DETERMINANT FACTORS OF E-GOVERNMENT IMPLEMENTATION AND PUBLIC ACCOUNTABILITY: TOE FRAMEWORK APPROACH

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Abstract. *This study aimed to provide recommendations related to the model of the relationship of key factors in the implementation of e-government by using the theory of the TOE approach represented by technological infrastructure, human resource competency, and external pressures. Moreover, this study has implications as a guideline in determining strategies to improve the problem of accountability in local government related to the dysfunction of e-government implementation factors and their relationship with accountability.*

The data was collected through a survey by distributing questionnaires to the head of the Regional Apparatus Organization (OPD) in the Regional Government of West Sumatra and processed by using SEM-PLS statistical tool. The result of the study showed that the factors raised in the TOE framework can determine the implementation of e-government but is not yet proven for public accountability. The positive and significant impact of implementing e-government can increase accountability. Therefore, it can be proved that the increase of accountability can be achieved through maximizing e-government by each region.

Background

The issue of the New Public Management (NPM) in the 1990s brought major changes to government policy (Chappelet 2004), creating new reforms to produce effectiveness and efficiency in the public sector by adopting private practices (Asif and Dawood 2017). The form of NPM is to produce a new paradigm known as good government or good governance. The expectation is to create better practices and management of public administration (Mukonza 2014). Moreover, this can also change the structure and function of the government to be better suited to the role of government. However, it can not be denied that the achievement of this change is real, and it can not be held separate from the role of technology's utilization.

In government, the use of ICT is generally known as e-government. E-government is the continuous optimization of services, community participation, and government by forming internal and external relations through technology, the internet, and other new media. E-government can broadly encourage efficiency and effectiveness in public services (Carter and Bélanger 2005; Warkentin et al. 2002). This is evident from several previous studies that found that if the adoption of e-government can bring benefits in government practice, it can better public services (Janowski 2015; Krishnan and Teo 2012).

Indonesia, as one of the developing countries, has issued Presidential Instruction (Inpres) No. 3 of 2003, which is a reference for implementing e-government in Indonesia. However, the results have not been achieved optimally, especially in the application of local governments, this is known from the result of the classification of 543 online pages managed by local governments, showing that 83 local governments are still in the preparation stage, 341 local governments are in the second or ripening stage, 115 in the third or consolidation stage, and only four local governments entered the utilization phase.

From the results of previous studies, one reason for the weak implementation of e-government is because the government is not ready to anticipate the limitations of its resources (Elkadi 2013). This unpreparedness is caused by various key factors that influence the implementation of e-government. Baker (2011) recommended the use of the technology-organization-environment (TOE) model as a reference for further research

(Baker 2011). The growth and maturity of a system require ICT infrastructure, human skills and knowledge, institutional arrangements, and governance mechanisms (Bwalya 2009) that can each be explained through the TOE context.

The use of e-government by the government with its main objective is to improve public services to be more accountable, easily accessible, and effective (Witarsyah et al. 2017). But, the weak public perception of government accountability can potentially disrupt government operations. If the government loses public support, it will be difficult for the government to implement its policies (Liu 2019).

Accountability involves the relations of public organizations answering for their performance, all while public organizations are ultimately made accountable to their citizens. This expectation of government responsibility to its citizens can be realized through the implementation of e-government. This is consistent with previous research which states that the pressure of information technology has an effect on state responsibility (Welch and Wong 2001). This means justifying the relationship between information technology that is owned by a country with accountability as citizens demand it. The problem today is that although accountability has become one of the founding pillars of public services, many countries still face a situation of low accountability in service provision (Ray 2012). This result is justified by Siddiquee (2005) who explains that the lack of accountability in the public administration system is an interesting phenomenon in the academic field as well as in the policy circle (Siddiquee 2005). But conflicting results occur in other research which explains that overall, technological performance may not always lead to a form of accountability that always has a public interest (Petrakaki, Hayes, and Introna 2009)

Al-Shbail & Aman (2018) provide the implication from their research that there are difficulties in managing e-government implementation in supporting successful accountability, so it takes effort and experience to overcome technological trends; this study was conducted especially in developing countries. Therefore, this study is expected to support the weaknesses of previous research on the main factors using the TOE context in the implementation of e-government and their impact on public accountability in Indonesia. As previous research recommendations provide, there is a need for further research on how e-government increases accountability (Halachmi and Greiling 2013).

Theoretical Review

Public Accountability

Currently, the issue of accountability is very important for governance, and the achievement of accountability is a hallmark of good governance in the public or private sector (Liu, 2019). From the results of the study conducted by Al-Shbail & Aman (2018), it revealed that e-government elements can alleviate the disfunction of accountability relations.

Accountability is related to government responsibilities to the community. Several studies related to accountability have been carried out in previous research. Harrison &

Sayogo (2014) conducted a comparative study nationally on the discussion of the fiscal domain and explored the relationship between social culture, government conditions, political concepts, economics, and government openness. The result of previous research found that democracy, human resources, and the disclosure of budget documents for instance, are consistently associated with transparency and accountability (Harrison and Sayogo 2014). In short, accountability is very important for governance, and the achievement of accountability is also a characteristic of good governance in both the public and private sectors (Liu, 2019).

Determinant Factor in Technology Organization Environment (TOE Framework)

The TOE Framework originates from the theory of adoption of new technologies, making the TOE framework widely adopted in various studies as compared to other models. This framework, produced by Tornatzky and Fleischer (1990) and widely adopted by other researchers, is related to empirical research and technological development innovations. The TOE framework studies the concept of implementation that can provide identification and contribution to adoption and the need for understanding innovation; to be able to provide in-depth insights to researchers and practitioners. Also, the TOE framework provides key benefits for understanding the factors that exist in the context of technology, organization, and environment in influencing the process of adopting technological innovation (Cahill, Stevens, and LaPlante 1990). This factor is a common problem in developing countries, especially in the development of technological innovation.

In this study, ICT Infrastructure variables represent the context of technology in the TOE framework, while the organizational context is represented by the human resource competency variable, and the external pressure variable represents the context environment. Infrastructure is a vital factor in development. Infrastructure development does require a lot of costs in various regions, but this needs to be done because it can provide long-term economic effects. Especially in the implementation of e-government programs that require various technological devices to support e-government activities based on technology and digitalizing. The existence of information and communication technology infrastructure is very important for the implementation of e-government. Without the availability of infrastructure, the implementation of e-government will be considered as an unrealistic program (Koh, Prybutok, and Zhang 2008; Srivastava and Teo 2006). Therefore, it can be hypothesized that:

H1: ICT Infrastructure positively affects implementation of e-government
H2: ICT Infrastructure positively affects public accountability

The availability of human resources (HR) in producing and running a system is a trigger for the success of a system, in other words, HR is part of the success of e-government. Lack of resources and trained personnel in information technology is a major obstacle in technological development (Eyob 2004). Therefore, human resources must be considered with economic capacity and e-government as technology advances (Nam

2018). Generally, the main focus is on education and training programs for inadequate personnel to change the ranking of new technologies and or e-government. The effect is that the full economic benefits of ICT implementation depend on the training process and learning skills, which are still at an important stage for all governments.

Weak human resources in managing information technology also contribute to the development of e-government (Anthopoulos et al. 2015; Das, Singh, and Joseph 2016; Huang and Bwoma 2003; Ifinedo, Singh, and Scotia 2011; Krishnan and Teo 2012; Reddick 2004). Srivastava & Teo (2006) in their research found that human capital is an important factor in the development of e-government but does not affect the development of e-business. Different results were conveyed by the findings of other research which showed that human capital does not have a significant effect on the maturity of e-government, meaning that the maturity of e-government can be achieved without major changes in human resources (Das et al., 2016). On this basis, the following hypotheses are put forward :

H3: Availability of human resources has a positive effect on implementation e-government

H4: Availability of human resource has a positive effect on public accountability

External pressure is an environmental characteristic which means that it is a factor that explains the organizational environment (Jeyaraj, Rottman, and Lacity 2006). In line with a study conducted by Gibbs & Kraimer (2004) which revealed that external pressures belong to the environmental context, in the relationship of Electronic Data Interchange (Iacovou, Benbasat, and Dexter 1995) and E-commerce (Melville, Kraemer, and Gurbaxani 2004). External pressure can come from the central government, or the community or the business world (Nurdin, Stockdale, and Scheepers 2012). Therefore, the fifth and sixth hypotheses are :

H5: External pressure has a positive effect on implementation of e-government

H6: External pressure has a positive effect on public accountability

At present, the issue of accountability is very important for governance, and achieving accountability is a hallmark of good governance in the public or private sector (Liu 2019). As stated, database openness can clarify and improve accountability perspectives (Lourenco 2015), and e-government is considered as an effective tool for increasing accountability in public organizations (Al-Shbail and Aman 2018). From the literature review that has been done before, the following research hypotheses can be proposed with regard to the relationship of e-government implementation and local government accountability, namely:

H7: The implementation of e-government has a positive impact on increasing local government accountability.
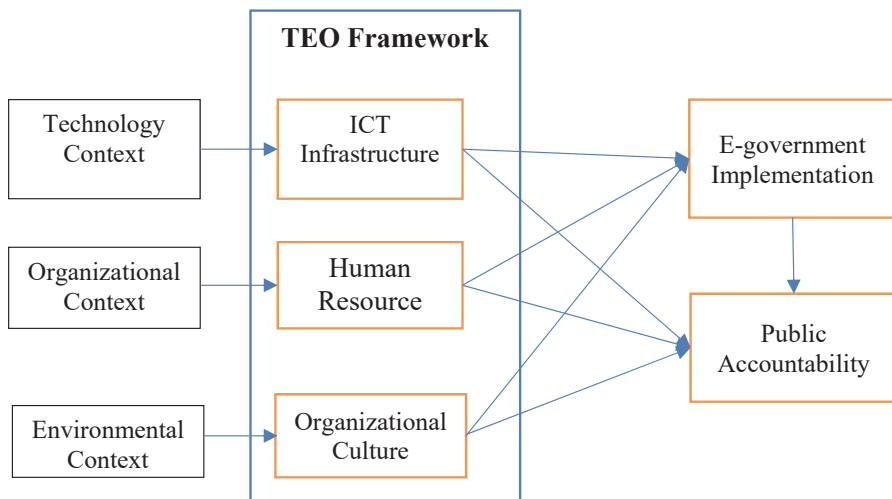
Figure 1. **Research Framework**

Research Method

This study uses a quantitative methodology through multivariate analysis. The development of this research came by looking at the characteristics of the theory, which in the end have not provided a right amount of certainty, and thus, the purpose given is to test the predictive relationship between constructs by looking at the relationships between one another. With complex structural models, we use Partial Least Squares Path Modeling (PLS-SEM). The PLS-SEM selection can ignore some non-parametric and parametric assumptions so that it can be done without a strong theoretical basis. For calculation and validation of statistical tests, this work was developed by multivariate analysis via the software SmartPLS. We use surveys to collect data by distributing questionnaires. The questionnaire was developed using a 5-point range of Likert scale answered with "Strongly Disagree" until Strongly Agree". Respondents in this study were all heads of the Regional Apparatus Organizations (OPD) at the local government in the province of West Sumatra as well as being the population in this study. Determination of non-probability samples used a quota sample technique due to reasons of the breadth of the area in this study. The amount of data to be processed was 263 respondents.

Result and Discussion

Based on the results, the questionnaire found the description of respondents seen from gender, age, level of education, and length of office as head in the Regional Apparatus Organization which can be seen in the following table:

Table 1. **Respondent Characteristics**

Information	Classification	Amount Respondent	Percentage
Gender	Man	187	71.10%
	Woman	76	28.90%
Age	< 40 years old	82	31%
	40 - 45 years old	42	16%
	46 - 50 years old	50	19%
	> 51 years old	89	34%
Education	Senior High School	3	1.14%
	Bachelor	132	50.19%
	Master	125	47.53%
	Doctor	3	1.14%
Long Served	< 5 Year	34	12.93%
	1-10 year	33	13.80%
	> 10 tahun	196	20.68%

Respondents in this study were dominated by men and respondents with more than 51 years of age were of the most respondents at 34%. Meanwhile, the level of undergraduate education is more than that of other education, which is 47.53% and the smallest number is occupied by respondents with the highest education (Doctorate) and the lowest (high school). In addition, respondents who have served as head of this study for more than 10 years are the majority respondents, meaning that respondents have long had experience in leading an organization and are suitable to be selected in this study.

In using the SEM PLS technique, the measurement model evaluation and structural model analysis were carried out. This analysis was used to find out how the manifest variable indicator showing latent variables were to be measured. The analysis of the measurement model passed three types of tests, i.e. convergent validity, discriminant validity, and composite reliability. The initial step was to test the validity of the reflective indicators. The testing used the correlation between indicator scores with construct scores.
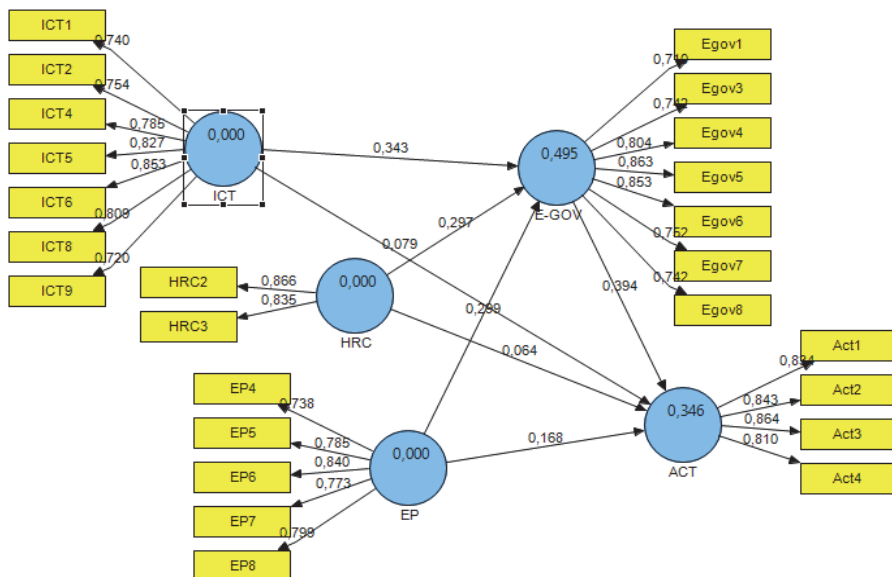
Note: ICT = Technology Infrastructure; HRC = Human Resource Competency; EP = External Pressure;
E-GOV = E-Government Implementation; ACT = Accountabiliy Public

Figure 2. **Result of Convergent Validity**

The result from Figure 2 shows that convergent validity has fulfilled the factor load-
ing value >0.70. It means that indicators that meet the value of factor loading can reflect
each variable in this study. Discriminant validity testing can be seen from the value of
Average Variance Extracted (AVE); the criteria of the AVE value must be greater than
0.5 (Sarstedt, Ringle, and Hair 2017)the model imposes some daunting assumptions and
restrictions (e.g. normality and relatively large sample sizes.

Table 2. **Results of Validity Testing**

Accountability		Variable				
		E-Gov-ernment	External Pressure	Human Resource Competency	ICT Infra-structure	
Factor Loading	Item 1	0.834	0.710	0.738	0.866	0.740
	Item 2	0.843	0.742	0.785	0.835	0.754
	Item 3	0.864	0.804	0.840	-	0.785
	Item 4	0.810	0.863	0.773	-	0.827
	Item 5	-	0.853	0.799	-	0.853
	item 6	-	0.752	-	-	0.809
	item 7	-	0.742	-	-	0.720
Average Variance Extracted (AVE)		0.702	0.613	0.621	0.723	0.617

Besides the construct validity test, data reliability is also performed. This measurement uses composite reliability and Cronbach Alpha values. Reliability composite values are used to reflect the reliability values of the indicators (Hair et al. 2009). For explorative research with a value > 0.7, composite reliability is acceptable (Sarstedt, Ringle, and Hair 2017)the model imposes some daunting assumptions and restrictions (e.g. normality and relatively large sample sizes. Cronbach alpha is a measurement for the level of consistency of respondents' answers in a latent variable, and in this case Cronbach alpha value > 0.6 is considered to meet the acceptance of measurements of each construct (Sarstedt, Ringle, and Hair 2017)the model imposes some daunting assumptions and restrictions (e.g. normality and relatively large sample sizes.

Table 3. **Composite Reliability Values**

Variable	Composite Reliability	Cronbach's Alpha
Public Accountability	0.904	0.858
E-Government	0.917	0.893
External Pressure	0.891	0.849
Human Resource Competency	0.839	0.618
ICT Infrastructure	0.918	0.897

Based on table 3, it is found that all variables have composite with reliability value is > 0.7, and Cronbach alpha value is > 0.6. It means that the construct has a high-reliability value or all variables are reliable. To predict the relationship between latent variables, it is necessary to evaluate the structural model (Sarstedt, Ringle, and Hair 2017)the model imposes some daunting assumptions and restrictions (e.g. normality and relatively large sample sizes.

External pressures, human resource competencies, and moderate ICT infrastructure can explain 49.5% of the variance of e-government implementation and implementation of e-government can explain 34.6% of the variance of public accountability. Therefore, the model formed is categorized as a good model because it has a moderate relationship with the criterion value of R^2 greater than 25%. To find out whether the path coefficients of the structural model are significant, we look for if they cannot be seen in the t-statistic value. The t-statistic value is greater than 1.96 (significance level =5%) so it can be decided that there is influence between variables and has a significant correlation (Sarstedt et al., 2017).

The path coefficient (Table 4) results show that not all variables in this study are influential. All variables that represent the technological, organizational, and environmental context in this research model do not support the results of the study. ICT infrastructure, human resource competencies, and external pressures are not significantly able to increase public accountability but have a positive relationship. Meanwhile, it is different from the implementation of e-government which shows that all frameworks in TOE significantly influence and have a positive relationship with e-government implementation.

Table 4. **Path Coefficient**

Hypothesis	Influence Path	Original Sample (O)	Standard Deviation (STDEV)	T Statistics (|O/STERR|)	Conclusion
H1	ICT Infrastructure -> E-Government	0.343	0.095	3.616	Support
H2	ICT Infrastructure -> Accountability	0.079	0.124	0.642	Does not support
H3	Human Resource Competency -> E-Government	0.297	0.087	3.430	Support
H4	Human Resource Competency -> Accountability	0.064	0.099	0.642	Does not support
H5	External Pressure -> E-Government	0.299	0.087	3.421	Support
H6	External Pressure -> Accountability	0.168	0.132	1.274	Does not support
H7	E-Government -> Accountability	0.394	0.137	2.882	Support

The relationship of ICT infrastructure to the implementation of e-government has the greatest significant value of 3.616. These results prove that the technological context represented by the availability of infrastructure is the main key to the implementation of e-government in local governments in West Sumatra. Information and communication technology infrastructure is recognized as a major challenge in e-government (Elnaim 2014), so it is necessary to require the integration of information systems so that e-government can work well (Bahari, Yonnedi, and Djunid 2015).

Then, human resource competency is part of the organizational context and external pressures in the environmental context within the TOE framework. Moreover, it includes determining the success of e-government. This is supported by the high significance value compared to 1.96 and has a positive relationship. E-government is created and implemented by humans. Humans can create innovations better. This innovation can make government activities more effective and efficient. Moreover, users should also be able to run well. Wairiuko et al., (2018) also found that human resource capacity has a significant influence on e-government adoption (Wairiuko, Nyonje, and Omulo 2018). Because after all, the cause of the under-development of e-government services is the lack of willingness from the leadership in planning the development of e-government that is done, and the required human resources are less viewed in terms of quantity and quality (Angguna, Gani, and Sarwono 2015).

In the environmental context, external pressure in this study also has a positive and significant impact on the implementation of e-government in local government. E-government has benefited by stakeholders such as the community (G2C), the business world (G2B), and the government itself (G2G) in government activities effectively and efficiently to improve public services. Pressure must exist and push from within the local government. Through the pressure, the local government can move quickly in implementing it

thoroughly and comprehensively. The cause of the under-development of e-government services is the lack of willingness from the leadership in planning the development of e-government, and the required human resources are not seen in terms of quantity and quality (Angguna, Gani, and Sarwono 2015).

The authority owned by each head of local government in Indonesia to regulate their regions and differences in the potential of their respective regions create not the same development of e-government practices at this time. Although the existence of a website is already owned, the optimization of e-government is less attended to. (Sosiawan 2008). The driving factor in realizing e-government should be human resources and it should become the main motor to create information and communication technology innovation. Local governments need to be given another strong pressure to implement e-government optimally. Pressure will result in compulsion, so inevitably it must be carried out no matter what. Communities as recipients of public services from local governments should be able to provide these demands to regional heads so that public services are not merely discourse but have been implemented equally.

Accountability is a form of giving responsibility. Accountability is the realization of the obligation to account for the success and failure of the implementation of the organization's mission in achieving the goals and objectives that have been set through the system of accountability periodically. The implementation of e-government is the application of government activities electronically that will be able to realize the accountability of government activities. The results of this study are in line with research by Halachmi & Greiling (2013) and Al-Shbail & Aman (2018). However, external resources and pressures are not factors that directly affect creating public accountability. Resources have a positive relationship in creating accountability and by increasing resources there will be an ability to increase public accountability.

Conclusion

The main factor represented in the TOE framework displays a good concept of assessing research on the acceptance of innovation in organizations; this would be useful especially in Indonesia as a developing country. The adoption of technology in the implementation of information systems is an innovation that can bring better change in government, especially in local governments with different leadership, but the readiness of each region remains in question. Innovation cannot be implemented if it is not supported by the availability of infrastructure and human resource competencies.

E-government as the use of technological innovation in government has the aim to facilitate all government activities in providing services to the community. With the availability of resources in the implementation of e-government, that goal can be achieved. To urge the optimal and complete implementation, it needs a lot of pressure. This pressure will accelerate and become a priority that must be hastened in government activities. A good e-government implementation will have an impact on increasing public accountability as a result of the manifestation of the responsibility of local governments in carrying out their duties to the community.

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Lemiantys e-valdžios įgyvendinimo ir viešosios apskaitos veiksniai: TOE metodas

Anotacija

Šiuo tyrimu buvo siekiama pateikti rekomendacijas, susijusias su pagrindinių veiksnių sąsajų modeliu, diegiant e-valdžią. Buvo remiamasi TOE metodika, nagrinėjant technologinę infrastruktūrą, žmogiškųjų išteklių kompetencijas ir išorinį spaudimą. Be to, šis tyrimas gali pasitarnauti kaip gairės nustatant strategijas, skirtas spręsti vietos valdžios atskaitomybės problemas, susijusias su e-valdžios įgyvendinimo veiksnių disfunkcija ir jų ryšiu su atskaitomybe. Duomenys buvo surinkti atliekant apklausą, persiunčiant klausimynus Vakarų Sumatros regioninės vyriausybės Regioninės aparatų organizacijos (OPD) vadovui ir apdoroti naudojant SEM-PLS statistinės analizės priemones. Tyrimo rezultatas parodė, kad TOE sistemoje iškelti veiksniai gali nulemti e-valdžios įgyvendinimą, tačiau tai nėra pagrįsta viešosios atskaitomybės atžvilgiu. Teigiamas ir reikšmingas e-valdžios diegimo poveikis gali padidinti atskaitomybę. Todėl gali laikoma įrodyta, kad atskaitomybės padidėjimą galima pasiekti maksimizuojant kiekvieno regiono e-valdžią.

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