COBIT 5 for Analysing Information Technology Governance Maturity Level on Masterplan E-Government

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***Abstract*— The information and communication technology development has increased to fulfil processes of an organization. It needs to be structured to create a clean, competent, evident and liable government and a quality and reliable civil service. With the existence of a system of electronic-based government system (SPBE), one of the regional governments that implemented SPBE is East Java Province by generating SPBE index value of 2.92. The SPBE value shows the SPBE implementation quality is still below the expected value, which is 3. By using COBIT 5 Framework, this research obtains levels of selected process capabilities, i.e. EDM05, APO01, APO04, APO06, are below 3rd level (Established). This research also gives recommendations for improving the level of the process capability.**

Keywords—COBIT 5, Electronic Based Government System (SPBE), IT Governance

I. INTRODUCTION

The Government in supporting the National development mission and implementing the national long-term development Plan (RPJP) program 2005 – 2025 is conducted through the development of State apparatus that embodies good Governance, improving the quality of government administration, and increasing community participation in the implementation of development. The revolution in information and communication technology (ICTs) made the Government innovate the development of the State apparatus through the application of an electronic-based government system (SPBE) or e-government. ICTs provides services to SPBE users with effective, efficient and sustainable processes [1], [2]. Also, Governance, through ICTs, aims to integrate various best practice to support Information Technology (IT) Business objectives in the organization.

IT Governance can help top-level leaders in decision making and improve other competitive advantages [3]. An existing research conducted an assessment on a system of electronic-based government system (SPBE) of Gorontalo [4]. The assessment implements on three domain, seven aspects, and thirty-five indicators that are noted in Peraturan Menteri Pendayagunaan Aparatur Negara dan Reformasi Birokrasi Republik Indonesia Nomor 5 Tahun 2018. Evaluations of those indicators use concept of maturity level, such as Process Assessment Model (PAM), Capability Maturity Model Integration (CMMI) or E-Government Maturity Models (EMM) [5]. The research of SPBE of Gorontalo [4] utilizes EMM.

This research conducts an analysis of SPBE for determining current and expected capability level. This research uses COBIT 5 [6]–[8] as the framework of analysis. The case study of this research is SPBE of East Java. Based on the index report of East Java SPBE [9], the existing SPBE index value is 2.92 [9], while the expected index value is 3 [9]. There are several steps of analysis by this research. First, this research identifies Enterprise Goals and IT Goals. After that, each IT objectives are mapped to each relevant IT process. Finally, this research does the measurement of Selected IT Process Capability Levels. Besides, this research also gives recommendations for improving the level of the process capability.

TABLE I. GRADE OF CAPABILITIES AND ATTRIBUTES

Grade	Zero Grade	First Grade	Second Grade	Third Grade	Fourth Grade	Fifth Grade
	Deficient processes	**Executed processes**	**Administered Processes**	**Built Processes**	**Certain Processes**	**Superlative Processes**
Process Attributes		P.A.1.1	P.A 2.1 P.A 2.2	P.A 3.1 P.A 3.2	P.A 4.1 P.A 4.2	P.A 5.1 P.A 5.2
Ability and attribute levels		Achievement of processes	Control of Achievement	Mission of Processes	Evaluation of Processes	Variation of Processes
			Product Control of Achievement	Distribution of Processes	Authority of Processes	Expansion of Processes

II. THEORITICAL CONSIDERATION

A. *Control Objectives for Information and Related Technology (COBIT)*

COBIT is a control framework of information technology that serves to establish IT alignment with businesses. Information Technology Governance Institute (ITGI) establishes COBIT. ITGI is a segment of Information Systems Audit and Control Association (ISACA). COBIT 5 [6]–[8], [10]–[12] is divided into two areas: governance and Management [3]. Governance area aims to evaluate the needs, conditions and prioritization of decision making. Governance control consists of evaluating, directing, and monitoring (EDM) processes. Then, management control includes aligning, planning, and organizing (APO), building, acquiring, and implementing (BAI), delivering, servicing and supporting (DSS), and monitoring, evaluating, and assessing (MEA) processes.

B. *Process Assessment Model*

PAM [13] gauges the level of implementation of IT Governance. PAM consists of several types. The first is achievement values of processes (denoted as capabilities processes). The achievement values commensurate with first grade until fifth grade. The second is applied performance values of processes. The performance attains first grade of capabilities. The grade of capabilities and attributes is mentioned in TABLE I.

TABLE II. DOMAINS, ASPECTS, AND RATING INDICATORS

Domains 1	**Private Protocol**
Aspect 1	**Private Protocol of SPBE Governance**
Indicator 1	Private Protocol of the SPBE Steering team of Government Agencies
Indicator 2	Private Protocol on Unified Business Process Variations
Indicator 3	Private Protocol SPBE Master Plan Government Agencies
Indicator 4	ICT Private Budget and Consumption Protocol
Indicator 5	Private Protocol for Data Center Actions
Indicator 6	Private Application System Integration Protocol
Indicator 7	Private Use Protocol General System for Giving
Aspect 2	**Private Protocol of SPBE Services**
Indicator 8	Private Protocol of Service Scenario Services
Indicator 9	Private Protocol on Personnel Management Services
Indicator 10	Private Policies of Budgeting
Indicator 11	Private Protocol of Economic Control Services
Indicator 12	Private Protocol of Achievement Control Services
Indicator 13	Private Acquisition Services Protocol
Indicator 14	Private Protocol on Society Charges Services
Indicator 15	Private Protocol on Report and Legitimate Info Services
Indicator 16	Private Blare Blasting Service Protocol
Indicator 17	Private Protocol Civil Services Government Agencies
Domain 2	**SPBE Governance**
Aspect 3	**Institutional**
Indicator 18	Steering Committee for SPBE Government Agencies
Indicator 19	Integrated Business Process Innovations
Aspect 4	**Strategy and Planning**
Indicator 20	SPBE Master Plans Government Agencies
Indicator 21	ICT Budget and Expenditures
Aspect 5	**Information and communication technology**
Indicator 22	Data Center Operations
Indicator 23	Application System Integration
Indicator 24	Utilization of Broad Giving System
Domain 3	**SPBE Services**
Aspect 6	**Electronic-based Government administration Services**
Indicator 25	Script Services
Indicator 26	Organization Control Services
Indicator 27	Outlining Control Services
Indicator 28	Apportion Control Services
Indicator 29	Economic Control Services
Indicator 30	Achievement Control Services
Indicator 31	Acquisition Services
Aspect 7	**Electronic-based Civil Services**
Indicator 32	Broad Charges Services
Indicator 33	Legitimate Report and Info Services
Indicator 34	Blare Blasting Services
Indicator 35	Civil Service Government Companies

C. *Electronic Based Government System (SPBE)*

SPBE is a government organizer that uses information and communication technology to provide the best service for all stakeholders who use IT Governance services. The fulfillment of SPBE is designed to create work processes that are clean, competent, evident and liable [14]. This assessment is carried out through three assessment structures, namely (1) Domain as the implementation area, (2) Aspect as the specific area of implementation, and (3) Indicator as specific information from the aspect of implementation assessed. The detail domains, aspects, and indicator are explained in TABLE II.

D. *Capability Maturity Model Integration (CMMI)*

CMMI [15] models increment of the software process 'maturity' within the organization to become more efficient and effective [16]. [16] sets the level of maturity for processes: initial, repeatable, defined, managed, and optimized. The maturity level of SPBE domain is shown in TABLE IV.

TABLE III. SCALE RATING: THE PROCESS ATTRIBUTE ACHIEVEMENT

Abbreviation	N (*Unachieved*)	P (*Limited Achieved*)	L (*Giant Achieved*)	F (*Entire Achieved*)
Description	This stage declares small or no confirmation of the achievement based on determined features in the evaluated processes.	This stage declares several confirmations of the achievement based on determined features in the evaluated processes. Those confirmations can be unanticipated.	This stage declares confirmations of systematic closeness case. It also declares an important achievement of features in the evaluated processes.	This stage declares confirmations of full and systematic suggestion, an also complete and excellent achievement grades based on features which are described in the evaluated processes.
Achieved %	0 – 15 %	>15 – 50 %	>50 – 85 %	>85 – 100 %

TABLE IV. MATURITY LEVEL ON SPBE GOVERNANCE DOMAINS

Level	Characteristics
1. Initial	The governance process is performed at any time, not well organized, without monitoring, and results are not predicted. Private policies are not yet available or still in draft form.
2. Repeatable	The governance process is implemented by the basic management that has been defined and documented, implemented according to the standards of each organizational unit. The Private Protocol has been legalized, but the setting is partial or sectoral.
3. Defined	The governance process is fully implemented with standardization by all related organizational units. The Private Protocol has set the standards of governance processes for all related organizational units but has not yet arranged alignment between governance processes.
4. Managed	The governance process is integrated with other governance processes and is measured by quantitative performance. The Private Protocol has set up the integration between governance processes and performance measurement mechanisms of the governance process.
5. Optimized	Governance process is implemented with continuous improvement of quality. Private policies have set up ongoing evaluation mechanisms and change management.

TABLE V. MATURITY LEVEL ON THE SPBE SERVICE DOMAIN

Level	Criteria
1.Information	Service provided in the form of one-way information.
2.Interaction	Services are provided in a bidirectional interaction form.
3.Transaction	The service is provided through information exchange and services.
4.Collaboration	Services provided through integration with other services
5.Optimization	Services can adapt to changing needs in Private and external environments

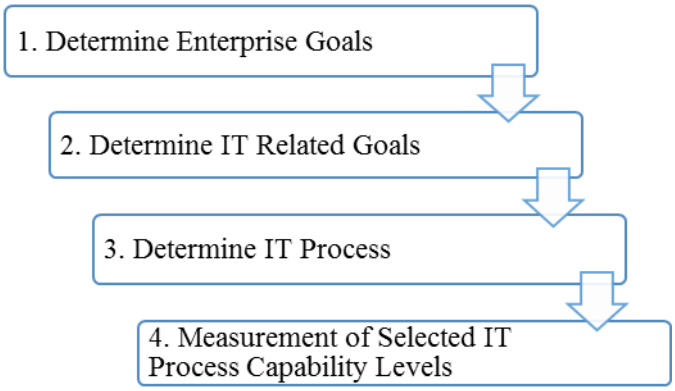

Fig. 1. Flow Research Method

E. E-Government Maturity Models

E-Government maturity model [17] is a model of maturity that measures the evolution of services in terms of functionality and technical capabilities. The maturity level of the technical function capability consists of five levels, namely information, interaction, transaction, collaboration, and optimization. The main purpose of this level of Maturity Model is to assess and provide a rating-based service provided [18]. Modelling E-Government Maturity Models consists of three parts:

1) Governmental models, which are established by governments, consultants, and academics to supervise companies in recognizing and enhancing the grade of their e-government maturity.
2) Comprehensive suggestion models, which are applied scheme of improved civil service activities to supervise the academic in recognizing e-government tasks success.
3) Transformative e-government, which focuses on the evolution of governance that uses successive steps, such as informative into optimization

The maturity level of SPBE service domain is described in TABLE V.

III. METHODOLGY

This research aims to conduct analysis of East Java SPBE Audit [9] to determine current and expected capability level. This Research method, which is depicted in Fig. 1, is structured systematically as a cornerstone of research framework:

1) Determine Enterprise Goal.

Performs *Enterprise Goals* mapping through the dimension *balance scorecard* which refers to the long-term development plan.

2) Determine IT Related Goals.
IT related Goals is the alignment of enterprise Goals into IT Related goals based on COBIT 5 mapping [19].

TABLE VI. ENTERPRISE GOALS AGAINST RPJMD

Balance Score Card	Enterprise Goals
Financial	Financial Transparency
Customer	Client – Adjust Service Civilization
	Business Service Constancy and Opportunity

TABLE VII. MAPPING IT-RELATED GOALS AGAINST IT-RELATED PROCESS COBIT 5

		Enterprise Goals		
		Financial Transparency	Client – Adjust Service Civilization	Business Service Constancy and Opportunity
IT Related Goals		5	6	7
1	Alignment of IT and business actions	S	P	S
5	Management of IT-related business exposure	S	P	S
6	Clarity of IT charge, assets, and exposure	S	S	P
7	Delivery of IT services correlation with business concerns	P	S	S
10	Security of information developing base and system	S	P	S

3) Determine IT *Process.*
To get the process on the COBIT domain, it is mapping each IT objective to each relevant IT process.

4) Measurement of Selected IT Process Capability Levels.
Maturity levels of each process related to the current governance conditions of East Java lead the selection of IT process measurement. Processes of rating capability grade is attained by looking at each achievement of the relevant processes. The process-level category is detailed in TABLE III.

The calculations of process assessment are described in Equation (1) and (2).

$$\textbf{PA level 1 = (WorkProduct + BasePractice) / 2} \quad (1)$$

$$\textbf{PA level 2 s.d. 5 = (GenericWorkProduct + GenericPractice) / 2} \quad (2)$$

where:

PA Level 1 : Process assessment level 1
PA level 2s/d 5 : Process assessment level 2 until level 5
Work Product: : Mean or average-calculated work product
Base practice: : Mean or average – Calculate base practice
Generic work Product : Mean – average count of work product
Generic Base Practice : Mean – Average calculated base practice

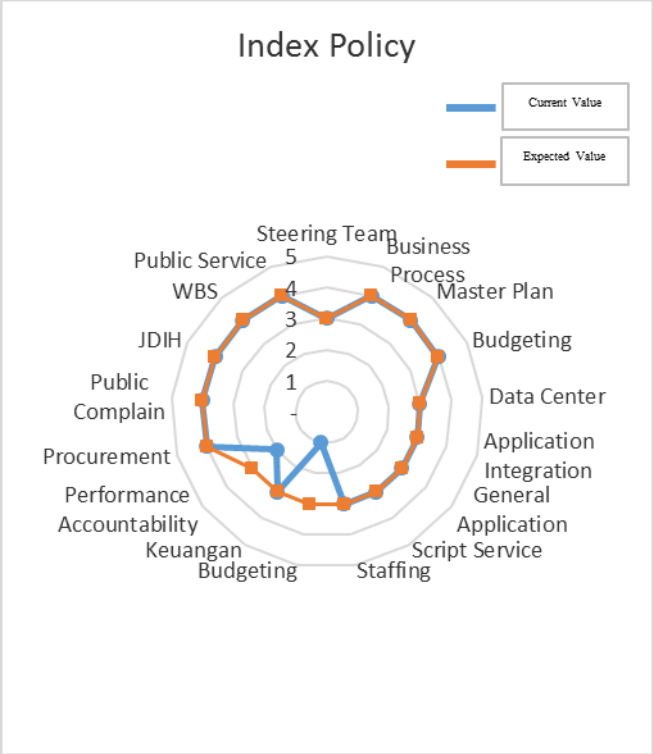

Fig. 2. Protocol index maturity value

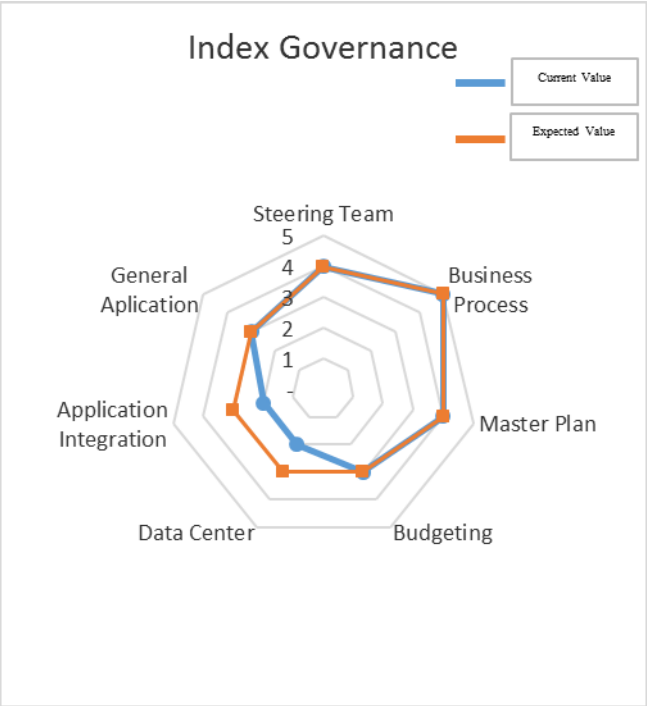

Fig. 3. Governance index maturity value

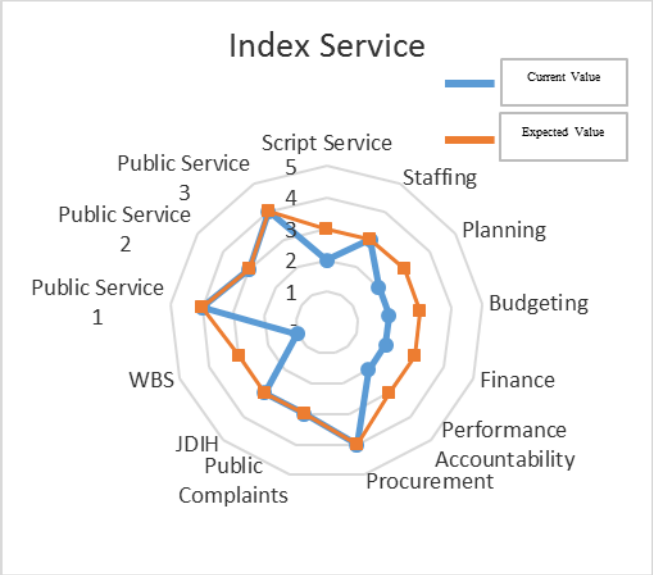

Fig. 4. Service index maturity value

IV. Analysis and Result

A. *Analysis*

The first step is to determine the *enterprise goals* based on the *Balance Score Card* of COBIT 5 against the East RPJMD of Java (can be seen in TABLE VI.). The second step is to define the destinates related to the IT (detailed in TABLE VII.). Maturity values of protocol index, governance index, and service index are shown in Fig. 2, Fig. 3, and Fig. 4. The blue lines indicate the current value by the

B. *Result*

There is a level of process capability that still resides at level 1. To increase the level of target capability at level 3. There are recommended process value improvements that can be performed.

1) *Level 2 Capability Improvement Measures*

To increase the level of capability at level 2 for processes that are still on Level 1, i.e. domain EDM05, APO01, APO04, APO06. Here Are the recommended improvements to reach Level 2:

a) The Private Protocol of planning and budgeting management services should be established by loading the needs and use of electronic planning and budgeting management services on all work units/regional devices in central/local government agencies.
b) The whistle Blowing System (WBS) service should be upgraded to a transaction service in which processes on the complaint service that supports the confidentiality of the reporter and implements the mechanism of action implemented automation such as downloading or Uploading information related to the complaint, and the system may respond to users reporting complaints about the transparency of the process flow and progress of the complaint.

2) *Level 3 Capability-Level Corrective Action*

To increase the level of capability at level 3 for processes that are still at level 2. Here are the recommended steps:

a) The Private Protocol of planning and budgeting management services should be equipped by loading the need for integration of planning and electronic budgeting management services with other SPBE services already available in central or local government agencies or electronic planning and budgeting management service integration between central or local governments and/or inter central agencies with local governments.
b) The Performance management Services Private Protocol should be supplemented by loading the needs of electronic performance management Services service settings electronically with other SPBE services already available in central or local government agencies or electronic performance management services integration between central and local government agencies and/or inter-agency with local governments.
c) Capacity planning, control, and monitoring of services from one or more data centers (data center) should be done periodically and centralized (single management).
d) Application system integration should be controlled, measured, monitored, and evaluated periodically based on the architecture and plan map of the SPBE master plan

V. CONCLUSION

The result of the level of maturity assessment of SPBE East Java for COBIT domain resulted in six domain processes, namely: EDM05, APO01, APO04, APO06. Furthermore, it is expected to increase the capability of all processes to become at level 3 (according to national standards).

Suggestions for further research are (1) this research still chooses that the selected process is based on the lowest value (under the value 3) on IT processes against the needs of information technology and business processes, and (2) the results of this research can be used as reference of East java as An evaluation of the process that still in the standard position.

ACKNOWLEDGMENT

The authors would like to sincerely thank Institut Teknologi Sepuluh Nopember, the Directorate of Higher Education, Indonesian Ministry of Education and Culture, and LPDP through RISPRO Invitation Program for funding the research.

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