
Krishnan, S., Teo, T. S. H., & Lim, V. K. G. (2013). Examining the relationships among e-government maturity, corruption, economic prosperity and environmental degradation: A cross-country analysis. *Information & Management*, *50*(8), 638–649.
Kumar, R., & Best, M. L. (2006). Impact and sustainability of e-government services in developing countries: Lessons learned from Tamil Nadu, India. *The Information Society*, *22*(1), 1–12.
Lau, T. Y., Aboulhoson, M., Lin, C., & Atkin, D. J. (2008). Adoption of e-government in three Latin American countries: Argentina, Brazil and Mexico. *Telecommunications Policy*, *32*(2), 88–100.
Lio, M.-C., Liu, M.-C., & Ou, Y.-P. (2011). Can the internet reduce corruption? A cross-country study based on dynamic panel data models. *Government Information Quarterly*, *28*(1), 47–53.
Mahmood, R. (2004). Can information and communication technology help reduce corruption? How so and why not: Two case studies from South Asia. *Perspectives on Global Development and Technology*, *3*(3), 347–373.
Meon, P.-G., & Weill, L. (2010). Is corruption an efficient grease? *World Development*, *38*(3), 244–259.
Misangyi, V. F., Weaver, G. R., & Elms, H. (2008). Ending corruption: The interplay among institutional logics, resources, and institutional entrepreneurs. *Academy of*

Management Review, *33*(3), 750–770.

Nam, T. (2018). Examining the anti-corruption effect of e-government and the moderating effect of national culture: A cross-country study. *Government Information Quarterly*, *35*(2), 273–282.

Ojha, A., & Palvia, S. (2012). E-Government and the Fight Against Corruption: Conceptual Modeland Five Case Studies from India. *Journal of Information Technology Case and Application Research*, *14*(4), 11–29.

Park, C. H., & Kim, K. (2019). E-government as an anti-corruption tool: panel data analysis across countries. *International Review of Administrative Sciences*, *0*(0), 1–17.

Rajan, R. G., & Wulf, J. (2006). The flattening firm: Evidence from panel data on the changing nature of corporate hierarchies. *The Review of Economics and Statistics*, *88*(4), 759–773.

Rose-Ackerman, S. (1999). Political corruption and democracy. *Conn. J. Int'l L.*, *14*, 363.

Rose-Ackerman, S. (2002). "Grand" corruption and the ethics of global business. *Journal of Banking & Finance*, *26*(9), 1889–1918.

Rustiarini, N. W., Sutrisno, T., Nurkholis, N., & Andayani, W. (2019). Why people commit public procurement fraud? The fraud diamond view. *Journal of Public Procurement*, *19*(4), 345–362.

Sandoval-Almazan, R., & Gil-Garcia, J. R. (2012). Are government internet portals evolving towards more interaction, participation, and collaboration? Revisiting the rhetoric of e-government among municipalities. *Government Information Quarterly*, *29*(1), S72–S81.

Sheryazdanova, G., & Butterfield, J. (2017). E-government as an anti-corruption strategy in Kazakhstan. *Journal of Information Technology & Politics*, *14*(1), 83–94.

Shim, D. C., & Eom, T. H. (2008). E-government and anti-corruption: Empirical analysis of international data. *Intl Journal of Public Administration*, *31*(3), 298–316.

Shim, D. C., & Eom, T. H. (2009). Anticorruption effects of information communication and technology (ICT) and social capital. *International Review of Administrative Sciences*, *75*(1), 99–116.

Shleifer, A., & Vishny, R. W. (1994). Politicians and firms. *The Quarterly Journal of Economics*, *109*(4), 995–1025.

Siddiquee, N. A. (2010). Combating corruption and managing integrity in Malaysia: A critical overview of recent strategies and initiatives. *Public Organization Review*, *10*(2), 153–171.

Siswanto, S. (2010). Systematic Review Sebagai Metode Penelitian Untuk Mensintesis Hasil-hasil Penelitian (Sebuah Pengantar). *Buletin Penelitian Sistem Kesehatan*, *13*(4 Okt).

UNODC. (2005). Corruption facts. Retrieved October 20, 2015, from http://www.unodc.org/pdf/facts_E.pdf.

UNPA. (2001). Benchmarking e-Government: A Global Perspective. Retrieved January 3, 2005, from http://www.nettelafrica.org/docs/NetTel%25%0A20Safari@the%2520Equator%2520(Uganda%25202003)/Benchmarkingegovt.pdf.

Vieira, E. S., & Gomes, J. A. N. F. (2009). A comparison of Scopus and Web of Science for a typical university. *Scientometrics*, *81*(2), 587.

Wahono, R. S. (2015). A systematic literature review of software defect prediction: research trends, datasets, methods and frameworks. *Journal of Software Engineering*, *1*(1), 1–16.

Walker, H., & Brammer, S. (2012). The relationship between sustainable procurement and e-procurement in the public sector. *International Journal of Production Economics*, *140*(1), 256–268.

Welsch, H. (2008). The welfare costs of corruption. *Applied Economics*, *40*(14), 1839–1849.

Wescott, C. G. (2001). E-Government in the Asia-pacific region. *Asian Journal of Political Science*, *9*(2), 1–24.

Wong, S. M., Hideki, N., & George, P. (2011). The use of importance-performance analysis (IPA) in evaluating Japan's e-government services. *Journal of Theoretical and Applied Electronic Commerce Research*, *6*(2), 17–30.

World Bank. (2017). Helping countries combat corruption: the role of the world bank. Retrieved June 26, 2017, from www1.worldbank.org/publicsector/anticorrupt/corruptn/cor02.htm#note1

Appendix

Tabel 3. Systematic review on e-government and corruption studies

Author (year)	Research purpose	Methodology	Main finding
Cho & Choi (2004)	Examine the effectiveness of OPEN system (Online Procedures ENhancement for civil applications) as e-government in controlling corruption.	Survey	The survey results are not entirely consistent but in general, it can be concluded that the OPEN system is effective in reducing corruption.
Shim & Eom (2008)	Assess the impact of e-government on corruption.	Archival	E-Government had a consistently positive impact on reducing corruption.
Andersen (2009)	Assess the impact of e-government on control of corruption.	Archival	E-Government is a useful tool in reducing corruption.
Kim, Kim & Lee, (2009)	Evaluating the development of an OPEN system to reduce corruption.	Case study	The OPEN system has a direct effect on reducing the level of corruption.
Shim & Eom (2009)	Examine the effectiveness of Information Communication and Technology (ICT) in reducing corruption.	Archival	ICT (measured by e-government readiness) is an effective tool for reducing corruption.
Hossan & Bartram (2009)	Analyzing the perception of government and private officials regarding the potential and benefits of e-government to reduce corruption.	Survey	Private officials have a positive perception and higher expectations that e-government can reduce corruption, but it is different with government official responses.
Ojha & Palvia (2012)	Analyze five cases of corruption that implement e-government, and develop a conceptual model related to the impact of e-government on corruption.	Conceptual paper	The implementation of e-government does not fully reduce corruption. There are three clear successes, one partial success, and one failure in reducing corruption.
Abu–Shanab, Harb, & Al–Zoubi (2013)	Investigate public perceptions regarding the effectiveness of e-government in reducing corruption.	Survey	E-government has an effective role in reducing corruption. As e-government matures, level of corruption in a country decreases.
Krishnan, Teo & Lim (2013)	Explore the relationship between e-government maturity and the level of	Archival	E-government maturity has a negative effect on

Author (year)	Research purpose	Methodology	Main finding
	corruption.		the level of corruption.
Choi (2014)	Examine the effect of e-government on corruption.	Archival	E-government has a positive influence on reducing corruption.
Elbahnasawy (2014)	Investigate the impact of e-government and internet adoption on corruption eradication.	Archival	E-government as an a powerful tool in reducing corruption via telecommunication infrastructure and the scope and quality of online services.
Kim (2014)	Examine linkages of anti-corruption initiatives, especially e-government and anti-corruption	Archival	E-government could be an effective tool to curb corruption in government, but the rule of law is the most powerful predictor of anti-corruption.
Sheryazdanova & Butterfield (2017)	Analyze Kazakhstan's efforts in developing e-government capacity, and investigate of its effectiveness in reducing corruption.	Case study	E-government is not a "panacea" to reduce corruption. This strategy is not able to limit oligopolistic behavior, especially in the state-owned business sector.
Basyal, Poudyal & Seo (2018)	Examine the relationship between e-government and corruption.	Archival	No relationship exists between e-government and corruption.
Nam (2018)	Examines the influence of e-government maturity on corruption control.	Archival	Given political and economic capacities, e-government can help reduce corruption at the country level.
Park & Kim (2019)	Empirically examine the effect of e-government in reducing corruption in all countries.	Archival	E-government as a whole significantly reduces corruption.