E-Government Readiness Model Development for Successful ICT Adoption at Government Institution in Indonesia

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ABSTRACT: *One of the biggest challenges for adopting IT at the time government use the new technologies and determine the standard for directive and management measure. Actually, it is closely related to the level readiness of electronic adoption in particular culture of unit or division. In this study, a model have been designed for ICT adoption in term of assessing the e-Government Readiness by using 7 enterprise enablers of COBIT 5, which is performed to a case study in the provincial government, focused in the Bandung districts. They are involving principles and policies, business processes, organizational structure, culture, ethics and attitudes, information, application and infrastructure services, skills and competencies of Human Resources. Meanwhile, research methodology is carried out through phases namely interviews, observation and questionnaires to collect the essential data, while the analysis through a quantitative approach presented that there is no significant effect on the services, infrastructure and applications towards ICT adoption. Hopefully, this model will support the provincial government of Bandung to assess the ICT adoption, even understand the factor related to the process.*

Keywords: e-Readiness, e-Government, COBIT 5, ICT Adoption

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1. Introduction

Information and Communication Technology (ICT) has become a leveraging factor in the process of development structure, performance, managerial, service in various sectors, while in the government sector during this past two decades have been achieved tremendous efficiency and effectiveness especially in the operational service [1]. Commonly, the primary obstacle to be considered related to the difficulty and reluctancy to adopt ICT application and management in the e-Government for integrating in the hierarchical structure and public services. In general, it was depended highly to the readiness of a country on the infrastructure, resource availability, literacy index, employee competence and ICT deployment. In general, the government

is required to implement ICT in their directive operational and managerial measure have posed no longer objection and question, which is recognized globally to promote transparency and accountability [2]. Therefore, e-Readiness of ICT adoption has become a critical tool for government to develop policy and procedure since it improve the quality of service and the citizens trust. On the other hand, the ICT implementation in the organizations is a flexible interaction between the technological measures and creativities that leads to the innovation of the reinvention and discovery of sophisticated system consisting the compatible platform, continuous service and organizational independence. Thus, the use of technology has generated a great deal of interest that take advantages of new features to ensure the implementation within the organization has been run without any problematic issues or hidden constraints [3, 16]. In general, the provision of e-Government Readiness is the initial step should be done to prepare the attempt to enhance performance of public service by government institution involving every stakeholders and relevance partners to utilize ICT with customer oriented in their mind such as acceptance to the changes from traditional manual processing into the modern computerized working system in their operations. It should has primary objective to produce at least the acceptable level of public services that emphasize mutual interest and complementary approach in togetherness to achieve continuous improvement and quick response [4].

2. Literature Review

2.1 E-Readiness Concept

In general, e-Readiness evaluates on the quality of society's position to take advantage of the opportunities offered by ICT, where infrastructure, human capital, regulations, policies and internet penetration are critical ingredients [5]. Meanwhile, it is also the ability to look for chance to create value that provide platform to utilize the benefit in optimum level and avoid the risk of failure and bad service [6]. Based on these definitions, there are various reasons to justify the need to adopt the ICT and raising the motivation of the countries especially the governments to be participated in the process of e-Readiness in respect to improve economy, social and political atmosphere. There is at least three model of e-Readiness [7], which are ready to use tools or assessment, case studies and third party surveys and reports. Often, general problem in both developed and developing countries is the adoption of e-Government services in low-level services among citizens, which differs within private organizations. The current study of ICT adoption in government does not have a comprehensive conceptual framework to explain to communities related to e-Government services [8]. In the era of information, the countries without high levels of resources only can accelerate the growth and expansion through the development of knowledge, which is collaborated with adequate relevant infrastructures and competent human resources to allow effective integration into knowledge-based institution. There are many wealthy opportunities for government to create value through the imaginative and effective use of technology such as: internet, radio, cellular phone, etc. The development of the e-Government system is the primary concern to improve the public service in diverse sectors, which the realization for helping the growth and achievement as the national confidence [21]. However, the degree of adoption for e-Government service must be interpreted in terms of the administrative benefit, the political nature of online applications, the organizational capacity and the impact of the deployment of e-Government service technology [24].

2.2 E-Government Readiness

Previous ICT infrastructure steps have failed to address regulatory problems, often with negligible access, while the remaining tools provide inconsistent and unprecedented factors in the assessment of comprehensive policies with the environment [1, 2]. However, the readiness of e-Government should demonstrate the government's ability to deliver effective and efficient public services via the Internet through proper application [3]. At the same time, it can also be described as using technology to improve business performance by providing services and processes to citizens in terms of interaction opportunities and doing potential interaction or communication with government through various electronic media such as self service booths, smart cards or EDI [4]. Similarly, evaluations will be useful in a wider range of measurements in some regions within countries, particularly to assess the willingness to develop appropriate strategies in anticipation of the effects of IT. Of course, transparency and accountability must be achieved in resource management and budget utilization [6]. At present, the uniqueness and small number of models in e-Government readiness means that there is no single model suitable for all countries to assess the adoption of IT in government, making it of high importance, especially in the light of national objectives. This is in line with the fact that the implementation of e-Government in one country will be different in terms of characteristics and considerations, where the initial strategy must be implemented very carefully and high consideration [8]. The increasing need to improve and accelerate the implementation of e-Government projects requires practical solutions to overcome barriers to project implementation [9].

In 2003, the United Nations (UN) conducted four surveys up to 2008 on this subject to Member States. The results were

evaluated in terms of EGRI, HCI, TCII, and WMI. India gets the lowest score on EGRI each year behind other countries. The average annual growth rate associated with agriculture increased by 12 per cent during this period, and India could also increase its EGRI production rate by 2 per cent. On the other hand, the UAE provided a total increase of around 18% but fell slightly in 2004. Meanwhile, countries such as Kazakhstan, the Republic of Korea, Japan, China and the Maldives increased by 23%, 12%, 11%, 21% and 10% respectively [10]. In general, e-readiness assesses the quality of people's situation to take advantage of opportunities offered by ICTs, where infrastructure, human resources, regulations, policies and Internet penetration are important components to support the process. At the same time, it is also the ability to look for opportunities to create value that provides a platform to exploit the benefits at optimal levels and avoid the risks of failure and poor service [12]. Based on this definition, there are several reasons for the need to adopt ICTs and to increase the incentive for countries, particularly the government to participate in the electronic readiness process in terms of improving the economic, social and political climate. There are at least three e-readiness modules [13], ready for use in tools or assessments, case studies, surveys and third-party reports.

The growing needs to enhance and fasten up the application process of e-Government projects require the practical solutions to overcome the hindrance to the implementation of projects [22]. As of 2003, the United Nations (UN) has run 4 surveys until 2008 on this topic to its member countries. The results have been evaluated in terms of the e-Government readiness index (EGRI), a composite measure of the human capital index (HCI), telecommunication infrastructure index (TCII) and the web measurement index (WMI). India obtained the lowest value on the EGRI each year behind the other countries. It also presented that the mean of EGRI has increase by 12% during those period, which India also able to increase its EGRI with 2%. On the other hand, the UAE has provided an overall improvement at around 18 % but a slight decrease at 2004. Meanwhile, countries like Kazakhistan, Republic of Korea, Japan, China, and Maldives also obtained an increase, which are 23%, 12%, 11%, 21% and 10%, respectively [23].

The prerequisites for e-Government are based on the most important needs of the community, for example, the level of technical infrastructure, legal frameworks and professional skills required for e-Government, which vary with the desired objectives. However, if the requirements differ, there is big question on how does the government assess e-government readiness [32]. However, component-based models provide considerable flexibility in developing concrete assessment tools from existing components and modifying these components to meet specific requirements. This determines the information needed for each component during survey design and helps develop tools for data collection from different sources through organization of 8 perspectives, which are international and national context, enabling environment, e-Government demand and capability, stakeholders, technology and perceptions on the challenge [33]. However, most of the current model in the assessment ignore the vision of stakeholders and external staff, although they represent the basis for the success of each e-Government project. Some researchers suggest that its framework consists of seven dimensions to assess the organization of government organizations, including e-Government organizational strategies, user access, e-Government programs, portals, business processes, ICT infrastructure and human resources [34]. Therefore, many models have been developed to assess e-Gov readiness as well as its maturity phase or level model that are becoming the benchmark. They all have strengths and weaknesses due to context and limitation of the components, the relationships and the framework used that should emphasize the establishment of trust and realize the economic objective within social and cultural domain [35, 36].

2.3 COBIT 5: 7 Enterprise Enabler

Control Objectives for Information and related Technology (COBIT) is one of the best practice used in IT governance. So far, it has reached the fifth version, with focused to provide business framework for the governance and management of IT organizations In its documentation, it explains the 7 components of the enablers as something that able to support the process of attaining the IT governance purpose in organizations involving the information and people. In general, it has 5 critical principles, which are meeting stakeholder needs, covering the enterprise end-to-end, applying a single, integrated framework, enabling a holistic approach and separating governance from management [14]. Its template can be in the form of a performance evaluation tool to evaluate whether system information can meet the needs of business objectives or not [25]. On the other hand, its purpose concern with IT control towards practices rather than their execution, with the most important aspects related to provide strategic alignment to the business in order to optimize the profit, assuring IT resources are used providently with potential risks are mitigated [26].

An external audit of the change management process at 2010 presented that the use of COBIT within the practices of e-Health organization become the highest achievement in the maturity scores and fastest improvements. It also led to a series of refinement linked to several processes such as change and configuration, service level and security management, business continuity, service desk and incident management [27]. At certain occasion, it is claimed that COBIT as a high grade reference in the

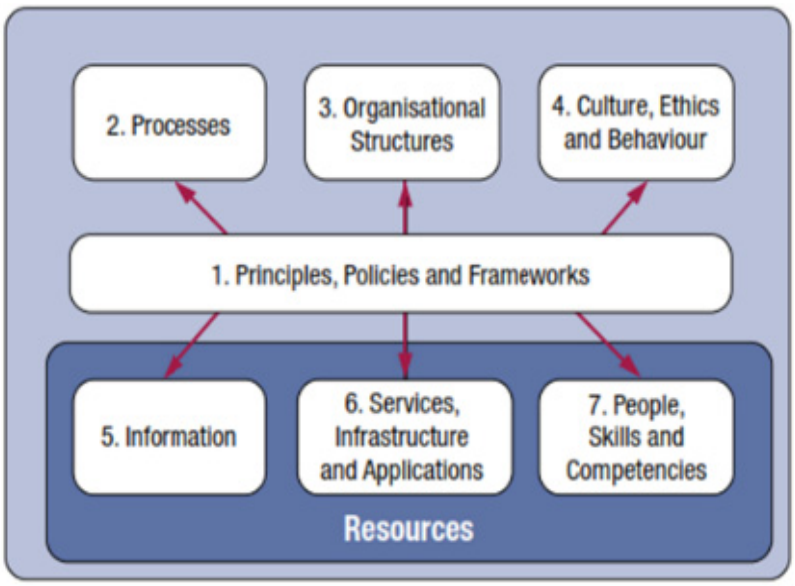

Figure 1. COBIT Enabler [13]

framework for governing information security while the use of ISO 17799 is considered as a lower grade guideline [28]. Interestingly, it has been analyzed that COBIT framework have high relevant to operational, compliance and financial auditing, while it is also found to be conformable and suitable in the case of validating IT controls [29]. Basically, it depends on the perspective of corporate governance to define the proper implementation, which often align with the stakeholder needs, balanced conditions and options, established enterprise objectives, prioritized direction of setting and maintaining performance in decision making [14].

3. Research Methodology

Our research follows the Design Science Research Methodology (DSRM), which is consisted to six steps of process [15, 16, 30] that should be aligned with the mutual comprehension of relevant factors and measures to minimize reluctancy and errors [18], or to limit any possibility of damages to occur by appropriate control [19]. They are problem identification, and motivation, the definition of the objectives for a solution, design and development, demonstration, evaluation, and communication. Problems identification of information technology adoption in Bandung district will be carried out through interviews with the Head of Agency for the management of archives, libraries and information systems development (BAPAPSI) as IT Unit organization. Meanwhile, the development of the solution is made through a literature review related to papers or research related to information technology adoption. It aims to get what factors are usually considered in adopting a technologically.

At the stage of design and model development demonstrations, it will be made a model for the e-Readiness of information technology adoption in Bandung district based on the factors that influence. Furthermore, e-Readiness ICT Adoption model generated will be tested using a quantitative approach through questionnaires. The questionnaire was developed based on the factors that influence the information technology adoption. It aims to obtain a major factor and a contributing factor in adopting the information technologies using factor analysis. Results of the testing model in the previous stage will be evaluated to get a fix models that can be used by the districts of Bandung as a reference to adopting an information technology. The tested model will be communicated in the form of socialization to the BAPAPSI and will be published in a journal or a ICT conference.

4. Analysis and Design

After a series of evaluation based on the enabler of COBIT 5, this study determine the predictor and response to develop e-Government Readiness Model to represent the activities, action, process and operation. It has the objectives to present the framework of the entire targeted system for any inquires and parameters in responding to the threats and recognizing the potency by understanding the interrelationship between each other.

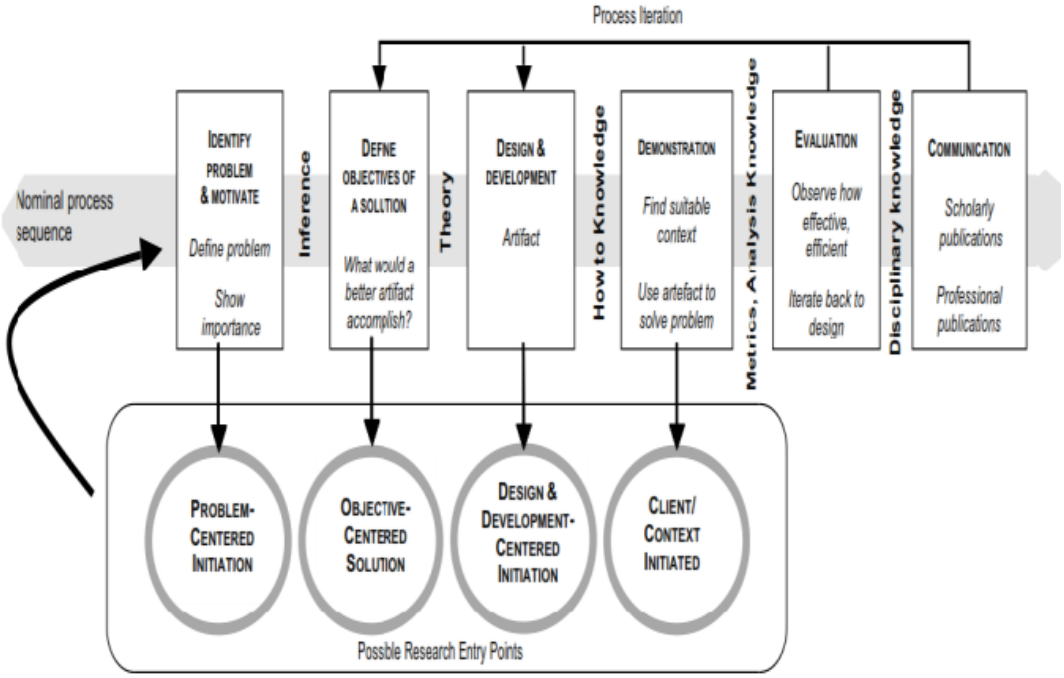

Figure 2. Design Science Research Methodology [13]

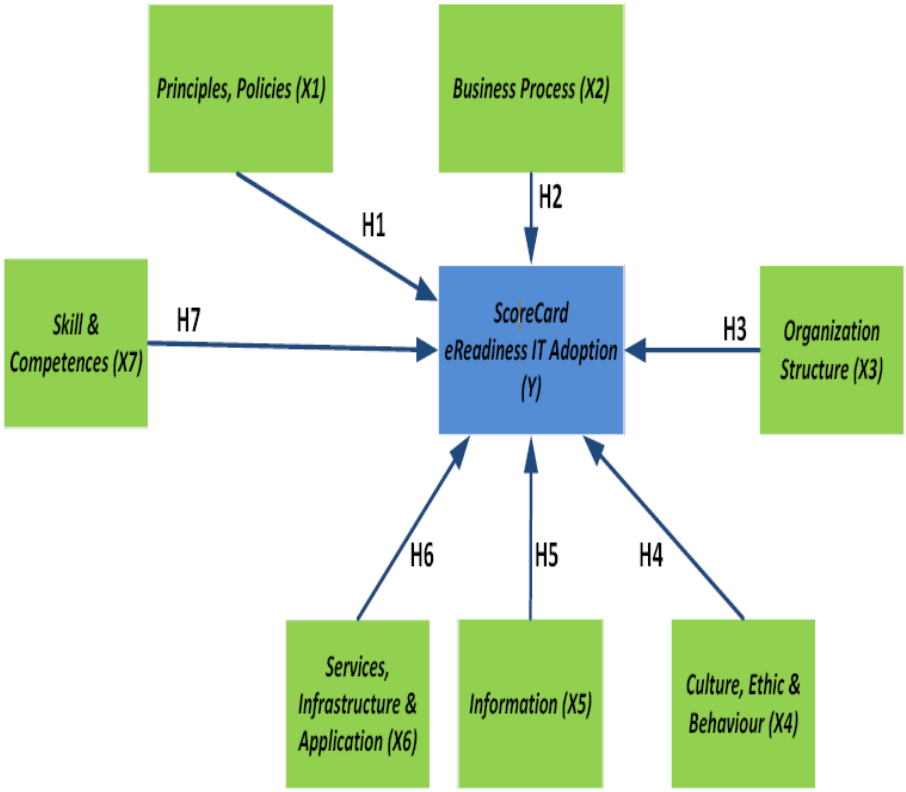

Figure 3. Hypothesis Model

Hypothesis 1

H_0: the principles and policies do not have impact on the e-Readiness ICT adoption

H_1: the principles and policies have an impact on the e-Readiness ICT adoption

Hypothesis 2

H_0: business process do not have impact on the e-Readiness ICT adoption

H_1: business process has an impact on the e-Readiness ICT adoption

Hypothesis 3

H_0: organizational structure do not have impact on the e-Readiness ICT adoption

H_1: organizational structure has an impact on the e-Readiness ICT adoption

Hypothesis 4

H_0: culture, ethics and behavior do not have impact on the e-Readiness ICT adoption

H_1: culture, ethics and behavior have an influence on the e-Readiness ICT adoption

Hypothesis 5

H_0: information do not have impact on the e-Readiness ICT adoption

H_1: information has an impact on the e-Readiness ICT adoption

Hypothesis 6

H_0: Services, infrastructure and application do not have impact on the e-Readiness ICT adoption

H_1: Services, infrastructure and application have an impact on the e-Readiness ICT adoption

Hypothesis 7

H_0: HR skills and competencies do not have impact on the e-Readiness ICT adoption

H_1: HR skills and competencies have an impact on the e-Readiness ICT adoption

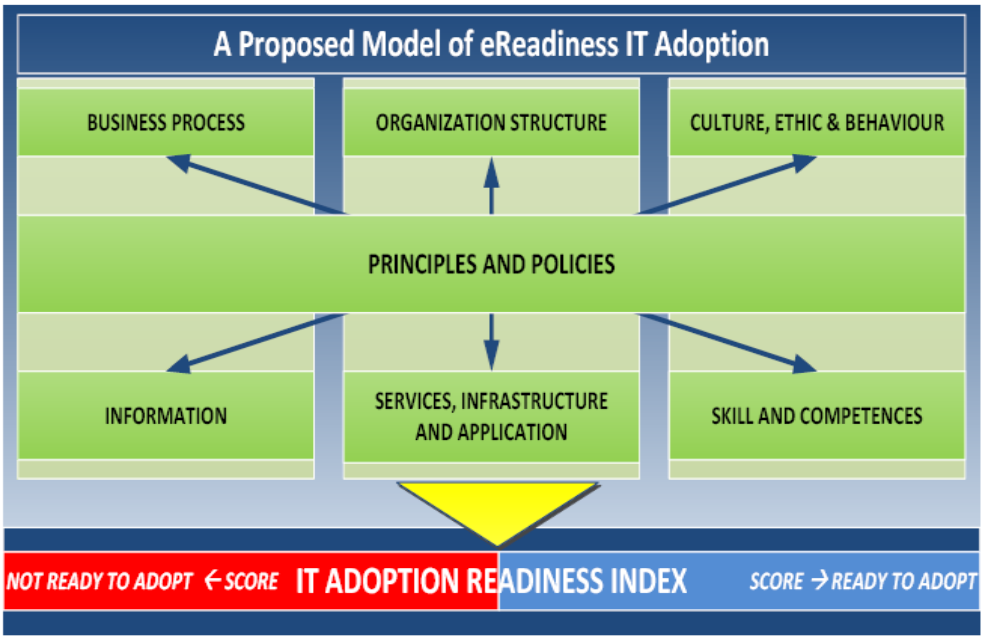

Figure 4. E-Readiness IT Adoption Validated Model

This study proposed a model to assess maturity level for the adoption of ICT in the provincial government institution in Bandung, Indonesia. In short, there are two types of available decision, which are "*Not Ready to Adopt"* (0-3) and *Ready to Adopt* (3-5) as show in Figure 4.

A strong relationship between COBIT 5 enablers in the e-Readiness of ICT adoption can be seen by the results of correlation analysis using SPSS software. Correlation between sets of data is a measure of how well they are related. The most common measure of correlation in stats is the Pearson Correlation. It shows the linear relationship between two sets of data. The results will be between -1 and 1. In this research, there are 31 respondents from the unit in government. Respondents were tasked to fill out questionnaires that have been determined. The result of the questionnaire is then processed by using a statistical approach. By a significance level of 5% were obtained r value of 0.355 tables to be utilized for correlation. However, the IT controls become significant component to attain the consistent and quality financial detail as well have been found to be the key ingredient to assure the system security, establish the changes, evaluate risk, organize data and estimate internal control adequacy [28]. Commonly, the framework of COBIT is often utilized as a guidance by IS professionals to managing ICT adoption in the organization or starting point to develop policy and procedure, for example, the maturity model to assess the development of management processes. It also can be used to recognize and find out the potential IT risk types towards process in the organization because it provides a platform to share specific experiences on best practices in the industry. Meanwhile, the chief officer usually look at the central view of overall process and manager look specifically to their related responsibilities and tasks. However, literature on COBIT have been indicating that organizations can use COBIT along with other frameworks [28], while there are no clear guidelines on how and when to select those complementary frameworks such as the use of agile software development methods with other type of approach such as RAD or Scrum.

A. Hypothesis 1
Principle and policy of obtaining a correlation coefficient $r = 0.512 >$ r table (0.355) and the $Sig = 0.001 < \alpha$ (0.05). There is a significant relationship between the variables principle and policy with the variable of e-Readiness ICT adoption.

B. Hypothesis 2
Business process of obtaining a correlation coefficient $r = 0{,}552 > r$ table (0,355) and the $Sig = 0.003 < \alpha$ (0:05). There is a significant relationship between the variables business process with the variable of e-Readiness ICT adoption.

C. Hypothesis 3
Organization structure of obtaining a correlation coefficient $r = 0{,}504 > r$ table (0,355) and the $Sig = 0.004 < \alpha$ (0.05). There is a significant relationship between the variables organization structure with the variable of e-Readiness ICT adoption.

D. Hypothesis 4
Culture, ethic, and behaviour of obtaining a correlation coefficient $r = 0{,}520 > r$ table (0,355) and the $Sig = 0.003 < \alpha$ (0.05). There is a significant relationship between the variables culture, ethic, and behavior with the variable of e-Readiness ICT adoption.

E. Hypothesis 5
Information of obtaining a correlation coefficient $r = 0{,}417 > r$ table (0,355) and the $Sig = 0.02 < \pm$ (0.05). There is a significant relationship between the variables information with the variable of e-Readiness ICT adoption.

F. Hypothesis 6
Services, infrastructure, and application of obtaining a correlation coefficient $r = 0{,}190 < r$ table (0,355) and the $Sig = 0{,}305 > \alpha$ (0.05). There is a significant relationship between the variables services, infrastructure, and application with the variable of e-Readiness ICT adoption.

G. Hypothesis 7
Skill and competence of obtaining a correlation coefficient correlation $r = 0{,}443 > r$ table (0,355) and the $Sig = 0.013 < \pm$ (0.05). There is a significant relationship between the variables skill and competence with the variable of e-Readiness ICT adoption.

The model have been validated, which can be divided into two enabler groups namely main enablers consists of principles

	Principle & Policy	Business Process	Organization Structure Ethic &	Culture, Behavior	Information	Service, Infrastructure & Application	Skill & Competence	e-Readiness ICT Adoption
Principle & Policy		.502" .004	.377' .037	.389' .031	.453' .010	.260 .158	.376' .037	.512" .003
Business Process	.502" .004		.560" .001	.594" .000	.597" .000	.395' .028	.398' .027	.552" .001
Organization Structure	.377' .037	.560" .001		.447' .012	.503" .004	.459" .009	.445' .012	.504" .004
Culture, Ethic & Behavior	.389' .031	.594" .000	.447' .012		.581" .001	.253 .170	.489" .005	.520" .003
Information	.453' .010	.597" .000	.503" .004	.581" .001		.240 .194	.609" .000	.417' .020
Service, Infrastructure & Application	.260 .158	.395' .028	.459" .009	.253 .170	.240 .194		.515" .003	.190 .305
Skill & Competence	.376' .037	.398' .027	.445' .012	.489" .005	.609" .000	.515" .003		.443' .013
e-Readiness ICT Adoption	.512" .003	.552" .001	.504" .004	.520" .003	.417' .020	.190 .305	.443' .013	

Table 1. Pearson Correlation Sig. (2- TAILED), $N = 31$

and policies variables, business process variables, organizational structure variables, cultural, ethics and behavior variables, information variable, the skill and competence variables. The other, support enabler which consists of services, infrastructure and application variable. Importantly, the holistic approach, end-to-end vision and relevant enablers should be conducted in complementarily to generate strategies and tactics.

5. Conclusions

In conclusion, e-Readiness ICT Adoption model can use a reference for the government at the time of going to adopt technology to support services for government or public needs to see the readiness based on the factors in the COBIT 5 enablers. From seven enterprise enablers, the e-Readiness ICT Adoption in Provincial Government Institution model consists six main enablers and one support enablers. The results of this research have been used by the government as part of the preparation of IT master plan for 2017 – 2021. The future work from this research is how to assess e-readiness to adopt information technology that will be used by the government based on the resulting model.

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