Developing E-Government Maturity Framework Based on COBIT 5 and Implementing in City Level: Case Study Depok City and South Tangerang City

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Abstract— The use of E-Government in achieving good governance has been done by government to serve citizen nowadays. However, not all local government were able to implement it. PeGI that has been used as a benchmark to check government's readiness rate in implementing E-Government can't describe all process that need to be assessed in developing local E-Government. Moreover, the emergence of social problems, such as organizational culture and human resource management which inhibits maturation of local E-Government. Therefore, it needs one general maturity framework which capable to guide local government to develop their own E-Government and able to address social problems that arise. This study is the incorporation of previous research results using meta-synthesis method combine with best practice, primary in COBIT 5 that has been adjusted to address a factor of social problems. The design framework begins with identifying the business principle of local government, stakeholders, concerns, requirements, and obstacles; thus, produced a model of maturity framework that has six types stages, eight types dimensions, four types main categories and 69 types sub-category of assessment processes. In the end, after the framework was tested and evaluated, we can conclude this framework already comply with PeGI's result. From local government who had the best PeGI's result, they had main problem in social issues and in documenting process. For local government with very low PeGI's result, they had common constraints related to IT (low understanding of IT governance and IT management, lack of infrastructure, human resources, and understanding how to use IT Master Plan).

Keywords— E-Government, Maturity Framework, Meta-Synthesis, COBIT 5, City, Indonesia

I. INTRODUCTION

E-Government can be defined as "Making use of Information Technology as a tool in running the government system more efficiently to improve the quality of service to community and other parties to achieve Good Governance" [1].

In line with the objective of E-Government, Indonesia has participated in the implementation of E-Government mainly for administration purpose. Like another developing country in general, Indonesia implementing E-Government focuses on the aspects of transparency and the fight against corruption [2].

To endorse this purpose, the President Instruction No. 3 of 2003 released, as National Policy and Strategy in Developing E-Government in Indonesia. By instruction, it's encourage governmental agencies in Indonesia to implement E-Government in their governmental system as fast as possible, in order to cut the bureaucracy, create transparency, and facilitating access of information for government agencies to be more efficiently with an integrated system that can be used for the country, community, and business; anytime – anywhere [3] – [4].

For application, the E-Government can practically running well, if it's fulfils the three aspects, namely: availability, multiple channel, and the role of government as the main coordinator [5], the following of explanation: 1) The public has a full access to be able to relate to government whenever and wherever if they want for 24 hours a day and 7 days a week (non-stop); 2) The availability of multiple service access channels (multiple channels) for the public and stakeholders; 3) The government shall act as the main coordinator who can create a conductive atmosphere in order to create an environment of governance as aspired to their people.

However, when we see from the state of the current government, E-Government is not meet the three aspects above, so that government needs to be more responsive in meeting these three aspects in the future implementation of E-Government.

That fact is reinforced by the emergence of a UN survey on E-Government Development, which showed that the level of implementation of E-Government in Indonesia dropped each year, starting from the year in 2003-2016 [6]. For more details, can be seen in the image below regarding Indonesia's ranking in the world.
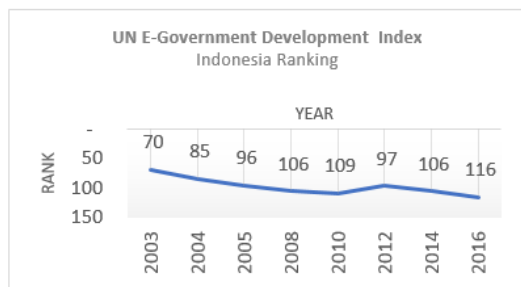
Fig. 1 Decreasing Indonesia's ranking in the world until 2010

If we saw from the implementation of E-Government now, the government only able to implement until the second stage, of the four stages of the implementation of E-Government maturity [5]:

- Phase I Preparation – Making Websites (web presence) as a medium of information and internal purposes institute.
- Phase II Maturation – The existence of interactions with the public and stakeholders through ICT media (e-mail, Forum, SMS, Mailing Lists).
- Phase III Stabilization – existence of transactions through service to the community with online system.
- Phase IV Utilization (Transformation) – Utilization of application of Government-to-Government (G2G), Government-to-Business (G2B), and Government-to-Consumers (G2C).

The above facts obtained from the research by using Deloitte & Touche framework, which says that generally the rate of implementation of E-Government in Indonesia is still in the second phase, namely the "Transaction with Two-Way Communication" [7], whereas when viewed more specific to each local authority, the majority of implementation is still in the first phase and only a small percentage who have reached the second phase (in Java), while the third and fourth level has not been reached [8].

Furthermore, in line with E-Government implementation, the government had also made a guideline which consist five dimensions of how to evaluate E-Government implemented in Indonesia (PEGI). PEGI dimensions are discussed in (1) Policies, (2) Institutions, (3) Infrastructure, (4) Application, and (5) Planning [9].

- Policies - is a main foundation for the development and implementation of E-Government.
- Institutions - Closely associated with the presence of authorities and organizations responsible for the development and use of ICT.
- Infrastructure - Relating to the infrastructure that supports the development and use of ICT.
- Application - Relating to the availability and utilization rate of software applications that support E-Government services directly or indirectly.
- Planning - Relating to the governance or management of ICT planning is carried out in an integrated and sustainable.

Unfortunately, this has yet to optimize the implementation of E-Government in Indonesia. This fact is reinforced back of research results by Suwadhi Yusuf [2], which can show the mapping of PEGI in Indonesia. Seen in the mapping result, readiness of local governments in the development of E-Government in the future is less satisfactory, it can be inferred from the average yield obtained, only on the island of Java that have the readiness level 3 (good), while the other islands are still had a poor status.

Adding with research result produced by Sosiawan [8], despite many efforts made by the government in improving the implementation of E-Government, should it be able to deliver positive results in the future. However, after several years had passed, the increase in the implementation runs very slowly. Even not spread evenly to every region in Indonesia. From several sources, the lack of uneven implementation in implementing E-Government level are due to insufficient human resources (expertise), lack of knowledge in the development of E-Government, the cost factor, and policies; which are all nationally ensnare. This statement has also been demonstrated from the interview results of expert and local governments itself [10] – [11]. In addition to the above factors, there is a new fact that there are some local governments that still do not know how to start the implementation of E-Government in its own region, that fact is obtained after the interview to the local government which is still relatively new established [11]. Although the central government has provided a draft of IT Master plan for each local government, whether it is a long-standing or a new established local government, many of these local governments still do not understand how IT Master plan should be used.

Therefore, to optimize in using and can create a better PEGI's result in the future; a special guideline for the development of E-Government maturity framework that can be applied to some service-minded organizations need to be created, especially for local governments. Furthermore, further study of the main factors required in developing a framework is also needed. In addition, to maintain a reliable framework remains in a state of implementation, also required a study on the factors that may hinder the implementation of E-Government in Indonesia, to provide information to anticipate problems that might occur. When all has been completed, check all these factors against the PEGI and the expert judgement needs to be done, so that the implementation can be run in line with the development of E-Government now.

II. LITERATURE REVIEW

Based on research scope, literatures that need to be studying must be related to: E-Government, PeGI, COBIT 5, and previous researches that explain how to create a maturity framework model for E-Government using Meta-Synthesis.

A. E-Government

Many governments in the world have implemented E-Government in their administration systems. This is effective due to the implementation of E-Government in the government, the system of government will be more efficient in improving the quality of services to the community [1].

Moreover, with the implementation of E-Government in the administration, it can improve the delivery of services and information to the public, ease of access for the public, increase the transparency aspects that led to the enforcement of state anti-corruption, as well as reduction in the use of money, time, and other resources to speed up the existing bureaucratic process [2].

In general, models of delivery and activities in the E-Government is divided into four, namely:

- Government-to-Citizen (G2C)
- Government-to-Business (G2B)
- Government-to-Government (G2G)
- Government-to-Employee (G2E)

In this study, G2G is the focus of the study. Whereas with the development of E-Government the local government can help improve the E-Government national level.

However, to be able to reach the "good" level of E-Government, E-Governance aspects also need to be considered [1]. Because of that, in its application, a good E-Government can be achieved by a good E-Governance too, so that each can in line between one another.

B. PeGI

Through the efforts made by the Ministry of Communication in E-Government rankings that exist in Indonesia, PeGI was made as a standardization in terms of evaluating the level of implementation of E-Government in Indonesia. The main goal in making this PeGI is as a reference for the development and use of ICT in government; give impetus to the development of ICT governance through evaluation is intact, balanced and objective; and able to provide a map of the condition of the use of ICT governance nationally.

Through the PeGI's implementation strategy by way grouping, assessment through agreed criteria, publishing, and evaluation; the entire national governments are rated in accordance with the conditions of IT implementation. The PeGI's ranking is done by evaluated into five dimensions, namely Policies, Institutions, Infrastructure, Application, and Planning [9].

From defining the dimensions in PeGI, there are several problems associated with social issues, whether it is a problem of organizational culture and human resource management issues [9]. Because of that, this study need to build some processes that can address into that issues.

With PeGI, it can support research in terms of validating the truth of the generated value from maturity framework that will be created. Moreover, with the PeGI can align what components are either included in the criteria for maturity assessment framework that will be created.

C. COBIT 5

Starting in 2012, ISACA has been released the latest version of COBIT, COBIT 5. As COBIT 4, in general COBIT 5 has some fundamental similarities, ranging from COBIT processes, business and technical view, the use of CMMI in matters relating to the capabilities, the use of several

international standards in determining the stage of maturity, how to use COBIT PAM, as well as many other things.

If explored, there are some new things that included in COBIT 5, which previously did not exist in the COBIT 4, for example, is a factor related to culture or cultural, humanitarian or human factors, as well as many other social factors [12].

Seen from information in COBIT 5, there are some new COBIT processes and changed in its name. Here is the evolution of the process dimension of COBIT 4:

- It is a fraction of the ME domain → Evaluate, Direct, Monitor (EDM) - The process of governance is related to the settlement of the problem of stakeholder governance objectives.
- Plan and Organize (PO) → Align, Plan, Organize (APO) - Gives direction to solution delivery (BAI) and service delivery and support (DSS).
- Acquire and Implement (AI) → Build, Acquire, Implement (BAI) - Providing solutions and implement those solutions to each of the existing services.
- Delivery & Service (DS) → Delivery, Service, Support (DSS) - Receiving a solution and can be used by end users.
- Monitor and Evaluate (ME) → Monitor, Evaluate, Assess (MEA) - Monitors all processes to ensure that all directives that are provided are correctly followed.

After generalization explanation COBIT 5 above, using COBIT 5 is not much different from COBIT 4, but there are several dimensions or processes that previously did not exist in the COBIT 4 (generally associated with social factors). To that end, a comprehensive COBIT 5 as one of the means of consideration in making this research E-Government maturity framework. By using COBIT 5 PAM and a top-down approach, IT process assessment attributes can be obtained. Then this attribute will be sorted back with expert judgment approach and will be evaluated on the results to the relevant local government, as well as the results of the PEGI 2014.

D. Previous Researches

Using previous researches, mainly topic in developing E-Government maturity framework with Meta-Synthesis method, this research using three main research results as base model in synthesizing into one maturity framework model that can be use in local government. Here is the summary that can be captured by those researches, shown in Table 1.

TABLE I
PREVIOUS RESEARCHES

Research Title	Methodology	Research Result	Related Research Critics
Stage Maturity Model of m-Government (SMM m-Gov)	Meta-Synthesis (7 E-Gov Maturity Model & 3 M-Gov Maturity Model)	Synthesis design M-Government maturity model in Indonesia	Lack of explanation for local government that used as research objects Lack of explanation

			how to define research objects as sample Lack of description in selecting experts
10 years retrospect on stage models of E-Government: A qualitative meta-synthesis	Meta-Synthesis (12 E-Gov Maturity Model)	Synthesis design E-Government maturity model generalization in the world	There is no explanation on how to capture information about dimensions and sub-dimensions in framework Depiction of model research is hard to read (rather than a model framework that refers to CMMI)
E-Government Stage Model: Based on Citizen-Centric Approach In Regional Government In Developing Countries	Meta-Synthesis (8 E-Gov Maturity Model)	Design and implementation E-Government maturity model for local government in developing countries	Lack of expert's participation in evaluating model Wrong in defining research's scope Stages in establishing a model is less explained

III. METHODOLOGY

This research mainly using meta-synthesis as method to synthesize model and using expert judgment for evaluated model and research result.

A. Meta-Synthesis

Meta-synthesis used in choosing maturity levels, dimensions, and categorizing COBIT attributes.

1) *Synthesizing Maturity Levels:* Based on maturity level from Lee's research [13] and COBIT 5 maturity level [12]; by definition and functional approach, this research synthesizing both point of view into a new one maturity level that can be used in local government.

2) *Synthesizing Dimensions:* Based on dimensions from Lee's research [13], Maranny's research [14], and interview result from expert in government field of study [15], [16], [17]; by functional approach, this research synthesizing concern that need to be address before implementing E-Government into a new one dimensions that can be used in local government.

3) *Categorizing COBIT Attributes:* based on functional approach, this research categorizing 69 COBIT [18] attributes into four main categories.

B. Expert Judgement

Expert judgement used in choosing COBIT 5 processes for assessment point in framework, choosing best practices that can addressing social issues like organization culture and human resource [12], and evaluating framework's assessment result and comparing with PeGI 2014's result [19].

IV. RESULTS

A. Best Practices for Social Issues

Using interview to get help from experts in determining best practices that well-suited with the conditions of the current government and adjusted to COBIT 5 enabler, obtained some result as follows [12], [15], [16]:

1) *Culture:* Communication, Enforcement, Incentives Rewards-Punishment, Awareness, Rules and Norms, and Establish Competition Environment.

2) *Human Resources:* Define Role Skill Requirements, Skill Levels, Skill Categories, Skill Definitions, Education and Qualifications, Technical Skill, Experience, Knowledge, Behavioural Skill, Availability, Turnover.

B. Concern in Government Policy

Using interview result from experts and some research studies, there are many policies that need to be concern to make implementation in E-Government succeed, here is some result [15], [16]: The policy of the Ministry of Administrative Reform (Ministry of Administrative Reform and Bureaucratic Reform); Presidential Decree No. 2003 3 (National Policy and Strategy Development of E-Government); Law on Public Information (Public, Act 2008, No. 14); Public Service Act (Public Service Act 2009 No. 25); Law on Government Administration (specifically concerning electronic documents); Guidelines for the management of Information and Documentation at the Environment Ministry of Internal Affairs and Local Government; Law No. 28 of 1999 on State Implementation of Clean and Free from Corruption, Collusion and Nepotism; Law No. 10 of 2004 on the Establishment of legislation regulations (can be replaced regulation of regional heads); Law No. 25 of 2000 on the National Development Program (PROPENAS) 2000-2004; State Gazette of the Republic of Indonesia Year 2000 Number 206; Presidential Decree No. 9 of 2003 on the Indonesian Telematics Coordination Team; Presidential Instruction No. 6 of 2001 on the Development and Utilization of Telematics in Indonesia; UU ITE; Communications and Information Technology Law; Act 2009 25 (Public Service); Regulation Act 2010 No. 35 (Guidelines for the Management of Information and Documentation Service at the Environment Ministry of Internal Affairs and Local Government).

C. Levels, Dimensions, and Attribute Assessment Process

Using meta-synthesis approach from Lee's research and adjusted with COBIT's level to determine levels that can be use in this framework. We can conclude, there are six levels that can be use in framework to rate local government maturity level as shown in Fig. 2: Not Present, Present, Assimilating, Reforming, Morphing, and E-Governance.
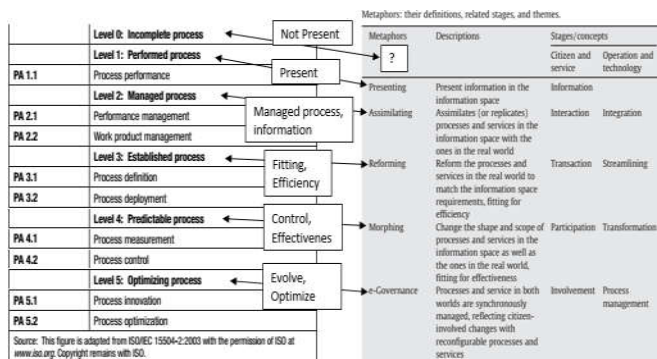

Fig. 2 Determination of Levels

Using meta-synthesis by definition and function approach from Maranny's and Shareef's research, adjusted with expert judgement to determine framework's dimensions. We can conclude, there are eight dimensions (concerns) that can be use in this framework so that local governments need to be careful in E-Government implementation, follow as shown in Fig. 3: Infrastructure, Security, Application Services, Policy, Knowledge Management, Human Organizational Factor, Privacy, and User Needs.
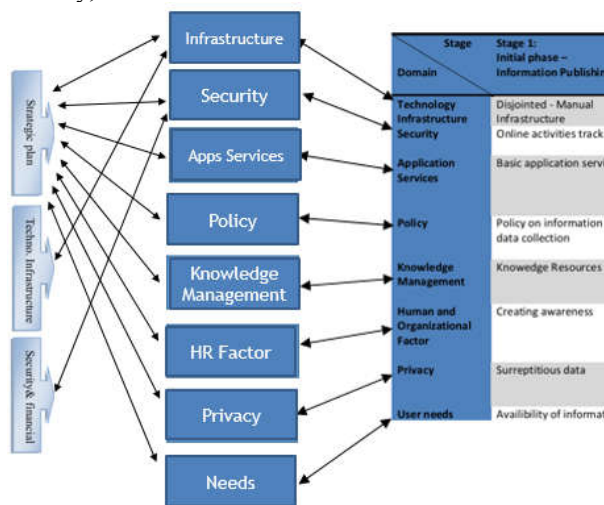

Fig. 3 Determination of Dimensions

Using Top-Down approach and focusing in "Customer Service" to determine COBIT processes that needs to be implemented in framework, here are the processes associated with customer-oriented service culture, this sorting results directly taken from the direction of COBIT 5 PAM [18], namely:

- EDM01 - Ensure Governance Framework Setting and Maintenance; EDM02 - Ensure Benefits Delivery; EDM05 - Ensure Stakeholder Transparency

- APO02 - Manage Strategy; APO08 - Manage Relationships; APO09 - Manage Service Agreements; APO10 - Manage Suppliers; APO11 - Manage Quality
- BAI02 - Manage Requirements Definition; BAI03 - Manage Solutions Identification and Build; BAI04 - Manage Availability and Capacity; BAI06 - Manage Changes
- DSS01 - Manage Operations; DSS02 - Manage Service Requests and Incidents; DSS03 - Manage Problems; DSS04 - Manage Continuity; DSS06 - Manage Business Process Controls
- MEA01 - Monitor, Evaluate and Assess Performance and Conformance

Judging from the contents of the process of defining its assessment, the results of the determination of the attributes of COBIT in the previous stage can be categorized into four general categories and 11 specific categories, namely: Plan (Guiding Principle Plan, Business Continuity Plan, and RACI), Monitoring (Monitoring, Operation, and Problem), Quality (Feedback and Solution), Improvement and Change (Information Gathering, Change, and Action).

Synthesizing all aspects that already defined before, here is the result:
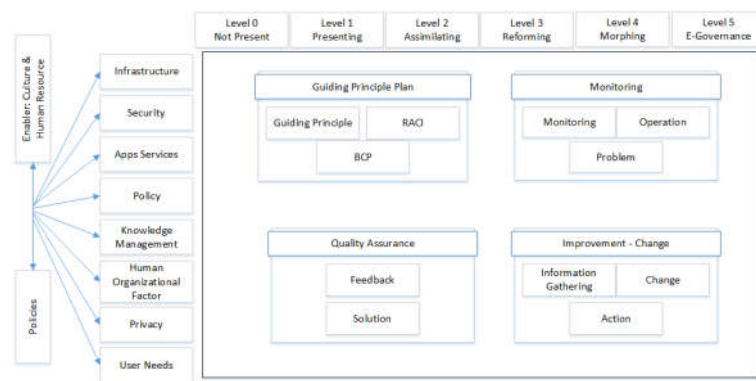

Fig. 4 E-Government Maturity Framework Model

D. Evaluation

Here is the evaluation based on PeGI 2014 and Maturity Framework, shown in Table 2.

TABLE 2
Result of PEGI 2014 and Maturity Framework

	Policy	Insti.	Infra.	Apps.	Plan
Depok PeGI	2.63	2.87	2.62	2.57	2.53
Depok MF	2.63	2.74	2.59	2.55	2.52
South Tangerang PeGI	1.00	1.33	1.10	1.43	1.47
South Tangerang MF	1.09	1.62	1.36	1.43	1.33

Based on experts judgement [15] [16] [19], there are several factors that make a different result in assessment, such as: 1) **Factors speakers**, an assessment of the final value assessment may differ due to inter opinion sources are not necessarily objective; 2) **The testing time factor**, if the

assessment carried out in time span far enough, the results are not necessarily the same; 3) **The variable factors are considered**, the difference between the assessed variables that can cause differences in outcome assessment final value; especially if it is checked to detail coma.

Though, in the end of explanation; if the results of PEGI is used like framework alone, then the value obtained is the same. Because of that, this framework has been declared valid.

V. CONCLUSIONS

Based on the analysis stage and the results obtained, we can conclude two things:

- In terms of analysis and design, obtained model of the E-Government maturity framework has six types of stages (Not Present, Presenting, Assimilating, Reforming, Morphing, E-Governance), eight types of dimensions (Infrastructure, Security, Apps Services, Policy, Knowledge Management, Organizational Human Factor, Privacy, User Needs), and the four main categories (Guiding Principle Plan, Monitoring, Quality Assurance, Improvement and Change) that has 69 sub-categories for the assessment process. From this model, to keep the entire existing processes, also required adjustments to government policy and do enabler of organizational culture and human resources.

- From the results of the testing and evaluation, in general the final results generated by the framework had a good level of alignment, in which the difference between the PEGI just different framework a few digits number behind comma alone (0.X). For the results of the evaluation framework, local government which had a good PEGI result, there are difficulties in documenting social issues and problems. For local governments with very low PEGI result, besides having constraints such as local governments who have good PEGI result, there are also common obstacles in the field of IT. These constraints such as lack of infrastructure, lack of capable human resources, low understanding of governance and IT management, as well as local governments are less able to understand how IT Master Plan is implemented.

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