# IT Governance Maturity Assessment Using COBIT 2019 for System Enhancement and Strategic Decision Support

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***Abstract***

*This study evaluates the maturity of IT governance at PT. Tirta Investama Airmadidi, a subsidiary of the Danone-AQUA Group, using the COBIT 2019 framework. Structured interviews and capability assessments focused on the EDM and APO domains to determine the alignment of IT processes with global best practices. Results show that enterprise strategies emphasize Growth/Acquisition and Client Service/Stability (score = 5), with IT infrastructure incidents identified as the highest risk factor (score = 15). Capability analysis revealed that DSS03 (Manage Problems) achieved 100% compliance at Levels 2, 4, and 5, and 85.71% at Level 3, fully meeting the target maturity level (Level 5). In contrast, BAI07 (Manage Change Acceptance and Transitioning) attained only 54.55% at Level 3, indicating a two-level gap from the target. These findings highlight strong performance in problem management but weaknesses in change transition processes. The study concludes that targeted governance improvements—particularly in change management—are essential to enhance IT governance maturity and align technological capabilities with strategic objectives within the bottled water industry.*

***Keywords***— *COBIT 2019*, *IT Governance*, *Information Technology, Design Factors, Capability Level*

## 1. INTRODUCTION

In the rapidly evolving era of digital transformation, Information Technology (IT) has become a crucial element in supporting the effectiveness and efficiency of corporate operations [1][2][3]. Nearly all business activities, ranging from data processing and strategic decision-making to customer service, now rely on reliable and integrated information systems. This makes IT governance an indispensable aspect in strengthening a company's competitiveness amid increasingly intense global competition. IT governance not only addresses technical aspects but is also closely related to business strategy, risk management, and regulatory compliance [4]. Therefore, a comprehensive framework is required to bridge business and technology needs holistically. COBIT 2019 is a framework developed by ISACA (Information Systems Audit and Control Association) to help organizations manage, measure, and improve IT activities effectively and efficiently [5]. This framework takes into account business needs, standards and best practices, as well as regulatory and compliance requirements [6]. COBIT 2019 also provides a set of control objectives that organizations can use as a guide to identify and implement the necessary controls for sound IT management [7]. PT. Tirta Investama Airmadidi, as part of the Danone-AQUA Group, is one of the bottled drinking water processing companies whose operational and production processes heavily rely on information technology systems [8]. The effectiveness of IT in this company not only supports production efficiency but also ensures product quality and distribution run optimally. However, there has not yet been a systematic study on the extent to

which IT governance at the Airmadidi unit aligns with global best practice standards such as COBIT 2019.

This study aims to analyze information technology governance at PT. Tirta Investama Airmadidi using the COBIT 2019 framework with a focus on the Evaluate, Direct, and Monitor (EDM) and Align, Plan, and Organize (APO) domains [9][10]. The approach used in this study includes data collection through structured interviews based on the COBIT 2019 maturity model, which is then analyzed to measure the level of IT process capabilities in the organization. The main contribution of this study is to provide a comprehensive overview of the level of IT process maturity at PT. Tirta Investama Airmadidi, as well as to identify areas that need improvement. The innovation in this research lies in the specific application of COBIT 2019 in the bottled water sector, which has not been widely explored, as well as the use of a contextual and adaptive evaluation model tailored to the needs of local organizations.

## 2. RESEARCH METHOD

### *2.1 Research Data*

This study uses a qualitative approach with primary data sources obtained through direct structured interviews at PT. Tirta Investama Airmadidi. Interviews were conducted with parties who have responsibility for and understanding of information technology governance within the company, including managers and staff of the information technology division. The interview instrument was developed based on the COBIT 2019 framework developed by ISACA [11][12][13], focusing on the Evaluate, Direct, and Monitor (EDM) and Align, Plan, and Organize (APO) domains, which are important parts of strategic and operational IT management [7]. The questions asked were designed to explore in-depth information about design factors as defined in COBIT 2019 [14][15], such as corporate strategy, risk profile, compliance requirements, and the technology threat landscape [16]. The collected data is analyzed using an evaluative approach to measure the level of capability and maturity of the organization's IT governance. This process aims to identify gaps between current practices and international best practice standards, as well as provide relevant and contextual recommendations for improvement [6].

### *2.2 Research Process*

Figure 1 below shows the stages of implementing an IT governance audit based on the COBIT 2019 framework. The research process begins with the Start stage as the initial point of the workflow. The first activity is the determination of COBIT 2019 domains, where the relevant domains to be audited are identified. This step is guided by design factors such as organizational goals, business strategies, structures, and applicable regulations that influence the governance requirements [17]. The next phase is audit planning, which consists of two main activities: question formulation and interview scheduling. Question formulation aims to prepare structured questions that align with the COBIT 2019 objectives [18], while interview scheduling ensures the data collection process is conducted in an organized and timely manner. After planning, the process continues with data collection through interviews, document analysis, and observations within the selected domains. The collected data is then analyzed to evaluate the extent of IT governance implementation and to identify capability gaps, strengths, and weaknesses. Following this, a RACI chart is created to illustrate the roles and responsibilities in the audit activities, indicating who is responsible, accountable, consulted, and informed [19][20]. The process concludes with the completion stage, marking that all audit phases have been systematically carried out according to the COBIT 2019 framework.

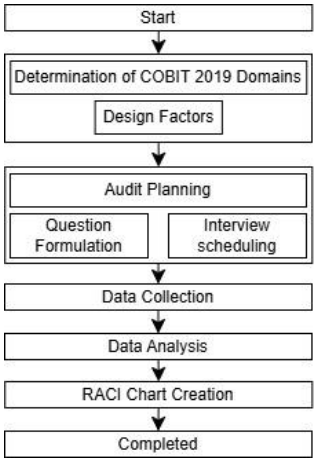


*Figure 1 Research Flow*

### *2.3 Process Capability Assessment Guide Calculation*

Calculation Formula:

$$Percentage = \left(\frac{Number\ of\ Checklist\ Checked}{Total\ Number\ of\ Checklist}\right) x\ 100$$

*Table 1. Percentage Interpretation*

| | | |
|---|---|---|
| 85 – 100% | Fully Achived | All or almost all criteria have been consistently met. |
| 50–<85% | Largely Achieved | Most criteria have been met, but there are still minor shortcomings. |
| 15–<50% | Partially Achieved | Only a small portion of criteria have been met; there are still many shortcomings. |
| <15% | Not Achieved | Almost all criteria have not been met. |
| 0% | Nil | There is no evidence of criteria fulfillment whatsoever. |

## 3. RESULT AND DISCUSSION

### *3.1 DF 1*

Based on interviews with respondents, the company's top priority strategies are Growth/Acquisition and Client Service/Stability, which received a score of 5, followed by Cost Leadership, which received a score of 3 and Innovation/Differentiation, which received a score of 2 as can be seen in table 2. In this case, the company shows that its main focus is on business growth and maintaining good customer relations, while innovation and cost efficiency are still important but not a top priority.

*Table 2. DF1 Results*

| Value | Importance (1-5) | Baseline |
|---|---|---|
| Growth/Acquisition | 5 | 3 |
| Innovation/Differentiation | 2 | 3 |
| Cost Leadership | 3 | 3 |
| Client Service/Stability | 5 | 3 |

### *3.2 DF 3*

The next design factor is enterprise goals. In table 3, there are several enterprise goals that have a score of 4, including EG01, EG02, EG04, EG07, EG09, EG10. There are also several enterprise goals that have a score of 5, including EG03, EG05, EG08, EG11, EG12, EG13. Then the result with the lowest score is EG06 with a score of 2. From a business objective perspective, it appears that compliance with laws and regulations, a customer-oriented service culture, optimization of internal business processes, and digital transformation programs are the most

important objectives for the organization. On the other hand, business service continuity received the lowest score, which may indicate that the Company is not overly concerned about operational disruptions or already feels sufficiently secure in this aspect.

*Table 3. DF2 Results*

| Value | Importance (1-5) | Baseline |
|---|---|---|
| EG01 – Diverse and Competitive Product and Service Portfolio | 4 | 3 |
| EG02 – Effective Management of Business Risks | 4 | 3 |
| EG03 – Adherence to External Laws and Regulations | 5 | 3 |
| EG04 – Reliability and Accuracy of Financial Information | 4 | 3 |
| EG05 – Strong Customer-Focused Service Culture | 5 | 3 |
| EG06 – Continuity and Availability of Business Services | 2 | 3 |
| EG07 – High-Quality Management and Decision-Making Information | 4 | 3 |
| EG08 – Optimization of Internal Business Process Efficiency | 5 | 3 |
| EG09 – Optimization of Business Process Costs | 4 | 3 |
| EG10 – Development, Motivation, and Productivity of Staff | 4 | 3 |
| EG11 – Compliance with Internal Policies and Standards | 5 | 3 |
| EG12 – Effective Management of Digital Transformation Initiatives | 5 | 3 |
| EG13 – Advancement of Product and Business Innovation | 5 | 3 |

### *3.3 DF 3*

In Design Factor 3, the most critical risk is IT Operational Infrastructure Incidents with a score of 15, highlighting the challenge of maintaining system availability and reliability as shown in table 4. Other high risks include IT Investment Decision Making, Software Failures, and Software Adoption/Usage Problems (score 10 each), as well as Third-party/Supplier Incidents (score 9) and IT Cost & Oversight (score 8), indicating that risks span both operational and strategic areas. Medium-level risks, such as Geopolitical Issues, IT Expertise, Skills & Behavior, Data Management, and Unauthorized Actions (scores 4–6), emphasize the need for stronger capabilities in compliance, security, and internal IT. The lowest risk is Technology-based Innovation (score 3), which, while less critical now, may grow in importance in the future. Overall, the IT Risk Profile suggests that organizations must prioritize infrastructure resilience while also addressing strategic risks and preparing for emerging threats.

*Table 4. DF3 Results*

| Risk Scenario Category | Impact (1-5) | Likelihood (1-5) | Risk Rating | Baseline |
|---|---|---|---|---|
| IT Investment and Portfolio Management | 5 | 2 | 10 | 9 |
| Program and Project Lifecycle Management | 5 | 1 | 5 | 9 |
| IT Cost Management and Financial Oversight | 4 | 2 | 8 | 9 |
| IT Skills, Expertise, and Professional Behavior | 5 | 1 | 5 | 9 |
| Enterprise and IT Architecture Management | 4 | 1 | 4 | 9 |
| Operational Infrastructure Incident Management | 5 | 3 | 15 | 9 |
| Prevention of Unauthorized Activities | 5 | 1 | 5 | 9 |
| Software Adoption and Usage Challenges | 5 | 2 | 10 | 9 |
| Hardware Incident Management | 5 | 1 | 5 | 9 |
| Software Failure and System Downtime | 5 | 2 | 10 | 9 |
| Protection Against Cyber Threats (Hacking, Malware, etc.) | 5 | 1 | 5 | 9 |
| Third-Party and Supplier Incident Management | 3 | 3 | 9 | 9 |
| Regulatory and Policy Noncompliance | 5 | 1 | 5 | 9 |
| Geopolitical and Socioeconomic Disruptions | 3 | 2 | 6 | 9 |
| Labor or Industrial Action | 5 | 1 | 5 | 9 |
| Natural Disasters and Environmental Hazards | 5 | 1 | 5 | 9 |
| *Technology-Driven Innovation Management* | 3 | 1 | 3 | 9 |
| *Environmental Sustainability Considerations* | 5 | 1 | 5 | 9 |
| *Data and Information Governance* | 5 | 1 | 5 | 9 |

### *3.4 DF 4*

The findings for Design Factor 4 reveal that organizations face a wide range of IT-related challenges, with eleven issues identified as serious (score 2), including major IT incidents, poor

audit results, unclear decision-making, high IT costs, weak data quality, privacy noncompliance, and limited innovation. Nine other issues were rated as issues (score 1), such as conflicts between IT and business units, insufficient resources, failed outsourcing, and hidden IT spending. Overall, the results highlight that while technical failures and governance weaknesses are the most pressing concerns, less critical issues in communication and resource allocation could escalate into more serious risks if left unresolved.

*Table 5. DF4 Results*

| IT-Related Issue | Importance (1-3) | Baseline |
|---|---|---|
| Misalignment among IT entities due to perceived low business value contribution | 1 | 2 |
| Tension between business units and IT caused by failed initiatives or low value perception | 1 | 2 |
| Major IT incidents such as data loss, breaches, project failures, and application errors | 2 | 2 |
| Service delivery issues from IT outsourcing partners | 1 | 2 |
| Noncompliance with IT-related regulations or contractual obligations | 1 | 2 |
| Frequent audit findings indicating poor IT performance or service quality | 2 | 2 |
| Uncontrolled or unauthorized IT expenditures outside approved budgets | 1 | 2 |
| Overlapping initiatives and inefficient use of resources | 1 | 2 |
| Lack of skilled IT personnel, resource shortages, or staff dissatisfaction | 1 | 2 |
| IT projects often delayed, over budget, or misaligned with business needs | 1 | 2 |
| Limited executive engagement or weak business sponsorship for IT | 1 | 2 |
| Complex IT structures and unclear decision-making processes | 2 | 2 |
| Excessively high IT operational costs | 2 | 2 |
| Outdated systems hindering innovation or new initiatives | 2 | 2 |
| Communication gap between business and technical stakeholders | 2 | 2 |
| Persistent issues with data quality and integration | 2 | 2 |
| Excessive end-user computing without IT oversight | 2 | 2 |
| Business units deploying independent IT solutions (shadow IT) | 2 | 2 |
| Noncompliance with data privacy and protection laws | 2 | 2 |
| Inability to adopt or leverage new technologies for innovation | 2 | 2 |

### *3.5 DF 5*

Design Factor 5's result in table 6 shows 80% of risks are classified as "High," while only 20% are classified as "Normal." This condition indicates that the organization faces high information security threats and therefore requires special attention in terms of strengthening cybersecurity systems, early threat detection, and emergency response planning for IT incidents.

*Table 6. DF5 Results*

| Value | Importance (100%) | Baseline |
|---|---|---|
| High | 80% | 33% |
| Normal | 20% | 67% |

### *3.6 DF 6*

Design Factor 6, which describes the level of compliance requirements, shows that all requirements are at a "Normal" level, with no 'High' or "Low" categories as can be seen in table 7 bellow. This indicates that the organization operates within a stable regulatory framework that is not overly burdensome. However, consistency in regulatory compliance is still necessary to avoid potential violations in the future.

*Table 7. DF6 Results*

| Value | Importance (100%) | Baseline |
|---|---|---|
| High | 0% | 0% |
| Normal | 100% | 100% |
| Low | 0% | 0% |

### *3.7 DF 7*

In Design Factor 7, the role of IT in organizations is more focused on operational and support functions. The "Factory" category received the highest score of 5, followed by "Support"

with a score of 4. Conversely, the role of IT in strategic and Tumaround aspects is still minimal, each receiving a score of only 1, as shown in table 8. This shows that IT is currently used more to maintain the continuity of daily business processes than to drive innovation and strategic growth. Going forward, it would be better for organizations to start considering how IT can be the main driver of digital transformation rather than just a supporting function.

*Table 8. DF7 Results*

| Value | Importance (1-5) | Baseline |
|---|---|---|
| Support | 4 | 3 |
| Factory | 5 | 3 |
| Turnaround | 1 | 3 |
| Strategic | 1 | 3 |

### *3.8 DF 8*

In Design Factor 8 related to the IT sourcing model, table 9 shows that it can be seen the majority of IT services are organized insourced, namely 90%, while the remaining 10% use the cloud. There is no use of outsourcing whatsoever. This shows that organizations prefer to manage IT resources internally, which may reflect a desire to maintain full control over systems and data. However, the low utilization of cloud and the non-use of outsourcing may also indicate limitations in flexibility and scalability, as well as the possibility of a greater operational burden internally.

*Table 9. DF8 Results*

| Value | Importance (100%) | Baseline |
|---|---|---|
| Outsourcing | 90% | 33% |
| Cloud | 0% | 33% |
| Insourced | 10% | 34% |

### *3.9 DF 9*

In Design Factor 9 regarding IT implementation methods, the entire process is carried out using a 100% DevOps approach, without using Agile or traditional methods. Table 10 reflects that the organization has transformed to an integrated IT development and operational model, prioritizing collaboration between development and operational teams to accelerate the development cycle and delivery of IT services. The DevOps approach also signifies a commitment to automation, efficiency, and rapid adaptation to changing business needs.

*Table 10. DF9 Results*

| Value | Importance (100%) | Baseline |
|---|---|---|
| Agile | 0% | 15% |
| DevOps | 100% | 10% |
| Traditional | 0% | 75% |

### *3.10 DF 10*

Design Factor 10, which indicates technology adoption strategies, table 11 shows that organizations identify themselves entirely as “slow adopters,” with a percentage of 100%. There are no initiatives as first movers or followers. This shows that organizations tend to be cautious in implementing new technologies, waiting for evidence of success from others before making decisions. Although this strategy can reduce the risks associated with technological failure, it also has the potential to reduce competitiveness due to delays in adopting innovations.

*Table 11. DF10 Results*

| Value | Importance (100%) | Baseline |
|---|---|---|
| First mover | 0% | 15% |
| Follower | 100% | 70% |
| Slow adopter | 0% | 15% |

### *3.11 Determining Objective Priority*

#### *3.11.1 Insight*

Based on the "Governance and Management Objectives Importance (All Design Factors)" chart, there are several governance and management objectives that show negative values, indicating a lack of organizational focus on certain areas that are actually quite strategic. Some objectives with negative scores include APO03 (Manage Enterprise Architecture) with -60, BAI11 (Manage Projects) with -40, and several others such as APO05 (Manage Portfolio), APO08 (Manage Relationships), and EDM02 (Ensure Benefits Delivery), each with a value of -30. The negative score on APO03 indicates that enterprise architecture is not yet a priority, even though architecture plays a crucial role in aligning business and technology strategies. Without a strong architectural framework, the risk of inefficiency and poor system integration can increase. The lack of attention to BAI11 also indicates a weak focus on overall project management, which can lead to delays or failures in strategic IT initiatives. Meanwhile, the negative scores for EDM02 and APO05 show that the organization has not maximized the benefits of its IT investments and does not have good control over its program and project portfolio.

#### *3.11.2 Recommendations*

To remedy this situation, it is recommended that organizations enhance awareness and capabilities in IT architecture management as a foundation for strategic decision-making. Strengthening project management practices with adaptive methods such as agile or hybrid can further improve the success of change initiatives. At the same time, organizations should review their benefits realization management to ensure that IT investments effectively contribute to business objectives. Finally, reinforcing portfolio management practices is essential to guarantee proper resource allocation and program prioritization in alignment with the organization's overall strategy.

### *3.12 DSS03 Activity as the Highest Scale on the Initial Summary Dashboard 1*

#### *3.12.1 DSS03 Level 2 Activities*

Based on Dashboard 1, the interview results for the highest-scoring Initial Summary are DSS03, as shown in Table 12.

*Table 12. DSS03 level 2 activities*

| Activity | Level | Check box |
|---|---|---|
| Identify issues by correlating incident reports, error logs, and other diagnostic sources | 2 | ✓ |
| Formally handle all problems with full access to relevant data, including change management, configuration, asset, and incident information | 2 | ✓ |
| Assign appropriate support groups for problem identification, root cause analysis, and solution design based on predefined categories such as hardware, network, software, and applications | 2 | ✓ |
| Set priority levels in consultation with the business to ensure timely problem resolution according to agreed SLAs, based on impact and urgency | 2 | ✓ |
| Report the status of problems to the service desk to keep customers and IT management informed | 2 | ✓ |
| Maintain a single problem management catalog to register and track problems, ensuring audit trails and status visibility (open, reopened, in progress, or closed) | 2 | ✓ |
| Create known error records and develop workarounds once root causes are identified | 2 | ✓ |
| Identify, assess, prioritize, and process solutions to known errors through change management, considering cost-benefit and business impact | 2 | ✓ |
| Close problem records after confirmed resolution or agreed alternative handling with the business | 2 | ✓ |
| Inform the service desk of closure schedules, available workarounds, or pending fixes, and communicate relevant updates to affected users and customers | 2 | ✓ |

A percentage of 100% was obtained after calculating the level 2 capability in Objective DSS03. Based on these results, DSS03 level 2 is rated as Fully Achieved and can proceed to the Level 3 Capability study.

### *3.12.2 DSS03 level 3*

Based on the interview results, the results for objective DSS03 level 3 are shown in Table 13.

*Table 13. DSS03 level 3 activities*

| Activity | Level | Check box |
|---|---|---|
| Identify potential known errors by comparing incident data with the database of known and suspected errors, including those reported by external vendors, and classify problems accordingly | 3 | ✓ |
| Link affected configuration items to the corresponding known error | 3 | ✓ |
| Generate reports to track progress in problem resolution and monitor the impact of unresolved issues, incorporating input from change and configuration management | 3 | ✓ |
| Obtain regular progress updates from change management throughout the resolution process | 3 | ✓ |
| Record problem information related to IT changes and incidents, and communicate it to key stakeholders through reports and periodic meetings among incident, problem, change, and configuration management owners | 3 | ✓ |
| Ensure regular meetings among process owners and managers to review known problems and planned changes | 3 | X |
| Identify and implement sustainable, permanent solutions addressing root causes, and submit change requests through formal change management procedures | 3 | ✓ |

After calculations were performed on DSS03 level 3, a percentage of 85.71 was obtained based on NPLF, resulting in a Fully Achieved rating, allowing for the next capability assessment or level 4 to proceed.

### *3.12.3 DSS03 level 4*

At DSS03 level 4, there are five activities, and based on the results of interviews with respondents, all activities carried out by the respondent companies can be seen in Table 14.

*Table 14. DSS03 Level 4 Activities*

| Activity | Level | Check box |
|---|---|---|
| Monitor the ongoing impact of problems and known errors on service performance | 4 | ✓ |
| Review and validate the effectiveness of major problem resolutions | 4 | ✓ |
| Capture and report change efforts and costs related to problem management activities, including fixes for problems and known errors | 4 | ✓ |
| Generate reports to track problem resolution progress against business requirements and SLAs, ensuring proper escalation when necessary—to higher management, external vendors, or the change advisory board for urgent requests | 4 | ✓ |
| Analyze and track problem trends to optimize resource utilization and minimize reliance on workarounds | 4 | ✓ |

After calculations were performed on DSS03 level 3, a percentage of 100% was obtained based on NPLF, resulting in a Fully Achieved rating, allowing for the next capability assessment or level 5 to proceed.

### *3.12.4 DSS03 activity level 5*

At DSS03 level 5, there is one activity, and based on the results of interviews with respondents, all activities carried out by the companies that were respondents can be seen in Table 15.

*Table1 5. DSS03.05 Level 5 Activity*

| Activity | Level | Check box |
|---|---|---|
| Ensure that lessons learned from the review are incorporated into service review meetings with the business customer | 5 | ✓ |

Thus, a percentage of 100% was obtained after calculating the level 5 capability in Objective which means that DSS03 level 5 is rated as Fully Achieved. Thus, the Initial Summary on dashboard 1 is at level 5 capability.

### *3.13 DSS03 Activity as the Second Highest Scale on Initial Summary Dashboard 1*

#### *3.13.1 BAI07 level 2*

At DSS03 level 5, there is one activity, and based on the results of interviews with respondents, all activities carried out by the respondent companies can be seen in Table 16.

*Table 16. BA107 Level 2 Activities*

| Activity | Level | Check box |
|---|---|---|
| Create an implementation plan detailing the overall strategy, implementation sequence, resource needs, dependencies, acceptance criteria, installation verification, production support transition, and business continuity updates | 2 | ✓ |
| Obtain commitments from external providers for participation in all implementation steps | 2 | ✓ |
| Identify and document fallback and recovery procedures | 2 | ✓ |
| Define a migration plan for business processes, IT services, data, and infrastructure, considering hardware, networks, software, data, interfaces, compliance, and documentation requirements | 2 | ✓ |
| Include procedural adjustments, revised roles, and control procedures in the business process conversion plan | 2 | ✓ |
| Ensure the data conversion plan avoids altering data values unless necessary; document and obtain approval for any changes | 2 | ✓ |
| Plan data backup and archival retention according to business and regulatory needs | 2 | ✓ |
| Conduct rehearsals and test conversions before live implementation | 2 | ✓ |
| Coordinate and verify conversion timing to ensure smooth transition and prevent data loss; freeze live operations if necessary | 2 | ✓ |
| Back up all systems and data prior to conversion, maintain audit trails, and prepare rollback and recovery plans | 2 | ✓ |
| Develop and document a comprehensive test plan aligned with project quality standards and consult relevant business and IT stakeholders | 2 | ✓ |
| Ensure the test plan addresses risks, requirements, and necessary testing types, including performance, stress, usability, pilot, security, and privacy tests | 2 | ✓ |
| Include provisions for internal or external accreditation of test outcomes when required | 2 | ✓ |
| Identify and allocate resources for testing, including test environments and staff, with stakeholder consultation on resource implications | 2 | ✓ |
| Define testing phases such as unit, system, integration, user acceptance, performance, stress, data conversion, security, privacy, operational readiness, and backup/recovery tests | 2 | ✓ |
| Incorporate test preparation, training, environment setup, test execution, issue handling, and formal approval in the test plan | 2 | ✓ |
| Obtain stakeholder approval for all test plans, including business owners, developers, and project managers | 2 | ✓ |
| Create a sanitized test data repository representative of the production environment, compliant with regulatory and privacy standards | 2 | ✓ |
| Review error logs from testing, ensuring all issues are corrected or formally accepted | 2 | ✓ |
| Prepare for transfer of business processes, applications, and infrastructure from testing to production per change management standards | 2 | ✓ |
| Determine pilot or parallel implementation scope according to the plan | 2 | ✓ |
| Promptly update business, system, configuration, and contingency documentation after implementation | 2 | ✓ |
| Update media libraries with current production versions, archive previous ones, and maintain configuration control | 2 | ✓ |
| For electronic distributions, ensure automated delivery only to authorized destinations, with backups for rollback in case of errors | 2 | ✓ |
| For physical distributions, maintain formal logs of distributed items, recipients, locations, and update dates | 2 | ✓ |

After calculations were performed on BA107 level 2, a percentage of 100% was obtained based on NPLF, resulting in a Fully Achieved rating, allowing for the next capability assessment or level 3 to proceed.

### *3.13.2 BAI07 level 3*

At BA107 level 3, there are 22 activities, and based on the results of interviews with respondents, all activities carried out by the respondent companies can be seen in Table 17.

*Table 17. BA107 Level 3 Activities*

| Activity | Level | Check box |
|---|---|---|
| Confirm approval of all implementation plans by both technical and business stakeholders, and ensure review by internal audit when appropriate | 3 | x |
| Formally assess and address technical and business risks related to implementation during planning | 3 | x |
| Include in the data conversion plan methods for collecting, converting, verifying, and validating data, ensuring completeness and integrity between original and converted datasets | 3 | ✓ |
| Incorporate risk mitigation for conversion issues, business continuity, and fallback procedures within migration plans to meet risk management, business, and compliance needs | 3 | ✓ |
| Define clear success criteria for each testing phase in consultation with business and IT stakeholders, and establish remediation actions for unmet criteria, including guidance on continuation, delay, or termination of testing | 3 | ✓ |
| Protect sensitive test data and results from unauthorized access, disclosure, or misuse, including proper handling, storage, and destruction | 3 | x |
| Implement procedures for secure retention or disposal of test results, media, and documentation in accordance with test plan and regulatory requirements | 3 | x |
| Ensure the test environment accurately represents the future business and operational landscape, including workloads, roles, operating systems, applications, databases, networks, and infrastructure | 3 | x |
| Maintain separation between test and production environments to prevent unintended interaction | 3 | x |
| Evaluate final acceptance against defined success criteria and present results clearly for business and IT review | 3 | ✓ |
| Obtain formal acceptance sign-off from business owners, IT stakeholders, and relevant third parties before production release | 3 | ✓ |
| Ensure testing is performed according to the approved test plan by an independent group separate from developers, with participation from business owners and end users where appropriate, and conducted only in the test environment | 3 | ✓ |
| Verify that test cases and results align with predefined success criteria | 3 | ✓ |
| Use detailed and approved test scripts to implement tests, ensuring coverage of security and privacy requirements | 3 | ✓ |
| Balance automated and interactive testing methods appropriately | 3 | X |
| Conduct security tests as planned to identify weaknesses, evaluate access and boundary controls, and address privacy considerations | 3 | x |
| Perform performance tests based on defined metrics, such as response times and database update speeds | 3 | ✓ |
| Verify that fallback and rollback procedures are included and tested during execution | 3 | ✓ |
| Identify, log, and classify test errors (minor, significant, or critical), maintaining audit trails of results | 3 | ✓ |

Thus, after calculating the level 3 capability for objective BA107, the result was 54.55%, which means that based on the NPLF, it was rated as Largely Achieved, meaning that it was partially achieved and therefore could not proceed to the level 4 capability assessment.

### *3.14 Capability Gap Level*

This table 18 bellow, shows a comparison between the expected capability level and the current capability level of two priority processes/projects based on the COBIT 2019 framework, along with the existing gaps.

*Table 18. Capability Gap Level*

| Objectives Prioritas | Expected Capability Level | Current Capability Level | Gap |
|---|---|---|---|
| DSS03 | 5 | 5 | 0 |
| BA107 | 5 | 3 | 2 |

Thus, based on the capability gap level,

- The DSS03 (Manage Problems) process has achieved the optimal capability according to the target (Level 5). This indicates that problem management in the organization's IT system is running very well, is documented, measurable, and continuously improved. There is no gap, so no corrective action is needed at this time.
- The BA107 process shows a gap of 2 levels, currently at Level 3, while the target is Level 5. This indicates that although the process has been defined and standardized, there is no quantitative control and consistent continuous improvement.

### *3.15 Recommendation*

#### *3.15.1 DSS03 level 3 recommendation*

*Table 19. DSS03 level 3 recommendation*

| Sub- Objectives | Capability Level | Recommendations for Reaching the Expected Level |
|---|---|---|
| DSS03.05 Perform proactive problem management. | 3 | To ensure effective cross-process coordination in handling issues, organizations are advised to schedule regular meetings between the owners of incident, problem, change, and configuration management processes. These meetings can be facilitated in the form of a Problem Review Board or incorporated into the agenda of an existing Change Advisory Board (CAB). The main objective is to align incident status, root cause identification, and change plans to prevent similar incidents in the future. The results of the meeting should be recorded in the problem log and followed up in a structured manner. |

#### *3.15.2 BAI07 level 3 recommendation*

*Table 20. BAI07 level 3 recommendation*

| Sub- Objectives | Capability Level | Recommendations for Reaching the Expected Level |
|---|---|---|
| BAI07.01 Establish an implementation plan. | 3 | Organizations should formally review technical and business risks as part of implementation planning. Risks such as service disruption, system incompatibility, or lack of end-user readiness should be identified and recorded in a risk log. Appropriate mitigation plans should be developed and reviewed during the planning phase to ensure preparedness for worst-case scenarios. |
| BAI07.04 Establish a test environment. | 3 | In system testing, it is important to ensure that sensitive test data, such as customer data or financial transactions, is not leaked or misused. It is recommended to implement data masking techniques, data encryption, and strict access controls in the testing environment. In addition, the use of production data should be avoided unless it has undergone a sanitization process in accordance with data privacy policies. |
| BAI07.05 Perform acceptance tests. | 3 | Organizations should implement a combination of automated testing (for efficiency and speed) and manual testing (for user experience and usability validation). The use of automated scripts can be focused on regression and technical testing, while interactive testing can be conducted with end users to detect issues that are not technically detectable. |
| BAI07.05 Perform acceptance tests. | 3 | Security testing must be conducted to ensure that the system to be implemented is free from security vulnerabilities. This testing includes penetration testing, vulnerability analysis, and access control validation. The results must be used to strengthen the system before it is implemented in a production environment, and the documentation must be used as a reference for security audits. |
| BAI07.07 Provide early production support | 3 | After system implementation, end users often face challenges in adapting. Therefore, organizations need to provide additional resources such as a dedicated helpdesk team, brief training sessions, user manuals, and online Q&A sessions. This is important to ensure a smooth transition process and prevent service disruptions due to user errors. |
| BAI07.07 Provide early production support | 3 | To support system stability after implementation, organizations need to plan and provide additional resources for their IT infrastructure until the system is running stably in the operational environment. These resources may include increased server capacity, additional bandwidth, increased computing power (CPU/memory), and real-time system performance monitoring using monitoring tools. This is especially important in the early stages of production, when user access loads increase dramatically and the potential for bottlenecks or disruptions is still high. With the availability of additional system resources tailored to needs, organizations can avoid downtime, maintain service quality, and accelerate system adjustments to actual workloads. In addition, documentation of the use of these temporary resources should be carried out as part of the evaluation and learning process for future launches. |

## 4. CONCLUSION

Based on the results of the study on IT governance at PT. Tirta Investama Airmadidi using the COBIT 2019 framework, it can be concluded that although the organization has made significant progress in aligning IT processes with business objectives, several areas still require improvement. Quantitative capability analysis shows that the DSS03 (Manage Problems) process achieved 100% at Levels 2, 4, and 5, and 85.71% at Level 3, indicating that problem management is “Fully Achieved” and meets the expected maturity level of 5 with no gap. This reflects robust

documentation, proactive root-cause handling, and continuous improvement practices. On the other hand, the BAI07 (Manage Change Acceptance and Transitioning) process achieved only 54.55% at Level 3, categorized as "Largely Achieved", with a gap of 2 maturity levels compared to the target level 5. This shortfall points to weaknesses in test environment readiness, post-implementation evaluation, and stakeholder involvement during change processes. Additionally, the analysis of design factors indicates that 90% of IT services are internally sourced, 100% of implementation follows a DevOps model, and 100% of technology adoption strategies are categorized as "slow adopter." These findings underline a strong internal control approach but also highlight limited innovation and strategic agility. Overall, while PT. Tirta Investama Airmadidi demonstrates high maturity in operational problem management, enhancing governance priorities, improving change management capabilities, and fostering greater stakeholder involvement are essential to achieving comprehensive IT governance maturity and fully realizing business objectives.

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