Development of System Continuance Models for Assessing among Local E-Government in Indonesia

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Abstract: This study reports how to combine technology acceptance and use models based on expectations and confirmations in the information system success model to objectively assess the continuance of local e-government based on the organizational perspective and perspective of users in Indonesia. The developed model is arranged in 11 variables and 48 indicators. Pathways of influence between variables are presented by 16 links. However, this study does have some limitations. With regard to the level of use, there is no fully mandatory use of the system, and not all UTAUT2 variables and the possibility of a moderator are integrated with the model. Other studies used various assumptions, methods, and different understandings can present different propositions. In addition, limitations can help to further study, especially the validity of the proposed model. Future research can explore additional expansion variables and moderators, so that in the new model between variables can be made more explicit relationships.

1 INTRODUCTION

The policy on the use of communication and information technology (ITC) in government processes (e-government) has encouraged in improving the efficiency, effectiveness, transparency and accountability of government administration (Indonesia, 2003; Sá, Rocha and Cota, 2016; Waller and Genius, 2015). E-government can increase the delivery of government services effectively and efficiently through ICT (Claver-Cortes, de Juana-Espinosa and Valdés-Conca, 2018; Waller and Genius, 2015; Yang and Rho, 2007), promote public administration (United Nations, 2014), and allow adjustments between the characteristics of public services and specificities in local communities (Sá, Rocha and Cota, 2016). Most developed countries benefit from e-government services (Lee, Tan and Trimi, 2005; Norris and Reddick, 2013; Roy, 2002), but there is still plenty of room for global improvement (United Nations, 2010; United Nations, 2016). On the other hand, most researchers are currently looking at the low level of implementation of e-government services in developing countries (Choi *et al.*, 2016; Dada, 2006).

The study of the success of e-government implementation leads to the success of IS applications (Rana *et al.*, 2015). However, studies focus more on the supply side (organizational perspective) and ignore the demand side (user perspective). The local IS success indicator is a continuation of the IS initiative (Baker-Eveleth and Stone, 2015), even if in a customized form (Sá, Rocha and Cota, 2016). In the context of this research, the IS initiative is after the initial implementation of e-government at the central and regional governments (Altameem, Zairi and Alshawi, 2006; Sá, Rocha and Pérez Cota, 2016). The purpose of this study is to fill this gap by proposing a conceptual model. This research broadens knowledge and continues this tradition in relation to the relationship of factors that influence users to accept and use (Thomas, 2006; Venkatesh and Davis, 2000; Venkatesh *et al.*, 2003; Venkatesh,

Thong and Xu, 2012a) based on confirmation (Bhattacherjee, 2001; Zolotov *et al.*, 2018) and uses (Baker-Eveleth and Stone, 2015) of IS success (DeLone and McLean, 1992; Delone and McLean, 2003). The aim is to develop a more comprehensive model for measuring the continuation of e-government in Local Government, by adopting, combining, and adapting (Subiyakto, 2017; Subiyakto and Ahlan, 2014) acceptance and use of technology (Venkatesh, Thong and Xu, 2012b), expectation-confirmation (Bhattacherjee, 2001), and success IS model (Delone and McLean, 2003). Following the research program mentioned above, two research questions were then proposed to guide the implementation of this exploratory research.

RQ-1. How to understand the relationship between the constructs of the technology acceptance and use model, the expectation-confirmation model, and the IS success model?

RQ-2. How to combine technology acceptance and use models and confirmation-expectation models in IS success models in the continuance of e-government systems in Regional Government?

This paper is presented in five parts. Each section describes the research program from research, literature review, research method, result and discussion, and conclusions.

2 LITERATURE REVIEW

Local e-government services can be considered as an extension of central e-government services, but have a number of specificities that need to be emphasized (Holgersson *et al.*, 2017; Sá, Rocha and Cota, 2016). In the context of research, a successful indicator of local e-government is a continuance of e-government initiatives, even if in an adapted form, after the initial implementation of e-government at the central and local governments. In this way, researchers gather views on the determinants of success that are not biased by one point of view (Altameem, Zairi and Alshawi, 2006). The successful implementation of e-government in the long run (Baker-Eveleth and Stone, 2015) depends on the willingness of citizens and the government to adopt (Rana, Dwivedi and Williams, 2015; Wirtz and Daiser, 2016). In addition, the successful implementation of e-government is measured not only in the perceived quality of information systems but also in implicit comparisons with prior expectations (Baker-Eveleth and Stone, 2015; Bhattacherjee, 2001; Zolotov *et al.*, 2018).

Although, the success model of DeLone and McLean IS (DeLone and McLean, 1992; Delone and McLean, 2003) is primarily used to assess the success of IS as mentioned in many studies. (Briggs *et al.*, 2003; DeLone and McLean, 1992; Nguyen, Nguyen and Cao, 2015; Rana *et al.*, 2015; Subiyakto *et al.*, 2016a; Subiyakto *et al.*, 2016b; Subiyakto *et al.*, 2016c; Subiyakto *et al.*, 2015a; Subiyakto *et al.*, 2015b; Subiyakto *et al.*, 2017). However, this model cannot support the relationship between system quality and perceived benefits (Nguyen, Nguyen and Cao, 2015; S., Olfman and Ryan, 2005). This model has not been able to evaluate factors related to e-government that influence users to receive and use (Thomas, 2006) e-government in the long run (Baker-Eveleth and Stone, 2015). In addition, this model has not been able to measure citizen satisfaction based on confirmation and perceived usefulness (Bhattacherjee, 2001).

The DeLone and McLean IS success model (Delone and McLean, 2003) is very good for assessing the success of the system based on information quality (INQ), system quality (SYQ) and IS quality of service (SVQ) that affect user satisfaction (USF) and net benefits (NBF) from use of IS (USE). Meanwhile, the Unified Theory of Acceptance and Use of Technology (UTAUT) is a theoretical framework that is widely used to understand the adoption of users or the continuous use of new technologies (Venkatesh *et al.*, 2003). This model was developed with four constructs from the acceptance and use of technology to assess society: performance expectations (PE), effort expectations (EE), social influence (SI), and facilitation conditions (FC). The UTAUT model is then extended to Model Extended UTAUT (UTAUT2) by adding three additional constructs: hedonic motivation (HM), price value (PV), and habit (HB) (Venkatesh, Thong and Xu, 2012a). The UTAUT2 does not focus more on the organizational context but emphasizes the context of consumer use, this is different from the previous technology acceptance model (Yuan *et al.*, 2015).

The UTAUT2 model (Venkatesh, Thong and Xu, 2012a) is proposed to gain a better understanding of technology acceptance. However, the UTAUT2 acceptance model (Venkatesh, Thong and Xu, 2012b) can only be used to evaluate user acceptance of SI (Thomas, 2006). Whereas to analyze citizen satisfaction as a result of confirmation (CF) of the previous use (USE) of ICT and perceived

usefulness, it is proposed to use the Expectation-Confirmation Model (ECM) (Bhattacherjee, 2001). In our case, The ultimate goal of the ECM model is to explain the continuance of the e-government system (SYC) in the Regional Government.

On the other hand, e-government has become a major topic of interest for academics and practitioners (Almarabeh and AbuAli, 2010; Gil-García and Pardo, 2005; Rana, Dwivedi and Williams, 2015; Wirtz and Daiser, 2016). Although local e-government services can be considered as an extension of central e-government services, the first has a number of specificities that need to be emphasized (Holgersson *et al.*, 2017; Sá, Rocha and Cota, 2016). To date, it cannot identify of continuance e-government evaluation models that are specifically focused on local e-Government in the Regional Government, and this justifies the development of a new model whose purpose is to create a model with this specificity (Sá, Rocha and Cota, 2016; Sá, Rocha and Pérez Cota, 2016).

3 RESEARCH METHOD

Development of a more comprehensive model to measure the success IS in the continuance of e-government in this Regional Government (see Fig. 2), based on literature review (S1), then the development of models (S2) with model development steps (Subiyakto, 2017; Subiyakto and Ahlan, 2014), namely developing a set of assumptions (S2.1), adoption (S2.2), combining (S2.3), and adapting (S2.4) from acceptance and use of technology (Venkatesh, Thong and Xu, 2012b), expectation-confirmation (Bhattacherjee, 2001), and success IS model (Delone and McLean, 2003). Picture. 1 shows the sequential stages of the development model and its revision.

Table 1: List of the basic models and theories

List of the Basic Models and Theories	References
The updated DeLone and McLean IS success model	(Delone and McLean, 2003)
The extended the UTAUT model (UTAUT2)	(Venkatesh, Thong and Xu, 2012a)
The expectation-confirmation model (ECM)	(Bhattacherjee, 2001)
The IS project success model	(Subiyakto and Ahlan, 2014)

Following the set of assumptions developed (S2.1) in the study, this new model (see Figure 2), based on (S2.2) previous works (Bhattacherjee, 2001; Delone and McLean, 2003; Venkatesh, Thong and Xu, 2012a) is conceptualized (S2.3 and S2.4). Table 1 represents the basic theory of model development.

Furthermore, the operationalization phase (S3) is carried out to be broken down into the level of research data collection instruments (Subiyakto, 2018; Subiyakto *et al.*, 2015c). Finally, the reporting phase (S4) is conducted to propose the model developed, in terms of conducting research.

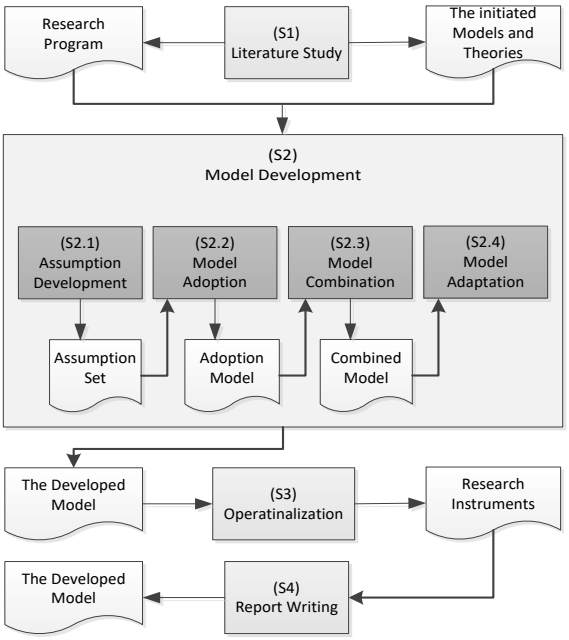

Figure 1: The proposed research model.

4 RESULT AND DISCUSSION

The main objective of this research is to develop a more comprehensive model to measure the continuance of e-government in the regional government. This new model developed refers to a set of assumptions. First, the continuation of e-government initiatives is an indicator of the success of local e-government. Delone and McLean (2003 stated the continuous use system (SYC) became a popular measure of success (Igbaria *et al.*, 1997; Larsen and Wetherbe, 1999; Taylor and Todd, 1995; Teng and Calhoun, 1996). Second, the successful implementation of e-government in the long run

(Baker-Eveleth and Stone, 2015) depends on the willingness of citizens and the government to adopt (Rana, Dwivedi and Williams, 2015; Wirtz and Daiser, 2016); and (iii) the successful implementation of e-government is measured not only in the perceived quality of information systems, but also in implicit comparisons with prior expectations (Baker-Eveleth and Stone, 2015; Bhattacherjee, 2001; Zolotov *et al.*, 2018).

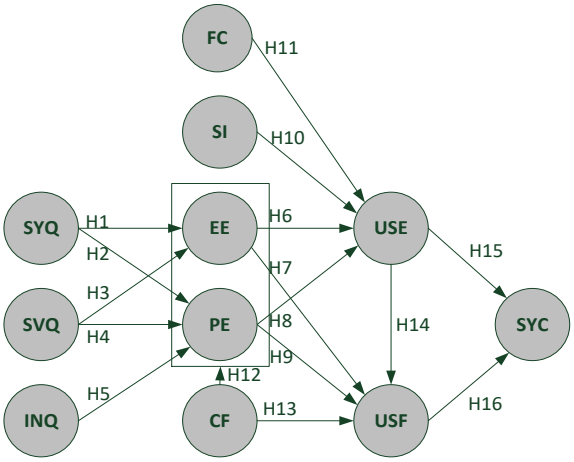

Figure 2: The proposed research model.

Referring to previous research (Altameem, Zairi and Alshawi, 2006; Baker-Eveleth and Stone, 2015; Bhattacherjee, 2001; Delone and McLean, 2003; Rana, Dwivedi and Williams, 2015; Subiyakto, 2017; Thomas, 2006; Venkatesh, Thong and Xu, 2012a; Wirtz and Daiser, 2016; Zolotov *et al.*, 2018), the constructs of acceptance and use of technology, expectation-confirmation, and IS success was then adopted, combined and adapted by researchers in the development of models to assess factors that influence the user to receive and use based on confirmation and success to the continuance of e-government in the Regional Government. Furthermore, the model development dimensions which include SYQ, SVQ, INQ, PE, EE, SI, FC, CF, USE, USF, and SYC are used to develop 16 hypotheses, as explained in the next paragraph. Then each relationship will be tested in the implementation of the research through a research instrument developed (Table 4).

First, to meet the needs given the totality of features and characteristics of a product or service that bears its ability to become a reference for quality (Thomas, 2006). Quality can also be measured by a variety of perspectives (Guimaraes and Igbaria, 1997). Delone and McLean (2003 assume that quality is divided into three dimensions: information quality (INQ), system quality (SYQ), and service quality (SVQ). When individuals feel the quality produced by the system, this may affect their perception of usability (USE) of the system. Therefore, the higher the level of system quality, the system will be more useful and easy to use (H1, H2, H3, H4, and H5).

Table 2: List of the variables (Bhattacherjee, 2001; Delone and McLean, 2003; Venkatesh, Thong and Xu, 2012a).

Variable	Definition
SYQ	Level to describe the quality of the content of the system.
SVQ	Level to assess how good the quality of service is for users.
INQ	The degree to which the information produced consistently meets user requirements and expectations.
FC	The extent to which users believe that organizational and technical infrastructure exists to support system use.
SI	The extent to which users feel that other important people believe they must use a new system.
EE	The level of ease associated with the use of the system.
PE	The rate at which users believe that using the system will help them benefit in performance.
CF	The level of user confirmation is positive for system usage satisfaction.
USE	Level of system utilization by individuals, groups, or organizations.
USF	The level of satisfaction with the initial system usage is positively related to the continuation of their system.
USF	The degree of user satisfaction with the initial system usage is positively related to the continuance of their system.
SYC	The degree of the continuance of the initiative of the system

Second, the four core constructs identified by Venkatesh *et al.* (2003 in UTAUT2 (Venkatesh, Thong and Xu, 2012b), remain the core construct used in this research model. PE, EE, SI, and FC are expected to positively and directly influence the mandatory USE system (H6, H8, H10, and H11). USE is expected to fully mediate the effect of the model positively for USF (H14). Petter et al., (Petter, DeLone and McLean, 2008) treats "intention to use" and "use" in avoiding the complexity of the model as a single variable, namely "system use". In addition, they argue that the intention to use is only appropriate for the level of individual analysis, while

the use of the system can be measured both at the individual and organizational level. In addition, the researcher explored the moderator (age, gender, experience) of UTAUT2 (Venkatesh, Thong and Xu, 2012a) in this model and found no statistically significant moderating effects (Tamilmani, Rana and Dwivedi, 2017; Yuan *et al.*, 2015). Therefore, this potential moderating variable is not included in our model (see Figure 2).

Table 3: List of the indicators.

Indicator	Definition
Ease of Use (SYQ1)	The degree of system freedom from constraints, difficulties, and problems during use.
Maintainability (SYQ2)	The degree associated with the ease of SI in its study.
Response Time (SYQ3)	The degree associated with the amount of time needed to respond to commands from that user.
Functionality (SYQ4)	The degree associated with the system can be operated according to the requirements that have been planned.
Safety (SYQ5)	The degree of the immune of the system from unexpected attacks, dangers, or damage.
Responsiveness (SVQ1)	The degree of the system's reaction to serve its users in a suitable way, time and situation.
Flexibilty (SVQ2)	The degree of the system adaptation to serve its users in accordance with the requested requirements.
Security (SVQ3)	The degree of security of an integrated system to serve users safely from attacks, dangers, or unexpected damage.
Functionality (SVQ4)	The degree associated with system service coverage corresponds to functional requirements.
Extension (SVQ5)	The degree associated with additional system service coverage that exceeds functional requirements.
Accuracy (INQ1)	The degree of feasibility of the information produced.
Timeliness (INQ2)	The degree of precision of the system information processing process at the planned time duration.
Completeness (INQ3)	The degree of information generated by the system is complete or without missing parts.
Consistency (INQ4)	The tendency of the system to still demonstrate the same information in operations, services, maintenance, or quality.
Relevance (INQ5)	Linkage level of information produced by the system with the subject matter.

Table 3: List of the indicators (continued).

Indicator	Definition
Perceived usefulness (PE1)	The extent to which a person believes in using a particular system will improve his work performance.
Extrinsic motivation (PE2)	The perception that users want to do an activity is considered an important role in achieving valuable results that are different from the activity itself.
Job-fit (PE3)	How does the ability of a system to improve individual work performance.
Relative advantage (PE4)	The extent to which innovation is considered better than its predecessor.
Outcome Expectations (PE5)	The extent to which the quality of community understanding and ability must be achieved.
Perceived Ease of Use (EE1)	The extent to which the user's perspective expects that using this system is free from effort.
Complexity (EE2)	The extent to which a system is perceived is relatively difficult to understand and use.
Subjective norm (SI1)	A person's perception that most people who are important to him think he should or should not do the intended behavior.
Social factors (SI2)	Individual internalization of the subjective culture of reference groups and specific interpersonal agreements that individuals have done with others, in certain social situations.
Image (SI3)	The extent to which the use of an innovation enhances the image or status of a person in one's social system.
Perceiver behavioral control (FC1)	Reflecting perceptions of constraints on behavior and including self-efficacy, resource facilitation conditions, and technological facilitation conditions.
Facilitating conditions (FC2)	Objective factors in the environment that the observer enters into action are easy to do.
Services provided (CF3)	The degree of service provided by the system is better than expected.
Experience using (CF1)	The degree of experience using the system is better than expected.
Innovation perceived (CF2)	The degree of innovation perceived is better than expected.
Services provided (CF3)	The degree of service provided by the system is better than expected.
Services required (CF4)	The degree of service required of the system is better than expected.

Table 3: List of the indicators (continued).

Indicator	Definition
Overall, using confirmed (CF5)	Overall, most use information systems.
The frequency of use (USE1)	Levels related to the amount of time used by the system.
The intensity of use (USE2)	Levels related to the amount of time used by the system.
The extent of use (USE3)	The level associated with the scope of use of the system is based on use or not using basic and advanced system capabilities.
Thoroughness of use (USE4)	The level associated with the accuracy of use.
Appropriate use (USE5)	The level associated with proper use.
Efficiency (USF1)	The level of user satisfaction with the system is based on the system to produce output with the resources needed to achieve output.
Effectivity (USF2)	System user satisfaction level based on the ability of the system to meet user needs.
Flexibility (USF3)	The system user level is related to the adaptability of the system according to the requested requirements.
Adequately (USF4)	The level of system user satisfaction associated with adequate system quality.
Overall Satisfaction (USF5)	The level of user satisfaction with the system is related to the adequacy of all aspects of the system.
Continuity of usability (SYC1)	The degree of Continuance of usability of the system.
Continuance of services provided (SYC2)	The degree of continuance to provide services.
Continuation of usage (SYC3)	The degree of continuance uses the system.
System continuation (SYC4)	The degree of system continuance.
Promote of service (SYC5)	The degree of promote of service.

Third, the perception of ease of use (EE1) is similar to business expectations (EE) (Chan *et al.*, 2010). Venkatesh *et al.* (2003 that for measurements for attitudes already included in EE and PE, in mandatory settings, attitudes should not be included in the model. Chan et al., (Chan *et al.*, 2010) state that PE and EE are one of the important variables to evaluate a system in a mandatory environment. Both variables play a role to "encourage a positive attitude towards and satisfaction of users with the use of the system by increasing efficiency and minimizing efforts in using technology (H7 and H9) (Petter, DeLone and McLean, 2008)."

Finally, confirmation also has a significant effect on perceived usefulness, can be seen by users who can also be adjusted to the level of confirmation. Confirmation (CF) is a new construction in research on IS usage. Satisfaction (USF) with use (USE) IS is predicted by confirmation (CF) of system use and both by use (H12 and H13) (Bhattacherjee, 2001). This construct conceptualization and validating its effects on the continuation of the system (H15 and H16) are two solutions to this study.

In short, it can be clearly seen that the description of the development of the system continuation model can explain the research questions mentioned above and can prove the possibility of developing new models by adopting, combining, and adapting acceptance and use of the technology (Venkatesh, Thong and Xu, 2012a), expectation-confirmation (Bhattacherjee, 2001), and success IS model (Delone and McLean, 2003). Furthermore, the definition of each variable, the indicators are broken down and the statements from the questionnaire can be seen in Table 2, Table 3, and Table 4 respectively.

This study contributes to the theoretical development of the literature about the success of existing information systems with the stages of development from the acceptance and use of technology, and the expectation in interpreting and predicting the continuation of e-government systems in the Regional Government. Second, this study explores the continued use and satisfaction in the continuance of information systems, thus highlighting the important role of use and satisfaction in the continuation of information systems. In addition, the transparency of the model development process and the credibility of the basic model and the theory used can also be considered as a model trust point.

This study does have some limitations. With regard to usage rates, Lassila and Brancheau (Lassila and Brancheau, 1999) identify various countries using the system based on use or not using basic and advanced system capabilities. Secondly, there is no mandatory use of the system entirely. At certain organizational levels, management has chosen to implement the system and requires employees to use

it. Thus, while the use of a system can be mandatory at one level, the adoption and use of the system itself may be entirely voluntary, based on management judgment, at a higher level. Management always has the option to stop the system that does not provide the desired results and benefits (Delone and McLean, 2003).

Table 4: List of the questionnaire statements.

Statements of the questionnaires
SYQ1 - The system is easy to use.
SYQ2 - Easy maintenance system.
SYQ3 - The system is able to respond quickly following the instructions given.
SYQ4 - The system is able to perform all the functions required in its development.
SYQ5 - The system is safe in its use.
SVQ1 - System to provide services quickly.
SVQ2 - The system provides flexible services according to user conditions.
SVQ3 - The system provides safe services.
SVQ4 - The system provides services that meet the requirements in its development.
SVQ5 - The system provides services more than the required functions.
INQ1 - The system produces information accurately.
INQ2 - The system produces information in a timely manner.
INQ3 - The system produces complete information.
INQ4 - The system produces information consistently throughout its operations.
INQ5 - The system produces information according to the needs of its users.
PE1 - Using the system will improve my work performance.
PE2 - Using the system in my work will increase my productivity.
PE3 - The use of the system can increase the effectiveness of the implementation of work tasks.
PE4 - Using the system makes it easier to do my work.
PE5 - Using the system can improve the quality of community understanding and ability as a result to be achieved.
EE1 - It will be easy for me to be skilled in using the system.
EE2 - Working with a system is very complicated, it is difficult to understand what is happening.
SI1 - According to someone who is important to me I have to use the system.
SI2 - In general, organizations have supported the use of the system.
SI3 - People in my organization who use the system have more prestige than those who don't.
FC1 - Users have the knowledge needed to use the system.
FC2 - Someone (or group) provides assistance for system difficulties.

Table 4: List of the questionnaire statements (continued).

Statements of the questionnaires
FC3 - Using this system is compatible with all aspects of the user's work.
CF1 - My experience with using system was better than what I expected.
CF2 - The system can meet gain performance in excess of what required for the service.
CF3 - The service level provided by the system was better than what I expected.
CF4 - The system can meet demands in excess of what I required for the service.
CF5 - Overall, most of my expectations from using system were confirmed.
USE1 - How often do users use this system.
USE2 - How much time does the user spend with the system during normal days when the user uses the computer.
USE3 - How much time does the user spend with the system during normal days when the user uses the computer to meet further needs.
USE4 - How accuracy of use of the system in meet services needed.
USE5 - How appropriate of use of the system in meet services needed.
USF1 - Users are satisfied with the level of system efficiency.
USF2 - Users are satisfied with the level of system effectiveness.
USF3 - Users are satisfied with the level of system flexibility.
USF4 - Users are satisfied with the level of system adequately.
USF5 - Users are satisfied with system performance.
SYC1 - This system is always useful.
SYC2 - Users feel that they are not burdened with the use of the system.
SYC3 - Users continue to use this system in the future.
SYC4 - Users strongly advise others to keep using the system.
SYC5 - Promote the system to the wider community as a form of service.

Finally, we do not integrate the variables of hedonic motivation, price values, habits and possible moderators into the original UTAUT2 (Venkatesh, Thong and Xu, 2012a). Future research can explore additional expansion variables and moderators, so that the relationship between variables in the new model can be made more explicit.

5 CONCLUSIONS

E-government has become a major topic of interest for academics and practitioners. The study of the

success of e-government implementation is part of the success study of the IS application. This research continues this tradition and broadens knowledge regarding the relationship of factors that influence users to accept and use based on confirmation and usefulness to IS success by adopting, combining, and adopting acceptance and use of technology, expectations, and IS success models, in the matter of assessing the continuation of e-government in the Regional Government. Factors that influence users to receive and use e-government in the long run are used by the author as an assumption of model development. The model uses 11 variables, 48 indicators with 16 paths of influence between variables. Researchers have also proposed 48 questions for the development of the next questionnaire. In addition to this exploratory study can contribute to the theoretical development of the success of the existing information system literature by adopting, combining, and adapting the acceptance and use of technology, and expectations in interpreting and predicting the continuity of the e-government in the Regional Government, the process the development of the proposed model and its data collection instruments can be a practical consideration for further studies. In addition, the transparency of the model development process and the credibility of the basic model and the theory used can also be considered as a model trust point. Despite the fact that this study does have some limitations. With regard to the level of use, there is no fully mandatory use of the system, and not all UTAUT2 variables and the possibility of a moderator are integrated into the model. Other studies used various assumptions, methods and different understandings can present different propositions. In addition, limitations can help to further study, especially the validity of the proposed model. Future research can explore additional expansion variables and moderators, so that the relationship between variables in the new model can be made more explicit.

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