



# Information technology governance in University of Muhammadiyah Palembang with framework COBIT 5 domain Evaluate, Direct and Monitor (EDM)

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## Abstract

This study aims to learn about Information Technology Management at Muhammadiyah University of Palembang and get proper advice in managing Information Technology from the University level to the Study Program. Regarding benchmarks in Information, and Technology Governance, use the Cobit 5 framework, the Evaluate, Direct, and Monitor domains. Monitoring and evaluation were conducted using a questionnaire distributed to lecturers and employees at the Muhammadiyah University of Palembang. The researchers made observations on the management of higher education information technology governance. Based on the questionnaire result, the highest gap occurs in subdomain 4, which is 3.65, while the observation result towards the capability level is at level 3 with a value of 56.67%, and the subdomain ensuring resource optimization has the highest capability value of 66.67%. Based on the data obtained using the EDM domain, the University of Muhammadiyah Palembang has to set Standard Operating Procedures (SOP) and Work Instructions (IK) so every five processes can run well to create good IT governance.

**Keywords:** COBIT; Evaluate Direct and Monitor; Information Technology Governance.

## Introduction

Information technology is vital in developing and controlling an organization to achieve its Vision, Mission, and goals [1] [2]. The development of information technology is a form of the development of science and technology related to the management, distortion, dissemination, and presentation of information [3].

Information technology (IT) is the structure of relationships and processes for directing and controlling an organization to achieve its goals by adding value when balancing risks compared to information technology and its processes [4] [5]. IT risk management plays a vital role in controlling security and building confidence in IT system services [6], so IT governance must be utilized optimally in an organization [7].

A good university will guarantee the creation of a transparent, accountable, efficient, and effective university. Creating a transparent, accountable, efficient, and effective university requires an appropriate information technology resource [8].

[9] conducted research on the use of information technology governance to facilitate monitoring and evaluating the performance of information technology SIPERUMKIM at the Department of Housing and Settlement Areas of Salatiga City. In evaluating IT governance using Cobit 2019 with 40 domains, three important domains were obtained, including APO12 on managing risk with a score of 85, DSS02 on managing service requests and incidents with a score of 100, and DSS03 on managing problems with a score of 95.

[10] conducted research on the IS audit of the inventory and accounting integrated system program because there was an error in the purchasing application with the aim of information technology governance implemented by PT. Catering Dimsum Indonesia has been going well using Cobit. The results of this study; 1) the PO8 domain is the

domain with the highest maturity level; 1.7 is Repeatable where the company has developed, but the company does not have documentation but standard procedures; 2) the PO4 domain of 0.8 Initial/Ad hoc where the company knows the existing problems but the process is not balanced.

[11] conducted a study to analyze data with risk analysis using the ISO 31000:2018 risk management approach, where the relevant risk identification refers to Generic Risk Scenarios COBIT 5 For Risk, and the determination of relevant controls refers to the Department of Defense Instruction 8500.2 and NIST 800-53. This research involves the Head of Service and Disdukcapil employees of XYZ City who are related to the strategic and operational aspects of SIAK. The results of this study identified 23 possible risks spread over five personal data protection processes that are classified as medium-high risk levels. The proposed risk control consists of 19 preventive controls, six detective controls, and two corrective controls.

[12] Four components are needed to achieve successful IT implementation following organizational goals: technology, people, organization, and vendors. Evaluation of governance and service management at the Directorate of Higher Education Institutions has been carried out with the implementation of COBIT 2019 to determine the level of satisfaction of service applications to users using e-GovQual. The capability assessment utilizes COBIT 2019 by measuring 11 processes and user satisfaction with six dimensions and 31 criteria. The evaluation of the IT capability level (currently) shows three process levels 0, six level 1 processes, 1 level 2 process, and 1 level 3 process. The expected level of IT capability is at levels 4 and 5. Measuring service satisfaction occupies three attributes in quadrant A, 13 attributes in quadrant B, 12 in quadrant C, and three in quadrant D.

One standard for measuring IT governance performance in organizations is to use the Control Objectives for Information and Related Technology (COBIT) framework [13]. The basic concept of the COBIT framework is to carry out an assessment of aspects of IT in the organization using the perspective of the benefits of IT for organizational goals [13] [14] [3].

For the application of information technology in Palembang Muhammadiyah University to take place effectively, Muhammadiyah University must be able to evaluate and assess the extent of the improvement that has been achieved. The COBIT (Control Objective for Information and related Technology) framework can be used to evaluate the application of information technology at Muhammadiyah University in Palembang.

This study focuses on Cobit 5 with the Evaluate, Direct, and Monitor (EDM) domain so that information technology governance between the University and Stakeholders runs well.

Cobit 5 is an Information Technology that can help make decisions at the managerial level. To make the application of Information Technology in a university be maximally used, a proper understanding of the basic concepts of the applicable system, the technology utilized, applications used, and management and system development carried out at the university.

Cobit 5 is a standard management model in the field of information technology that can be used as a tool and measurement tool in making rules for information technology management. COBIT 5 has 5 Domains, including [16]:

- a) Evaluate, Direct, and Monitor (EDM), 5 Practice, 15 Activity
- b) Align, Plan, and Organize (APO), 13 Practice, 72 Activity
- c) Build, Acquire and Implement (BAI), 10 Practice, 68 Activity
- d) Deliver, Service and Support (DSS), 6 Practice, 38 Activity
- e) Monitor, Evaluate and Assess (MEA), 3 Practice, 17 Activity

COBIT 5 identified 37 IT processes with Domain Governance of 5 processes and management of 32 processes [17]:

- a) Evaluate, Direct, and Monitor (EDM) Governance processes related to stakeholders' focus on benefits, risk optimization, data source optimization, practices, and activities aimed at evaluating strategic steps, providing direction in the use of IT, and monitoring IT usage.

- b) Align, Plan, and Organize (APO) This domain includes strategies and practices, focusing on identifying the best ways IT can contribute to achieving business goals. The realization of the strategic vision needs to be planned, communicated, and managed.
- c) Build, Acquire and Implement (BAI) Provides solutions and is developed into services. IT solutions must be identified, developed, implemented, and integrated into business processes as part of IT strategy. This domain also covers changes and maintenance of existing systems to ensure that solutions meet business objectives.
- d) Deliver, Service, and Support (DSS) Accept solutions that end users can use. This domain relates to the delivery/delivery and service support needed, including services, security and continuity management, service support for users, data management, and operational facilities.
- e) Monitor, Evaluate, and Asses (MEA) Monitor all processes to ensure the steps given have been implemented. All IT processes need to be assessed regularly from time to time to maintain quality and control standards.

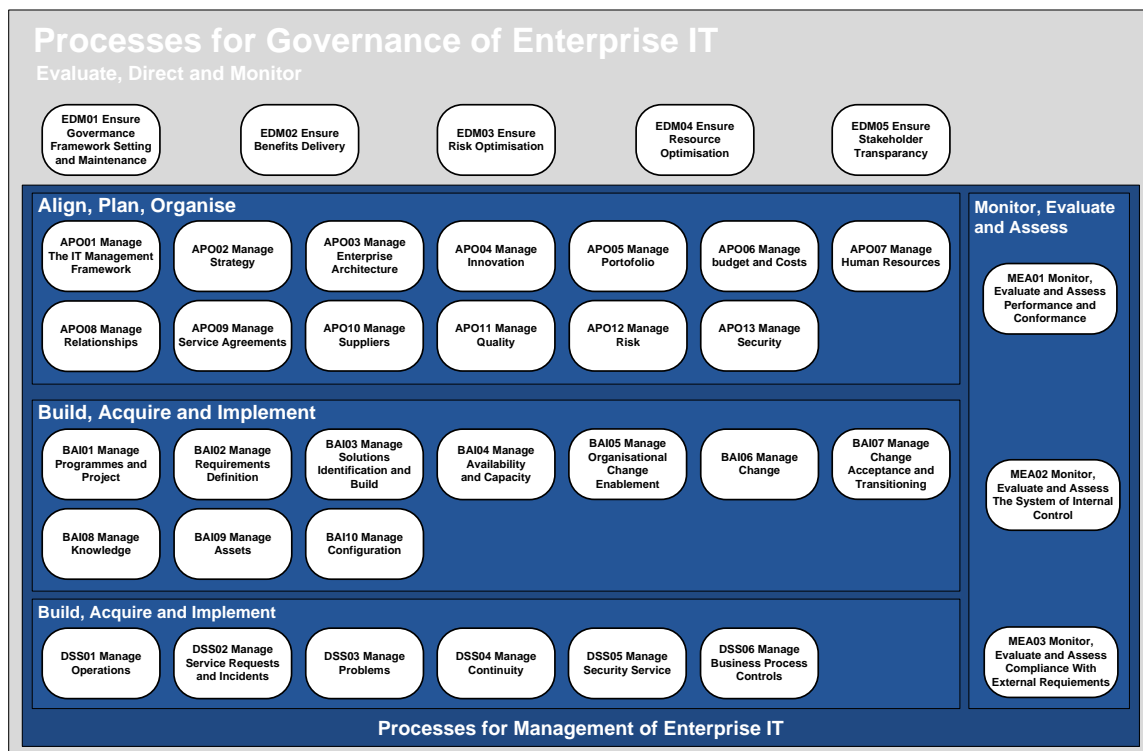


Figure 1. IT Management Process at COBIT 5 [15]

COBIT 5 is based on five key principles [18] discuss in Figure 2.

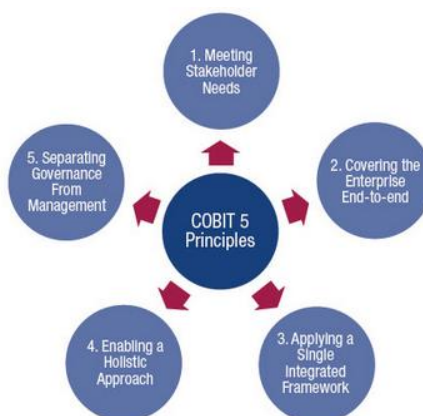


Figure 2. COBIT 5 Principles [19]

### ***Principle 1. Meeting Stakeholder Needs***

The company's value creation to its stakeholders, such as information security, is based on maintaining a balance between the realization of profits, the optimization of risk, and the use of available resources. Risk optimization is considered the most relevant for information security. Each company has different goals, so the company must be able to adapt or customize COBIT 5 to the company's context.

### ***Principle 2. Covering the Enterprise End-to-End***

COBIT 5 integrates enterprise IT in government organizations by accommodating all functions and processes in the enterprise. COBIT 5 not only focuses on 'IT functions' but also includes maintaining information and related technology as assets like assets in an enterprise.

Accommodate all stakeholders, functions, and processes relevant to information security.

### ***Principle 3. Applying a Single, Integrated Network***

COBIT 5 can be adapted to other standards and frameworks and allows companies to use other standards and frameworks as the scope of management frameworks for enterprise IT. COBIT 5 for Information Security brings knowledge from previous ISACA versions such as COBIT, BMIS, Risk IT, and Val IT with guidance from the ISO / IEC 27000 standard, which is the ISF standard for information security and U.S. National Institute of Standards and Technology (NIST) SP800-53A.

### ***Principle 4. Enabling a Holistic Approach***

Effective and efficient IT company governance and management require a holistic approach. COBIT 5 defines a set of triggers called enablers to support the implementation of comprehensive governance and management of enterprise IT and information systems. Enablers are individual and collective factors that influence something in order to work or work. 7 enablers used on COBIT 5 include:

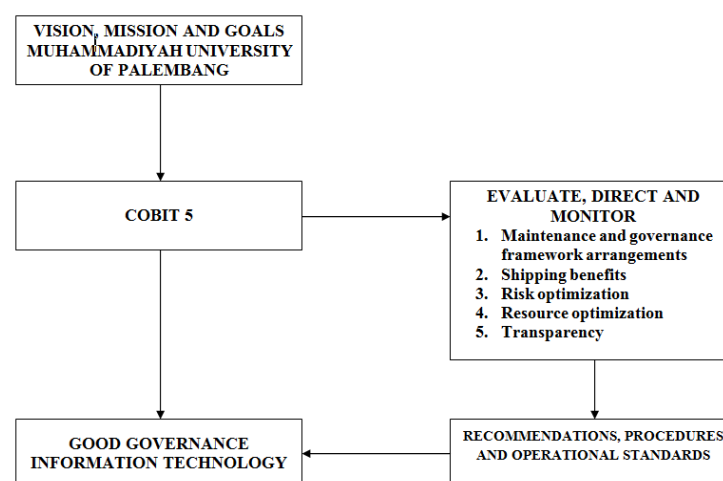
- a) Principles, Policies and Frameworks
- b) Processes
- c) Organizational Structures
- d) Culture, Ethics and Behavior
- e) Information
- f) Services, Infrastructure and Applications
- g) People, Skills and Competencies

### ***Principle 5. Separating Governance from Management***

COBIT 5 clearly distinguishes government and management. Both of these disciplines have different types of activities, require different organizational structures, and have different goals.

### **Method**

The information technology governance planning framework in Palembang Muhammadiyah University refers to the Evaluate, Direct, and Monitoring framework cobit process. Based on **Figure 4** the framework is as shown below:



**Figure 3.** Research Framework

**Vision** "To become a national standard university and produce graduates who are highly competitive and excel in Islamic-based science and technology by 2022 towards an international standard university".

**Mission** "As a university, Muhammadiyah University of Palembang focuses on quality education so that its graduates can strengthen human resources that are efficient and effective, and pious. In addition, the University of Muhammadiyah Palembang conducts pure and applied research to find valuable new technologies for nation and religion. The study results are applied through community service to improve their welfare.

**Objectives** "The vision and mission that have been formulated need to be realized by setting operational goals that enable the achievement of future expectations".

Based on the Vision, Mission, and Goals, Muhammadiyah University of Palembang can have good information technology governance by referring to the Cobit 5 framework. In COBIT, an EDM (Evaluate, Direct, and Monitor) domain functions as a guide to the Information Technology governance process. Therefore, the data collection tool was developed based on the activity indicators contained in the EDM domain. The primary data collection was carried out by questionnaires and supplemented by interviews, observations, and literature studies.

**Questionnaire**, The questionnaire is an activity used to record related to the information needed. Questionnaire questions refer to the Cobit 5 framework with the Evaluate, Direct, and Monitor (EDM) domain consisting of 58 questions and the answers to questions using a nominal scale with necessary and unnecessary answers.

**Interviews**. This activity was carried out to capture a complete picture of the problems studied that were not captured through questionnaires while the questions in the interview were: 1) What things triggered the formation of information technology governance at the Muhammadiyah University of Palembang? 2) What regulations and laws affect the information technology governance of Muhammadiyah University of Palembang?; 3) How is the delivery/feedback flow for information technology governance?; 4) What framework is used as a guideline for the implementation of information technology governance at the Muhammadiyah University of Palembang?; 5) What controls are used or referenced from ISO 27001:2005 or COBIT 5?.

**Observations**, Observations were made on the management of information technology governance at the Muhammadiyah University of Palembang based on aspects in the EDM domain. The observations for each EDM subdomain are 1) EDM 01 consists of 42 questions; 2) EDM 02 consists of 41 questions; 3) EDM 03 consists of 41 questions; 4) EDM 04 consists of 42 questions, and 5) EDM 05 consists of 42 questions.

**Literature study**, literature study was carried out to learn more about the Cobit 5 framework, especially in the EDM domain.

The results of questionnaires, interviews, and observations obtained recommendations, operational procedures, and standards for creating good Information Technology Management.

To control the Information Technology process using an assessment method so that the organization can assess the Information Technology process on a scale of 0 to 5 based on the Cobit Maturity model show in **Table 1** [20].

**Table 1.** Model Maturity Level [21]

Indeks	Tingkat Kedewasaan Model
0	Incomplete Process
1	Conducted Process
2	Managed Process
3	Established Process
4	Predictable Process
5	Optimization Process

Maturity Index Attributes for each domain module are obtained by adding up the number of respondents who answered for each attitude scale in each domain module multiplied by the weight of the scale, then divided by the number of respondents as follows **Equation 1**:

$$Index = \frac{\sum(\text{answers})}{\sum(\text{questionnaire questions})} \quad (1)$$

Each attribute is rated using the standard rating scale specified in the ISO/IEC 15504 standard. This rating consists of:

- 1) N-Not reached. There is little or no evidence of achievement of the specified attributes in the assessed process, with values of 0 to 15% achieved.

- 2) P-Partially achieved. There some evidence of the approach to, and some attainment of the attributes are defined in the process assessed. Some aspects of attribute achievement may be unpredictable, with 15% to 50% values achieved.
- 3) L-Largely achieved. There is evidence of a systematic approach to and significant achievement of the attributes defined in the assessed process. Some weaknesses associated with this attribute may exist in the assessment process, with a score of 50% to 85% achieved.
- 4) F-Fully achieved. There is evidence of a complete and systematic approach to, and full achievement of, the attributes defined in the process being assessed. There are no significant weaknesses associated with this attribute in the assessment process, with a score of 85% to 100% achieved.

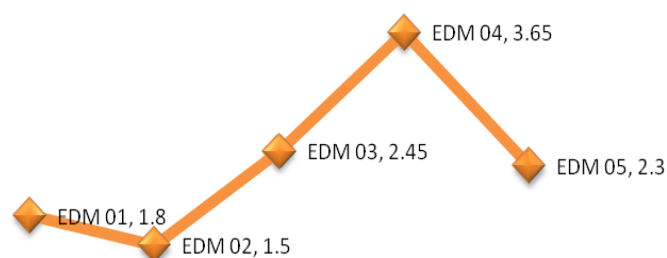
## Results and Discussion

The capability level (Capability Level) was determined as a measuring tool for respondents' answers from the questionnaire based on the COBIT 5 framework. This questionnaire contains questions from the Evaluate, Direct, and Monitor (EDM) domain; the calculation results are shown in **Table 2**.

**Table 2.** Current vs. EDM Domain Index is expected

EDM	Current Index	Expected Index
EDM 01	3.20	5
EDM 02	3.50	5
EDM 03	2.55	5
EDM 04	1.35	5
EDM 05	2.70	5

### Gap Index in the EDM Domain



**Figure 4.** Gap Index in the EDM Domain

**Figure 4** illustrates the gap that occurs in each subdomain. The gap obtained is the difference between the Expected Index and the Current Index, the highest gap in the Ensuring resource optimization subdomain of 3.65, and the smallest gap in the Ensure the benefits of shipping subdomain.

Based on the results of observations on information technology governance at the Muhammadiyah University of Palembang, the following results were obtained:

**Table 3.** Process Capability Level

Proses Name	Process Capability Level					
	0	1	2	3	4	5
EDM 01	N	F	F	F	P	N
EDM 02	N	F	F	F	P	P
EDM 03	N	F	F	F	N	N
EDM 04	N	F	F	P	P	N
EDM 05	N	F	F	P	P	P

Based on **Table 3**, the average capability level is at level 3 with a value of 56.67%, and the ensuring resource optimization subdomain is the highest capability value of 66.67%.

### **A. EDM01**

Based on the analysis of the results of the distribution of questionnaires and indices obtained at the moment Muhammadiyah University of Palembang at level 3 (Permanent Process) with an index value of 3.20 with a target difference of 1.8. Palembang Muhammadiyah University needs to be more optimal in maintaining and managing the governance framework, which is inconsistent with the system's maintenance and repair schedule. To improve EDM01, the proposed recommendations are:

- a) Evaluate and monitor the System Maintenance and Repair process.
- b) Evaluate and monitor the IT strategy process in IT optimization decision-making at the University of Muhammadiyah Palembang.

### **B. EDM02**

Based on the analysis of the distribution result of questionnaires and the index obtained at the moment Muhammadiyah University of Palembang at level 3 (Fixed Process) with an index value of 3.50 with a target difference of 1.5. Palembang Muhammadiyah University has not been optimal in procuring IT equipment, where many of the purchased IT devices are not used and need to follow their functions. To improve EDM02, the proposed recommendations are:

- a) Conduct a review of the value and benefits of procuring Information Technology devices so that they are following their benefits and functions..
- b) Planning a work program, investment, financing, and risk, to see the benefits of using IT as a performance support..

### **C. EDM03**

Based on the analysis of the distribution results of questionnaires and the index obtained at the moment Muhammadiyah University of Palembang at level 3 (Fixed Process) with an index value of 2.55 with a target difference of 2.45. Palembang Muhammadiyah University could be more optimal in risk management. To improve EDM03, the proposed recommendations are:

- a) UM Palembang must evaluate the risk management of Information Technology that can result in losses to assets.
- b) The evaluation process on risk management must be known by the leadership as the supervisor of governance.

### **D. EDM04**

Based on the analysis of the distribution results of questionnaires and the index obtained at the moment Muhammadiyah University of Palembang in level 1 (Process Run) with an index value of 1.35 with a target difference of 3.65. Palembang Muhammadiyah University still needs to improve in optimizing human resources.

- a) Managing my human resources by mastering ICT so as to achieve the minimum target of a fixed process.
- b) Conduct ICT training in human resources and the addition of professional HR in IT.

### **E. EDM05**

Based on the analysis of the distribution results of questionnaires and the index obtained at the moment Muhammadiyah University of Palembang at level 3 (Fixed process) with an index value of 2.70 with a target difference of 2.30. Muhammadiyah Palembang University still needs to improve transparency in managing Information Technology. To increase transparency, you need to::

- a) Always coordinate all parties involved in Information Technology Governance.
- b) Monitoring the work implementation stages of all parties involved.

## **Conclusion**

Provide a statement that what is expected, as stated in the "Introduction" chapter, can ultimately result in the "Results and Discussion" chapter, so there is compatibility. Moreover, it can also be added the prospect of developing research results and application prospects of further studies into the next (based on results and discussion).

For every activity on Information Technology governance with the Cobit 5 EDM domain, a Standard Operating Procedure (SOP) and Work Instructions (IK) must be made so that every five processes can run smoothly and that good IT governance is created.

The SOP and IK can provide certainty and uniformity in the process of carrying out the task, as a guide to resolve a conflict, and reinforce the responsibility in carrying out the task. The benefits of SOP and IK are:

- a) As a standard used to perform tasks so that it is more directed and effective.
- b) Reducing the factor of error and disorder.
- c) Increasing efficiency and effectiveness both in groups and individually.
- d) Creating work standards and standards that can be used by the team to evaluate
- e) Providing information about the development of the problem.

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