

E-Gov Adoption Model of the Military Organization in Indonesia

Achmad Farid Wajdi
Doctoral Research in Management
Bina Nusantara University
Jakarta, Indonesia
zahramdr@gmail.com

Dyah Budiastuti
Doctoral Research in Management
Bina Nusantara University
Jakarta, Indonesia
dbudiastuti@binus.edu

Abstract— Not only being implemented in the government ministries and agencies, e-gov is also implemented in the military sector in terms of service delivery to the public. Many researchers have studied and proposed models of e-gov adoption in order to predict or explain user behavior, or to formulate a strategy based on Technology Acceptance Model (TAM). Small research number has been established to analyze factors influencing e-gov adoption in military organization. Thus, this work inspects the applicability of the TAM with many constructs under technology-organization-environment framework that predict a suitable model to the Indonesian military in the context of e-gov adoption. The Dematel method was used to figure out the factors that affect the acceptance of e-gov by military personnel using a survey sample of 42 ICT administrators of TNI (Ministry of Defense, Army, Navy, and Air Forces). Moreover, Structural Equation Modelling was used to analyze data of 400 TNI personnel to validate dominant factors resulted from the Dematel. The findings indicate that competitive pressure, self-efficacy of computer, ease of use, e-readiness, usefulness, service quality, attitude, and behavioral intention were valid constructs of e-gov adoption in Indonesian military organization. The study recommends a further research of e-gov adoption strategy that focuses on the implementation of those factors on the level of organizational units within the military.

Keywords— e-gov; technology acceptance model; technology-organization-environment framework; military

I. INTRODUCTION

In Indonesia, the e-gov services not only provided by government ministries and agencies, but are also provided by the military. Small research number has been conducted to analyze the factors influencing egov adoption in military organization [1] and [2]. Thus, this study investigates the TAM applicability with many constructs under technology-organization-environment framework that predict a suitable model to the Indonesian military in the e-gov adoption context. Researching the adoption of e-gov in military organizations would be interesting, without doubt, and due to small amount of research on it. Therefore, the research that explores the unique characteristics of the military organization would enrich the theory of e-gov adoption; and the argument about the importance of the successful adoption of e-gov for a military organization itself.

There are two main identified problems related to this study, such as the problem of e-gov services management in the military, and the issue of implementation of the adoption model in Indonesian military organization. The e-gov problems are universal [3], ranging in difficulty administrative transformation to access the service [4], assuming that the electronic information or services are not attractive or not updated, or they do not trust of e-gov services provided [5]. Indonesia is classified on the disposition of the level of democratization and the low level of e-government readiness and transparency [6]. There are also an indication about the consultational disposition, where values do not oblige policy dialogue between the government and citizens [7]. It is suggested that a model of the e-gov necessary adaptation is proposed for adoption in countries, such as Indonesia. In case of e-gov services provided by the military, it is suspected that there is a gap between realities vs. design of e-gov [8]. Referring to the fact that a research on the adoption of e-gov in Indonesian military organizations has not been existed yet, the main question that requires an answer is what are the dominant factors that affect decision making in the e-gov adoption? Furthermore, the external variables on TAM allow for expansion of the model, depending on the environment of adoption and other underlying theories or other models [9], [10], [11].

Since e-gov adoption model in the military environment has not been widely studied, even in the context of the Indonesian military organization, it is essential to formulate an appropriate model by referring to the models of other technology adoption which has been developed in the public services or e-commerce environments, as well as the underlying theories. This would lead to the central question of this study: What is the model of e-gov adoption in Indonesian military organization?

Based on both question above, there are three research objectives of this paper, which are: identifying and assessing the adoption of e-gov variables in the Indonesian military organization; analyzing the relationship among adoption variables of e-gov in Indonesian military organization; and formulating models of e-gov adoption in Indonesian military organization.

II. LITERATURE REVIEW AND HYPOTHESES

A. Adoption of E-government

In Indonesia, e-government initiatives seek to enhance participation and interaction between government and its stakeholders (President Decree No.3/2003). Regardless some success, the e-government program is still facing key challenges: lack of citizens' awareness, limited ICT skills among the government employees, integration problems, financial issues, lack of related legislations, and the digital divide [12]. There are still controversies and gaps [13], [14], [15], [16]. There is also no specific model for e-gov adoption in military organizations, particularly in Indonesia.

B. Technology Acceptance Model (TAM)

TAM is a powerful information system theory in the form of a predictive model of how users will accept or implement the technology [17]. However, the basic theory of TAM was developed from a deep insight of two popular theories called Theory of Reasoned Action (TRA) and Theory of Planned Behavior (TPB) [18],[19], and [20]. To understand the behavior of the adoption, both theories reveal general concept of human behavior and attitudes of different beliefs, which drive to behavioral interest to adopt e-gov. Meanwhile, to apply theory to a wide range of environmental conditions, technology and the different organizations, TAM is often referred to the TAM extension [21], such as TAM2, TAM3 or UTAUT (Unified Theory of Acceptance and Use of Technology). UTAUT is basically a merger of TAM with other theories to explain further to the adoption of the technology [22], [23] and [24].

Related to the e-gov adoption models, basic theory of general adoption of e-gov is the TAM, which was originally initiated by Davis in 1989 [25]. Thus it can be said that TAM and both theories are grand theory of the e-gov adoption [26], [27].

C. Technology-Organization-Environment (TOE)

TOE is a framework initiated by Tornatzky & Fleischer in 1990 [28]. The integration of TAM and TOE provides valuable insights on how companies are adopting e-commerce can maintain or improve competitive advantage. It is, therefore, clear that the context of the adoption of the technology is a part of the strategic management of the company or organization. TAM integration and TOE also be richer when integrating other construction and / or merge with other IT acceptance model to handle the techno-centric nature of the TAM [29].

TOE framework has been believed to be a good theoretical view to defining factor based on the context of the spread of technology, organization, or the environment; and has been widely used by researchers. Using TOE, researcher can disclose how the inter-organizational systems integration influence the e-commerce companies adoption [30]. The use of TOE framework is also suggested for benchmarking in adopting innovations [31], and can be used to assess the acceptance of Internet technology [32].

Based on TOE framework, several constructs selected for the study. The hypotheses model based on TOE framework is

adopted from [28] and [29]. According to the original TAM [33], Attitude (ATT) is the mediating variable, Behavioral Intention (BI) is the dependent variable, and there are 14 variables into 3 adopters that selected as external variables, namely:

1) *Technology adopters: Perceived Usefulness (PU), Perceived Ease of Use (PEOU), Perceived Behavioral Control (PBC), and Perceived Service Quality (PSQ);*

2) *Organization adopters: Computer Self-Efficacy (CSE), Facilitating Condition (FC), Social Influence (SI), Perceived Organizational Support (POS), Perceived Organizational Commitment (POC), Procedural Justice (PPJ), and e-readiness (ER);*

3) *Environment adopters: Competitive pressure (CP), Perceived Trust (PT), Digital Divide (DD).*

The selection of 16 constructs are according to the results and recommendations of the research carried out by [34], [35], [36], and [37]. Understanding of the dominant variable toward an adoption for a successful e-gov will be very important in decision making and planning related to the implementation of e-gov [25]. Official managers of e-gov services in Indonesia, particularly in the military organization, in general, have not gained insight on e-gov adoption model that can be used as the basis for managing e-gov. Therefore, the research is intended to contribute positively to development of the theory, and the successful implementation of e-gov in Indonesia, particularly in the military organization.

D. Hypotheses

Based on the review of literature on TAM and TOE, hypothetical models to predict the e-gov adoption in military organizations depicted in Figure 1.

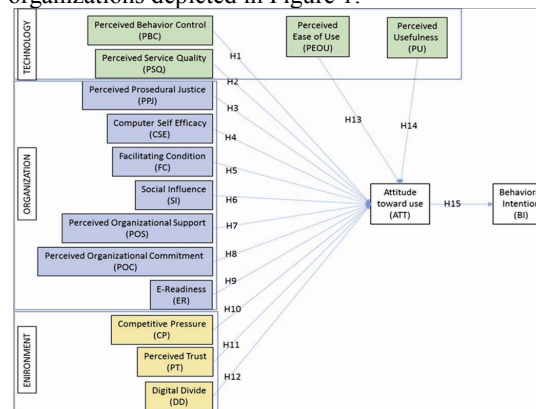


Fig. 1. The hypotheses model proposed

Hypothetical relationship of constructs shown by H1 to H15, which are:

- 1) *H1: Perceived Behavioural Control influence Attitudes;*
- 2) *H2: Perceived Service Quality influence Attitudes;*
- 3) *H3: Perceived Procedural Justice influence Attitudes;*
- 4) *H4: Computer Self-Efficacy influence Attitudes;*

- 5) H5: Facilitating Condition influence Attitudes;
- 6) H6: Social influence influence Attitudes;
- 7) H7: Organizational Support influence Attitudes;
- 8) H8: Organizational Commitment influence Attitudes;
- 9) H9: E-Readiness influence Attitudes;
- 10) H10: Competitive Pressure influence Attitudes;
- 11) H11: Perceived Trust influence Attitudes;
- 12) H12: Digital Divide influence Attitudes;
- 13) H13: Perceived Ease Of Use influence Attitudes;
- 14) H14: Perceived usefulness influence Attitudes;
- 15) H15: Attitudes influence Behavioural Intention

III. METHODOLOGY

In accordance with the purpose of research, there are three types of research used, namely descriptive, explorative and verificative research. Descriptive method is to obtain a description of the object studied, Explorative method is a method to understand complex issues and chose a dominant factor as well as examine the causal relationship of the variables, while the verificative method aims to verify the dominant factors and the characteristics of the relationship among variables to examine a number of samples. Table I is a design research conducted.

TABLE I. METHOD OF RESEARCH

Method	Analytical Tools	Source of Data
Descriptive	Descriptive Statistic	Data from the Ministry of Defense (MoD), military headquarter, military command, naval base and airfield
Explorative	Dematel	Focus Group Discussion: 42 commanders of ICT units at the Ministry of Defense, military command, naval base and airfield
Verificative	PLS-SEM	Questionnaires: 400 personnel at the Ministry of Defense, military command, naval base and airfield

The study population at the level of military commander of ICT units of MoD, Army, Naval-base and Airfield totaled 46 units, consisting of: Army (18), Naval Base (11), and the Airfield (17). Indonesian military personnel population in 2014 amounted to 367200 person. Consists of: Army, 273104 person; Navy, 68194 person; and Air Force, 25902 person.

Interviews with 42 commanders of the military units conducted to obtain information about the condition of the e-gov adoption, the profiles, as well as to collect insight into the implementation of e-gov in the military. Furthermore, the FGD was held to obtain dematel matrix. The goal is to determine the dominant constructs in the proposed model. To validate the Dematel result, questionnaire is distributed to 400 military personnel at random, and analyzed using PLS-SEM.

Decision Making Trial and Evaluation Laboratory (DEMATEL) initially developed between 1972 to 1979 by the

Science and Human Affairs Program of the Battelle Memorial Institute of Geneva, with the aims to learning complex issues and interrelationships [38]. This method has been widely used as one of the means to solve the issues and effect relationships between evaluation criteria [39] and [40].

In practice, DEMATEL has been utilized to demonstrate the linkages between criteria and to look for criteria that play a central role in a system [41], [42], and [43]. In addition, DEMATEL combination with other methods have been widely used in different fields consists of automotive [39] and [40], ecotourism [44], finance [45], and in the context of the variable selection and evaluation of the relationship among the variables in the adoption model of DTPB (Decomposed Theory of Planned Behavior) conducted by [46]. A simple explanation of the DEMATEL procedure is presented by [47].

Furthermore, the variables selected from the proposed model, will be verified by the PLS-SEM. The data used is from 400 respondents (military personnel). PLS-SEM is widely used when motivation of research leads to exploratory research on complex models. In general, the use of PLS-SEM has been recommended by some experts as excerpted by [48].

IV. FINDINGS AND RESULTS

Expert opinions analyzed by Dematel to see the effect of each factor on the Technology adopter, Organization adopter, and Environment adopter. Overall, the Dematel results eliminate two variables of the model: Perceived Procedural Justice (PPJ) and Social Influence (SI). This decision was taken because the total influence value (r+c) of PPJ or SI is low compared to that of other constructs on the organization adopter. Meanwhile the r+c of constructs on the Technology adopter or the Environment adopter relatively has the same value. See Table II.

TABLE II. THE POWER OF INFLUENCES AND EFFECTS OF CONSTRUCTS

Technology Adopter			Organization Adopter			Environment Adopter		
Con	r+c	r-c	Con	r+c	r-c	Con	r+c	r-c
PU	15.197	-0.010	PU	15.342	0.043	PU	7.385	0.298
PEOU	14.904	0.369	PEOU	15.251	0.187	PEOU	7.243	0.360
BI	14.866	-1.508	ATT	14.841	-1.436	ATT	7.068	-0.755
ATT	14.543	-0.842	BI	14.701	-1.927	BI	7.020	-1.232
PSQ	14.531	1.612	POS	15.176	1.106	CP	6.562	0.439
PBC	14.126	0.379	ER	15.175	0.125	DD	6.539	0.846
			POC	15.010	0.637	PT	6.445	0.045
			FC	14.992	1.253			
			CSE	14.955	-0.087			
			SI*	13.922	-0.323			
			PPJ*	12.669	0.422			

Table II shows that the constructs accepted are perceived organizational support (POS), e-readiness of organization (ER), competitive pressure (CP), perceived organizational commitment (POC), digital divide (DD), perceived trust (PT), perceived service quality (PSQ), and perceived behavior control (PBC). This shows that the choice of technology when it gained the support of the construct operationalization will

be a strong influence on the e-gov adoption. For example, organizational readiness (e-readiness) and organizational commitment (POC) concerned about the loyalty of the individual to the organization and vice versa, which then change positively the attitude of personnel to adopt e-gov system in their office. In this case, it appears also that the usefulness of the system (PU) and convenience (PEOU) as the main constructs of TAM indicates the strength of its influence in this analysis. In the context of the selection in the Dematel, social influence and perceived procedural justice can be eliminated because of the weakest effect. It shows that in the opinion of the commanders, the influence of social relationships and perceived procedural justice is not dominant in the e-gov adoption in the military organization. Table II also shows that behavioural intention is the effect of other constructs. This is similar to the results of the literature review on TAM and TOE framework, where behavioral intention is a significant variable for the e-gov adoption. Attitude as a mediating variable also has significant effect at the whole.

To verify the Dematel result, PLS-SEM is used to convince that the variables are valid predictors in e-gov adoption model proposed. As Dematel data are from unit commander acting as ICT expert, then the data of PLS-SEM are from personnel acting as individual or user target of e-gov adoption. PLS-SEM results will be a final prediction model in this study. The result of PLS-SEM shows that outer loading value of the model (OLV) is higher than 0.4. It shows quite good indicator reliability for exploratory research [48].

TABLE III. OVERVIEW OF QUALITY CRITERIA

Constructs	AVE	Composite Reliability	Cronbachs Alpha	Communality
ATT	0.732299	0.891141	0.815756	0.732299
BI	0.648297	0.880467	0.819113	0.648297
CP	0.571669	0.797457	0.618061	0.571669
CSE	0.570751	0.839933	0.748185	0.570751
DD	0.510909	0.838894	0.760367	0.510909
ER	0.793146	0.884565	0.741902	0.793146
FC	0.647950	0.846260	0.730732	0.647950
PBC	0.574970	0.869519	0.808994	0.574970
PEOU	0.710391	0.907479	0.864240	0.710391
POC	0.530478	0.816819	0.698405	0.530478
POS	0.744696	0.897381	0.829674	0.744696
PSQ	0.632159	0.837387	0.709891	0.632159
PT	0.741383	0.895636	0.827297	0.741383
PU	0.576494	0.870707	0.812523	0.576494

Table III shows truncated overview of quality criteria of the model. It shows that internal consistency reliability (Composite Reliability > 0.6), and convergent validity (AVE > 0.5) of the model meet the criteria.

The final result of this research is shown in Table IV. There are six constructs which have T-Statistic < 1.96: Digital divide (DD), Facilitating Condition (FC), Perceived Behavioral Control (PBC), Perceived Organizational Commitment (POC), Perceived Organizational Support), and

Perceived Trust (PT). It means that the constructs are not dominant predictors of the model.

V. DISCUSSION

Results of the analysis showed that the digital divide which admittedly still exists in some areas in Indonesia is not considered as a limiting factor or driving force in the e-gov adoption in the military. Results of this analysis also confirms that the commanders and personnel had a different opinion. Facilitating condition complained by some of commanders at the focus group discussion was also not seen as a serious matter by personnel in the e-gov adoption. Similarly, in view of the user (military personnel), the results of behavioral control, organizational commitment, organizational support, and anxiety of Internet threats (trust) are not regarded as dominant factors in the e-gov adoption. Thus, the results of the analysis recommends that the dominant predictor of the adoption of egov in military organization are: competitive pressure, self-efficacy of computer, e-readiness, ease of use, usefulness, service quality, attitude, and behavioral intention [49]. Attitude as intervening variable has predictors: competitive pressure, self-efficacy of computer, e-readiness, ease of use, usefulness, and service quality. Attitude is a strong predictor of behavior intention to adopt e-gov.

TABLE IV. PATH COEFFICIENTS (MEAN, STDEV, T-VALUES)

	Original Sample	Sample Mean	Standard Deviation	Standard Error	T-Statistic
ATT -> BI	0.6047	0.6081	0.0394	0.0394	15.3633
CP -> ATT	0.1028	0.1012	0.0470	0.0470	2.1902
CSE -> ATT	0.1729	0.1732	0.0656	0.0656	2.6360
DD -> ATT	-0.0583	-0.0557	0.0452	0.0452	1.2883*
ER -> ATT	0.1925	0.1892	0.0754	0.0754	2.5528
FC -> ATT	-0.0169	-0.0163	0.0448	0.0448	0.3762*
PBC -> ATT	0.0146	0.0239	0.0843	0.0843	0.1733*
PEOU -> ATT	0.1708	0.1675	0.0831	0.0831	2.0543
PEOU -> PU	0.6770	0.6789	0.0356	0.0356	19.0311
POC -> ATT	0.0393	0.0434	0.0427	0.0427	0.9205*
POS -> ATT	-0.0422	-0.0415	0.0485	0.0485	0.8695*
PSQ -> ATT	0.1583	0.1582	0.0435	0.0435	3.64034
PT -> ATT	0.0368	0.0348	0.0566	0.0566	0.6514*
PU -> ATT	0.1623	0.1589	0.0634	0.0634	2.5591

The original TAM (which have constructs: PU, PEOU, ATT and BI) are strong theory according to [56], [55], [49], [35] and [11]. It is also proven and supported by the results of this study. While social influence (SI) or procedural justice (PPJ) is not considered as a major factor affecting the e-gov adoption. The fact differs from previous studies in the context of technology acceptance [50] and [51]. Thereby, this study shows us that the behavior of military personnel is different from the behavior of the civil society in general.

From Table IV can also be seen that the attitude of the military personnel are dominant predictor of behavioral intentions toward the e-gov adoption. These results corroborate the general opinion that military personnel dedicated to the attitude and discipline. In general, the attitude

of the military personnel is recommended to be maintained and enhanced to accelerate the e-gov adoption. Meanwhile, in the context of the e-gov adoption, the digital divide has not gained much previous research focus. Although at first, Dematel shows that the digital divide affects the attitude to the e-gov adoption in the military organization, but in the end, PLS-SEM results indicates rejection.

For military organizations in Indonesia, this implies that the operationalization of the dominant variables in this study (PU, PEOU, CP, CSE, ER, and PSQ) should be followed to ensure the successful e-gov adoption. The constructs that elaborated according to the dimensions of its operation will facilitate the planning or decision-making in the policy for the adoption of egov in the military organization. For examples, PU has dimensions: the benefits, effectiveness and efficiency [51], [52], [53], [5], and [33]; and PEOU has dimensions: Effort, Clarity, and Flexibility [54], [52] and [33].

Differences in opinion between the user and the commanders in some e-gov adoption factors indicate that the perception of personnel in terms of adoption is influenced by the level of organizational units within the military. In other words, each level of the hierarchy of organizational units in the military may have its own dominant factors in adoption. Related to the allegations, further research is needed on the basis of the level of organizational units in the military.

In all, integrating dematel and PLS-SEM in the context of an exploration of e-gov adoption model is interesting. Dematel is helpful to solicit expert opinion, while PLS-SEM is useful to confirm the opinion of the user. The use of PLS-SEM in this study can also be seen as a limitation, given the resulting model is only a prediction of constituent constructs. The use of other analytical techniques or longitudinal data are recommended in researching further results.

VI. CONCLUSION

The dominant predictors of the e-gov adoption model in this study, namely: competitive pressure, self-efficacy of computer, eradiness, ease of use, usefulness, service quality, attitude, and behavioral intention. In military, Attitude is a strong predictor of behavior intention to adopt e-gov.

Based on the analysis and the results of further discussions among military officers, the study recommends a grand strategy of the e-gov adoption in the military organization, namely: "Improving the attitudes and interests of personnel in the e-gov adoption", through five initiatives:

- 1) *Meet the usability and convenience of the system,*
- 2) *Improving the quality of online services,*
- 3) *Enhance the competence of personnel,*
- 4) *Setting up e-gov standards organizations*
- 5) *Encourage competition among organizational units and individual*

The use of other analytical techniques are recommended in researching further results, and further research is needed on the basis of the level of organizational units in the military.

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