Implementation of COBIT 2019 with Domain DSS01, DSS03, and MEA01 for Audit of Customer Water Usage Recording Information System at HIPPAM Mandiri Arjowinangun

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Abstract

Currently, HMA faces challenges in optimizing the recording system, because the meter recording process is still done manually. This manual process hampers operational efficiency and data accuracy which impacts the quality of service to customers. Therefore, it is necessary to evaluate the existing information system to measure whether the application of information technology is in accordance with the goals and expectations of the organization. This study aims to analyze the application of information technology in HMA using the COBIT 2019 framework, specifically in the domains DSS01 (Manage Operations), DSS03 (Manage Problems), and MEA01 (Monitor, Evaluate, and Assess Performance). Through capability analysis in these three domains, this study identifies gaps in the existing system and provides recommendations for improvements to improve the efficiency and accuracy of the customer water usage recording system. The results of the study indicate that HMA's capability level is still below the desired target, so it is important to make improvements by implementing more integrated digital solutions and improving continuous monitoring and evaluation of system performance.

1. Introduction

HIPPAM Mandiri Arjowinangun (HMA) is a drinking water service provider in the Arjowinangun area, Malang City. HMA has a customer water usage recording system called MyArjowinangun to input the amount of customer water usage each month. The MyArjowinangun system still requires staff assistance to input large data on customer water usage, resulting in a lack of efficiency and data accuracy. This shows the need for better system governance so that water usage recording can be done more accurately and efficiently.(Maryati et al., 2018).

Information system audits play an important role in ensuring that the system is in accordance with the organization's vision and established standards. In the case of HMA, the audit focused on improving data efficiency and accuracy through improving the governance of the MyArjowinangun system. The purpose of this audit is to reduce manual processes, so that recording becomes more reliable and the risk of errors can be minimized. With a good audit, the system is expected to function more optimally(Rohmanto, 2023).

The COBIT 2019 framework is used as the primary guideline for improving information system governance. COBIT 2019 is globally recognized as an effective framework for managing and governing information technology. With this framework, organizations can improve the quality, efficiency, and security of their information systems. The guidance from COBIT 2019 helps identify areas for improvement to optimize governance. In the context of HMA, the audit aims to improve the efficiency and accuracy of water usage recording through improvements to the MyArjowinangun system.(Martinus et al., 2021).

COBIT 2019 divides IT governance into several important domains, including Deliver, Service, and Support (DSS) which ensures services run smoothly. Another domain is Monitor, Evaluate, and Assess (MEA), which helps organizations monitor and assess the overall effectiveness of the system. In the HMA case study, these two domains are used to improve the management of MyArjowinangun to be more efficient and according to needs. The implementation of these two domains is expected to significantly improve system performance.

In this study, the DSS and MEA domains are applied in the MyArjowinangun case study to improve system governance. DSS focuses on improving service quality and supporting system operations, while MEA directs monitoring and evaluation of system performance to ensure its effectiveness.(Awalia et al., nd). This study aims to optimize the MyArjowinangun system through the implementation of good governance, so that recording water usage in HMA becomes more efficient, accurate, and no longer relies too much on manual input from staff.

1.1 Literature Review

1.1.1 Theoretical Basis1.1.1.1 Information System Audit

Information systems audit is an evaluation process that aims to ensure that information systems support business objectives effectively, efficiently, and securely. This process involves examining the controls, security, and reliability of information systems. Information systems audits are used to identify weaknesses in systems that could pose risks to the organization.(Delvika et al., nd)For example, audit research on the General Ledger system at the Bandung PDAM Cooperative showed inaccuracies and data security issues, so an audit was conducted to improve the effectiveness of the system.(Rohmanto, 2023).

1.1.1.2 COBIT

COBIT 2019 is a global framework designed to help organizations manage and optimize information technology governance. This framework supports organizations in facing challenges such as digital transformation and improving the quality of IT management. In the context of PT Telkom, COBIT 2019 is used to design a SIBORDER system governance audit guide, with the aim of aligning IT with business needs and improving system efficiency.(Maryati et al., 2018).

1.1.1.3 Domain

The DSS01 domain ensures the delivery of information technology services that support organizational operations effectively. DSS03 focuses on incident management to ensure services continue to run optimally. MEA01 helps organizations monitor and evaluate system performance, so that weaknesses can be proactively fixed. In the MyArjowinangun case study, these domains were applied to improve the governance of water usage recording to be more efficient and accurate (Maryati et al., 2018).

1.1.2 Review of Previous Research

Previous research review was conducted to understand and evaluate research results relevant to this case study, especially in the application of DSS and MEA domains in the COBIT 2019 framework. In this review, ten articles related to information system governance and audit, COBIT 2019 implementation, and DSS and MEA domains were reviewed. The following table shows the results of the literature review gap analysis conducted on these articles:

Table 1. Previous Research Review

No.	Authors	Research Title	Domain	Results
1	Kezia Nadia, daughter of Martinus, Evi Maria, Hanna Prillysca Chernovita	Boost The Order (SIBORDER) Information System Governance Audit Guide Design at PT Telekomunikasi Indonesia Using COBIT 2019	BAI10, DSS03, DSS04, DSS05	Designing audit manuals, mapping RACI Charts, and preparing audit worksheets and schedules.
2	Yumi Novita Dewi, Missing Rifkawati Marbun	Audit of the Monitoring and Evaluation Information System (Monev) at the Ciracas District Health Center Using	EDM02, MEA03	Demonstrates good maturity level, supports IT governance improvements.
3	Clarissa Anindita Wahyuningtyas, I Ketut Adi Purnawan, Ni Made Ika Marini Mandenni	IT Governance Audit of Company X With COBIT 5	APO04, APO11, DSS03	Found the process regular, but the problem is not completely resolved.
4	The following are the names of the three actors: Lisda Awalia Aprilianti, Eko Darwiyanto, Yanuar Firdaus Arie, and Eko Darwiyanto.	Information Technology Governance Audit Using the COBIT 5 Framework (Case Study of PDAM Tirta Patriot, Bekasi City)	APO01, MEA01, APO07	Recommend improvements to work products to achieve target capability levels.
5	Ricky Rohmanto	General Ledger Information System Audit Using COBIT 5.0 Framework (Case Study of PDAM Bandung Cooperative)	APO01, APO07	Identifies low capability levels (0.85) and provides recommendations for improvement.
6	Bayu Delvika, Naufal Abror, Dwi Sri Rahayu, Muhammad Hafis Zikri, Habib Dwi Putra, Megawati	Information System Audit Governance at BMKG Meteorological Station SSK II Pekanbaru Using COBIT 2019	APO03, APO05, APO07, APO12, BAI02	Suggest governance improvements to achieve level 3 Fully Achieved.
7	Eva Zuraidah, Besus Maula Sulthon	Sales Information System Audit at MAM UMKM Using Cobit 5 Framework	EDM04, APO04, APO07, BAI08, DSS01, MEA03	Optimize HR management, documentation, and regulatory compliance.
8	Good news for you, Arie Nugroho	A Local Government Application Capability Level Information System Audit using COBIT 5 Framework	DSS01, DSS06	Found level 1 capability GAP and recommended other frameworks for further research.

9	Gracela Beatrix Thenu, Christ Rudianto	Information System Audit Using Cobit Framework 2019 (Case Study: PT X)	MEA01	Improving domain capabilities through evaluation, HR training, and workflow improvements.
10	Sahrul, Elvin Leander Hadisaputro	Evaluation of Yankel Services Using DSS and MEA Domains Based on the COBIT 2019 Framework (Case Study of Manggar Village)	DSS01-DSS05, MEA	Improve SOPs, notification systems, data backup, and training management.

2. Methodology

This study uses a quantitative descriptive method that aims to analyze information technology governance at HIPPAM Mandiri Arjowinangun on the MyArjowinangun system. This study describes and summarizes the conditions and situations that occur in the implementation of the system by referring to the COBIT framework in the Deliver, Service, and Support (DSS) and Monitor, Evaluate, and Assess (MEA) domains.(Andika et al., 2023; Zuraidah & Sulthon, 2022).

2.1 Research flow

Fig 1. Flowchart of research stages

2.1.1 Study of Literature

At this stage, a literature study was conducted to understand the theory, concepts, and framework of COBIT 2019. The main focus is on the domains DSS01 (Operations Continuity), DSS03 (Problem Management), and MEA01 (Performance and Compliance Monitoring). This research was conducted by reading literature and articles related to the audit of the customer water usage recording information system at Hippam Mandiri Arjowinangun.(Rohmanto, 2023).

2.1.2 Domain Process Selection

At this stage, the domain to be analyzed is selected based on the needs and objectives of the study. Domains DSS01, DSS03, and MEA01 were selected because of the suitability of the domains with the management of the customer water usage recording information system at HIPPAM Mandiri Arjowinangun (HMA).

2.1.3 Questionnaire Development

At this stage, the researcher determines the questionnaire model based on the selected process domain. The questionnaire model is designed to measure the level of process capability based on the attributes contained in each COBIT 2019 capability level.

2.1.4 Data Collection in HMA

At this stage, data collection is carried out through in-depth interviews with the head and staff of HMA. Data from this interview is the basis for identifying gaps between current conditions and the ideal standards referred to by COBIT 2019.

2.1.5 Processing and Analysis of Survey Results

Survey data obtained from the Likert scale-based questionnaire will be processed to measure the level of capability of each selected process domain, namely DSS01, DSS03, and MEA01. Data processing and analysis aims to evaluate and determine the extent of the process capability in HMA, based on the NPLF scale (Not Performed, Partially Performed, Largely Performed, Fully Performed) that has been applied to the questionnaire.

2.1.6 Analysis of Gap Level

The results of the analysis will be compared with the standards set by COBIT 2019 to identify gaps. This analysis aims to find areas that need improvement.(Wahyuningtyas et al., nd).

2.1.7 Recommendations

Based on the results of the gap analysis, recommendations for improvement are prepared. These recommendations focus on steps that can improve the efficiency, accuracy, and compliance of the system with applicable standards. Based on the results of the gap analysis, recommendations for improvement are prepared. These recommendations focus on steps that can improve the efficiency, accuracy, and compliance of the system with applicable standards.

2.1 Data Collection Methods

The population and sample used are the chairman and staff of Hippam Mandiri Arjowinangun. There are two HMA members who will be used as samples to assess the use of the MyArjowinangun application, here is a list of HMA members:

- FatherThe Story of Zainul Fahrudin= Chairman of the Independent Hippam Arjowinangun
- Mr. Samsul Arifin = Meter Reading Officer

Data collection was conducted using questionnaires and direct observation. The measurement method used a qualitative scale.

2.2 Data Analysis Methods

There are two COBIT 2019 domains used in this study, namely Deliver, Service, and Support (DSS) and Monitoring, Evaluate, and Assess (MEA). The DSS domain focuses on the IT technical service and support process which includes system security rights, service continuity, training, and ongoing data management.(Sahrul & Hadisaputro, 2021). The DSS domain has six objects that cover the following:(Goddess & Miss Rifkawati Marbun, 2024):

1. DSS01 – Managing Operations.
2. DSS02 – Managing Service Requests and Incidents.
3. DSS03 – Managing Problems.
4. DSS04 – Managing Sustainability.
5. DSS05 – Managing Service Security.
6. DSS06 – Managing Business Process Control.

Then, the MEA domain has four objectives which cover the following:

1. MEA01 – Managed Performance and Confidence Monitoring
2. MEA02 – Managed System of Internal Control
3. MEA03 – Managed Compliance with External Requirements
4. MEA04 – Managed Assurance

The domains selected in this study are DSS01 (Managing Operations), DSS03 (Managing Issues), and MEA01 (Monitoring Performance and Conformance). The quantitative descriptive method in this study is used to convert numerical data into statements that describe existing conditions, so that it can provide an understanding of the extent to which the implemented system is in accordance with the controls recommended by COBIT 2019.

The measurement of the current capability level is calculated using the formula(Adriansyah et al., nd):

$$Tingkat\ Kapabilitas = \frac{\Sigma\ aktivitas\ yang\ sudah\ dilakukan}{Total\ aktivitas} \times 100\%$$

The process capability levels used in process assessment consist of six levels, namely:

1. Level 0: incomplete process, which is the process is not implemented or fails to achieve the goal. There is no evidence of systematic achievement of goals.
2. Level 1: performed process, which is the process implemented and the objectives achieved, but there is no further management or evaluation. This process has 1 attribute, namely.
    1) PA 1.1 Process Performance, which is to measure the extent to which process objectives can be achieved. The achievement of this attribute is seen from the output produced by each process.
3. Level 2: managed process, namely the process at level 1 is implemented with a more structured arrangement. This process includes planning, monitoring, evaluation, and proper control and maintenance, both for the implementation of the process and the work products produced. At this level there are two attributes, namely.
    1) PA 2.1 Performance Management: Measures the extent to which the implementation of the process has been well organized and managed.
    2) PA 2.2 Work Product Management: Measures the level of management of work products produced to comply with predetermined standards.
4. Level 3: established process, namely the process at level 2 is implemented using a clearly defined framework, so that it is able to achieve the expected results. At this level, there are two attributes, namely:
    1) PA 3.1 Process Definition: Measures the extent to which the process has been defined in sufficient detail to support consistent and effective implementation.
    2) PA 3.2 Process Deployment: Measures the extent to which established standards are effectively implemented in process execution.
5. Level 4: predictive process, namely the process at level 3 is run with defined boundaries to achieve consistent and predictable results. The process at this level focuses on quantitative management to ensure stability and predictability. This level has two attributes, namely:
    1) PA 4.1 Process Measurement: Measures the extent to which measurement data is used to ensure that process implementation effectively supports the achievement of organizational goals.
    2) PA 4.2 Process Control: Measures the extent to which the process is quantitatively regulated to produce stable results and within established limits.
6. Level 5: optimizing process, namely the process at level 4 is continuously improved to meet the current needs of the organization while preparing it for future challenges. The main focus at this level is to ensure that change and innovation are implemented effectively to support process improvement. This level has two attributes, namely:
    1) PA 5.1 Process Innovation: Measures the extent to which process changes can be identified based on existing process implementation and the innovation approach applied.
    2) PA 5.2 Process Optimization: Measures the extent to which defined changes can be managed and implemented effectively to support the improvement and achievement of organizational goals.(Thenu & Rudianto, 2024).

Table 2. Capability Assessment Categories

Average value (%)	Capability Level	Information
0 - 15%	Level 0: Incomplete	Processes are not implemented or fail to achieve objectives.
16 - 50%	Level 1: Performed	The process is implemented but there is no further management or evaluation.
51 - 75%	Level 2: Managed	Processes are managed with structured arrangements, including planning, control, and maintenance.
76 - 90%	Level 3: Established	The process uses a clearly defined framework, supporting consistent and effective implementation.
91 - 99%	Level 4: Predictable	Processes are run within quantitatively defined boundaries to achieve stable and predictable results.
100%	Level 5: Optimizing	Processes are continuously optimized with a focus on information and improvement to achieve broader organizational goals.

Table 3. Achievement Level Categories

Achievement Level	Value Range	Information
Not Achieved (N)	0-15%	Little or no evidence of attribute achievement; achievement is almost non-existent.
Partially Achieved (P)	>15%-50%	There is some evidence of approach and achievement, although it is inconsistent.
Largely Achieved (L)	>50%-85%	Systematic approach and significant achievements, although there are still weaknesses.
Fully Achieved (F)	>85%-100%	Full achievement with complete evidence of a systematic approach without any weaknesses.

3. Results and Discussion

3.1 RACI Chart Calculation

RACI Chart is a useful tool to explain each individual's role in carrying out certain tasks and their respective responsibilities.(Sahrul & Hadisaputro, 2021). Based on this context, the RACI Chart was created to divide the roles and responsibilities of Mr. Zainul Fahrudin and Mr. Samsul Arifin in managing the information system related to customer water usage. The following is an explanation of each parameter in the RACI Chart:

1. Responsible (R) : The person who is directly responsible for carrying out the task. They are the main executors who complete the work.
2. Accountable (A) : The person who is ultimately responsible for the task. They have the authority to make decisions and are accountable for the results.
3. Consulted (C) : A person who provides input or consultation regarding the tasks being carried out.
4. Informed (I) : People who need to know the results or decisions related to the task but are not directly involved.

Table 4. RACI diagram

Task	Mr. Zainul Fahrudin	Mr. Samsul Arifin
System Performance Monitoring (MyArjowinangun)	A	R
Preparation of System Performance Report	A	C
Water Use Data Collection	I	R
System Problem Solving (Troubleshooting)	A	R
System Security Evaluation	R	C
System Maintenance and Updates	A	C
System User Training	R	A
Preparation of System Improvement Plan	A	C

Table 5. RACI Diagram Results

Name	Competent
Mr. Zainul Fahrudin	DSS01, DSS03, and MEA01
Mr. Samsul Arifin	DSS01 and DSS03

3.2 DSS01 Process Assessment

Based on the RACI diagram, the sample of DSS01 is Mr. Zainul Fahrudin and Mr. Samsul Arifin. The following are the results of the DSS01 data calculation:

Table 6. DSS01 Data Calculation

Process Name	Level 0	Level 1	Level 2		Level 3		Level 4		Level 5	
DSS01		PA 2.1	PA 2.1	PA 2.2	PA 3.1	PA 3.2	PA 4.1	PA 4.2	PA 5.1	PA 5.2
Percentage (%)	100%	100%	3.3%		3.5%		3%		55.5%	
Criteria	F	F	N		N		N		L	
Capability Value		44.2%								

Based on the results of calculations and data analysis on the DSS01 domain at HIPPAM Mandiri Arjowinangun (HMA), the current condition shows a significant gap in operational process management capabilities. The DSS01 capability value was recorded at 44.2%, which indicates that HMA is still at Level 1 of the capability scale, which is a very basic level and requires significant improvement. This gap needs to be addressed immediately through improvements in the implementation of management systems and increased use of information technology to optimize operational processes at HMA.

3.3 DSS03 Process Assessment

Based on the RACI diagram, the sample of DSS03 is Mr. Zainul Fahrudin and Mr. Samsul Arifin. The following are the results of the DSS03 data calculation:

Table 7. DSS03 Data Calculation

Process Name	Level 0	Level 1	Level 2		Level 3		Level 4		Level 5	
DSS03		PA 2.1	PA 2.1	PA 2.2	PA 3.1	PA 3.2	PA 4.1	PA 4.2	PA 5.1	PA 5.2
Percentage (%)	100%	100%	47.2%		26.8%		21.8%		50%	
Criteria	F	F	P		P		P		L	
Capability Value			57.6%							

Based on the results of calculations and data analysis on the DSS03 domain at HIPPAM Mandiri Arjowinangun (HMA), the current condition shows some progress, but there are still gaps in the implementation of problem management. The capability value for DSS03 was recorded at 57.6%, indicating that HMA is at Level 2 of the capability scale, which is at a level that still requires significant improvement to achieve the desired standard. This indicates that although there have been some positive steps in problem management, HMA still needs to improve the integration and effectiveness of problem management processes to achieve a higher level of capability.

3.4 MEA01 Process Assessment

Based on the RACI diagram, the sample of MEA01 is Mr. Zainul Fahrudin. The following are the results of the MEA01 data calculation:

Table 8. MEA01 Data Calculation

Process Name	Level 0	Level 1	Level 2		Level 3		Level 4		Level 5	
DSS01		PA 2.1	PA 2.1	PA 2.2	PA 3.1	PA 3.2	PA 4.1	PA 4.2	PA 5.1	PA 5.2
Percentage (%)	100%	100%	16.1%		15%		43%		10%	
Criteria	F	F	P		N		P		N	
Capability Value		47.3%								

Based on the results of data calculations on the MEA01 domain at HIPPAM Mandiri Arjowinangun (HMA), the analysis shows that there are several significant challenges in monitoring and evaluating system performance. HMA is at Level 1, which is at a level that still requires improvement and strengthening in terms of monitoring and evaluating system performance. This condition indicates that although there are efforts to evaluate performance, the overall performance monitoring and evaluation process still needs to be improved to achieve higher capability standards and support organizational goals effectively.

3.5 GAP and Recommendations

GAP or gap in capability level is the difference between expected capability and target level with current capability. The level of gaps in the three audited domain processes can be seen in Table 9 below.

Table 9. Gap Capability Level

Domain	Current Capability (CC)	Expected Capability (EC)	GAP (EC - CC)
DSS01	44.2%	80%	35.8
DSS03	57.6%	80%	22.4
MEA01	47.3%	80%	32.7

This study provides recommendations for improvement to address the gaps (GAP) of the audited IT process capability level, so that the process can be implemented more optimally and increase its capability level. These recommendations are based on the COBIT 2019 standard. Table 10 below contains the proposed improvement recommendations for HMA with reference to the DSS01, DSS03, and MEA01 domains.

Table 10. Recommendations and Solutions Provision

No.	Domain	Recommendations and Solution Provision
1.	DSS01	- Installing a digital meter reader device that is directly connected to the MyArjowinangun system to automate recording and reduce manual errors. - Connect the billing recording system with the online payment module so that customers can make payments directly through the application, reducing manual processes. - Create operational procedure documentation within the application to make it easier for staff to follow procedures, improve consistency and quality of work.
2.	DSS03	- Develop an automated problem reporting system in the MyArjowinangun application or website to make it easier for customers to report complaints directly. Integrate the report with the notification feature to the technical team so that problems can be handled immediately according to priority. - Routinely implement root cause analysis to identify the root causes of problems in billing and transaction recording. Use the results of this analysis to design solutions that prevent similar problems from occurring in the future. - Provide regular training for officers on the use of reporting systems and standard steps for handling problems. Complete the training with scenario simulations to improve readiness and speed of response in handling customer complaints.
3.	MEA01	- Develop a real-time performance dashboard that displays analytical information about the performance of the accounting and payment system. This dashboard allows the management team to monitor key performance indicators (KPIs) and respond immediately if anomalies or performance declines are detected. - Conduct regular system evaluations and audits to ensure processes are aligned with organizational goals. Identify areas for improvement and ensure each process supports the achievement of efficiency and effectiveness targets. - Integrate performance data collected by the MyArjowinangun application with reporting systems to generate comprehensive reports. Use these reports to support data-driven decision making and drive continuous system improvement.

HIPPAM Mandiri Arjowinangun needs to carry out a gradual digital transformation to improve operational efficiency. This can be started by implementing a digital system for meter recording, which can speed up and simplify the process. In addition, technology also needs to be applied in other operational aspects, such as human resource management and system maintenance. Infrastructure improvements, such as faster internet connections and larger server capacities, must be carried out so that the MyArjowinangun application can run optimally. Staff training is also needed to ensure that adaptation to new technologies runs smoothly. With these steps, HIPPAM Mandiri Arjowinangun can reduce manual processes, increase efficiency, and meet capability targets according to the COBIT 2019 standard.

4. Conclusions

Based on the analysis of the implementation of COBIT 2019 in the DSS01, DSS03, and MEA01 domains in the customer water usage recording information system at HIPPAM Mandiri Arjowinangun, it can be seen that HMA still faces several challenges in achieving optimal capabilities. In the DSS01 domain related to operational management, there is a significant gap related to the use of information technology in meter recording which is still done manually with a capability value of 44.2%. The DSS03 domain related to problem management shows a capability value of 57.6%, but there is still a need for improvements in terms of a more efficient reporting and problem handling system. Meanwhile, in the MEA01 domain, which is related to monitoring and

evaluating system performance, the capability value was recorded at 47.3%, which indicates the need for improvements in performance measurement and overall system evaluation. HMA needs to carry out a gradual digital transformation by implementing more efficient technologies, such as an IoT-based automatic recording system, as well as improving the real-time reporting and problem analysis system to achieve the desired capability target, namely Level 3. By implementing these recommendations, HMA can improve efficiency and accuracy in recording and managing customer water usage transactions to strengthen system capabilities and support the achievement of higher capability targets in accordance with the COBIT 2019 standard.

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