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Audit of Hospital Management Information Systems Based on The COBIT 4.0 Framework

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ABSTRACT

The Hospital Management Information System (SIMRS) audits primarily assess maturity levels without establishing a direct link to strategic management decision-making. This research examines the governance of SIMRS at Wangaya Regional General Hospital in Denpasar City, using the COBIT 4.0 framework, and explores how audit outcomes can influence the development of hospital information technology policies and strategies. The methodology involved auditing four COBIT 4.0 domains: Plan and Organize (PO), Acquire and Implement (AI), Deliver and Support (DS), and Monitor and Evaluate (ME), with maturity level assessment serving as the analytical foundation. Findings reveal that the DS domain boasts the highest maturity level at 3.4, whereas the ME domain presents the lowest at 2.0. These results suggest that while SIMRS effectively supports healthcare service functions, it is not aligned with strategic planning processes and continuous IT performance assessments. This study's contribution lies in translating the audit findings into strategic recommendations for operational and contextual IT governance tailored for regional hospitals functioning as Regional Public Service Agencies.

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1. PENDAHULUAN

Wangaya Regional General Hospital, located in Denpasar City, is a government-owned Type B facility. It offers outpatient health services across 24 polyclinics[1]. The hospital aims to be the preferred choice for patients by delivering innovative, high-quality, and exceptional health services[2]. Wangaya Regional General Hospital plays a crucial role as the primary healthcare provider in the area[3]. To enhance the quality and sustainability of its services, the hospital has adopted innovative measures, including electronic medical records. [4][5].

The adoption of this technology not only enhances the efficiency of patient data management but also improves coordination and the overall quality of healthcare services [6]. Wangaya Regional General Hospital plays a vital role as a primary healthcare provider in its vicinity[1]. To uphold and advance the quality of services offered, this hospital integrates technological advancements as a key strategy [7].

In its commitment to continuous innovation, Wangaya Regional General Hospital has implemented an electronic Hospital Management Information System [8]. This choice was made to improve the efficiency, precision, and accessibility of patient information [9]. The information system implementation has been initiated at Wangaya Regional General Hospital, with a focus on electronic medical record audits. However,

the auditing process has not been performed regularly or effectively, creating challenges for management in establishing the direction and policies for the information system's development [10].

A crucial measure to enhance the quality of electronic medical records is conducting regular, effective audits of the information system [11]. These system audits serve as a vital tool in evaluating how well the electronic medical record system aligns with security, integrity, and availability standards for health data[12][8].

In evaluating the effectiveness of the electronic medical record system at Wangaya Regional General Hospital, the author employs the COBIT (Control Objectives for Information and Related Technologies) framework to carry out the system audit. COBIT offers extensive guidelines for managing, controlling, and auditing information technology, aligning with the requirements and standards of healthcare services [13] [14]. Conducting information system audits requires a structured framework, and COBIT is a prominent option [15].

The COBIT framework provides comprehensive insights into information systems governance, from planning through evaluation and monitoring [16]. It encompasses four primary domains: plan and organize, acquire and implement, deliver and support, and monitor and evaluate [13]. COBIT's capabilities enable auditors, users, and management to effectively address the intersection of business risks, control requirements, and technical IT challenges [17]. Consequently, COBIT provides a detailed, comprehensive overview of the strategies and configurations of information technology processes that underpin business strategies [15] [1].

By conducting information system audits of electronic medical records using the COBIT 4.0 framework at Wangaya Regional General Hospital, operational efficiency is expected to improve, patient service quality to increase, and patient health data to remain secure. This will facilitate more straightforward decision-making regarding the direction and policies for future information system development. [3]

Consequently, technological innovation serves not only as a pathway to advancement but also as a crucial measure to meet the rising standards of health service delivery. [6][8][5]

2. METHOD

2.1. Audit Phases

The phases of an information system audit are categorized into four distinct parts: audit planning, preparation, execution, and reporting. Each phase encompasses various interconnected sub-processes. The relevant sub-processes are as follows:

1. Information System Audit Planning Phase: In this phase, the auditor must familiarize themselves with the stakeholders involved (auditee).
2. Information System Audit Preparation Phase: The research team will meticulously plan and oversee the detailed execution of the information system audit.
3. Information System Audit Execution Phase: During this phase, the auditor gathers and assesses evidence and data regarding the application of Information Technology within the Management Information System at Wangaya Hospital, conducts the necessary information system audit, and performs compliance testing.
4. Information System Audit Reporting Phase: This final phase involves the auditor preparing an objective and thorough audit report, which will ultimately be presented to the auditee (the party under audit).

2.2. COBIT Domains

COBIT 4.0 consists of four primary domains, which are as follows:

1. Planning and Organization

The Planning and Organization (PO) domain focuses on identifying IT investments and formulating strategies to achieve business objectives. This domain encompasses eleven key elements, including:

a. PO1: Establishing the strategic plan for the information system
b. PO2: Outlining the information architecture
c. PO3: Defining the technological direction
d. PO4: Clarifying organizational and IT relationships
e. PO5: Overseeing IT investments
f. PO6: Communicating management goals and directives
g. PO7: Managing human resources effectively

h. PO8: Ensuring adherence to external requirements
i. PO9: Conducting risk assessments
j. PO10: Overseeing project management
k. PO11: Ensuring quality management

2. Acquisition and Implementation

The Acquisition and Implementation (AI) domain aims to integrate an IT strategy within business processes. It includes six essential components, which are:

a. AI1: Identifying automated solutions
b. AI2: Acquiring and maintaining application software
c. AI3: Acquiring and sustaining technology infrastructure
d. AI4: Developing and upholding procedures
e. AI5: Installing and accrediting systems
f. AI6: Managing change effectively

3. Delivery and Support (DS)

The Delivery and Support (DS) domain emphasizes the importance of IT service delivery and support within a business context, encompassing aspects such as security management, user assistance, and data handling. This domain includes 13 key components, which are:

a. DS1: Defining and managing service levels
b. DS2: Overseeing third-party services
c. DS3: Performance and capacity management
d. DS4: Ensuring ongoing service availability
e. DS5: Safeguarding system security
f. DS6: Identifying and allocating expenses
g. DS7: User education and training
h. DS8: Customer assistance and guidance
i. DS9: Configuration management
j. DS10: Problem and incident management
k. DS11: Data management
l. DS12: Facilities management
m. DS13: Operations management

4. Monitoring and Evaluating

In the Monitoring and Evaluation (ME) domain, the need to regularly assess all IT processes is emphasized to ensure they meet quality and compliance standards. This domain focuses on 4 main components, which are:

a. ME1: Process monitoring
b. ME2: Evaluating the effectiveness of internal controls
c. ME3: Obtaining independent verification
d. ME4: Facilitating independent audits.

2.3. Maturity Level

The maturity model serves as a framework for evaluating the advancement of process management.

Table 1. IT Management Capability Level Scale

Level	Criteria
0 (Non Extent)	The organization or organizations lack any awareness of the IT processes within their structure.
1 (Initial/ Ad Hoc)	The organization acknowledges the significance of a particular issue. Nevertheless, there is no formalized procedure in place; instead, a team-based approach is utilized, executed individually and on a case-by-case basis.
2 (Repeatable but Intuitive)	At this stage, regulations to oversee the progression of a project and methods for executing those regulations have been put in place. Procedures have been refined to a point where various individuals perform identical tasks using the same approaches.

3 (Defined Level)	There are sufficient SOPs and training in place. Nevertheless, there is no requirement to adhere to the standards, resulting in frequent unnoticed deviations.
4 (Managed Level)	There is a process for monitoring and evaluating the implementation of standards, along with measures to address any inefficiencies in the process. This procedure is conducted under the umbrella of ongoing performance enhancement and is executed properly.
5 (Optimized Level)	The process has reached its optimal level (best practice), leading to improvements in Monev outcomes. This ongoing process has bolstered the Organization's Vision and Mission, as well as the formulation of development plans for the short, medium, and long term.

3. OUTCOME AND ANALYSIS

1. Domain Plan and Organize (PO)

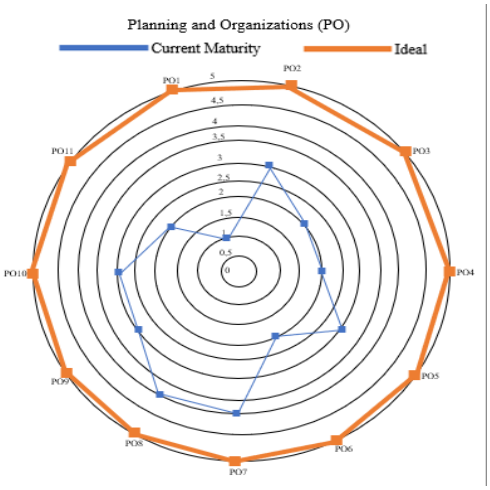

Figure 1. Maturity Levels in the PO Domain

Table 2. Maturity Level Assessment Outcomes in the Plan and Organize (PO) Domain

Domain	Maturity Level	Outcomes
PO1	1	The Hospital has yet to perform a comprehensive analysis concerning the formulation of information technology strategies and the associated risks overall. Currently, performance measurement remains an informal process.
PO2	3	Implementation of consistent training schedules for all new employees has been initiated; however, communication has not been executed uniformly, and an organizational data dictionary along with policies is currently absent.
PO3	2	The allocation of duties and responsibilities in the development and upkeep of infrastructure has not been applied uniformly. However, there are established criteria for choosing reliable vendor partnerships for the long haul.
PO4	2	Proportional oversight of all personnel to guarantee that duties and responsibilities are fulfilled effectively, preventing any backlog of tasks for individuals. Nevertheless, an IT control committee has yet to be established.
PO5	3	Investment policies and procedures have been shared and discussed with the individuals accountable for each project category; however, comprehensive guidelines have not yet been articulated, and IT benefits management has not been implemented.
PO6	2	Formal training is provided to enhance the information control environment, occurring every three months. The management has established protocols for the storage and backup of data to ensure the security of information technology.
PO7	4	Regular assessments have been conducted for every employee, and the outcomes of these evaluations serve as benchmarks for implementing training and professional development programs for the staff.

PO8	4	A training initiative was held to emphasize the significance of service quality via information technology, targeting all tiers of staff who interact directly with customers or patients.
PO9	3	Ineffective staff planning related to supervisory tasks across all tiers for the purpose of conducting risk identification.
PO10	3	Insufficient clarity in the assignment of roles and expectations for a project leader leads to extended timelines and delays in project completion.
PO11	2	The approach to planning quality management for systems and the development of their life cycles remains informal. Although quality assessments and measurements are routinely conducted by quality control, they tend to be quite basic.
Total		29
Average		2,6

According to the table presented above, the outcomes derived from the COBIT 4.0 framework yield an average score of 2.6. This indicates that the maturity assessment for the Planning and Organization domain concerning HMIS is classified at level 2 (Repeatable).

2. Domain Acquire and Implementation (AI)

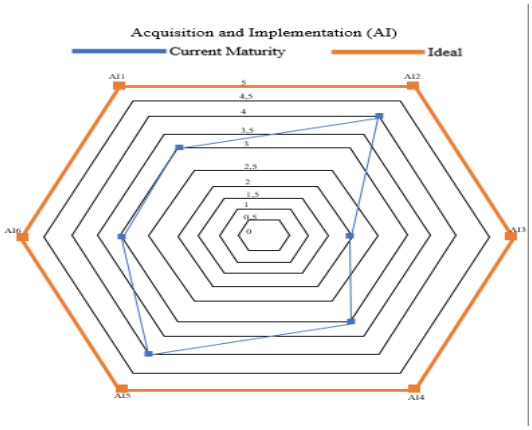

Figure 2. Maturity Levels of AI Domain

Table 3. Maturity Level Measurement Outcomes in the Aquire and Implementation (AI) Domain

Domain	Maturity Level	Outcomes
A11	3	As it has successfully established and executed research on automated solutions. The hospital possesses a report concerning risk assessment. Solutions have been recognized both informally and through a systematic method.
A12	4	Reflecting the solid maintenance of the system. However, the agency still lacks a comprehensive approach to the upkeep of its application software. This is highlighted by the presence of procedures for software maintenance, which are not being effectively executed. Furthermore, while the IT staff's skills and HR experience have been aligned with the agency's requirements, they remain inadequate. Additionally, the agency's responsibilities have not been properly formalized or consistently implemented.
A13	2	As the agency possesses a technology infrastructure acquisition strategy that fulfills functional needs. Additionally, it has formulated strategies and plans for maintaining the infrastructure and has guaranteed that all modifications adhere to established change management protocols.
A14	3	As the agency is already focused on the establishment and upkeep of information system protocols. Nevertheless, the agency has yet to effectively communicate these information system protocols to all personnel currently working at the hospital.

A15	4	The IT department maintains a comprehensive understanding of system accreditation. Whenever it is essential to validate and ensure that the implemented system meets testing requirements, evaluations are conducted each time medical staff requests it. Additionally, any challenges encountered during system implementation are thoroughly examined to identify any issues, enabling prompt repairs to be made.
A16	3	Agencies have the ability to adjust to shifts that arise from system updates. Nonetheless, the processes implemented are often not very effective and tend to be purely procedural.
Total		19
Average		3,1

According to the table provided, the outcome derived from the COBIT 4.0 framework yields an average score of 3.1. This indicates that the maturity assessment for the Acquisition and Implementation domain concerning HMIS is positioned at level 3 (Defined Process).

3. Domain Delivery and Support (DS)

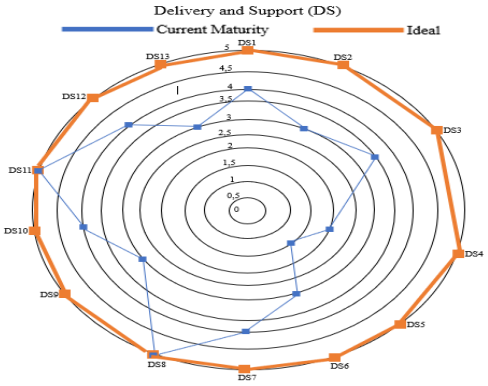

Figure 3. Maturity Levels of DS Domain

Table 4. Maturity Level Measurement Outcomes in the Delivery and Support (DS) Domain

Domain	Maturity Level	Outcomes
DS 1	4	A service level agreement has already been established and is either formal or governed by existing procedures. The service level coordinator has received a definitive task, albeit with restricted authority. Nevertheless, the documentation pertaining to the service level framework remains informal.
DS 2	3	Formal documentation exists outlining the technical and organizational relationship, detailing tasks and responsibilities, objectives, and anticipated deliverables. Third-party performance is monitored based on information, yet there is no documentation available regarding this process.
DS 3	3,5	In overseeing the performance and capacity of IT resources within the hospital, a structured approach is taken, and suggestions from the medical records department are forwarded to external parties. Currently, the IT performance in the hospital is satisfactory, with applications seldom encountering issues, along with stable data storage and robust IT infrastructure.
DS 4	2	The agency currently has an individual responsible for executing the framework as a backup option in case of any disruption in information system services. Nonetheless, there is no established framework available to be utilized as an alternative solution during such service disruptions.
DS 5	1,5	Assessment of data security and physical infrastructure associated with health facility information systems has been conducted effectively. However, there is a lack of documented definitions outlining the factors that lead to disruptions in information system services, as well as the measures for involvement.

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DS 6	3	Insufficient guidance from leadership regarding the identification, assessment, and allocation of costs associated with all system-related expenditures has led to a lack of consistent reporting on the outcomes of cost identification and utilization in both business and IT operations.
DS 7	4	The health center has provided instruction and training to users regarding HMIS data processing tasks, shared the outcomes of the training and education on the system, and assessed the training and education of users.
DS 8	5	sufficient communication channels are in place to address user inquiries and concerns. Management responds effectively to user issues and queries, and regular reviews of these problems are conducted to analyze their root causes, ensuring that similar issues do not arise again in the future.
DS 9	3	Within the hospital, a monitoring protocol is in place to oversee database access activities conducted by management in the healthcare setting. Additionally, there are established policies, procedures, and standards that outline ethical guidelines for computer usage and define user access rights to organizational data.
DS 10	4	Issues and challenges that emerge in the implementation of information systems are investigated and addressed promptly and effectively. Nonetheless, there are no established protocols or criteria for managing repair issues, which continue to be addressed reactively, lacking systematic procedures for resolution.
DS 11	5	The hospital has recognized its data requirements. The data management process involves implementing efficient protocols, including data backup and recovery strategies along with appropriate media disposal methods, all designed to enhance the quality, timeliness, and accessibility of business data.
DS 12	4	Visitor activities within the hospital premises are already under surveillance to reduce the chances of unauthorized individuals gaining physical access to the IT infrastructure. Furthermore, the area is additionally secured with a CCTV system.
DS 13	3	the availability of alternative procedure training conducted by users during system outages. This includes techniques for data backup and restoration. In cases where a user's computer becomes inoperable unexpectedly, an alternative location is available. Data access is performed in line with the standard working hour schedule.
Total		45
Average		3,4

According to the table above, the outcomes from the COBIT 4.0 framework have an average score of 3.4. This indicates that the maturity level assessment within the Delivery and Support domain for HMIS falls at level 3 (Defined Process).

4. Domain Monitoring and Evaluate (ME)

Figure 4. Maturity Levels of ME Domain

Table 5. Maturity Level Measurement Outcomes in the Monitoring and Evaluate (ME) Domain

Domain	Maturity Level	Outcomes
ME 1	1	The hospital has yet to implement a unified monitoring framework and strategy to outline the scope, methodology, and procedures required to assess information technology solutions and evaluate the impact of information technology on the business.
ME 2	4	Internal control has been established to ensure sufficient assurance in the compilation of financial reports that comply with financial accounting standards. Hospital accurately manages information that serves to offer security assurance in safeguarding organizational assets, particularly in cash receipts. In real-world scenarios, if an error occurs, corrective measures will be initiated; however, these actions might not be implemented promptly.
ME 3	2	While there is currently no formal IT implementation policy in place, an approach has been established to guide the objectives of IT implementation. However, this has not been executed effectively, highlighting the necessity for the development and management of IT implementation policies that align with relevant SOP standards. Additionally, it is important to offer clear guidance for managing and assessing business processes.
ME 4	1	As independent audits at the hospital are currently in the planning phase, both within the organization and from external sources, it is crucial to ensure that all hospital procedures comply with the relevant regulations and laws in Indonesia. This also highlights how companies can stay informed about the most recent regulatory updates.
Total		8
Average		2

According to the table provided, the results from using the COBIT 4.0 framework show an average score of 2. This indicates that the maturity level assessment within the Delivery and Support domain for HMIS is classified as level 2 (Repeatable).

4. CLOSING

According to the findings of the research, it was determined that the audit utilizing the COBIT 4.0 framework yielded a maturity level score of 2.6 in the Planning and Organization domain, a maturity level score of 3.1 in the Acquisition and Implementation domain, a maturity level score of 3.4 in the Delivery and Support domain, and a maturity level score of 2 in the Monitoring and Evaluation domain.

This research indicates that SIMRS governance at Wangaya Regional Hospital is at a moderate maturity level. It shows notable strengths in operational service areas but reveals weaknesses in strategic planning and IT performance assessment. The differences in maturity levels across the COBIT 4.0 domains highlight that the effectiveness of SIMRS implementation relies not solely on technological capabilities but also on managerial ability to oversee and assess IT continuously. Thus, this study puts forth the following suggestions:

1. Formulate an IT steering committee to ensure alignment of IT strategies with the hospital's vision and mission.
2. Create a comprehensive and quantifiable framework for monitoring and evaluating IT performance.
3. Standardize IT policies and SOPs to enhance consistency in SIMRS management.
4. Design a roadmap for SIMRS development that is informed by risk assessments and prioritized audit findings.

These suggestions aim to provide a foundation for strategic decision-making, enhancing the effectiveness of IT governance and ensuring the ongoing success of digital transformation within regional hospital healthcare services.

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