Information Technology Governance Analysis Using COBIT 5 Framework

(Case Study : PLANT Division PT Pamapersada Nusantara)

Kelvin Kurniawan [#1], Kusuma Adi Achmad [#2], Satria Akbar Mugitama [#3]

Department of Information Technology, Telkom University
Jl. Telekomunikasi Terusan Buah Batu, Bandung, West Java, Indonesia

[1] kelvinkurniawan@student.telkomuniversity.ac.id
[2] adikusuma@telkomuniversity.ac.id
[3] satriamugitama@telkomuniversity.ac.id

Abstract

PT Pamapersada Nusantara (PAMA), a subsidiary of PT United Tractors Tbk, has several divisions, including the PLANT Division which is the focus of this research. This division is responsible for planning equipment maintenance based on equipment operating hour intervals recommended by the manufacturer or internal company policies. To improve performance, an IT system was created for employees. To ensure better application development and align with the company's objectives, an analysis was carried out using the COBIT 5 framework method, with a focus on the MEA01 (Monitor, Evaluate, Assess Performance and Conformance) domain. The authors used observation and interviews to gather accurate data. The results of the IT governance analysis and recommendations to optimize the information system were based on COBIT 5 framework standards. The average results obtained are level 3 for the current condition and level 4 for the expected condition. The recommendation of this study is for companies to implement regular monitoring SOPs for their existing IT management and governance.

Keywords: IT Governance, COBIT 5, MEA01 Domain, PAMA, PLANT Division

Abstrak

PT Pamapersada Nusantara (PAMA), anak perusahaan dari PT United Tractors Tbk, memiliki beberapa divisi, termasuk Divisi PLANT yang menjadi fokus penelitian ini. Divisi ini bertanggung jawab untuk merencanakan perawatan peralatan berdasarkan interval waktu operasi peralatan yang dianjurkan oleh produsen atau kebijakan internal perusahaan. Untuk meningkatkan kinerja, sebuah sistem teknologi informasi dibuat untuk karyawan. Untuk memastikan pengembangan aplikasi yang lebih baik dan sejalan dengan tujuan perusahaan, analisis dilakukan menggunakan metode COBIT 5 framework, dengan fokus pada domain MEA01 (Monitor, Evaluasi, Tinjau Kinerja dan Konformitas). Peneliti menggunakan observasi dan wawancara untuk mengumpulkan data yang akurat. Hasil analisis tata kelola teknologi informasi dan rekomendasi untuk mengoptimalkan sistem informasi didasarkan pada standar COBIT 5 framework. Hasil rata-rata yang diperoleh adalah tingkat 3 untuk kondisi saat ini dan tingkat 4 untuk kondisi yang diharapkan. Rekomendasi dari studi ini adalah bagi perusahaan untuk melakukan pemantauan SOP reguler untuk manajemen dan tata kelola teknologi informasi yang ada.

Kata Kunci: Tata Kelola TI, COBIT 5, Domain MEA01, PAMA, PLANT Division

I.   Introduction

THE development and advancement of the Information Technology (IT) sector has become an important factor in organizations. IT plays a crucial role for large companies in supporting their business operations. The use of IT can increase a company's value. To ensure the success of IT investment, it's crucial to measure its effectiveness and efficiency in the organization [1].

The widespread implementation of successful information technology governance has been adopted by companies to support their business operations and to motivate entrepreneurs to grow their businesses. This is aimed at enhancing the quality of information technology in order to meet the goals of the company.

Information technology governance has been widely adopted by companies to support their business activities and improve the quality of their IT systems. There are several frameworks to assess the success indicators, including Information Technology Infrastructure Library (ITIL), Capability Maturity Model Integration (CMMI), International Standard Organization (ISO), The Open Group Architecture Framework (TOGAF), and Control Objectives for Information and Related Technology (COBIT). In this study, COBIT 5 was chosen as the framework because it provides a comprehensive approach to IT control and management.

ITIL describes best practices in IT Services Management, ranging from strategy building to continuous service improvement [2]. CMMI is aimed at assessing and improving organizational processes in the development, operation, and maintenance of information systems and software products [3]. ISO develops standards to help organizations achieve sustainable development, such as the ISO 14000 standard [4]. The Open Group Architecture Framework (TOGAF) provides a comprehensive approach to designing, planning, implementing, and governing enterprise information architectures [5]. COBIT 5 enables organizations to develop systems and procedures for effective IT control and management, which is useful in managing Enterprise IT [6]. In this study, COBIT 5 was selected as the framework due to its domain that monitors the performance of each aspect related to the problem to be discussed [7].

PT. Pamapersada Nusantara, a member of the Astra Group and a contractor company in the coal and mineral mining industry since 1993, has adopted the implementation of information technology governance to support its operations and achieve strategic success, similar to other companies in the field.

To implement the strategy, the role of IT and governance is necessary for monitoring, evaluating, and assessing the company's processes and performance to align with the strategy. Based on observations and interviews with employees of the PLANT Division, the big data information system in the division frequently experiences errors, unreadable data, and a lack of coordination and notification for system maintenance [8]. This issue is due to the absence of regular management monitoring by relevant stakeholders to manage personnel competencies and skills, as well as company procedures and policies. This highlights the need for an analysis of information technology governance at PT Pamapersada Nusantara, particularly in the PLANT Division, to enhance the management and quality of information systems. In this study, the analysis was conducted using the COBIT framework to gain insight into the conditions that support IT processes and strategies. According to the IT Governance Institute (ITGI), the COBIT standard provides the most comprehensive view of the IT strategy and process settings that align with business strategy [9]. The Performance Management (PM), Internal Control Monitoring (ICM), Regulatory Compliance and Governance (RCG) domains focus on performance management, internal control monitoring, regulatory compliance, and governance [10]. The MEA domain focuses on managing and overseeing IT usage in organizations, and can also ensure compliance with regulations, as well as monitor the efficiency and effectiveness of information systems.

PT. Pamapersada Nusantara, a contractor company in the coal and mineral mining industry and a member of the Astra Group, has also implemented IT governance to achieve its strategic goals. The role of IT and

governance is crucial in monitoring, evaluating, and assessing the company's processes and performance to align with the strategy. However, based on employee observations and interviews, the big data information system in the company's PLANT Division often experiences errors and lacks regular management monitoring. This indicates that the IT governance at PT Pamapersada Nusantara, particularly the PLANT Division, requires analysis to improve the management and quality of its information systems.

This research aims to evaluate the IT governance of PT Pamapersada Nusantara PLANT Division using the COBIT 5 framework in the MEA01 process domain (Monitor, Evaluate, and Assess Performance and Conformance) to determine the current capability level and find gaps in the application of information systems. The study also aims to provide recommendations based on COBIT 5 for the development and improvement of IT governance.

II. Literature Review

In this research, the authors collect data and information from previous studies as a reference and comparison material. The obtained information can serve as a comparison for conducting a proper analysis of IT governance. Some studies in the field of information system audits that support IT governance include:

Table 1. Related Works

No	Researchers	Background	Method
1	K. N. Rachmah and S. Mukaromah, 2021 [11]	At PT Kereta Api Indonesia (Persero), monitoring the implementation and adherence to all guidelines and policies is crucial. Through evaluating the rating or level, recommendations can be identified for management to improve the effectiveness of IT management and align it with business goals.	The research involves designing a tool to measure the level of IT capabilities, focusing on the Align, Plan, and Organize (APO) domain, specifically the APO01 domain of "Managing the IT Management Framework" based on the COBIT 5 framework. This will enable the determination of the rating or level of the IT process.
2	L. N. Resti, F. Prima Adityawan and R. Alit, 2020 [12]	The aim of this study is to measure the performance of IT governance within the ESDM Agency and provide recommendations for improvement in its management.	This study will use the COBIT 5 framework, specifically the domains MEA02, APO07, and BAI04. The research method will include determining case studies, analyzing stakeholder needs, analyzing data processing, assessing gaps, presenting results, and providing recommendations.
3	Y. Khairunnisa, 2019 [13]	The lack of standard operating procedures (SOPs) and policies for monitoring, evaluating, assessing conformity, and managing quality has caused slow decision-making for quality due to the lack of standards. Additionally, Universitas Pembangunan Nasional "Veteran" has not evaluated its information technology governance using the COBIT 5 framework.	To evaluate the information technology governance at Universitas Pembangunan Nasional "Veteran," the COBIT 5 framework will be used, with a focus on the APO11 (Manage Quality) and MEA01 (Monitor, Evaluate and Assess Performance and Conformance) processes, to determine the capability level.

| 4 | N. Safira, 2018 [7] | The migration process is being delayed due to the shortage of human resources needed to implement the migration from the old to the new architecture, as well as the discovery of incomplete documentation regarding the company's IT processes, which can lead to discrepancies in the initial plan. | This research on evaluating information technology governance utilizes the COBIT 5 framework, with a focus on APO08 (Managing Relationships), BAI02 (Managing Definition of Requirements), and BAI07 (Acceptance Management and Transition Change). The evaluation stages in this study include Initiation, Planning the Assessment, Briefing, Data Collection, Data Validation, Process Attribute Level, and Reporting the Results, as described in the COBIT 5 Assessment Process Activities. |

In explanations related to previous research, monitoring IT governance can serve as a reference for authors [11]. This study, however, focuses solely on the MEA01 domain in order to provide recommendations for monitoring results, evaluating conformity assessment, and performance. The study also offers suggestions for improving the quality of IT and paying attention to business processes and risk management [12]. The research is related to this study as they share the common goal of improving the quality of IT. The MEA01 domain is also relevant for monitoring IT governance or other domains [13]. MEA01 can also be used to view gap findings based on monitoring conducted [7]. The MEA01 domain can be utilized to identify gaps based on monitoring results.

III. RESEARCH METHOD

A. COBIT 5

COBIT 5 is a business framework aimed at improving corporate governance and management. As an updated version of IT, it incorporates the latest thinking in corporate governance and management techniques and provides globally recognized principles, practices, analytical tools, and models to enhance the trust and value of information systems [14]. COBIT 5 is a comprehensive framework for IT management, covering both technical and non-technical aspects and addressing all aspects of information technology, including the fulfillment of stakeholders' needs [15]. The framework of COBIT 5 has fundamental principles for governance and IT management [16]. In order to improve IT governance within an organization, COBIT 5 applies five principles that should be considered, including:
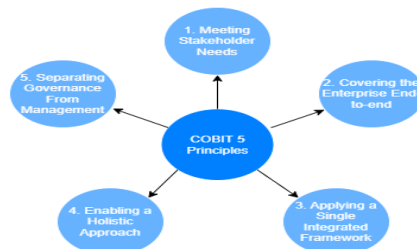

Figure 1. COBIT 5 Principles [17]

1. Fulfilling Stakeholder Requirements:
   This process involves negotiating and reaching a mutual agreement on interests. Enterprise systems must take into account all stakeholders when formulating policies, including the benefits, resources, and risk assessments [7].

Figure 2. Value Creation Meeting Stakeholder Needs [17]

2. End-to-End Enterprise Coverage:
   COBIT 5 integrates IT governance with corporate governance and encompasses all functions and processes within the organization. COBIT 5 not only focuses on IT functions, but also views information and related technologies as assets to be managed like any other assets [7].
3. Utilizing a Unified Framework:
   COBIT 5 takes into account best practices and concepts from other frameworks and incorporates them into its principles, models, and structures. This allows companies to use COBIT 5 as a common and integrated form of governance [7].
4. Encouraging a Comprehensive Approach:
   COBIT 5 encourages a comprehensive approach, recognizing that each enabler affects the others [7].
5. Differentiating Governance from Management:
   COBIT 5 clearly distinguishes between governance and management, as they involve different activities, require different organizational structures, and serve different purposes [7].

In COBIT 5, the implementation of the principles is carried out through the reference process model. The reference process model is a framework within COBIT 5 that outlines the stages of each process and domain and can be tailored to meet specific needs. Each process and domain has different objectives. COBIT 5 categorizes information technology activities into five domains, as described in [7].

Table 2. COBIT 5 Domain

Domain	Domain Descriptions
EDM (*Evaluate, Direct and Monitor*)	This governance process encompasses practices and activities aimed at conducting evaluations.
APO (*Align, Plan and Organise*)	The domain focuses on strategy and tactics, identifying ways for IT to effectively align with and support business objectives.
BAI (*Build, Acquire and Implement*)	It provides advice and solutions regarding IT services.
DSS (*Deliver, Service and Support*)	The solution is accepted and made accessible to the final user.
MEA(*Monitor,Evaluate,and Assess*)	This domain is deemed valuable for monitoring and facilitating the provision of IT solutions to the intended users.

The research conducted at PT Pamapersada Nusantara used mapping based on the COBIT 5 framework.
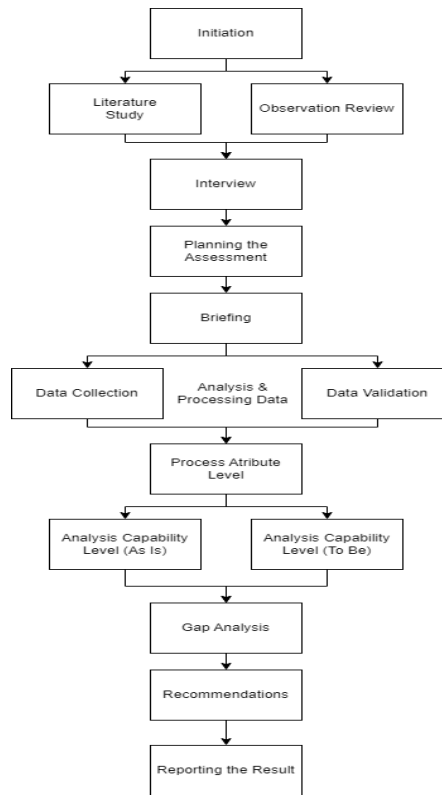

Figure 3. Research Methodology

Referring to Figure 3, the sub-domains and roles of MEA01 have been assigned at each stage of the research. The MEA01.01 sub-process of quiet monitoring was implemented during the initiation stage. The MEA01.02 sub-process of performance rules and conformity targets was applied during the research planning stage. During the briefing stage, the MEA01.03 sub-process of collecting performance data and assessing its suitability was carried out. In the data collection and validation stage, the MEA01.04 sub-process of performance analysis and reporting was executed. Finally, during the reporting stage, the MEA01.05 process of implementing corrective actions was implemented.

In line with the description and the sub-domains of the MEA01 process, the domain of Monitor, Evaluate, Assess Performance and Conformance was executed by involving relevant stakeholders as reflected in the RACI chart [18] :

Table 3. Respondents and Positions

RACI Chart	Organization Structure
CIO *(Chief Information Officer)*	Leader Section Main Process
BE *(Business Executive)*	Staff Life Cycle Expert
BE *(Business Executive)*	Staff Big Digger
BE *(Business Executive)*	Maintenance Reliability Expert
COO *(Chief Operating Officer)*	PLANT SHE Coordinator

The results of the interviews on monitoring and evaluation with stakeholders were mapped as follows:

Table 4. Mapping Goals & Results

Enterprise Goal	IT Related Goal	IT Process
Monitoring and Evaluation Process Performance Management	know the current conditions to monitor and evaluate for expected conditions.	MEA01- Monitor, Evaluate, Assess Performance and Conformance

Determining the current state in order to monitor and assess it against the expected conditions.

B. Formulas

The following steps are involved in recapitulating the processed and validated data:

1. Calculating the Recapitulation of Questionnaire Answers

$$C = \frac{\sum H}{\sum R} \; x \; 100\% \qquad (1)$$

Details :
C   = Recapitulation of capability level questionnaire answers
$\sum$H   = Total of capability level questionnaire answers
$\sum$R   = Total of respondents

2. Calculating Value and Capability Levels

$$\sum MV = \frac{(LP \; x \; MV)0 + (LP \; x \; MV)1 + (LP \; x \; MV)2 + (LP \; x \; MV)3 + (LP \; x \; MV)4 + (LP \; x \; MV)5}{100} \qquad (2)$$

Details :
$\sum$MV   = Total Maturity Value
LP   = Level percentages on answer distribution questionnaire
MV   = Maturity values listed on the answer mapping

The assessment of the capability levels and maturity levels in COBIT 5 is divided into [17].

Table 5. Value Range Capability

Range Capability Level
0 = Incomplete Process
1 = Performed Process
2 = Managed Process
3 = Established Process
4 = Predictable Process
5 = Optimizing Process

Based on the data presented in Table 5, the capability value range has been rated as follows [17].

Table 6. Rating Scale

Level	Description %	Achieved
N	Not achieved	0 to 15% achievement
P	Partially achieved	>15% to 50% achievement
L	Largely achieved	>50% to 85% achievement
V	Fully achieved	>85% to 100% achievement

IV. Results And Discussion

A. *Capability Level Measurement*

The following is a description of each stage of the research process for measuring capability levels:

1. Initiation
   The authors conducted an investigation to gather information about the company and its current state, as well as to determine what changes need to be made to improve the organization's future. Through the research process, the authors obtained data from PT Pamapersada Nusantara, specifically from the KPCS PLANT Division, which included the company's history, profile, vision and mission, organizational structure, and responsibilities. In addition, the authors collected information about the management and utilization of information technology. The research was motivated by the identification of issues in the PLANT Division of PT Pamapersada Nusantara, and focused on improving the management, quality, monitoring, evaluation, and assessment of performance and suitability.
2. Planning the Assessment
   The outcomes of the mapping process align with the stakeholders who are willing to participate as respondents according to the RACI chart, and they are the stakeholders accountable for the Pamapersada PLANT Division. These stakeholders have the ability to comprehend and have knowledge about IT governance within the company.
3. Briefing
   The authors informed stakeholders about the process of filling out the questionnaire through meetings and explained the questionnaire indicators. Then, the authors distributed the questionnaires via email for stakeholders to complete. After evaluating the questionnaire data based on points and evidence, the authors recapitulated the collected data to determine the process attribute level and report the results. This was part of the research schedule for conducting the analysis of information technology governance assessment in the PLANT Division of PT Pamapersada Nusantara, which involved various parties.
4. Data Collection
   In data collection phase, the authors discovered findings within the KPCS PLANT Division of PT Pamapersada Nusantara, which were used to assess and evaluate the various process activities. This was done by completing questionnaires that helped to support modifications in the IT governance level.
5. Data Validation
   At data validation stage, the authors obtained results based on questionnaire calculations using a Likert scale to assess the capability level. The validation process involved analyzing the data from the questionnaires, which were distributed to respondents according to the RACI mapping. Afterward, the authors synthesized and calculated the data to determine the detailed results of the questionnaire answers.
6. Process Attribute Level
   The authors calculated capability values using a pre-determined formula. By doing so, the authors obtained the results of the values and Capability Level from the questionnaire data calculation from previous stages. The formula used was described to allow for gap analysis in the next stage.

MEA01 involves monitoring, evaluating, and assessing performance and conformance, as well as collecting, validating, and evaluating the business, IT, and organizational objectives. The process also involves ensuring

that the operations are in line with agreed performance and objectives, and providing systematic reporting [19]. The sub-domains of MEA01 utilized in this study are:

Table 7. Practice MEA01

Process	Sub Process	Description
MEA01	MEA01.01	Establish a monitoring approach
	MEA01.02	Set performance and conformance targets
	MEA01.03	Collect and process performance and conformance data
	MEA01.04	Analyze and report performance
	MEA01.05	Ensure the implementation of corrective actions

The results of the current (as is) and expected (to be) conditions based on MEA01 were determined through a review of the references and calculations, and are summarized as follows:

Table 8. Result MEA01

No	Sub Process	Capability Value		Capability Level	
		As Is	*To Be*	*As Is*	*To Be*
1	MEA01.01	2.17	3.88	3	4
2	MEA01.02	2.25	4	3	4
3	MEA01.03	2.32	3.92	3	4
4	MEA01.04	2.3	4	3	4
5	MEA01.05	2.45	4.1	3	5
	Average	**2.29**	**3.98**	**3**	**4**

The results from Table 8 show that the capability value for the governance system monitoring approach obtained from MEA01.01 is 2.17, which places it at capability level 3. The expected condition for this approach has a capability value of 3.88, putting it at capability level 4. Moreover, the analysis of the performance and conformity targets of the governance system at PT Pamapersada Nusantara PLANT Division, obtained from MEA01.02, reveals a current capability value of 2.25, which is also at level 3. The expected condition for this aspect has a capability value of 4, which is at level 4.

The performance process and suitability of governance system data at PT Pamapersada Nusantara PLANT Division, obtained from MEA01.03, has a current capability value of 2.32, again at level 3. The expected condition for this aspect has a capability value of 3.92, which is at level 4. Furthermore, the analysis and reporting of governance system performance at PT Pamapersada Nusantara PLANT Division, obtained from MEA01.04, has a current capability value of 2.3, at level 3, and the expected condition has a capability value of 4, at level 4.

Finally, the implementation of corrective actions for the governance system at PT Pamapersada Nusantara PLANT Division, obtained from MEA01.05, has a current capability value of 2.45, which is at level 3, while the expected condition has a capability value of 4.1, at level 5. The average current capability value is 2.29, and the expected is 3.98, with the current rounded to level 3 and the expected rounded to level 4.

B. Maturity Rate Analysis

The calculation of the maturity rate, based on the comparison of the current conditions (as is) and expected conditions (to be) in the MEA01 domain, is presented in Table 9. This table reveals the capability gap level.

Table 9. Average Gap Analysis of Capability Level

Domain	Current Condition	Expected Condition	Gap
MEA01	3	4	1

Table 9 displays the results of the comparison between the current and expected conditions, which are further visualized in a representation diagram for easier interpretation.
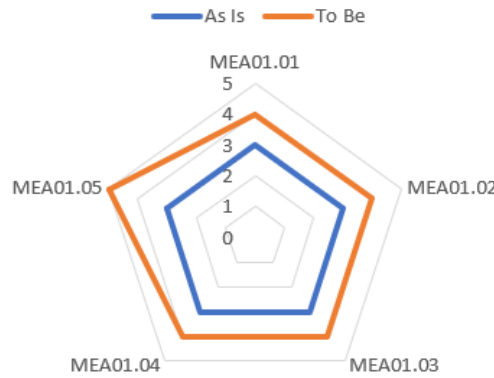

Figure 4. Capability Level Diagram

The gap analysis for each process were obtained from Figure 4. Based on these findings, the authors made recommendations for improving the performance of the IT governance process at PT Pamapersada Nusantara, specifically the PLANT Division. The following are the recommended improvements:

1. It is recommended that PT Pamapersada Nusantara give special attention to governance management in order to prevent and anticipate any issues related to company regulations and maintenance as early as possible.
2. PT Pamapersada Nusantara should regularly monitor and maintain its IT Governance management by engaging all relevant stakeholders.
3. In order to close the gap in PT Pamapersada Nusantara, the company should create standard operating procedures (SOPs) in line with COBIT 5 guidelines and improve the process level from 3 to 4. Additionally, documentation reports of all system activities should be created so that stakeholders can be informed.

C. Recommendations Stages of Process

The results of the gap analysis have revealed the need for adjustments. The following are the recommended steps that can be taken to align business processes with IT governance:

Table 10. Stages Recommendations

Sub Process	Recommendations
MEA01.01	It is important to implement a monitoring approach for IT systems, including measuring their suitability and potential risks based on user needs.
MEA01.02	Efforts should be made to enhance the alignment of IT system performance with business requirements and establish regular monitoring.
MEA01.03	The efficiency of manual or automated processes should be increased to align with company reporting metrics.
MEA01.04	In case of discrepancies, an analysis should be conducted and improvement plans and responsibility actions for IT governance should be developed.
MEA01.05	The corrective actions taken for IT governance should be tracked and reported to stakeholders, along with discussions on recommendations to address enterprise issues.

According to Table 10, the recommended actions for the company have been categorized based on the findings from each sub-process domain. These recommendations should be implemented by relevant stakeholders to enhance the management and performance of the company's processes.

According to the findings, it can be observed that nearly all evaluations of corporate IT governance result in a gap analysis of the current and expected conditions. As depicted in Table 1, previous studies have suggested corrective actions based on the results of the study. For example, the arrangement of PT KAI (Persero) was found to be effective and efficient, as per a previous study [11]. In contrast, another study revealed that the ESDM Agency did not reach its target in the processing of EDM, APO and BAI data [12]. These findings support the idea that conducting an IT governance analysis can help identify and address existing gaps.

In the case of PT Pamapersada Nusantara, although the analyzed process is functioning, it is often prone to errors and issues due to server and big data system bugs. Therefore, it is critical to periodically monitor the implementation of recommended actions. The study results indicate that the APO01 process is currently at level 3, with a desired capability level of 5, which can be achieved by meeting the Work Products/Generic Work Products (WPs/GGWPs) indicators. Similarly, the MEA01 process currently stands at level 3, with a target level of 5, which requires the creation of standard operating procedures (SOPs) and implementation of recommendations from COBIT 5 to enhance the MEA01 process [13].

Following the findings, the next step is to implement recommendations. The suggestions from previous research include providing training to IT division personnel and revising standard operating procedures (SOPs) to make them more specific and focused [7]. However, this study differs in terms of the domains used as it employs the APO08 and BAI02 domains, leading to less noticeable gap monitoring. Thus, this research proposes using the MEA01 domain for analysis of the system at PT Pamapersada Nusantara, allowing for recommendations that more closely monitor the accuracy and performance of the IT governance system.

V. Conclusion

Based on the research findings, the results indicate that the current state of the MEA01 domain is partially achieved with a score of 2.29, or a capability level of 3, implying that PT Pamapersada Nusantara has established a process. The governance regarding the series of processes, policies, rules, and practices within the PLANT Division plays a significant role in the management, direction, and control of the company. However, there is room for improvement in optimizing the relationships between stakeholders to align with the company's goals. The desired state (to be) is largely achieved with a score of 3.98, or a capability level of 4, implying that the process has become predictable, with established restrictions in place to meet the company's objectives. It is suggested that the performance changes be validated on the big data system as early as possible to prevent and correct deviations in performance. Future studies could compare the results of IT governance audits using different frameworks such as COBIT 4.1, COBIT 5, and COBIT 2019, and their implementation in the company.

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