

Audit of Hospital Management Information System Financial Governance Using the COBIT 2019 APO06 Framework at Hospital X in Banyuwangi

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Abstract

Effective financial governance is essential for sustaining Hospital Management Information Systems (HMIS), particularly in aligning technology investments with organizational priorities. This study aimed to evaluate the capability level of HMIS budget and cost management at Hospital X in Banyuwangi using COBIT 2019 APO06 – Managed Budget and Costs and formulate improvement recommendations based on identified governance gaps. An evaluative qualitative approach was employed from April to August 2026, involving four purposively selected key informants representing hospital management, financial administration, accounting, and HMIS management. Data were collected through semi-structured interviews, observations, and document reviews, followed by source and method triangulation and evidence mapping against five APO06 management practices. The findings indicated that HMIS financial governance was at Capability Level 1, compared with the target of Level 3, resulting in a two-level capability gap. Although basic financial administration and annual budgeting procedures had been implemented, HMIS expenditure was not specifically classified, resource allocation remained predominantly reactive, budgeting was insufficiently integrated with system development planning, and systematic cost allocation and expenditure monitoring mechanisms were lacking. These findings demonstrate that existing financial procedures have not been adequately integrated into HMIS-specific governance. Recommended improvements include establishing HMIS-specific cost classifications, formalizing investment prioritization, integrating development plans into annual budgeting, implementing phased cost allocation, and strengthening budget realization monitoring and corrective actions. The study concludes that progressive improvements in APO06 practices are necessary to strengthen financial transparency, accountability, and evidence-based investment decisions while supporting sustainable HMIS development.

Keywords: COBIT 2019; APO06; hospital management information system; IT financial governance; budget and cost management

1. Introduction

Digital transformation in the healthcare sector has increased hospitals' reliance on information technology (IT) to support healthcare delivery, information management, and decision-making. Hospital Management Information Systems (HMIS) have become an essential component of this transformation by

integrating clinical and administrative processes and providing information to support hospital management. Previous research has highlighted the organizational dimension of HMIS implementation. Mudiono et al. (2018) identified system users and organizational factors as important determinants of HMIS performance, emphasizing that effective

implementation requires alignment among technological, human, and organizational components. Their study also positioned financing, human resources, training, information management, and infrastructure development as relevant components of HMIS management. As hospitals become increasingly dependent on digital technologies, effective IT governance is therefore necessary to ensure that technological resources and investments remain aligned with organizational needs. A recent systematic review further emphasized the role of IT governance in supporting efficiency, security, and healthcare service quality amid increasing digital adoption (Maharani et al., 2026).

Organizational support is particularly relevant because HMIS implementation extends beyond the technical operation of an information system. Amalia and Ferdianto (2022) demonstrated that organizational structure was significantly associated with system use and HMIS implementation, indicating the importance of institutional arrangements in supporting information system implementation. Their study also noted that HMIS development may require substantial financial resources, illustrating the relationship between organizational support and the resources needed to sustain system development. These findings suggest that sustainable HMIS implementation requires not only functional technology and user acceptance but also organizational capacity to provide and manage the resources required for continuous development.

An important component of such organizational capacity is budget and cost management. HMIS implementation requires initial investment as well as continuous financial support for system maintenance, module development, infrastructure enhancement, system integration, and evolving user requirements. Inadequate alignment between IT requirements and financial planning may constrain system development and reduce an organization's ability to realize the expected value of its investments. Budget

and cost management should therefore be regarded as an integral component of HMIS governance. This consideration is particularly important in digital health, where sustainable transformation requires long-term investment and systematic allocation of limited resources. Nguyen et al. (2024) emphasize the importance of identifying and evaluating the costs and benefits associated with digital hospital investments, highlighting the need for reliable financial information to support investment decisions.

COBIT 2019 provides a comprehensive framework for the governance and management of enterprise information and technology by linking stakeholder needs, enterprise goals, and governance and management objectives. Within the Align, Plan and Organize (APO) domain, APO06 – Managed Budget and Costs addresses the management of I&T-related financial resources through transparent and effective budget and cost management. APO06 comprises five management practices: APO06.01 Manage Finance and Accounting, APO06.02 Prioritize Resource Allocation, APO06.03 Create and Maintain Budgets, APO06.04 Model and Allocate Costs, and APO06.05 Manage Costs (ISACA, 2019a). Collectively, these practices provide a structured basis for assessing how organizations plan financial resources, establish resource priorities, allocate costs, and monitor expenditure related to information and technology.

Budget and cost management are particularly relevant to Hospital X in Banyuwangi, a Type D hospital that has implemented a Hospital Management Information System (HMIS) since 2014. Sustainable HMIS development requires continuous organizational support for system maintenance, infrastructure improvement, application development, and integration across hospital services. However, the effectiveness and sustainability of HMIS implementation

are influenced by multiple interconnected factors, including technological readiness, system interoperability, infrastructure availability, human resource competencies, user acceptance, and organizational coordination. Therefore, limitations in HMIS development or implementation cannot be attributed exclusively to financial constraints without further empirical evidence.

Within this broader organizational context, financial governance remains an important component of HMIS sustainability because it determines how financial resources are planned, prioritized, allocated, and monitored to support operational requirements and strategic objectives. Effective budget and cost management can facilitate more transparent investment decisions and strengthen accountability for technology-related expenditure. Nevertheless, this study does not examine the causal relationship between financial constraints and HMIS implementation outcomes, nor does it assess the operational performance or utilization of individual HMIS modules.

Accordingly, COBIT 2019 APO06 – Managed Budget and Costs was selected as the assessment framework because it specifically addresses financial management and accounting (APO06.01), resource allocation prioritization (APO06.02), budget preparation and maintenance (APO06.03), cost modeling and allocation (APO06.04), and cost management (APO06.05). By focusing on these five management practices, the study evaluates the existing financial governance mechanisms supporting HMIS development, identifies gaps between current and expected capability levels, and formulates recommendations for strengthening budget and cost management. This approach provides a focused assessment of HMIS financial governance without assuming that financial management weaknesses are the sole determinants of system development or implementation performance.

Several studies have applied COBIT 2019 to assess IT governance in healthcare

organizations. Azzahra et al. (2024) evaluated hospital IT governance by focusing on EDM03, APO12, and APO07, addressing risk optimization, risk management, and human resources. Oktaviani and Setyadi (2025) applied APO12, BAI02, BAI03, BAI06, and BAI07 in a maternal and child hospital to assess risk management and processes associated with requirements definition, solution development, IT changes, and change acceptance and transitioning. Puspitaningrum et al. (2025), meanwhile, combined COBIT 2019 and ITIL V4 to evaluate IT governance and IT service management in a hospital setting. These studies demonstrate the growing application of COBIT 2019 in healthcare organizations, although their primary assessment areas differ from the specific financial governance addressed by APO06.

Previous studies have applied COBIT 2019 to evaluate various aspects of information technology governance in healthcare organizations. Azzahra et al. (2024) focused on risk optimization, risk management, and human resource management, while Oktaviani and Setyadi (2025) examined risk management and processes related to system development and change management. Similarly, Puspitaningrum et al. (2025) integrated COBIT 2019 and ITIL V4 to assess information technology governance and service management in a hospital setting. Although these studies provide valuable insights into healthcare IT governance, they did not specifically examine HMIS financial governance through the five management practices of APO06 – *Managed Budget and Costs*. Within the literature reviewed in this study, the application of APO06 as a focused framework for examining financial planning, resource allocation prioritization, budgeting, cost allocation, and expenditure control has not been explicitly addressed. This represents a contextual and analytical gap within the

cited studies rather than evidence of a general absence of APO06-focused research in healthcare. Accordingly, the present study contributes by applying COBIT 2019 APO06 to evaluate HMIS financial governance at Hospital X in Banyuwangi, identifying capability gaps and developing improvement recommendations based on the hospital's existing financial management practices. The study does not assume that financial governance weaknesses are the sole causes of HMIS development limitations, as technical and organizational factors may also influence system implementation.

The relevance of such an assessment extends beyond financial administration. Digital health investments require organizational mechanisms capable of linking technological requirements with available resources and expected organizational value. Nguyen et al. (2024) demonstrate that systematic economic assessment can provide a basis for understanding the costs and benefits associated with digital hospital investments. In this context, stronger budget and cost governance can contribute to financial transparency, investment accountability, and the sustainability of digital development.

This study specifically applies APO06 of COBIT 2019 to examine the current condition and capability level of HMIS budget and cost management in a hospital experiencing constraints in system development. The assessment encompasses financial management and accounting, resource prioritization, budgeting, cost allocation, and cost control. By focusing specifically on APO06, the study provides empirical evidence regarding the application of COBIT 2019 to HMIS financial governance and identifies areas in which existing financial management mechanisms require further development.

The evaluation is also intended to identify the gap between current and expected capability conditions as a basis for targeted improvement. Rather than focusing solely on the availability of financial

resources, the analysis considers whether existing mechanisms provide an adequate governance structure to support HMIS development. The resulting recommendations are therefore directed toward strengthening the integration of budgeting, resource prioritization, cost allocation, expenditure monitoring, and managerial control to support sustainable HMIS development.

Accordingly, this study aims to evaluate the capability level of HMIS budget and cost management at Hospital X in Banyuwangi based on APO06 – Managed Budget and Costs of COBIT 2019 and to formulate improvement recommendations based on the gap between the current and target conditions.

2. Method

This study employed a qualitative evaluative design based on the COBIT 2019 framework, specifically the APO06 – Managed Budget and Costs management objective. The study was conducted from April to August 2026 at Hospital X, a Type D hospital located in Banyuwangi, East Java, Indonesia. The assessment focused on the financial governance of the Hospital Management Information System (HMIS), encompassing financial management and accounting, resource allocation prioritization, budget preparation and maintenance, cost modeling and allocation, and cost control. The hospital's organizational characteristics and distribution of responsibilities among executive management, financial administration, and the HMIS unit provided the institutional context for evaluating the alignment between system development requirements and financial resource management.

Key informants were selected using purposive sampling guided by the Responsible, Accountable, Consulted, and Informed (RACI) responsibility

framework incorporated into COBIT 2019 APO06. Four key informants participated in the study: the Hospital Director, Head of Administration and Finance, Head of the Finance/Accounting Subdivision, and Head of the HMIS/IT Unit. Informant selection was based on their direct involvement and authority in HMIS budget planning, approval, allocation, utilization, and expenditure control. The adequacy of the four informants was justified by their functional coverage of strategic management, financial administration, accounting, and information technology responsibilities relevant to APO06, rather than statistical representativeness. RACI roles were mapped functionally to the hospital's organizational structure and the actual responsibilities of each position. The functional mapping of informants is presented in Table 1.

Table 1. Functional Mapping of Key Informants Based on COBIT 2019 APO06 RACI

Key Informant	Represented Organization al Function	Relevant APO06 Practices
Hospital Director	Strategic decision-making and budget approval	APO06.02 , APO06.03
Head of Administration and Finance	Financial planning, budgeting, and resource allocation	APO06.01 , APO06.02 , APO06.03
Head of Finance/Accounting Subdivision	Financial recording, cost classification, budget realization, and expenditure control	APO06.01 , APO06.04 , APO06.05
Head of HMIS/IT Unit	System requirements identification, development prioritization, and IT resource management	APO06.02 , APO06.03 , APO06.04 , APO06.05

Data were collected through semi-structured interviews, observations, and document reviews. The research instruments consisted of a semi-structured interview guide, an observation checklist, and a document review checklist developed from the management practices and process activities specified in COBIT 2019 APO06 (ISACA, 2019a). The assessment covered five management practices: APO06.01 Manage Finance and Accounting, APO06.02 Prioritize Resource Allocation, APO06.03 Create and Maintain Budgets, APO06.04 Model and Allocate Costs, and APO06.05 Manage Costs. Interviews explored budget planning and approval procedures, resource allocation priorities, HMIS development requirements, cost allocation mechanisms, and expenditure monitoring practices. Observations focused on financial management processes and coordination among organizational units involved in HMIS governance. The document review included financial management policies and standard operating procedures (SOPs), planning and budgeting documents, cost allocation records, HMIS development documents, and budget realization and evaluation reports for the 2026 fiscal year that were available during the April–August 2026 data collection period.

Data analysis was conducted manually without specialized qualitative data analysis software. Interview data were analyzed descriptively by identifying relevant information, categorizing findings according to the five APO06 management practices, and comparing the findings with observations and documentary evidence. Data trustworthiness was strengthened through source and method triangulation. Source triangulation involved comparing information provided by informants with different organizational

responsibilities, whereas method triangulation involved comparing interview findings with observations and document reviews. The findings were subsequently organized into an evidence matrix linking each APO06 activity to its supporting evidence, implementation status, and assessment rationale. Inconsistencies among sources were examined against the available evidence before being incorporated into the evaluation.

Process capability was assessed using the COBIT Performance Management (CPM) approach within COBIT 2019 (ISACA, 2019b). The unit of assessment was the individual process activity associated with the five APO06 management practices, considering the capability level assigned to each activity in the framework. Each activity was evaluated based on its implementation, the availability of supporting evidence, and the consistency of its application. Achievement was classified into four categories: Not Achieved (N), Partially Achieved (P), Largely Achieved (L), and Fully Achieved (F), as presented in Table 2.

Table 2. Rating Criteria Based on COBIT Performance Management

Rating	Achievement Range	Assessment Criteria
N - Not Achieved	0–15%	Little or no evidence demonstrates achievement of the assessed requirements.
P - Partially Achieved	>15–50%	Some requirements are achieved, but implementation remains limited.
L - Largely Achieved	>50–85%	Most requirements are achieved, although certain deficiencies remain.
F - Fully Achieved	>85–100%	All or nearly all requirements are achieved with sufficient supporting evidence.

The assessment was conducted sequentially by examining the activities

required at each capability level. The final capability level was determined by the highest level supported by sufficient evidence of achievement of the applicable requirements, rather than by averaging the ratings of the five management practices. The results were used to identify gaps between the current and target capability levels and formulate recommendations for improving HMIS budget and cost governance.

The study was conducted in accordance with research ethics principles. Written informed consent was obtained from all informants before their participation in data collection. Participation was voluntary, and confidentiality was maintained through the use of informant identification codes. The hospital's identity was anonymized as Hospital X, and the findings were reported without disclosing personally identifiable information. Ethical approval was obtained from Politeknik Negeri Jember (Approval No. 8043/PL7/PG/2026).

3. Result and Discussion

3.1 Evaluation of HMIS Budget and Cost Management Based on APO06

The evaluation of Hospital Management Information System (HMIS) budget and cost governance at Hospital X in Banyuwangi was conducted using APO06—Managed Budget and Costs—of the COBIT 2019 framework. The assessment covered five management practices: APO06.01 (Manage Finance and Accounting), APO06.02 (Prioritize Resource Allocation), APO06.03 (Create and Maintain Budgets), APO06.04 (Model and Allocate Costs), and APO06.05 (Manage Costs). Research evidence was obtained through interviews with four key informants, observations, and document reviews, and subsequently examined through source and method triangulation.

The findings indicated that the hospital had established general financial administration mechanisms, including expenditure recording, budget requests, and annual financial planning. However, these mechanisms had not been systematically integrated into HMIS-specific financial governance. This distinction is important because COBIT 2019 emphasizes not only the existence of financial administration but also the effectiveness of budgeting, resource allocation, and cost control in supporting organizational objectives (ISACA, 2019a).

Table 3. Summary of HMIS Budget and Cost Governance Findings Based on APO06

Management Practice	Existing Condition	Identified Governance Gap
APO06.01 – Manage Finance and Accounting	HMIS expenditure is recorded through general hospital accounting procedures	HMIS-specific cost classification has not been established
APO06.02 – Prioritize Resource Allocation	Budget requests are submitted according to operational needs	Formal investment prioritization criteria are not documented
APO06.03 – Create and Maintain Budgets	Annual budgeting procedures are implemented	HMIS development requirements are not systematically integrated into financial planning
APO06.04 – Model and Allocate Costs	HMIS expenditure is included in general IT costs	No dedicated cost allocation model exists for HMIS components or services
APO06.05 – Manage Costs	General expenditure recording is performed	Systematic HMIS budget variance monitoring and corrective action procedures have not been

Management Practice	Existing Condition	Identified Governance Gap
		established

Source: Research findings mapped to COBIT 2019 APO06

3.1.1 Financial Management and Accounting (APO06.01)

The assessment of APO06.01 revealed that financial recording was incorporated into the hospital's existing administrative procedures. However, HMIS-related expenditure was not separately classified from other information technology costs. Interviews with the Head of the Finance/Accounting Subdivision (R3) and the Head of the HMIS/IT Unit (R4) indicated that HMIS expenditure was recorded within general IT expenditure accounts rather than as a distinct financial category.

This finding indicates that financial recording had been implemented but did not provide sufficiently detailed information to identify expenditure associated with HMIS development, maintenance, infrastructure, and integration. According to ISACA (2019a), APO06.01 requires organizations to establish financial management processes and classify information and technology expenditure according to relevant cost categories. Therefore, the existence of general financial records does not necessarily demonstrate adequate implementation of HMIS-specific financial governance.

The findings are also relevant to the systematic review by Kruse et al. (2016), which identified financial costs, including implementation and maintenance expenditure, among the barriers to electronic health record adoption. Although their review focused on EHR adoption rather than COBIT capability, it illustrates the importance of identifying both initial and recurring technology costs.

From a critical perspective, the primary weakness identified at Hospital X was not the absence of financial administration but the limited analytical value of the resulting financial information. Aggregated expenditure records may support general financial reporting; however, they provide limited information for evaluating resource utilization across individual HMIS components. Consequently, improving HMIS cost classification is necessary to strengthen financial traceability and support informed technology investment decisions.

3.1.2 Resource Allocation Prioritization (APO06.02)

The assessment of APO06.02 identified a predominantly reactive approach to resource allocation. Interviews with the Hospital Director (R1) and the Head of Administration and Finance (R2) indicated that HMIS budget proposals were generally submitted in response to immediate operational requirements rather than being guided by a dedicated HMIS development plan.

This finding indicates that resource allocation activities were performed, but a formal mechanism for ranking HMIS investments according to strategic priorities had not been established. COBIT 2019 APO06.02 emphasizes the prioritization of information and technology initiatives based on organizational objectives, business cases, and available resources (ISACA, 2019a).

AbuKhousea and Al-Qirim (2018) examined health information technology governance in healthcare organizations and highlighted the relevance of structured investment decision-making and clearly defined governance responsibilities. Their findings provide a useful comparison with Hospital X, where the absence of documented prioritization criteria may limit the transparency and consistency of resource allocation decisions.

Nevertheless, reactive budgeting should not automatically be interpreted as inappropriate. In healthcare organizations, urgent technology expenditure may be necessary to maintain service continuity and

address operational risks. The governance weakness arises when immediate needs become the primary basis for allocation decisions without documented criteria for comparing urgency, service risks, expected benefits, and available resources.

Therefore, the hospital requires a prioritization mechanism that accommodates urgent operational requirements while maintaining alignment with long-term HMIS development objectives.

3.1.3 Budget Planning and Maintenance (APO06.03)

Observations and document reviews indicated that the hospital had implemented annual budgeting procedures. However, HMIS development requirements had not been systematically integrated into financial planning. This finding demonstrates that the existence of an organizational budget does not necessarily indicate adequate planning for technology development.

According to ISACA (2019a), APO06.03 requires the preparation of an information and technology budget that considers organizational needs, funding sources, internal and external resources, and capital and operational expenditure.

Stoumpos et al. (2023) emphasize that digital transformation in healthcare involves technological, organizational, and human factors. Their findings suggest that successful digital transformation requires organizational arrangements that extend beyond technology acquisition. In the present study, the limited integration of HMIS development planning into annual budgeting may create a mismatch between technological objectives and the financial resources required for implementation.

Similarly, the World Health Organization (2021) emphasizes coordinated planning and sustainable financing as important components of digital health transformation. These perspectives reinforce the need to

connect HMIS development priorities with institutional financial planning. Consequently, the improvement required under APO06.03 is not the establishment of an entirely new budgeting mechanism but the integration of HMIS development requirements into existing hospital financial procedures. Such integration would allow management to anticipate expenditure associated with system maintenance, infrastructure replacement, interoperability, and future development.

3.1.4 Cost Modeling and Allocation (APO06.04)

The evaluation of APO06.04 identified the absence of a dedicated HMIS cost allocation model. This condition was closely related to the insufficient cost classification identified under APO06.01.

COBIT 2019 APO06.04 emphasizes the establishment of transparent, measurable, and consistently applied cost allocation models (ISACA, 2019a). Without a defined cost structure, management has limited capacity to determine how financial resources are distributed across HMIS applications, infrastructure, maintenance, and supporting services.

Kruse et al. (2016) identified financial barriers associated with the implementation and continued operation of electronic health records. Their findings support the importance of distinguishing initial technology expenditure from recurring operational costs. However, the study does not directly establish which cost allocation model should be adopted by hospitals.

Therefore, the appropriate response to the findings at Hospital X is not necessarily to introduce a sophisticated allocation model immediately. Such an approach could increase administrative complexity without substantially improving decision-making if reliable cost classification is not yet available.

A phased approach is more appropriate. The hospital should initially distinguish direct and shared HMIS expenditure, followed by the development of allocation methods based on identifiable system components or services. This

approach would strengthen financial accountability while remaining proportionate to the hospital's administrative capacity.

3.1.5 Cost Management and Control (APO06.05)

The assessment of APO06.05 indicated that expenditure recording was implemented, but systematic HMIS budget variance monitoring and documented corrective actions had not been established.

ISACA (2019a) specifies that APO06.05 requires organizations to compare actual expenditure with approved budgets, identify significant deviations, and implement appropriate corrective measures.

The findings suggest that financial information was primarily used for administrative recording rather than systematic managerial control. This distinction is important because expenditure recording documents financial transactions, whereas cost control requires evaluation of financial performance and corrective decision-making.

The World Health Organization (2021) emphasizes the importance of sustainable financing and coordinated governance in digital health development. In this context, financial monitoring should provide information that supports resource allocation, expenditure evaluation, and subsequent planning decisions.

However, the present study did not quantify the financial consequences of inadequate monitoring. Therefore, reduced cost efficiency should be interpreted as a potential governance risk rather than a demonstrated financial outcome.

Taken together, the five management practices indicate that the hospital's central governance challenge is the incomplete integration of existing financial mechanisms. Effective APO06

implementation requires a continuous process connecting investment prioritization, budget preparation, cost allocation, expenditure monitoring, and corrective action

3.2 Evidence Matrix and Assessment of APO06 Achievement

Evidence mapping was conducted to establish a traceable relationship between research findings and the activities specified under COBIT 2019 APO06. This approach is important because the implementation of a management practice does not automatically indicate that all activities required for a particular capability level have been achieved.

The analysis focused on activities assigned to Capability Level 2, as these represent basic process requirements that must be considered before progressing toward Level 3. The mapping was based on interview findings, observations, and available institutional documents.

Table 4. Evidence Mapping of APO06 Activities at Capability Level 2

Activity	COBIT 2019 Requirement	Research Evidence	Interpretation
APO06.01-1	Establish financial management processes and responsibilities	General hospital financial administration is implemented	Partially supported
APO06.01-2	Establish a classification scheme for I&T expenditure	HMIS expenditure is included in general IT costs	Partially supported
APO06.02-1	Prioritize I&T initiatives and budget requests	Budget requests are predominantly based on urgent needs	Formal prioritization is not demonstrated
APO06.02-2	Allocate resources according	Resources are allocated	Allocation exists, but alignment

Activity	COBIT 2019 Requirement	Research Evidence	Interpretation
	to approved priorities	through existing financial procedures	with ranked priorities is not demonstrated
APO06.02-3	Communicate and review allocation decisions	Coordination between management and relevant units is reported	Formal procedures require verification
APO06.02-4	Identify and address significant impacts of allocation decisions	Insufficient specific evidence is available	Not determined
APO06.03-1	Establish a formal I&T budget	Annual hospital budgeting is implemented	Comprehensive HMIS budgeting is not demonstrated
APO06.03-2	Consider relevant funding sources and expenditure components	General budgeting procedures are available	Comprehensive consideration of HMIS costs is not demonstrated
APO06.03-3	Document and review budget contingency justifications	No specific evidence is available	Not determined
APO06.03-4	Involve relevant process, service, and	HMIS budget requests are submitted	Formal responsibilities require verification

Activity	COBIT 2019 Requirement	Research Evidence	Interpretation
	project owners in budget planning	d	n
APO0 6.05-1	Obtain approval and communicate the I&T costing model	No dedicated HMIS costing model exists	Implementation is not demonstrated
APO0 6.05-2	Establish schedules for cost management	Annual budgeting procedures are implemented	HMIS-specific cost management schedules require verification
APO0 6.05-3	Establish methods for collecting budget variance information	Systematic HMIS budget variance analysis is not implemented	Implementation is not demonstrated

Source: Research findings mapped to COBIT 2019 APO06 activities

The evidence matrix demonstrates that several financial management activities had been implemented, but their implementation remained incomplete or insufficiently supported by verifiable evidence. Financial recording and annual budgeting provided an administrative foundation; however, these activities did not independently establish the presence of systematic prioritization, cost allocation, or expenditure control.

The findings also reveal dependencies among APO06 management practices. Cost classification under APO06.01 provides the information required for cost allocation under APO06.04, while budget planning under APO06.03 establishes the reference point for monitoring financial performance under APO06.05. Consequently, weaknesses

in one management practice may constrain the effectiveness of others.

This interpretation is consistent with the integrated structure of COBIT 2019, which defines management practices through related activities, responsibilities, and process outputs (ISACA, 2019a). It also supports the broader argument of Stoumpos et al. (2023) that healthcare digital transformation requires coordinated organizational arrangements rather than isolated technological interventions.

To support assessment consistency, COBIT Performance Management distinguishes four achievement categories: Not Achieved (N), Partially Achieved (P), Largely Achieved (L), and Fully Achieved (F).

Table 5. COBIT Performance Management Achievement Categories

Rating	Achievement Category	Achievement Percentage
N	Not Achieved	0–15%
P	Partially Achieved	Greater than 15% to 50%
L	Largely Achieved	Greater than 50% to 85%
F	Fully Achieved	Greater than 85% to 100%

Source: COBIT Performance Management (ISACA, 2019b).

Although these categories provide a structured assessment framework, the available research materials do not include the complete original activity-level scoring records. Therefore, the interpretations in Table 2 represent evidence-based qualitative judgments rather than independently verified N/P/L/F ratings.

This distinction is methodologically important. The absence of documentation does not necessarily demonstrate that an activity was never performed, while an informant's statement alone may be insufficient to confirm consistent implementation. Triangulation should therefore be used to examine the relationship between reported activities,

observable practices, and available documentary evidence.

3.3 Determination of the APO06 Capability Level

The study reported that HMIS budget and cost management at Hospital X was at Capability Level 1. According to COBIT 2019, Level 1 indicates that a process begins to achieve its purpose through incomplete activities. Level 2 requires more comprehensive implementation of basic activities, while Level 3 represents processes implemented through defined organizational arrangements (ISACA, 2019a).

Table 6. Interpretation of the APO06 Capability Level

Capabi lity Level	COBIT 2019 Characteri stics	Research Findings	Interpretat ion
Level 0	The process does not adequately achieve its purpose	Budget requests, expenditure recording, and financial planning are performed	Evidence of basic implementation exists
Level 1	The process begins to achieve its purpose through incomplete activities	Financial administration exists but remains insufficiently integrated	Consistent with the reported current capability
Level 2	The process achieves its purpose through a complete set of basic activities	Formal prioritization, cost classification, and expenditure control remain incomplete	Achievement is not established
Level 3	The process is implemented through defined	Standardized HMIS financial governance	Target condition is not achieved

organizational
procedures
are not
sufficiently
demonstrated

Source: Research findings interpreted using COBIT 2019

The reported Level 1 classification is consistent with the qualitative findings because financial administration was implemented, but essential governance activities remained incomplete. Budget requests, expenditure recording, and interdepartmental coordination indicate that the hospital had progressed beyond the complete absence of financial management activities. However, these mechanisms had not been sufficiently integrated to demonstrate comprehensive achievement of the APO06 process purpose.

Importantly, the distinction between Level 1 and Level 2 should not be based solely on the availability of formal documentation. COBIT 2019 emphasizes process achievement through the implementation of relevant activities. Therefore, documentation should be treated as supporting evidence rather than the sole criterion for determining capability.

For example, the existence of annual budgeting does not necessarily demonstrate that all financial requirements associated with HMIS development have been considered. Similarly, expenditure recording does not necessarily indicate that budget deviations are systematically identified and addressed.

Stoumpos et al. (2023) emphasize that digital transformation in healthcare involves organizational and managerial factors beyond the adoption of technology itself. This perspective supports the distinction between the operational availability of an HMIS and the maturity of the organizational processes supporting its development.

Nevertheless, broader digital transformation literature cannot independently establish a COBIT capability level. The capability determination must remain grounded in the activities and assessment requirements of COBIT 2019 (ISACA, 2019a, 2019b).

Accordingly, the reported Level 1 classification is analytically consistent with the identified governance weaknesses, but definitive confirmation requires verification of the original activity-level assessment records.

3.4 APO06 Capability Gap Analysis

The capability gap was determined by comparing the reported current level with the target established for the assessment. Level 3 was selected as the improvement benchmark because it represents processes implemented through defined and organized procedures.

Table 7. APO06 Capability Gap Analysis

Governance and Management Objective	Current Level	Target Level	Capability Gap
APO06 Managed Budget and Costs	- 1	3	2

Source: Research assessment.

The two-level gap indicates the need for incremental improvement. The initial stage should focus on completing the basic activities associated with Level 2, particularly financial classification, investment prioritization, integrated budgeting, and expenditure monitoring.

Subsequent improvements should emphasize standardized procedures, clearly defined responsibilities, and consistent implementation to support Level 3.

This sequential approach is important because standardizing incomplete processes may not resolve their underlying weaknesses. For example, introducing a budget monitoring procedure would provide limited benefits if HMIS expenditure could not be separately identified. Likewise, establishing a detailed cost allocation model would be difficult without reliable cost classification.

The World Health Organization (2021) emphasizes coordinated governance, planning, and financing as important components of sustainable digital health development. The present findings support this perspective by demonstrating that HMIS financial sustainability depends not only on the availability of resources but also on how those resources are planned, allocated, monitored, and evaluated.

However, the present study did not directly measure financial sustainability or investment returns. Therefore, the capability gap should be interpreted as evidence of financial governance improvement needs rather than proof of financial inefficiency.

The two-level gap represents an organizational development challenge requiring stronger integration between existing financial mechanisms and HMIS development priorities.

3.5 Recommendations for Improving APO06

Recommendations were formulated by linking the identified weaknesses to the relevant APO06 management practices and expected process outputs. Improvement priorities were determined according to their contribution to financial governance and their dependencies on other activities.

Table 8. Recommended Improvements for HMIS Budget and Cost Governance

Management Practice	Identified Weakness	Recommended Improvement	Expected Output	Priority
APO06 .01	HMIS expenditure is aggregated within general IT costs	Establishing HMIS-specific cost classifications	Traceable HMIS expenditure records	High
APO06 .02	Investment decisions are	Develop formal investment	Documented investment	High

Management Practice	Identified Weakness	Recommended Improvement	Expected Output	Priority
	predominantly driven by urgent requirements	ent prioritization criteria based on risks, urgency, benefits, and available resources	ment prioritization and allocation decisions	
APO06.03	HMIS development planning is not systematically integrated into annual budgeting	Integrate HMIS development requirements into existing budget planning	HMIS budget aligned with the development plan	Very High
APO06.04	No dedicated HMIS cost allocation model exists	Develop a transparent cost allocation model based on HMIS components or services	HMIS cost allocation model	Medium
APO06.05	Systematic variance monitoring and corrective actions are not	Implement periodic budget realization monitoring, variance	Budget evaluation and corrective action reports	High

Management Practice	Identified Weakness	Recommended Improvement	Expected Output	Priority
	established	analysis, and corrective action procedures		

Source: Recommendations developed from research findings and COBIT 2019 APO06

The integration of HMIS development requirements into annual budgeting was assigned the highest priority because it establishes the financial foundation for planned system improvements. This recommendation is consistent with the World Health Organization's (2021) emphasis on aligning digital health strategies with sustainable financing arrangements.

Investment prioritization under APO06.02 should accompany budget integration. AbuKhoua and Al-Qirim (2018) highlight the relevance of structured investment decision-making and governance responsibilities in healthcare organizations. Their findings support the establishment of documented criteria for comparing proposed investments, although the specific criteria should be adapted to the operational context of Hospital X.

Cost classification under APO06.01 represents another foundational improvement. Separating HMIS expenditure into identifiable categories would improve financial traceability and provide the information required for subsequent cost allocation under APO06.04.

The development of a detailed cost allocation model was assigned medium priority because its implementation depends on the availability of sufficiently classified expenditure data. Introducing complex allocation methods before reliable

financial information is available may increase administrative burden without producing proportionate managerial benefits.

Periodic expenditure monitoring under APO06.05 was assigned high priority because it would enable management to identify budget deviations, examine their causes, and implement corrective measures. Such monitoring should generate actionable information rather than merely additional financial reports.

The proposed improvement sequence is presented in Table 9.

Table 9. Proposed Stages for Improving APO06 Capability

Improve ment Stage	Main Focus	Key Activities	Expected Outcome
Stage 1	Completing basic activities toward Level 2	Cost classification, investment prioritization, integrated budgeting, and expenditure monitoring	More complete implementation of basic APO06 activities
Stage 2	Strengthening processes toward Level 3	Standardizing procedures, defining responsibilities, and developing cost allocation models	Defined and consistently implemented financial governance processes
Stage 3	Evaluating implementation	Reviewing process evidence and reassessing activity achievement	Verified capability improvement

Source: Proposed improvement pathway based on COBIT 2019

The proposed stages emphasize that capability improvement should be supported by demonstrable process achievement rather than merely the establishment of additional policies or documentation.

Overall, strengthening APO06 is expected to improve financial transparency, accountability for technology investments, and the sustainability of HMIS development. These expected benefits are consistent with the digital health governance principles emphasized by the World Health Organization (2021). However, they remain anticipated outcomes because the recommendations were not implemented or evaluated during the research period

3.6 Research Limitations and Transferability of Findings

Several limitations should be considered when interpreting the findings.

First, the study was conducted at a single Type D hospital and involved four purposively selected informants representing executive management, financial administration, accounting, and HMIS management. Although these informants represented functions directly relevant to APO06, the study did not capture all organizational perspectives affected by HMIS investment decisions.

Second, the assessment relied on interviews, observations, and available institutional documents. Differences in documentary completeness may have affected the ability to verify individual APO06 activities. The absence of documentary evidence should not automatically be interpreted as evidence that an activity was never performed.

Third, the original detailed activity-level assessment records were unavailable for independent verification. Therefore, the evidence mapping provides a qualitative interpretation of the findings rather than a substitute for a

complete COBIT Performance Management assessment.

Fourth, the study focused exclusively on APO06 and did not evaluate other COBIT governance and management objectives. Consequently, the findings should not be interpreted as representing the hospital's overall IT governance capability or digital maturity.

Finally, the proposed recommendations were not implemented or evaluated during the research period. Their feasibility and effectiveness therefore remain to be examined through subsequent research.

Despite these limitations, the findings may have analytical transferability to healthcare organizations with comparable budgeting arrangements, financial management structures, and HMIS governance challenges. Such transferability requires consideration of organizational characteristics, financial capacity, decision-making arrangements, and technology infrastructure.

Future research should strengthen activity-level evidence documentation, involve additional stakeholders, and evaluate capability changes following the implementation of governance improvements.

4. Conclusion

The evaluation of Hospital Management Information System (HMIS) financial governance at Hospital X in Banyuwangi using COBIT 2019 APO06 - *Managed Budget and Costs* indicated a Capability Level of 1, against a target of Level 3, resulting in a two-level capability gap. Although basic financial administration, expenditure recording, and annual budgeting procedures had been implemented, HMIS budgeting remained predominantly reactive, was not systematically integrated with system development planning, and lacked adequate mechanisms for resource prioritization, cost classification, cost allocation, and budgetary control. Therefore, improvement efforts

should focus on integrating HMIS budgeting with system development plans, establishing documented investment priorities, implementing systematic cost classification and allocation, and conducting periodic budget-to-actual monitoring supported by corrective actions. Progressive improvements in APO06 governance are expected to enhance financial transparency, accountability, and evidence-based IT investment decisions while supporting sustainable HMIS development. The authors express their sincere gratitude to the management and staff of Hospital X in Banyuwangi, particularly the key informants who participated in the study and provided valuable information, as well as to Politeknik Negeri Jember for its institutional support throughout the research.

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