Chapter 1

รัฐบาลอิเล็กทรอนิกส์: ความพยายามในการยกระดับธรรมาภิบาล

E-Government: Striving for Higher Level of Governance

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บทคัดย่อ

เนื่องจากมีความเห็นต่างที่หลากหลายในหมู่ของนักวิชาการว่า รัฐบาลอิเล็กทรอนิกส์นั้น ช่วยส่งเสริมให้ระดับของธรรมาภิบาลของประเทศต่าง ๆ เพิ่มขึ้นได้จริงหรือไม่ งานวิจัยชิ้นนี้มุ่งหาคำตอบว่าความเป็นรัฐบาลอิเล็กทรอนิกส์ในเชิงเทคนิคเพียงอย่างเดียวนั้น สามารถยกระดับความมีธรรมาภิบาลของประเทศได้หรือไม่ หากไม่แล้ว อะไรคือองค์ประกอบที่สำคัญที่สามารถเพิ่มโอกาสให้ความเป็นรัฐบาลอิเล็กทรอนิกส์สามารถยกระดับความมีธรรมาภิบาลได้ โดยการวิเคราะห์ข้อมูลเพื่อหาคำตอบต่าง ๆ ดังที่ได้กล่าวไปแล้วนั้น ดำเนินการโดยการวิเคราะห์ข้อมูลเชิงปริมาณทั้งในส่วนของการใช้สถิติเชิงพรรณนา และสถิติเชิงอนุมาน ทำการวิเคราะห์จากข้อมูลจากหน่วยวิเคราะห์ คือ 138 ประเทศจากทั่วโลก โดยเก็บรวบรวมข้อมูลจากแหล่งข้อมูลที่น่าเชื่อถือ โดยหลังจากที่ดำเนินการวิเคราะห์ข้อมูลเชิงปริมาณจากหลากวิธี รวมถึงในการวิเคราะห์ข้อมูลจากสมการหลักโดยใช้เทคนิค Ordinary Least Squares (OLS) และเทคนิค Two-Stage Least Squares (2SLS) แล้ว พบว่า การดำเนินนโยบายด้านการพัฒนาระบบของรัฐบาลอิเล็กทรอนิกส์เพียงอย่างเดียวนั้น ไม่สามารถบรรลุเป้าหมายของการเพิ่มระดับความมีธรรมาภิบาลของประเทศได้ อย่างไรก็ตาม ตัวแปรเครื่องมือที่เกี่ยวข้องที่จะต้องดำเนินการเป็นเงื่อนไขเบื้องต้นทั้งก่อนและระหว่างการดำเนินการพัฒนาระดับของรัฐบาลอิเล็กทรอนิกส์นั้นมีความสำคัญเป็นอย่างยิ่ง โดยตัวแปรเครื่องมือดังกล่าวประกอบไปด้วย สภาพเศรษฐกิจของประเทศ การพัฒนาทรัพยากรมนุษย์ ขีดความสามารถในการบริหารงานของหน่วยงานที่เกี่ยวข้อง และการรักษาความปลอดภัยของระบบ ยิ่งไปกว่านั้น ผลการวิจัยยังพบอีกว่ามีการสมาสกันของอิทธิพลของการพัฒนาระบบของรัฐบาลอิเล็กทรอนิกส์กับสิทธิขั้นพื้นฐานของสังคมที่ส่งผลต่อตัวแปรตาม ซึ่งก็คือ ระดับของความมีธรรมาภิบาลอีกด้วย โดยอิทธิพลที่สมาสกันนี้ส่งผลอย่างมีนัยสำคัญในทิศทางบวกต่อระดับของตัวแปรตาม นอกจากนี้แล้วยังพบอีกว่า ประเภทของระบอบ

การปกครองของประเทศต่าง ๆ ทั่วโลกที่แตกต่างกันมีผลต่อระดับของความมีธรรมาภิบาลที่เปลี่ยนแปลงโดยระดับการพัฒนารัฐบาลอิเล็กทรอนิกส์ที่แตกต่างกันออกไป โดยกำหนดให้ตัวแปรควบคุมคงที่ กล่าวคือ ประเทศที่มีระบอบการปกครองแบบประชาธิปไตยในระดับสูงนั้น การเพิ่มขึ้นของระดับความมีธรรมาภิบาล อันเนื่องมาจากการพัฒนารัฐบาลอิเล็กทรอนิกส์จะสูงกว่าประเทศที่เหลือในโลกอย่างมีนัยสำคัญ

คำสำคัญ: รัฐบาลอิเล็กทรอนิกส์/ ธรรมาภิบาล/ สิทธิ/ ระบอบการปกครอง/ นโยบาย/ 2SLS

Abstract

There is the discrepancy among scholars whether electronic government is the key influence to attain the higher level of governance for the country worldwide. This research aimed to replicate on questions regarding to whether solely electronic government system can improve the governance or not. If not solely, what the other predictors are. Data analysis in this research is quantitative research methods with both descriptive and inferential statistics on 138 countries worldwide as the unit of analysis in the data retrieved from various reliable sources. After analyzing data via ordinary least squares estimation and two-stage least squares estimation, this research finds that solely implementing electronic government cannot achieve the goal of increasing level of governance; nevertheless, other instruments must be incorporate into the electronic government development as the pre-condition of the system as well. These instrumental

variables include economic conditions, human resource management, capacity in administration, and safety of the system. Also, there is a covariation between electronic government development and fundamental rights of the society, as control variable in this regard, on level of governance as the dependent variable, which in turn having the positive impacts on the higher level of the governance. Finally, political regime type as the dummy variable explains the different between level of governance after considering these two predictors, electronic government development and fundamental rights of the society that full democratic countries tend to have higher governance level comparing with other regime types including (i) flawed democracy, (ii) hybrid regime, and (iii) authoritarian regime at the same level of electronic government development.

Keywords: Electronic Government/ Governance/ Rights/ Regime/ Policy/ 2SLS

Introduction

Defined as the usage of internet along with information and communication technology to establish interaction between government and other parties, electronic government*,** has been employed to respond accordingly to demand from the

* Electronic government (e-government) can also be called digital government or wired government.

** The term "electronic government" is interchangeably used with "e-government".

society inevitably (Stefanovic et al., 2016). Demand by nature of the society can be seen as dramatically increase in internet users over years, which can be seen as numbers of internet users in 2016 worldwide are approximately 725.702 percent1*, ** higher than number of internet users in 2000. Moreover, many governments has been implemented electronic service to serve their societies such as providing register a business via online platform and e-service for paying utilities. Interestingly, number of countries employing electronic service in providing register a business has been rapidly increase from year 2014 to year 2016 for 61.667 percent***, whereas number of countries providing electronic service for paying utilities increases from year 2014 to year 2016 for 56.164 percent.**** In addition, e-government has been considered as the new hope globally as the new hope to striving better outcomes in developing many aspects of the society such as overall economy and business environment. In regard to better level of governance, many countries, worldwide have been developed important components of the e-government system along with integration with their public services. However, keys to

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* Data employing in this percentage change is via this certain pre-analysis of this research and data were retrieved from http://www.internetlive stats.com/internet-users/

** Internet users in year 2000 equals to 414.795 million users, whereas in year 2016 internet users equals to 3.425 billion users.

*** Rising from 60 to 97 countries.

**** Rising from 41 to 104 countries and data employing in this certain pre-analysis were retrieved from https://www.statistics/421610/global-transactional-government-website-services/

the success both in developing theoretical concepts and thrusting in practices of e-government in order to achieve the better level of governance is still a myth to academic researchers, executives, policy makers, and practitioners.

Significance of the Research

Although electronic government is not a new term both in academia and in practice, nonetheless, there are two main concerns, (i) possible misconception regarding to what the e-government really is (in term of academia) and (ii) possible misdirection of policy-making regarding to e-government development (in term of practice).

Firstly, as possible misconception regarding to what the e-government really is, typically there usually is misapprehension that e-government is mainly about developing relevant technologies and infrastructure. The reason that some e-governments fail in real implementation is due to not fully understanding the multidimensional latent components that should be considered prior policy-making process. Though one part of developing e-government is about developing infrastructure and technologies, the most important in establishing e-government may be about re-organization on change management strategies, designing style in administration, preparing the appropriate environment in interacting the best out of the system, generating social infrastructure and information literacy, credibility or the system, public trust, and implementing

e-government in the most efficient way, which means the government should employ e-government only if it is better than traditional public administration (Bwalya and Mutula, 2014)

Secondly, in practice, when there is the misconception regarding to what e-government really is, there is the following mislead in directions of policy-making regarding to e-government development in order to achieve the ultimate goal as improving governance. In addition, the so-called "garbage in, garbage out" and "garbage in, gospel out", explain the possible misdirection due to misconception (Titah, R. and Barki, H., 2006). As a result, these misinterpretations may lead to various unintended consequences in wasting in efforts and cause in plausible opportunity cost. Also, if the e-government is employed with lack of other essential components related to citizens, Chabrow (2004) indicates that citizens are still more likely to use traditional channels rather than e-platform and so there is a prone to various pitfalls and thus not much improvement of governance whatsoever.

The imperative question is how to develop the e-government to achieve the higher level of governance. In this regard, there are two main tasks to work on. First of all, perceiving the important components to develop concurrently with developing e-government infrastructure is essential. This is for increasing the efficiency of national resource allocation for raising higher level of governance and increasing understanding in what has to be done for establishing e-government effectively in order to achieve the ultimate goal in

raising level of governance as well. Second of all, person who in charge of developing e-government must be able to prioritizing tasks and resource allocations, for instance, they need to understand what to do first and so on, as the shortest path to the ultimate goal in increasing level of governance.

Hence, this research strives to find the evidence to verify relevant variables and understand the phenomena of e-government development in respect to the feasible solutions to improve the level of governance in the level of country, worldwide.

Objective of the Research

The objective of the research includes (1) to perceive whether solely electronic government system of the country can improve the governance of the country (2) to perceive the essential components activating electronic government system to improve the level of governance (3) to perceive whether political regime of the country relevant to development of governance regarding to electronic government system of the country and (4) to perceive how political regime of the country relevant to development of governance regarding to electronic government system of the country

Scope of the Research

Unit of analysis in this research is country worldwide. In this regard, countries which contain missing values in relevant variables are dropped in the process of data cleaning to make data better in predictability. The content of this research is scoped in contributing direction of policy studies and public administration for the base of further research and application in developing e-government in order to achieve the feasible highest governance in the efficient and effective solutions. Moreover, in term of timeframe, this research is scheduled to process within six months, starting from December 1st, 2016 to May 31st, 2017.

Benefit of the Research

Perceiving the essential components activating the true capacity of e-government can contribute to establishing the short-term and intermediate-term goals and formulating policies in developing e-government to raise the possibility of achieving higher level of governance. The correct understanding can also enlighten the *efficient* and *effective* paths for policy makers to customize the best work tasks in activating and utilizing the e-government system in relevant concurrent processes to achieve the feasible highest governance level.

Literature Review

In the section of literature review, there are topics regarding to the concept of governance, e-government, fundamental rights of society and regime type effect.

The Concept of Governance

World Bank (2006) states that governance refers to the aspect of predictable, open, professional, accountable and enlighten policy-making and bureaucracy, and a strong will of citizen in participation in public affairs under the environment of rule of law. Moreover, United Nation (UN) indicates more that essential parts of governance include transparent, efficient, effective, and equitable public regulation and service delivery. Good governance requires that the voices of the most vulnerable are heard in decision-making and implementation of decision-makings (UNDP, 1997). Regarding to governance, both World Bank and UNDP share a common perception that good governance should have a range of attributes including transparency, accountability, and rule of law. Efficiency within effectiveness in decision making and participation are identified attribute of good governance that UNDP believe that they are also important to comprise good governance (World Bank, 1992; UNDP, 1997).

The Concept of Electronic Government

The emergence of the digital economy affects both roles and functions of public institutions. While undertaking traditional functions such as law enforcement and social equity, governments worldwide are now required to take new roles of utilizing the capacity of information technology, leading change, and potential restricting organizations (Fraga, 2002).

Electronic Government for Governance

The certain conceptual and theoretical linkages between governance and e-government that both concepts share very similar objects in that administrative efficiency, the quality of public services, and participation are main focuses of both. Likewise, e-government is a mean for the realization of higher level of governance due to the change in the back office* and the front office** in a way that makes the different components of good governance a reality (Suhardi et al., 2015; Allaaraj and Ibrahim, 2014; Abu-Shanab, 2012).

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* Back office refers to government internal operations and relations.

** Front office refers to government relations with citizens and other external stakeholders.

Electronic Government and its Limitations

Despite the remarkable potential influence of electronic government to increase the level of governance, many scholars argue that solely e-government eco-system is not enough to significant improve the level of governance (Suhardi et al., 2015). However, Kaur and Kamalkant (2012) argue that to eliminating the corruption, e-government itself cannot guarantee the end of the corruption due to the control of technological processes are empowered to find new opportunities for them to do the rent-seeking. Suhardi et al. (2015) argue that good governance principles are required precondition for successful e-government implementation.

Essential Pre-Condition of Electronic Government for Better Governance

Although e-government is expected to increase the better governance for the country, the practical employ of it must be due to the better use of the e-government system (Halachmi and Greiling (2013). To maximizing the e-government capacity for higher level of governance, decision-makers must understand the essential pre-condition for the best implementation.

Scholars found that the first reason most electronic systems deployed in many developing countries fail to enhance the governance is economic factors. However, some scholars argue that there is no significant relationship between economic

condition and e-government growth (Azad et al., 2010) Besides, Irani et al. (2003), Ho (2002) as well as Bonham et al. (2001) indicates that success of e-government cannot be separated from economic factor due to the high cost of initiation and maintenance process of e-government.

Secondly, transformation paradigm toward e-government needs to be accompanied by the readiness and speed of human resource development as well as the cautious of misuse by public and private actors to operate the application of technology to achieve the better governance. In term of interaction between human and machine, an awareness of technological competency of bureaucrats and relevant officers requires the training and replacing of public employees to enable them to become knowledge agents to successfully implementing e-governmental service on their assigned mission (United Nations, 2012; Halachmi, 2004). Also, it is very important that citizen and client of government are well educated in necessary skills, language, and have enough technological literacy (Hall and Owens, 2011). However, some scholars argue that human capital has no influence on e-government maturity (Signh and Joseph, 2017).

The third pre-condition is administrative capacity factor, additionally, e-government initiatives have been predominantly focused on changing government operation, structures, and services to boost productivity, in this regard; increasing the capacity of administration is a must to concurrently implement along with the e-government development. In practice, unintended

consequences may be occurred if the administration capacity is not enough to moderate the e-government eco-system (Halachmi and Greiling, 2013).

Fourthly, Bonham et al. (2001) share the similar perceptions that one of the most significant barriers for the success of e-government implementation is system safety including (i) system security, (ii) privacy, and (iii) confidentiality of data. Risk of e-government security is very high cost as public network contains the databases of government information and citizen profile. In these regards, government bodies at all levels use, collect, process, and disseminate a wide range of sensitive information on personal and financial aspects. Thus, securing information which relates to privacy is not only critical for the availability of such these data and information, but it also relates to confidence and trust of citizens and other government clients.

Fundamental Rights of Society

Majeed and Malik (2016) state that fundamental rights of society cannot fight against corruption alone but the combined effect of e-government success and fundamental rights can contribute a higher plausible to achieve better governance. Fundamental rights are linked to modernization of government, better new public management, and improving the governmental process. In addition, the ability of citizens and government clients to request and receive information is critical to transparency, accountability, and other aspects of governance.

Regime Types and Governance Level

Regime types tend to be important in driving overall patterns of international diffusion (Kalathil and Boas, 2003). Generally, democratic countries adopt more e-government tools than authoritarians and more likely to promote access to e-government eco-system than the autocratic regimes. Yet, some authors argue that e-government can be developed equally regardless of regime type, yet many authors assert that the outcomes from that certain development are different among regimes (Kalathil and Boas, 2003).

Conceptual Framework

In conceptual framework, level of governance is the dependent variable, whereas level of e-government development is the endogenous variable and level of rights is the exogenous variable. In this regard, as level of e-government is endogenous, there are four instrumental variables; (i) efficiency of the economy, (ii) human resource development, (iii) capacity of the administration, and (iv) level of safety, having impacts of level of e-government development.

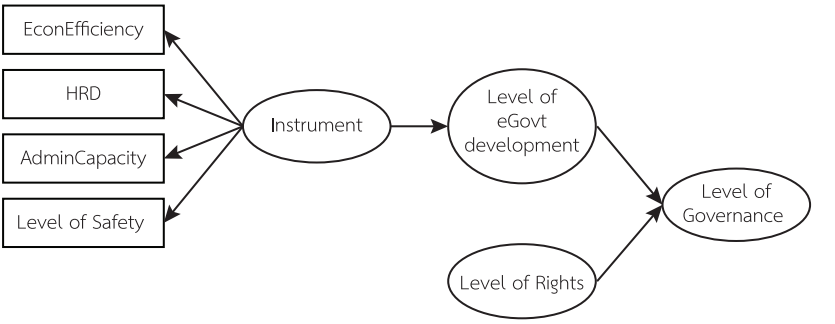

Figure 1: Conceptual Framework of the Research

Data Collection and Data Analysis

Unit of analysis is country worldwide, which includes 138 countries*. Also, there are 10 variables in this regard. 'cpi', ' wgi_govern', and 'lega_govern', are used as the sub-component to generate the dependent variable to measuring the level of governance** and also are normalized*** prior consolidating all together to be composite dependent variable (consogovern). Moreover, for the RHS (right-hand-side) variable, there are seven variables; including one exogenous variable (rights), one endogenous variable (egdi), four instruments (hrd, econefficiency,

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* One hundred and thirty-eight countries is attained via dropping 55 of 193 countries for not making dataset truncated as they contain missing values

** Variable 'consogovern is employed for measuring level of governance.

*** Formula to normalize data via min-max rescaling is as follow.

$$X_{scaled} = \left[\frac{(X_d - Min_d) \times Max_{range})}{Max_d - Min_d}\right] + Min_{scaled}$$

$$where\ x = variable$$

admincapacity, safety), and one dummy variable (regime). Additionally, for the purpose of alleviating possible outliers, all of these RHS variables are normalized. Additionally, dummy variable 'regime' is transformed into two dummy variables, democ and fulldemoc*. Additionally, data analysis is employed through quantitative research methods. Both descriptive and inferential statistics are performed. Analysis starts with describing data and index validation to test all the propose compositions of dependent variable and (iii) Pearson correlation to assure the significant level of association between proposed dependent variable and its normalized compositions along with item validation via Pearson correlation as well, one-way table and summary statistics to explain all normalized variables relevant to variable of normalized e-government development**. For main analysis, employing the first model via OLS estimation***, which is BLUE**** if necessary assumptions are satisfied*****, however, if not, the better model will be employed. Moreover, dummy variable is employed as well.

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* For dummy variable 'democ', the outcomes of full democracies and flawed democracies are coded as 1, whereas the outcomes of hybrid regimes and authoritarian regimes are coded as 0. Likewise, for dummy variable 'fulldemoc', the outcome of full democracies is coded as 1, whereas the outcomes of flawed democracies, hybrid regimes, and authoritarian regimes are coded as 0.

** Both all observations and by region

*** OLS estimation refers to ordinary least squares estimation.

**** BLUE means the best linear unbiased estimator.

***** Assumption testings include (i) Breuch-Pagan/Cook-Weisberg test for heteroskedasticity, checking VIF, and endogeneity test via Ramsey RESET test.

Research Results

Regarding to the pathway to perform as explained in research methods, results are explained in three sections; (i) result from data management and composite index validation, (ii) describing in general about units of analysis and variables, and (iii) main analysis result.

Result from Data Management and Composite Index Validation

In this regard, scatter plot of all three pairs between each proposed composition of composite index (consogovern) are performed and resulted in strongly positive correlated. In addition, to confirm a strong correlation between these three indices employed to construct the composite dependent variable, Pearson correlation technique is performed and result of Pearson correlation indicates a significant positive linear correlation between ncpi and nwgi_govern at 0.0001 α-level with β of 0.930. In addition, there is a significant positive linear correlation between ncpi and nlega_govern at 0.0001 α-level with β of 0.942. Moreover, there is a significant positive linear correlation between nwgi_govern and nlega_govern at 0.0001 α-level with $\beta$of 0.904. Hence, all the Pearson correlation tests confirm the result from scatter plots. As such, all three proposed indices as the composition of dependent variable are good candidate. Furthers, the index validation is performed through item analysis via

Pearson correlation due to the level of measurement for each variable tested is interval scale. The result indicates the significant linear correlation of proposed composite index, consogovern, and all three sub-indices at 0.0001 α-level for all three Pearson correlation tests. In this regard, result from Pearson correlation test between consogovern and ncpi expresses $p < 0.0001$ with β of 0.983. Moreover, result from Pearson correlation test between consogovern and nwgi_govern expresses $p < 0.0001$ with β of 0.969. Lastly, result from Pearson correlation test between consogovern and nlega_govern expresses $p < 0.0001$ with β of 0.972. Thus, there are strong evidences indicating that consogovern is a strong composite indicator as the dependent variable of the model and can be used as the dependent variable after the process of normalization*.

Describing in General about Units of Analysis and Variables

Dataset, as managed, contains 138 observations of countries as the unit of analysis. In this regard, after normalizing all seven variables**, mean of 'nsafety' is the highest among all, $\bar{x}$ = 0.622, whereas mean of 'nadmincapacity' is the lowest among all variables, $\bar{x}$ = 0.303. Nevertheless, all $\bar{x}$ of variable are not much

* Variable 'consogovern' is normalized to be variable 'nconsogovern' for the purpose of alleviating the potential outlier issue and be employed as the dependent variable in the main analysis.

** Normalizing process is done via min-max rescaling.

different, range of $\bar{x}$ = 0.319. In addition, standard deviation of 'nadmincapacity' is the highest one, sd = 0.268, whereas standard deviation of 'nsafety' is the lowest one, sd = 0.218. However, standard deviations across variables are not much different, range of standard deviation across all variables = 0.050. Finally, minimum and maximum value of all variables are the same due to the normalization process*.

Main Analysis Result

In order to find predictors of dependent variable, nconsogovern, the first model to employ is ordinary least squares (OLS) due to the fact that OLS is the best linear unbiased estimator (BLUE) if all assumptions of it are satisfied. Regarding to testing whether each predictor has significant impact on dependent variable or not, hypothesis settings are shown as follows**.

H_1: Level of e-government has significant impact on level of governance.

H_2: Level of safety has significant impact on level of governance.

After running OLS regression analysis, R^2 of the OLS model is 0.792, which mean the model can explain 79.2 percent of the variance***. In this regard, result of testing H_1 indicates t = 11.15,

* Min = 0 and Max = 1.

** All predictors employing to test on H_1 and H_2 are treated as exogenous variables.

*** R^2 is explained for illustrating how well of the model explain the variances.

$p < 0.001$, and $\beta = 0.546$ which support the implication that variable negdi has a significant impact on nconsogovern* at 0.001 α-level, with β of 0.546. In addition result from testing H_2 indicates $t = 8.85$, $p < 0.001$, and $\beta = 0.445$ which support the implication that variable nrights has a significant impact on nconsogovern at 0.001 α-level, with β of 0.445. Moreover, constant of this model equals to -0.098. Besides, testing whether variance is constant or the so-called "test for heteroskedasticity" is employed via Breuch-Pagan/ Cook-Weisberg test for heteroskedasticity.

In addition, to test for the homoskecasticity, the result of Breush-Pagan/Cook-Weisberg test indicates $p = 0.022$, which is less than 0.05 of the α-level. Hence, there is enough evidence to support the rejection of the null hypothesis and can conclude that variance is not constant (heteroskedasticity) at 0.05 α-level.

H_3: negdi has a significant impact on nconsogovern via robust standard error.

H_4: nrights has a significant impact on nconsogovern via robust standard error.

As the Breush-Pagan/ Cook-Weisberg test for heteroscedasticity indicates the occurrence of heteroscedasticity, robust standard error is employed to improve the OLS model and after performing OLS regression with robust standard error, the model expresses R^2 of 0.792, which indicates that the model

* nconsogovernance is the normalized dependent variable employed in the analysis.

is explained by the 79.2 percent of the variances. In this regard, the result of H_3 testing indicates t = 9.92 and p < 0.001, with β of 0.546. Thus, the result implies that negdi has a significantly positive impact on nconsogovern at 0.001 of α-level, with the magnitude of impact equals to 0.546. In addition, the result of H_4 testing indicates t = 8.54 and p < 0.001, with β of 0.445. Hence, the result implies that nrights has a significantly positive impact on nconsogovern at 0.001 of α-level, with the magnitude of impact equals to 0.445.

Result of the variance inflation factor* (VIF) indicates all VIFs express value less than 3, as such there is no perfect multicollinearity in this model.

Another important assumption of OLS estimation is no endogeneity, cov (x_i, ε_i) = 0. This is because when there is the endogeneity occurring within the OLS model, the OLS model is no longer best linear unbiased estimator. In this regard, Ramsey RESET test is performed to test the hypothesis of no omitted variables, which causes the problem of endogeneity**. In this regard, after performing Ramsey RESET test, as null hypothesis means the model has no omitted variables, whereas the alternative hypothesis is otherwise. In this matter, the test reports

* VIF is performed to check whether there is multi-collinearity or not.

** See model tested for endogeneity in appendix A.

that F = 9.24 and p < 0.0001. As such, there is the rejection of null hypothesis at the 0.0001 α-level and can conclude that there is (are) omitted variable(s) in the OLS model, thus, OLS estimation is no longer BLUE* in this regard, due to cov (x_i, ε_i) ≠ 0 . To solve the problem of endogeneity, the proposed model to improve the likelihood in estimation is 2SLS model.** In this regard, to assure that 2SLS regression is the best model in this analysis, testing the proposed instrumental variables for endogeneity variable is performed through at least two steps; (1) scatter plot with regression line of negdi and each normalized instruments and (2) OLS regression which negdi is endogenous variable whereas nhrd, nadmincapacity, neconefficiency, and nsafety are instrumental variables.

In this regard, this research performs scatter plot of negdi*** and all instrumental variables are positive correlated. Thus, there is a high potential that all proposed instruments can be good instruments via the 2SLS model. Besides, to affirm that all proposed instruments are appropriate to use when negdi is endogenous variable, OLS regression is employed to regress 'negdi' on all of four proposed instruments as following hypothesis settings.

---

* BLUE stands for best linear unbiased estimator.

** Due to the fact that literature review expresses number of variables that have the potential instruments for the model more than the remain exogenous variables. As such the IV estimator is no longer the best model but 2SLS is the one should be performed in this research.

*** The endogenous variable in this model is negdi.

H_5: nadmincapacity has a significant influence on negdi.

H_6: neconefficiency has a significant influence on negdi.

H_7: nhrd has a significant influence on negdi.

H_8: nsafety has a significant influence on negdi.

The result of H_5 indicates the rejection of the null hypothesis* as t = 3.36 and p < 0.005 with β of 0.121. Hence, nadmincapacity has a significantly positive influence on negdi at the 0.005 α-level with the magnitude of influence for 0.121. In addition, the result of H_6 expresses** t = 2.16 and p < 0.05 with β of 0.165. Thus, neconefficiency has a significantly positive influence on negdi at the 0.05 α-level with the magnitude of influence for 0.165. Moreover, the result of H_7 indicates t = 10.28 and p < 0.001 with β of 0.641. Hence, nhrd has a significantly positive influence on negdi at the 0.001 α-level with the magnitude of influence for 0.641. Furthermore, the result of H_8 indicate*** t = 2.34 and p < 0.05 with β of 0.129. Thus, nsafety has a significantly positive influence on egdi at the 0.05 α-level with the magnitude of influence for 0.129. As such, after regressing negdi on all four prospective instrumental variables, all of negdi's prospective instrumental variables have significant impact on negdi at least 0.05 α-level. Thus, all of four proposed instrumental variables have a high likelihood to be considered as the instruments for

* p = 0.001
** p = 0.032
*** p = 0.021

negdi and two-stage least squares (2SLS) estimation is employed.

Two-Stage Least Squares (2SLS) Regression Estimation

To perform 2SLS regression estimation, H_9 and H_{10} are set in this regard.

H_9: negdi has a significant impact on nconsogovern.

H_{10}: nrights has a significant impact on nconsogovern.

The result is shown as following figure.

```
Instrumental variables (2SLS) regression          Number of obs =     138
                                                  Wald chi2(2)  =  523.99
                                                  Prob > chi2   =  0.0000
                                                  R-squared     =  0.7870
                                                  Root MSE      =  .11321
```

nconsogovern	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
negdi	.634074	.0545698	11.62	0.000	.5271192	.7410289
nrights	.3896614	.0524448	7.43	0.000	.2868714	.4924513
_cons	-.1187954	.0266166	-4.46	0.000	-.1709629	-.0666279

```
Instrumented:  negdi
Instruments:   nrights nadmincapacity neconefficiency nhrd nsafety
```

Figure 2: 2SLS Regression Result of Baseline Model

According to figure 2, for negdi as the regressor, z = 11.62 and p < 0.001, with β of 0.634, which supports the rejection of the null hypothesis at the 0.001 α-level. Thus, negdi has a significant positive impact on nconsogovern with the magnitude of impact at 0.634 when holding value of nrights at its mean. Moreover, for nrights as the regressor (control variable in the model), z = 7.43 and p < 0.001, with β of 0.390, which supports the rejection of the null hypothesis at the 0.001 α-level. Hence,

nrights has a significant positive impact on nconsogovern with magenitude of impact at 0.390 when holding value of negdi at its mean.

Model Specification for Two-Stage Least Squares (2SLS) Regression Estimation

To assure that all variables and instruments including in 2SLS model are best fit for the model, tests of endogeneity and first-stage regression estimation are employed in this regard. Durbin test indicates $p < 0.0005$, which supports the rejection of the null hypothesis at the 0.0005 α-level. In this matter, Durbin test indicates that variables are endogenous, which supports the estimation via 2SLS regression model for the best likelihood in model specification. Moreover, Wu-Hausman test indicates $p < 0.0005$, which also supports the rejection of the null hypothesisat the 0.0005 α-level. As such Wu-Hausman test indicates that variables are endogenous, this supports the estimation via 2SLS regression model for the best likelihood in model specification as well.

First-stage regression summary statistics

Variable	R-sq.	Adjusted R-sq.	Partial R-sq.	F(4,132)	Prob > F
negdi	0.8793	0.8747	0.8079	138.755	0.0000

Minimum eigenvalue statistic = 138.755

Critical Values # of endogenous regressors: 1
Ho: Instruments are weak # of excluded instruments: 4

	5%	10%	20%	30%
2SLS relative bias	16.85	10.27	6.71	5.34
	10%	15%	20%	25%
2SLS Size of nominal 5% Wald test	24.58	13.96	10.26	8.31
LIML Size of nominal 5% Wald test	5.44	3.87	3.30	2.98

Figure 3: Result from first-stage regression

Moreover, result of first-stage regression, as shown in figure 3, expresses the *partial* R^2 of 0.80, which indicates the strong association among variables within the model. In addition, F-statistic equals to 138.755, which is larger than all critical values shown in figure 3. Moreover, $p < 0.0001$, which supports the rejection of the null hypothesis and as a result, instruments in the 2SLS regression model are significantly strong. Thus, all instrument variables show good aspect in model specification. In conclusion, all the tests for model specification indicate that 2SLS regression model and all instrumental variables are appropriate in estimation.

Performing 2SLS Regression with Dummy Variable

Including dummy variable into the model can make the result more informative, in this regard, dummy in democratic spectrum of observations (countries) within the dataset are considered into two aspect; (1) 'democ', which is the dummy variable that separates observations (countries) into two groups; the first group is countries those are considered full democracies and flawed democracies whereas the second group is countries those are considered hybrid regime and authoritarian regime and (2) 'fulldemoc' is the dummy variable that separates observations (countries) into two groups as well. However, the first group contains only countries those are considered to be full democracies whereas the second group contains countries those are considered flawed democracies, hybrid regime, and authoritarian regime.

H_{11}: negdi has the signifiant impact on nconsogovern.

H_{12}: nrights has the significant impact on nconsogovern.

H_{13}: Difference in democ indiates the difference in baseline of nconsogovern.

The result of 2SLS regression estimation with dummy variable in the first aspect, dummy = democ, is illustrated in figure 4.

```
Instrumental variables (2SLS) regression          Number of obs =     138
                                                  Wald chi2(3)  =  535.24
                                                  Prob > chi2   =  0.0000
                                                  R-squared     =  0.7903
                                                  Root MSE      =  .11232
```

nconsogovern	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
negdi	.618093	.057591	10.73	0.000	.5052168	.7309692
nrights	.3575561	.05995	5.96	0.000	.2400562	.475056
democ	.0287709	.0288224	1.00	0.318	-.02772	.0852618
_cons	-.1071903	.029214	-3.67	0.000	-.1644487	-.049932

```
Instrumented:  negdi
Instruments:   nrights democ nadmincapacity neconefficiency nhrd nsafety
```

Figure 4: 2SLS Regression with dummy 'democ'

Regarding to testing H_{11}, as shown in figure 4, z = 10.73 and p < 0.001 with β of 0.618 indicates the rejection of the null hypothesis at the 0.001 α-level. As such, negdi has significant positive impact on nconsogovern with the magnitude of impact at 0.618. Moreover, after testing H_{12}, z = 5.96 and p < 0.001 with β of 0.358 indicates the rejection of the null hypothesis at the 0.001 α-level. As such, nrights has significant positive impact on nconsogovern with the magnitude of impact at 0.358. Furthermore, after testing H_{13}, z = 0.029 and p > 0.05 and p > 0.10 which means there is no rejection of the null hypothesis and can conclude that there is no different in baseline of nconsogovern between group that democ = 1 and group that democ = 0.

H_{14}: negdi has the signifiant impact on nconsogovern.

H_{15}: nrights has the significant impact on nconsogovern.

H_{16}: Difference in fulldemoc indiates the difference in baseline of nconsogovern.

The result of 2SLS regression estimation with dummy variable in the second aspect, dummy = fulldemoc, is illustrated in figure 5.

```
Instrumental variables (2SLS) regression          Number of obs =     138
                                                  Wald chi2(3)  =  631.84
                                                  Prob > chi2   =  0.0000
                                                  R-squared     =  0.8182
                                                  Root MSE      =   .1046
```

nconsogovern	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
	.5872754	.0512908	11.45	0.000	.4867473	.6878036
nrights	.2865845	.0539056	5.32	0.000	.1809314	.3922376
fulldemoc	.1533589	.0342793	4.47	0.000	.0861726	.2205451
_cons	-.0572456	.0280685	-2.04	0.041	-.1122587	-.0022324

```
Instrumented:  negdi
Instruments:   nrights fulldemoc nadmincapacity neconefficiency nhrd nsafety
```

Figure 5: 2SLS Regression with dummy 'fulldemoc'

Result of testing H_{14}, z = 11.45 and p < 0.001 with β of 0.587 implies that negdi has significant positive impact on nconsogovern with the impact magnitude of 0.587 at the 0.001 α-level. In addition, after testing H_{15}, z = 5.32 and p < 0.001 with β of 0.287 implies that nrights has significant positive impact on nconsogovern with impact magnitude of 0.287 at the 0.001 α-level. Finally, after testing H_{16}, z = 0.153 and p < 0.001, which implies that there is the significant different in baseline of nconsogovern between group that fulldemoc = 1 and group that fulldemoc = 0.

Final Model of the Analysis: 2SLS Regression with Dummy Variable 'fulldemoc'

	(1) nconsogovern	(2) nconsogovern	(3) nconsogovern
negdi	0.634***	0.618***	0.587***
	(11.62)	(10.73)	(11.45)
nrights	0.390***	0.358***	0.287***
	(7.43)	(5.96)	(5.32)
democ		0.0288	
		(1.00)	
fulldemoc			0.153***
			(4.47)
_cons	-0.119***	-0.107***	-0.0572*
	(-4.46)	(-3.67)	(-2.04)
N	138	138	138

t statistics in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Figure 6: Results of (1) 2SLS (2) 2SLS with 'democ' and (2) 2SLS with 'fulldemoc'

According to figure 6, there are three models within including (1) baseline model (2) model with dummy 'democ', and (3) model with dummy 'fulldemoc'. However, the third model (3), is the final model, which can be understood by the following equation.

$$nconsogovern_i = -0.057 + 0.587 negdi_i + 0.287 nrights_i + 0.153 fulldemoc_i + u_i$$

In term of significance of the test, star signs are employed to illustrate the level of significance, including one star (*) for $p < 0.05$, two star (**) for $p < 0.01$, and three stars (***) for $p < 0.001$. In these regards, all coefficients (β) of RHS variables have significant impacts on nconsogovern at the 0.001 α-level. The replication from 2SLS model with dummy variable 'fulldemoc' expresses that 'negdi' has significant positive impact on nconsogovern for the impact magnitude of 0.587 when holding other right-hand variables constantly at their means. In addition, 'nrights' has significant positive impact on nconsogovern for the impact magnitude of 0.28 when holding RHS variables constantly at their means. Moroever, when dummy variable 'fulldemoc' = 1, nconsogovern is 0.153 unit higher than when dummy variable 'fulldemoc' = 0.

Conclusion

E-government is a remarkable influencer for the best outcome in governance level. However, the e-government should not be implemented solely in technical aspects; otherwise the effect of e-government alone cannot improve the governance. Additionally, other important components should be well prepared and operated along the process to improve the governance as well. The first essential component to employ within the e-government is the robust administration of the government bodies. Leadership and well management are

required. The second component is a good condition of economy to assure that the operation and maintenance of e-government are smoothly performed. Thirdly, human resource development aspect is important. Machine cannot independently fruit the maximum payoff until the capable government employees are in charged to managing it. As well, in the demand side, people should be well educated to have an enough competency to use the e-government eco-system at best level of the society. Lastly, to build trust on the demand side, such as citizens and business firms, on the e-government system, the safety environment in respect to managing capacity with both possible internal threats, such as misuse of citizen information and government client information, and external threats, such as hackers and viruses, is a must. Likewise, fundamental rights of citizens and other government clients should be concurrently with the process of improving governance as it can support the better governance for the country as well. This is to assure the minimal information asymmetry among all units of society to participate and look after the society along with the government for the better outcome in governance level. Speaking of regime type, the best outcome of e-government can be seen from the high level of democracy. Lower than the high level of democracy, including flawed democracy, hybrid regime, and authoritarian, cannot perform the best out of the e-government to influence the better governance. Even this research found that e-government can improve the governance regardless of regime type; nonetheless, at the same

level of e-government, countries whose full democracy gain significantly higher level of governance than flawed democracy, hybrid regime, and authoritarian regime. In this regard, all flawed democratic countries, hybrid regime countries, and authoritarian countries have no significant different level of governance at the same level of electronic government development whatsoever.

Discussion

This research finds that there are some latent factors as the pre-condition of e-government to attain higher level of governance. The first pre-condition of e-government development as found in this research is economic condition variable. Although Azad et al. (2010) asserts that there is no association between economic level and e-government growth, this research finds the different result. The significant level of the first stage regression in the two-stage least squares estimation indicates that economic condition is a positive association with the e-government, which have the impact on the level of governance. This finding is in the same way with statements of Bonham et al. (2001), Ho (2002), and Irani et al. (2003) that the success of e-government implementation cannot be separated from economic level. The readiness of human resource development is necessary pre-condition of e-government development process. Although Signh and Joseph, (2017) claimed that there is no significant impact of human capital on e-government performance, this research finds that without a well-prepared and proper

development of human capital, the e-government implementation has a huge challenge in its success. In this regard, this finding of this research is in the same direction with assertion of United Nations (2012), Halachmi (2004) as well as Heek (2001). As such, the success of implementing e-government to increase level of governance cannot overlook human resource development. The third pre-condition of e-government development is administrative capacity. Finding in this regard of this research indicates in the similar replications with Lenk (2012), Aikins and Krane (2012), as well as Northruup and Thorson (2003) that without a leadership, well-performed management style, and well prioritized procedure, e-government cannot increase the level of governance for the country. Also, the proper set of strategies is an essential pre-condition in this regard as well. The fourth pre-condition of e-government development found in this research is safety environment factor. As similar as Bonham et al. (2001) as well as Ebrahim and Irani (2005), result of this research finds that e-government eco-system cannot survive without a well-constructed security, privacy, and confidentiality for protecting system itself and private information of citizens and government clients from possible internal and external threats to exploit information holding by e-government database and to assure the public trust to operate e-government successfully.

Furthers, fundamental rights can contribute the success along with e-government development. The covariates of fundamental rights and e-government development as found in

the second stage of 2SLS estimation both positively impacts on higher level of governance. This finding agrees with Mendel (2000) that if the country has the enough high level of fundamental rights, the governance level will be high along with the implementation of e-government.

Finally, finding of this research indicates that authoritarians are less likely to attain the level as high as the more democratic, which this findings are similar to Kalathil and Boas (2003), and Johnson and Kolko (2010); yet, this research finding provides more details about the regimes other than authoritarian. Say, this research result indicates that even among the more democratic spectrum, there are difference in level of governance at the same level of electronic government development and level of fundamental rights of the society. Regarding to the finding, there is a significant higher level of governance in full democratic countries comparing with countries which are defined as another two regimes type; flawed democracy and hybrid regime.

Recommendation

To improve the level of governance via e-government, policy-maker should not overlook latent factors. Firstly, prior and concurrent process of development e-government, at each stage of development should be synced with the proper procedure of organization administrative development. Leadership is the pre-condition to gear the following process of management skill properly with e-government eco-system at certain stage. Also,

integrating information management of all government agencies and relevant facilities of public service has to be done in the final stage of e-government development. Secondly, high level of economic condition is crucial for increasing the potential of employing e-government smoothly during the process of e-government operation and development to serve all the society well and to increase the capacity of overall governance. Thirdly, decision makers and policy makers should build the competency of e-government managers, supervisors, and agents in using the e-government applications, which is very important regarding to supply side. Besides, decision makers and policy makers have to assure that citizens and government clients must have a foundation of these mentions applications of e-government's literacy otherwise they may still choose to communicate and/or transact with government in the traditional methods. Fourth, to gain trust from the mass, the stable e-government operation and the system of e-government from the emergence stage to the integrated e-government stage must be capable of securing the system and information from internal and external threat is essential. Fifth, to accompany with the operation of e-government to achieve the higher level of governance, decision makers and policy makers must realize about fundamental rights of citizens and government clients in requesting and retrieving reliable and valid information from the e-government system for alleviating or eliminating information asymmetry problem. Finally, with countries whose regime type is lower than full democracy, the

more resources and efforts have to be more than the full democratic countries in order to attain the same level of governance through e-government development in overall.

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Appendix A: Result of Endogeneity Test

```
Ramsey RESET test using powers of the fitted values of nconsogovern
       Ho:  model has no omitted variables
                 F(3, 132) =      9.24
                  Prob > F =      0.0000
```