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To cite this article: Noerlina *et al* 2018 *IOP Conf. Ser.: Earth Environ. Sci.* **195** 012051

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# Systematic literature review on corruption prevention efforts towards sustainable economy in Indonesia: ICT perspective

Noerlina<sup>1\*</sup>, D M Kristin<sup>1</sup>, R Dewanti<sup>2</sup>, Sasmoko<sup>3,4</sup>, T N Mursitama<sup>5</sup>, A M Muqsith<sup>6</sup>, S P Fajrianti<sup>7</sup>, N S Krishti<sup>7</sup>, B A Makalew<sup>8</sup>

<sup>1</sup>Information Systems Department, School of Information Systems, Bina Nusantara University, Jakarta, Indonesia 11480

<sup>2</sup>Management Department, BINUS Business School Undergraduate Program, Bina Nusantara University, Jakarta, Indonesia 11480

<sup>3</sup>Primary Teacher Education Department, Faculty of Humanities, Bina Nusantara University, Jakarta, Indonesia 11480

<sup>4</sup>Research Interest Group in Educational Technology, Bina Nusantara University, Jakarta, Indonesia 11480

<sup>5</sup>International Relations Department, Faculty of Humanities, Bina Nusantara University, Jakarta, Indonesia 11480

<sup>6</sup>Computer Science Department, School of Computer Science, Bina Nusantara University, Jakarta, Indonesia 11480

<sup>7</sup>Psychology Department, Faculty of Humanities, Bina Nusantara University, Jakarta, Indonesia 11480

<sup>8</sup>Mobile Application & Technology Program, School of Computer Science, Bina Nusantara University, Jakarta, Indonesia 11480

\*Corresponding author: nurlina@binus.edu

**Abstract.** Corruption is an extraordinary crime and must be eradicated not only as fast as possible, but also as efficient and as effective as possible as it hinders the process of achieving sustainable economy. In current modern society, information technology exists as a multidisciplinary tool to solve lingering problems that could not be solved by traditional efforts. This paper aims to provide knowledge regarding identified efforts to fight corruption specifically in Indonesia region. Systematic Literature Review (SLR) methodology is used as the methodology, and Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow is used as framework to identify relevant records. Scopus database is used as data source. A total of 10 records are labelled as relevant to this research, and the findings are synthesized. It was found from the records that the main areas of interest for ICT research for corruption prevention in Indonesia are (1) information transparency, (2) operational enhancement, (3) success evaluation, (4) security and fraud, and (4) decision support. The findings are expected to assist future research in term of providing valuable insights on corruption prevention using ICT in Indonesia.

## 1. Introduction



A country can be defined as prosperous when it has a sustainable economy growth. In general, one of the main significant issues hindering economical growth is corruption [1]. Corruption is defined as a misuse of power for personal gain [2, 3]. Corruption can be present both in micro context (done by public staffs) and in a macro context (done by high level government officials) [4]. A systematic and organized effort must be done to counter corruption. Although decentralized research is effective, a meta-analysis addressing all efforts done to counter terrorism must be present.

Currently, Indonesia is having a significant issue regarding corruption, especially after a lot of government officials were persecuted by *Komisi Pemberantasan Korupsi* (Corruption Eradication Committee) right before general election. As the fourth most populous country in the world and one of the growing countries, corruption must be eradicated as soon as possible. This Systematic Literature Review (SLR) paper addresses the effort done by researches focusing in Indonesia as the subject of research using ICT as the medium to fight corruption. The next section will explain corruption and the readiness of information technology overview in Indonesia, The third section will explain the methodology used in this paper, the fourth section will explain the result of findings, and the fifth section will deliver the final conclusion.

## 2. Theoretical Background

### 2.1. Corruption Overview

Although a lot of indicators are available to measure corruption, but Corruption Perception Index (CPI) seems to be the most used because it also encompasses a number of perception from multinational companies [4, 5]. Currently, CPI have done surveys involving 180 countries related to the level of public sector perception on corruption according to experts and businessman using 0-100 scales. 0 score indicates a high degree of corruption, and 100 score indicates that no corruption is present. According to gathered data, CPI also underlined countries that lack or have no effort in fighting the corruption phenomenon. Referring to the latest CPI in 2017, New Zealand and Denmark is on the highest place scoring 89 and 88 respectively. Moreover, Syria, South Sudan, and Somalia are on the lowest rank scoring 14, 12 and 9 respectively [6].

Previous researches have investigated several factors that contribute in affecting the level of corruption in one country [7], which are: (1) ineffective bureaucracy and political administration/structure [8]; (2) civil participation / freedom of press [9]; (3) economical growth [10]; (4) gender [11]; (5) globalization [12]; (6) size of government [13]; (7) system of government [14]; (8) history of country [15]; (9) poverty [16]; (10) trade [17]; and (11) transparency [18].

Corruption is an immoral action investing a lot of misery to the people. The impact of corruption according to Dimand and Tosato [7] are: (1) reducing bureaucratic efficiency [19]; (2) lowering state profits through business and investment [20]; (3) reducing the rights of the community [21]; (4) inhibits economic growth [22] (4) reduces income figures from foreign country investment [23]; (5) uneven population income / poverty [24]; (7) weakening international trade [25]; (8) decreasing the value of political legitimacy [26]; and (9) underground / shadow economy [27].

Corruption is pertained as an extraordinary crime, for it decays the state of life. In reality, the imposition of sanction to corruptors is deemed by public as very low compared to the impact. This leads to perception of improvement in corruption according to the public if the country does not have severe sanctions. Some countries like China, United States, Malaysia, and Saudi Arabia have implemented the death penalty to some corruptors [28].

Other than the creation of a strict policy and regulation to control corruption [29], governments in each country also regularly try to find other solutions to this phenomenon. Information and Communication Technology has offered a new strategy to establish transparency and to support anti corruption movement. This is consistent to previous research [18] that claims transparency can influence the level of corruption in the country. Convenience in information access and dissemination makes ICT a powerful tool to prevent or reduce the level of corruption. A more concrete example is

the implementation of e-government that enables the public to monitor every decision and action taken by public officials [1, 30].

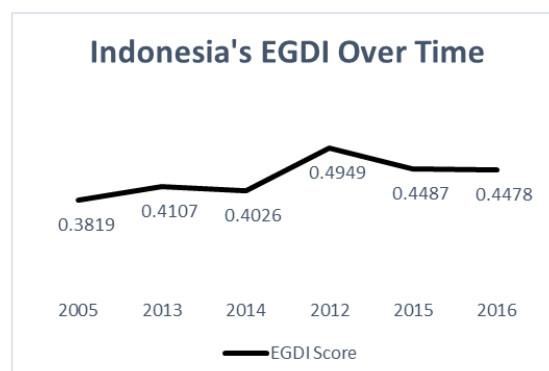
## 2.2. Readiness of Information and Communication Technology in Indonesia

An overview of information technology in a country can be seen through some indicators. E-Government Development Index (EGDI) for example, measures the use of ICT in a country to transform and reform public sector [31]. Areas that are expected to be measure for each country in regards to the e-government is the efficiency, effectiveness, transparency, accountability, access to public services, and citizen participation. A total of 193 countries participates in this biannual survey conducted by United Nation department of Economics and Social Affairs and (UN-DESA). The E-government readiness is measured using a weighted average of three index: Online Service Index (OSI) to measure scope and quality of online services, Telecommunication Infrastructure Index (TSI) to measure development of ICT infrastructure, and Human Capital Index (HCI) to measure the development of human capital in observed country [31]. In the latest result of 2016 EGDI survey, the top 10 countries can be seen in Table 1.

**Table 1.** Top Ten Countries with the Highest EGDI

Rank	Country Name	EGDI Score
1	United Kingdom	0.9193
2	Australia	0.9143
3	Republic of Korea	0.8915
4	Singapore	0.8828
5	Finland	0.8817
6	Sweden	0.8704
7	Netherland	0.8659
8	New Zealand	0.8653
9	Denmark	0.8510
10	France	0.8456

Based on the latest EGDI, Indonesia is placed on the 116th rank out of 193 participating country, with the score of 0.4478 out of 1, and is lower than average compared to sub region (South East Asia), region (Asia), and world ranking. Although some improvements are visible when compared overtime, the state of E-government readiness in Indonesia is visibly diminishing since 2012, with the highest score of 0.4949. The visualization of Indonesia's EGDI overtime can be seen in Figure 1.



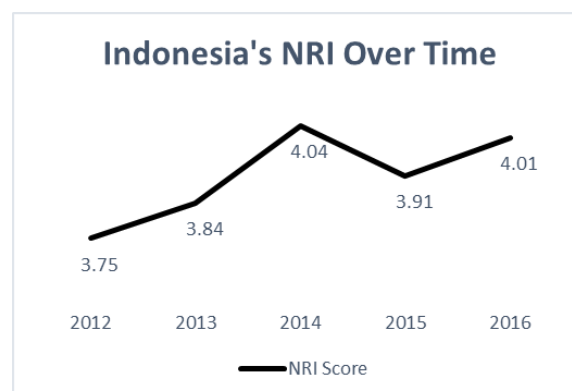
**Figure 1.** Indonesia's E-Government Development Index 2005-2016

Observed from another perspective, ICT condition in Indonesia can also be assessed with Networked Readiness Index (NRI) by World Economic Forum. NRI measures the tendency of a country to make use of ICT and the opportunities of it, and is regarded as the most comprehensive assessment of ICT impact to one country's competitiveness and well-being [32]. A total of 53 indicators is used to calculate NRI, grouped into 4 sub-indexes: Environment sub-index, Readiness sub-index, Usage sub-index, and Impact sub-index. NRI covers 139 countries in its most recent report of 2016, and the top 10 countries can be seen in Table 2.

**Table 2.** Top Ten Countries with the Highest NRI

Rank	Country Name	NRI Score
1	Singapore	6.0
2	Finland	6.0
3	Sweden	5.8
4	Norway	5.8
5	United States	5.8
6	Netherlands	5.8
7	Switzerland	5.8
8	United Kingdom	5.7
9	Luxembourg	5.7
10	Japan	5.6

In the latest report from World Economic Forum from 2016, Indonesia is ranked 73 out of 139 countries with a score of 4.0 [32]. The lowest score comes from Readiness sub-index and Impact sub-index, more specifically in infrastructure and digital content indicator and economic impacts indicator. Indonesia has a really low and decreasing score in Internet bandwidth connection, and got almost no score in the number of patent per million of population.



**Figure 2.** Indonesia's Networked Readiness Index 2012-2016

From the score of EGDI and NRI, it is very apparent that ICT development in Indonesia, more specifically in government offices, is still ineffective although slowly improving. When linked to corruption, it is apparent that corruption in Indonesia as measured by Corruption Perception Index (CPI) is decreasing although slowly [6]. Compared to 2012 score of 32, the latest report from Transparency International in the year 2017 shows that Indonesia's CPI has increased to 37 and is currently ranked 96. It is evidential that although direct causation is not visible, ICT development is correlated to effectiveness of corruption prevention.

The low score of EGRI and NRI indicates that Indonesia is in dire need of optimizing its ICT infrastructure, complimented by its implementation. In the scope of this paper, the ICT implementation will be assessed in term of corruption prevention, both designed for public use, or government operation use, more practically used in e-Government.

From the descriptive condition of e-government readiness, networked readiness, and corruption perception, a rough depiction of Indonesia's corruption and ICT condition is apparent. This paper is aimed to complement previous researches in terms of providing meta-analysis on previous works about how ICT is able to improve Indonesia's corruption prevention. This paper presents the exploratory study using Systematic Literature Review (SLR) structured by Preferred Reporting items for Systematic Reviews and Meta-Analyses (PRISMA) flow. A good understanding of the matter is expected to improve future research quality and to improve strategic roadmap for future findings. Lessons identified from previous researches along with the methodologies are expected to enrich the reader's proficiency. Areas untouched by the records are expected to be explored by future researchers, especially if there was strong evidence of its impact in corruption prevention.

### **3. Methodology**

This paper uses Systematic Literature Review (SLR) methodology for the data collection. SLR is defined as a methodological way to identify, assess, and analyse primary studies in a purpose of answering specific research question [33]. Although this paper identifies as literature review, it is different from regular literature review, as the records were obtained in a methodical way, and enables easier replication and more valid findings. The phase in this work is defined as follows: (1) determining research question, (2) establish the strategy, rules, and boundaries for record findings, (3) performing selection, (4) re-applying rules considering the context and content of full paper, (5) extracting and analysing data.

#### *3.1. Research Question*

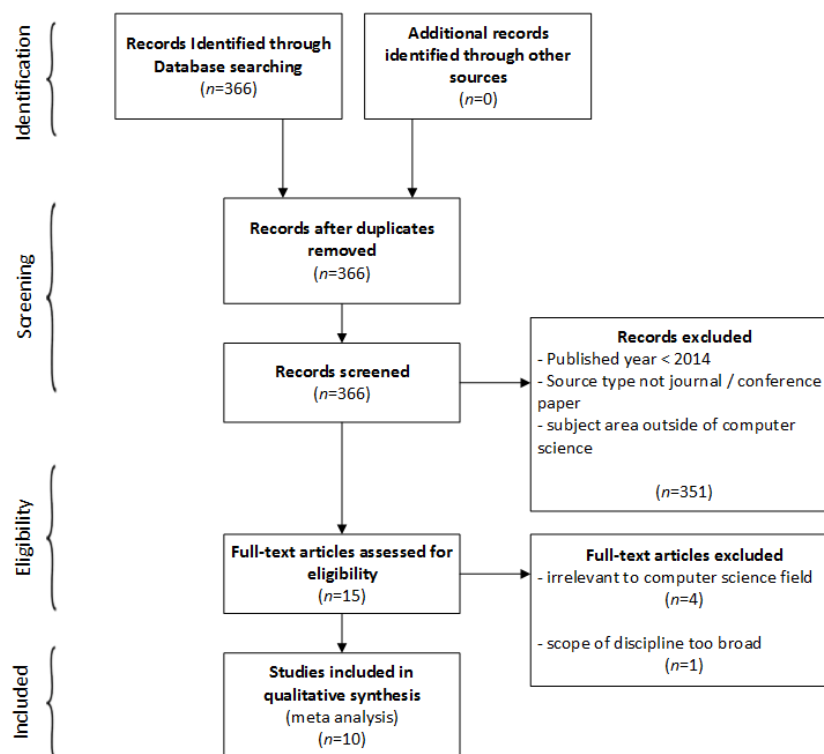
The research question for this research is: *What are the areas of interest in research for preventing corruption from an ICT point of view in Indonesia?*

#### *3.2. Data Source*

This research gathers data from the Scopus Indexing site. We decided on using Scopus as the indexing site for several reasons. Firstly, it is managed by one of the top publisher in the world, Elsevier. Secondly, it is used as the official indexing site to determine performance of research and publication by Indonesia's Ministry of Research, Technology, and Higher Education. The overall number of indexed articles are also considered sufficient to perform this work as it covers almost 40.000 high quality titles. Lastly, it is considered easy to navigate and provides an array of multidiscipline scientific publications [34].

#### *3.3. Data gathering method*

This work uses Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow to map the data since the beginning of identification, up to inclusion of relevant records [35]. PRISMA flow is chosen as the framework to ensure a transparent process of this SLR paper as it shows the number of paper included, excluded, and the reasons.



**Figure 3.** Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow

### 3.4. Inclusion & exclusion criteria

The papers that are included in record screening must fulfil the following criterias: (1) Published in 2014-2018, (2) must be journal / conference papers, and (3) subject area must be related to computer science. Upon fulfilling the record screening condition, the content and context of the full paper must be assessed for eligibility, considering some aspects, which are: (1) relevant to computer science field, and (2) has narrow enough scope of discipline. Relevancy to computer science field is done twice, one in record screening, and another in full text assessment to further filter non-computer science paper written in computer science conference / journal.

### 3.5. Data Extraction

The included research articles were categorized in 2 big categories: (1) basic research, and (2) applied research. Papers that are categorized as basic research paper shows qualitative findings and are mostly used to act as a base for other future implementative research. Practical research papers are the papers that provide tangible solution from analysed problems, and is able to demonstrate the solution in a more concrete way. From the included results, 2 records were determined as practical research and 8 other papers were determined as basic research as shown in Table 3.

**Table 3.** Identified Record Types

Type	<i>n</i>
Basic Research	8
Applied Research	2

The following data were collected from the each publication: published year, title, authors, methodology, problem, solutions/findings, technology type (web application, mobile application, data mining, etc.), and general area of interest. Due to the lack of relevant record, descriptive statistic such

as number of occurrence and percentage analysis is not possible. The analysis will be conducted qualitatively to assess each identified article both individually and collectively.

## 4. Result & Discussion

### 4.1. Solution classifications

From Table 4 it is apparent that corruption prevention researches are centered on e-Governance. Identified areas of interest include information transparency, which focuses on how a government should present public information; operation enhancement, where a lot of operations are deemed ineffective or do not have a solid base of framework; success evaluation, to improve the objectivity of evaluating a strategy; security and fraud, which emphasize on the importance of integrity throughout the e-government process and system; and decision support, where the focus is to provide data and insights to government officials in their process of making public regulation and policy.

**Table 4.** Identified records by area of interest

General Area	Area of Interest	Record
e-Government	Information Transparency	[36, 37]
	Operation Enhancement	[38, 39]
	Success Evaluation	[40, 41]
	Security and Fraud	[42, 43, 44]
Strategic Policy	Decision Support	[45]

From Table 5, e-Government is still apparent as the main area of improvement specifically in ICT area to support corruption prevention. Data & Text mining area used mostly to provide more tangible solution in the form of software or application. Web application and social media are mostly used as the empirical source of data and findings regarding government activities to support e-Governance. The detail of findings will be explained in the next section.

**Table 5.** Identified records by ICT area

ICT Area	<i>n</i>	Record
e-Government	6	[38, 40, 41, 43, 43, 44]
Data & Text Mining	2	[42, 45]
Web Application	1	[36]
Social Media	1	[37]

### 4.2. Solutions & findings Synthesis

Although a lot of identified records talk about e-Government aspect, the area of interest quite varies. In information transparency aspects, the findings in assessed papers suggested that government officials does not utilize the information technology accordingly. For example, twitter usage is not optimal to provide public information via social media [36]. Websites created for government offices also are not utilized efficiently, making the public wonder on where to find information that they should easily find [37]. This is coherent to findings in Networked Readiness Index that shows Indonesia is lacking in digital content quantity, also with e-Government Readiness Index that scores low on Online Service Index aspect [31, 32].

Effective operation will have a significant impact on both e-government readiness and ICT implementation in Indonesia. A low best practice utilization along with no systematic approach in managing e-Government will have a significant impact on the implementation, as addressed by the records found. Open data architecture requirement and e-procurement framework were addressed and proposed as the solutions for better operational management [38, 39].

An important issue to address is also success measurement. Awareness of corruption significantly influence the successful adoption of e-government implementation [40]. Trust, regulation, system



quality, and service quality must be adopted as the main metric to measure successful e-Government implementation as those aspects are proven to be the most important aspect, especially to related stakeholders [41].

Considering that e-Government relies heavily on security, fraud detection is needed especially to assist the issue of ineffective traditional audit [42]. In a specific field like e-procurement, a certificate based strategy is proposed and should be very effective in preventing collusion [43]. Finally, an effective system evaluation tool is needed, as also emphasized that it has direct correlation to successful e-government implementation [44].

To further support it all, related stakeholders more specifically decision markers must be able to make policies and regulations effectively and objectively. A tool for identifying high corruption case region is provided, and should be able to assist in making the decisions [45].

## 5. Conclusion

This research is aimed to provide insight and knowledge regarding the usage of ICT to support corruption prevention in Indonesia. The research was conducted using Systematic Literature Review as the method and Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow as the framework to map record findings. Ten relevant articles were assessed and the findings were categorized into five area of interests, which are: (1) information transparency, (2) operation enhancement, (3) success evaluation, (4) security and fraud, and (5) decision support. The findings show that previous researches were aimed to provide solutions around those 5 areas. The findings show coherent result with assessment done in the form of E-Government Development Index (EGDI) done by United Nations and Networked Readiness Index (NRI) done by World Economic Forum. If used correctly, the findings synthesized in this work will assist corruption prevention greatly and will improve E-Government and Strategic Policy.

## 6. Limitations and Future works

This work is limited especially in the number of records found. Future work should address this issue and synthesize a strategy to improve the number of records. When a larger  $n$  is obtained, a descriptive statistic is able to be conducted, meaning a more cohesive meta-analysis should be produced. A regional expansion should also be conducted, starting from sub-regional like South East Asia (SEA) or as big as world description. Addressing the limitation of meta-analysis, future works should use the knowledge from this research to develop a practical research to provide tangible solution.

## Acknowledgements

This work is supported by the Directorate General of Research and Development Strengthening, Indonesian Ministry of Research, Technology, and Higher Education, as a part of National Strategic Institutional Research Grant to Binus University titled “*Pengembangan Sistem Pemetaan Kasus Korupsi Berdasarkan Indeks Persepsi Korupsi Dengan Menggunakan Teknik Text Mining*” or “*The Development of Corruption Case Mapping Based on Corruption Perception Index using Text Mining*” with contract number: 024/KM/PNT/2018 and contract date: 6 March 2018.

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