ANALYSIS OF INFORMATION TECHNOLOGY GOVERNANCE AUDIT USING COBIT 2019 FRAMEWORK (A CASE STUDY AT GENERAL HOSPITAL DENPASAR)

Ni Putu Sukma Paramita Sari, I Gede Putu Krisna Juliharta, I Made Dwi Hita Darmawan
Universitas Primakara Denpasar
Jalan tukad badung No.135 Denpasar Bali 80226
niputusukma127@gmail.com

ABSTRAK

Effective information technology management is essential for hospitals to improve efficiency and quality of service. This research evaluates information technology governance at Bhakti Rahayu General Hospital Denpasar using the COBIT 2019 framework. The problem studied was the level of process capability in achieving IT governance objectives. The toolkit design factor analysis showed five domains with a score ≥75 were evaluated, namely risk management (APO12), security management (APO13), IT change management (BAI06), disaster recovery (DSS04), and system security management (DSS05). Data was collected through a questionnaire completed by five relevant respondents. The evaluation results show that APO13, BAI06, and DSS05 are at capability level 2, while APO12 and DSS04 are at level 1 with a capability gap of 2. Proposed recommendations include implementing an Information Security Management System (ISMS) and Security Information and Event Management (SIEM) in APO12, developing a security incident SOP and information security plan in APO13, establishing a cross-departmental team and documenting change requests in BAI06, improving security infrastructure in DSS04, and implementing cloud computing such as software as a service (SaaS) to save operational costs and increase flexibility in DSS05.

***Keywords**: Governance, Information Technology, COBIT 2019, Hospital.*

1. INTRODUCTION

In the rapidly growing digital era, information technology (IT) is one of the most important factors in supporting business growth, especially in the healthcare sector, namely in hospitals [1].

IT helps hospitals face challenges in the healthcare industry while improving efficiency, accuracy, and protection of health data. The implementation of an IT-based Hospital Management Information System (SIMRS) is expected to be a strategic innovation that supports the hospital's vision and mission [2].

SIMRS is designed to manage, store and analyse patient data in an integrated manner, and improve the efficiency and quality of health services. The system facilitates clinical and managerial decision-making. The implementation of SIMRS in Indonesia is required by the Minister of Health Regulation No. 82 Year 2013. However, although 90% of hospitals are connected to the MOH system, the effectiveness of SIMRS only reaches 79%, indicating challenges in its implementation, such as lack of data integration and difficulties in employee adaptation [3].

Effective IT governance is essential to ensure IT is aligned with hospital goals. One framework that can be used for IT governance audits is COBIT 2019, which helps identify gaps between technical issues, risks, and controls. This framework is useful for managing information and technology in hospitals [4].

Bhakti Rahayu General Hospital Denpasar is a fully accredited private hospital, having integrated IT in its operations since 2006. Evaluation and improvement of IT governance that is aligned with hospital goals can improve service quality on an ongoing basis and improve hospital accreditation even better. So it is necessary to conduct an IT governance audit to determine the level of capability (capability level) that is currently running at Bhakti Rahayu General Hospital Denpasar.

2. LITERATURE REVIEW

Theoretical Basis Control Objectives for Information and Related Technologies (COBIT), framework for managing and governing IT. The framework provides guidance on IT governance and management, covering aspects such as control, evaluation, and policy implementation. COBIT helps companies align IT strategies with business objectives, manage risks, and optimise IT resources. To support this research, a theoretical basis is needed which will be used in the research [5].

Entitled Evaluation of Governance and Audit of Ganesha Hospital Information Systems Using the COBIT 5 Framework. Evaluating IT governance at Ganesha Hospital using COBIT 5, the research focus is on the EDM04, APO07, DSS06, and MEA03 domains. The results show that the IT maturity level of SIMRS Ganesha is at level 3 (Established). The findings and improvement recommendations provided can be used as a reference for improving IT governance in the health sector [6].

Evaluated the security of the Hospital Management Information System at Palembang BARI Hospital using the COBIT 2019 framework. This research focuses on the EDM03, APO12, APO13, APO14, and DSS05 domains. The evaluation results

showed that system security was at level 3 (Defined), below the expected target. This research identifies risks, establishes controls, and provides improvement suggestions for IT governance [7].

Entitled IT Governance at Hospital Rachmi Dewi Gresik General Hospital Using Framework Cobit 5' shows that RSU Rachmi Dewi Gresik General Hospital has not yet reached the optimal level of IT governance, with a maturity level at level 1 (Performed Processes). The existing IT governance process still needs improvement to achieve a higher level of maturity [8]. This research is relevant and can be used as a reference in analysing IT management at Bhakti Rahayu Hospital, especially in developing more effective and efficient IT management strategies.

3. RESEARCH METHODS

This research uses a descriptive qualitative approach that focuses on an in-depth understanding of a problem, through a systematic case study. Qualitative approaches pay attention to observed phenomena, collect data, analyse information, and present findings in detail [9].

The data collection method was carried out using a questionnaire based on the COBIT 2019 framework, as well as observations and interviews to strengthen the research results.

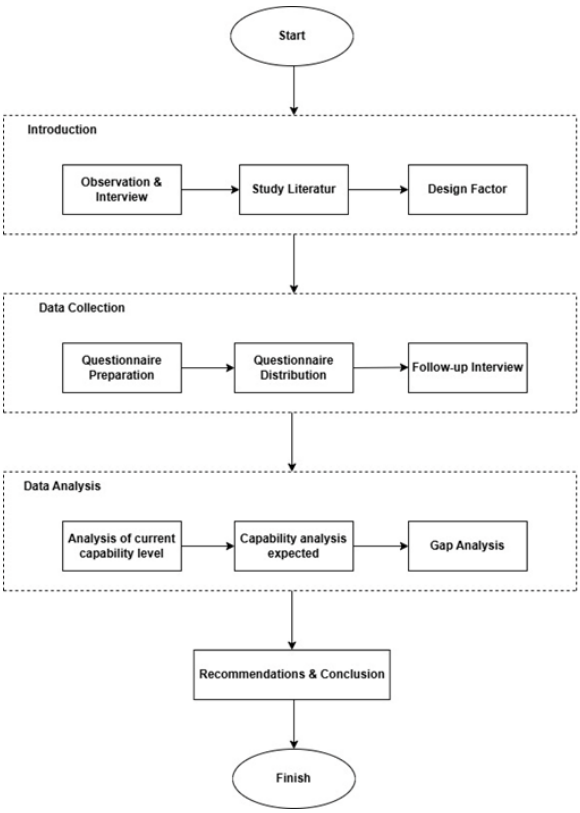

Figure I. Research Flow

3.1. Data Collection

The method of data collection in this study is as follows:

a. Interviews are as a support for the results of observations and questionnaire surveys that have been distributed to get the expected information. Interviews in this study were addressed to Head of IT Unit of Bhakti Rahayu Hospital Denpasar.
b. Questionnaire is a data collection method which consists of a list of questions to know the perception of a respondent against several given variables. The questionnaire in this study is based on selected process domains in the COBIT framework 2019.

3.2. Capability Level Analysis

Capability Level analysis is carried out after obtaining the results of questionnaire calculations with a Guttman scale. This analysis refers to the COBIT 2019 framework, which is used to assess the level of IT governance capability at RSU Bhakti Rahayu Denpasar both in the current condition (as-is) and the expected condition (to-be). Through this analysis, it can be identified to what extent the IT governance process has been implemented, as well as the gap from the current condition and the expected condition [10].

3.3. Capability Level Analysis

Gap Analysis (GAP) is an analysis process carried out after knowing the current level of capability (as-is) and the desired level of capability (to-be). The purpose of gap analysis is to identify activities that need to be carried out by the company to improve IT management, so that the actual conditions related to current capabilities can reach the expected level of capabilities in the future [5].

4. RESULTS AND DISCUSSION

4.1. IT Governance Design Factor

There are 11 stages in the IT governance design factor to design a governance system. Starting with understanding the context and strategy of the company, followed by determining the scope of the system through design factors 1 to 4. Next improvements and refinements are made to the scope of the system in design factors 5 to 11.

Table 1. Enterprise Strategy

Value	Importance (1-5)
Growth/Acquisition	4
Innovation/Differentiation	4
Cost Leadership	4
Client Service/Stability	5

Table 2. Enterprise Goals

Value	Importance (1-5)
EG01—Portfolio of competitive products and services	5
EG02—Managed business risk	5
EG03—Compliance with external laws and regulations	5
EG04—Quality of financial information	4

Value	Importance (1-5)
EG05—Customer-oriented service culture	4
EG06—Business-service continuity and availability	5
EG07—Quality of management information	4
EG08—Optimization of internal business process functionality	4
EG09—Optimization of business process costs	4
EG10—Staff skills, motivation and productivity	4
EG11—Compliance with internal policies	4
EG12—Managed digital transformation programs	5
EG13—Product and business innovation	5

Table 3. Risk Profile

Risk Scenario Category	Impact (1-5)
IT investment decision making, portfolio definition & maintenance	3
Program & projects life cycle management	3
IT cost & oversight	2
IT expertise, skills & behavior	3
Enterprise/IT architecture	3
IT operational infrastructure incidents	4
Unauthorized actions	3
Software adoption/usage problems	4
Hardware incidents	4
Software failures	2
Logical attacks (hacking, malware, etc.)	4
Third-party/supplier incidents	2
Noncompliance	3
Geopolitical Issues	2
Industrial action	2
Acts of nature	3
Technology-based innovation	3
Environmental	4
Data & information management	4

Table 4. IT Related Issues

I&T-Related Issue	Importance (1-3)
Frustration between different IT entities across the organization because of a perception of low contribution to business value	2
Frustration between business departments (i.e., the IT customer) and the IT department because of failed initiatives or a perception of low contribution to business value	2
Significant I&T-related incidents, such as data loss, security breaches, project failure and application errors, linked to IT	3
Service delivery problems by the IT outsourcer(s)	2
Failures to meet IT-related regulatory or contractual requirements	1
Regular audit findings or other assessment reports about poor IT performance or reported IT quality or service problems	2
Substantial hidden and rogue IT spending, that is, I&T spending by user departments outside the control of the normal I&T investment decision mechanisms and approved budgets	2
Duplications or overlaps between various initiatives, or other forms of wasted resources	2
Insufficient IT resources, staff with inadequate skills or staff burnout/dissatisfaction	2
IT-enabled changes or projects frequently failing to meet business needs and delivered late or over budget	2
Reluctance by board members, executives or senior management to engage with IT, or a lack of committed business sponsorship for IT	2
Complex IT operating model and/or unclear decision mechanisms for IT-related decisions	2
Excessively high cost of IT	2
Obstructed or failed implementation of new initiatives or innovations caused by the current IT architecture and systems	2
Gap between business and technical knowledge, which leads to business users and information and/or technology specialists speaking different languages	3
Regular issues with data quality and integration of data across various sources	1
High level of end-user computing, creating (among other problems) a lack of oversight and quality control over the applications that are being developed and put in operation	1
Business departments implementing their own information solutions with little or no involvement of the enterprise IT department (related to end-user computing, which often stems from dissatisfaction with IT solutions and services)	2
Ignorance of and/or noncompliance with privacy regulations	2
Inability to exploit new technologies or innovate using I&T	3

Table 5. Threat Landscape

Value	Importance (100%)
High	75%
Normal	25%

Table 6. Compliance Requirement

Value	Importance (100%)
High	25%
Normal	75%
Low	0%

Table 7. Role of IT

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

Table 8. IT Sourcing Model of IT

Value	Importance (100%)
Outsourcing	75%
Cloud	0%
Insourced	25%

Table 9. IT Implementation Methods

Value	Importance (100%)
Agile	50%
DevOps	10%
Traditional	40%

Table 10. Technology Adoption Strategy

Value	Importance (100%)
First mover	75%
Follower	15%
Slow adopter	10%

Enterprise Size, based on the number of employees in RSU Bhakti Rahayu Denpasar as many as 170 employees, which has a Small and Medium Enterprise type sourcing model because it has a range of 50-250 employees.

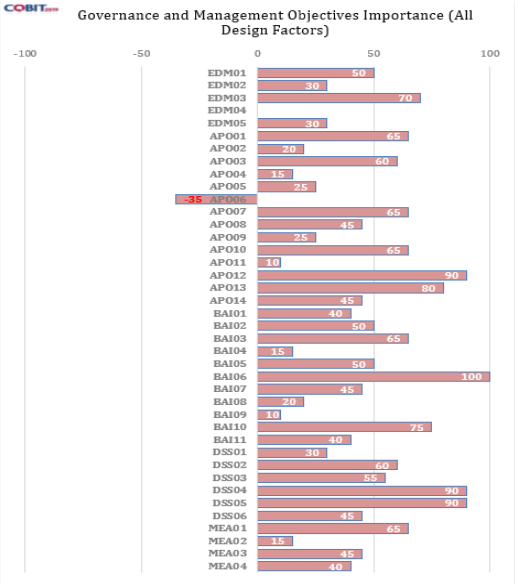

Figure 2. IT Governance Design Result

Interests that have a value of ≥75, namely APO12, APO13, BAI06, DSS04, and DSS05, are objectives that have a higher value and objectives that require a level of ability 4 than other objectives which are benchmark situations in concluding objectives that will be evaluated into the core model, so APO12, APO13, BAI06, DSS04, and DSS05 are process objectives that will continue to the core model evaluation stage.

4.2. Activity Capability Levels Analysis

Activities that reach the full capability level can continue to be analyzed for the assessment of the next level to determine the capability level of the company's activities. The following is the rating of process activities in determining capability levels.

Table 11. Capability Levels Rating

Scale	Description	Achievement (%)
N (0)	Not Achieved	0-14
P (1)	Partially Achieved	15-49
L (2)	Large Achieved	50-84
F (3)	Fully Achieved	85-100

Source: ISACA 2019

4.2.1. Managed Risk (APO12)

The APO12 capability level was measured through a questionnaire distributed to five employees of Bhakti Rahayu General Hospital Denpasar. The evaluation results are summarized as follows:

Table 12. AP012 Capability Level 2 Result

Respondent	Capability Values
Respondent 1	66%
Respondent 2	66%
Respondent 3	50%
Respondent 4	50%
Respondent 5	83%
Rotally	315%
Results	**63%**

The APO12 capability level at Bhakti Rahayu General Hospital Denpasar is at capability level 1, as level 2 has not reached full achieved (85%-100%). Therefore, it does not proceed to level 3 assessment due to remaining weaknesses.

4.2.2. Managed Security (APO13)

The APO13 capability level was measured through a questionnaire distributed to five employees of Bhakti Rahayu General Hospital Denpasar. The evaluation results are summarized as follows:

Table 13. AP013 Capability Level 3 Result

Respondent	Capability Values
Respondent 1	71%
Respondent 2	71%
Respondent 3	71%
Respondent 4	71%
Respondent 5	71%
Rotally	355%
Results	71%

The APO13 capability level at Bhakti Rahayu General Hospital Denpasar is at capability level 2, as level 3 has not reached full achieved (85%-100%). Therefore, it does not proceed to level 4 assessment due to remaining weaknesses.

4.2.3. Managed IT Changes (BAI06)

The BAI06 capability level was measured through a questionnaire distributed to five employees of Bhakti Rahayu General Hospital Denpasar. The evaluation results are summarized as follows:

Table 14. BAI06 Capability Level 3 Result

Respondent	Capability Values
Respondent 1	60%
Respondent 2	60%
Respondent 3	60%
Respondent 4	60%
Respondent 5	60%
Rotally	300%
Results	60%

The BAI06 capability level at Bhakti Rahayu General Hospital Denpasar is at capability level 2, because level 3 has not yet reached fully achieved (85%-100%). Therefore, it is not continued to level 4 assessment because there are still weaknesses.

4.2.4. Managed Continuity (DSS04)

The DSS04 capability level was measured through a questionnaire distributed to five employees of Bhakti Rahayu General Hospital Denpasar. The evaluation results are summarized as follows:

Table 15. DSS04 Capability Level 2 Result

Respondent	Capability Values
Respondent 1	63%
Respondent 2	47%
Respondent 3	57%
Respondent 4	57%
Respondent 5	57%
Rotally	281%
Results	56%

The DSS04 capability level at Bhakti Rahayu General Hospital Denpasar is at capability level 1, as level 2 has not reached full achieved (85%-100%). Therefore, it does not proceed to level 3 assessment due to remaining weaknesses.

4.2.5. Managed Security Services (DSS05)

The DSS05 capability level was measured through a questionnaire distributed to five employees of Bhakti Rahayu General Hospital Denpasar. The evaluation results are summarized as follows:

Table 16. DSS05 Capability Level 3 Result

Respondent	Capability Values
Respondent 1	70%
Respondent 2	58%
Respondent 3	65%
Respondent 4	58%
Respondent 5	58%
Rotally	309%
Results	61%

The DSS05 capability level at Bhakti Rahayu General Hospital Denpasar is at capability level 2, as level 3 has not reached full achieved (85%-100%). Therefore, it does not proceed to level 4 assessment due to remaining weaknesses.

4.3. Analysis of Current Capability Level (As-Is)

Overall capability level results from objective processes evaluated in measuring the level of IT governance capability is as follows as follows:

Table 17. Current Capability Level (As-Is)

GMO	Level	Achievement Description
APO12	1	The activities undertaken achieve their goals through the incomplete application of activities that can be categorised as intuitive not very organised.
APO13	2	The activities performed have achieved their objectives through the application of a basic, complete, and set of activities that can be characterised as performance.
BAI06	2	The activities performed have achieved their objectives through the application of a basic, complete, and set of activities that can be characterised as performance.
DSS04	1	The activities undertaken achieve their goals through the incomplete application of activities that can be categorised as intuitive not very organised.
DSS05	2	The activities performed have achieved their objectives through the application of a basic, complete, and set of activities that can be characterised as performance.

4.4. Expected Capability Level Analysis (To-Be)

The target capability level expected for each objective is obtained from the results of the analysis contained in the design conclusion factor (IT Governance Design Result). The expected capability level target is contained in the following table:

Table 18. Expected Capability Level (To-Be)

GMO	Level	Description of expected skill level
APO12	3	The activities undertaken achieve the objectives in a much more organised way by using the organisation's assets.
APO13	4	Activities performed have achieved their objectives well-defined performance (quantitatively measurable).
BAI06	4	Activities performed have achieved their objectives well-defined performance (quantitatively measurable)
DSS04	3	The activities undertaken achieve the objectives in a much more organised way by using the organisation's assets.
DSS05	4	Activities performed have achieved their objectives well-defined performance (quantitatively measurable).

4.5. Objective Capability Level Gap Analysis

The results of the analysis of the gap (gap) can be seen in the table below:

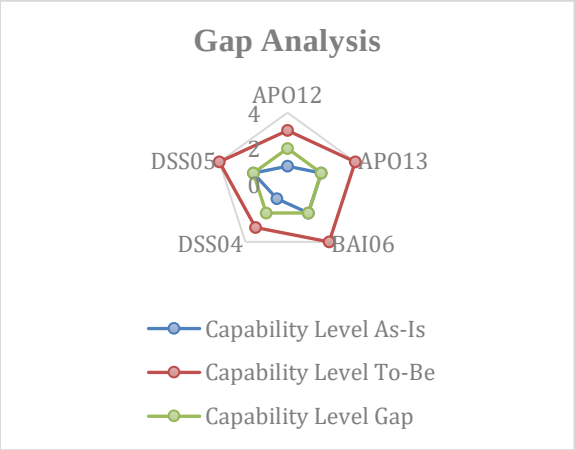

Figure 3. Gap Analysis

4.6. Audit Results and Recommendations

The following are the results and recommendations of the governance audit information technology governance audit of Bhakti Rahayu General Hospital Denpasar which is obtained as follows:

Table 19. Audit Result and Recommendations

Audit Results	Recommendation
IT risk management at Bhakti Rahayu General Hospital Denpasar is currently still at capability level 1. The risk that occurs today is about rules. Currently there is a risk of change due to regulations, such as in the one healthy application and the latest regulations from BPJS health. As a result, it increases the potential for patient data security, the process of migration and data integration is at risk of causing data loss or damage and needs adaptation to new applications so that it requires additional costs and resources.	Bhakti Rahayu General Hospital Denpasar needs to implement standard operating procedures for risk management and document all risk management processes, including risk identification, analysis and mitigation. Implement an Information Security Management System (ISMS) according to the ISO 27001 standard, as well as security monitoring using Security Information and Event Management (SIEM).
IT security management at Bhakti Rahayu General Hospital Denpasar is currently still at capability level 2. This hospital already has a basic policy that defines the main objectives and principles related to information security at RSU Bhakti Rahayu. Currently, the governance of cable placement in this hospital has not been optimally updated causing the difficulty of the maintenance process by the IT unit so that the network used for SIMRS both WiFi and LAN is not optimal.	Bhakti Rahayu General Hospital Denpasar should implement information security with ISO027001 standards and need to strengthen IT security policies with SOPs for handling security incidents and create an information security plan. Conduct employee training such as how to use the system safely, and choose strong passwords. Need to optimise the network by tidying up the clear placement of cables and other network infrastructure for easy access.
IT change management is currently at capability level 2, Bhakti Rahayu General Hospital Denpasar currently has a change submission document from each unit where the contents of the document explain the problems being faced and the reasons for the need to make changes. This document also includes factors such as regulations that require system updates or the addition of new features.	Bhakti Rahayu General Hospital Denpasar needs to create a documented SOP for Change Requests to state, assess, provide initial approval, authorise after changes and record emergency changes. Plan and evaluate all requests in a structured manner. Include impact analysis on business processes, infrastructure, systems and applications, business continuity plans (BCP) and service providers to ensure that all affected components are identified.
Disaster recovery management at Bhakti Rahayu General Hospital Denpasar is at capability level 1. Bhakti Rahayu General Hospital Denpasar is currently in the planning stage in reporting the business continuity plan (BCP) and disaster recovery plan (DRP) to ensure that the sustainability plan can function properly.	It is expected that Bhakti Rahayu General Hospital Denpasar will improve its security infrastructure, including the implementation of firewalls, intrusion detection systems, data encryption, and access control. Conduct an inventory of existing security technologies and identify shortcomings.
The management of system security services at Bhakti Rahayu General Hospital Denpasar is currently at capability level 1. Bhakti Rahayu General Hospital Denpasar currently implements measures to protect the confidentiality, integrity, and availability of data and already uses antivirus security software. However, there is no system security monitoring report and no procedure for handling system security incidents.	Bhakti Rahayu General Hospital Denpasar needs to implement cloud computing such as software as a service (SaaS) to save operational costs, increase flexibility, and agility. Implement a real-time security monitoring system to detect and prevent threats to data confidentiality, integrity, and availability.

5. CONCLUSIONS AND SUGGESTION

Based on the discussion, it can be concluded that the IT governance audit at RSU Bhakti Rahayu Denpasar using the COBIT 2019 framework identified five process domains with a score ≥75, namely risk management (APO12), security management (APO13), managed IT changes (BAI06), managed disaster recovery (DSS04), and system security management (DSS05). The capability level analysis shows that APO13, BAI06, and DSS05 are at level 2, while APO12 and DSS04 remain at level 1, indicating the need for further improvements. To enhance IT governance, it is suggested that future research evaluate domain processes in hospitals with higher accreditation (Types A, B, and C) for a more comprehensive assessment. Additionally, other frameworks such as ITIL, ISO/IEC 27001, NIST Cybersecurity Framework, or Balanced Scorecard can be used to evaluate IT governance performance and strategy alignment. Lastly, RSU Bhakti Rahayu Denpasar is encouraged to improve IT governance based on accreditation standards to enhance its accreditation level.

REFERENCES

[1] I. M. D. H. Darmawan, "Information Technology Training Towards Digital MSMEs (Collaboration with the Bangli District Cooperative and MSMEs office)," *Journal of Social Sciences and Technology for Community Service*, vol. 4, no. 2, 2023, doi: 10.33365/jsstcs.v4i2.2807.

[2] G. Natalia Krisnawati, S. Sucipto, and R. Firliana, "Evaluasi Penerapan SIMRS Menggunakan COBIT 5 Pada RSUD Lawang," *Antivirus : Jurnal Ilmiah Teknik Informatika*, vol. 13, no. 2, pp. 80–89, Nov. 2019, doi: 10.35457/antivirus.v13i2.858.

[3] S. N. D. Septiyani and W. Sulistiadi, "Penerapan Sistem Informasi Manajemen Rumah Sakit (SIMRS) Dengan Menggunakan Metode Hot-Fit: Systematic Review," *J-KESMAS: Jurnal Kesehatan Masyarakat*, vol. 8, no. 2, p. 136, Nov. 2022, doi: 10.35329/jkesmas.v8i2.3706.

[4] Harisaiprasad Kumaragunta, "COBIT 2019 and COBIT 5 Comparison," ISACA. Accessed: Nov. 17, 2024. [Online]. Available: https://www.isaca.org/resources/news-and-trends/industry-news/2020/cobit-2019-and-cobit-5-comparison

[5] I. G. W. Aditya, I. G. P. K. Juliharta, and I. G. A. P. D. Putri, "Penerapan Framework COBIT 2019 Dalam Audit Tata Kelola Sistem Informasi Pada LPD Desa Beraban," Denpasar, 2023. doi: https://doi.org/10.36040/jati.v7i4.7142.

[6] D. G. E. K. Pradana, A. A. I. I. Paramitha, and P. G. E. Juliana, "Evaluasi Tata Kelola dan Audit Sistem Informasi Rumah Sakit Ganesha Menggunakan Kerangka Kerja COBIT 5," *Journal of Applied Management and Accounting Science (JAMAS*, vol. 01, no. 1, pp. 65–75, 2019.

[7] M. A. Algiffary, M. Izman Herdiansyah, and Y. N. Kunang, "Audit Keamanan Sistem Informasi Manajemen Rumah Sakit Dengan Framework COBIT 2019 Pada RSUD Palembang BARI," *Journal Of Applied Computer Science And Technology (JACOST)*, vol. 4, no. 1, pp. 2723–1453, 2023, doi: 10.52158/jacost.505.

[8] S. Rachmawati, R. Rosidin, and M. Lubis, "Information Technology Governance at Rachmi Dewi Gresik Hospital Using the Cobit 5 Framework," in *2022 1st International Conference on Information System and Information Technology, ICISIT 2022*, Institute of Electrical and Electronics Engineers Inc., 2022, pp. 301–305. doi: 10.1109/ICISIT54091.2022.9873099.

[9] I. M. D. H. Darmawan and I. B. A. Putra, "Transformasi Regulasi Pengembangan dan Penguatan Sektor Keuangan Otoritas Jasa Keuangan: Sebuah Evaluasi dan Rekomendasi," *Jurnal Eksplorasi Akuntansi* , vol. 6, no. 3, pp. 1022–1033, Aug. 2024, doi: 10.24036/jea.v6i3.1620.

[10] L. Lubna, A. H. Muhammad, and A. Purwanto, "Identifikasi Level Tata Kelola TI dan Penilaian Tingkat Capability Level Menggunakan COBIT 2019," *JIPI (Jurnal Ilmiah Penelitian dan Pembelajaran Informatika)*, vol. 8, no. 3, pp. 815–827, Aug. 2023, doi: 10.29100/jipi.v8i3.3947.