Evaluation of IT Governance Based On Spbe Using Cobit 2019 And ISO/IEC 38500:2015

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Abstract – SPBE is a mandatory IT Governance framework implemented by all government agencies in Indonesia. The SPBE aims to achieve clean, effective, transparent, and accountable governance, to realize integration and efficiency in the implementation of e-government, thereby producing quality and trustworthy government services. Since its implementation in 2018, the national average maturity level remains very low, with the main obstacle being in the fundamental domain of IT Governance, as identified during the 2022 evaluations. The low maturity level of SPBE reflects the challenges of digital transformation still carried out in overlapping with many duplicated services, lack standardization in IT implementation and service quality. An evaluation was conducted on government agencies facing similar challenges using COBIT 2019 as the framework, providing the best practices and widely used standards for IT Governance. This was combined with the principles of ISO/IEC 38500:2015, an international standard for IT Governance. Through this combination, the research aims to identify the main obstacles in the IT governance domain in SPBE implementation and offer improvement recommendations from a different perspective. Maturity level measurements were taken to assess the current conditions of the agencies and provide improvement recommendations linked to indicators in the SPBE maturity level evaluation guidelines. The improvement recommendations provided were able to enhance maturity levels holistically, not only in the IT Governance domain but across the entire management processes and product services of the agencies, aiming to achieve sustainable benefits and objectives.

Keywords – IT Governance, SPBE, COBIT, ISO38500, Maturity Assessment.

I. INTRODUCTION

The Electronic Government System (‘Sistem Pemerintah Berbasis Elektronik’ / SPBE) is an Information Technology (IT) governance framework which mandatory for all government agencies in Indonesia. Established since 2018, SPBE frameworks elaborate on various Enterprise Architecture (EA) frameworks such as TOGAF, the Zachman Framework, resulting in integral IT management covering aspects like organizational strategy, business processes, service architecture, data and information architecture, application architecture, IT infrastructure architecture, and information security architecture within an organization. SPBE frameworks also serve as guidelines for the evaluation and maturity measurements of policy, governance, management, and services. However, there are numerous challenges in its implementation. According to the 2022 evaluation conducted, out of 558 government agencies, the average SPBE maturity level index is 2.32. The highest SPBE maturity level is 3.86 (Very Good/Defined), while two agencies still have a maturity level of 1.00 (Poor/Initial). A case study is conducted on the Tangerang Selatan City Government, which was previously ranked third in SPBE implementation in Indonesia in 2018. However, since 2019, the maturity level has been declining annually. According to the 2022 Evaluation Report, the Tangerang Selatan City Government has a maturity level of 2.54 (Sufficient/Repeatable).

Based on the aforementioned background issues, this research aims to identify the main obstacles in the IT governance domain in SPBE implementation and offer improvement recommendations, through combine the COBIT 2019 and ISO/IEC 38500:2015 frameworks

from a different perspective. The research will also simulate the impact of the improvement recommendations on the increase in SPBE maturity level.

II. SIGNIFICANCE OF THE STUDY

A. IT Governance

IT Governance is a framework used by organizations to direct, control, and manage their information technology resources. This concept aims to ensure that the use of information technology within an organization aligns with the strategic objectives and business values established. Through IT Governance, organizations ensure that IT strategies, decisions, and initiatives are directed in line with the organization's goals and business strategies, thus integrating IT applied in a synergistic manner with the organization's vision.

1. SPBE

The Indonesian Electronic Government System (‘Sistem Pemerintah Berbasis Elektronik’ / SPBE) is an IT Governance framework aimed at achieving clean, effective, transparent, and accountable governance, as well as improving quality and trustworthy government services. SPBE is a framework that ensures the regulation, direction, and control of integrated digital transformation implementation. In the SPBE frameworks, the SPBE Architecture (Enterprise Government Architecture) serves as a framework describing the integration of business processes, data and information, applications, IT infrastructure, and security in e-government implementation to produce integrated government services. The SPBE Architecture is developed using various Enterprise Architecture (EA) frameworks to plan, design, implement, and manage enterprise architecture comprehensively. EA frameworks like TOGAF and Zachman involve integral management of aspects such as business strategy, information technology architecture, data architecture, application architecture, infrastructure architecture, as well as organizational and business processes within an organization. In simple terms, EA Frameworks help to plan and develop IT implementation strategies in an effective, efficient, integrated, interoperable, sustainable, safe and accountable manner.

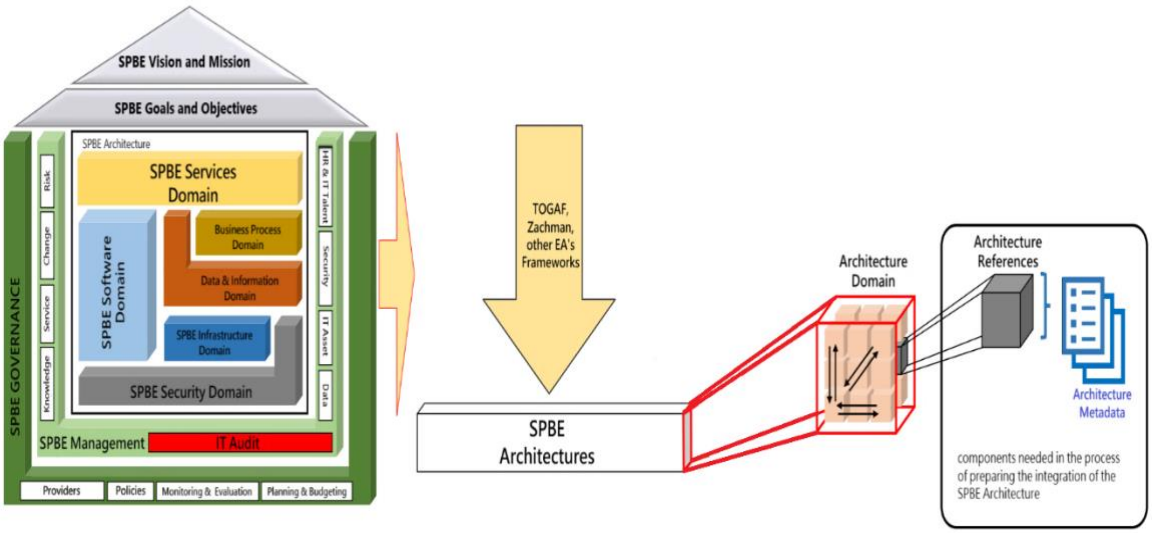

Figure 1. Framework SPBE

The Ministry of Administrative and Bureaucratic Reform of the Republic of Indonesia has issued Technical Guidelines for Monitoring and Evaluating SPBE, the guidelines consist of various instrument explanations for measuring the maturity level of SPBE frameworks, procedures and assessment rules, and assessor ethics in conducting Monitoring and Evaluation of SPBE in government agencies. The Assessment Structure for measuring the Maturity Level

in SPBE frameworks consists of 4 (four) domains, 8 (eight) aspects, and 47 (forty-seven) indicators. The Assessment Structure in Monitoring and Evaluating SPBE produces SPBE Evaluation Results Reports that measure the maturity level of SPBE implementation in an agency on a scale of 1-5. Maturity level refers to the organization's level of maturity in managing IT comprehensively, akin to the maturity level concept in frameworks such as COBIT (Control Objectives for Information and Related Technologies) or CMMI (Capability Maturity Model Integration).

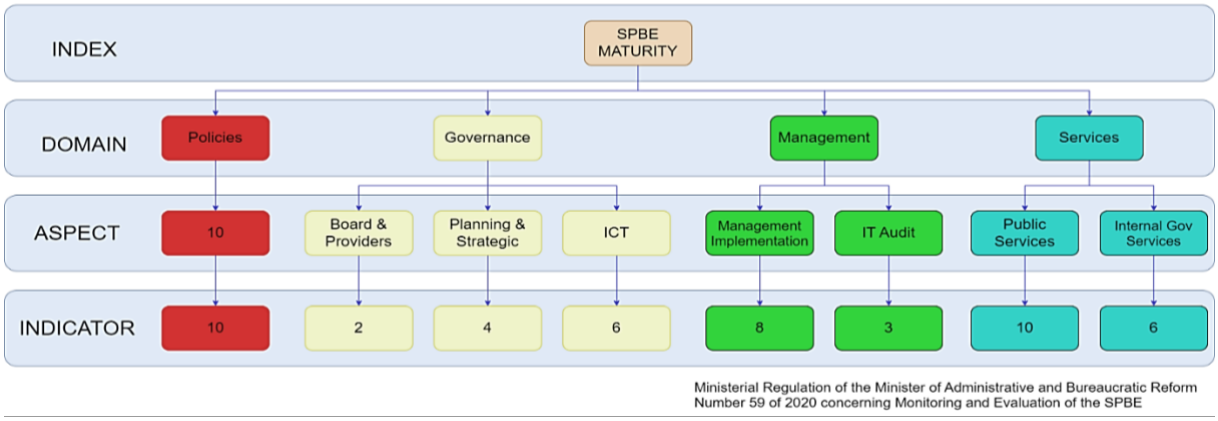

Figure 2. *Assessment Structure Frameworks SPBE*

Maturity levels are generally expressed on a scale of 1-5, where level 1 is the initial level or lack of maturity, and level 5 is the highest level or full maturity in managing IT comprehensively. The common maturity level classifications used in SPBE Frameworks are as follows:

1) Level 1 – Initial: The organization has no experience in implementing SPBE frameworks practices or may have just started developing IT architecture.
2) Level 2 – Repeatable: The organization has some experience in implementing practices and can consistently repeat these SPBE frameworks practices.
3) Level 3 – Defined: The organization has defined SPBE frameworks practices that can be consistently applied throughout the organization.
4) Level 4 – Managed: The organization can regularly measure and monitor the performance of SPBE frameworks practices and manage changes effectively.
5) Level 5 – Optimized: The organization continuously improves and optimizes SPBE frameworks practices to enhance effectiveness and efficiency.

However, since its implementation in 2018, in 2022 the Ministry of Administrative and Bureaucratic Reform of the Republic of Indonesia still found low maturity levels in the 558 government agencies that were evaluated. The national average maturity level index only reached 2.32, and there are still government agencies with a maturity level of 1.00. One of the main obstacles in implementing SPBE is in the IT Governance domain [10], besides other emerging challenges such as planning and budgeting issues, human resources, and IT infrastructure. This is also supported by the Gap Analysis in the 2022 SPBE Evaluation Results Report issued by the Ministry of Administrative and Bureaucratic Reform of the Republic of Indonesia, which shows that the achievement of the national average maturity level in the SPBE Governance domain is only 1.89. The previous Literature Review conducted on SPBE [2] aims to examine the development of various maturity level measurement concepts and to construct a conceptual map of these concepts in relation to SPBE. Analysis of service capability maturity is dominated by evaluations of public services in the government sector, and no one has ever evaluated SPBE governance.

2. COBIT 2019

In a literature review study on the development of IT Governance [8], an examination of previous research related to the development of IT governance evaluation was conducted to review research activities carried out during a certain period, analyze the frameworks used, and why those frameworks were used. From this Literature Review, it was found that IT governance reached its peak using the COBIT framework. The majority of reasons COBIT was chosen are because COBIT provides the best practices in IT governance and controls, which can help organizations optimize IT investments, ensure services are delivered properly, and provide metrics for assessment. COBIT is also used to align business goals with what is desired through the use of information technology. COBIT 2019 was developed by ISACA (Information Systems Audit and Control Association) as the latest version of COBIT, which has been introduced in several previous versions (COBIT 5). COBIT 2019 has four main domains as management objectives, which include Allign, Plan, and Organize (APO), Build, Acquire, and Implement (BAI), Deliver, Service, and Support (DSS), and Monitor, Evaluate, and Assess (MEA). Each domain has a specific set of processes and activities for managing information technology within an organization. COBIT 2019 represents a significant change from COBIT 5, with a more integrated approach, a focus on management principles, more comprehensive risk management, and a simpler domain structure.

In the COBIT 2019 framework, it can support the generation of Capability Maturity Model Integration (CMMI)-based measurement schemes called Capability Levels and Maturity Levels. Capability level refers to an organization's ability to implement specific IT governance practices. Meanwhile, maturity level is the measurement of the organization's maturity or capability in managing and implementing IT governance practices found in the COBIT framework. Each maturity level in COBIT 2019 has descriptions and criteria that organizations must meet to achieve that level. Higher maturity levels indicate that the organization has more mature and structured capabilities in managing IT according to the practices outlined in the COBIT 2019 framework.

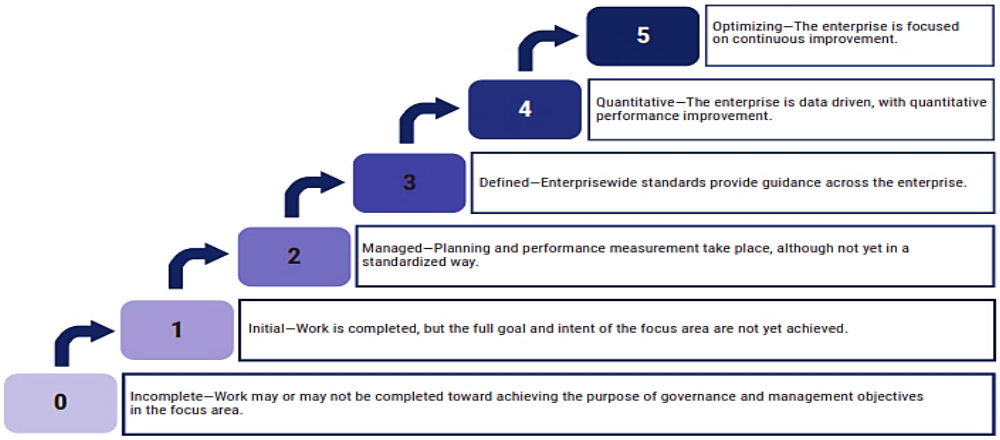

Figure 3. *Maturity Level COBIT 2019*

COBIT is also used in various other studies in Indonesia, including research that attempts to provide recommendations for improving the SPBE index value of the East Java Provincial Government using COBIT 5 [1]. In this IT governance evaluation, the selected process domains were EDM05, APO01, APO04, and APO06, although the basis for selecting process domains and their correlation with IT governance was not explained. It was found that there are still process capability levels at level 1. To increase the capability level to the target level of 3, recommendations for improving the value of these processes were provided. COBIT can also be combined with other frameworks such as ISO using various techniques/methods, as done in the studies [3], [4], [9]. In the previous study [3], an attempt was made to integrate ISO 38500,

which is an international standard for IT governance, with the COBIT framework through mapping ISO 38500 with COBIT's core processes. The mapping of ISO 38500 with COBIT's core processes in this study was used to determine the process domains, which also referred to previous studies [6], [7], which it turned out by combining COBIT 5 with ISO 38500:2008, although the process determination was based on identifying Business Goals & IT Goals. Another study [9] integrated COBIT 5 with ISO 38500 to evaluate IT governance in the Infrastructure and Communication Network Section at Diskominfo Tangerang Selatan, and provide considerations for determining or creating specific policies starting with a systematic data collection process. The evaluation results obtained a maturity level score of 2.35 for EDM04 and MEA01, with the target level desired being 3.00 based on interview results, and the maturity level gap was known to be 0.66. In addition to ISO 38500, there is also another study [4] that combines the COBIT 2019 Framework with ISO 27001:2013 to design recommendations and roadmaps for an ideal IT governance based on COBIT 2019 and ISO/IEC 27001:2013 regarding Information Security Management System (ISMS). Recommendations include organizational structure, human resource acquisition, processes, and activities in the form of policies and procedures to be fulfilled between 2021 and 2025. The determination of process domains in this study was mapped to COBIT 2019 Framework Governance and Management Objectives whose process domains have related guidance with ISO/IEC 27001:2013.

3. ISO/IEC 38500:2015

ISO/IEC 38500 is an international standard that addresses corporate governance in the use of information technology (IT). This standard was published by the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC) in 2008. ISO/IEC 38500 provides guidelines for effective corporate governance in the use of IT by organizations, both in the public and private sectors. The standard discusses principles, frameworks, and processes that organizations can use to manage information technology effectively to achieve organizational goals and provide optimal value.

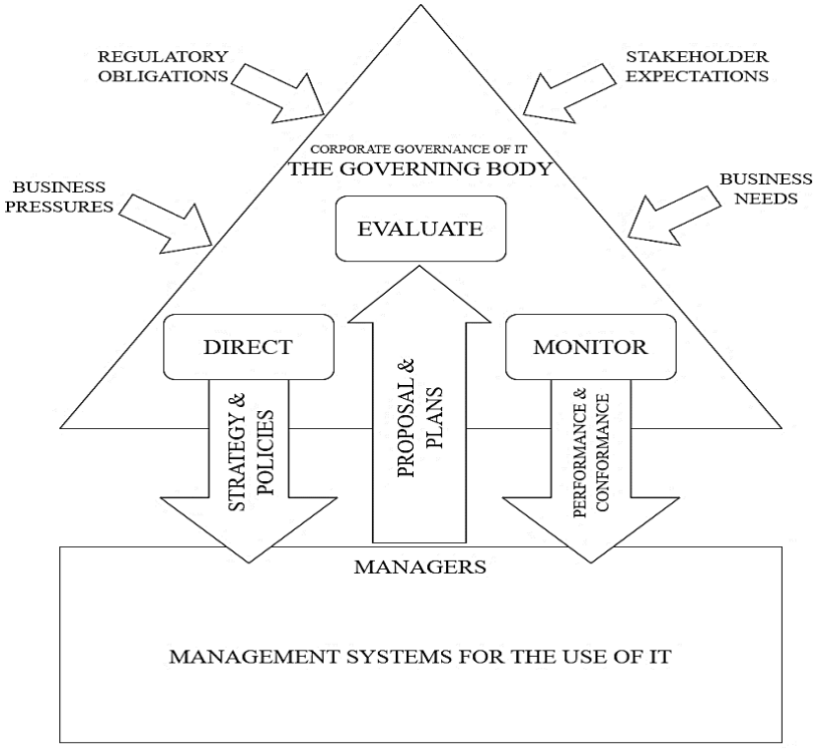

Figure 4. *ISO/IEC 38500:2015 Model*

The latest version of ISO/IEC 38500 is ISO/IEC 38500:2015, published in 2015. ISO/IEC 38500:2015 replaces the previous version and provides updated guidance for corporate governance in the use of information technology by organizations. ISO/IEC 38500:2015 can serve as a reference for organizations in developing and implementing effective corporate governance in the use of information technology, ensuring that IT is used optimally to achieve organizational goals and provide expected value. ISO/IEC 38500:2015 is a governance standard that provides principles based on a framework by supporting the effective, efficient, and appropriate use of IT in an organization, using six (6) principles and three (3) main models, thus serving as a support in providing recommendations based on the evaluation results to be conducted. The research previously conducted regarding the assessment of IT governance based on ISO 38500 [5] concluded that the implementation of IT governance in an organization should be evaluated to ensure compliance with ISO 38500. ISO 38500 is often combined with other frameworks such as COBIT [3], [9]. Evaluations using this method aim to assess and provide specific recommendations for improvement related to IT governance.

B. Research Methods

Based on various literature studies conducted in previous research, this study aims to address the IT Governance issues present in Indonesian government agencies that have implemented the SPBE framework, as identified with primary obstacles in the SPBE Governance domain [10]. The proposed approach for this research is to evaluate the IT Governance in a selected case study location that has implemented SPBE. This evaluation will be conducted using COBIT 2019, which is recognized as a best practice framework for IT Governance. Additionally, it will be combined with the international standard ISO 38500, utilized for assessing IT Governance.

The research methods regarding the evaluation of IT Governance in the development of e-government based on the SPBE framework using COBIT 2019 and ISO/IEC 38500:2015 frameworks that will be conducted in Tangerang Selatan City Government:

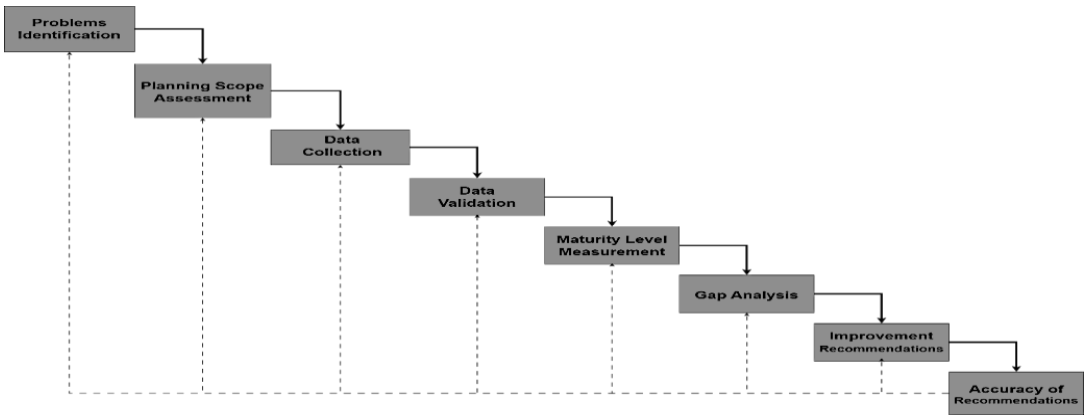

Figure 5. *Research Process*

Here is the explanation of the stages in this research process:

1) Problems Identification: This stage involves interviews and observations to understand the needs and urgency of the issues observed in the institution. It identifies general problems based on literature reviews and unique issues specific to the case study location. It's found that IT Governance in Indonesian Government requires the use of the SPBE Framework, and the majority of government institutions have low SPBE Maturity Levels, especially in the IT Governance domain. The main issue identified in the SPBE IT Governance domain is also observed in the case study location, Tangerang Selatan City Government, where the target Maturity Level is 3.5 according to Regional Medium-Term Development Plan (RPJMD) & Strategic Plan, but the current Maturity Level (as-is) is 2.54.

2) Planning Scope Assessment: Based on previous literature studies, this stage involves mapping the clause domain processes in the COBIT 2019 framework with the principles of ISO/IEC 38500:2015. This combination aims to evaluate and measure IT Governance maturity levels using COBIT 2019 supported by ISO/IEC 38500:2015 principles and implementation approaches, resulting in a focused and directed evaluation model. The mapping process is carried out by obtaining the process domain in guidelines published by ISACA 'COBIT 2019 framework's Governance and Management Objectives' which is have related to ISO/IEC 38500:2015, because COBIT 2019 has comprehensively included process domains that have relationships with other guidelines. The scope of the COBIT 2019 process domains that will choose to be evaluated are EDM01, EDM 02, EDM 04, and MEA01. This stage also involves creating a list of activity steps, scheduling evaluation activities, and defining expected outputs for each stage. Evaluation schedules are agreed upon based on the periods of IT Governance implementation documents for further processing.
3) Data Collection: This stage involves collecting data through interviews, questionnaires, and observations from officials or stakeholders involved in managing IT Governance and SPBE. Based on the process domain that has been determined based on the results of the COBIT 2019 and ISO/IEC 38500:2015 mapping above, the official who will be selected as the interviewees is determined based on the RACI Chart in COBIT 2019, therefore the Head of Communication and Informatics Agency has been chosen to act as the role of Chief Information Officer of Tangerang Selatan City Government. Data collection also includes gathering various documents such as regulations, policies, guidelines, evaluation/audit reports, and relevant data sources related to IT Governance implementation from Communication dan Informatics Agency of Tangerang Selatan City Government. All data from various departments has been collected and categorized neatly in the Communications and Informatics Agency, because the Tangerang Selatan City Government has implemented centralized IT management in the Communications and Informatics Agency, and has gone through the process of measuring the maturity level of SPBE implementation in 2022 from The Ministry of Administrative and Bureaucratic Reform of the Republic of Indonesia. The data that be obtained as material for evaluating and measuring maturity levels are all documents and implementation of IT Governance during 2023 (January 2023 – December 2023).
4) Data Validation: This stage aims to verify and validate the collected interview, questionnaire, and document data. It involves checking the accuracy and correctness of the data and documents, which are then summarized for maturity level measurement.
5) Maturity Level Measurement: This stage measures the maturity levels of IT Governance implementation based on the SPBE framework using the COBIT 2019 and ISO/IEC 38500:2015 frameworks, utilizing the term COBIT Performance Management (CPM) considered as the current as-is condition. The measurement of maturity level for a governance objective with COBIT CPM will be achieved only if all the required capability levels for the activities have been fully attained. Simply to reach the next capability level, you must have carried out all activities completely 100% and performed well at the previous capability level.
6) Gap Analysis: This stage aims to identify the gap between the maturity levels obtained in the current as-is condition and the expected to-be condition. The to-be condition also represents the desired state based on the RPJMD & Agency Strategic Plan for SPBE target Maturity Level.
7) Improvement Recommendations: In this stage, evaluation results and recommendations are presented based on the above data analysis. The evaluation results include maturity level values based on the COBIT 2019 and ISO/IEC 38500:2015 frameworks and the difference

in maturity level values between the SPBE framework and the COBIT 2019 and ISO/IEC 38500:2015 frameworks. Improvement recommendations are provided as evaluation and improvement materials for IT governance and management in Tangerang Selatan City Government.

8) Accuracy of Recommendations: In this stage, a re-measurement of the SPBE maturity level index post-improvement recommendations are conducted to determine whether there is an impact, such as an increase in the maturity level based on the COBIT 2019 & ISO/IEC 38500:2015 mapping. It assesses whether the evaluation and improvement recommendations provided can impact the increase in the SPBE maturity level.

III. RESULTS AND DISCUSSION

A. COBIT 2019 and ISO 38500:2015 Process Mapping

To obtain guidelines for evaluating the maturity level of IT implementation that are focused and directed at IT Governance, this combination aims to evaluate and measure the maturity level of IT Governance using COBIT 2019 which is supported by the principles and implementation approach of ISO/IEC 38500:2015. This process mapping is carried out by selecting the COBIT 2019 Governance Objectives & Domain Process which has guidance related to ISO/IEC 38500:2015, which contains in the COBIT 2019 framework Governance and Management Objectives. The selected COBIT 2019 Governance Objectives & Domain Process are as follows:

TABLE I
DOMAIN PROCESS MAPPING

Mapping COBIT 2019 & ISO/IEC 38500:2015			
COBIT 2019		**ISO/IEC 38500:2015**	
Governance / Management Objectives	**Domain Process**	**Principles**	**Tasks**
EDM01 — Ensured Governance Framework Setting and Maintenance	EDM01.01 Evaluate the governance system	Responsibility	Evaluate
	EDM01.02 Direct the governance system	Responsibility	Direct
	EDM01.03 Monitor the governance system	Responsibility	Monitor
EDM02 — Ensured Benefits Delivery	EDM02.02 Evaluate value optimization	Strategy	Evaluate
	EDM02.03 Direct value optimization	Strategy	Direct
	EDM02.04 Monitor value optimization	Strategy	Monitor
EDM04 — Ensured Resource Optimization	EDM04.01 Evaluate resource management	Acquisition	Evaluate
	EDM04.02 Direct resource management	Acquisition	Direct
	EDM04.03 Monitor resource management	Acquisition	Evaluate
MEA01 — Managed Performance and Conformance Monitoring	MEA01.01 Establish a monitoring approach	Performance Conformance	

B. Data Collection

The evaluation will be conducted by preparing questionnaires based on the activities in the EDM01, EDM02, EDM04, and MEA01 process domains, which will then be followed by interviews and document collection. Based on the RACI Chart, the selected process domains are the responsibility of the Chief Information Officer role. Therefore, interview responses will be obtained from the Head of the Communication and Informatics Agency, who acts as the Chief Information Officer in the Tangerang Selatan City Government. The questionnaire will be developed step by step based on the mapping of capability levels in the activities within the process domains as listed in Table I. The questionnaire responses will be rated using the following rating scale Not Achieved (N) which means there is little or no evidence achieved, 0-15%. Partially Achieved (P) which means there is only some evidence and achievement in assessing activities, greater than 15-50%. Largely Achieved (L) which means there is evidence

and achievement that has almost fulfilled the assessment of activities, greater than 50-85%. Fully Achieved (F) which means there is evidence and achievement that has fulfilled the assessment of activities, greater than 85-100%. Here are the results of filling out the questionnaire activities in the EDM01, EDM02, EDM04, and MEA01 process domains after conducting interviews and collecting documents from respondents:

TABLE II
RESULT OF DATA COLLECTION

Capability Level	Governance Objectives	Domain Process	Status
2	EDM01	EDM01.01	Achieved
		EDM01.02	Achieved
	EDM02	EDM02.02	Achieved
		EDM02.03	Not Achieve
	EDM04	EDM04.01	Not Achieve
		EDM04.02	Not Achieve
	MEA01.01	MEA01.01	Not Achieve
3	EDM01	EDM01.01	Achieved
		EDM01.02	Achieved
		EDM01.03	Achieved
4	EDM01	EDM01.03	Not Achieve

From this interview process, it is also understood that the expected maturity level (to-be), besides the target SPBE index value of 3.5 in 2024, and the expected maturity level (to-be) from the evaluation process using this method should be at least level 3 (Defined). This is to ensure that the organization has well-defined IT governance and business processes, documented implementation, and consistent application throughout the organization. Ultimately, the maturity level using this method should support the maturity level in SPBE implementation.

C. Data Validation

After completing the questionnaire based on interviews with activities in the process domains as shown in Table II, the next step will involve validating the responses from the interviewees with the availability of documentary evidence, and mapping back the selected domains of EDM01, EDM02, EDM04, and MEA01 in COBIT 2019 with the indicators available in the SPBE maturity level measurement guidelines. This is aimed at identifying which SPBE documents or evidence will be impacted by the activities in the COBIT 2019 process domains. Here are the results of mapping the EDM01, EDM02, EDM04, and MEA01 process domains in COBIT 2019 related to the maturity level measurement indicators in SPBE:

TABEL III
MAPPING DOMAIN PROCESS & SPBE

Mapping COBIT 2019 & SPBE			
COBIT 2019		**SPBE**	
Governance / Management Objectives	Domain Process	Governance Indicators	**Related Indicators**
EDM01 — Ensured Governance Framework Setting and Maintenance	EDM01.01 Evaluate the governance system EDM01.02 Direct the governance system	IT Governance: 11. IT Architecture 12. IT Roadmap 13. IT Plan & Budget 14. Innovation Governance 15. Application Development Governance 16. Data Center Governance 17. Network Governance	Internal Control: 29. IT Infrastructure Audit 30. Application Audit 31. Information Security Audit Regulatory: 1. IT Architecture Regulations 2. IT Roadmap Regulations 3. Data Management Regulations

Mapping COBIT 2019 & SPBE			
COBIT 2019		**SPBE**	
Governance / Management Objectives	Domain Process	Governance Indicators	**Related Indicators**
		18. Service Integration System Governance 19. IT Coordination Team / IT Board 20. IT Implementation Collaboration	4. Application Development Regulations 5. Data Center Regulations 6. IT Network Regulations 7. Service Integration System Regulations 8. Information Security Regulations 9. IT Audit Regulations 10. IT Board Regulations
	EDM01.03 Monitor the governance system		
EDM02 — Ensured Benefits Delivery	EDM02.02 Evaluate value optimization EDM02.03 Direct value optimization EDM02.04 Monitor value optimization	IT Governance: 11. IT Architecture 12. IT Roadmap 13. IT Plan & Budget 14. Innovation Governance 15. Application Development Governance 16. Data Center Governance 17. Network Governance 18. Service Integration System Governance 19. IT Coordination Team / IT Board 20. IT Implementation Collaboration	Internal Control: 29. IT Infrastructure Audit 30. Application Audit 31. Information Security Audit Management: 28. Management IT Services & Portofolio
EDM04 — Ensured Resource Optimization	EDM04.01 Evaluate resource management EDM04.02 Direct resource management EDM04.03 Monitor resource management	IT Governance: 11. IT Architecture 12. IT Roadmap 13. IT Plan & Budget 14. Innovation Governance 15. Application Development Governance 16. Data Center Governance 17. Network Governance 18. Service Integration System Governance 19. IT Coordination Team / IT Board 20. IT Implementation Collaboration	Management: 25. Human Resource Management Internal Control: 29. IT Infrastructure Audit 30. Application Audit 31. Information Security Audit Management: 25. Human Resource Management
MEA01 — Managed Performance and Conformance Monitoring	MEA01.01 Establish a monitoring approach	IT Governance: 11. IT Architecture 12. IT Roadmap 13. IT Plan & Budget 14. Innovation Governance 15. Application Development Governance 16. Data Center Governance 17. Network Governance	Management: 27. IT Change Management

Mapping COBIT 2019 & SPBE			
COBIT 2019		**SPBE**	
Governance / Management Objectives	Domain Process	Governance Indicators	**Related Indicators**
		18. Service Integration System Governance 19. IT Coordination Team / IT Board 20. IT Implementation Collaboration	

D. Maturity Level Measurement & Gap Analysis

Based on the data and evidence collected in Table II, a step-by-step check of the achievement of capability levels for each activity within the process domain is conducted to determine the maturity level of a governance objective. Simply put, COBIT 2019 uses the term COBIT Performance Management (CPM), so the maturity level of a governance objective will be achieved only if all the required capability levels for the activities have been fully attained. Here are the maturity level achievements for the process domains EDM01, EDM02, EDM04, and MEA01:

TABEL IV
MATURITY LEVEL SELECTED DOMAIN PROCESS

Capability Level	Activity Domain Proses	Activity Count	Activity Accomplished	Activity Achievements (%)	Maturity Level Reached	Maturity Level Predicate
2	EDM01 — Ensured Governance Framework Setting and Maintenance	7	7	100.00%	**2**	**Managed**
	EDM02 — Ensured Benefits Delivery	2	1	50.00%	**1**	**Initial**
	EDM04 — Ensured Resource Optimization	6	1	16.67%	**1**	**Initial**
	MEA01 — Managed Performance and Conformance Monitoring	5	3	60.00%	**1**	**Initial**
3	EDM01 — Ensured Governance Framework Setting and Maintenance	9	9	100.00%	**3**	**Defined**

From the information in Table IV, it is observed that in EDM01, all activities at capability level 2 (7 activities) and all activities at capability level 3 (9 activities) have been fully achieved, but only 1 out of 5 available activities has been accomplished. Hence, EDM01 has attained maturity level 3 (Defined). However, in other process domains like EDM02, only 1 out of 2 activities at capability level 2 has been achieved, EDM04 has achieved only 1 out of 6 activities at capability level 2, and MEA01 has achieved only 3 out of 5 activities at capability level 2. Consequently, the maturity level for the EDM02, EDM04, and MEA01 process domains remains at level 1 (Initial). After knowing what the maturity level as-is, here is the gap analysis:

TABEL V
GAP ANALYSIS

Domain Process Governance Objectives	as-is	to-be	gap
EDM01 — Ensured Governance Framework Setting and Maintenance	3	3	**0**
EDM02 — Ensured Benefits Delivery	1	3	**-2**

EDM04 — Ensured Resource Optimization	1	3	**-2**
MEA01 — Managed Performance and Conformance Monitoring	1	3	**-2**
Maturity Total	**1.50**	**3.00**	**(1.50)**

From the information gathered in Table V above, it is evident that the overall Maturity Level achieved by the Tangerang Selatan City Government in the as-is condition in 2023, after implementing the SPBE framework and conducting IT Governance evaluation using a combination of COBIT2019 with domain process determination based on related guides from ISO/IEC 38500:2015, is only 1.50. With the desired to-be condition valued at 3.00, there is a noticeable gap analysis of 1.50. This situation reflects the existence of obstacles in the IT Governance domain within the implementation of SPBE.

E. Improvement Recomendations

Based on the findings from Table IV and the gap analysis conducted in Table V, there are several recommendations for improvement and enhancement that can be implemented to increase the maturity level in the evaluated domain processes. These recommendations aim to not only improve the maturity level of the IT Governance but also to enhance the overall SPBE maturity level as shown in Table III. By effectively implementing these recommendations, it is hoped that the organization can achieve the desired maturity level of 3, which will support the strategic goals of the organization in enhancing the SPBE maturity index and providing optimal value-added. Here are some recommendations based on the best practices of COBIT 2019 governance objectives and the principles of ISO/IEC 38500:

1) Restructure the governance framework already in place considering the principles outlined in ISO/IEC 38500, such as responsibility, strategy, acquisition, performance, and conformance. Documents output could include IT Architecture, IT Roadmap, IT Plan & Budget, Innovation Governance, Application Development Governance, Data Center Governance, Network Governance, Service Integration System Governance, IT Coordination Team / IT Board, and IT Implementation Collaboration. All IT Governance & Management documents should be established as regulations or policies binding to all stakeholders, serving as guidelines in evaluation and control, and maintaining the sustainability of IT Governance & Management.
2) Identify and define clear roles and responsibilities for each stakeholder in the organization, following governance principles in the IT Coordination Team / IT Board established in the IT Board Regulations.
3) Redefine the evaluation, supervision, and regulation processes to ensure consistency and sustainability in the governance framework application. Having IT Audit Regulations available can serve as guidelines in conducting IT Infrastructure Audit, Application Audit, and Information Security Audit.
4) Enhance understanding of the value generated by IT investments and ensure that investment-related decisions are based on expected benefits listed in IT Architecture & IT Roadmap.
5) Develop a clear and measurable IT roadmap for optimal IT benefit delivery and as a reference in preparing IT Budget & Plan, considering changes in business and technology needs.
6) Set clear criteria for assessing and measuring business values generated by IT, and manage IT Services & Portfolio to continuously optimize the use of various resources to achieve & enhance various benefits.
7) Strengthen the evaluation and supervision processes of IT resource management, including human, financial, application, infrastructure, and information security.

8) Establish clear policies and procedures for the allocation and utilization of IT resources effectively and efficiently, considering the principles contained in ISO/IEC 38500.
9) Enhance transparency and accountability in resource management, ensuring that resource-related decision-making is based on organizational needs and priorities listed in IT Architecture & IT Roadmap.
10) Strengthen performance and compliance monitoring processes against applicable standards, regulations, and policies, considering the principles in ISO/IEC 38500.
11) Establish measurable key performance indicators (KPIs) related to organizational business and IT goals, and implement an effective reporting system to monitor performance.
12) Develop feedback mechanisms and reporting that allow for continuous adjustment and improvement in performance and compliance management.

F. Accuracy of Recommendations

In this final stage, a simulation is conducted to measure the SPBE maturity level that can be achieved by implementing various improvement recommendations based on the best practice governance objectives in COBIT 2019 and the principles in ISO/IEC 38500, while also considering the activities of domain processes in EDM01, EDM02, EDM04, and MEA01 that are related to the indicators of maturity level evaluation guidelines in SPBE. With the provided improvement recommendations, the IT Governance & IT Regulations domain will increase to maturity level 3, and it will also enhance the management objectives and service portfolios, which already have maturity levels 3 & 4 due to the implementation of evaluations / controls and follow-up on improvement recommendations.

This simulation plays a crucial role in convincing the Head of the Department of Communication and Informatics, acting as the Chief Information Officer in the Tangerang Selatan City Government, to promptly implement the provided improvement recommendations. The following is the simulation of the SPBE maturity level (to-be) that can be achieved by implementing the improvement recommendations:

TABEL VI
SIMULATION OF TO-BE MATURITY LEVEL SPBE

SIMULATION OF SPBE MATURITY INDEX VALUE	SPBE (as-is) 2.54 (SUFFICIENT)	SPBE (to-be) 3.60 (VERY GOOD)
SPBE Policy & Regulations Domain	**1.8**	**3**
Internal Policies related to SPBE Governance	1.8	3
SPBE Governance Domain	**2.4**	**3.7**
SPBE Strategic Planning	1	3
Information Technology Governance	3.5	4.25
SPBE Organizer	3	4
SPBE Management Domain	**1.00**	**2.09**
Implementation of SPBE Management	1	1.75
ICT Audit	1	3
SPBE Services Domain	**3.38**	**4.25**
Electronic Based Government Administration Services	3.3	4.2
Electronic Based Public Services	3.5	4.33

IV. CONCLUSION

This research focuses on evaluating IT Governance practices implemented using the SPBE framework in government institutions in Indonesia. The evaluation is conducted using the COBIT 2019 framework, with domain process determination based on the mapping of COBIT 2019 Governance Objectives & Domain Process, which has guidance related to ISO/IEC 38500:2015. From this research, it is evident that conducting evaluations and implementing improvement recommendations for IT governance using COBIT 2019, with domain process determination based on related guides correlated with ISO/IEC 38500:2015, is crucial to ensuring that institutions can manage information technology effectively and efficiently

according to international standards and industry best practices. COBIT 2019 and ISO/IEC 38500:2015 provide recommendations on the importance of the IT Governance evaluation, direct and monitoring process in order to align and integrate IT implementation in an agency, so that it is able to achieve the expected targets.

Through routine evaluations, leaders can understand the maturity level of IT within the organization and identify areas that require improvement, especially in the process domain EDM02 - Ensured Benefits Delivery, EDM04 - Ensured Resource Optimization & MEA01 - Managed Performance and Conformance Monitoring. Implementing improvement recommendations resulting from these evaluations will assist organizations in enhancing resource management, optimizing the benefits of IT investments, improving performance oversight, and ensuring compliance with applicable standards and regulations. Crucial role in convincing the Head of the Department of Communication and Informatics, acting as the Chief Information Officer in the Tangerang Selatan City Government, to promptly implement the provided above improvement recommendations. Consequently, organizations can achieve better governance, enhance operational efficiency, and reduce risks associated with IT management, thereby supporting business goals and long-term growth.

Ultimately, the entire process outlined above can help institutions achieve organizational / enterprise goals to optimize and sustain SPBE implementation. By addressing barriers in the IT Governance domain, it can holistically impact other SPBE domains, thereby enhancing SPBE maturity levels as desired. Based on simulation of the SPBE maturity level (to-be) that can be achieved by implementing this improvement recommendations is 3.60 (Very Good). The improvements not only in the SPBE Governance domain as target of evaluation, but there are also improvements that have an impact on the SPBE Management domains and SPBE Service domains.

REFERENCE

[1] Rizal, Rahmat Awaludin, Riyanarto Sarno, and Kelly Rossa Sungkono. *COBIT 5 for analysing information technology governance maturity level on masterplan E-Government*. In: 2020 International Seminar on Application for Technology of Information and Communication (iSemantic). IEEE, 2020. p. 517-522.

[2] Santoso, Irfan Budi, Rudy Hartanto, and Lukito Edi Nugroho. *Acceleration of Integrated Electronic-Based Government System in Indonesia with the Maturity Model of Electronic-Based Government System: A Systematic Literature Review*. In: 2021 IEEE 5th International Conference on Information Technology, Information Systems and Electrical Engineering (ICITISEE). IEEE, 2021. p. 12-17.

[3] Visitsilp, Busarin, and Nalinpat Bhumpenpein. *Guidelines for Information Technology Governance Based on Integrated ISO 38500 and COBIT 2019*. In: 2021 Research, Invention, and Innovation Congress: Innovation Electricals and Electronics (RI2C). IEEE, 2021. p. 14-18.

[4] Yasin, Muhammad, et al. *Designing information security governance recommendations and roadmap using COBIT 2019 Framework and ISO 27001: 2013 (Case Study Ditreskrimsus Polda XYZ).* In: 2020 14th International Conference on Telecommunication Systems, Services, and Applications (TSSA. IEEE, 2020. p. 1-5.

[5] Putri, Rahmi Eka, and Kridanto Surendro. *A process capability assessment model of IT governance based on ISO 38500.* In: *2015* International Conference on Information Technology Systems and Innovation (ICITSI). IEEE, 2015. p. 1-6.

[6] Nugroho, Heru, and Kridanto Surendro. *Proposed model of vocational university governance and measurement model by utilizing the ISO 38500 framework and COBIT 5 enabler.* In: International Conference on ICT for Smart Society. IEEE, 2013. p. 1-5.

[7] Widjajanto, Budi, Dewi Agustini Santoso, and Nova Riiati. *Alignment model of quality assurance system of higher education and performance measurement based on on framework cobit 5*. In: 2018 International Seminar on Application for Technology of Information and Communication. IEEE, 2018. p. 207-213.
[8] Khansa, Shafa Salsabila, et al. Perkembangan Evaluasi Tata Kelola Teknologi Informasi: Literature Review. *Journal of Computer Science and Engineering (JCSE)*, 2022, 3.2: 95-106.
[9] Toifur, Tubagus, Kusrini Kusrini, and Agung Budi. Evaluation of Information Technology Governance Using COBIT 5 and ISO/IEC 38500. *Jurnal Online Informatika*, 2022, 7.1: 17-27.
[10] Hartanto, Rudy, and Silmi Fauziati. Hambatan-Hambatan Dalam Implementasi Layanan Sistem Pemerintahan Berbasis Elektronik (SPBE) Pada Pemerintah Daerah. *JIKO (Jurnal Informatika dan Komputer)*, 2022, 5.3: 215-223.
[11] Aywandari, Trahtandwina Lina, Soni Fajar Surya Gumilang, and Ryan Adhitya Nugraha. Enterprise Architecture Sistem Pemerintahan Berbasis Elektronik (SPBE) Pada Domain Infrastruktur Di Lingkungan Kabupaten Kuningan. *eProceedings of Engineering*, 2021, 8.5.
[12] Ardima, Muhammad Basyier, Rahmat Gernowo, and Vincencius Gunawan Slamet. Pengukuran tingkat kapabilitas sistem tata kelola TI menggunakan COBIT 5 dengan ISO 38500. *Jurnal Teknologi Informasi dan Ilmu Komputer (JTIIK)*, 2020, 7.3.
[13] Wawondatu, Allen Roy Stevenson, and S. Adelia. Penggabungan Klausul dari Framework ISO/IEC 20000 dan COBIT 5.0 DSS06 dalam Analisis Layanan Teknologi Informasi di Universitas X. *Jurnal STRATEGI-Jurnal Maranatha*, 2020, 2.2: 484-496.
[14] Sukarsa, I. Made, et al. Evaluation of E-government maturity models in sub-district public services in Indonesia using the SPBE framework. *Jurnal RESTI (Rekayasa Sistem dan Teknologi Informasi)*, 2020, 4.2: 243-253.
[15] Marthaningrum, Hetti, Admaja Dwi Herlambang, and Widhy Hayuhardhika Nugraha Putra. Evaluasi Pengelolaan Strategi dan Kerangka Kerja Teknologi Informasi pada Dinas Komunikasi dan Informatika Kota Malang Menggunakan COBIT 5. *Jurnal Pengembangan Teknologi Informasi dan Ilmu Komputer*, 2019, 3.10: 9508-9517.
[16] Artana, Ida Bagus Yoga, et al. Evaluasi tata kelola teknologi informasi pada kantor pertanahan xyz. *Jurnal Ilmiah Teknologi dan Komputer*, 2.1: 319-330.
[17] Ningsih, Suhartini Setia. Evaluasi tata kelola Teknologi Informasi (TI) pada pengembangan aplikasi dan data menggunakan framework cobit 5 dan ISO/IEC 38500 (studi kasus: Dinas Komunikasi Dan Informatika (DISKOMINFO) Kabupaten Bogor). Bachelor's Thesis. Jakarta & Fakultas Sains dan Teknologi Universitas Islam Negeri Syarif Hidayatullah Jakarta; 2021.
[18] Schekkerman, Jaap. How to survive in the jungle of enterprise architecture frameworks: Creating or choosing an enterprise architecture framework. Second Edition. Canada: Trafford Publishing, 2004.
[19] Sugiyono. Metode Penelitian Bisnis (Pendekatan Kuantitatif, Kualitatif, dan R&D). Edisi 3. Bandung: Alfabeta. 2018.
[20] Information Systems Audit and Control Association. COBIT 2019 Framework: Introduction and Methodology. United States: ISACA. (2018).
[21] ISO (International Organization for Standardization), Information technology — Governance of IT for the Organization.Switzerland: ISO/ IEC 38500:2015.
[22] President of the Republic of Indonesia. Presidential Regulation of the Republic of Indonesia Number 95 of 2018 concerning the Electronic-Based Government System. 2018.

[23] President of the Republic of Indonesia. Presidential Regulation of the Republic of Indonesia Number 132 of 2022 concerning the Architecture of the Electronic-Based Government System. 2022.
[24] Minister of Administrative and Bureaucratic Reform. Ministerial Regulation of the Minister of Administrative and Bureaucratic Reform Number 59 of 2020 concerning Monitoring and Evaluation of the Electronic-Based Government System. 2020.
[25] Minister of Administrative and Bureaucratic Reform. Ministerial Guidelines of the Minister of Administrative and Bureaucratic Reform Number 6 of 2023 concerning the Procedures for Monitoring and Evaluation of the Electronic-Based Government System. 2023.

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